

***FOUR MILE RUN
FEASIBILITY STUDY
PROJECT MANAGEMENT PLAN***

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PROJECT MANAGEMENT PLAN

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Four Mile Run Watershed Restoration Feasibility Study

PROJECT MANAGEMENT PLAN

1. PURPOSE OF PROJECT MANAGEMENT PLAN (PMP)

This project management plan (PMP) outlines the study description and components for a multipurpose feasibility study which will be developed by the Baltimore District, Army Corps of Engineers, in conjunction with the non-Federal cost-sharing partners, the City of Alexandria and Arlington County. The multipurpose feasibility study covers the entire Four Mile Run watershed includes local flood protection project modification, watershed planning, and aquatic ecosystem restoration.

The PMP is the result of negotiations between the Baltimore District, Arlington County, and the City of Alexandria during the reconnaissance phase. Various members of Alexandria and Arlington government, local citizen representatives, and the Baltimore District's study team conducted the scoping process. The PMP must be approved by the non-Federal sponsors, approved by the Corps of Engineers North Atlantic Division prior to its implementation, and certified by the Office of the Chief of Engineers.

The PMP details the scope of the study, schedule of tasks to be completed, and budget to complete the feasibility study. The division of labor and costs of the study are cost shared 50/50 between the Baltimore District and the non-Federal sponsors. The PMP is a "living" document, and as such, will be updated when changes in scope, schedule, or budget occur during the feasibility phase.

2. ON-GOING RESTORATION EFFORTS

2.1 Four Mile Run

The Four Mile Run Watershed is 19.7 square miles and is home to 183,000 residents in the greater Washington Metropolitan Area (WMA). The region is completely urbanized with an impervious cover of over forty percent. Urbanization has led to major impacts in the watershed, such as excessive nutrients, sedimentation, loss of habitat, flooding and impaired water quality.

In addition to authorizing the Local Flood Protection project in Four Mile Run in 1974, Congress also mandated that a multi-jurisdictional land use management program. This mandate led to the creation of the Four Mile Run Watershed Management Program at the Northern Virginia Regional Commission (NVRC). Represented by the various counties and cities within the watershed, this commission was tasked with developing a method for quantifying the benefits of reducing flood damages by reducing the amount of stormwater runoff. The NVRC has developed a watershed model for stormwater management purposes. In addition to the model, a variety of studies and products related to improving water quality and restoring flood damages have been

underway, such as: a regional best management practices study, non-point source planning and outreach, and TMDL studies and implementation plan.

During the planning process for the South Tract development adjacent to Four Mile Run, Arlington County and the City of Alexandria applied for and received a grant from the Environmental Protection Agency in the amount of one million dollars in 2002 to evaluate environmental opportunities within the levee corridor and construct an environmental demonstration project.

2.2 Chesapeake Bay Program

The Chesapeake Bay Program (CBP) is a unique regional voluntary partnership directed to restore the Chesapeake Bay. The CBP was created in 1983 with the signing of the *Chesapeake Bay Agreement* by the states of Maryland, Pennsylvania, and Virginia; the District of Columbia; the tri-state legislative Chesapeake Bay Commission; the U. S. Environmental Protection Agency (EPA), representing the Federal governments; and participating advisory groups. With the Federal government as a signatory on the Bay agreements, the executive branch has agreed to support and help implement the CBP goals and initiatives. Overall, Federal agencies play a major role in the success of restoring the Chesapeake Bay. Federal agencies are involved in the CBP because they provide technical and financial assistance to governments and private citizens, oversee regulatory programs, and manage nearly 1.6 million acres within the drainage basin.

2.3 Summary

The benefits of restoring the Four Mile Run watershed will not only be the restoration of an individual watershed, but also the restoration of a small but significant component of the Potomac River sub-basin and the Chesapeake Bay drainage basin. As a result, the watershed is the target of many initiatives, as described above. This study provides an increased opportunity for the Corps of Engineers to support and help implement an ecosystem management approach of the Bay.

3. BACKGROUND ON CORPS EFFORTS IN THE FOUR MILE RUN WATERSHED

The following section provides a brief description of the Corps local flood protection project within the Four Mile Run watershed.

3.1 Existing Projects

In March of 1974, Congress authorized the Corps to design and construct a project for flood protection on Four Mile Run “to accommodate flood flows of twenty-seven thousand cubic feet per second” (PL93-251, Section 84.) The Four Mile Run Local Flood Protection Project (LFPP) was constructed in 1980. The LFPP was designed to provide protection from flood flows of 27,000-cfs on Four Mile Run and fluvial and tidal backwater stages from the Potomac River having a frequency of occurrence of once in 180 and 1,000 years respectively. The project features levees and floodwalls, interior drainage facilities, an improved channel for flood capacity,

and several highway and railroad bridge modifications. The project non-Federal cost-sharing sponsors were Arlington County, Virginia, and the City of Alexandria, Virginia.

3.2 Recent Authorization

A study of Four Mile Run, Virginia, was authorized by Section 201 of the Flood Control Act of 1965 (Public Law 89-298), as modified by the River Basin Monetary Authorization Act of 1971 and Section 84 of Water Resources Development Act of 1974 (PL 93-251).

More recent authority for the study was given in the Energy and Water Appropriations Bill of 2002, which provided \$100,000 *“for the Corps of Engineers to undertake a reconnaissance study of flood control needs and environmental restoration opportunities in Four Mile Run, Virginia.”*

3.3 Reconnaissance Phase

3.3.1 Purpose

Under the 2002 authority, the first action by the Corps was to complete a reconnaissance study for the entire watershed. The purposes of the reconnaissance study were: (a) to determine whether there is a Federal interest in implementing a project or projects in the interest of environmental restoration, wetlands creation and protection, habitat improvement, and flood protection within the Four Mile Run watershed; (b) to scope one or more project management plans focused on environmental enhancements and flood protection in the Four Mile Run watershed; and (c) to negotiate a feasibility cost-sharing agreement (FCSA) between the Corps and non-Federal sponsor(s) to cost-share the feasibility phase 50 percent Federal, 50 percent non-Federal.

3.3.2 Findings

In order to demonstrate a Federal interest in an environmental restoration project for the Four Mile Run, the reconnaissance report did the following:

- Demonstrated national, regional, or local significance of ecological resources within the study area;
- Identified alternatives (i.e., a combination of physical improvements and management measures) that would contribute significantly to improvement in the ecosystem (and is within the authority of the Corps or non-Federal cost-sharing partners to implement); and
- Demonstrated a clear linkage between implementation of the plan and measurable improvements in the ecosystem

The Four Mile Run 905(b) WRDA Analysis report, dated August 2002, recommended that the Corps of Engineers conduct a feasibility study for environmental restoration of the Four Mile Run Watershed.

4. FEASIBILITY PHASE

The feasibility study is the second phase of the Corps of Engineers planning process and follows a favorable reconnaissance report and execution of a feasibility cost sharing agreement (FCSA) between the Corps of Engineers and the non-Federal cost-sharing partners. The purpose of the feasibility study is to fully evaluate all reasonable solutions to the problems identified. The feasibility report is a complete decision document that presents the results of the reconnaissance and feasibility phases and provides the basis for developing a Four Mile Run levee corridor master plan and a watershed restoration plan; recommending the construction of a project or multiple projects; and preparing plans and specifications during the preconstruction engineering and design (PED) phase.

4.1 Goals and Objectives

The legislative authority for this feasibility study allows for a watershed approach to restoring Four Mile Run while maintaining or enhancing flood damage protection within the Four Mile Run watershed. During the feasibility phase, the study team will address the following study goals:

- evaluate the authorized level of flood protection provided by the existing Four Mile Run local flood protection project and determine the appropriate level of protection based on current build-out conditions and historical flow data;
- reduce incidental flood damages in conjunction with habitat improvement;
- restore aquatic and riparian habitat within the Four Mile Run watershed;
- enhance the aesthetics of the channel and levee corridor;
- integrate the design of the channel with surrounding communities and proposed urban development adjacent to Four Mile Run;
- develop upstream strategies to maintain the long-term viability of flood control measures and restore aquatic habitat; and
- protect the Potomac River and the Chesapeake Bay.

4.2 Purposes

The purposes of the feasibility phase are the following:

- To evaluate and formulate plans based on detailed engineering, economic, environmental, and cultural investigations;
- To identify environmental restoration projects that produce high priority environmental outputs, and that are incrementally justified and technically feasible;
- To evaluate options for modifying the existing local flood protection project in Four Mile Run to provide for aquatic ecosystem restoration and recreational opportunities;
- To estimate costs and benefits to a level of detail suitable to justify the proposed plans and projects;
- To determine the appropriate construction cost-sharing arrangements and obtain non-Federal support, as necessary;
- To prepare appropriate documentation for Federal project authorization;

- To recommend favorable projects for authorization and construction, if appropriate; and
- To comply with the National Environmental Policy Act (NEPA) requirements by preparing an EIS or EA, depending on level of impacts of proposed projects.

