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U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION  
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CENAD-PD-P

AUG 14 2014

MEMORANDUM FOR Commander, New England District, (CENAE-EP-PP/Wendy Gendron) 696 Virginia Road Concord, MA 01742-2751

SUBJECT: Review Plan Approval for Pawcatuck River, Rhode Island Flood Risk Management Feasibility Report

1. Reference, Pawcatuck River, Rhode Island Flood Risk Management Feasibility Report Review Plan prepared by New England District dated June 2014.
2. The Flood Risk Management Planning Center of Expertise of the South Pacific Division is the lead office to execute the referenced Review Plan. The Review Plan includes Independent External Peer Review.
3. The above referenced Review Plan has been approved for execution and is subject to change as study circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.
4. Point of contact is Mr. Larry Cocchieri, 347-370-4571.

Encl  
Review Plan, Pawcatuck River,  
Rhode Island Flood Risk

  
KENT D. SAVRE  
Brigadier General, USA  
Commanding

# REVIEW PLAN

**Pawcatuck River, Rhode Island  
Flood Risk Management Feasibility Report**

**New England District**

**MSC Approval Date: August 14, 2014**

**Last Revision Date: June 2014**



**US Army Corps  
of Engineers ®**

# REVIEW PLAN

## Pawcatuck River, Rhode Island Flood Risk Management Feasibility Report

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## 1. PURPOSE AND REQUIREMENTS

**a. Purpose.** This Review Plan defines the scope and level of peer review for the Pawcatuck River, Rhode Island Flood Risk Management Feasibility Study and Environmental Assessment Report.

**b. References.**

- (1) Engineering Circular (EC) 1165-2-214, Civil Works Review, 15 Dec 12
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 11
- (3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 06
- (4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 07
- (5) Project Management Plan (PMP) for the Pawcatuck River, Rhode Island Flood Risk Management Feasibility Study and NEPA Compliance Report, dated April 2014
- (6) NAD North Atlantic Division Regional Quality Assurance Program (R-QAP) Main Document
- (7) New England District Quality Management Plan

**c. Requirements.** This review plan was developed in accordance with EC 1165-2-214, 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 1165-2-214) 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 associated with the feasibility phase products described in this Review Plan is Flood Risk Management Planning Center of Expertise (FRM-PCX) located in San Francisco Division.

The RMO will coordinate with the Civil Works Cost Engineering and Agency Technical Review Mandatory Center of Expertise (MCX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. The District will coordinate with the Ecosystem Restoration Planning Center of Expertise (ECO-PCX) should a worthy ecosystem restoration be identified during the study.

### 3. STUDY INFORMATION

**a. Decision Document.** This study is authorized in a resolution approved by the Committee on Public Works of the United States Senate, dated September 12, 1969 (also known as the Southeastern New England (SENE) resolution). This resolution by the Committee on Public Works of the United States Senate gives the Army Corps of Engineers the authority to investigate solutions for "flood control, navigation, and related purposes in Southeastern New England ..." Authorization and funding is also provided under investigations heading, Chapter 4, Title X, Division A of the Disaster Relief Appropriations Act of 2013, Public Law 113-2 (127 Stat. 23) enacted January 29, 2013 (hereinafter "DRAA 13"). The Secretary of the Army is authorized, at full Federal expense using funds provided in DRAA 13, to complete ongoing flood and storm damage reduction studies in areas that were impacted by Hurricane Sandy in the North Atlantic Division (NAD) of the United States Army Corps of Engineers, which includes the Pawcatuck River Flood Risk Management Feasibility Study. The District will prepare the Pawcatuck River Flood Risk Management Feasibility Study and NEPA Compliance decision document for review by NAD and approval at Corps Headquarters in Washington by the Chief of Engineers for transmittal to Congress. It is expected that the Environmental Assessment (EA) will result in the signing of a Finding of No Significant Impact (FONSI) at the District level.

**b. Study/Project Description.** In 2011, the USACE New England District conducted a Section 905(b) Reconnaissance Study and concluded that there is a Federal interest in continuing with a feasibility study. The study area is located primarily in Washington County, Rhode Island but also includes areas in Stonington, Connecticut within the Pawcatuck River watershed (Figure 1). The total drainage area is 303 square miles of which 246 square miles are located in Rhode Island and the remaining 57 are in Connecticut. Primary tributaries in the study area are the Usquebaug River, Beaver River, Meadow Brook, and Wood River.

