

Forge River Watershed, Suffolk County, New York

Feasibility Study

Project Management Plan



September 2009

Forge River Feasibility Study
Town of Brookhaven, New York
PROJECT MANAGEMENT PLAN

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CHAPTER I - INTRODUCTION

Since the early 20th century, the Forge River and its associated tributaries have experienced significant declines in water quality and environmental conditions which are reflected in excessive macroalgal growth and by periodic hypoxic and or anoxic conditions in the water column that results in the die-off of aquatic species and objectionable odors and visual impacts. In response, New York State, Suffolk County and the Town of Brookhaven have funded a variety of studies to better understand the causes of these conditions and to develop measures that will minimize and mitigate them. In addition, the Town of Brookhaven in 2005 created the Forge River Protection Task Force, comprised of resource managers, regulators, elected officials, local residents, and non-governmental organizations to study existing conditions and make recommendations to elected officials. The task force has provided an invaluable forum for the exchange of information and to focus attention on the problems of the Forge River.

In 2006, because of excessive pathogens and nitrogen and low dissolved oxygen, the Forge River was added to New York's list of 303d waters which requires the preparation of Total Maximum Daily Load (TMDL) that will specify the maximum amount of pollutants the Forge River can receive and still meet water quality standards. The Town of Brookhaven, with funding from the New York State Department of State and assistance from the New York State Department of Environmental Conservation and Suffolk County, will be preparing a third party TMDL which the Department of Environmental Conservation will submit to the US Environmental Protection Agency.

In 2007, the Corps initiated a reconnaissance study of the Forge River watershed. The reconnaissance study found that there is a Federal interest in continuing the study into the feasibility phase. The reconnaissance study concluded that water quality and habitat had been degraded leading to a loss of ecosystem services and identified a number of mitigation measures including improved management of point and non-point source inputs, increased circulation, capping sediment in place, dredging and treating sediment layers and restoring marsh and terrestrial habitats.

While many of the causes of problems associated with the health of the Forge River and its watershed have been identified, a fuller and more comprehensive understanding of the watershed and the Forge River is needed. With a better understanding of the dynamics of the Forge River and its watershed, resource management decisions will more likely succeed in achieving the goals established, and may be applied in a more cost-effective manner.

This Project Management Plan (PMP) describes the details of the cost-shared work the Corps and the Town of Brookhaven as local sponsor as well as the other PMP partners and participants would accomplish under this feasibility study. The purpose of the feasibility study will be to develop an integrated management plan (the PLAN) to maintain, restore and enhance activities that contribute to a healthy Forge River. The Corps' feasibility study is designed to compliment other study, monitoring and implementation efforts within the Forge River's watershed. The feasibility study will result in the development of models to comprehensively address current hydrologic, hydraulic, and sediment transport conditions within the watershed and environmental surveys to map remaining riparian habitats along stream corridors. Preliminary-level studies will be performed at several sites to investigate water quality improvements (such as constructed wetlands) that may assist in meeting the TMDL objectives for the river. Based on this information, alternatives will be identified and screened and an

Environmental Impact Statement (EIS) will be prepared. It is recognized that this PMP is a "living" document and will be revised as needed as new information becomes available or other conditions dictate. The Forge River Protection Task Force and its Technical Advisory Subcommittee will be used as the "umbrella" organizations for this study and other watershed efforts so as to provide open communication and coordination and to avoid duplication of efforts.

1.1 Feasibility Study Objectives

In order to efficiently undertake the feasibility study and to develop actions that can be implemented in the short term, the feasibility study has been divided into two phases:

PHASE I

- a) A comprehensive update of hydrologic, hydraulic, and sediment (yield and transport) models for a range of flow rates for existing conditions and future conditions within the Forge River watershed.
- b) Identification of the environmental resources (key species and habitat types) that should be restored, enhanced or sustained to insure a well-functioning watershed supporting a wide diversity of plants and animal species and improving water quality
- c) Investigation of large and small scale conceptual, site-specific environmental restoration, sediment control, and erosion control opportunities within the Forge River watershed. Prioritize alternatives in the event that funding is not fully available.
- d) Evaluation of ground water and surface water interactions and identification of the relationship between environmental conditions in the Forge River and Moriches Bay and Moriches Inlet. Hydrodynamic and water quality conditions within the Forge River will be modeled for the evaluation of hydrodynamic modification as an alternative.
- e) Identification of actions and programs that can be implemented by Federal, state and local agencies that can help fund or implement solutions to water quality problems based on existing and future development in the watershed.

The Town of Brookhaven (local sponsor) is undertaking a Watershed Management Plan and the preparation of a TMDL which will address many of the elements in a) through e) above and which will be integrated into the feasibility study. The TMDL will enumerate the numeric TMDL number (loading capacity of the watershed) and the Watershed Management Plan will characterize the watershed and identify the conditions within the Forge River's watershed that are causing the water quality problems in the Forge River and set forth early, readily implemented, cost-effective remedial actions within the watershed. This information will be integrated into the assessment and restoration of the Forge River.

PHASE II

- f) Develop watershed management alternatives that integrate ecosystem restoration with flood control, groundwater recharge, polishing of wastewater effluent, and recreation.

- g) Prepare supporting engineering and environmental documentation of without project conditions and with-project conditions for each alternative evaluated in the feasibility phase.
- h) Design, and assess costs, benefits, and environmental outputs of each alternative. Costs will include construction costs, land acquisition, and operation and maintenance.
- i) Formulate for appropriate scale and location of alternative using the U.S. Fish and Wildlife Services Habitat Evaluation Procedures (HEP) or other defensible scientific method.
- j) Prepare a comprehensive environmental document to assist in future watershed management, complete public information process and prepare Record of Decision.

1.2 Specific Restoration Alternative Investigations

During the development of the PLAN, specific alternatives within the Forge River and its watershed may be investigated for restoration purposes.

A preliminary-level investigation of the restoration alternatives will be included as part of the baseline studies, and will provide enough information for decisions in the second phase of the feasibility study. Recommendations for Federal involvement in implementable projects at specific sites will also be identified throughout the course of this feasibility study.

If a specific project can be identified for implementation under an existing Corps authority, then a feasibility study will be undertaken and cost-shared with the appropriate local sponsor(s) as a second phase of this feasibility study. At the W3 Milestone (see Section C Milestones) potential spin-off studies will be identified. The watershed feasibility study will document the initial results of site specific investigations, and focus specific design and analysis on the most appropriate solution within the federal interest.

1.3 Local Sponsorship

A number of public agencies, including Suffolk County and the State of New York, and community groups have indicated support and a willingness to contribute resources, either funding or in-kind services, to the feasibility study. During the course of the feasibility study, the Town of Brookhaven will act as the project manager, facilitating local communication among the multiple partners, and ensuring that all partnering requirements with the Corps are met. A Feasibility Cost Sharing Agreement (FCSA) will be executed between the Town and the Corps. Concurrently, the Town may enter into separate, individual agreements with the other local agencies for cost-recovery and in-kind support for the study.

1.4 Feasibility Study Milestones

The Corps, New York District, is responsible for following the milestone schedule listed below. The start date for this schedule and, therefore, all subsequent dates are contingent upon

execution of the FCSA and receipt of local sponsor funds. The overall study duration is currently estimated to be twenty-six months.

Date	Milestone	Action
Phase I		
10/09	P5	Execute Feasibility Cost Sharing Agreement (FCSA)
1/10	W1	Receive Funds/Begin Feasibility Study
3/10	W2	Public Workshop/EIS Scoping (P-6): Establish protocol for public involvement and agency coordination; present draft Public Involvement Plan; other public workshops to be scheduled if needed.
	W2A	USACE Pre-FSM/Model "Buy-In". Confirm appropriate model selection and application within USACE.
3/11	W3	Formulation Conference: Establish current (baseline) and likely future without project conditions for, a comprehensive look at the basin both existing (baseline) and future without project, with a detailed focus on H&H and ENV; identify, describe and discuss preliminary watershed restoration sites or sub-basins; establish decision framework for prioritizing sites/sub-basins.
7/11	W4/W4A	Formulation Review Briefing/Conference (P-7/P-8): Alternative actions will be identified for Federal and local implementation, if warranted. Conceptual designs and preliminary costs will be described for alternatives; and prioritized. Watershed Management Plan (WMP) completed.
Phase II		
TBD	W5	Draft Feasibility Report, Draft Environmental Document
TBD	W6	Public Review.
TBD	W7	Final Public Meeting and Public Information Meeting, with Draft EIS
TBD	W8	Final Report Submitted (formally P-9): Submit Final Feasibility Report, WMP and Environmental Document. District Engineer's Certification.
TBD	W9	Division Commander's Certification (formally P-10).
TBD	W10	Final Report Submitted to HQ, CWRB, OMB, Congress

* Schedule subject to change as dictated by review requirements.

CHAPTER 2 – THE RECONNAISSANCE STUDY

The Forge River Watershed 905(b) Reconnaissance Study was conducted by the Corps of Engineers to review and assess past and current activities and trends within the watershed, and to identify opportunities for addressing river management issues from a basin-wide perspective.

The 905(b) report, approved September 16, 2008, is attached.

CHAPTER 3 - SCOPE OF WORK

The feasibility study will build on the efforts of previous studies and programs, updating, not replicating existing watershed data. This study will include original data collection and modeling, providing the opportunity for a more accurate assessment of the existing baseline hydrologic, hydraulic, sediment and environmental conditions. Watershed restoration opportunities will be formulated and designed at a level of detail sufficient enough to evaluate system performance and recommend further action, if warranted. Feasibility-level construction evaluations and plans may be an output of the watershed study. If appropriate, a second phase of this feasibility study will be required for projects recommended for implementation, and will be cost-shared with willing partners according to the currently accepted Corps policy.

The following is a description of the major tasks required during the feasibility study. The descriptions are intended to reflect the entire study scope, including work to be performed by the Corps, A-E services, and local sponsor in-kind services. An overview on how all the technical tasks will be integrated to formulate a watershed plan is presented first under "Plan Formulation", with greater detail of the subtasks in the following sections. For a summary of study costs for each account, refer to Section VI. For a complete description and value of the local sponsor in-kind services, please refer to Section VII.