4.3 Feasibility Process

The feasibility study follows a six step planning process described in ER 1105-2-100, “Policy and Planning - Planning Guidance”, 28 Dec 90:

1. Specify water and related land resources problems and opportunities;
2. Inventory, forecast, and analyze of water and related land resource conditions within the planning area relevant to the identified problems and opportunities;
3. Formulate alternative plans;
4. Evaluate effects of the alternative plans;
5. Compare alternative plans; and
6. Select a recommended plan based upon the comparison of alternative plans.

4.4 Study Area

The study area is defined as the Four Mile Run watershed, which is located in Northern Virginia and includes portions of four different local jurisdictions (see Figure 1). Four Mile Run rises near Brilyn Park in Arlington County, Virginia, and flows in a southeasterly direction for a distance of approximately 9 miles to the Potomac River. The total drainage area of the watershed is 19.1 square miles, of which 3.2 square miles are within the City of Alexandria, Virginia; 0.6 square miles in the City of Falls Church, Virginia; 13.2 square miles in Arlington County, Virginia; and 2.1 square miles in Fairfax County, Virginia. The Cities of Falls Church and Alexandria are independent communities not within any county.

Figure 1: Study area for the local flood protection project modification and environmental restoration feasibility study

4.5 Scope of this Feasibility Study

By taking a watershed approach, the scope of this project encompasses several broad components to meet the planning goals and objectives outlined above. The components of the study can be grouped into the following categories: wetland creation and restoration; hydrologic and floodplain function restoration; in-stream habitat restoration and channel modification; beneficial use of dredge material; land acquisition; master planning for restoration, creation and protection of natural infrastructure; flood protection and management; aesthetics; and recreation. A more detailed discussion of each alternative is provided below.

4.5.1 Master Planning for Restoration, Creation and Protection of Natural Infrastructure

This component of the study focuses on the creation of a comprehensive watershed plan for the Four Mile Run watershed. It would identify ecosystem restoration opportunities for creation and restoration of altered landscapes and habitat, and would reevaluate the level of flood protection required throughout the watershed. The master planning effort will take a two-phased approach, one focusing on the levee corridor the other the upper reaches of the watershed. The final watershed plan will combine the results of each phase, building upon existing plans developed by the non-Federal sponsors.

4.5.2 Wetland Creation, Restoration and Enhancement

This alternative will identify restoring wetlands habitat within the LFPP and throughout the watershed. The types of wetlands that can be created, restored, or enhanced in the Four Mile Run watershed include freshwater tidal wetlands, riparian wetlands, and vernal pools. The non-Federal sponsors' watershed restoration plan identifies a variety of riparian wetland sites for restoration, and the reconnaissance study has identified existing tidal and riparian wetlands in the watershed that could be enhanced. Creation of additional tidal or riparian wetlands, or vernal pools, would provide further habitat benefits, and potentially, floodwater attenuation.

4.5.3 Hydrologic and Floodplain Function Restoration

Hydrologic function can be restored throughout the watershed by reducing imperviousness, increasing infiltration, decreasing the volume of runoff and flows, and expanding stream buffers in the floodplains of the watershed. Opportunities for restoration exist in the current parklands along the stream corridor, as well as within the LFP project. The non-Federal sponsors have identified additional areas for potential hydrologic and floodplain function restoration.

4.5.4 In-Stream Habitat Restoration and Channel Modification

A variety of stream restoration and channel modification techniques can be used to restore in-stream habitat throughout the watershed. They include daylighting streams, restoring tributaries, removing blockages to allow anadromous fish passage, expanding forest buffers, removing invasive species, and addressing channel erosion. The non-Federal sponsors have surveyed 236

sites in the watershed and identified potential stream restoration projects. In addition, the Corps study team members have surveyed the LFP project corridor, and believe that some channel modifications can be done that will restore habitat while maintaining the authorized level of flood protection.

4.5.5 Beneficial Use of Dredged Material

Prior to the channel modifications, the tidal portion of Four Mile Run supported a variety of wetland habitats. The beneficial placement of dredged material from local sources would potentially allow for the creation of freshwater tidal wetlands by raising elevations from 1.9 to 2.8 feet to support the growth of wetland plant species. Some tidal wetlands have already been forming within the local flood protection project area due to sedimentation within the channel. The number and/or size of tidal wetlands within the watershed could potentially be expanded under this alternative.

4.5.6 Land Acquisition

In some cases, the only methods for meeting the designs and objectives may be to acquire land. The non-Federal sponsors have identified areas to expand existing parkland, to improve infiltration, and reduce stormwater impacts, primarily in the headwaters. Land acquisition could be recommended as a project alternative for non-Federal implementation, or potentially Federal participation, depending upon real estate requirements.

4.5.7 Flood Protection and Management

This alternative would verify the level of flood protection provided by the existing Four Mile Run Local Flood Protection Project, and would identify the need, if any, for additional flood damage protection within the watershed. This alternative would identify whether the existing LFP project provides flood protection above the authorized level of protection, based on a greater number of years of hydrologic data for the watershed. Should the project provide less than the authorized level of protection, the study could determine the economic feasibility of modifying the project to regain the full authorized level of protection. Should the project provide more than the authorized level of protection, this information could be used in the evaluation of environmental restoration features that could be incorporated or retrofitted into the LFP project design. This alternative could also examine non-structural and bio-engineering methods to provide enhanced flood damage protection, including measures to reduce negative environmental impacts associated with excessive storm water runoff.

4.5.8 Aesthetics

Through the modifications of the levee corridor for flood damage reduction and environmental restoration, improved aesthetics alternatives will be evaluated. This study area is a focal point of the local community and non-Federal sponsors' economic revitalization plan for this area. Improved aesthetics will contribute to making the area more attractive to the surrounding community and new development.

4.5.9 Recreation

Through the modifications of the levee corridor for flood damage reduction and environmental restoration, improved recreation alternatives will be evaluated. Visual and physical access to the river will be important considerations during the evaluation of alternatives. Improved recreation will contribute to making the area more attractive to the surrounding community.

4.6. Feasibility Cost-Sharing Agreement (FCSA)

Administrative policy permits the expenditure of Federal funds for all costs associated with the reconnaissance phase. Section 105(a)(1) of the Water Resources Development Act (WRDA) of 1986; however, requires that the cost of a subsequent feasibility phase be shared equally (50/50 split) between the Federal government and a non-Federal cost-sharing partner(s). The non-Federal contribution, or fifty percent of the total cost of the feasibility phase, may be in the form of in-kind services. In-kind services are those tasks performed and paid for by the non-Federal cost-sharing partners in direct support of the feasibility study effort. While all in-kind services should be in support of the particular study, it is permissible for non-Federal cost-sharing partners to reorient existing programs and ongoing work to complement the Corps' feasibility study.

To proceed beyond the reconnaissance phase, the Federal government and the non-Federal cost-sharing partners must agree that the proposed project is in the Federal and non-Federal interest and then negotiate an FCSA that commits both parties to equally sharing 50 percent of the feasibility phase cost. The FCSA is intended to promote a partnership for conduct of the feasibility phase. It sets forth the management structure, obligations of the signatories, methods of payment, resolution of disputes, methods for termination or suspension of the feasibility study, and other general contractual matters.

Federal funds to initiate the feasibility phase may be allocated only after a negotiated FCSA has been prepared and Corps' higher authority has certified all documents. The feasibility phase can then begin after execution of the FCSA.

Arlington County and the City of Alexandria have been identified as the non-Federal cost-sharing partners for this feasibility study.

5. DESCRIPTION OF PRODUCTS

This PMP covers the development of three products during the feasibility phase prior to the initiation of the pre-construction engineering design (PED) phase: (1) feasibility report and integrated Environmental Assessment/Environmental Impact Statement (EA/EIS), (2) design agreement and financing plan, and (3) project management plan.

5.1 Feasibility Report and Integrated Environmental Assessment

This feasibility report includes all activities leading to the approval of the final feasibility report and NEPA documentation (integrated Environmental Assessment or Environmental Impact Statement) by the Office of the Chief of Engineers. The report includes all problem identification and plan formulation activities required to identify and recommend plans of improvement. The integrated EA/EIS details the impacts of the alternatives considered and the recommended plan. It also includes NEPA, Section 106, and other environmental compliance documentation; coordination of the study and results with all interested parties; initial and final independent technical review; and ultimately, transmittal to Congress. The feasibility study, culminating in the Notice of the Division Engineer, is scheduled for completion in the Federal fiscal year 2006.

The integrated EA/EIS includes all activities leading to the assessment of environmental impacts related to the various projects being investigated. These activities include scoping and preparation of the environmental document, public coordination and review, and notification of findings. As part of the EA/EIS, the alternative analysis will investigate the positive and negative impacts of each alternative proposed at each site identified in the feasibility study.