The Pawcatuck River causes periodic flood damages to public and private property and infrastructure. The spring flood of 2010 was the historic peak discharge of record for many Northeastern states, including every measuring gage in the Pawcatuck River watershed. During this event, flood waters were approximately four feet deep in the Town of Westerly. This flood affected 25 commercial/industrial buildings, 47 residential and three utility structures (sewer pump, electrical substation and natural gas stations). There were other towns and services affected throughout the watershed as well. The causes of this problem can be ascribed to the following:

- Reduced stream capacity due to floodplain and channel constrictions;
- Obstructions (culverts and bridges); and
- Watershed development reducing pervious surfaces reducing groundwater recharge and baseflow and increase peak storm flow.

The feasibility study will evaluate alternatives and recommend a plan to reduce the economic and life risk for area affected by flooding in the Pawcatuck River watershed. The 905(b) analysis identified measures that include no action, and structural and nonstructural measures. These measures include:

- 1) No Action – For this very rural watershed, where the majority of flooding problems revolved around road washouts, traffic detours and flooded basements, the no action alternative is a very real possibility.
- 2) Buy-Outs/Relocation – There are a total of 47 residential properties in the Canal Street area of Westerly with 22 residential structures with first floor elevations at or below the 100-year flood elevation. There are 25 commercial/industrial properties in this area, 20 of which have first-floor elevations at or below the 100-year flood elevation.
- 3) Elevating Structures – Elevating the 22 residential structures mentioned above will be considered.

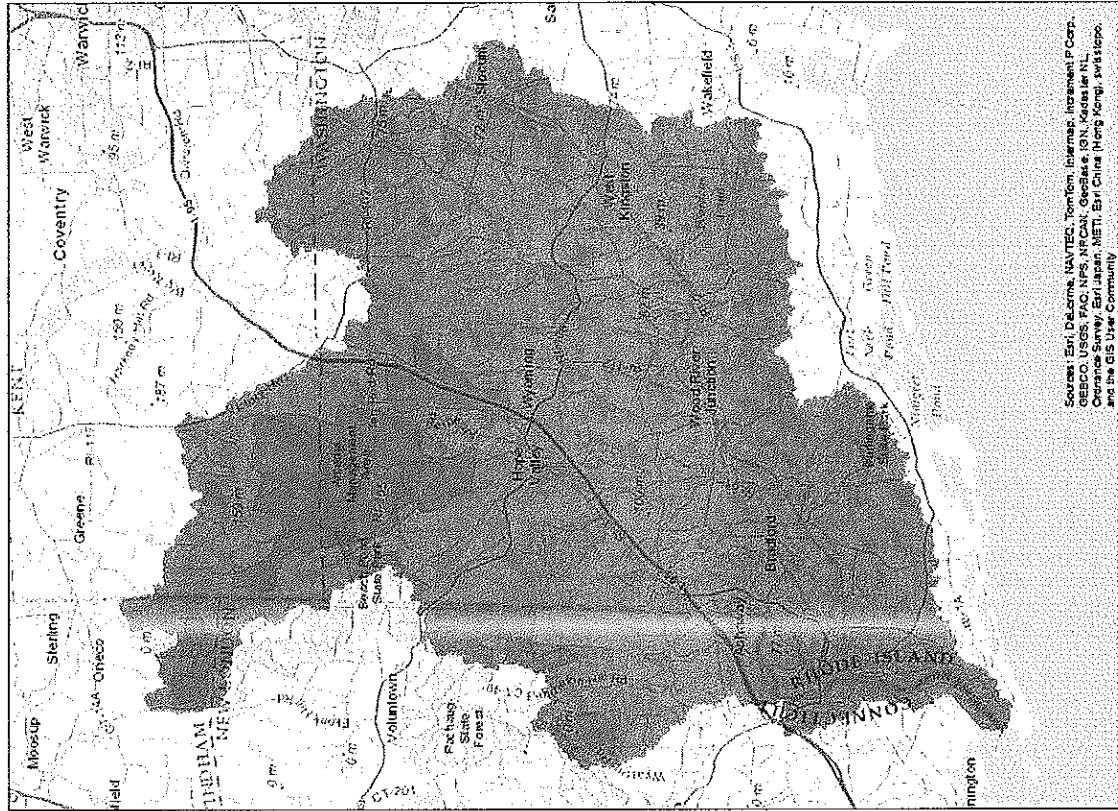


Figure 1. Rhode Island Watershed and Flooding Photographs within the Pawcatuck Watershed following the 2010 Peak Flow Event.

