Royal River Aquatic Ecosystem, Yarmouth, ME
Section 206 Flood Risk Management
Feasibility Phase

Project Management Plan

July 12, 2023

US Army Corps
of Engineers
New England District

1.0 Purpose of Project Management Plan

The purpose of this Project Management Plan (PMP) is to define the specific scope, tasks, schedule, and budget for the formulation and evaluation of a reasonable range of ecosystem restoration alternatives that will improve the quality of the environment of the Royal River in Yarmouth, Maine. This PMP lays out specific tasks following the planning process consistent with ER 1105-2-100 and other applicable USACE regulations and guidelines. This PMP is tiered off the Continuing Authorities Programmatic Project Management Plan available on New England District Office of the USACE network.

This PMP will identify:

- Project Description
- Scope of Work
- Required documentation, including an integrated detailed project report and environmental assessment
- Project Delivery Team (PDT) to conduct the evaluation and prepare the report
- Budget
- Schedule

This PMP presents information specific to this project (alternatives, data needs, etc.) and will change with project progress and be updated as needed. The Project Manager will hold meetings with the project deliver team to ensure that project changes are communicated to each team member on a timely basis. Each PDT team member is responsible to read and understand this PMP and inform the project manager when changes to scope, schedule, or budget are required.

2.0 Project Study Description

2.1. Project Authority

The authority for this study is Section 206 Aquatic Ecosystem Restoration, of the Water Resources Development (WRDA) of 1996, as amended, which authorizes USACE to carry out aquatic ecosystem restoration projects that will improve the quality of the environment, are in the public interest, and are cost-effective. USACE conducted an initial appraisal and determined there is a Federal interest for an Aquatic Ecosystem Restoration project at this location along the Royal River.

Constraints under the Continuing Authorities Program (CAP) Section 206 authority include:

- USACE provides the first $100,000 of study costs. The non-Federal sponsor must contribute 50 percent of the cost of the feasibility study after the first $100,000 of expenditures.

- The project limit is $10-million Federal funds that are matched at 35 percent non-federal to 65 percent Federal funding sources, for an upper limit of total project cost of approximately $15.3 million.
- One hundred percent of the cost of operation and maintenance is the responsibility of the non-Federal sponsor.
- The sponsor receives a credit for the value of real estate necessary to implement the project.
- The proposed alternative must be cost effective, which is measured by a quantified output of environmental benefits that an alternative may generate compared to the project cost to design and construct that alternative.
- Environmental justice must be accounted for.
- Climate change must be accounted for.

The project requires a non-Federal sponsor, which is the Town of Yarmouth, hereby referred to as the Sponsor.

2.2. Project Phase

The project phase is Feasibility.

2.3. Project Purpose

The purpose of the proposed study is to assess the first two dams above the head of tide on the Royal River owned by the Town of Yarmouth: The Bridge Street Dam and the East Elm Street Dam. Both dams have nonfunctioning/minimally functioning fishways (**Figure 2 & 3**).

2.4. Project Information

The study area is located in the Town of Yarmouth, which is located in Cumberland County, in Southern Maine, approximately 12 miles north of the state's largest city, Portland. As of the 2020 census, Yarmouth has a population of 8,990 (2020 US Census Bureau).

The headwaters of the Royal River originates in Sabbathday Lake, New Gloucester and flows downstream for about 39 miles and empties into Casco Bay, Yarmouth, Maine. The Royal River is a freshwater environment that transitions into an estuarine, tidally influenced aquatic environment in Yarmouth. The head of tide is located approximately at the East Main St. /Route 88 Bridge in Yarmouth as shown on **Figure 1**. The two project locations are the East Elm Street Dam (**Figure 2**) and the Bridge Street Dam (**Figure 3**). Both project locations are in the vicinity of private properties and may require real estate coordination for construction operations.