Regulatory requirements that must be met during the NEPA process include:

- Coordination of a public involvement to ensure that the public's concerns are addressed and that the public is kept apprised of what the Corps is proposing;
- Coordination with the USFWS including receipt of a FCWA report;
- Investigation of possible impacts to cultural resources with results and determination of effects coordinated in accordance with Section 106 (Public Law 89-665, as amended) responsibilities;
- Preparation of a preliminary hazardous, toxic, and radioactive waste (HTRW) assessment;
- Compliance with applicable statutes, executive orders, policies, and other environmental laws and regulations, as appropriate; and
- Assessment of the environmental effects of the possible solutions, and preparation of an EA/EIS, depending on level of impacts

Additional tasks to be documented in the feasibility report include, but are not limited to, the following:

- Investigation of restoration and recreation opportunities within the Levee Corridor and in the upper watershed;
- Development of master plan for levee corridor, which will be included as an appendix and stand alone document;
- Detailed examination of the potential restoration alternatives and development of watershed restoration plan;
- Preparation of feasibility level detailed designs including, design plates and quantity estimates;
- Estimation of project costs and benefits;

- Analysis of project implementation arrangements, including construction cost-sharing requirements and an ability-to-pay analysis of the non-Federal cost-sharing partner's project financing plan;
- Update of the project management plan which describes the tasks required during the preconstruction engineering and design phase, and their associated costs; and
- Recommendation for authorization of plans and construction, if a projects are justified and supported by the non-Federal cost-sharing partners

5.2 Preconstruction Engineering and Design Agreement and Financing Plan

As the details of the recommended plans are finalized, the District and the non-Federal cost-sharing partners will review the model language for the preconstruction engineering and design agreement, as well as eventual project implementation requirements. Letters of intent will be developed that acknowledge the requirements of local cooperation and that express good faith intent to provide those items for the recommended project. Additionally, preliminary financing plans will be developed by the non-Federal cost-sharing partners to detail plans for financing the project costs. Assessment of these plans will then be completed by the Baltimore District.

In the event that the federal cost-sharing requirement of a proposed project is below \$5 million, a Letter of Intent from the non-Federal partners will be submitted under the Continuing Authorities Program for implementation.

5.3 Project Management Plan (PMP)

As part of the feasibility effort, a project management plan (PMP) will be updated and a baseline cost estimate will be prepared based on the recommended projects to be implemented the design phase. The PMP will address the schedule of design activities. These activities potentially include design memorandums, and preparation of plans and specifications for the initial construction contracts. The project management plan that is then further updated as the project approaches construction and as any major schedule or scope changes occur.

6. ORGANIZATIONAL BREAKDOWN

The purpose of this section is to define the study team organization and their roles and responsibilities for accomplishing the study.

6.1 Executive Committee

As indicated in the FCSA, the overall study management is the responsibility of the Executive Committee. The Executive Committee shall consist of the Baltimore District Engineer; Deputy District Engineer for Programs and Project Management; Chief, Planning Division, Baltimore District; Arlington County Manager, Director of the Arlington County Department of Parks, Recreation and Community Resources; Director of the Arlington County Department of Environmental Services; Alexandria City Manager; Alexandria Director of Recreation, Parks and Cultural Activities; and Alexandria Director of Transportation and Environmental Services. The

Executive Committee will meet as needed throughout the study to review study progress, finances, and findings as developed and reported by the study team. The committee will also resolve any disputes, which are not resolved by the study team and will appoint appropriate representatives to serve on the study team.

6.2 Study Team

The study team, referred to as the Four Mile Run Agency Coordination Group, is comprised of representatives from the Baltimore District and the non-Federal sponsors (see Attachment A). The Baltimore District includes representatives from the Planning Division, Engineering Division, Real Estate Division, Construction Division, Contracting Division, and Programs and Project Management Division. The non-Federal sponsors include representatives from various Alexandria and Arlington county agencies.

Alexandria

- Alexandria Park and Recreation Commission
- Department of Transportation and Environmental Services
- Department of Planning and Zoning
- Department of Recreation, Parks and Cultural Activities

Arlington

- Arlington Planning Commission
- Arlington County Park and Recreation Commission
- Department of Environmental Services
- Department of Parks, Recreation and Community Resources
- Department of Public Works
- Department of Community Planning and Development

The Northern Virginia Regional Commission is also a member of the group, representing the non-Federal sponsors and other jurisdictions within the watershed. In addition, Arlington County and the City of Alexandria will form an ad hoc committee to coordinate community involvement (see Attachment A for table of current team members and outline of the community planning process).

The study team is responsible for completing the study in accordance with the FCSA, PMP, and appropriate Federal and state guidance and regulations. The study team will meet regularly to coordinate on study progress, interim findings, financial status, and all matters related to conduct and complete the study. A technical coordinator will be assigned as the representative of each of the technical divisions. The development of a timely, quality product within the established task budget is the responsibility of the technical coordinator, and ultimately, of the project manager. In addition, the individual team components are responsible for scope of work preparation, contract negotiation, and performance of any work to be completed by consultants or other Federal agencies.

6.3 Technical Review Team

The Technical Review Team (TRT) for the study is responsible for ensuring that all technical products of the study team meet Corps regulations, standards and current guidance. The TRT

will provide in-progress-review and technical guidance throughout the planning process to facilitate compliance and participate in key team meetings, particularly those at the beginning of the study and during plan formulation. The TRT will be responsible for documentation and certification of the review process and coordinate signing of the quality control report by the technical division chiefs.

7. SCHEDULE

The schedule for a typical feasibility phase covers 30 to 36 months, including a public review period. Development of a preliminary schedule for the local flood protection project modification and environmental restoration study and integrated EIS were negotiated during the reconnaissance phase reading to a final FCSA. The feasibility study initiation date is tentatively scheduled for September 2003. The feasibility phase can begin only after the execution of the FCSA.

7.1 Milestones

This PMP reflects Baltimore District and the non-Federal sponsors capability. The preliminary milestone schedule assumes that funding for the study is provided for FY04 and that subsequent years are funded as required to effectively accomplish the study. These milestones are to meet USACE requirements.

MILESTONE	DATE *	DESCRIPTION
P-5	Dec 03	Sign FCSA and Initiate Feasibility Study
P-6	Jan 04	Study initiation meeting
P-7	Aprl 04	Formulation briefing with Higher Authority ; read ahead material (RAM) due 30 days prior to briefing
P-8a	Dec 06	Draft report to Corps higher authority
P-8b	Jan 07	Hold feasibility resolution conference (FRC) to review feasibility report and resolve issues; RAM due 30 days prior to briefing
P-9	Mar 07	Final report & QC; send NAD final report/EIS.
P-10	Apr 07	Submittal of the Division Engineer's (public) notice of study completion

7.2 Timeline and Phasing

A phased approach will be utilized to maximize resources of the Agency Coordination Group and assist the non-Federal sponsors in meeting their program deadlines. The phases and tasks to be completed during this study are:

7.2.1 Phase I- Data Collection, Analysis and Identification of Opportunities

The first phase will focus on data collection and analysis. Work within the levee corridor and the upper watershed will be conducted simultaneously. This phase will be completed by three work groups: Hydraulics and Hydrology, Environmental/Urban Design, and Watershed Restoration.

Tasks to be completed by the Hydraulics and Hydrologic Work Group are:

- a. Review historical plans, literature files, and databases for Four Mile Run; directly measure conditions, including stage and discharge characteristics of the channel and current channel profiles; collect field data; analyze data; and develop a computer model of the existing hydrology that could incorporate the modeling expertise of the Northern Virginia Regional Commission.
- b. Determine the current capacity of the channel. Evaluate the hydrology of the channel based on a range of possible maintenance strategies such as periodic dredging of the channel.
- c. Study the entire watershed and estimate the likely flow of the channel at maximum future build out, using existing patterns of development, current zoning, existing stormwater management and detention requirements, and any hydrologic analyses that have already been conducted by Arlington County and City of Alexandria staff.

Tasks to be completed by the Environmental/Urban Corridor Restoration Work Group are:

- a. Gather information and case studies of similar, innovative stream restoration projects throughout the country. Study successful examples of engineering, planning, improvement of riparian and aquatic habitat, watershed management programs and policies, and implementation strategies.
- b. Evaluate existing physical conditions along the channel. Evaluate current and proposed development patterns and land uses, zoning, park and trail connections, and existing environmental conditions.
- c. Identify opportunities for restoration and redevelopment along the channel, including appropriate land uses, open space initiatives, the urban and natural design character of the channel, recreational activity and connections to trail systems, improved aesthetics, and aquatic and riparian enhancements.

Tasks to be completed by the Watershed Restoration Workgroup are:

- a. Examine existing site and stormwater management policies in the watershed and make recommendations to enhance those policies relative to new development and possible retrofit of existing development.
- b. Review the current capacity, future watershed build out data, and maintenance. Determine flood levels for the 100-year storm based on current data, and identify appropriate engineering opportunities and constraints for redesign of the channel and flood management program.

- c. Identify opportunities for restoration and redevelopment throughout the watershed, such as wetland restoration, in-stream habitat improvements, best management practices to restore hydrological conditions, and riparian buffer re-establishment.

7.2.2 Phase II – Design synthesis

Based on the data collection, analysis, and identification of opportunities from Phase I, the work group shall work jointly in this phase to develop recommendations. Work on the levee in-channel designs, urban corridor designs, and watershed restoration plan will be done concurrently for input into final feasibility report. The following tasks shall be performed in this phase.

