

Wreck Pond Watershed Management Study

Project Management Plan

**New York District
U.S. Army Corps of Engineers**

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CHAPTER I. INTRODUCTION

1) Background

The Wreck Pond Brook watershed includes 8,174 acres in southern Monmouth County, New Jersey. The western boundary of the watershed is in Wall Township and extends east-southeast to Wreck Pond on the border of Spring Lake and Sea Girt. Wreck Pond is a tidal pond located on the coast of the Atlantic Ocean. The watershed also includes lands in the Borough of Spring Lake Heights and Wall Township. The major tributaries are Hannabrand Brook, Wreck Pond Brook, Hurley's Pond Brook, and Black Creek.

The study was authorized by a resolution by the Committee on Transportation and Infrastructure of the United States House of Representatives, adopted on 26 October, 2005. The District initiated the Reconnaissance Phase in January 2010 (Chapter II of this PMP). The 905(b) reconnaissance report was completed in August 2010. Representatives from the NY District have been attending monthly meetings of the Wreck Pond Brook Regional Stormwater Management Plan Committee ("Steering Committee") in order to gain an understanding of current problems, opportunities, and constraints. The reconnaissance study examined the current field conditions and study criteria to determine whether any watershed-based opportunities for flood damage reduction, ecosystem restoration and other allied purposes exist for continued Federal participation during detailed evaluation and construction. As part of this study, the water resources problems in the area were identified, as will potential solutions to the problems. It has been determined that there is Federal interest in a cost-shared watershed management study. In a letter dated 23 November 2010, the Office of Engineering and Construction (OEC) in the New Jersey Department of Environmental Protection (NJDEP) has expressed its intent to serve as non-federal sponsor of the flood risk management-related portions of Feasibility Phase of this study, pending the development of this Project Management Plan (Attachment A).

The study objectives are specified as follows:

- To identify one or more watershed-based solutions within the watershed by taking a comprehensive approach to ecosystem restoration and flood risk reduction.
- To examine the entire watershed, including the outfall and stormwater system, and identify improvements in order to reduce the number of beach closures and the resultant economic impacts to tourism.
- To reduce beach closures caused by poor water quality discharging from the Wreck Pond outfall structure.
- To restore a natural tidal exchange between Atlantic Ocean, Wreck Pond, Black Creek, and other appropriate areas of the watershed while balancing the need for flood protection, including analyzing the effectiveness of the outfall structure.
- To identify BMP's within the watershed that address both point and non-point source loading of pathogens, nutrients, etc., carried with the sediment to Wreck Pond and generally improve water quality of the Pond and watershed.
- To maintain or improve the ecological health of Wreck Pond, Black Creek, Hannabrand Brook, Spring Lake and the overall watershed, including the identification of habitat improvements and fish passage.
- To reduce the threat of loss of life from dangerous flood conditions and financial losses incurred from flood and erosion damages to homes, private property, businesses, and

infrastructure throughout the watershed, including Spring Lake, Spring Lake Heights, Sea Girt, and Wall Township.

- To improve land use within the floodplain appropriate for maintaining or improving aquatic and riparian habitat throughout the basin.
- To assess existing data from all sources to avoid the duplication of efforts and to analyze differences in scientific results.

To meet the study objectives, the watershed study will identify problems and opportunities to reduce the risk of flood damage, restore or maintain ecosystem & water quality, improve streambank stabilization, reduce erosion, reduce constrictions and generally improving the flow regime through the region. The planning process will characterize sub-watersheds, assess flood risk, assess natural resources, evaluate governmental roles, local laws, programs and practices affecting the watershed and nonpoint source pollution management, and provide community outreach and training. If appropriate, the study will recommend a Federal Watershed Program to produce management strategies for watershed protection and restoration, for project implementation.

The data previously collected by various members of the Steering Committee, especially as part of the compilation of the Regional Stormwater Management Plan was extensive and comprehensive. Due to the considerable amount of effort that has already been put into studying the Wreck Pond Watershed, the Corps will utilize as many existing studies and as much existing data as possible.

2) Definition of a Project Management Plan

- a) The Project Management Plan (PMP) defines the planning approach, activities to be accomplished, schedule, and associated costs that the Federal Government and the local sponsor(s) will be supporting financially. The PMP, therefore defines a contract between the Corps and the local Sponsor(s), and reflects an agreement on the part of the financial backers, as well as those who will be performing, and reviewing, the activities involved in the study.
- b) The PMP is a basis for change. Because planning is an iterative process without a predetermined outcome, more or less costs and time may be required to accomplish the tasks identified. With clear descriptions of the scopes and assumptions outlined in the PMP deviations are easier to identify. The impact in either time or money is easily assessed and decisions can be made on how to proceed. The PMP provides a basis for change.
- c) The PMP is a basis for the review and evaluation of the draft report. Since the PMP represents a contract among study participants, it will be used as the basis to determine if the draft report has been developed in accordance with established procedures and previous agreements. The PMP reflects mutual agreements of the Corps and the sponsor into the scope, critical assumptions, methods, and level of detail for the studies that are to be conducted during the study. Review of the draft report will be to insure that the study has been developed consistent with these agreements. The objective is to provide early assurance that the study is developed in a way that is acceptable to the local sponsor.