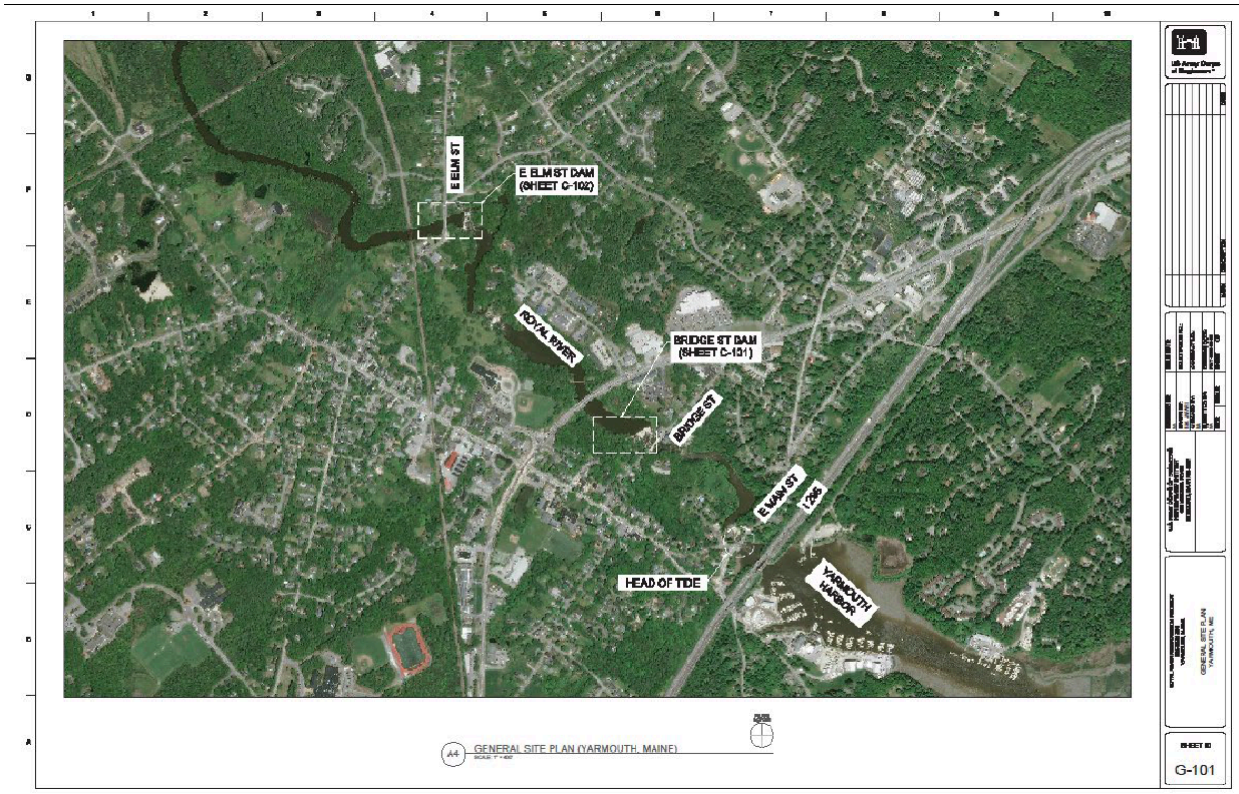

Figure 1: Royal River, Yarmouth, Maine

Figure 2: East Elm Street Dam & Fish Passage, Royal River, Yarmouth, Maine

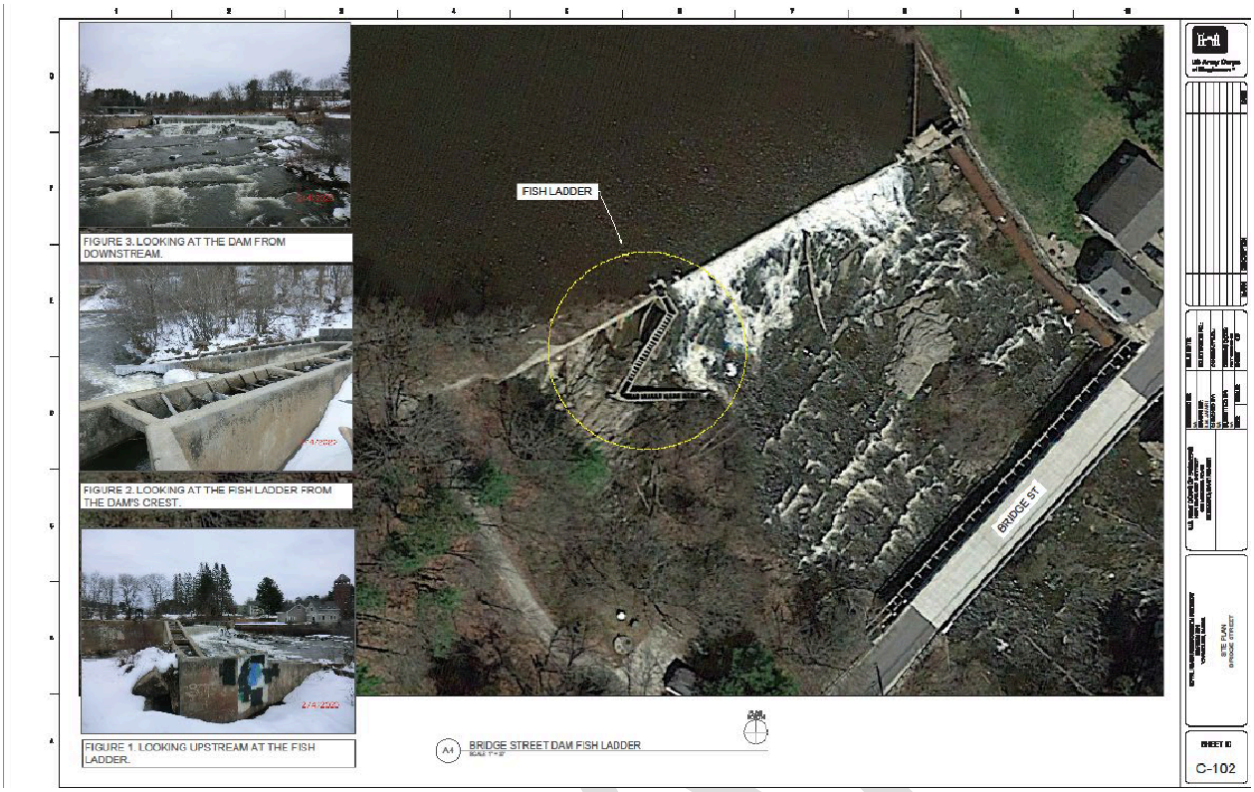

Figure 3: Bridge Street Dam & Fish Passage, Royal River, Yarmouth, Maine

The project has the potential to restore access to about 71 miles of river habitat for federally listed fish species and non-listed anadromous fish species, providing the fish with upstream access to historic reproductive habitat for adults and nursery habitat for the development of eggs and juvenile life stages. With Yarmouth's fish passage barriers addressed in the watershed, up to 135 miles of reproductive and nursery habitat may also be made accessible to migratory fish species, including blueback herring (*Alosa aestivalis*), alewives (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*) American eel (*Anguilla rostrata*), sea run brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), sea lamprey (*Petromyzon marinus*), Atlantic salmon (*Salmo salar*) and rainbow smelt (*Osmerus mordax*). Restoring fish passage on the Royal River will also benefit mammals and avian predators that prey upon fish species that include bears, foxes, eagles, ospreys and loons. Likewise, water quality conditions may be expected to improve due the resumption of historic flushing patterns.