1. Define engineering, design and environmental goals.
2. Develop conceptual options for engineering, design, and environmental improvements of lower Four Mile Run that take into consideration the Army Corps of Engineers requirements for storm channel capacity, and sound environmental design.
3. Identify and assess growth management tools and opportunities, watershed restoration opportunities for implementation by the local jurisdictions.
4. Obtain public input through a series of workshops and meetings to help shape the goals and proposed improvements.
5. Evaluate the input and identify concept plans for engineering and design.
6. Share the proposal with the public through community meetings and Advisory Commission meetings.
7. Refine the preferred engineering and design options within the corridor and the upper watershed.
 - a. Develop a hydraulic computer model of the existing channel and input proposed engineering and design recommendations into the model.
 - b. Develop preliminary design plans, sections, elevations, sketches, and/or photos to illustrate the proposed urban design and uses of the channel.
 - c. Develop recommendations for short and long term environmental improvements for the channel and watershed.
 - d. Identify and develop watershed management practices, policies and action strategies to reduce runoff and improve stream quality over the long term. Management practices and strategies identified in this phase should maintain the capacity of the channel at maximum future build out.

- e. Identify channel maintenance requirements and strategies. Monitor and evaluate results for long term viability as possible solutions.

7.2.3 Phase III -Completion of Integrated Feasibility and EA/EIS Report

Based on the recommended plans developed in Phase II, the study team will prepare the feasibility report. The report will document the plan formulation process, develop 65% design and construction drawings and specifications for the project(s), obtain public input, develop a project budget and funding plan, prepare a timeline for implementation of the project, and construct the project. The completed project will be a physical demonstration of environmental, engineering and design improvements within the project boundaries. Implementation of early phases of maintenance and management strategies may occur during the Design Synthesis phase of the project.

A more detailed schedule is provided on the following page, outlining the various tasks to be completed during the feasibility study.

Insert timeline (excel file)

8.0 DETAILED FEASIBILITY STUDY SCOPE AND COST ESTIMATE

Major work tasks for a feasibility phase are identified in terms of the general activities that are included in the Corps of Engineers standard study cost estimate for general investigations (e.g. 22A, 22B, etc). The entire study will cost \$3,719,000 and is broken down into specific subaccounts and cost shared accordingly between the District and the non-federal sponsors. These subaccounts are further divided into tasks that are specifically applicable to the proposed feasibility study and reflected the needs and grant obligations of the non-Federal partners. The tasks are based on a concurrent phases of plan formulation- one phase for the levee corridor and one phase for the upper watershed. The results of each phase will be synthesized into a final master plan for the watershed.

For accounting and administrative purposes, all tasks, including in-kind services provided by the non-Federal cost-sharing partners, are categorized by cost subaccounts. Acceptance of the product of in-kind services will be subject to appropriate review by the Corps. The following is a list of each subaccount and a description of what each entails. A summary of the cost break down and grand total is found at the end of this section.

The Four Mile Run Agency Coordination Group, consisting of members of the Baltimore District, Arlington County, and the City of Alexandria will guide the overall study process. It is envisioned that sub-work groups will be established to address specific technical and focus areas of the study. Initial subgroups to be formed include the Environmental Restoration/Urban Work Group, Urban Design Work Group, Community Task Force, Hydrological & Hydraulic Work group, and Watershed Restoration Work Group. These work groups will work simultaneously to provide input into the levee corridor design and the overall watershed restoration designs. Members of the study team may also be members of subgroups based on their expertise and interest. A list of these subgroups and their members will be developed as the groups become established and included in attachment A of the PMP.

22A Public Involvement

a. Newsletters

The non-Federal sponsors in-kind contribution is to prepare, print, and distribute the first newsletter during the initiation phase of the feasibility study to inform the public about the study, study area, study goals and objectives, and to solicit input from the public. The second newsletter will be distributed during the recommended plan phase of the feasibility study to inform the public of the recommended plan for the study area. The mailing list will be prepared by the non-Federal partners with input from the Planning Division.

b. Workshops, Community Meetings and Citizen Task Force

The study will include extensive coordination and community outreach in order to accomplish the study's goals. This public process will be conducted as in-kind services by the non-Federal partners as part of the larger community outreach plan led by the Citizen Task Force (see Appendix A). The Citizen Task Force will consist of multiple representatives from Arlington and Alexandria whom will guide the planning process.

At least three public workshops will be held as part of the feasibility planning process. The purpose of the first public workshop will be to scope out public interest and ideas about potential projects. The purpose of the intermediate public meetings will be to provide information and gather public comments after several alternatives have been developed. It is anticipated that the first two meetings will be somewhat informal, informative, and highly interactive.

A third public meeting will be held after the release of the draft feasibility study and EA/EIS to present, discuss, and receive comments on the Draft Environmental Assessment or a Draft Environmental Impact Statement (DEIS) and the recommended plan. The District's Planning Division will be responsible for adhering to the coordination requirements set forth in NEPA. Coordination with state and local agencies will be initiated immediately and will be maintained throughout the study process.

c. Website, Fact Sheets, and Public Outreach Documents

The non-Federal sponsors via the NVRC will be responsible for setting up and maintaining a website to inform the public planning process. In addition, the Planning Division will investigate the possibility of setting up an intranet service for sharing information among the study team members. Fact sheets and information papers will be prepared on a as-needed basis, based on upward reporting requirements of each agency represented on the study team.

d. Advisory Commission

As outlined in Attachment B, the non-Federal sponsors have formed a task force consisting of various local government and citizen representatives from Alexandria and Arlington. The purpose of the task force is get input into the levee corridor environmental, recreational, and aesthetic improvements. The non-Federal partners will hire NVRC and a consultant to assist with this process. It is anticipated that this task force will meet bi-monthly throughout the study process. All Agency Coordination Team members will attend these meetings to ensure consistency throughout the feasibility study.

e. Congressional, City and County Briefings

Briefings requested by members of congress will primarily be the responsibility of the District. This task includes preparation of briefing material, presentations and fact sheets on the status of the project, and attendance by the Project Manager when requested. The non-Federal sponsors will receive in-kind credit for briefings required by the City and County on the status of the study as well members of Congress when requested.

e. Total Costs

Due to the extensive coordination necessary for this project, the total cost for this subaccount is \$272,865. The District's efforts for completing the necessary public involvement components under this subaccount will require 348 hours for a sub-total of \$34,765. The non-Federal sponsors will in-kind services at a cost of \$236,200.

Federal Effort:	\$34,765
<u>Non-Federal Effort:</u>	<u>\$236,200</u>
Total Public Involvement:	\$272,865

22B Institutional Studies

a. Preparation of Financing Plan

Work under this subaccount will involve performing a financial analysis in accordance with Corps of Engineers guidance in Engineering Regulation 1105-2-100, Chapter 6, Section XIV, October 1997. This account is described in more detail than other subaccounts to provide specific guidance to the non-Federal partners in completing this task.

One element of the financial analysis is development of a financing plan. The plan is the responsibility of the non-Federal cost-sharing partners. The plan consists of a clear and convincing description of how non-Federal cost-sharing partners plan to meet their financial obligations for the project in accordance with the project funding and Operation, Maintenance, Replacement, Repair and Rehabilitation (OMRR&R) schedules. The purpose of this analysis is to reduce the risk of having a partially built project or one that is not maintained after it is built. The feasibility report will be accompanied by a preliminary financing plan.

The financing plan submitted during the feasibility study should include the following information:

1. A current schedule of estimated Federal and non-Federal expenditures by Federal fiscal year, including Federal expenditures, non-Federal contributions, non-Federal lands, easements, rights-of-ways, relocations, and disposal areas (LERR&D). The total Federal and non-Federal shares displayed in the schedule should exactly reflect cost-sharing policy and should agree with estimated cost figures in the PCA.
2. A schedule of the sources and uses of non-Federal funds during and after construction by Federal fiscal year. The schedule should include project outlays and income as well as outlays and income related to project outlays and financing. The schedule of the sources and uses of funds should be consistent with the schedule of estimated Federal and non-Federal expenditures.
3. The method of finance for all non-Federal outlays including Operations, Maintenance, Replacement, Repair, and Rehabilitation (OMRR&R) associated with the project should be explained in the financing plan. This should be consistent with OMRR&R information provided in the Engineering Appendix and should be consistent with paragraph 10e, and Appendix A, paragraph 12 of ER 1110-2-1150.

As part of the financing plan, the non-Federal cost-sharing partners should provide a statement of financial capability. This statement should provide evidence of the non-Federal cost-sharing partners' authority to utilize the identified source or sources of funds. The statement should also provide information on the non-Federal cost-sharing partner's capability to obtain remaining funds, if any.

The statement of financial capability will be at a level of detail necessary to demonstrate its capability for the projects recommended in the feasibility study. The level of detail will be

determined by the method that the non-Federal cost-sharing partners will use to obtain remaining funds.

In a situation where a non-Federal cost-sharing partner(s) is relying on its full faith and credit to obtain remaining funds (as in the use of general obligation bonds, appropriations, or a repayment agreement), the statement of financial capability should include a credit analysis that demonstrates that the non-Federal cost-sharing partner is credit worthy for the required amount and purpose.

If a non-Federal cost-sharing partner(s) is relying on non-guaranteed debt (e.g. a particular revenue source or limited tax, or bonds backed by such a source) to obtain remaining funds, the statement of financial capability should include an analysis that demonstrates that the projected revenues or proceeds are reasonably certain and are sufficient to cover the non-Federal cost-sharing partner's stream of costs through time.