- d) The PMP is a study management tool. It includes scopes of work that are used for funds allocation by the Project Manager. It forms the basis for identifying commitments to the non-Federal sponsor and serves as a basis for performance measurement.
- e) This Project Management Plan (PMP) is a plan to use the extensive data already compiled by the Steering Committee in order to complete a feasibility study in the most timely and cost-effective manner possible.

3) **Summary of Project Management Plan Requirements**

This PMP includes the following chapters:

- **Chapter I – Introduction.** This chapter includes the definition of the PMP and a summary of the PMP requirements.
- **Chapter II – Background: Section 905(b) (WRDA) Analysis.**
- **Chapter III - Scopes of Work.** A detailed scope of the tasks and activities that describe the work to be accomplished, in narrative form, that answers the questions: "what, how, and how much."
- **Chapter IV - Responsibility Assignment.** An Organizational Breakdown Structure (OBS) will identify the entity responsible for a certain study task. This allows the identification of the functional organization that will perform each of the tasks in a Responsibility Assignment Matrix (RAM).
- **Chapter V – Study Schedule.** The schedule will define "when" key decision points.
- **Chapter VI - Cost Estimate.** This is the baseline estimate for the study.
- **Chapter VII - Quality Management Plan.** This chapter supplements the District's Quality Management Plan. It highlights any deviations to the District's plan and lists the members of the study team and the review team.

CHAPTER II. BACKGROUND: SECTION 905(B) (WRDA) ANALYSIS

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CHAPTER III. SCOPES OF WORK

1) Public Involvement

Public Involvement entails the continuation and expansion of the public involvement started during the Reconnaissance phase. Initially, it will involve introducing and explaining the watershed stakeholders, the reconnaissance study results and the direction and goals of the Watershed Study. It will then continue by conducting meetings and coordination with a broad range of public and private agencies.

Monmouth County Planning Board has been the lead local agency for the Steering Committee. The planning process and development of this plan has primarily been conducted by the Wreck Pond Watershed Technical Advisory Committee, along with input from the RSWMP Committee. As noted, the RSWMP Committee has been meeting regularly, with over sixty members including those on the TAC, municipal officials and staff, as well as other interested parties, including local residents.

Agencies, institutions and firms represented on the TAC or the Stormwater Committee include Monmouth County Office of GIS, Monmouth County Engineering, NJDEP, Division of Watershed Management, NJ Department of Agriculture, Rutgers Cooperative Extension, Freehold Soil Conservation District, Monmouth University, Najarian Associates, US Fish and Wildlife Service, Monmouth County Health Department, NJDEP Marine Water Monitoring, and the Municipalities, AECOM/ENSR.

The Steering Committee shall establish an implementing agency representing the four municipalities.

Preparation of Community Outreach/Participation Plan – The outreach plan (also known as the Public Involvement Plan) will identify key individuals, organizations, and entities to be involved, and will identify the visioning process and the roles and responsibilities in coordinating the entire outreach process, logistics, and the proposed schedule of public meetings.

The first public participation/outreach meeting shall be conducted early in the study, during the watershed and waterbody characterization phase of the project, to solicit public input in defining and characterizing the nonpoint source pollution issues in the waterbody, refine the watershed vision, goals and objectives, and to review and discuss water quality and watershed protection and restoration issues. A written summary of public input obtained at this meeting shall be prepared. A second public participation/outreach meeting shall be conducted to allow for public review and comment on the Draft Watershed Management Recommendations and Prioritization. A written summary of public input obtained at this meeting shall be prepared. Public input shall be incorporated into the Final Watershed Management Plan. A third public participation/outreach meeting shall be conducted prior to preparation of the Final Watershed Management Plan to allow for back-check and additional public review and comment on the draft document. A written summary of public input obtained at this meeting shall be prepared. Public input shall be incorporated into the Final Watershed Management Plan to the satisfaction of the Sponsor, prior to finalization and/or publication.

The Sponsor will be responsible for providing representatives at the public meetings, meetings with other agencies and officials, and participation in other local coordination efforts. The Sponsor will also be responsible for providing the facilities for public meetings.

2) Economic Studies

Existing economic data will be used to define the preliminary benefits and costs of potential watershed projects. Benefits include the reduction of flood and erosion damages, the increase in habitat and recreational value, the savings in sediment maintenance, water supply 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.

The economic data prepared during previous studies will be used to its full extent when such data is consistent with the study objectives. The baseline conditions from which economic development occurs must be well-documented and readily understood. The 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 Flood & Erosion Damages.* Collect and conduct a general inventory of the following facilities susceptible to being damaged by floods or erosion within the study area: residential & commercial structures, bridges, agriculture areas, canal facilities, utilities, emergency costs incurred. Field investigations will be based upon hydrology, hydraulics and sediment transport investigations that identify areas subject to erosion, and by information provided by the public or private stakeholders affected by flooding and erosion.

b) *Inventory of Sediment Related Maintenance Costs.* Collect and conduct 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.

c) *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.