3.1 Plan Formulation

Plan formulation is the process of integrating and analyzing the technical data that is made available during the course of the feasibility phase. The Principles and Guidelines (P&G, Water Resources Council, 1983), the centerpiece of Corps planning guidance, enumerates a six-step planning process that provides a conceptual planning sequence for determining the feasibility of alternative project plans. The process is also applicable to the development of a watershed management plan. The six steps follow a logical order, beginning with identifying problems and opportunities through formulation of alternative plans that may reduce problems or exploit opportunities, to comparison and eventual selection of a recommended plan that is considered to be in the federal interest.

The planning process will follow six basic steps:

- (1) identification of problems and opportunities within the study area
- (2) inventory, forecast, and analysis of water and related land resources within the planning area relevant to the problems and opportunities identified in the first step
- (3) preliminary formulation of alternative plans
- (4) evaluation of the effects of the alternative plans
- (5) comparison of alternative plans
- (6) selection of a recommended plan based upon the comparison of alternative plans

The formulation of plans evolves from an iterative process, repeating one or all of the above steps as needed. At the reconnaissance level (which is the level of detail in this study) the early iterations involve problem identification and resource inventories and forecasts. If project

alternatives advance to the spin-off feasibility phase, steps 4-6 become more rigorous, and include iterations involving combinations, and sizing of structural elements.

Plan formulation will ensure that the report is prepared in accordance with ER 1105-2-100, ER 5-7-1, EC 1105-2-206, EC 1105-2-208, P&G, NEPA, and other pertinent engineering, environmental, and economic guidance and regulations.

Specific activities to be accomplished during the planning process are described below in greater detail:

- A. *Define Existing Conditions.* An updated and detailed assessment of present conditions within the Forge River Watershed will be made as a baseline of reference for comparison with future without and with-project conditions and for evaluation of the impact of past human disturbance and management practices. The assessment will include a mapping and inventory of the items listed below. All of the gathered information will be entered into a geographical information system (GIS) as individual themes and/or tables.
- Surface water hydrology, including base (dry season) flows as well as flood peaks
 - Channel widths, depths and condition (natural, channelized but not lined, lined with bank protection only, fully-lined open channel, underground storm drain, etc.)
 - Hydrodynamics and non-cohesive sediment transport
 - Flood-prone areas and flood-related damages
 - Sediment transport conditions, areas of river aggradation and degradation, bank erosion and related damages
 - Bank protection, bridges, grade-control structures, and detention basins
 - Wastewater facilities including treatment plants and major conveyance lines
 - Surface water quality
 - Groundwater location, depth and quality, including major well locations
 - Recreation facilities including parks, trail linkages, recreational facilities, golf courses, school yards, major open space, etc.
 - Riparian vegetation and wildlife habitat (documented by ground and aerial photography)
 - Cultural resources inventory
 - Existing infrastructure (roads, water mains, major electricity/gas, railroads, and landfills)

- Land development, densities, ownership, and land use patterns
 - Open space
- B. *Likely Future Conditions (No Action).* Future, without-project conditions will be forecast for the watershed. Time periods for future without-project forecasting will be defined during the course of the study. This condition will represent the "no-action" alternative. In terms of water quality, it will necessarily consider the likelihood of compliance with TMDL's for sediment, nutrients, toxics, and pathogens; and the associated costs.
- C. *Plan Formulation.* Objectives, opportunities, and constraints will be defined for the following Watershed Plan purposes:
- | | |
|------------------------------|--------------------------------|
| Ecosystem Restoration | Sediment Management |
| Flood Peak/ Damage Reduction | Erosion Protection |
| Water Supply and Re-Use | Surface & Ground Water Quality |
| Recreation | Education (Schools/Volunteer) |
- D. *Structural Components of the Watershed Management Plan.* The reconnaissance report identified several alternative components of an overall watershed management plan. These projects, which include variations of structural and nonstructural components have the potential to help restore the health of the river and watershed by; (a) trapping additional sediment before it reaches the river (b) removing or reducing nutrients from daily return flows, (c) removing or minimizing exposure to nutrient laden sediment, (d) removing invasive species and restoring riparian vegetation, (e) preventing or reducing incidences of erosion, and (f) increasing flow of watershed. They can be altered or adjusted and recommended for spin-off studies, based on revised opportunities identified during plan formulation. One or more may be more fully examined in a second phase of this feasibility study. Recreation opportunities that compliment the restoration objective, and linkages with existing open spaces will be integrated where feasible.
- E. *Non-structural Components.* Alternatives may include non-structural river management practices (or actions) to be implemented by local entities, as well as specific projects or activities for implementation in cooperation with the Corps (and other local, state and federal agencies). These may include:
- *Monitoring.* Opportunities to improve the current sediment and nutrient watershed monitoring program will be identified. Sites for new gauges, types of data to be collected and frequency will be recommended.
 - *Public Education.* A plan shall be developed that establishes the framework for community and school-based participation in future watershed rehabilitation efforts, including: 1) clean-up of degraded environments; 2) curriculum guidelines for science programs involving field work, biology, botany, geomorphology, etc; 3) tree planting campaigns; 4) community fund raising for riparian corridor improvements, and 5) education campaigns for management of pet wastes.

- F. *Preliminary Evaluation of Alternatives.* Evaluation criteria will be established and alternatives screened to eliminate those which are manifestly not technically feasible, do not meet established objectives, or which violate physical, economic, and institutional constraints.

Alternatives which meet initial screening criteria will be evaluated according to completeness, technical feasibility, effectiveness, efficiency, acceptability, environmental effects, ability to meet objectives, and other evaluation criteria as developed during the course of the study. Conformance with Corps of Engineers guidelines will be a consideration, but will not necessarily be grounds for rejecting an alternative that otherwise fits into the overall river management philosophy provided that other agencies with interest in implementing the alternative can be identified.

Costs, benefits, and environmental outputs of each basin management alternative will be assessed at a preliminary level. Costs will include construction costs, land acquisition, and operation and maintenance. Environmental outputs will be measured in terms of habitat units using the U.S. Fish and Wildlife Services Habitat Evaluation Procedures (HEP) or other defensible scientific method. Tradeoffs between monetary and non-monetary project outputs will be evaluated.

- G. *Recommendation of Watershed Plan.* A recommended, integrated, watershed management plan will be selected and clearly justified according to established criteria. Responsibilities of different agencies will be clearly defined. Individual components of the management plan will be separable to the maximum extent possible to permit their implementation according to a timetable dictated by the abilities and resources of the responsible agencies.

The decision-making framework leading to the recommended management plan will consist of 1) early and continued close coordination between the Corps of Engineers, the local sponsors and other interested agencies, 2) development and evaluation of alternatives using an incremental and cost effectiveness approach, and 3) public involvement and stakeholder buy-in.

3.2 Study Management

The feasibility study will be managed accordingly:

PHASE I:

- (A) The study will begin with a workshop attended by representatives from the Corps of Engineers and all local sponsors (W2 Milestone). The purpose of this workshop will be to: 1) familiarize all study participants with the scope and purpose of the study; 2) identify primary areas of concern for each of the local sponsors; 3) clarify study responsibilities and the proposed schedule; 4) identify preliminary study objectives; 5) identify ongoing efforts to avoid duplication of effort; and, 6) discuss and approve the public and agency involvement plan developed by the Corps study manager.
- (B) Existing and future without-project conditions will be evaluated by the Corps and local sponsors. A comprehensive report describing these conditions will be prepared for review by Corps and the local sponsor.

- (C) A workshop (W3 Milestone), attended by representatives of the Corps and local sponsors will be conducted after review of the baseline conditions report. The purpose of this workshop will be to: 1) discuss baseline conditions, problems and opportunities; 2) define study objectives; and, 3) identify, describe and discuss preliminary river management alternatives to be submitted by the Corps and local sponsors.
- (D) The Corps of Engineers, in conjunction with the local sponsors, will conduct an initial screening of alternatives. A screening report will be written by the Corps and reviewed by the local sponsors, after which a workshop (W4 Milestone) will be conducted to: 1) discuss the results of the screening process; 2) verify river management alternatives to be evaluated in detail and; 3) identify procedures and responsibilities for the detailed evaluation.
- (E) An overall river management plan will be selected from the alternatives and described in a draft report which describes the plan and the alternative evaluation that led to it. This report will be provided to the local sponsors for review and comment (W5 Milestone). The Corps and local sponsors will conduct any appropriate feasibility evaluations of screened alternatives as a second phase of this study.
- (F) A workshop, attended by the public, the Corps and local sponsors will be held to discuss the recommended plan and comments to the draft report (W7 Milestone).

PHASE II

- (G) Actions identified as in the Federal interest will be evaluated. Alternative conceptual designs and preliminary costs will be described and feasibility document will identify recommended plan.
- (H) Draft Environmental Document will be prepared.
- (I) Public Review, Final Public Meeting and Public Information Meeting will be conducted.

The areas of emphasis described above are a general guide and can be modified as necessary by the study manager with concurrence of the local sponsors. Public input will be solicited throughout the course of the study according to the public involvement plan to be developed in the early stages of the study.

3.2.1 Corps Study Management

Study management includes all study, project, and program activities, in accordance with current guidelines outlined in ER 1105-2-100, ER 5-7-1, EC 5-1-48, EC 1105-2-206 and EC 1105-2-208, providing detailed information for the work done for others; establishing study milestones; assisting the development of networks to include work activities, task schedules, critical path networks, and funding schedules; directing, monitoring, and modifying assigned work items as required and agreed upon by the Sponsor; reviewing results and reports provided by the technical support staff; correspondence; report preparation and review;

inter-organization coordination; and conference preparation and presentation. Coordination with the Project Manager involves periodic meetings held with the Sponsors to report on technical issues and the status of the study and in-kind services. Study Management Team meetings will be held on a quarterly basis or more frequently if necessary.