The non-Federal cost-sharing partners will be responsible for preparing the forms and documentation demonstrating local legal financial capability to support project construction. The Corps will be responsible for coordinating with the non-Federal cost-sharing partners for the required forms of financial documentation. Financial analysis by the Corps will proceed after complete financial documentation packages have been provided.

b. Assessment of Financial Capability

The purpose of the assessment of a non-Federal cost-sharing partner's financial capability is to determine whether it is reasonable to expect that ample funds will be available to satisfy the non-Federal cost-sharing partner's financial obligations for the project. This assessment will be conducted by the Corps and done when the non-Federal cost-sharing partner's initial draft of the financing plan is submitted to the District. The assessment will consider the non-Federal cost-sharing partner's plan as submitted. Consideration will be given to the certainty of revenue sources and method of payment, as well as to the overall financial position of the non-Federal cost-sharing partners.

c. Reviews

Upon completion of the draft financing plan and assessment of the non-Federal cost-sharing partners financial capabilities, the Study Team will review and comment on the final document. All comments will be addressed by the non-Federal partners.

d. Total Costs

The total cost for this subaccount is \$53,400. The District's efforts for the determination of financial plan for future cost-sharing efforts under this subaccount will require 40 hours for a sub-total of \$5,200. The non-Federal sponsors services will provide in-kind services in the amount of \$48,200.

Federal Effort:	\$5,200
Non-Federal Effort:	\$48,200
Total Financial Plan Costs:	\$53,400

22C Social Studies

This assessment will include documentation of baseline demographic data in the study area and the affected County and City under existing conditions, as well as projections of future conditions both with and without the project implementation in the levee corridor and at the watershed level.

a. Provide Demographic Data

The demographic information will be gathered, compiled, and prepared primarily by the non-Federal sponsors with assistance from the District's Planning Division. The County and the City will utilize the information from recent surveys for development projects in the area, as well as obtain input from NVRC.

The following information will be provided and documented as it relates to the study area;

- General population growth
- Age and sex profiles
- Migration patterns
- Total employment/unemployment rates
- Discussion of major employers in the study area
- Per capita income and household income
- Land use patterns and changes
- Transportation and utilities
- Infrastructure
- Community development
- Public health and social well being
- Recreation opportunity

Data sources for this information include:

- BEA Regional Projections, U.S. Department of Commerce, Bureau of Economic Analysis, Washington, DC.
- U.S. Bureau of Labor Statistics, Washington, DC.
- U.S. Bureau of the Census, Washington, DC.
- Virginia Departments of Economic and Development

b. Analysis of Existing Conditions /Without Project Conditions

The data collected will be analyzed using GIS to map the distribution of demographics (census data from 1990) and census block and block group data layer for the County and City, including the study area. Results of this survey include three analyses (1) demographic analysis, (2) environmental condition, and (3) environmental equity analysis. The Corps study team member will work with the County and the City to ensure that the information provided fulfills the purpose and requirements for the project.

The District's Planning Division will use the existing conditions data to document projected future conditions in the study area, as forecast by the pertinent resource agencies, for a 50-year planning horizon. Work under this task will be from 2003 to 2055. Establishment of the existing condition and "without Federal project" condition profile for the study area will require the collection of historical and current social, demographic, and economic data. The without-project for presentation of historical data will be the 1980, 1990, 1995 years. Beyond 1995, the study will forecast data every 10-years until 2055. Data will be presented for the study area by county,

city and Metropolitan Statistical Area (MSA) for Virginia and will be compared to the United States. Percentage changes in parameters will be displayed in tables and discussed in documentation of results.

The information provided in the above paragraphs will be the establishment and documentation of the “without project” condition. This collective data will be used in the presentation of what is likely to transpire in the study area without a project. The Corps study team member will work with the non-Federal partners to ensure that the information provided fulfills the purpose and requirements for the project.

c. Future Projections

The next part of the socio-economic study task will involve defining future with-project conditions compared to the tasks identified in the “without project” conditions (population, housing, income, land use and industrial activity). The same data and time projection will be used to define the with-project conditions. Tables along with narratives will clearly demonstrate the expected difference in project implementation. The conclusion of the with project will be compared to the existing condition and most probable future without-project conditions in order to identify the potential impacts of the proposed project on the social and economic resources in the study area.

d. Identify Impacts of Project Alternatives

The Corps study team member and NVRC will use the above information and information on the recommended project, to identify socio-economic impacts to the surrounding community. This impact assessment will consider and compare social benefits or drawbacks of the existing (without project) and proposed plans from a technical perspective as well from a perceived citizen perspective. The social impacts will be described by type and location of impact as well as level of concern. The impacts will be broken down into two categories 1) Levee Corridor and 2) Upper Watershed.

e. Document Findings

The findings of the social studies will be documented electronically by the District’s cultural resources team member and provided to the study manager for inclusion in the feasibility report. Findings will be broken down into two study areas- the levee corridor and the upper watershed. The findings will be provided at an appropriate level of detail to support the NEPA process. If available, data will be provided in a Geographic Information System format.

f. Reviews

The study team will be responsible for reviewing all documents and forward all necessary documentation to design contractors and team members within their respective agencies.

g. Total Cost

The total cost for this subaccount is \$32,787. The District’s efforts for the determination of existing and future conditions and project impacts on the social resources of the study area under this subaccount will require 128 hours for a sub-total of \$12,787. The non-Federal sponsors will provide in-kind services in the amount of \$20,000.

Federal Effort:	\$12,787
<u>Non-Federal Effort:</u>	<u>\$20,000</u>
Total Social Studies Costs:	\$32,787

22D Cultural Resources Studies

This task includes all appropriate requirements to comply with Section 106 of the National Historic Preservation Act. All tasks listed below are primarily for the levee corridor. Five additional sites upstream have been included in the cost estimates. Should additional sites be identified in the watershed planning phase, additional costs may be necessary and the PMP will be updated to reflect this change in scope.

a. Consultation and Coordination with VA State Historic Preservation Officer

The District's cultural team member will conduct a needs assessment for compliance with Section 106 of the National Historic Preservation Act. This Phase IA assessment will consist of review of the known archeological sites, location data, and existing predictive models for developing high, medium, and low archeological sensitivity models for the study areas using USGS 7.5 foot Quadrangle Sheets, and consultation with the VA State Historic Preservation Officer.

c. Existing Cultural Conditions

This cultural assessment will identify the known site locations and will identify the high, medium, and low sensitive cultural areas. The following sites will be included:

- (1) historical archeological sites: a primary historic background research will be completed to identify specific areas that may contain historic archeological sites which could be impacted by project activities;
- (2) historic architecture and Historic District: a primary historic background research will be completed to identify historical areas and buildings in the study area, and potential impacts to these resources and their viewsheds; and
- (3) prehistoric sites: an archeological field survey and a study of existing geomorphologic data will be completed to identify floodplain areas that contain buried prehistoric sites which could be impacted by project activities.

In addition, the assessment will identify existing conditions, landscape conditions, viewshed and line of sight, and disturbed study areas. The assessment report will identify if a Phase IB field investigation is needed and, if so, what is the strategy. If no cultural resources are located in the project area, the Baltimore District will prepare a cultural resources report and Finding of No Effect (FONE) letter to the Virginia SHPO. This will end the Section 106 requirements.

d. Site Investigations

The District and the non-Federal partners will jointly conduct site visits to ensure existing data is accurate. Most of the levee corridor study area has been altered through the construction of the previous local flood protection project. As a result, it is anticipated that intact archeological and prehistoric sites do not remain within the study boundary. Therefore, a detailed site investigation

should not be needed. However, if modifications to the channel below GW parkway bridge or between Route 1 and Mt. Vernon Avenue are proposed, then the adjacent wooded and wetland areas will need to be tested for deeply buried and intact cultural resources. This Phase 1B field investigation consists of walking over and backhoe trenching to the geomorphic landsurface conditions and confirm presence or absence of known resources, and determine size of site within the study area. Similar work will be conducted in the upper watershed once specific sites have been identified. If cultural resources are identified within a potential study area, the site may be dropped from further consideration. This will end the Section 106 consultation requirements.

e. Determination of Significance and Effect

Based on the requirements of Section 106, if buried cultural resources are located within a project area and will be impacted by the proposed project, a Phase II field investigation must be completed to evaluate the potential significance of any cultural resources to determine their eligibility for listing in the National Register of Historic Places. No Phase II investigations will be undertaken during this feasibility study. The Phase II investigation is not included in this feasibility cost estimate. If the team decides that a Phase II field investigation is necessary, then it will need to be scoped based on the preliminary site investigation.

f. Reviews

Reviews of all documents and reports under this subaccount will be conducted by the District and the non-Federal partners to ensure consistency with project and potential design constraints as a result of the surveys.

g. Total Cost

The total cost for this subaccount is \$53,760. The District's efforts for the determination of existing conditions and site investigation tasks under this subaccount will require 120 hours for a sub-total of \$12,960. The non-Federal sponsors will provide in-kind services in the amount of \$40,800.