- 4) Dry Floodproofing – Some of the concrete and brick commercial structures along Canal Street in Westerly, the Bradford Printing and Finishing Company, and Kenyon Industries may be able to incorporate sealants and closures to prevent future flooding.
- 5) Wet Floodproofing – Elevating utilities from the basement to the upper floors of some of the residential buildings will be examined during the feasibility study.
- 6) Floodwall/Dike – A floodwall (reinforced concrete or sheeting) or earthen dike was considered for the different damage zones in the Pawcatuck River basin. The Bradford industrial area may be appropriate for some type of flood wall. The Canal Street area in Westerly is too congested for a dike to be constructed. A floodwall might be feasible in this area, though even this would be a challenge to construct. The difficulties arise in that there are several commercial buildings that sit right on the river's edge. Also, the amount of floodwall needed to prevent flooding of the area could be very long (~ 3,000 feet or more), depending on where the wall is tied into high ground. The residential area in Richmond, Valley Lodge Estates, has relatively few impacted properties (~ 20), so an expensive floodwall or dike will not be economically feasible.
- 7) Dry Bed Reservoir (storage) – The construction of some shallow head (<10-foot high) dry bed reservoirs in the upper reaches of the watershed will be considered, if the topography allows.
- 8) Channel Modifications – The river profile in the area upstream of the Stillman Avenue Bridge appears to be somewhat flat but just below the bridge there is a fairly steep series of rapids. It appears a dam was removed in this area. A feasibility study will look at modifying the river profile to see if this has any effect on flood levels.
- 9) Dam Removal (ecosystem restoration) – The removal of the White Rock Dam, a mile above the Canal Street area of Westerly, would not reduce the flooding downstream. However, it will reduce flood levels upstream and may significantly improve the environment (e.g. water quality, habitat connectivity).

The planning objectives for the feasibility study are to:

- Reduce the flood hazards and associated flood damages in the Pawcatuck River watershed;
- Provide flood risk management for(or Reduce flood risk to) buildings, critical utility centers, emergency response facilities, and transportation corridors improving public health and safety during future flooding; and
- Contribute to national ecosystem restoration by providing more natural habitat, where possible.

**c. Factors Affecting the Scope and Level of Review.**

The complexity, challenges, and risks associated with the Pawcatuck River FRM Feasibility Study will depend on the size of the affected area eligible for Federal



participation and the probable alternatives formulated for flood attenuation. We anticipate that an IEPR of our Decision Document is necessary at this point in the project. The Project Delivery Team (PDT) and Vertical Team (VT) will evaluate risks associated with each alternative throughout the project. The PDT and VT will make a decision on whether a Type I IEPR is required during the Alternatives Milestone. We assume a Type I IEPR is required at this stage and is included in the project schedule and budget.

Challenges associated with this FRM study include defining the scope and extent of the study. The watershed is large and flood impacts are broad, but impacts severe enough to warrant Federal participation may be limited. The PDT will need to accurately define the study area and appropriate alternatives for Federal participation. An accurate assessment of the economics of potential damages will be challenging. There are many secondary impacts when electricity and sewer utilities are hampered due to flood flow and can be difficult to quantify. There is also the potential for environmental resource agencies to oppose structural measures if recommended. Environmental interests are often not completely harmonious with the urban flood risk management efforts.

The project will not be justified by life safety. Potential project measures such as floodwalls, dike and dry bed reservoir facilities may be considered during the development of alternative plans. These types of structures can pose human life/safety concerns in the event of a catastrophic failure. The District Chief of Engineering has determined that some of the alternative plans considered in the feasibility study could potentially result in a significant threat to human life. Non-performance can also result in economic damages that could be greater than under existing conditions. The magnitude of these concerns is dependent on their location, height, storage capacity, and nature of the areas protected. The PDT will assess the alternatives for economic and threat to life as the study progresses and due diligence exercised during planning, design and construction.

The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) office in Taunton, Massachusetts provides daily Pawcatuck River stage, flood forecasts and warnings to local communities and businesses. Project stakeholders are aware of the NWS systems and use warnings to prepare for flooding. During an extreme flood event it is anticipated that employees at businesses and residents evacuate quickly and safely to higher ground. Evacuations of industrial properties are typically conducted rapidly and without the delays. Residents are less likely to evacuate, but flooding conditions are generally limited to high water along road ways. Residents experience a temporary inconvenience of restricted road travel and power outages.