- i) Current forecasts for the project/surrounding area
- ii) Census tract population/demographic items count for the area
- iii) Household formation rates for the area
- iv) Project area vacancy rates
- v) Land zoning/ Zoning densities
- vi) Public land demands
- vii) Commercial land demands
- viii) Development pattern
 - (1) Parcel size development
 - (2) Ratio of parcel size development.
- ix) Socio-economic characteristics of future population.

d) *Flood & Erosion Damage Assessment.* Estimate the preliminary future without-project damages from floods & erosion within the watershed, by reviewing existing information and conducting a preliminary survey of damages along the major watercourse and or sub-

basins. Forecast of damages will be supported by hydraulic studies and historic documentation, where information exists.

e) *Incremental Cost Analysis.* A modified or preliminary incremental cost analysis (or similar) will be performed in cooperation with Environmental Branch to determine what types of preliminary alternatives for ecosystem restoration appear to be the most efficient and cost-effective. A preliminary screening will be conducted to compare each site or sub-basin, using one generally acceptable, conceptual plan for each site or sub-basin.

f) *Habitat Benefits.* Habitat values will be displayed for each site or sub-basin in terms of habitat units from the HEP analysis, EPA's RBP or other appropriate methodology identified to be conducted into the quantification of environmental restoration outputs. Habitat values for the various plans will be compared to preliminary costs.

g) *Prepare Economic Baseline Conditions Report.* The baseline conditions report includes a discussion of current and likely future economic conditions.

h) *Prepare Economic Appendix.* All data collected and/or developed to support the study will be collected and displayed in an economics appendix to the final report.

3) Cultural Resources

It is assumed that the Watershed Management Study will identify actions in which the Corps may participate during a future Watershed Program. Cultural Resource review, evaluation and coordination tasks for this PMP are intended to evaluate conceptual plans in which the Corps may have a primary role. A comprehensive cultural resources analysis will include an inventory of known historic resources, either listed or determined to be eligible for listing on the National Register of Historic Places. This inventory will include documented Prehistoric and Historic sites (standing structures and archaeological), historic districts and viewscape. If Areas of Potential Effect (APE) for cultural resources are determined for proposed plans, future investigations and consultations will be identified. Project plans will be screened to avoid, minimize, and reduce adverse effects on known cultural resources. If it is not possible to avoid impacts, further work will be required during implementation under the follow-on program. Cultural Resources work is not expected to proceed past the Phase 1A during the watershed study for any specific site or sub-basin.

Although not required for a watershed study, a follow-on program would have to comply with 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.

For this study, a Phase IA Documentary Research Report will be undertaken for the higher ranking sites or sub-basins. 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.

The findings of this task will be documented in the Environmental Appendix to the final report. The cultural resource sites will be added to the GIS database developed for the study.

4) Environmental Studies

The environmental studies will begin with data collection and analyzing existing information. To the extent possible, watershed inventory and mapping of remaining riparian habitat along stream corridors, identification of species diversity, a rating of habitat quality (high, degraded, etc...), and preliminary screening of potential restoration sites/sub-basins will occur. The information will be used in defining the baseline (existing and future without project assumptions) environmental conditions used to evaluate the effects of watershed management alternatives. At the baseline conditions meeting, the PDT will determine the focus of the remaining study. It may include limiting the remaining study to specific sub-basins. The information will be documented in an Environmental Appendix.

a) Defining Existing Conditions

i) *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 researched, identified, mapped, and adequately described at a level appropriate to this study so that a preliminary 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, the U.S. Fish and Wildlife Service, local sponsors and stakeholders will be used to assess habitat value.

ii) *Water Quality Assessment (in coordination with ENG-H&H)*. Environmental studies will include evaluation of baseline (existing and future without-project) water quality conditions for surface water and groundwater within the Wreck Pond watershed. Effects of proposed 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. Detailed tasks include:

(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, temperature, dissolved oxygen, conductivity, turbidity, urban and vegetative trash/debris, depth, and water movement criteria.

(2) 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.

(3) Determine the effects of alternatives on water quality.

(4) Address if water quality improvements for the watershed and if they are achievable objectives, based on baseline condition analyses and potential benefits resulting from the ecosystem restoration alternatives.

b) HTRW Evaluation – A comprehensive evaluation of existing information and data gaps will be conducted for the Watershed 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 could be used in the future NEPA documents. 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 and design purposes.

c) 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 may eventually be quantified in terms of habitat units, functions, and values as defined by the habitat evaluation method adopted for use in the study. Ecosystem restoration opportunities will be compatible with economic development, flood control, groundwater recharge, wastewater re-use, and recreation objectives of the watershed management plan.

d) Environmental Opportunities – 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 eradication 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.

e) **Environmental Benefits** – Environmental benefits 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 similar to that shown in EC 1105-2-185, which allows for an incremental cost analysis of the measures under consideration.

f) **Prepare Environmental Baseline Conditions Report** – The baseline conditions report includes a discussion of current and likely future environmental conditions.

g) **Environmental Appendix** – The Environmental Studies Task will include preparation of an Environmental Appendix.

5) Fish and Wildlife Studies

a) **Habitat Field Surveys** – The U.S. Fish and Wildlife Service (USFWS) will work with Corps' Environmental Branch personnel to conduct field surveys of within portions of the watershed. The USFWS will use existing maps and aerial photos to analyze the habitat types. The USFWS will coordinate work efforts with other resource agencies. A technical team which, at a minimum, consists of the Corps of Engineers, the U.S. Fish and Wildlife Service (USFWS), and representatives appointed by the local sponsors will assist the study team in historical research, data collection, species identification, habitat modeling, and ecosystem mapping to arrive at the baseline conditions.

b) **Planning Aid Report** – The USFWS will provide a Planning Aid Report (or similar programmatic document) to the Corps for inclusion into the Environmental Baseline Conditions Report. The report will describe baseline conditions, habitat evaluation methodology, and identify types of restoration measures appropriate for the Wreck Pond Watershed.