Federal Effort:	\$12,960
<u>Non-Federal Effort:</u>	<u>\$40,800</u>
Total Cultural Resources:	\$53,760

22E Environmental Studies

The purposes of environmental studies subaccount during the feasibility phase are: (1) to satisfy the compliance requirements of NEPA, Section 404, and other environmental resources laws and regulations; and (2) to provide environmental technical support during plan formulation in the levee corridor channel design, levee corridor urban design, and upstream watershed design.

The District's environmental technical support focuses on these three components of the study area: (1) wetland creation, (2) in-stream habitat improvement, and (3) terrestrial habitat improvement. The description of each environmental component will include existing conditions data, identification of problems and opportunities, completion of conceptual designs, comparison

of alternatives, a selection of the final plan, and the process for completing detailed designs for the recommended plan. In addition, all work groups under this subaccount will develop a set of criteria for selecting site-specific solutions. For examples, the criteria that could be used for screening site-specific solutions include determining if the technique meets several objectives, is environmentally feasible, requires low maintenance, meets stakeholder and public expectations, and is cost-effective.

The environmental studies will be reviewed and approved by the Environmental/Urban Design Work Group, consisting of members from the District's Planning and Engineering Divisions, Alexandria, Arlington and NVRC. The results of these studies will feed into all phases of the design. In addition to staff time, the non-Federal partners will hire a team of consultants to assist with the completion of the tasks of this subaccount. A request for proposal to assist with these studies will be reviewed and approved by the Agency Coordination Group. Award of the design contract will be contingent upon a review board consisting of members of the Agency Coordination Group.

a. Levee Corridor Channel Design

The District's Planning and Engineering Divisions will provide technical support to the Environmental/Urban design work group to develop concept plans for environmental improvements and ecosystem restoration within the channel. Via the work group, the District and the non-federal sponsors will ensure that all pertinent data is collected, including geospatial, hydrological, ground water, soil maps, existing wetland features, physical channel conditions, and environmental impacts of current maintenance practices within the channel. A variety of existing and historical biological, hydrological, and geomorphic information and data will be used to determine optimum conditions for the levee channel. To the extent possible, information will be collected concerning pre-Corps project (pre-1980) conditions concerning the river/floodplain geometry and the biota that used to inhabit Four Mile Run. This will help define conditions prior to the habitat deterioration caused by the Corps LFPP. The County and City will provide support in collecting all existing conditions data.

After reviewing all pertinent data, the work group will identify successful examples of riparian and aquatic improvements in build-out conditions similar to Arlington and Alexandria and determine if similar designs could be applied to Four Mile Run. District technical support on this task will focus on in-stream habitat and wetland creation opportunities within the channel corridor.

b. Levee Corridor Urban Design

Environmental studies for the levee corridor urban design will primarily be accomplished by the team of consultants selected by the non-Federal sponsors, with input from the District. The Planning and Engineering Division and the non-Federal sponsors will assist the consulting team in the identification of restoration opportunities within the 2.3 mile levee corridor from I-395 to George Washington Parkway (see location maps in section 2). The non-Federal partners will provide the necessary pertinent data to develop concept plans for the levee corridor, including, but not limited to, land use, proposed development patterns, zoning, park and trail connections, and existing wetland and riparian habitat.

The consulting team will identify successful examples of environmental improvements to flood protection projects throughout the country, with input from the Environmental/Urban Design work group. These examples will serve as a starting point to identify restoration and recreation opportunities within the levee corridor. Site visits will be conducted as needed to verify existing conditions and data collected. Opportunities which will be considered in the levee corridor could include appropriate land uses, open space initiatives, the urban and natural design character of the channel, recreational activity and connections to trail systems, improved aesthetics, and aquatic and riparian enhancements.

c. Upstream Watershed Design

After work has begun on the levee corridor designs, the Watershed Restoration work group will identify opportunities to reduce storm water flows, restore hydrological functions, and restore aquatic ecosystem habitat (wetlands, riparian, and in-stream) within the upper watershed. For the purposes of this feasibility study, the upper watershed will be defined as all tributaries of Four Mile Run and the main-stem of Four Mile Run north of I-395. In previous studies,

The Arlington County Four Mile Run Watershed Plan will be used as a starting point for the development of a watershed restoration plan for the entire watershed. The work group will examine existing site and stormwater management policies in the watershed and make recommendations to enhance those policies relative to new development and possible retrofit of existing development. In addition, aquatic ecosystem restoration opportunities will be identified for wetlands, streams, and riparian buffers. These recommendations will be carried forward into the plan formulation/design synthesis phase.

d. NEPA Compliance

NEPA compliance requirements are outlined within the provisions of the National Environmental Policy Act, the Council on Environmental Quality (CEQ) regulations 40 CFR 1500-1508, and the U.S. Army Corps of Engineers Regulation 200-2-2, *Procedures for Implementing NEPA*.

Requirements include documentation and assessment of the effects of a proposed Federal action on natural resources. The focus of NEPA compliance will be to provide information to other agencies, the public, and decisionmakers on the study and to ensure that the report adequately addresses environmental requirements. Other laws and regulations that require environmental compliance actions include Sections 401 and 404 of the Clean Water Act, Section 7 of the Endangered Species Act, Clean Air Act, U.S. Fish and Wildlife Coordination Act, Section 106 of the National Historic Preservation Act, Prime and Unique Farmlands, and National Pollutant Discharge Elimination System (NPDES) Act.

A comprehensive EA/EIS will be prepared, including an alternative analysis, in order to justify the environmental restoration projects that will be implemented to restore the degraded riparian, aquatic, and wetland ecosystems. The alternatives analysis will investigate feasible alternatives at each site to evaluate the positive influences as well as the adverse impacts the proposed solutions will have on the study area and the larger ecosystem. The analysis will then compare the site combinations in order to identify the combination that will provide the watershed with the most

beneficial results for the biological community. In addition, impacts from levee modifications to the surrounding natural resources will be evaluated.

Other tasks to be accomplished as part of the NEPA process include preparation and issuance of a notice of intent (NOI) to the Federal Register for the preparation of the draft EA/EIS, issuance of a notice of availability (NOA) for the DEIS, the release of the draft and final EA/EIS, and preparation of the final Record of Decision (ROD).

e. Documentation

The final environmental task is the report documentation. Upon completion of plan formulation (subaccount 22R), Planning Division with assistance from the non-federal sponsors will prepare environmental, recreation, and aesthetic appendices, as well as environmental sections for the engineering appendix. Sections of the main report to which Planning Division will contribute include baseline conditions, future with- and without-project conditions, problem identification, plan formulation, alternative assessment and evaluation, plan selection, selected plan descriptions, and public involvement. Since the report will be an integrated feasibility/EIS report, all the incorporated information will be prepared in compliance with NEPA and all other applicable laws and regulations.

Documentation on existing conditions and the work groups planning process will be documented by the non-Federal partner's consulting team. These consultants will be developing a final master plan based on the environmental studies conducted under this subaccount. This master plan will be included as a stand alone appendix in the final feasibility report by the Planning Division.

f. Total Costs

The total cost for this subaccount is \$362,129. The District's efforts for the determination of existing conditions, environmental restoration opportunities, NEPA compliance, recreational opportunities, and aesthetics tasks under this subaccount will require 708 hours for a sub-total of \$70,729. The non-Federal sponsors will provide in-kind services to complete these tasks in the amount of \$291,400.

Total Federal Effort:	\$70,729
<u>Non-Federal Effort:</u>	<u>\$291,400</u>
Total Environmental Resources:	\$361,129

22F U.S. Fish and Wildlife Service Studies

The District will actively coordinate with the U.S. Fish and Wildlife Service (USFWS) throughout the entire study, as required by the Fish and Wildlife Coordination Act (FWCA).

USFWS participation will be accomplished by including the agency as an integral team member in the evaluation of opportunities, development of alternatives, and selection of solutions. The Corps will also request that the USFWS participate in the preparation of a habitat assessment. In addition, the USFWS will prepare a FWCA report (if appropriate), attend team meetings, and visit the final design sites, if necessary. The completed reports and the FWCA will be included as an appendix to the main

report and sections of the text will be incorporated by Planning Division into the main report, as applicable.

The non-Federal partners will receive in-kind credit for review and QC of the final report prior to inclusion in the feasibility report.

The total cost for this subaccount is \$39,995. The District's efforts for coordination with the U.S. Fish and Wildlife Service under this subaccount will require 48 hours for a subtotal of \$4,795 and an additional \$30,000 for consulting services from the USFWS. The non-Federal partners will provide in-kind services in the amount of \$5,200.