The proposed feasibility study will develop an array of alternatives to support the restoration goal of the Royal River. USACE will determine the merit of each alternative with respect to functionality, constructability, impacts to environmental and cultural resources, real estate requirements, and cost. The findings of the study and any recommendations for implementation will be documented in a Detailed Project Report/Environmental Assessment (DPR/EA).

2.5. Measures and Alternatives

The East Elm Street Dam was originally constructed in 1857 and the current non-functioning fish passage was built in 1979. The Bridge Street Dam was originally constructed in 1894 and the current non-functioning fish passage structure was built in 1973.

Possible measures include the following:

(1) **Complete removal of both dams**: Dam removal must address natural downstream transport of associated sediments or removal and onsite reuse of materials that have accumulated on the upriver side of both dams. Sediment sampling will be necessary to understand the level of risk and spatial extent of contaminants of concern that may persist in sediments on the upriver side of the dams. Characterizing contaminants that may exist at both dams will allow the New England District to determine appropriate options for disposal, reuse, or release of sediments associated with the existing dam structure. These data will also allow the New England District to effectively evaluate the potential risks and exposure pathways to ecological receptors and humans. Concern with impounded sediments extends to any impacts on maintenance of the Federal Navigation Project which ends below East Main Street and I-295, as well as the marinas and town landing facilities. The study will consider a suite of measures that may restore healthy natural ecosystem functionality within Royal River, as described in the Study Purpose, above.

(2) **Reconstruction/Improvement of existing fish passage structures**: If dam removal is eliminated as an option, assessment of existing fish passage structures to determine if they can be modified and provide efficient fish passage for species identified.

The two existing dams with non-functioning fish passage structures, the Bridge Street Dam and East Elm Street Dam, restrict the historical movement of migratory fish. The ladders do not efficiently pass key species in this waterway such as American shad, alewife, blueback herring, Atlantic salmon and rainbow smelt (*Osmerus mordax*). The Denil fish ladders were originally installed in the 1970s to support the commercial alewife and blueback herring fisheries but restoring fish passage in this river would benefit a host of other species. Other diadromous fishes that may benefit from improved fish passage in this area are American eel (*Anguilla rostrata*), sea run brook trout (Salvelinus fontinalis), brown trout (*Salmo trutta*), and sea lamprey (*Petromyzon marinus*).

(3) **Removal of one dam with improvement of fish passage at the other would also be considered.**

The study team will consider the dam removal measure first, for practicality, function, and consequences, and then either drop the measure from further consideration or consider it further combined with other feasible measures to develop a small range of feasible alternatives. Resource costs and schedules will be based on a total of four alternatives to be evaluated in detail, including the no-action alternative.

2.6. Expectations of the Study Sponsor:

The sponsor for this project is the Town of Yarmouth (the Sponsor). The Town expects an evaluation of the removal of the two dams. If this alternative is eliminated from consideration, the sponsor expects that alternative plans would be developed to restore fish passage. The sponsor is expecting an accurate assessment of existing and potential future conditions, cost estimate for project implementation, feasibility level designs and timely, cost-effective completion of the feasibility study.

2.7. Study Conditions:

The feasibility study initially will be based on the following conditions:

- The study will briefly and broadly identify numerous possible measures (as summarized above) and then narrow the scope to evaluate one or two ecosystem restoration alternatives along with the no-action plan. The team should expect that most of the measures will be eliminated from further consideration after an initial screening.
- The study starts with the premise that the team will assess sediments settled behind the dams and hydrologically model the potential affects to the surrounding environment for full removal of both dams and fish passages.
- The study is conditioned on the Town of Yarmouth's willingness and ability to support the study effort financially.
- The iterative nature of a planning process may result in the need to incorporate revisions and/or additional measures to the evaluation process. The study budget includes a contingency line item that is intended to account, in part, for the evaluation of iterations not yet considered.
- Based on initial evaluation, the premise is that an Environmental Assessment, not an Environmental Impact Statement, will be sufficient for this study.

3.0 PROJECT STUDY DESCRIPTION

The Project Study involves the following outputs, team involvement, and project-specific tasks, team members, cost estimate, and schedule.

3.1 Required Project Study Output:

The required outputs of the feasibility study are an approved Integrated Detailed Project Report and Environmental Assessment (DPR/EA), including signed Finding of No Significant Impact (FONSI). The report will document the assessment of a narrow range of feasible alternatives and selection of a recommended proposal that meets the Section 206 authority criteria, is feasible, cost-effective, and is within funding constraints, and where real estate interests can be readily obtained by the sponsor.

Cost-effectiveness is measured by a quantified output of environmental benefits that an alternative may generate compared to the project cost to design and construct that alternative. The DPR/EA will document compliance with environmental requirements and will include coordination with Federal and state agencies. Feasibility analysis in the report will include assessment of real estate acquisition and access, feasibility-level cost estimate of a small range of alternatives (assume two plus the no-action), quantified ecosystem restoration benefits, environmental impacts, and ability to be permitted. The DPR/EA will refer to (without replicating effort) previous studies along with their associated documents.