The successive precipitation events from February through late March 2010 produced more than half the average annual rainfall for Rhode Island. Approximately 25 inches of rain fell during this time period. Peak flows at gaged

rivers during this event were as much as two to three times the peak flow for the period of record. The Pawcatuck River gage in downtown Westerly Rhode Island estimated a peak flow of 10,800 cubic feet per second (cfs) in March 2010 and is now the new peak of record. The next highest flow for this gage was 7,070 cfs back in June 1982<sup>1</sup>. No fatalities were reported for the 2010 flooding<sup>2</sup>. We are not aware of any reports of major injuries or illnesses occurring during this recent peak event. The PDT and VT will assess potential impacts to human life throughout the project, including residual risk and uncertainty.

There has been no request from the Governor of Rhode Island for a study peer review by independent experts. Based on public outreach meetings conducted during the Reconnaissance Study, the feasibility study is not likely to involve significant public dispute as to the size, nature, or effects of the project. Flood risk management alternatives will be developed in full consideration of the comments provided to the PDT from project stakeholders. The Town of Westerly and the State of Rhode Island are represented on the PDT and local and State officials are very supportive of the study.

The information presented in the decision document will not be based on novel methods or involve the use of innovative materials or techniques. The overall study has limited risks and will most likely be a traditional flood risk management project. The study is considering both structural and nonstructural flood risk management measures listed in Section 3b of this Review Plan. The PDT does not believe the study will present complex challenges for interpretation or require the need for precedent-setting methods or models. Only accepted planning and engineering models will be used for this study. Based on the traditional nature of this study, conclusions presented in the decision document are unlikely to change prevailing practices.

At this early stage, it is unknown to what degree the project design will require redundancy, resiliency, and/or robustness. However, these qualities will be built into the range of flood risk management alternatives considered as part of the study.

The factors affecting the scope and level of review will be reassessed and the review plan will be updated at least three times; when the without-project conditions are identified, following the Alternatives Milestone, and following the Tentative Selected Plan.

**d. In-Kind Contributions.** Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. We do not

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<sup>1</sup> Zarriello, PJ, Ahearn, EA and SB Levin (2012). Magnitude of Flood Flows for Selected Annual Exceedance Probabilities in Rhode Island through 2010. United States Geological Survey Scientific Investigations Report 2012-5109, 81 pg.

<sup>2</sup> Hydrologic Information Center - NWS Annual Flood Loss Summary Reports To U.S. Army Corps of Engineers. United States Flood Loss Report - Water Year 2010 <http://www.nws.noaa.gov/hic/summaries/WY2010.pdf>

anticipate the non-Federal sponsor providing any in-kind products or analyses at this time.

#### **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.** Documentation of the technical and policy review of a specific product will be sufficient to allow both Planning management and QC reviewers to feel confident that a comprehensive review was conducted in accordance with principles and guidelines established. It is expected that all in-progress review actions, review team meetings, and other significant technical review related actions will be documented in the form of a written memorandum prepared by the review leader. This memorandum as well as any other pertinent information will be provided to the ATR team prior to initiating any ATR effort to inform them that the internal DQC review has been completed by the New England District. The decision document will follow standard New England District quality control procedures. The results of this review, including any significant concerns, will be provided to the ATR team for their consideration.
- b. Products to undergo DQC.** Products that will undergo DQC will include the Decision Document, EA and appendices. The PDT, supervisor or designated specialist within the appropriate discipline will also review supporting documentation used to generate these products. Examples include but are not limited to: milestone submittals (report synopsis, risk register, decision management plan, decision log, study issue checklist etc) cost estimate spreadsheet, quantity estimates, conceptual designs, H&H model output summaries, HEC-FDA output summaries, planning spreadsheets and other products where the risk of error is moderate to high or when the consequences for mistakes may result in poor decision making. All products will be reviewed prior to submittal to the PM for inclusion in the Decision Document or EA. All work products (spreadsheets, figures, tables, reports, etc) will undergo quality checks and reviews during the development process. These reviews are carried out as a routine management practice.
- c. Expertise required for DQC.** The disciplines expected for DQC are the same as those required to complete the project by the PDT (see Attachment 1 for Team Roster).