The Planning Study Manager will provide direction to all members of the technical study team, and briefings to the Forge River Watershed Executive Committee (FRWEC). The Planning Study Manager will ensure that all required tasks and team communications are performed, resulting in the production of a high-quality Feasibility Report document. Technical coordination and inter-disciplinary planning are the responsibilities of the Planning Study Manager. This will include monitoring the scope and progress of the activities of the study to ensure that the study is consistent with all relevant planning and engineering guidelines and policy. Deviations of the scope that affect schedule and cost will be immediately coordinated with the FRWEC.

The Planning Study Manager will coordinate with the FRPTF currently includes: the State of New York, Suffolk County, towns within the watershed, Environmental, several special interest groups. The committee should also include representatives from all financial and in-kind contributors to the cost-shared feasibility study. The Study Manager and the Committee will meet on a quarterly basis to discuss study progress and direction, data collection/analyzes and information needs, local community concerns, in-kind deliverables, Corps and A/E contractor deliverables, product acceptance, and financial commitments. In the event that a critical issue shall arise and agreement by the FRWEC for resolution cannot be reached, a formal consultation with the FRWEC shall be scheduled.

Section IX shows three sub-tasks for Corps study management costs for each fiscal year. Tasks are listed in the cost summary table as 13.A.1 for fiscal year one, 13.A.2 for fiscal year two, and 13.A.3 for fiscal year three. The Federal fiscal year begins October 1 of every calendar year.

3.2.2. Sponsor Study Management

A manager will be assigned by each of the participating sponsors to ensure communications, in-kind work, and funding requirements are made in a timely, quality manner. The manager(s) will participate in the monthly FRWEC meetings, public workshops, hearings, and briefings as needed.

Section IX also shows three sub-tasks for Sponsor study management costs for each fiscal year. Tasks will be listed in the cost summary table as 13.B.1 for fiscal year one, 13.B.2 for fiscal year two, and 13.B.3 for fiscal year three. The Sponsor's fiscal year begins July 1 of every calendar year.

3.2.3. Executive Committee

The Forge River Watershed Executive Committee (FRWEC) will include the individuals identified in the Feasibility Cost Sharing Agreement (FCSA). The FRWEC has final authority for resolving study issues and modifying the study agreement and scope of services as described in the PMP. The FRWEC is usually comprised of high-level department managers or appointees, including one or two

representatives per cost-sharing agency. They will meet on an as-needed basis, but no less than four (4) times, during the course of the twenty-nine month study (milestones W1, 3, 4, 9). All major deviations to the schedule, cost, and scope of the approved PMP must be approved by the EC.

3.3 Coordination and Public Involvement

This task will include public meetings, workshops, hearings, and briefings, as well as the preparation and distribution of fact sheets and information papers to interested parties and local news agencies. A Forge River watershed website will be developed as a central repository for electronic information. A draft of all information to be provided to the public, or placed on the website, will be reviewed by the Study Manager. Responsibility for all public involvement will be shared equally between the Corps and local sponsors.

The goals of this task are: 1) promote understanding of the planning process, and to a lesser extent, the design and construction processes in terms of potential projects; 2) obtain public input regarding problems, opportunities, constraints, alternatives, outputs, impacts, and costs; 3) coordinate the Forge River watershed planning effort with the efforts of other Federal, state, and local agencies; and 4) satisfy public meeting and scoping requirements of the NEPA process.

The end product of the Coordination and Public Involvement Task will be to summarize the information obtained from the following subtasks into a Public Involvement section to the final feasibility report.

- A. *Public Involvement Plan.* The Corps Study Manager, in cooperation with the lead study manager for the Town of Brookhaven, will provide participating sponsors with guidelines to define the objectives of the program. Public involvement techniques will be decided and a study schedule with specific milestones will be incorporated into a Public Involvement Plan. During the formulation of the Public Involvement Plan, the number and types of meetings, workshops, and newsletters will be determined. A mailing list will be updated to include all potentially interested parties. Strategies to maximize public outreach will be developed.
- B. *Initial Public Workshop (W2 Milestone).* An initial public meeting will be held early in the feasibility schedule to serve to introduce the study to interested parties. Scoping issues, concerns, and opportunities will be discussed. The following will be required:
 - Public meeting facility (50+persons)
 - Professional facilitator
 - Audio/visual equipment
 - Meeting announcement/advertising
 - Presentation materials/handouts
 - Record of meeting/follow-up mailing to interested parties
- C. *Additional Study Progress Briefings.* The Forge River Watershed Executive Committee meetings will be held on a monthly basis, and will be used to brief the public on the status of the watershed study efforts. Additional informal public workshops may be held during the course of the study to report technical findings and solicit public input into the formulation of the watershed framework plan.

- D. *Information Dissemination.* All interested parties will continue to be informed of the progress of the study through periodic news releases and newsletters. A Forge River watershed website will be established under the existing Town of Brookhaven homepage as a repository for electronic copies of documents, newsletters, and links to related websites or homepages. Prior to the Final Public Meeting, the Draft Feasibility Report will be released for review and comment by the public.
- E. *Watershed Education.* This task will include a public awareness and education program targeting elementary schools within the watershed. Opportunities to link communities with school programs and public/private partnerships for restoring and monitoring the health of watershed and bay ecosystems will be evaluated. These opportunities include the use of the website to be constructed for this study, field trips for students and parents, and guest speakers.
- F. *Final Public Meeting (W7 Milestone).* A Final Public Meeting will be held to present the findings of the Draft Feasibility Report. Direct input from the public will be obtained for incorporation into the Final Report. Similar logistical requirements as Item B above, with the addition of a professional recorder and preparation of hearing transcripts are suggested.

3.4 Institutional Studies

The Institutional Studies Task involves determining the financial and legal arrangements required to implement the recommended plans, including methods of financing the projects and operating and maintaining existing projects in a manner that will ensure long term restoration of the watershed and river ecosystem. A financial capability analysis will examine whether or not the Sponsor(s) have the organizational, legal, and financial capability to undertake the required financial obligations for implementing and maintaining the project(s) after it is authorized for construction by Congress. The financing plan will determine the Federal, state and local interests in the financing and maintenance of elements of the recommended watershed plan. The information obtained from the following subtasks will be provided in a financial, legal, and cost recovery analysis section of the feasibility report.

- A. *Financial Analysis and Planning.* This subtask will begin with a review of the current financial agreements in place for operation and maintenance of water resource related infrastructure, including an assessment of long term local financial interest and capability. Cost sharing, alternative repayment options for any incidental project purposes, and other financial options will be defined. Financial discussions will be coordinated between the Sponsors, other interested agencies, and the public. The collected data will be evaluated, and a financial capability analysis will be performed. The analysis consists of plan development, evaluation, optimization, and selection of a recommended plan that is consistent with local desires and maximizes the opportunity for leveraging local, state and federal funding for long term requirements. A draft and final financial and cost recovery section of the feasibility report will be prepared. Interim status reports will be developed and fully coordinated with local, state and federal agencies during the course of the study. An authorized, local committee representing all legal entities will work closely with the Corps in the analysis, documentation, and drafting of this sub-report.

- B. *Water Rights, Regulations, and Legal Considerations.* Research will be conducted into water rights for surface and groundwater in the study area, to determine the potential for use of water at the ecosystem restoration sites identified in the watershed study. Potential alternatives involving groundwater, treated wastewater, and surface water will be reviewed for compliance with local, state, and federal water quality regulations and water rights issues. This task should build on existing data and identify gaps that need to be filled.

- C. *Legal Responsibility for Remediation by Other Parties.* EC 1105-2-210, par. 6(c), prohibits the Corps of Engineers from participating in ecosystem restoration activities that would principally result in treatment of pollution problems caused by others who may still have a legal responsibility for remediation. District counsel will prepare a determination of potential liability for the remediation for present and past owners for project sites that appear to have federal interest for implementation and which may be impaired with pollution problems.

3.5 Social Studies

The existing sociological, economic, and demographic conditions for the Forge River watershed will be documented for the final report. Information should reflect the results of the most recent census.

3.6 Cultural Resources Studies

It is assumed that the Watershed Feasibility Study will identify actions in which the Corps may participate as well as opportunities for collaborative actions. Cultural Resource review, evaluation and coordination tasks for this PMP are intended to evaluate actions in which the Corps will have a primary role. The Corps will ensure compliance with Section 106 of the National Historic Preservation Act and its implementing regulations (36 CFR Part 800). The Corps shall conduct documentary research to identify existing historic properties and archaeological sensitive areas within the proposed study area. This research will be used to determine if potential projects will have an effect on the identified resources and make recommendations for additional investigations. Based on this investigation, the completion of the Section 106 process may result in the execution of a programmatic Memorandum of Agreement (MOA). The Town of Brookhaven will be consulted and requested to provide data and input regarding the Phase I evaluation of historic and cultural properties within the study area. The Unkechaug Indian Nation of Poospatuck Indians will be consulted regarding the archaeological potential of the study area.

This process could conclude with a signed Memorandum of Agreement with relevant parties that will outline how site specific cultural resource issues will be evaluated and either avoided or mitigated for, once a final recommended alternative is proposed. If other watershed opportunities are identified in which the Corps will also have a role, then further coordination for those actions may be required.

An inventory of known historic resources, either listed or determined to be eligible for listing on the National Register of Historic Places will be compiled. This inventory will include documented Prehistoric and Historic sites (standing structures and archaeological), historic districts and viewscapes. Once the Areas of Potential Effect (APE) for cultural resources are determined for proposed alternatives, further investigations and consultations will be undertaken to assess and

fill any data gaps. Project alternatives will be developed to avoid, minimize, and reduce adverse effects on cultural resources. If it is not possible to avoid impacts, further work, and a revised PMP may be required. Unavoidable adverse effects will be mitigated through appropriate treatment plans and commitments for cultural resource mitigation, data recovery, and curation, as appropriate, will be institutionalized in a MOA.