3.2 Team Involvement

The principal members of the Project Delivery Team (PDT) will be the Project Manager and specialists from the USACE New England District along with input from Sponsor representatives. The USACE PDT team members will include:

- Planning Division, Plan Formulation Branch – project manager/planner, economist, and geographic information system (GIS) specialist
- Planning Division, Environmental Branch – environmental resources specialists and cultural resources specialist
- Engineering Division, Geotechnical/Water Resources Branch –geotechnical engineering and water management specialists
- Engineering Division, Design Branch – specialists in civil engineering, structural engineering, and mechanical engineering
- Engineering Division, Technical Support Branch – cost engineering specialist and management support
- Real Estate Division – realty specialist and real estate appraiser
- Additional assistance from Office of Counsel, Contract Division, and Construction Division

The PDT will be responsible for preparing the decision document that will be used for evaluation of ecosystem restoration alternatives. In preparation of this PMP, each team member submitted a scope, cost, and schedule for the project. Team members are responsible for the technical adequacy of their work and to ensure that the work is accomplished consistent with USACE and other applicable regulations and guidelines. Team members are accountable to ensure that all work is completed within established schedules and budgets. Team members are also responsible for responding to review comments on the project reports and analyses they prepare.

The Feasibility Study is cost-shared with the Non-Federal Sponsor (Town of Yarmouth) on a 50/50 basis and is pursuant to execution of a feasibility cost share agreement (FCSA) between the Sponsor and the USACE. A portion of the study cost-share may be contribution of in-kind work by the sponsor that is necessary for the study and identified and agreed to by the USACE and Sponsor and identified in the PMP and the FCSA.

The PDT will undergo planning steps including problem identification and project purpose, inventory and forecasting conditions, alternative formulation and evaluation, benefit and cost analyses, and alternative comparison. Then the PDT will select a proposed alternative that meets the project purpose and is cost effective in providing ecosystem restoration benefits. This proposed alternative, known as the tentatively selected plan (TSP), will then be reviewed in a joint USACE New England District and North Atlantic Division (NAD) meeting for NAD approval to proceed to completion of the draft DPR/EA for technical review and public review.

Once the draft DPR/EA is completed, the report will undergo a District Quality Control (DQC) review at the USACE New England District, and the PDT will edit the draft report based on the review. All functional elements from which staff is assigned to the project are responsible to assign staff for the DQC review and will certify that the work is accomplished consistent with the District's Quality Control Plan (QCP). Then the DPR/EA will undergo an Agency Technical Review (ATR), USACE NAD review, and public review through public release of the draft report.

An ATR is undertaken to "ensure the quality and credibility of the government's scientific information" in accordance with this policy and regulations. This level of review will also cover any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products. An ATR is mandatory for all decision and implementation documents.

The PDT will address the various review comments and revise and complete the final DPR/EA along with a FONSI. The USACE New England District will then submit this package to the USACE NAD, followed by signature by the New England District Engineer, for approval to proceed to the next project phase – design and construction (DI) phase.

The success of the project is highly dependent on the PDTs communication and cooperation. Each member of the PDT (both team members and sponsor representatives) provides information and support that is essential for the project. Each project has a unique set of goals, challenges, and constraints that determine the importance of each team member's role. General descriptions of team member responsibilities are also available in the CAP Programmatic PMP.

3.3 Project-Specific Task Descriptions:

The following specific tasks are based on input from specialists with coordination of the entire PDT and review by section and/or branch chiefs.

Plan Formulation Branch – Project Management and Planning:

Tasks: The planner will be responsible for project management (PM), study team leadership, plan formulation, coordination of internal and external reviews, and sponsor involvement.

Specific tasks include:

- Prepare and manage project schedule, scope, and budget, including working with Management Support Group.
- Lead project study team and coordinate team efforts and integrate and manage all study team products.
- Coordinate site visits and meetings, including lining up transportation and conference lines as needed.
- Lead plan formulation, evaluation, and design efforts.
- Serve as the primary point of contact for communication with the non-Federal Sponsor.
- Assess the environmental justice aspects of the project.
- Compile and edit the integrated DPR/EA: set up report outline and layout with appendices, and write project formulation sections, description of recommended alternative, schedule of accomplishments, findings, conclusions, and recommendations; provide overall editing and document quality control.
- Manage review processes and obtain project approval.
- Reporting: Provide all upward reporting requirements on project schedule/progress, fiscal status, and issues.
- Coordinate reviews and responses to reviews: Coordinate team responses to District quality review and Agency Technical Review, and other reviews by the Sponsor and USACE vertical team (Division and Headquarters) for the reports and associated documents.
- Coordinate normal project activities with Sponsor: Provide normal project coordination with the project's non-Federal sponsor, including coordination of the signed FCSA, quarterly status/financial reporting, amendments to cost-sharing documents if needed, participation in USACE/Sponsor conferences, project presentations to Sponsor boards and managers, and coordination of Sponsor's input to planning activities and review of project products and documents.

Comments: None

Plan Formulation Branch – GIS Services:

Tasks: Provide GIS services to team members, including GIS services for the flooding assessment and economics analysis. GIS services include creating location maps, resource maps, and providing area quantities. GIS services will also provide about 5 figures for the DPR and create maps with resource overlays for the environmental evaluation.