#### **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.** Specific products to undergo ATR include the Draft and Final Report (including NEPA and supporting documentation). The PM will also coordinate with the ATR Lead to engage select members (likely Economics and H&H) from the ATR team to conduct targeted reviews of milestone deliverable documents that drive the alternative analysis. This will help provide consistent coordination throughout the project. These documents may include: the Report Synopsis, Risk Register and Decision Log and supporting model materials. This targeted review will be expedient and not affect the milestone execution schedule. A limited review of the HEC-RAS model is anticipated because the model was recently modified by the USGS and has undergone their review process.

b. **Required ATR Team Expertise.**

ATR Team Members/Disciplines	Expertise Required
ATR/ Planning Lead	The ATR lead should be a senior water resources planner with extensive experience in preparing FRM Civil Works decision documents and conducting ATRs. 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 the plan formulation component of the study.
Economics	The team member for the economics portion of the ATR review will have knowledge of damage evaluation for flood reduction studies, stage damage curve assessments, structure evaluation, stage damage curve assessments HEC's Expected Annual Flood Damage methodology
Environmental Resources	The team member for the environmental section should be an expert in the NEPA process, reviewing EAs, Fish & Wildlife Impacts, Coastal Zone Management and the Section 7 of Endangered Species Act, Sections 401 and 404 of the Clean Water Act, the Clean Air Act, the U.S. Fish and Wildlife Coordination Act, and Section 106 of the National Historic Preservation Act. The reviewer should also be familiar with

	cultural resources.
Hydrology & Hydraulic Engineering	The H&H engineering reviewer will be an expert in the field of hydrology and hydraulics and have a thorough understanding of open channel dynamics, application of levees and flood walls, nonstructural solutions involving flood warning systems and flood proofing, etc and the HEC-RAS v 4.0.1 computer model.
Civil/Gen Engineering	The person performing the review for the civil engineering portions of this study should have a good understanding of typical USACE FRM structural project designs such as levees, floodwalls and integrated pump systems. The reviewer should also be familiar with mechanical and electrical pump feasibility-level design fundamentals.
Geotechnical Engineer	The geotechnical reviewer should be a senior geotechnical engineer familiar with geologic principles, static and dynamic slope stability evaluation, evaluation of the seepage through earthen embankments and under seepage through the foundation of the flood risk management structures, floodwalls, closure structures and other pertinent features, and in settlement evaluation of the structure. The reviewer should also have knowledge of boring logs, soil sampling techniques and testing methods for both geotechnical and environmental testing.
Risk Analysis	The risk analysis reviewer will be experienced with performing and presenting risk analyses in accordance with ER 1105-2-101 and other related guidance, including familiarity with how information from the various disciplines involved in the analysis interact and affect the results. This review can be combined with either the Economics or H&H reviews.
HTRW (Tentative)	This team member will be familiar with HTRW Site Inspection Reports, hazards mapping, soil sampling and environmental testing, groundwater monitoring, and groundwater testing. <i>Note: Not currently included in the ATR budget and could be included with the Environmental Resource member if a Phase I HTRW Report only.</i>
Cost Engineering	The team member reviewing the cost engineering section of the report should have familiarity with cost estimates that have been developed in accordance with the guidance contained in ER 1110-2- 1302, Civil Works Cost Engineering using the MII (MCACES Second Generation) cost estimating system. Cost estimates will be prepared for all items that are required for project construction for both Federal and non-Federal costs, including mitigation, operation and maintenance. The Cost Engineering review will be coordinated with the Cost MCX.
Real Estate	The real estate reviewer should be an expert in real estate acquisition, appraisals, temporary work area easements and

**c. Documentation of ATR.** DrChecks review software 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 been 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 VT coordination (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.

**d. Certification of ATR.** ATR is certified when all ATR concerns are either resolved or referred to the VT for resolution and the ATR documentation is complete. For draft and final products, the ATR Lead will prepare a Completion of ATR statement documenting that the ATR has been completed and the issues raised by the ATR team have been resolved (or elevated to the vertical team). Subsequently, the District will prepare (with ATR Lead assistance upon request) a Certification of ATR statement that certifies all concerns resulting from the ATR of the project have been fully resolved. Sample statements of Completion and Certification of Agency Technical Review are 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. It is USACE policy that all Section 205 projects undergo an IEPR unless certain an exemption is granted. A risk-informed decision, as described in EC 1165-2-214, is made to determine if IEPR is appropriate for this project and is described below. 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:

- (1) 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 1165-2-214.
- (2) 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.** Based on the guidance published in EC 1165-2-214 and the lack of information to justify exclusion at this point in the project process, the Pawcatuck FRM study is expected to undergo a Type I IEPR including a Safety Assurance Review. This project does not trigger any of the other mandatory triggers for Type I IEPR including:

- Total Project Costs – the Reconnaissance 905(b) Report estimated the high end of potential costs to be \$9 million, well below the \$45 million threshold;
- The State Governor has not requested a review;
- The Chief of Engineers or the Director of Civil Works (DCW) have not determined that the project study is controversial in size, nature, effects, economics, environmental, costs or estimated benefits;
- The head of a Federal or state agency has not determined that the project is likely to have a significant adverse impact on environmental, cultural, or other resources after implementation of planned mitigation;
- The information reviewed and generated during the study is not based on novel methods, doesn't present complex challenges for interpretation, does not contain precedent-setting method or models and is not likely to present conclusions that are likely to change prevailing practices.

A project study exclusion may be requested from Type I IEPR in cases where none of the above mandatory triggers are met and:

- The project does not include an EIS,
- The DCW or the Chief determines that the project is not controversial and has no more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources or substantial adverse impacts on fish and wildlife species and endangered or threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) or the critical habitat,
- The project does not pose a significant threat to life safety.

The project is expected to contain an Environmental Assessment (EA) and a Finding of No Significant Impact (FONSI). It is the PDT's opinion at this stage that the project will have no adverse effects on the tribal, cultural or historic areas or any adverse effects on Endangered Species based information gathered during the reconnaissance study. The PDT and the VT will continue to evaluate the need for Type I and Type II IEPR throughout the study.



**b. Products to Undergo Type I IEPR.** The Draft Integrated Flood Risk Management Feasibility and Environmental Assessment Decision Document, including supporting documentation will undergo Type I IEPR. All products will be reviewed by the PDT and undergo DQC and targeted ATR prior to submittal for Type I IEPR. This includes products that are produced by the non-Federal sponsors as in-kind services, though the PDT does not anticipate the sponsor producing any in-kind services at this time.

**c. Required Type I IEPR Panel Expertise.** Type I IEPR will be conducted by a minimum of three team members. Disciplines that are needed to perform the Type I IEPR are hydrology, hydraulic engineering, geotechnical engineering, civil design, economics, and environmental impacts.

IEPR Panel Members/Disciplines	Expertise Required
Plan Formulation	The Plan Formulation reviewer should be a senior water resources planner with experience in flood risk management and environmental mitigation methods.
Economics	The Economics reviewer will be responsible for reviewing the required economic analyses, project benefits, anticipated future costs, and residual damages for the project alternatives. The Economics reviewer should have extensive experience in economics analysis for FRM feasibility studies and utilization of approved economic models (HEC-FDA and IWR-Plan).
Environmental/Biologist/NEPA	The Environmental reviewer will be responsible for assessing environmental impacts, and ensuring the proper NEPA and cultural resource compliance activities were completed. This includes verifying any NER calculations, mitigation plan review, and completion of the Fish and Wildlife Service Coordination Act requirements.
Hydraulic/hydrologic Engineering /Flood Risk Management	The hydraulic engineering reviewer will be an expert in the field of hydrology & hydraulics and have a thorough understanding of computer modeling techniques that will be used such as HEC-RAS.
Geotechnical Engineering	The geotechnical reviewer will ensure that the project designs meet Corps standards, that the quantities estimated and assumptions are reasonable.

**d. Documentation of Type I IEPR.** The Type I IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, 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 described 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.

**e. Type II IEPR/Safety Assurance Review (SAR).** The Pawcatuck River FRM design and construction activities may be required to undergo Type II IEPR. EC 1165-2-214 requires that a Type II IEPR/SAR be performed on projects that involve a significant threat to human life and public safety. The PDT and VT will assess the need for a Type II IEPR for the TSP. Details for the Type II IEPR will be determined at that time.

## **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 AND ATR MANDATORY CENTER OF EXPERTISE (MCX) REVIEW AND CERTIFICATION**

All decision documents shall be coordinated with the Cost Engineering and ATR MCX, located in the Walla Walla District. The MCX will assist in determining the expertise

needed on the ATR team and Type I IEPR team (if required) and in the development of the review charge(s). The MCX will also provide the Cost Engineering certification. The RMO is responsible for coordination with the Cost Engineering MCX.

## 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.** HEC-FDA is the only planning model anticipated at this time to be used on this study. HEC-FDA is used to perform an integrated hydrologic engineering and economic analysis during the formulation and evaluation of flood risk management plans. HEC-FDA is a USACE-approved planning model. Should a planning model be required for the assessment of dam removal for ecosystem restoration, this section of the Review Plan will be revised.