6) Survey 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.

b) **New Mapping** – After existing data is collected, the USACE, Sponsor and stakeholders will identify the data gaps and need for new mapping to assist with the study. As a guide, it is anticipated that 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; 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.

Although not required for a watershed study, where applicable, this data shall be consistent with EM 1110-1-1002 Survey Markers and Monumentation; EM 1110-1-1003 NAVSTAR Global Positioning System Survey; EM 1110-1-1005 Topographic Surveying; EM 1110-1-2909 Geospatial Data and Systems; and Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE); and A/E/C CADD Workspace. The EM's can be found at the website <http://www.hnd.usace.army.mil>. SDSFIE and A/E/C WS can be found at the website <http://tsc.wes.army.mil>.

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 will be available to the Sponsor and all USACE team members.

7) Hydrology and Hydraulics

This section describes preparation of hydrologic, hydraulic and sediment evaluations of the existing and proposed watershed features. The goal is to identify adjustments to the system to balance the sedimentation flow regime and improve the flooding and erosion/sedimentation conditions in the Wreck Pond Watershed while providing opportunities for environmental restoration within the watercourses.

- a) **Collect and Review Existing Data** – Research, collect, and review hydrologic and hydraulic information from the Steering Committee, NJDEP, FEMA, local governments, other public agencies, NGO's and consultants. The goal is to utilize as much existing information and avoid duplicating previous efforts. Tasks include, but are not limited to:
 - Collect and review current rainfall-frequency data. Coordinate with NJDEP, sponsor and other study partners to determine if existing depth-duration-frequency relations, or aerial reduction of point rainfall depths need revision.
 - Collect available stream gauge data and update existing flood frequency analyses.
 - Identify and obtain all relevant hydraulic engineering studies previously conducted. Review previous studies and reports, catalogs etc.
 - Collect and review topographic mapping; and field survey to determine channel configuration.
 - Perform a field reconnaissance of selected reaches of the Wreck Pond Watershed 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.
- b) **Construct Rainfall-Runoff Models** – Once data gaps and needs are identified, rainfall-runoff models of the Wreck Pond watershed shall be developed using the Corps of Engineers HEC-HMS computer program. 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 hydrographs for the gage sites listed above, and at the selected reaches and tributaries.

- Determine rainfall inputs, watershed losses, unit hydrograph, and channel routing parameters in coordination with the USACE and appropriate local agencies. 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 sized to accommodate the decision making needs of this study. The models can be extended to the 500-year (or greater) events, as needed.
 - Determine with-project discharge-frequency curves for each of the sub-basins at the same concentration points for current and future land-use conditions.
- c) 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.
- d) Prepare a hydraulic analysis of the selected reaches of the Wreck Pond Watershed for existing and future without project conditions using HEC-2 or HEC-RAS, or similar acceptable method. 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.
- e) Prepare hydrologic documentation presenting discharge-frequency results for without project conditions and for each of the sites or sub-basins evaluated during the watershed study. Perform reconnaissance-level hydraulic design for conceptual plans. When possible, design should improve physical water quality characteristics and minimize debris trapping on structures. Consider effects of in-channel restoration projects on flood conveyance capacity.
- f) Detention basin conceptual plans 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.
- g) Prepare a conceptual-level hydraulic analysis of Wreck Pond Watershed 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.
- h) Erosion / Sedimentation - Review previous erosion and sedimentation studies conducted in the Wreck Pond 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, including known

information on 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 efforts, the sedimentation studies should build on previous information whenever practical. Prepare a preliminary geomorphic analysis that characterizes the general stability or erosion 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. Prepare a comprehensive sedimentation analysis for existing and future without-project conditions. Estimate sediment delivery to the selected sites in the Wreck Pond Watershed.

- i) Prepare H&H Baseline Conditions Report – The baseline conditions report includes a discussion of current and a comprehensive description of the likely future H&H conditions.
- j) Prepare an H&H Appendix.

8) Geotechnical Investigations

Geotechnical investigations will include general description of the geological conditions in the watershed, assistance to the plan formulation process. Tasks include:

- Research, collect and summarize the existing geology information in regards to groundwater and bank stability.
- Collect existing soils information, address foundation requirements for hydraulic structures, and prepare a comprehensive analysis describing the watershed characteristics.
- Prepare Geotechnical Baseline Conditions Report – The baseline conditions report includes a discussion of current and likely future geotechnical conditions.

9) Conceptual Design and Preliminary Cost Estimates

Conceptual plans and preliminary cost estimates shall be prepared at a level of effort needed for public meetings and preliminary screening needs. After types of solutions and locations are identified, typical designs will be prepared and added to the GIS database.

- a) Preliminary Cost Estimates – Review conceptual plans and conduct site visits, verify quantities and prepare reconnaissance-level construction cost estimates using professional judgment suitable for prioritizing sites or sub-basins.

Note: An Engineering Technical Manager (TM) will be assigned to this study to be a point of contact for all Engineering activities. The TM will coordinate 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. The TM will be funded at the discretion of Engineering Division, using funds allocated for each Engineering task.

10) GIS Mapping

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.

The GIS mapping database will be maintained and updated by the Sponsor. All files will be shared with the USACE GIS Manager to ensure USACE in-house staff has access to all data for assistance in performing the tasks required of this study.