Several studies and related tasks are required to fulfill the following regulations:

- The National Historic Preservation Act of 1966, as amended through 1992, particularly Section 106 which requires a Federal Agency to take into account the effect of any undertaking on any district, site, building, structure or object that is included in or eligible for inclusion in the National Register of Historic Places;
- Section 110 which states that Federal agencies shall assume the responsibility for the preservation and protection of historic properties and the recordation of historic properties prior to their demolition;
- 36 CFR Part 800: Protection of Historic Properties, the regulations governing the Section 106 Review Process, including the coordination between a Federal Agency, the appropriate State Historic Preservation Office and the Advisory Council on Historic Preservation, when necessary and the Abandoned Shipwreck Act of 1987, which requires Federal agencies to locate and identify shipwrecks and to determine which shipwrecks are historic in waters under their ownership and control. It also requires Federal agencies whose activities may disturb, alter, damage or destroy State owned shipwrecks to take into account, prior to approving the activity, the effect of the proposed activity on any State owned shipwreck and to afford the State agencies assigned management responsibility for State owned shipwrecks a reasonable opportunity to comment on the proposed activity.

An evaluation of the impact of alternative plans on historic properties will be developed in consultation with the New York State Office of Parks, Recreation and Historic Preservation (NY SHPO). If additional resources are considered, cultural resource studies will be required at additional cost. The costs do not include the cost of mitigation in the form of data recovery (i.e., Phase III Recordation) should significant resources be unavoidable.

A. Comprehensive Study

There are four phases to the cultural resource process:

Phase IA -Documentary Report:

A baseline study of existing conditions and potential effect of the proposed project.

Phase IB - Field Testing:

Limited testing, generally Standardized Test Pits (STPs) to determine whether or not potential remains exist within the project area.

Phase II - Field Testing:

If known sites exist, or have been uncovered in the Phase IB, expanded test are undertaken to determine if full excavation/mitigation is required.

Phase III - Mitigation:

A full archaeological excavation and mitigation of significant buried cultural resources.

Generally, not every phase of the process is undertaken. They are sequential.

For this study, a Phase IA Documentary Research Report will be undertaken of the entire project area. This work includes gathering pre-existing historic and archaeological information, field survey, map review, oral and landscape/viewscape consideration and finally, analyzes the proposed/projected alternatives to determine what, if any, impacts the potential project may have on the various cultural resources. The report may also recommend further testing, in the form of a Phase IB, to better evaluate the potential impacts the project may have on potential eligibility for listing of site(s) on the National Register of Historic Places (NRHP). All of these actions will be done in coordination with the various local, State and Federal regulatory agencies and interested parties. This task will be undertaken by District personnel.

B. Native American (Poospatuck) Coordination

As the study area includes a portion of the Unkechaug Indian Nation of Poospatuck Indians, a state recognized Indian Tribe and property stakeholder within the project area, the Corps will consult with them to identify 1) potentially culturally sensitive areas within and around the study area and 2) potential projects within their state-reservation lands. The Corps is responsible for conducting this consultation as part of the Section 106 process and as part of project development. The Town of Brookhaven may have experience in working with the Poospatuck Indians and can provide support in conducting this consultation.

C. Memorandum of Agreement

As there may be several alternatives proposed for future study, the Corps will develop a Programmatic Memorandum of Agreement (MOA) to insure that potential impacts of proposed projects to historic properties will be adequately evaluated. The preparation of the programmatic MOA will require coordination with the NY SHPO, the Advisory Council on Historic Preservation, the Town of Brookhaven, the Unkechaug Indian Nation of Poospatuck Indians, other State and Local governmental agencies and other interested parties. The draft programmatic MOA will be circulated to the public for review and comment as part of the public review of the draft EIS. This task will also include participating in and providing input for the NEPA scoping process and the draft and final EIS.

D. All Other Cultural Resources Studies/Reports/Tasks

These various in-house tasks include, but is not limited to: attendance of Corps, interagency and public meetings and review of Corps and other relevant project documents; preparation of contracting documents and the awarding of the SOW, review of A/E submissions, coordination with NY SHPO, the Advisory Council on Historic Preservation, various other State and local governmental agencies, interested organizations, parties and individuals; the preparation of input to the NEPA documents; preparing mitigation plans and cost estimates for the PED and PMP but does not include the costs to prepare and coordinate a Memorandum of Agreement; S&A costs and public outreach and other project information enhancement by the participation in workshop, conferences and/or specific training. Cultural resources study management will be on-

going throughout the study. These tasks will be undertaken by District personnel.

FINAL NOTE: If it is determined that cultural resource tasks should move beyond the Phase IA and Programmatic Memorandum of Agreement, this PMP will have to be updated to reflect the changes. At this time, a budget and schedule is impossible to outline as the specific nature of the resource has yet to be uncovered.

3.7 Environmental Studies

The environmental studies will include a watershed inventory and mapping of remaining riparian habitat along stream corridors, identification of species diversity, a rating of habitat quality, an integration of available surface and ground water quality information, and formulation of restoration alternatives. The information will be used in defining the baseline (existing and future without project) environmental conditions used to evaluate the effects of watershed management and ecosystem restoration alternatives.

A Defining Existing Conditions

1. *Riparian Habitat Assessment.* Baseline (present and future), without-project conditions for riparian habitat, water quality, fish and wildlife, endangered species, and other pertinent environmental conditions will be surveyed, mapped, and adequately described at a level appropriate to this study so that an incremental analysis may be performed. This assessment will include landscape-scale mapping and area inventory of all major watershed tributary habitat types. Baseline riparian habitats for major tributaries of the watershed shall be evaluated using available information, aerial photographs, and a comprehensive field survey. Baseline non-riparian habitat shall be evaluated using available information, aerial photographs and field spot checks as needed. A scientific habitat evaluation method acceptable to the U.S. Army Corps of Engineers, Suffolk County, the U.S. Fish and Wildlife Service, local sponsors and stakeholders will be used to assess habitat value. Invasive plant species shall be identified and mapped.
2. *Water Quality Assessment.* Environmental studies will include evaluation of baseline (existing and future without-project) water quality conditions for surface water and groundwater within the Forge River watershed. Effects of projects alternatives and surface and groundwater quality will also be evaluated. The analysis will be based on the review of existing water quality data collected by local and state agencies. Temperature, dissolved oxygen, conductivity, turbidity, depth, water movement criteria, sediment and nutrient loading, groundwater pollutant types and concentrations, and other components of water quality shall be collected and evaluated. Limiting values (i.e. loads, concentrations, etc.) that adversely affect recreational use, or wildlife and aquatic species shall be established. Future without project conditions must consider ongoing efforts in the sediment and nutrient TMDL's. Detailed tasks include:
 - 2.1 Analysis of surface water and groundwater quality, including non-point urban runoff and point source runoff. Water quality components include, but are not limited to: sediment and nutrient loadings, trace constituents, toxic substances, pathogens, recently mobilized DDT, temperature, dissolved oxygen, conductivity, turbidity, urban and vegetative trash/debris, depth, and water movement criteria. Quantify the spatial

(tributary) and temporal (seasonal) distributions of constituents for use in siting proposed restoration alternatives. Coordinate with hydraulics to determine if water quality is affected by ponding of daily return flows behind debris trapped on structures.

- 2.2 Model water quality by acquiring, reviewing, plotting and assembling data within CEQUAL-ICM and perform scenario assessments for up to 4 alternatives.
- 2.3 Review and evaluate the water quality monitoring activities ongoing in the watershed and provide recommendations to improve or augment them from a watershed basis. Develop protocol or process (where, when, how) for collection of fluvial samples during the ascending phase, at the peak discharge, and in the descending phase of flows resulting from storms with greater than 0.5 inches of rain. Coordinate with sediment monitoring.
- 2.4 Determine the effects of project alternatives on water quality. Coordinate with hydraulics to reduce ponding of low flows at structures.
- 2.5 Identify sediment, nutrient, toxics and pathogenic target levels for the watershed and Bay, based on baseline condition analyses and potential benefits resulting from the ecosystem restoration alternatives.

3. *HTRW Evaluation.* A detailed evaluation of existing information and data gaps will be conducted for the Feasibility Study to include review of geotechnical products, development of integrated work plans and data collection efforts; Develop sampling strategy, acquisition plan for contracted services, implement survey, monitor, review report and coordinate results.

The HTRW work will be documented in a report that will be used in the EIS. The known sites will be summarized, and an inventory of available data (i.e., agency, location, website, etc.) will be produced for use for future project feature siting and design purposes.

- B. *Ecosystem Restoration Goals and Objectives.* Ecosystem restoration goals and objectives for the study area will be defined. Overall goals and objectives may be set in terms of ecosystem restoration of habitats and communities for a range of species within the watershed. Objectives must eventually be quantified in terms of habitat units, functions, and values as defined by the habitat evaluation method adopted for use in the study. The objectives should be coordinated with those articulated within the South Shore Estuary Reserve (SSER) Comprehensive Management Plan (CMP). Ecosystem restoration opportunities will be compatible with economic development, flood control, groundwater recharge, wastewater re-use, and recreation objectives of the watershed management plan. This task will require close coordination with other agencies.

- C. *Environmental Opportunities.*

- 1 *Restoration Alternatives.* Assist in the development of watershed management alternatives that integrate ecosystem restoration with flood control, groundwater recharge, polishing of wastewater effluent, and recreation. Emphasis will be given to measures or groups of measures that will restore a corridor or green way of interconnected habitat as opposed to isolated measures with limited habitat

output. Strategies shall be developed for removal of invasive species with replacement by native vegetation. Opportunities and alternatives for with-project water quality improvement shall be developed for surface water flows, local water supply for domestic use, water used for recreational purposes, and groundwater. These water quality issues may be interrelated. Improvements to be investigated shall include wetland and riparian vegetation development, best management practices, public awareness programs, modification of stream topography and gradient, dilution of surface and ground waters, optimum usage of reclaimed wastewater, and other opportunities identified in the plan formulation process.

2. *Maintenance of Channels and Basins.* In conjunction with hydraulic team members and local sponsors, channel maintenance needs and appropriate maintenance methods will be identified and impacts documented as part of the EIS/EIR that accompanies the PLAN.
3. *Recreation Needs and Opportunities.* Develop a comprehensive, realistic vision of the river recreation system along the major tributaries of the watershed. Develop and evaluate recreation alternatives in conjunction with ecosystem restoration and flood control opportunities. This will include, but not be limited to:
 - Develop concept plans at a reconnaissance level showing the nature and location of alternative recreational facilities.
 - Identify and evaluate opportunities for development of river parks trails and other appropriate recreational uses along the creek system.
 - Coordinate with other planning efforts by Suffolk County and the Town of Brookhaven.