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5 (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	Certified

	with-project plans along the Pawcatuck River to aid in the selection of a recommended plan to manage flood risk.	
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**b. Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document:

<b>Model Name and Version</b>	<b>Brief Description of the Model and How It Will Be Applied in the Study</b>	<b>Approval Status</b>
HEC-RAS 4.0.1 (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 flow analysis to evaluate the future without- and with-project conditions along the Pawcatuck River. The HEC-RAS model for this study will be used for steady flow analysis. The review plan should indicate how the model will be used for a particular study.]	HH&C CoP Preferred Model
MII (Second Generation MCACES software)	The MII cost engineering program will be utilized to develop construction costs of study alternatives. MII provides an integrated cost estimating system (software and databases) that meets the U.S. Army Corps of Engineers (USACE) requirements for preparing cost estimates.	Enterprise Model

## 10. REVIEW SCHEDULES AND COSTS

**a. ATR Schedule and Cost.** The individual cost estimates below are rough estimates for establishing an overall estimated ATR budget. The actual distribution of costs across disciplines will depend on the specific products produced and specific review issues that arise, and will be developed by the ATR Lead in collaboration with the PDT.

### **Milestone Documents/Targeted Review (Budget \$8,000):**

1- Alternative Milestone July 30, 2014	July 23, 2014
2- Tentatively Selected Plan Milestone Oct 27, 2015	Oct 20, 2015
3- Agency Decision Milestone May 20, 2016	May 10, 2016
4- Final Report Jan 9, 2017	Dec 20, 2016

### **Draft Report ATR Schedule:**

1- Draft Report submitted to ATR team	Dec 5, 2015
2- Deadline for comments from ATR team into Dr. Checks	Dec 26, 2015
3- Deadline for comments to be evaluated by PDT members	Jan 15, 2016
4- Deadline for ATR back-checking	Jan 22, 2016

**Estimated ATRT Budget:**

ATR Lead/Planning	\$17,000
Hydrology and Hydraulics (and Risk)	\$10,000
Civil	\$4,000
Cost	\$8,000
Environmental	\$4,000
Economist	\$4,000
Real Estate	\$4,000
Geotechnical	\$4,000
Review of Final Report (if significant changes occur after Draft)	\$5,000
<b>TOTAL</b>	<b>\$60,000</b>

**b. Type I IEPR Schedule and Cost (budget \$150K).**

1- Draft Report submitted to Peer Review team	Dec 14, 2015
2- Deadline for comments from Peer Review team into Dr. Checks	Feb 10, 2016
3- Deadline for comments to be evaluated by PDT members	Mar 24, 2016
4- Deadline for Peer Review back-checking	April 8, 2016

**c. Model Certification/Approval Schedule and Cost.** All of the models anticipated to be used for this feasibility study are already certified or approved for use.

**11. PUBLIC PARTICIPATION**

Public participation and comment will be received concurrently with the State and Agency review upon the issuance of the Public Notice signifying the release of the Draft Feasibility Report and Integrated Environmental Assessment (EA). Significant and relevant public comments will be provided to reviewers prior to the initiation of the review period. The final decision document and associated review reports will be made available to the public via the project's web page.

**12. REVIEW PLAN APPROVAL AND UPDATES**

The NAD Commander is responsible for approving this Review Plan. The Commander's approval reflects VT 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. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. 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, should be posted on

the Home District's webpage. The latest Review Plan should 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:

- Home District; Project Manager, (978) 318-8603
- Major Subordinate Command; Chief of Planning, (347) 370-4570
- Planning Center of Expertise; FRM-PCX Deputy Director, (415) 503-6852
- Sandy Coastal Management Division, Program Manager, (347) 370-4779

## ATTACHMENT 1: TEAM ROSTERS

### Vertical Team POCs

	Title	Name	Phone
<b>HQ</b>	CECW-NAD-RIT/Sandy Program Manager - Planning	Laura Cameron	202-761-0108
	Plan Formulation	Andrea Walker	202-761-0316
	Economics	Doug Gorecki	202-761-5450
	Environmental	Jeff Trulick	202-761-1380
	Real Estate	Michael Haskins	202-761-0441
<b>NAD</b>			
	Sandy Coastal Management Division, CENAD-PD-CS, Sandy Investigations Program Manager	Hibba Wahbeh	347-370-4779
	NAD MSC POC	Naomi Fraenkel	917-790-8615
<b>PCX</b>			
	FRM Planning Center of Expertise POC	Eric Thaut	415-503-6852
	FRM-PCX Regional Manager	Karen Miller	304-399-5859