Comments: None

Plan Formulation Branch – Economics:

Tasks: Economics will assist the PDT in identifying the National Ecosystem Restoration (NER) plan by completing a Cost-effectiveness (CE)/Incremental Cost Analysis (ICA) on a small number of ecosystem restoration alternatives, planned for now to be three alternatives, plus the no action alternative. The Economics team member will complete the CE/ICA using environmental inputs (changes in habitat units) provided by Environmental and cost inputs provided by Cost Engineering. The economic model that will be used for this study to complete the CE/ICA is Institute of Water Resources (IWR) Planning Suite. Also, in accordance with the 5-January-2021 Comprehensive Documentation of Benefits in Decision Document memo, the analysis will consider (qualitatively or quantitively where time and money permit) all four benefits accounts (NER, Other Social Effects (OSE), EQ (Environmental Quality), and Regional Economic Development (RED)). The level of effort dedicated to each benefit category will be commensurate with the extent to which the PDT and sponsor believe that benefits in each category will vary across alternatives and thus could impact plan selection. Documentation of the CE/ICA and comprehensive benefits analysis will be completed by the Economics team member with assistance (as needed) from the Environmental lead and Plan Formulation lead.

Comments: None

Environmental Branch – Environmental Resources:

Tasks: The team member will prepare the Environmental Assessment (EA) portion of the combined DPR report, which will be integrated by Planning. The team member will use existing information, information developed during the study, and data provided by the various branches. The environmental team member will evaluate four alternative plans for their environmental impacts. The team member will also conduct a site visit and virtual site visit with stakeholders to evaluate existing and future conditions and coordinate with the appropriate resource agencies.

Specific tasks will include:

- Attend team meetings
- Attend public meetings
- Prepare documentation for the DPR/EA sections including the existing conditions – affected environment, environmental impacts of the proposed alternative, public and agency coordination, addressing applicable laws and regulations and identifying permitting needs, including documentation
- Prepare FONSI
- Prepare public notice
- Coordinate with local, state, and Federal agencies and attend virtual coordinated site visit
- Review draft DPR and address review comments.

Comments: Dam removal may affect recreational boating upstream of the dams without the impoundments.

Environmental Branch – Environmental Conditions Analysis

Tasks: The team member will oversee sample collection and testing and analysis of environmental conditions, including sediments in the Royal River channel and banks. The specific scope of this analysis will be developed as measures are being identified and if additional data collection and analysis are determined necessary to perform project feasibility-level analysis.

Specific tasks will include:

- Attend team meetings
- Prepare environmental conditions scope of work
- Perform field work, including sediment collection
- Oversee material analysis
- Interpret results of analysis
- Prepare report
- Participate in formulation of measures based on investigation results

Comments: None

Environmental Branch – Cultural Resources:

Tasks: The cultural resources team member will attend team meetings, attend a site visit, and coordinate cultural resource management and requirements with Maine State Historic Preservation Office (SHPO) and local Native American Tribes. The team member will send letters as needed and collect and prepare documentation. Conduct background cultural and historical information search of the area to determine if historic properties are present. Complete two (2) sections for cultural resources (Existing Conditions and Environmental Consequences sections) in EA.

Comments: Several historic properties exist along the banks of the Royal River. If dam removal is selected, it could be considered an adverse effect to cultural resources. Depending on the proposed project it is possible that the project will have impacts on cultural resources. However, the nature and severity of any impacts would be determined during the study and coordinated with appropriate regulatory agencies in accordance with Section 106 of the National Historic Preservation Act.

Geotechnical/Water Resources Branch – Hydrology, Hydraulics and Coastal:

Tasks: The Water Management Section will be primarily responsible for evaluating the hydrology and hydraulic (H&H) conditions of the Royal River through the Town of Yarmouth. Following this evaluation, the Water Management Section will develop a detailed Hydrology and hydraulics report to be appended to the main DPR/EA.

- Participate in team scoping meetings internally and externally (i.e., with Sponsor) to identify locations most vulnerable to flooding.
- Review results of existing hydraulic models (e.g., HEC-2, HEC-RAS) for the identified areas.
- If existing HEC-RAS models are available, utilized FEMA flow rates and estimate flood levels. Interpret existing models and perform limited statistical analysis of already computed model results to provide rough estimates of flood levels.
- Work with PDT to develop an array of alternatives for initial screening. Perform hydraulic analysis for the alternatives identified by the PDT.
- H&H modeling will be performed to evaluate the river flows with and without the dams.
- HEC-RAS model will be modified to incorporate alternatives being evaluated and results will be coordinated with Economics section. The HEC-RAS model will be run for various frequency floods (e.g., 100-year) for each of the different alternatives. It is assumed a total of 4 alternatives that includes two combinations for the two sites.
- Perform a qualitative assessment of climate change impacts to inland hydrology for this project according to ECB 2018-14 “Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects.”
- Prepare Hydrology & Hydraulics Engineering Appendix. Respond to DQC and ATR comments on Draft Appendix.
- Address H&H-related review comments.
- Provide Final Draft Hydrology & Hydraulic Engineering Appendix.

Comments: None

Geotechnical/Water Resources Branch – Geotechnical Engineering

Tasks: Geotechnical efforts will be undertaken to assess needs for channel bank stabilization protection and flood structures associated with the project in conjunction with input from the Hydrology, Hydraulics and Coastal Section and other disciplines. The team member will assist in the design of any structural alternatives considered in the alternatives analysis that might require geotechnical considerations.

Specific tasks include:
- Attend team meetings
- Coordinate with other team members for field collection activities and site visits
- Review of available documentation including reports, test results, existing plans, geologic maps, charts, aerial photos, borings, construction records, etc.
- Support the Environmental Evaluation Branch in developing the sediment analysis plan for the analysis of material in the impoundment behind East Elm Street Dam and Bridge Street Dam.