D. *Environmental Benefits.*

- 1 *Environmental Outputs.* Environmental outputs shall be measured in terms of habitat units using an approved habitat evaluation method established for the baseline conditions. Outputs of plan increments will be displayed in a format prescribed by USACE which allows for an incremental cost analysis of the measures under consideration.

- 2 *Recreation Outputs.* Recreation outputs will be quantified in coordination with the Economic Section of the Corps and include a breakdown of water contact (public health) related benefits as well as user days for trails, hiking, etc.

- E. *Environmental Appendix Including NEPA Documentation.* The Environmental Studies Task will include preparation of an Environmental Appendix.

3.8 Fish and Wildlife Studies

Coordinate Fish and Wildlife Coordination Act Report.

3.9 Economic Studies

Economic data will be used to define the benefits and costs of potential restoration projects. Benefits include the reduction of flood and erosion damages, the increase in habitat and recreational value, and the savings in sediment maintenance and water quality related costs in comparison to the baseline condition. The baseline is defined as the expected flood and erosion damages, or the value of habitat and recreation for the current condition, and for the future without-project condition. Costs include those for construction, operation, and maintenance of proposed project alternatives.

The economic data prepared during previous studies will be used to its full extent when such data is consistent with feasibility report requirements. Studies will be conducted pursuant to Chapter 6, Economic Considerations, of ER 1105-2-100. The base conditions from which economic development occurs must be well-documented and readily understood. The feasibility analysis will also require the development of project area specific baseline information. To develop this baseline condition, the following tasks must be accomplished:

- A. *Inventory of Erosion Damages.* Conduct a general inventory of the following facilities susceptible to being damaged by erosion within the study area: bridges, flood control channels, pipelines (gas, water, and sewage). Field investigations will be based upon hydrology, hydraulics and sediment transport investigations that identify channel areas subject to erosion, and by contacting the public or private establishments charged with the operation of affected facilities.
- B. *Inventory of Sediment Related Maintenance Costs.* Complete a financial inventory of the historical costs associated with sediment control and maintenance. This will include the cost of construction and the long-term maintenance requirements of any sediment control features. Inventory the costs for individual stakeholders to meet sediment and water quality goals versus a regional approach.
- C. *TMDL Implementation Costs.* Evaluate compliance costs to meet the partial or total objectives of the sediment, nutrient, toxics and pathogenic TMDL's.
- D. *Recreation.* An inventory and description of existing recreation resources will be completed and will include the following:

- Estimate recreation resource (similar recreation provided in the study area). This involves gathering information from the local sponsor (s) and/or local experts to estimate the inventory of recreation resources in the market area.
 - Forecast potential recreation use in study area. Gather information from the local sponsor(s) and local experts to determine potential recreation use.
- E. *Development Growth.* Based on a review of existing data, the rate of future growth of development in the watershed will be documented. This review will include documentation of the available information listed below.
1. Current forecasts for the project/surrounding area
 2. Census tract population/demographic items count for the area
 3. Household formation rates for the area
 4. Project area vacancy rates
 5. Land zoning/ Zoning densities
 6. Public land demands
 7. Commercial land demands
 8. Development pattern
 - a. Parcel size development
 - b. Ratio of parcel size development.
 9. Socio-economic characteristics of future population.
- F. *Erosion Damage Assessment.* Determine the future without-project damages from erosion within the watershed, by conducting a general survey of damages along the major watercourses, with more detailed economic studies at project alternative sites. Forecast of damages will be supported by hydraulic studies and historic documentation.
- G. *Incremental Cost Analysis.* An incremental cost analysis will be performed in cooperation with Environmental Branch to determine the most efficient and cost-effective alternatives for ecosystem restoration. This effort includes the following tasks:
- Display environmental outputs (Habitat units) and cost estimates of the management measures increments.
 - Analyze management measures to separate those that can and can not be implemented together.
 - Identify combinations of managements measures and calculate each combination output (habitat units) and cost.
 - Eliminate economically inefficient solutions (e.g. those solutions which have a higher cost and produce less output).
 - Calculate average cost of each level of output.
 - Recalculate average costs for additional output.
 - Calculate incremental costs.
 - Compare successive outputs and incremental costs.
- H. *Compute Annual Cost* Annual costs will also be calculated for each alternative, including construction costs, interest during construction, real estate, operation and

maintenance, etc. Costs will be converted to annual figures using the appropriate discount rate.

- I. *Habitat Benefits.* Habitat values will be displayed for each alternative in terms of habitat units (from the HEP analysis) or other appropriate methodology identified in a literature search to be conducted into the quantification of environmental restoration outputs. Habitat values for the various alternatives will be compared to costs in the selection of recommended management alternatives.
- J. *Tradeoff Analysis.* A trade-off analysis between monetary and non-monetary benefits shall be completed for the structural and non-structural elements of the PLAN. Selection criteria derived at the beginning of the study will be applied to a decision-framework that is acceptable to all members of the study team (Federal and non-Federal).
- K. *Prepare Economic Appendix.* All data collected and/or developed to support the alternatives will be collected and displayed in an economics appendix to the final feasibility report.

3.10 Surveying and Mapping

- A. *Collection of Existing Mapping.* This task will include the collection of existing aerial photographs, topographic, and Geographical Information System (GIS) mapping for use by the study team to define the baseline condition. Known resources include, but are not limited to:
 - Are Digital USGS contours are available from the Suffolk County GIS. Can be used to generate Digital terrain Models (DTM) for use in watershed delineations under for Hydrology.
 - Aerial photos, if available may be used as a backdrop for GIS information.
- B. *New Mapping.* New aerial mapping is not anticipated for the overall study area, based upon the availability of existing information. As efforts proceed into Phase II, site specific aerial mapping may be required. The mapping is intended for plotting of overflows and for the conceptual design of the alternatives. The mapping along the channels should be wide enough to include the overflow delineations and should also accommodate conceptual design of proposed wetlands/restoration project. Where plotted, the existing 500-year FEMA floodplain is suggested as a minimum mapping width. Exact mapping requirements shall be coordinated with the study manager and the hydraulic, environmental and economic technical team members prior to initiation of this task. To avoid duplication, mapping efforts should also be coordinated with any that may be underway elsewhere, such as Environmental Protection Agency (EPA) funded watershed work efforts.

The mapping shall show culture, including buildings, bridges, fences, walls, trees, shrubbery, labeled streets and access roads (including curb, gutter and sidewalks), railroads, drainage features, and exposed utility features. The mapping shall be supplemented by ground survey with field notes indicating: dimensions, and

elevations of the invert, low chord, and top of road or railing for each bridge or utility crossing the channel; dimensions and elevations of pipes, culverts, headwalls, chutes, or drainage ways entering the channel; dimensions and elevations of any other culture found along the study reaches, and along the major tributaries within 200 feet of their confluence with one of the study reaches.

Mapping is required to be compiled in the 1983 North American Datum (NAD 1983) for horizontal control, and the 1988 North American Vertical Datum (NAVD 88) for vertical control, and must meet the U.S. Bureau of the Budget's United States National Map Accuracy Standards and comply with: Federal Geodetic Control Networks and the following Corps Engineering Memorandums:

- EM 1110-1-1002, Survey Markers and Monumentation,
- EM 1110-1-1003 14 June 1991, NAVSTAR Global Positioning System Surveying
- EM 1110-1-1807, Parts 1 to 4 30 July 1990, □Standards Manual for U.S. Army Corps of Engineers Computer Aided Design and Drafting Systems.

Original topographic maps and aerial ortho-photographs shall be supplied to the hydrologic/hydraulic, environmental and economics sections of the Corps. Original field notes shall be provided to the hydrologic/hydraulics section. Digital files shall be provided to the engineering division.

- C. *Aerial Photography.* Existing aerial photography should be sufficient for use in habitat evaluation and identification of restoration alternatives.
- D. *GIS.* A Data Management Plan (DMP) will be created for the project and maintained throughout the lifecycle of the project. The DMP will identify existing sources of geospatial (CADD and GIS) data, new geospatial data collection, and catalog all aspects of geospatial data. Discharges, floodplains, habitat areas, project alternatives, etc. generated by the study will be converted into a project GIS. Aerial photographs should be geo-referenced to serve as a backdrop.

3.11 Hydrology, Hydraulics, Sedimentation, and Groundwater Investigations

This section describes preparation of hydrologic, hydraulic, sediment, and groundwater evaluations of the existing and planned watershed features and facilities. The goal is to identify adjustments to the system to reduce sedimentation and improve water quality in Forge River and tributaries to the Forge River while providing opportunities for environmental restoration within the watercourses. Because this task encompasses the majority of the necessary technical studies, it is broken into four major subtasks: (A) Hydrology, (B) Hydraulics, (C) Sedimentation, and (D) Groundwater.

A. Hydrology

- 1) Research, collect, and review hydrologic information from Corps of Engineers, Suffolk County Public Facilities and Resources Department, other public agencies, and private consultants. The aforementioned studies are suggested as a minimum starting point. The goal is to avoid duplicating previous efforts.

- 2) Collect and review current rainfall-frequency analyses for Suffolk County watersheds. Coordinate with the County and the Corps to determine if existing depth-duration-frequency relations, or aerial reduction of point rainfall depths need revision.
- 3) Collect available streamgage data and update existing flood frequency analyses (computed probability, 5% and 95% confidence limits) for the following gage records.
- 4) Construct rainfall-runoff models for the Forge River watershed using the Corps of Engineers HEC-1, or HECHMS computer programs. Model results will be used to construct without project discharge - frequency curves for the current land use conditions and the expected future land use conditions. Develop 5-, 10-, 25-, 50-, and 100-year synthetic hydrographs for the gage sites listed above, and at the tributaries and potential restoration sites (see Plan Formulation section) listed below.