Federal Effort:	\$4,795
USFWS Effort:	\$30,000
<u>Non-Federal Effort:</u>	<u>\$5,200</u>
Total Fish and Wildlife Studies:	\$39,995

22G Economic Studies

a. Review Existing Information

The District's Planning Division economist and the non-federal sponsors will review economic materials from the previous study and request additional information to supplement the existing floodplain inventory, such as SIC codes, and total structure and content values. The sponsors will provide all available information relating to the economic situation for the study, including income levels (existing and projected). In addition, the sponsors will assist with the property assessment for the areas within the 100-year floodplain, including providing building locations, property values, and structural information for each building as part of their in-kind services.

b. Mapping and Field Work

The study economist will use existing mapping from the previous project to identify floodplain structures by number on a map representing the complete floodplain inventory. The study economist will key each structure to the three digit SIC code that best describes each non-residential structure. The study economist will identify unique structures that warrant follow-up interviews and also select a random sample from the remaining non-residential structures. The properties in the sample will be inventoried from the outside of the structure, using Marshall & Swift field forms. The sample will be used to estimate how much of the floodplain has changed or remained the same since the last inventory. The study economist will recompute depreciated structure values for the sample using the Marshall & Swift estimator program.

c. Flood Damage Analysis Computations

Using the Corps of Engineers Flood Damage Analysis Program (FDA), the study economist will enter all structures into the database. The study economist will enter standardized (SIC based) depth-damage functions and content-to-structure ratios developed by Baltimore District into the database. New input files will be created for FDA. The Planning Division study economist will work in conjunction with Water Resources Branch and the Hydrological & Hydraulic working group to apply appropriate stage, discharge and frequency data for existing and "with" project

alternatives. Once completed, FDA will be run and the results will be analyzed to determine the expected annual damages for all alternatives under the with-and without project conditions.

d. Risk and Uncertainty Analysis

An important role in dealing with risk and uncertainty is to identify the areas of sensitivity and describe them clearly so that decisions can be made with knowledge of the degree of reliability of available information. Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, social, and economic situations.

Using FDA program, the study economist will perform risk analysis for appropriate parameters (stage-damage relationship; frequency curves; stage and discharge relationships). The FDA uses Monte Carlo simulation to run a large volume of storm frequency observations through the program to estimate the probability of overtopping or failure associated with each levee modification, as well as for performance of any other project alternative. The sponsors will participate in the evaluation of alternatives, both risk and uncertainty and incremental and cost effectiveness as part of their in-kind services.

e. Estimation of Existing and Future Conditions

Based on the data collected in the field and historical conditions, the study economist will determine the baseline condition and expected future conditions without the proposed project.

f. EAD Calculations for All Alternatives

A engineering and design cost will be determined for all proposed alternatives and will be based on an MCACES cost estimate. These calculations will be used to perform the incremental cost analysis.

g. Incremental Cost Analysis

Using the IWR-Plan program, the study economist will calculate environmental restoration benefits for the study area using a dollar versus habitat unit or community suitability unit for each site. The environmental inputs will be evaluated and weighted previously and then combined with costs to produce outputs for the analysis. The Planning Division study economist will participate in establishing appropriate metric for measurement of all alternatives proposed by the design work groups.

h. Calculation of Annual Benefits, Annual Costs and Benefit-Cost Ratios

Using information from the FDA program, the study economist will calculate benefits associated with each proposed plan, first within the levee corridor and second, in the upper watershed. Any future benefits will be discounted to a uniform present worth figure. Using initial cost figures from Engineering and/or the non-Federal sponsors consulting team, the average annual cost of each proposed project using the current Federal interest rate for the appropriate period of analysis (usually 50 years) will be calculated. If the Federal interest rate is updated during the course of the study, the annual cost will be recalculated to reflect the most recent information. Once annual benefits and annual costs have been calculated, they will be used to calculate benefit-cost ratios and net benefits for all plans under consideration. The selected plan will be the plan that has the most efficient trade-off between NED (National Economic Development) and NER (National

Environmental Restoration) benefits. The study economist will participate in all trade-off analyses.

i. Report Preparations

Written documentation under this subaccount will consist of sections for the main feasibility report and a technical economic appendix incorporating, narrative, methodology and tables for flood reduction benefits, risk analysis and environmental incremental cost analysis.

j. Meetings, Review, Quality Control

The study economist will attend two meetings with IWR and HQ to discuss methodology for risk analysis and plan selection considering the mix of flood control and environmental benefits. The study economist will also meet two to three times with District Economic Policy advisor for periodic review of economic methodology. The study economist will provide written responses to review comments from District QC, NAD and HQ.

k. Sponsor Reviews

The non-Federal sponsors will receive in-kind credit for reviewing the draft economic documentation and providing written comments to the Planning Division for inclusion in the final document

l. Total Cost

The total cost for this subaccount is \$130,680. The District's efforts for the determination of existing conditions, determination of flood damage reductions, and comparison of alternatives under this subaccount will require 968 hours for a sub-total of \$106,480. The non-Federal sponsors will provide in-kind services in the amount of \$24,200.

Federal Effort:	\$106,480
<u>Non-Federal Effort:</u>	<u>\$24,200</u>
Total Economic Resources:	\$130,680

22H Real Estate Studies

The objectives of the tasks performed as part of this subaccount are (1) develop a comprehensive plan identifying the real estate requirements for the project and the estimated costs associated therewith; and (2) develop a realistic acquisition schedule in coordination with the non-Federal sponsor.

a. Tasks

The major tasks associated with this subaccount are to develop (1) rights-of-entry, (2) right-of-way maps, (3) gross appraisal, (4) real estate plan, (5) MCACES cost estimate, (6) Attorney's Opinions of Compensability, (7) acquisition schedule, and (8) PMP input. The detailed cost estimate breaks out tasks 2 and 4 in more detail.

1. Rights-of-entry will be obtained, if required, for cultural, environmental, HTRW, survey, or geotechnical analyses for the feasibility study.

2. Right-of-way maps will be prepared by utilizing any available aerial photogrammetric mapping, tax maps, topographic survey information, and design plans. Mapping is for the purpose of depicting types of estates required for the project, property data and extent of ownerships for calculating land areas, and value of properties required for the project.
3. A Gross Appraisal will be prepared that will provide a detailed estimate of all costs associated with acquisition of real property interests.
4. A Real Estate Plan (REP) will be prepared to describe the real estate requirements for the project. As part of the REP, a preliminary real estate cost estimate will be prepared in the MCACES format. The cost estimate will include a value estimate for real estate property required, PL 91-646 relocation payments, the non-Federal sponsor's administrative costs to accomplish the Project's real property requirements, and the Corps' administrative costs to assist and monitor the non-Federal sponsor's real property acquisition program. Attorney's Opinions of Compensability will be prepared as part of the REP for each relocation associated with the project, to determine whether the owner has a compensable interest, and what the best measure of just compensation would be. Research regarding applicability of navigational servitude will be conducted. A detailed acquisition schedule will also be developed and included in the REP. In general, approximately 6-8 months will be needed for preparation of the REP from the time base mapping is received.
5. The Real Estate Division will conduct a peer review of the feasibility report and respond to Division comments accordingly. Real Estate will also have input into the PMP and attend the feasibility resolution conference as necessary.

b. Coordination

Coordination includes, but is not limited to, Real Estate participation in team meetings, site visits, negotiation of work agreements, coordination with other offices on project data needed for Real Estate's major study products, and monitoring of progress and findings associated with Real Estate study products.

c. Assumptions/Uncertainties

The real estate cost estimate is based on the assumption that a majority of the lands are owned by the Arlington County and the City of Alexandria within the Levee Corridor.

d. Sponsors' in-kind contribution

The sponsors will provide assistance with gathering the necessary real estate information, including the property maps and ownership for the recommended plan, utility maps and points of contact for the entire study area, tax maps for the recommended plan, and property assessments for the recommended plan. In addition, the sponsors will support the development of the acquisition schedule, if necessary.

e. Total costs

The total costs for this subaccount is \$48,630. The District's efforts for the determination of existing conditions and site investigation tasks under this subaccount will require 440 hours for a sub-total of \$38,630. The non-Federal sponsors will provide in-kind services in the amount of \$10,000.

Federal Effort:	\$38,630
Non-Federal Effort:	\$10,000
Total Real Estate:	\$48,630

22J Hydrologic and Hydraulics (H&H) Investigations

The District's Water Resources Section will conduct hydrologic and hydraulic analyses associated with environmental enhancement and flood protection. These analyses will be performed as part of the Hydrological and Hydraulic Work Group and in accordance with current Corps of Engineers (COE) guidance, regulation, and policy. The hydrologic and hydraulic consequences and impacts associated with flood protection aspects versus environmental enhancement will be identified separately to the extent practicable. The upper watershed restoration efforts will focus on identifying watershed management practices that reduce stormwater inputs as well as aquatic ecosystem restoration opportunities.

Note, Technical and QA/QC review of concept and detail designs, and engineering reports and analyses are reflected in Section 22Y, Technical Review.

a. Tasks

1. Review existing information data: Corps, NVRC, USGS, FEMA, etc.

ASSUMPTION: Majority of the data will be obtained by the non-federal sponsors and NVRC.

2. Collect pertinent data/watershed characteristics, stream gauging information, channel parameters, stormwater management facilities.

This task will be completed by completing a field reconnaissance with the H&H work group, obtaining photographs, and verifying existing condition of channel. The Water Resources section will also provide input to the scope of work for surveying the existing channel. Other data to be collected are existing FEMA studies, mapping, and hydraulic models.

ASSUMPTION: The Corps will obtain majority of data with assistance from non-federal sponsors and NVRC.