- Review the results of sediment testing to assist in developing alternatives for stabilization and placement of the sediment for dam removal alternative measures.
- Recommend geotechnical feasibility-level solutions for stabilization and protection of stream banks, abutments, foundation elements, and infrastructure that could be affected by implementation of measures as determined through HEC-RAS modeling.
- Coordinate with Hydrology, Hydraulics and Coastal Section, and structural engineering to develop feasibility-level alternatives that may be considered as part of the alternatives analysis
- Support Civil Design with conceptual layout of structures and preparation of feasibility-level sketches
- Preparation of a Geotechnical Appendix for the Feasibility Report. The Geotechnical Appendix will identify any future subsurface investigation and testing needs to support the future project design, and development of plans and specification.

Comments: None

Design Branch – Civil Engineering:

Tasks: The civil team member will be responsible for developing feasibility level plans for the recommended alternative. The Civil Engineering team member will also be responsible for coordinating the survey activities for the study.

Specific tasks include:

- Attend team meetings.
- Coordination within PDT and with technical personnel from sponsors and outside agencies.
- Site visits as required – assumed that at least one visit will be required.
- Research and obtain sufficient background information to assess existing conditions and problems, including affected utilities, structures, etc.
- Coordinate with local sponsors to obtain proprietary information such as utility plans, georeferenced images for the project location, and GIS data for property boundary lines. Incorporate such data into the drawings.
- In coordination with the other PDT members, develop design elements for the dam removal alternative.
- Determine quantities of materials for alternatives and provide input to Cost Engineering for preparation of cost estimates.
- Determine environmental quantities for impact assessment.
- For the selected plan, a full-size set of conceptual plans will be developed, including site plans and typical sections. It is assumed that at least two sheets will be required.
- Prepare real estate plans for construction access and laydown areas.
- Prepare appropriate sections within DPR/EA document and appendices.
- Review and comment on draft DPR/EA.
- Prepare Civil input to the Engineering Appendix

- Address Civil-related review comments.

Assumptions:

1. No additional topographic or bathymetric survey will be required by the the New England District survey unit.
2. Drawings and plates will be prepared digitally using appropriate CADD software

and any information obtained from outside sources (surveys, maps, design drawings, etc.) will not require extensive modification to be usable/compatible with in-house software and hardware systems.

3. The scope includes evaluation and analysis of 1 alternative; should additional

alternatives be developed during the course of the study this scope must be modified.

Design Branch – Structural Engineering:

Tasks: The Structural Engineering team member will be responsible for identifying the structural components of the existing dams and the existing condition as well as conceptually identify the structural components needed.

Specific tasks include:

- Attend team meetings
- Attend site visits as required
- Research and obtain sufficient background information to assess existing conditions and problems including affected utilities, structures, etc. This would have to include coordinating with bridge owners (State & local municipalities) to gather information about bridges and railroad crossings within the study area and determine scour susceptibility for those river crossings. NOTE: If scour susceptibility has not yet been accomplished, then a Level 2 scour analysis should be completed for those sites. Attached is a typical Level 2 analysis. This Level 2 analysis is typically an H&H led effort.
- Participate in the identification of construction access/laydown and associated Real Estate
- Identify constructability concerns
- Determine materials for various alternatives and provide input to Cost Engineering for preparation of cost estimates
- Participate in evaluation of feasible alternatives to identify the selected plan.
- Communicate structural engineering considerations relative to the development of structural measures included in the alternatives analysis.
- Assist other team members and H&H TMs in developing measures to be included in the alternatives analysis
- Prepare appropriate sections for Engineering Appendix (see below)
- Review and comment on draft DPR/EA
- Address Structural-related review comments.

Note: Structural Engineering input will follow ER-1110-2-1150 as outlined in “APPENDIX C CONTENT OF ENGINEERING APPENDIX TO FEASIBILITY REPORT”:

C-7.1. Identify all functional design requirements and technical design criteria for the structural elements of the project. Include references, loads, load combinations, load factors, safety factors, and assumed or calculated uplift pressures.
C-7.2. Identify appropriate survey, hydrologic, hydraulic, and geotechnical data used as the basis for structural design. Also identify key design data obtained through coordination with other disciplines (e.g., machinery loads).
C-7.3. Provide the structural basis for site selection studies. Include descriptions of any structural measures to maintain or enhance environmental quality.
C-7.4. Provide the technical basis for selection of type and configuration of main and major appurtenant structures for all of the alternatives studied.
C-7.5. Describe evaluation and selection of substructure alternatives based on economy and performance.
C-7.6. Describe site restrictions, probable construction techniques and sequence, and plans for dewatering and care of water. Indicate how these considerations affected evaluation of the alternatives.
C-7.7. Provide results of stability analyses to show application of stability criteria, methods of analysis, and assumptions for each type of structural monolith. The analysis summary for all monoliths should be sufficient to reduce cost contingencies to an acceptable level.
C-7.8. Provide results of initial stress analysis to show application of strength criteria, methods of analysis, assumptions, and key dimensions of components of each major structural system. The analysis summary for all structural elements should be sufficient to reduce cost contingencies to an acceptable level.
C-7.9. Provide results of initial seismic analysis to show application of seismic criteria, methods of analysis, assumptions, and key dimensions of components of each major structural system required too meet seismic requirements. The seismic analysis summary for structural systems should be sufficient to determine if seismic loading controls the design of the structures and should be sufficient to reduce cost contingencies to an acceptable level.
C-7.10. Summarize results of initial thermal stress analyses of massive concrete monoliths.
C-7.11. Describe results of any other analyses, laboratory tests, or field tests, which were necessary to evaluate unprecedented site conditions, operating environment, materials, or load level.
C-7.12. Identify plans for further studies, tests, and analyses after the feasibility phase. This shall include identification of any significant unresolved design issues, an evaluation of how these issues affect current cost contingencies, and how they may impact design costs and schedule.