Determine rainfall inputs, watershed losses, unit hydrograph, and channel routing parameters in coordination with the USACE and appropriate local agency. Peak discharges will be computed for the expected value (50% confidence interval). The model will be calibrated to adequately reproduce the n-year peak discharges for the available gages in the area, and regional relationships, if practical. In order to accommodate detailed sediment yield analyses, the drainage area of the subwatersheds should be on the order of one square mile. The models can be extended to the 500-year (or greater) events, as needed during spin-off feasibility analyses.

- 5) Perform seasonal discharge frequency analyses for the selected stream gages to identify the dry season for low flow analysis. Using average daily flows values, compute the number of days per month that low flows exceed certain thresholds (i.e., 1 cfs, 5 cfs, 10 cfs, etc.).
- 6) Determine with-project discharge-frequency curves for each of the alternatives at the same concentration points for current and future land-use conditions.
- 7) Review and summarize the operations of existing flood control and water storage reservoirs. Coordinate with Sedimentation tasks to evaluate potential for additional sediment trapping, and the effects on storage for flood control, water use, and water reuse systems.
- 8) Coordinate with other study team members to provide hydrologic input to design alternatives. Attend meetings, conferences, and coordinate as required and assist in plan formulation. Prepare qualitative concept hydrologic design data with sketches and narrative.
- 9) Prepare hydrologic documentation presenting discharge-frequency results for without project conditions and for each of the alternatives evaluated in the feasibility phase. Prepare independent technical review comments and attend review conferences. Address review comments and prepare final appendix. File study material.

B. Hydraulics

- 1) Coordinate with Corps of Engineers, Suffolk County, the Town of Brookhaven, other agencies and consultants to identify and obtain all relevant hydraulic engineering studies previously conducted. Review previous studies and reports, catalogs, and prepare a very brief abstract/summary.
- 2) Collect and review as built plans for structures, bridges, and utilities; topographic mapping; and field survey to determine channel configuration. Prepare a list of all plans and surveys available, with the dates and a map locating all plans and surveys along the creek.
- 3) Perform a field reconnaissance of Forge River and prepare field notes, sketches, and photographs of bridges, utility crossings, confluences, transitions, and other areas as needed to verify channel geometry, stability, roughness values, debris trapping problems, and river morphology. Provide hydraulic parameters (reach length, slope, geometry, and roughness) for use in the without-project hydrologic models.
- 4) Prepare a detailed hydraulic analysis of Forge River for existing and future without project conditions using HEC-2 or HEC-RAS. Prepare overflow maps and flood profiles for the 5-, 10-, 25-, 50-, and 100-year events. Tabulate hydraulic parameters including water surface elevation, depth, velocities, slope, and top width.
- 5) Perform reconnaissance-level hydraulic design for alternatives. When possible, design should improve physical water quality characteristics (dissolved oxygen, temperature, turbidity) and minimize debris trapping on structures. Consider effects of in-channel restoration projects on flood conveyance capacity.
- 6) Detention basin alternatives for flood peak reduction and sediment trapping. Research Corps guidance on stable channel and sedimentation basin design. Lay out plan and profile, including low drop structures, inlet and outlet features, sediment trapping features, overflow structures, and erosion protection for side slopes. Develop stage-storage and stage-discharge relations.
- 7) Channelization/channel restoration alternatives. Coordinate with biologists, develop criteria for allowable vegetation, consult Corps guidance, and determine values. Design incidental revetment structures and bank protection where needed as part of the restoration projects.
- 8) Prepare a conceptual -level hydraulic analysis of Forge River for with-project conditions using HEC-2 or HEC-RAS. Describe changed conditions, including trapping efficiency for sediment control features, and estimates of contributions to erosion control.
- 9) Coordinate with other study team members to provide hydraulic input to design alternatives. Attend meetings, conferences, and coordinate as required and assist in plan formulation. Prepare qualitative concept hydraulic design data with sketches and narrative.

- 10) Prepare hydraulic documentation for without project conditions and for each of the alternatives evaluated in the feasibility phase. Prepare independent technical review comments and attend review conferences. Address review comments and prepare final appendix. File study material.

C. Sedimentation

- 1) Review previous sedimentation studies conducted in portions of the Forge River watershed to assess the watershed's hydraulic conditions, hydrology, methods used, data, and results pertinent to the present conditions and proposed project conditions. Collect and review the data available from the sediment control and maintenance monitoring program ongoing in the watershed. Include in the review an identification of major sediment sources within the watershed. What are the effects of flow diversions, sediment retention facilities, and agricultural irrigation activities on sediment production. Compile information that may be used to characterize watershed soil loss and sediment yield. Summarize the data available and identify gaps. To avoid duplication of previous efforts, the sedimentation studies should build on previous information whenever practical.
- 2) Prepare a geomorphic analysis that characterizes the general stability or erosional characteristics of the study reach. Use available information, particularly historic aerial photographs, development history, flood/erosion history, maintenance records, surveyed cross-sectional data and field reconnaissance.
- 3) Sediment sampling to determine particle size distributions at source areas (channels) and sink areas (basins, channels, and the river).
- 4) Prepare sedimentation analysis for existing and future without-project conditions.
- 5) Estimate sediment delivery to Forge River.
- 6) Hydraulic/Sediment Design Data for Potential Solutions. Research Corps guidance and provide input for stable channel and sedimentation basin design. Evaluate potential for additional sediment trapping for proposed detention basin modifications. Consider use of polymer additives that promote flocculation of the colloids and increase the rate of settling of fines.
- 7) Prepare sedimentation analysis for with-project conditions. Apply SAM program and refine design for stability of sediment transport.
- 8) Assist in Developing Maintenance Plan. Review and evaluate existing maintenance activities in terms of frequency, volumes of sediment and vegetation removed, limits of removal, disposal sites, and environmental restrictions. In light of the monitoring plan (see below) discuss potential to improve, augment, or optimize maintenance practices. The goal is to improve efficiencies by replacing individual piecemeal efforts with regional efforts. Summarize the impacts of any ecosystem restoration as they affect maintenance practices and the conveyance capacity of the channels.
- 9) Assist in Developing a Monitoring Plan.

- 10) Review ongoing monitoring efforts, including gaging stations and scour studies in Forge River and its tributaries. Develop protocol and process (where, when, how) to track changes in the watershed. Include re-surveying a number of established channel cross sections after major storm years, and collection of sediment samples (with particle size analysis) from in-channel and in-Bay basins following significant storm events.
- 11) Review monitoring efforts at the detention basins. Propose sediment monitoring process for the foothill detention basins, including annual surveys of sediment accumulation, and gaging to measure sediment outflow from the basins.
- 12) Prepare documentation for without project conditions and for each of the alternatives evaluated in the feasibility phase. Compile individual draft report texts and prepare draft sedimentation appendix. Prepare independent technical review comments and attend review conferences. Address review comments and prepare final appendix. File study material.
- 13) Model hydrodynamics and noncohesive sediment transport using CH3D-SED, a three-dimensional, finite-difference, physics-based numerical code. Mesh development, development of boundary conditions using freshwater inflows, tidal water surface elevations, wind data, and sediment inflows data for sediment modeling. Incorporate model hydrodynamic results in water quality model.

D. Groundwater

- 1) Collect and summarize the available groundwater quantity data and evaluate in comparison to seasonal discharge frequency.
- 2) Collect and summarize groundwater quality data. Coordinate with Environmental efforts under Subaccount-05 to evaluate the groundwater effects on water quality in the river.

3.12 Geotechnical Investigations

- A. Geotechnical investigations will include general geotechnical assistance to the plan formulation process to enhance long term watershed stability and to reverse negative trends that impact watershed stability. Most of the site specific projects have common elements that include detention, sediment trapping, and constructed wetlands for nutrient removal, and thus have some common geotechnical requirements.
- B. Research, collect and summarize the existing geology information in regards to groundwater and bank stability.
- C. Collect existing soils information, address foundation requirements for hydraulic structures; constructability (in terms of excavatability) analysis, special processing and handling requirements, specification requirements, and construction considerations in support of the cost analysis; slope stability analysis for wetlands basins and constructed channels, and a plan of exploration to develop the slope stability and design parameters for selected alternatives.

- D. Perform geotechnical studies for dredging and capping of sediments.

3.13 Design and Cost Estimates

In order to perform economic and trade-off analyses, a conceptual level of design is required to evaluate the project performance and cost for each restoration alternative. Cost evaluations are necessary for any alternatives described under Plan Formulation.

- A. *Plan Formulation Assistance.* Assist in plan formulation, in-house review, response to all comments, and support to the study manager and other study team members; assistance in developing design features and cost estimates for the potential restoration sites.
- B. *Site Design.* Prepare up to twenty-eight (28) conceptual design drawing sheets including: One (1) title sheet, up to four (4) plan and profile sheets at a scale of 1" = 100' (or 1:1000 metric), up to four (4) sheets of cross sections, and up to five (5) sheets of miscellaneous details. Compute material, equipment, and labor quantities, and perform a reconnaissance-level design of major structural features. Prepare a draft design appendix for the relevant milestones.
- C. *Cost Estimates.* Review drawings and conduct site visits (up to 4 alternatives and 4 sets of drawings), verify quantities and prepare reconnaissance-level construction cost estimates using the MCACES. Prepare a draft cost engineering appendix for the alternative sites for the relevant milestones.

3.13.1 Design Appendix

A draft and final design appendix to the feasibility report will be prepared and review comments incorporated. The design appendix will describe the basis of design for the alternatives considered, design methodologies and assumption. All design and drawings will be presented in a level of detail that will insure the integrity of the structure and/or system and meet the requirements of the baseline cost estimate.

3.13.2 Internal Technical Review

Technical review will be conducted on all work products generated under sections 3.10 thru 3.13.

3.13.3 Engineering Management Documentation

This task includes engineering management, coordination of the design between the engineering disciplines, project schedule and status, meetings, coordination with other divisions, A/E contracting actions, assembly of internal review documentation and QA/QC reviews, and assembly of correspondences for dissemination of information to other divisions.