11) 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:

- 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 sites.
- Mapping. Mapping shall be prepared on a comprehensive level, identifying public vs. private property, which will be used in screening potential sites or sub-basins.
- Acquisition Plans & Cost Estimates. Where appropriate, preliminary acquisition plans will be identified for the purposes of preliminary screening. The cost estimates will be reconnaissance level and use for prioritizing sites or sub-basins.

12) Study Management

- 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:
 - familiarize all study participants with the scope and purpose of the study;
 - identify primary areas of concern for each of the local sponsors;
 - clarify study responsibilities and the proposed schedule;
 - identify preliminary study objectives;
 - identify ongoing efforts to avoid duplication of effort; and,
 - discuss and approve the public and agency involvement plan developed by the Corps study manager.
- b) The Sponsor and USACE, in coordination with study stakeholders and any other appropriate entities shall hold a project kick-off meeting to review the project scope, project requirements, roles and responsibilities of project partners. The Sponsor, or a designated project partner, shall prepare and distribute to all project partners a brief meeting summary clearly indicating the agreements/understandings reached at the meeting.
- c) 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.

- d) 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 plans to be submitted by the Corps and local sponsors.
- e) The Sponsor and USACE shall hold a second project meeting including the other project partners as appropriate, to review project requirements, site conditions, and roles and responsibilities; identify new information needs and next steps; and transfer any information to the appropriate team members which would assist in completion of the project. The Sponsor shall prepare and distribute a brief meeting summary clearly indicating the agreements/understandings reached at the meeting.
- f) The Corps of Engineers, in conjunction with the local sponsors, will conduct an initial screening of conceptual plans, sites and sub-basins. 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:
- discuss the results of the screening process;
 - verify plans, sites and sub-basins to be evaluated in detail and;
 - identify procedures and responsibilities for the detailed evaluation.
- g) The watershed management program will be identified and prioritized in terms of project types and described in a draft report. This report will be provided to the local sponsors for review and comment (W5 Milestone). The Corps and local sponsors will conduct any appropriate evaluations of screened plans as a second phase of this study.
- h) A workshop, attended by the public, the Corps and local sponsors will be held to discuss the recommendations and comments to the draft report (W7 Milestone). Depending upon consensus, the report and plan can be certified for adoption at this time, or certified at a later date after resolution of comments.
- i) Overall Coordination and Management Duties – USACE 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 USACE technical study team, and briefings to the Wreck Pond Watershed Steering Committee. The Planning Study Manager will ensure that all required tasks and team communications are performed, resulting in the production of a high-quality watershed management study. 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 Sponsor.

The Planning Study Manager will coordinate with the Sponsor. The Project Delivery Team (PDT) should also include representatives from all financial and in-kind contributors to the cost-shared watershed study. The Study Manager and the PDT 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.

j) A Sponsor Study 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 PDT meetings, public workshops, and briefings as needed.

The Wreck Pond Watershed Steering Committee will include the individuals identified in the Feasibility Cost Sharing Agreement (FCSA). The Executive Committee has final authority for resolving study issues and modifying the study agreement and scope of services as described in the PMP. The Executive Committee 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 study. All major deviations to the schedule, cost, and scope of the approved PMP must be approved by the EC.

13) Plan Formulation/Watershed Management Plan

Plan formulation is the process of integrating and analyzing the technical data that is made available during the course of watershed study. 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. For a watershed approach, the same logic is applied, but instead of analyzing alternatives, potential project sites are identified and screened. 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 sites or sub-basins that may reduce problems or exploit opportunities, to comparison and eventual prioritization of the sites or sub-basins, with conceptual plans that are considered to be potential federal projects.

The planning process will follow six basic steps:

- 1) Identification of sites or sub-basins and their problems and opportunities
- 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 conceptual plans at each site or in each sub-basin.
- 4) Evaluation of the effects of the sites or sub-basins.
- 5) Comparison of the sites or sub-basins.
- 6) Prioritization of the conceptual plans of the sites or sub-basins; and a recommendation for a Watershed Program for implementing the types of projects identified.

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.

Objectives, opportunities, and constraints will be defined for the following Watershed Plan purposes:

- Ecosystem Restoration
- Flood Risk Reduction
- Sediment Management
- Flood Peak/ Damage Reduction
- Erosion Protection
- Water Supply and Re-Use
- Water Quality
- Invasive Species Management
- Land Use/"Smart Growth"
- Recreation
- Education (Schools/Volunteer)

Evaluation criteria will be established and conceptual plans will be screened to eliminate those which are manifestly not technically feasible, do not meet established objectives, or which violate physical, economic, and institutional constraints.

Plans 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 a plan that otherwise fits into the overall basin management philosophy provided that other agencies with interest in implementing the plan can be identified.

Costs, benefits, and environmental outputs of each conceptual plan 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 EPA's Rapid Bioassessment Protocol (RBP), 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.

The decision-making framework leading to the recommendations will consist of 1) early and continued close coordination between the Corps of Engineers, the Sponsor 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.