Assumptions:

1. The scope includes evaluation and analysis of 1 alternative; should additional alternatives be developed during the course of the study this scope must be modified.

Technical Support Branch - Cost Engineering:

Tasks: The Cost Engineering team member will provide rough estimates on proposed alternatives throughout the alternative development. More detailed cost estimates will be required two alternatives as instructed by the PM.

Specific tasks include:

- Attend team meetings
- Participate in site visit(s) and team meetings to provide parametric cost estimates for the measures described above.
- Prepare more detailed MII (an application used to develop detailed cost estimates) cost estimates for up to 3 alternatives that are likely to be considered as the recommended plan
- Prepare Total Project Cost Summary format for one proposed alternative
- Prepare Cost Appendix. Respond to review comments. Obtain Cost Certification for Selected Plan from the Cost Engineering Center of Expertise (Cost MCX).
- Calculate risk-based contingency utilizing Abbreviated Risk Assessment spreadsheet obtained from the Cost MCX (it should be noted that the PDT will be expected to participate in Risk Assessment meeting).

Comments:
It is assumed that parametric costs for individual measures will be sufficient to develop initial costs for alternative development.
Alternatives that demonstrate initial promise as potentially being recommended will warrant a more formal cost estimate, from which those
alternatives can be compared against each other in a cost benefit analysis.

USACE Engineer Research and Development Center (ERDC) – Dredging Operations Technical Support Program.

The ERDC Dredging Operations Technical Support Program (DOTS) provides environmental and engineering technical support to USACE Operations and Maintenance navigation and dredging missions. The PDT submitted a request to the DOTS program asking for a fluvial geomorphology assessment of potential changes resulting from Elm Street dam removal and its predicted water surface evaluation drawdown. This request was accepted. Work completed by ERDC will not increase estimated study costs.

Real Estate Division Efforts:

Tasks: Real Estate Division is responsible for obtaining rights-of-entry for general survey and exploration activities to include researching public records and existing maps to obtain site and ownership information. Civil Engineering and Planning will provide a draft feasibility-level drawing showing the real estate footprint needs for the proposed construction alternative, including parcel identification, estimate of acreage, and acreage subject to navigation servitude, if applicable. Project mapping and conceptual plans will be reviewed to identify real estate requirements, specifically regarding fee acquisition, permanent easements and/or temporary construction easements. In coordination with Engineering Division, ensure project boundaries, project features, required estates, and required facility/utility relocations are accurately depicted on project plans, prior to release to the sponsor. Preliminary lands, easements, right-of-way, relocations, and disposal areas (LERRD) needs and values will be prepared for the LERRD that the sponsor will need to secure prior to construction. The LERRD needs will be in accordance with the proposed construction alternative. The Real Estate Division will prepare a real estate planning report to summarize the LERRD needs and preliminary value estimates. If utility/facility relocations are required, request an attorney's opinion of compensability from Office of Counsel, subject to utility-facility relocation agreement.

Comments: Rights-of-Entry may be required to conduct surveying of the site, but it has not yet been determined whether temporary construction easements, permanent easements, or permanent in-fee acquisition will be required in order to construct and maintain the recommended construction alternative.

Office of Counsel Efforts:

Tasks: Review and certification of documents for legal sufficiency and legal counsel.

Comments: The Office of Counsel efforts are not cost-shared with the sponsor.

District Quality Control Review:

Tasks: All district products, including NEPA and decision documents, will be reviewed by District management, as guided by the project review plan prepared during this feasibility study and by the New England District Quality Control Plan for Civil Works Decision Documents (prepared by Plan Formulation Branch). Review will be managed using Dr. Checks, with all comments, responses, and back-checks fully documented.

Comments: DQC review occurs at the New England District.

Agency Technical Review:

Tasks: The Detailed Project Report, including all appendices and supporting technical documents, will be reviewed by a USACE review team independent of the PDT and drawn from staff outside the performing district, and with a technical review lead from outside the Division. The review will be guided by the project review plan prepared during this feasibility study and by the New England District Quality Control Plan for Civil Works Decision Documents (prepared by Plan Formulation Branch). The Review will be managed using Dr. Checks, with all comments, responses, and back-checks fully documented.

Comments: Independent review by a national USACE Team. ATR team members are chosen from districts other than the New England District.

In-Kind Contributions Provided by the Sponsor:

Tasks: In-kind contributions by the Sponsor (Town of Yarmouth) are defined as "those planning activities (including data collection and other services) that are integral to the Study and would otherwise have been undertaken by the Government for the Study and that are identified in the PMP and performed or provided by the Non-Federal Sponsor after the effective date of this Agreement (once executed) and in accordance with the PMP." The following activities are identified:

Report Writing and Review

- Assist with writing and editing the Detail project report (editing).
- Review and provide comments on planning products and documents.

Data Collection

- Cultural Resources - Assist archeologist with the collection of data about historic structures/cultural resources. Provide information (e.g., pictures and records of flooding events) of historic events.
- Environmental - Provide resource data inventory.
- Real Estate - Provide data and information on land management planning, resources, and ownership.
- Sediment - Collect sediment depth data by probing upstream of the Elm Street Dam to supplement USACE survey collections.

Public Meetings and Coordination

- Assist in conducting public information meetings and compilation of interests, problems, and opportunities. Provide a location and manpower for public meetings.
- Coordinate/communicate with local stakeholders who are interested in the study
- Lead communications with land/property owners that abut the project area.