3.14 Real Estate Studies

Real Estate Studies are required to determine the value of land affected by flood inundation and erosion, and the cost of land necessary to construct any proposed projects. The studies will include the following tasks:

- A. *Rights of Entry.* Gain rights of entry to portions of watershed for mapping and field investigations for Corps and contract employees. Investigate access at potential restoration sites.
- B. *Site Specific Parcel Mapping.* Parcel maps of the restoration sites for the spin-off studies must be extracted from Suffolk County or appropriate agency GIS for use in the overflow mapping, inundation and erosion damage analysis, and formulation of alternatives.
- C. *Acquisition Plans and Cost Estimates.* A preliminary, reconnaissance-level, real estate acquisition plan shall be prepared for the proposed alternatives. The plan shall include a gross appraisal of all project area properties for the market value of lands at their highest and best use and preparation of a baseline cost estimate for real estate acquisition associated with the proposed alternatives.

3.15 Report Preparation

The work will be in accordance with ER 1105-2-100, Chapter 2, EC 1105-2-206, EC 1105-2-208 and ER 110-2-1150, paragraph 10c. Report preparation includes the compilation of all study team products into an initial draft report and a final report. The work will include collection and assembly of pertinent data, writing, editing, typing, drafting, reviewing, revising, reproducing, and distributing the draft and final Feasibility Reports, Environmental Impact Statement/Report, and related technical documents and appendices.

Planning will be responsible for reproduction and dissemination to facilitate review and revision. All study team members will be involved in the formulation and review of the reports. A Feasibility Review Conference and two comment periods will be held to assure that all comments and views are incorporated.

This task also includes any possible requirements for additional rewriting, unforeseen technical modifications, reformulation, or documentation as a result of the Washington-level review process which take place outside of the end of the feasibility phase (i.e., submittal of the report to the OMB by the ASA). Time and cost estimates are based on time the study manager spends on report preparation, and reproduction costs for the reports.

- A. *W3 Report.* The report content includes a discussion of current and likely future baseline conditions, and a discussion of preliminary restoration alternatives and spin-off feasibility studies.
- B. *W4 Report.* Spin-off feasibility studies will be determined by this milestone and described in this report. This draft of the watershed feasibility study will also include a joint programmatic EIS/EIR.
- C. *W5 Public Draft.* The public draft feasibility report will include report revisions based on comments received during review of the F4 report. This report will be released to the

public and resource agencies for comments. A formal public meeting will be held during the public review period.

- D. *Final Report.* The final report includes revisions based on comments received during the public review time period. The report will include information entered into GIS; results of the hydrologic, hydraulic, and sediment transport investigations; restoration site investigations and a description of the "spin-off" feasibility studies; other technical appendices; and, a joint programmatic EIS/EIR for the watershed.

3.16 Programs and Project Management

- A. *Programs Management.* This subaccount includes budget preparation for current year and out years, monitoring cost and accounting allocations.
- B. *Project Management*
This subaccount includes point of contact responsibilities, and development and negotiation of the PCA, MOA's and other customer agreements. Periodic meetings will be held between the Corps and the Sponsor to report on the status of the study and responsible in-kind services and credits.

Monthly status reports covering selected financial and performance measurements will be provided by the Corps. Responsibilities include the finalizing of the study network based on resource availability, and the maintenance and management of the network during the course of the study.

Budgetary management responsibilities include tracking and documenting the funds and budget (accounting) of the study, documenting appropriations, including interpretation of current and future budgetary guidance submitting project data sheets, justification sheets and other testimonial fact sheets as required; monitoring and reprogramming study funds, executing current year and future funds; processing schedules of obligations and expenditures; monitoring project financial performance and coordinating with study and project managers on project financial performance; assessing District manpower allocations versus available funds, assuming district operating budget includes appropriate hired labor and contract amounts; coordinating future funds allocations and manpower requirements with other District elements; setting up and documenting all cost key accounts, and reviewing pre-and post-labor reports.

The Project Manager will coordinate with the sponsor for the management of negotiated in-kind services and coordination with Corps review, coordination of cost-sharing procedures, and management of budgets and schedules for the feasibility study. Negotiation of tasks and costs, review of reports, and participation in meetings on study results and issues are included in this task.

The Project Manager will establish, manage and maintain a study network to facilitate cost accounting and schedule purposes.

3.17 Review Support

All planning, NEPA and CEQA documents will be extensively reviewed prior to being finalized. The quality control process will include technical team meetings, meetings with the local sponsors, and Corps in-house technical review. The quality control process will be on-going throughout the study (seamless peer review), but at particular milestones, specific efforts will be made to assess the quality and progress of the study (independent technical/policy review). Review Plan should be developed in accordance with EC 1105-2-410, Review of Decision Documents, dated 22 Aug 2008.

List of Documents to be Reviewed. A list of completed documents to be reviewed by the Technical Review Team will be developed.

Review Plan and Schedule. A schedule for review activities will be developed and included as a part of the QC plan. This will include a schedule for periodic review and update of the QC plan.

Other. Other items to be included in the QC plan are a discussion of known policy questions needing clarification, a list of major technical issues that may require Headquarters' technical guidance, a statement of manpower and financial resources to be committed to the review, and views of the local sponsor on the QC process.

3.18 Contingencies

A ten percent (10%) contingency has been placed on the feasibility study cost. The contingency amount applies to both Corps in-house efforts as well as in-kind service efforts. This contingency would be assessed based upon the recommendations from the feasibility study team and approved by the feasibility Executive Committee.

CHAPTER 4 - STUDY COST SUMMARY

SUB-ACCOUNT	TASK	Lead	Phase I			Phase II		
			USACE	Non-Fed In-Kind	Phase I Total	USACE	Non-Fed In-Kind	Phase II Total
1	Plan Formulation and Alternative Screening							
	Cycle 1 - Plan Formulation	BR	20	50	70			0
	Cycle 2 - Plan Formulation	USACE	40		40			0
	Cycle 3 - Plan Formulation	USACE				60		60
2	Study Management	USACE	60	10	70	70		70
3	Public Involvement	BR	10	30	40	20	10	30
4	Institutional Studies	BR				2	2	4
5	Social Studies	BR	5	2	7			0
6	Cultural Resources							
	Phase 1 Evaluation	BR	30	5	35			0
	Native American Consultation	BR	20	5	25	10		10
	Section 106 compliance					25		25
7	Environmental Studies							
	Habitat Units	BR	20	15	35			0
	Formulation / Alternatives Input	USACE	15	10	25	40		40
	Existing Conditions Characterization	BR		80	80			0
	NEPA Scoping	USACE				30		30
	Draft EIS	USACE				100		100
	Record of Decision	USACE				10		10
	Final EIS	USACE				20		20
	CZM/WQC Certification	USACE				15		15
	Section 404 Evaluation	USACE				15		15
	ESA Coordination	USACE				15		15
	HTRW	USACE				25		25
	GIS Support	USACE				20		20
	Water Quality Model Support	USACE	25		25	25		25
8	Fish & Wildlife Studies							
	Planning Aid Letter	USFW	10		10			0
	FWCAR	USFW				25		25
9	Economic Studies	BR	10	10	20	5		5
10	Survey and Mapping							
	Watershed scale mapping	BR	5	20	25			0
	Site specific Surveying	USACE				50		50
11	Hydrology and Hydraulics							
	H&H Investigations	USACE	100	140	240	75		75
	CH3D-SED - Modeling/Combo	USACE	200	100	300	100		100

Forge River Watershed Study
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12	Geotechnical Investigations	BR	5	5	10			0
13	Design and Cost Estimates							
	Cycle 1 - Design and Costs	BR	20	35	55			0
	Cycle 2 - Design and Costs	USACE	75	0	75			0
	Cycle 3 - Design and Costs	USACE				150		150
14	Real Estate Studies							
	Real Estate Mapping - Watershed	BR	5	10	15			0
	Real Estate Plan	USACE				40		40
15	Report Preparation							
	Cycle 1 - Screening Report	BR	15	15	30			0
	Cycle 2 - Watershed Plan	USACE	40	15	55			0
	Cycle 3 - Feasibility Report	USACE				160		160
16	Programs and Project Management	USACE	60	15	75	60		60
17	Review Support							
	District Quality Control	USACE	50	15	65	50		50
	Agency Technical Review	USACE				75		75
	External Peer Review*	USACE				0		0
	HQ Review Costs	USACE				50		50
18	Contingencies (10%)		84		84	135		135
	Study Cost Sub-totals		924	587	1,511	1,477	12	1,499
	Feasibility Total - Phase 1 and 2							3,000

*If Independent External Peer Review is required costs will be adjusted.

CHAPTER 5 - SCHEDULE

Phase I

8/09	P5	Execute Feasibility Cost Sharing Agreement (FCSA)
1/10	W1	Receive Funds/Begin Feasibility Study
3/10	W2	Public Workshop/EIS Scoping (formally P-6): Establish protocol for public involvement and agency coordination; present draft Public Involvement Plan; other public workshops to be scheduled if needed.
	W2A	USACE Pre-FSM/Model "Buy-In". Confirm appropriate model selection and application within USACE.
3/11	W3	Formulation Conference: Establish current (baseline) and likely future without project conditions for, a comprehensive look at the basin both existing (baseline) and future without project, with a detailed focus on H&H and ENV; identify, describe and discuss preliminary watershed restoration sites or sub-basins; establish decision framework for prioritizing sites/sub-basins.
7/11	W4/W4A	Formulation Review Briefing/Conference (formally P-7/P-8): Alternative actions will be identified for Federal and local implementation, if warranted. Conceptual designs and preliminary costs will be described for alternatives; and prioritized. Watershed Management Plan (WMP) completed.

Phase II

TBD	W5	Draft Feasibility Report, Draft Environmental Document
TBD	W6	Public Review.
TBD	W7	Final Public Meeting and Public Information Meeting, with Draft EIS
TBD	W8	Final Report Submitted (formally P-9): Submit Final Feasibility Report, WMP and Environmental Document.* District Engineer's Certification.
TBD	W9	Division Commander's Certification (formally P-10).
TBD	W10	Final Report Submitted to HQ, CWRB, OMB, Congress

* Schedule subject to change as dictated by review requirements.