- a) Initial Vision and Watershed Goals – The Sponsor, in collaboration with the watershed advisory committee, shall prepare an initial vision statement that expresses an idea of what the watershed will become, and clearly describes what the community hopes to accomplish. The vision will set the tone of the watershed plan and will be used throughout the planning process. In addition, an initial set of watershed goals and objectives will be created to provide a realistic framework for achieving the vision as well as help focus limited

resources .

b) Description and Assessment of the Waterbody(ies) and Watershed Resources – The Sponsor shall conduct an inventory of the waterbody(ies) and watershed(s) based on existing data, and state, county, regional or local planning and monitoring programs, and new information collected specifically for this project, as necessary. The scale for which the primary unit of analysis, presentation and recommendations for protection and restoration shall be at the subwatershed level. Based on the inventory, the Sponsor will prepare a description and assessment that:

- Delineates the watershed and its constituent subwatersheds determined by an analysis of topography, existing drainage infrastructure, surface hydrology, field observation, and other factors as appropriate.
- Identifies and describes the geographic setting and features of the watershed, including but not limited to, topography, geology, hydrography, floodplains, soils, areas of erosion, and precipitation.
- Identifies, describes and maps infrastructure (i.e., roads and bridges; stormwater infrastructure including outfalls; dams, and other impoundments or flow constriction structures).
- Identifies and describes well heads and public water supplies.
- Identifies and describes groundwater recharge areas contributing to aquifer replenishment, stream base flow, or wetland hydrology.
- Describes demographics, and historic, current, and projected population density.
- Describes historic, current and projected land uses and land cover.
 - Describes types, sizes, and locations of agricultural operations, as well as their positive & negative water quality impacts
 - Describes types, sizes, and locations of forestry operations, as well as their positive & negative water quality impacts
- Describes zoning.
- Identifies water quality classifications for all segments of the waterbody.
- Identifies and describes impairments to water quality and living resources.
- Identifies point sources and hot spots (ie. NPDES Phase I & II permittees, septic and underground storage tanks, landfills and superfund sites).
- Describes living resources (i.e., fish, macroinvertebrates), and overall watershed habitat.
- Describes key water and habitat resources warranting special protection or restoration.
- Describes a projected build-out for the community(ies) based on current land use plans and regulations.
- Estimates impervious cover for each subwatershed.
- Estimate runoff and pollutant loadings for each subwatershed under current conditions, and anticipated pollutant loads resulting from new or expanded uses in the watershed.

c) Description and Assessment of Local Laws, Programs and Practices Affecting Water Quality – The Sponsor shall identify and describe federal, state, county, and local laws, programs and practices that affect surface and groundwater quality, including point and nonpoint source pollution, habitat protection, and restoration in the watershed. The characterization shall identify and document any gaps in data or information.

The assessment of local laws, programs and practices shall include the following:

- a) Description of federal, state, county, and local agencies as they affect nonpoint source pollution, including stormwater management, habitat protection, and restoration in the watershed.
- b) Description of local land use plans, regulations, (including zoning, site plan review, subdivision regulations, stormwater management, and wetlands, watercourse and flooding regulations), programs and practices, (including road de-icing practices, basin maintenance schedules, salt storage placement and volumes, ditch maintenance, etc.), including an analysis of their strengths and weaknesses as they relate to management of point and nonpoint source pollution and protection of aquatic habitat.
- c) Refinement of Vision and Watershed Goals – Based on information gathered from the characterization and comments from the public, the Sponsor shall refine the initial vision statement and watershed goals and objectives, as needed.
- d) Defining Existing Conditions – An updated and comprehensive assessment of present conditions within the Wreck Pond 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 for the main tributaries, 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.) for the main tributaries.
 - Hydrodynamics and non-cohesive sediment transport for the main tributaries.
 - 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
- e) 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” and will describe the anticipated condition of the watershed in the future, if no watershed protection projects are implemented.

- f) Prepare Baseline Conditions Report (incl. Future Without Project Conditions)
- g) Watershed Management Recommendations to Achieve Goals and Objectives
 - i) Identify and Describe Management Strategies and Recommendations - Based on the characterization of the waterbody and its watershed, the Sponsor will identify management strategies and recommendations to protect and restore the resources of the waterbody and its watershed. Regulatory and Programmatic actions, which may include, but not be limited to:
 - Land use management, such as: comprehensive plans, zoning, site plan review, erosion and sediment control
 - Improved stormwater management practices, including Low Impact Development and Green Infrastructure
 - Onsite wastewater treatment system management
 - Wetlands and watercourse protection (including buffer area establishment)
 - Groundwater and aquifer protection, floodplain management
 - Open space protection and land conservation and protection and forest management.
 - Training, education, and stewardship programs.
 - Identification of monitoring and research needs to advance watershed management goals.
 - Restoration and Protection Projects, which may include, but not be limited to:
 - Watershed-wide and site specific actions to restore and protect water quality and living resources/habitat.
 - Stormwater remediation measures to reduce pollutant loadings in each subwatershed (i.e., wetland creation, vegetative treatment systems, retrofitting, reduction of impervious surfaces).
 - Identifying potential sites for fish and wildlife habitat restoration including areas within streams, stream corridors, freshwater and tidal wetlands, and ponds for potential improvement to ecological integrity (i.e., habitat structure, dynamics, connectivity, and quality).
 - Structural activities such as stream restoration, stormwater treatment system retrofits, or agricultural BMPs
 - Establishing education programs to build awareness and stewardship. This could involve activities such as storm drain stenciling that are implemented on-the-ground and are identified during field assessments.
 - ii) Prioritize Recommended Projects and Actions and Key to Map(s) - The Sponsor shall develop a prioritized list of recommendations, with supporting justification, and linked to maps and should include photographs showing project locations and conditions .