Comments: Non-Federal work to be contributed needs will be documented through a MOA and then supported by periodic expenditure documentation submittals by the

Sponsor before it can be considered as non-Federal cost-shared contribution toward the total project cost. The PM will work with the sponsor to line out tasks to be credited and documentation requirements.

4.0 Project Budget

Cost-shared estimated budget to complete the feasibility study phase and preparation of the Detailed Project Report and Environmental assessment for the Royal River, Yarmouth ME Section 206 Ecosystem Restoration Project is as follows in **Table 1**.

Table 1: Estimated Study Budget

Major Study Tasks	Task Cost	Federal Cost	Non-Federal Cost
Project Management, Team Leader, and Planning	$100,000		
Geographic Information System Services & Mapping	$6,000		
Economics	$24,000		
Environmental Section	$85,000		
Environmental Conditions (Sediment Analysis)	$34,000		
Cultural Resources	$27,000		
Water Management (Hydrology & Hydraulics)	$175,000		
Geotechnical Engineering*	$47,000		
Civil Engineering	$40,000		
Structural Engineering	$40,000		
Cost Engineering	$45,000		
Real Estate	$30,000		
Management Support	$2,000		
Travel Support	$2,000		
District Quality Control Review	$20,000		
Agency Technical Review	$30,000		
Subtotal	$667,000		
Planning Contingency (10%)	$66,700		
Total	$733,700		

5.0 Project Schedule

Table 2: Study Schedule for the Royal River, Yarmouth, ME Section 206 Ecosystem Restoration Study

Project Task	Milestone Code	Start Date	Complete Date
Development of the PMP		April 2023	June 2023
Prepare and execute Feasibility Cost Share Agreement (completed)	CW130	Oct 2022	Mar 2023
Secure FY2023 funding (non-fed and fed)		Dec 2022	Apr 2023
Hydrologic and Hydraulic modeling (Interim/draft)		Nov 2022	Nov 2023
Identifying Problems and Opportunities, and inventorying and forecasting conditions		Jun 2023	Aug 2023
Sediment Sampling		Aug 2023	Sep 2023
Secure FY 2024 funding (non-fed and fed)		Aug 2023	Sep 2023
Alternative formulation and evaluation, proposed alternative		Aug 2023	Jan 2024
Prepare draft DPR and EA		Jan 2024	Mar 2024
Tentatively Selected Plan Briefing with NAD	CW190	Apr 2024	Apr 2024
District Quality Control of draft DPR/EA		May 2024	Jun 2024
Agency Technical Review (ATR) of draft DPR/EA		Jun 2024	Aug 2024
NAD (MSC) review of draft DPR/EA		Jun 2024	Aug 2024
Public Notice and review period of draft DPR/EA	CW250	Jun 2024	Aug 2024
Finalize DPR/EA as needed with all reviews		Aug 2024	Nov 2024
Submit draft Final DPR package to NAD for final review and approval	CW150	Nov 2024	Mar 2025
PDT addresses NAD comments to finalize DPR/EA and resubmits Final DPR/EA to NAD		Mar 2025	Apr 2025
NAD approves Final DPR/EA	CW170	Apr 2025	May 2025

6.0 Project Delivery Team Members

Currently assigned Project Delivery Team members, as of the date of this PMP, are shown in **Table 3**.

Table 3: Project Delivery Team Members for the Royal River, Yarmouth ME Section 206 Ecosystem Restoration Project.

Team Position	Name
Plan Formulation Branch, Project Manager, PDT Leader, and Planning PDT Member	Janet Cote
Plan Formulation Branch, GIS Resources PDT Member	TBD
Plan Formulation Branch, Economics PDT Member	Courtney Jackson (TBD)
Environmental Branch, Environmental Resources PDT Member	Donald Faughnan
Environmental Branch, Environmental Conditions (Sediment) Analysis PDT Member	Ben Loyd
Environmental Branch, Cultural Resources PDT Member	Marc Paiva
Geotechnical/Water Resources Branch, Water Management (H&H) PDT Member	Thomas Mihlbachler
Geotechnical/Water Resources Branch, Geotechnical Engineering PDT Member	Matt Fleming
Design Branch, Civil Engineering PDT Member	Kevin Hebard
Design Branch, Structural Engineering PDT Member	Mike Andryuk
Technical Support Branch, Cost Engineering PDT Member	Dan Palmer (TBD)
Real Estate Division PDT Member	William Mehr

APPENDIX A: ACTUAL STUDY EXPENDITURES

The budget below represents the estimated feasibility study costs. Budgets will be adjusted throughout study to reflect additional studies or other expenses that may be required to perform the study.

Actual Expenditures FCSA to Present (June 5, 2023)				
	Effort by Discipline	**Federal Funds ($)**	**Non-Federal Funds ($)**	**Total ($)**
1	Project Mgmt./Planning	0	0	0
2	Environmental/NEPA/Cultural Resources	0	0	0
3	Economics	0	0	0
4	H&H Engineering (Modeling)	107,797	0	107,797
5	Structural Engineering	0	0	0
6	Civil Engineering	0	0	0
7	Geotechnical Engineering	0	0	0
8	Geology	0	0	0
9	Cost Engineering	0	0	0
10	Real Estate	0	0	0
11	Agency Technical Review (1 review required)	0	0	0
12	District Quality Control Review (1 reviews required)	0	0	0
13	Survey	0	10,000	10,000
14	GIS	0	0	0
15	Contracts Branch & Division	0	0	0
16	Management Support &Travel	0	0	0
17	Office of Counsel Support	0	0	0
18	Programs Branch	0	0	0
19	Design Branch	0	0	0
	TOTAL	**107,797**	**10,000**	**117,797**