CHAPTER 6 - QUALITY CONTROL PLAN

1. **Introduction**

Effective 1 October 1995, the North Atlantic Division and HQUSACE no longer review planning reports for technical adequacy. This responsibility has been placed with the District producing the report. Although NAD and HQUSACE will not conduct a technical review they will review reports for conformance to current policy. As such, the New York District is responsible to ensure that its report conforms to all current professional practices and standards by conducting an internal technical review of the report, prior to its submission to NAD and HQUSACE. Policies and procedures defining the quality control / internal technical review process are specified in EC 1165-2-203, "Technical and Policy Compliance Review", 15 October 1996.

2. **Quality Control / Internal Technical Review Responsibilities**

The goal of the technical review process is to ensure that the report and its sub-components meet the technical standards and regulations of the Corps of Engineers. The New York District is responsible for the independent technical review of the feasibility study and its products and will develop and implement a QC plan for the project. The QC plan includes the independent technical review of decision and implementation documents, consistent with established criteria, guidance, procedures, and policy; and identifies how the district plans to ensure compliance with technical and policy requirements.

3. **Technical Review Process**

Technical review is part of the overall development of implementation and decision documents and is the systematic execution of actions, decisions, and reviews taken during the concept development, formulation of alternatives, and project design phases to ensure conformance with laws and Administration policy. An independent technical review is conducted for all decision and implementation documents and is independent of the technical production of the project/product.

The selected independent technical review methods are identified in this QC plan. The technical review team members have the proper knowledge, skills, and experience necessary to perform their tasks and are independent of the study team responsible for the development of the project/product. The QC/QA process described herein will be fully documented in the feasibility study. Documentation and certification of technical/legal review will accompany the feasibility report that is submitted to NAD and HQUSACE for policy compliance review.

The New York District will apply all appropriate technical and policy guidance in developing Forge River Watershed feasibility study. Since the District is responsible for both conducting the work and providing the technical review of the work, the technical review will be independent. Independent review will include review of all the technical work and products from plan formulation, environmental, economics, engineering, cost estimating, real estate, and other disciplines that are essential to achieving a quality feasibility report. A QC plan has been prepared for this project and is documented in this PMP. The QC plan includes the following items:

- (1) Discussion of the selected independent technical review option which identifies the review team members, qualifications, and the rationale for selection.
- (2) Schedule of in-progress technical and/or policy reviews.
- (3) Description of the process for documenting decisions, issues, and issue resolution.
- (4) Discussion of the methods to be used to resolve significant technical and other policy issues.
- (5) Discussion of the lessons learned process.
- (6) Legal review of the decision document and associated NEPA compliance document by district counsel.

(7) Any issues that cannot be resolved within the district will be forwarded to NAD and HQUSACE for resolution.

It is the responsibility of each technical division within the District to establish its own quality control plan. Based on their input, the following actions will take place during the feasibility study:

1. Planning Division

Environmental Resources: Work performed to produce the environmental analysis and NEPA document may be done, in part, using a contractor. As such, the quality control process will be in two steps. This first will be by the contractor, who will conduct the review in accordance with their internal QA/QC procedures. A copy of EC 1165-2-203 will be provided to the contractor to ensure that their internal QA/QC procedures conform to Corps of Engineers' requirements. The second step in the QA/QC process will be performed by the District planning review team members, who will review the contractor's work to ensure that it meets the requirements of the contract and conforms to the requirements set forth in the PMP and other Corps regulations.

Plan Formulation: Plan formulation and preparation of the Feasibility Report will be performed under the direction of the Chief of the Plan Formulation Branch. The main report will also be reviewed by the Chief, Planning Division for compliance with policy.

2. Engineering Division

The draft Engineering Appendix will be reviewed by the Engineering Division. A back check review of the final engineering appendix will be conducted. The review team will consist of individuals from the following fields: civil design, structural, geotechnical, cost estimating, hydraulics and hydrology. Corps of Engineers criteria will be used to judge the technical adequacy of the products and documentation will be accomplished by written comments, responses and correspondence.

3. Review Process

Each technical element will schedule sufficient time for a technical review to allow their appendix to be submitted in accordance with the currently approved PMP. In order to accomplish this, each technical element will conduct its quality control on a continual basis with each major sub-product serving as a check point in the quality control process. This will ensure that any technical mistakes are found early and resolved while the material is fresh in the minds of those working on it. For work performed by a contractor, each contract scope of work will require several work progress updates and submissions prior to the submission of the draft report and final report. These progress updates will serve to ensure that the contractor is proceeding in the direction that the District wishes to pursue and raise any issues that may need to be resolved. Checklists will be used in the quality control process to assist the reviewer, but will not be used to replace that persons technical expertise or judgment. The checklists are designed to assist the reviewer in ensuring that the report contains the minimum amount of material necessary to make decisions and that any conclusions drawn in the report are based on the information provided.

Each reviewer will document their comments on review sheets. At a minimum, each comment will refer to the page and paragraph in question, the nature of the problem, where guidance can be found which applies to the problem, and if possible, a suggested solution to the problem. The comments and any checklist used will be returned to the person responsible for the product to resolve. Responses to each comment will provide, at a minimum, what was done to correct the deficiency and where the deficiency was corrected, or a justification for why the deficiency was not corrected. The package of comments and responses will be attached to the final

submission as a sub-appendix. It is the responsibility of the section supervisor responsible for the product to review the comments and responses to ensure that all issues are resolved. Each line supervisor has the responsibility for the day to day quality control of those they supervise. As such, they are directly responsible for checking the day to day work of their subordinates and resolving any issues that the review team members may raise. Contractors will conduct internal QA/QC review and provide comment and extent of compliance to the New York District in accordance with the District Memorandum dated 02 October 2000.

4. Additional Quality Control Measures

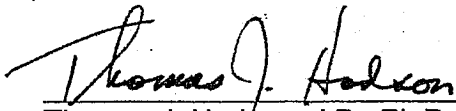
In addition to the steps described above, three quality control meetings will be held during the course of the study. The purpose of these meetings will be for the Branch Chiefs and other team members to gain an understanding of what the study team has produced and provide comments and raise issues at the appropriate time. The review team members will provide their written comments on the main report at this time. The three briefings are:

1. Without Project Conditions;
2. With Project Conditions; and
3. Alternative Selection (Note, this briefing will also include participants from NAD, HQUSACE, the non-Federal sponsor, and Federal and state environmental agencies).

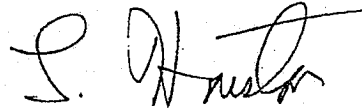
5. Agency Technical Review

The specific requirements for Agency Technical Review and External Peer Review will be identified in the Peer Review Plan for the Feasibility Study.

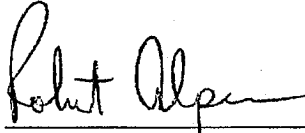
ENDORSEMENTS, Civil Works Team



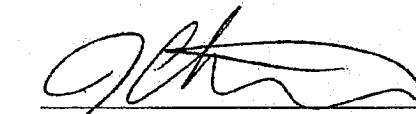
Thomas J. Hodson, J.D., Ph.D.
Chief, Plan Formulation



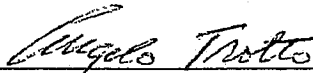
Leonard Houston
Chief, Environmental Branch



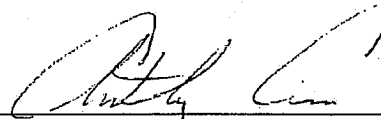
Robert Alpern
Chief, Civil Resources Branch



John Chew, PE
Chief, Cost Engineering Branch



Angelo Trotto, P.E.
Chief, Engineering Management



Anthony Ciorra
Chief, Civil Works Branch



Randy Williams
Supervisory Realty Specialist,
Management and Disposal Branch

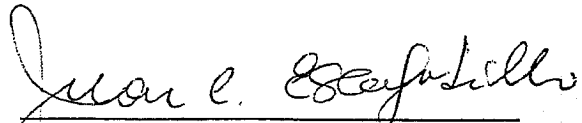


Thomas Dannemann, PE
Chief, Design Branch

ENDORSEMENTS, Project Delivery Team



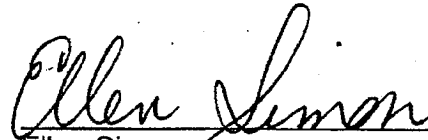
Caroline McCabe
Project Planner/Economist



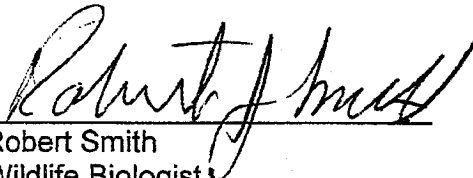
Juan Carlos Escajadillo
Hydraulic Engineer



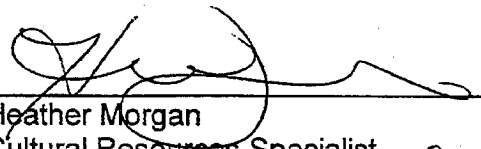
Elena Manno
Project Engineer



Ellen Simon
Assistant District Counsel



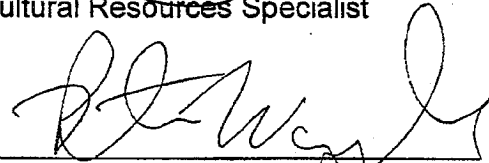
Robert Smith
Wildlife Biologist



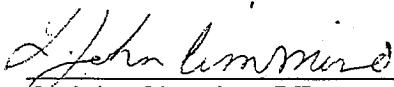
Heather Morgan
Cultural Resources Specialist



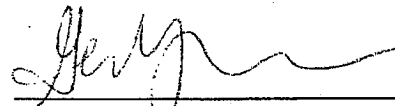
Stephen Couch
Chief, Coastal Section



Peter Wepler
Chief, Coastal Ecosystem Section



G. John Cimmino, PE
Civil Engineer



Gerlyn Perlas
Operations