The prioritization process will include:

- Evaluating subwatersheds according to impairments and/or threats to water quality and habitat.
- Identifying priority subwatersheds for focused nonpoint source pollution management action.

- Ranking projects and actions within each subwatershed according to anticipated reduction in nonpoint source. Potential ranking factors may include, but would not necessarily be limited to:
 - watershed goals, subwatershed priority, and vulnerability
 - pollutant reduction/protection afforded and habitat value
 - cost, permitting, and maintenance
 - land owner cooperation, public access and visibility
 - partner involvement and innovation

h) Implementation Strategy and Schedule – The Sponsor shall prepare a strategy and schedule to implement the identified watershed management practices and approaches, including the specific projects and other actions that were identified through analysis and public participation . Implementation strategy will:

- Clearly articulate priorities, measurable objectives and steps to implement the identified protection and restoration strategies.
- Include cost estimates, potential funding sources, and a phasing schedule noting lead/involved organizations for each action.
- Include a schedule for periodically updating the plan.
- Articulate the ongoing role of the watershed advisory committee.

The Implementation Strategy will include a matrix of prioritized projects and other actions for advancing the implementation of the goals and objectives of the watershed plan, including steps needed to implement the specific projects (i.e., feasibility, design, permitting, construction), timeframe for implementation; short term (i.e., immediate to 1 year), medium term (i.e., greater than 1 year, up to 5 yrs), or long-term (i.e., greater than 5 years), cost estimates, potential funding sources, regulatory approvals needed, and likely project sponsor (agency or organization lead) and project partners.

i) Tracking and Monitoring – The Sponsor shall prepare a plan that includes strategies for tracking implementation of projects and other actions, and monitoring water and related resources to measure success in achieving project goals and objectives. The tracking and monitoring plan shall identify methods to track implementation of projects and other actions and gather baseline data on watershed conditions toward assessing the effectiveness of implementation over time. The plan would include a method for tracking the implementation of projects and actions, and periodic monitoring of water and related resources. In addition, the plan may include identification of potential parties to conduct monitoring activities, potential funding sources, and methods of data management.

14) Report Preparation

a) Baseline Conditions Report – Based on the information available, the baseline conditions report content will include a discussion of known current and likely future baseline conditions, and a discussion of the types of potential preliminary watershed plans. The baseline conditions report will be prepared with the intent to determine the direction of the remainder of the study. A workshop (W3 Milestone), attended by representatives of the Corps and Sponsor, 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) redefine study objectives; and, 3) identify, describe and discuss preliminary plans to be submitted by the Corps and local sponsors. In addition to each

Baseline Condition Appendix, the Sponsor's input that will be included is:

- i) Draft Watershed Characterization Report – The Sponsor shall prepare a single Watershed Characterization Report including the written description and assessment of the waterbody and watershed as well as assessment of local laws programs and practices to control nonpoint source pollution and habitat degradation. The characterization will be supported by maps and other data as appropriate that describe the physical, biological and ecological condition of lakes, rivers, streams, wetlands, riparian areas, and upland portions of the watershed .
 - ii) Final Watershed Characterization Report – The Sponsor shall prepare a final Watershed Characterization Report. The draft Watershed Characterization Report shall incorporate the Description and Assessment of the Waterbody(ies) and Watershed Resources, the Description and Assessment of Local Laws, Programs and Practices, and the statement of Vision and Watershed Goals (part C) into one cohesive document that discusses the relationships among these components. The final report shall be supported by maps, tables, and graphics as appropriate. The final report shall incorporate stakeholder comments in the final Watershed Characterization Report.
- b) Watershed Management Recommendations Report – The Sponsor shall prepare the draft and final Watershed Management Recommendations Report. The draft shall incorporate the management recommendations, and the prioritization and potential recommendations into one cohesive chapter. The final report shall incorporate the stakeholder comments in the final Watershed Characterization Report.
- c) Draft Watershed Management Plan – The Sponsor shall prepare the Draft Watershed Management Plan, which shall include the elements described in the previous tasks. The Draft Plan shall reference all sources of information and identify any information gaps and issues requiring further study. The watershed management plan will contain six main sections: Executive Summary, Introduction, Characterization, Watershed Management Recommendations, Implementation Strategy, Monitoring and Tracking. Executive Summary - The executive summary will provide a concise, reference for the entire document. It will present key points of the watershed plan, provide a brief overview of the purpose of the watershed plan, who was involved in the planning process, and highlight the vision, main findings, and list watershed goals, and recommendations. Introduction - The introduction will describe the watershed plan (including where the watershed is located, general facts about the watershed and the communities within its boundaries, and general demographics) and provide a basic understanding of the planning process (including partners involved and how they contributed, methodologies used to prepare the plan) to give the reader an understanding of the watershed and why watershed planning is important. The introduction will also contain the watershed vision - what it means to the community and how it will shape the future of the watershed.
- d) Characterization - The characterization will provide an inventory and analysis describing the current state of the watershed and assessment of programs and practices in place for controlling pollution. This section will delineate the watershed and subwatershed boundaries and describe its waterbodies, describe physical and biological characteristics, including how the watershed functions, explain existing land use and land cover patterns, and identify trends within the watershed. The characterization will include an identification of sensitive resource areas, water quality issues, pollutants, and corresponding activities

impacting water resources. This section will also assess the programs and practices in place for controlling pollution, describe the assessment process used and discuss the gaps found during the assessment. The characterization is the basis for the development of watershed management recommendations. To the extent possible, this section will explain how water quality will be protected and restored within the watershed through a series of projects and actions developed to correct existing impairments and prevent future impacts to water quality. The recommendations will be supported by the available technical data collected and conducted during the study.