### Home District Project Development Team Roster

Title	Name	Org	Phone
Planning – PM	Wendy Gendron	E6L0610	978-318-8603
Environmental Resources	Mike Penko	E6L0710	978-318-8139
Economics	Ed Oleary	E6L0720	978-318-8235
Cultural Resources	Kate Atwood	E6L0720	978-318-8537
Hydrology/Hydraulics	Marilyn Mroz	E6L0510	978-318-8356
Civil Design	Coral Siligato	E6L0310	978-318-8012
Geotechnical	Dara Gay	E6L0540	978-318-8787
Geology/Chemistry	Paul Young	E6L0430	978-318-8597
Cost Engineering	Andy Jordan	E6L0301	978-318-8476
Structural Engineering	Marcus Madison	E6L0350	978-318-8785
Mechanical Engineering	TBD	E6L0350	978-318-8466
Electrical Engineering	TBD	E6L0350	978-318-8143
Real Estate	Jeffrey Teller	E6N0100	978-318-8030

## ATR Project Development Team Roster

<b>Title</b>	<b>Name</b>	<b>Phone</b>
ATR Lead/Planning	TBD	
Environmental Resources	TBD	
Economics	TBD	
Cultural Resources	TBD	
Hydrology/Hydraulics	TBD	
Civil Design	TBD	
Geotechnical	TBD	
Geology/Chemistry	TBD	
Cost Engineering	TBD	
Structural Engineering	TBD	
Mechanical Engineering	TBD	
Electrical Engineering	TBD	
Real Estate	TBD	
Cost Estimates	TBD	



**ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS**

**COMPLETION OF AGENCY TECHNICAL REVIEW**

The Agency Technical Review (ATR) has been completed for the Pawcatuck River FRM Feasibility Study and Environmental Assessment Report. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. 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<sup>sm</sup>.

SIGNATURE

\_\_\_\_\_  
Name  
ATR Team Leader  
Office Symbol/Company

\_\_\_\_\_  
Date

SIGNATURE

\_\_\_\_\_  
Name  
Project Manager  
Office Symbol

\_\_\_\_\_  
Date

SIGNATURE

\_\_\_\_\_  
Name  
Architect Engineer Project Manager<sup>1</sup>  
Company, location

\_\_\_\_\_  
Date

SIGNATURE

\_\_\_\_\_  
Name  
Review Management Office  
Representative  
Office Symbol

\_\_\_\_\_  
Date

## 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

\_\_\_\_\_  
Scott Acone  
Chief, Engineering Division  
CENAE-EP

\_\_\_\_\_  
Date

SIGNATURE

\_\_\_\_\_  
John Kennelly  
Chief, Planning Branch  
CENAE-EP-P

\_\_\_\_\_  
Date

<sup>1</sup> Only needed if some portion of the ATR was contracted

**ATTACHMENT 3: REVIEW PLAN REVISIONS**

<b>Revision Date</b>	<b>Description of Change</b>	<b>Page / Paragraph Number</b>

#### ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

<u>Term</u>	<u>Definition</u>	<u>Term</u>	<u>Definition</u>
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
EA	Environmental Assessment	OEO	Outside Eligible Organization
EC	Engineer Circular	OSE	Other Social Effects
EIS	Environmental Impact Statement	PCX	Planning Center of Expertise
EO	Executive Order	PDT	Project Delivery Team
ER	Ecosystem Restoration	PAC	Post Authorization Change
FDR	Flood Damage Reduction	PMP	Project Management Plan
FEMA	Federal Emergency Management Agency	PL	Public Law
FRM	Flood Risk Management	QMP	Quality Management Plan
FSM	Feasibility Scoping Meeting	QA	Quality Assurance
GRR	General Reevaluation Report	QC	Quality Control
Home District/MS	The District or MSC responsible for the preparation of the decision document	RED	Regional Economic Development
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMC	Risk Management Center
IEPR	Independent External Peer Review	RMO	Review Management Organization
ITR	Independent Technical Review	RTS	Regional Technical Specialist
LRR	Limited Reevaluation Report	SAR	Safety Assurance Review
MCX	Mandatory Center of Expertise	USACE	U.S. Army Corps of Engineers
MSC	Major Subordinate Command	WRDA	Water Resources Development Act