e) **Implementation Strategy** - This section will set the stage for implementation by identifying the actions needed to address the problems and opportunities in the watershed. It will set out an implementation schedule, lay out priorities, establish realistic expectations for partner involvement, and outline budget needs.

f) **Monitoring and Tracking** - This section will outline a proposed long-term monitoring and tracking plan, describe indicators and performance criteria for monitoring restoration projects, establish milestones and tracking mechanisms to evaluate progress over time, and propose mechanisms for reporting progress and updating the watershed plan. Creating a plan for observing changes in water quality will help you understand how well certain practices work and how to adapt the plan to continue to provide water quality improvement.

g) **Final Watershed Management Plan** – The Sponsor shall complete the Final Watershed Management Plan, which shall incorporate and reflect comments received from the watershed advisory committee, and the public.

h) **Semi-annual Reporting** – The Sponsor shall prepare semi-annual reports (every six months) including a description of the work accomplished, any problems encountered, and any assistance needed.

i) **Final Project Summary Report and Measurable Results Forms** – The Sponsor shall complete the Final Project Summary Report and Measurable Results forms. Forms will be completed as required and filed with project deliverables.

j) **Draft Watershed Management Study** – The public draft 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.

k) **Final Watershed Management Study** – The final report includes revisions based on comments received during the public review time period.

15) Flood Warning System

Planning Division will develop recommendations for a flood warning system for watershed. The USACE will work in coordination with the Monmouth County Office of Emergency Management to develop a system that is consistent with their existing system. The recommendation will include the type of flood warning system with recommendations for implementation and cost estimates.

16) Review Support

All 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 (agency technical/policy review).

a) PDT Quality Control – Seamless peer review is an in-progress, single discipline peer review conducted at the work station of the project/study/design team member. It will not substitute for normal internal review of products which is the responsibility of each Study/design team member's first line supervisor. Upon completion of each assigned study or design task, and prior to release of task products, study/design team members will request on-board peer reviews by their Review Team counterparts. It is envisioned that most study/design team members will receive a series of reviews during the preparation of a major project document. The review will be planned, conducted and documented. Underlying policy and design assumptions will be identified. Each review will include an evaluation of the adequacy of data, assumptions, acceptability of techniques and procedures used, level of detail, compliance with policy and guidelines, consistency of results, accuracy and comprehensiveness. A formal comment/response/decision process will be used in this stage of review. A memorandum for the record prepared by the Review Team member will be the basis for establishing accountability for the product and review process. Peer reviews will be conducted much less formally than final document reviews. Countersigned checklists must be submitted to maintain accountability. The reviews will be completed prior to major decision points so that technical results can be verified prior to setting the future course of design/study activities. Costs associated with these reviews are incorporated into the other subaccounts.

b) Agency Technical Review – In accordance with Corps policy, all General Investigations feasibility studies shall be technically reviewed by an entity outside the producing District. This agency technical review (ATR) process, which does not replace internal technical reviews (District Quality Control), shall encompass all technical products being developed as part of the feasibility study. External review entities can include, but are not limited to, other Corps Districts, Division offices, Corps Headquarters, Corps Laboratory and Research Facilities, academia, technical experts, and contractors. An ATR entity will be identified for this study early in the study process. ATR is defined and scoped in consultation with the Corps' Planning Centers of Expertise (PcX). In the case of environmental restoration, that is the Mississippi Valley Division. A Quality Control Plan or Review Plan will be developed to define the technical review/quality control processes that will be used. It is assumed, however, that, since this effort will not lead to Corps construction or NEPA documentation, the overall ATR effort will be less than is typically necessary for Corps feasibility studies.

17) Contingencies

\$50,000 in contingency funds has been estimated for the study. 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.

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CHAPTER V. STUDY SCHEDULE

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Table 2 Project Delivery Team Members		
Team Member	Division	Role
Laura Singer	PL-F	Project Manager
Jason Shea	PL-F	
Heather Morgan	PL-E	
Gail Woolley	EN	
Jeff Cusano	PL-E	
Mark Burlas	PL-E	

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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

November 23, 2010

Mr. Eugene Brickman
Deputy Chief, Planning Division
United States Army Corps of Engineers
New York District
26 Federal Plaza, Room 2145
New York, New York, 10278

Dear Mr. Brickman:

This letter confirms that the Office of Engineering and Construction (OEC) in the New Jersey Department of Environmental Protection has reviewed the recent United States Army Corps of Engineers' (USACE) Section 905 (b) Reconnaissance Study for the Wreck Pond Watershed in Monmouth County, New Jersey.

OEC concurs with the Reconnaissance Study recommendation that the study proceed into the feasibility phase, but must condition this on the development of a Project Management Plan that is acceptable to OEC and the availability of state funds for cost sharing with the USACE. OEC is particularly interested in the flood damage reduction and the erosion and sediment control that the feasibility study will consider.

We have been looking forward to partnering with the USACE to resolve the Wreck Pond issues. Please contact me at 609-292-9236 or dave.rosenblatt@dep.state.nj.us to discuss any aspect of this process or OEC's participation.

Sincerely,

David Rosenblatt
Administrator