3. Review NVRC (hydrologic) model and provide assessment of capabilities.

4. Develop revised hydrologic model, based on NVRC model or a new model, depending on decision of H&H workgroup.

ASSUMPTION: Corps will review work performed by sponsor as an In-Kind service. If a new model is required, this will need to be re-scoped.

5. Develop revised hydraulic model for levee corridor.

To assist in the environmental planning and design process, H&H Section shall take a base condition FEMA HEC-2 hydraulic model and convert it to a HEC-RAS model. The HEC-RAS model will be modified to simulate the impact which each of the individual environmental enhancement concepts would have on a design water surface profile if that concept was implemented over both 100% and 50% of the total project length. The increase in water surface profile between the base condition and the environmentally enhanced condition will provide a sound measure of the likely impact each of the enhancement plans may have upon the required top-of-protection during the planning process. The environmental enhancements shall include (1) in-stream habitat improvement, (2) narrowing of the low-flow channel, (3) light woods, (4) dense woods, (5) meadows, (6) single and double tree rows, (7) low-growth wetlands and (8) high growth wetlands.

ASSUMPTION: FEMA HEC-2 model is available.

6. Conduct geomorphic stream survey of levee corridor and develop restoration alternatives.

Data collected in the field will be analyzed and initial concept plans for various proposed stream restoration alternatives. These concept plans will be done in an electronic format and provided to the civil section and the H&H work group for comment and input.

ASSUMPTION: Field work to be performed by the Corps. Alternatives to be limited to stream restoration opportunities within Federal channel limits and those identified in the Arlington Watershed Plan for Four Mile Run. If additional restoration sites are identified, the scope will have to be modified to reflect this change.

7. Determine current and maximum build-out flows and corresponding stage-discharge characteristics.

ASSUMPTION: Work on build-out flows to be done by sponsor as an In-Kind service and stage-discharge characteristics to be determined during task 8 by the Corps.

8. Determine levee capacity and potential for redesign opportunities (i.e. hydraulic evaluation of alternatives).

Analysis of the existing and proposed future flood protection needs will utilize risk-based methodology currently used by the Corps during flood damage reduction studies. The study area, which includes (1) long-term data from two stream gages, (2) coincident flow at a stream confluence, and (3) tidal influences on starting water surface elevations, offers challenging hydrologic methodologies for determining appropriate flow and stage exceedance frequencies. Both gage data analyses and rainfall-runoff analyses may be conducted to best define peak flow frequency curves for the three separate stream reaches. The Water Resources team member will

work closely with the H&H work group and NVRC to ensure the level protection necessary is determined.

ASSUMPTION: A maximum of 4 alternatives, including the No-Action (or existing conditions), will be evaluated.

9. Review and revise maintenance and management strategies of channel based on model input.

The H&H section in conjunction with the non-federal sponsors will develop the management strategies.

10. Conduct Value Engineering (VE) to assist in selection of the alternative that best fits the function of the project.

11. Develop base mapping for the conceptual grading plan for the selected alternative.

12. Design stream stability measures for stage-discharge relationships and velocities.

13. Develop stream plan, profile and typical section

H&H Section will coordinate with Civil Section to define and obtain the required cross section data and mapping required for hydraulic analyses. An HEC-RAS computer model utilizing cross sections that are representative of existing conditions will be used in conjunction with top-of-protection survey data to establish hydraulic parameters and thresholds and will be compared to original design conditions. The HEC-RAS model will extend upstream of the Corps project to adequately define potential impacts of the proposed alternative at upstream locations. The HEC-RAS computer model will also extend downstream of the Corps project to minimize uncertainty in the downstream boundary condition.

ASSUMPTION: Work to be performed by the Corps. Work includes only the hydrologic and hydraulic input to the design of the restoration measures.

14. Document findings.

The District's Water Resources Section is responsible for draft report preparation for both geomorphic analysis and hydraulic analyses. The cost breakdown for this task also includes all coordination and team meetings required to complete the study.

ASSUMPTION: Corps to document geomorphic analysis and hydraulic analyses. Sponsor to document hydrologic analyses as an In-Kind service. Engineering Appendix to Feasibility Report to be coordinated by Design Team Leader in the District's Design Management Branch. One team meeting (1.5 hrs) will be held per month throughout the 3-year study and a coordination meeting (4 hrs) will be held with sponsor every 4 months during the study.

b. Sponsors' in-kind contribution

The sponsors will provide assistance with determining the existing conditions information for the study area, including existing hydrologic, hydraulic, and topographic information for the study area. The sponsor will be responsible for providing an updated hydrological model for the watershed and participate in the technical discussions pertaining to the hydraulic model and its analysis. In addition, the sponsors have a key role during the technical meetings and discussions with FEMA pertaining to any levee channel modifications.

The total cost for this subaccount is \$348,500. The District's efforts under this subaccount will require 2194 hours for a sub-total of \$225,200. The non-Federal sponsors provide in-kind services in the amount of \$122,800

Total Federal Effort:	\$225,200
Non-Federal Effort:	\$122,800
Total H&H Account:	\$348,500

22K Geotechnical Investigations

All available geotechnical information relative to this project and other existing data will be reviewed by the Geotechnical Branch and the non-federal sponsors.

An appropriate foundation exploration program will be established to obtain necessary foundation data for the design of proposed wetlands or design features within the floodplain. Proposed drill hole and test pit locations will be laid out in the field and located by survey.

Foundation drilling and test pits will be accomplished at the study areas either by District crews or by contract. Standard Penetration Test (SPT) methodology will be utilized in obtaining split spoon samples. A backhoe will be used for test pit excavations in order to obtain for evaluation of the proposed wetland sites if required. The drilling will be monitored by a senior geotechnical engineer. Field logs will be prepared by the drill inspector..

Testing will be accomplished by District personnel and will consist of visual classification, mechanical analysis, Atterberg limits determinations, water content determinations, organic content determinations, and other tests necessary to classify the soil.

Geotechnical input into the design of the project will be accomplished utilizing appropriate design criteria and analyses. Final logs will be prepared for all drilling and testing accomplished. Appropriate sketches, drawings, and text will be prepared for the report.

Areas that are anticipated to require some geotechnical involvement are (1) providing geotechnical support for the design and analyses of wetlands and (2) assist in the feasibility design of the Landscape Management Plan.

It should be noted that the level of effort for wetland design is estimated at the excavation of up to a total of 16 test pits at the proposed wetland sites. If it is decided that monitoring wells are required, this scope of work and associated costs will have to be adjusted.

This task will also include coordinating with the study team and the non-Federal sponsor, attending team meetings, and participation in plan formulation. Written responses to all geotechnical related comments will be prepared and provided in Dr. Checks Also, a peer QA/QC review will be performed by a geotechnical engineer, which is included in the technical review subaccount below.

The total costs for this subaccount is \$73,480. The District's efforts for the determination of existing conditions and site investigations tasks under this subaccount will require 204 hours plus appropriate Supervision and Administration (S&A) costs for a sub-total of \$25,830 and \$31,250 for drilling and testing. The non-Federal sponsors will provide in-kind services in the amount of \$16,400.

Total Federal Effort:	\$57,080
<u>Total non-Federal Sponsor Effort:</u>	<u>\$16,400</u>
Total Geotechnical Studies:	\$73,480

22L Hazardous, Toxic and Radioactive Waste Studies

a. Tasks

Hazardous, toxic, and radioactive waste studies (HTRW) will be completed, continuing the preliminary assessment in accordance with ER 1165-2-132. The preliminary assessment will address the existence of or potential for HTRW in the study area or external HTRW contamination that could impact or be impacted by the proposed restoration measures.

This survey uses GIS to map the distribution, type and magnitude of (1) point pollution source discharging wastewater to streams (2) point pollution sources with a potential for contaminated stormwater discharges and requiring NPDES permit, (3) point pollution with a significant air pollution release, and (4) in-stream water quality limited reaches based on the 305 (b) and 303 (d) listed waters suspected sources of pollution for the County, including the study area.

In addition to using the above information, the assessment will investigate existing and past land uses, reviewing present and past maps, aerial photos, and community records; conducting visual land surveys; interviewing land owners and knowledgeable individuals; and coordinating with EPA, state, and local HTRW regulatory agencies. The results of the investigation will be documented in the report and will include identification of known, reported, or suspected HTRW sites; characterization of each HTRW site; description of assessment techniques utilized; and sources of information.

The preliminary assessment will be incorporated into the main report. Planning Division will coordinate with Engineering Division and will provide the findings of the preliminary assessment to them for review. In general, sites identified as having a potential for HTRW will be excluded from further planning stages. If a site suspected of being contaminated with HTRW is essential for the success of a proposed measure, the preliminary assessment will be used by Engineering Division to scope the next level of HTRW investigations. Funding for preliminary site testing is

not included in this FCSA. Costs and scopes of work would be submitted for this additional work by HTRW division

The non-Federal cost-sharing partners will coordinate with the study manager to ensure partners' satisfaction with and enhancement of the work tasks under this sub-account.

b. Sponsors' in-kind contribution

The sponsors will provide assistance with gathering the existing hazardous, toxic, and radioactive waste information for the study area, including information on known contamination sites, Brownfields sites, and historical land use information, if necessary.

c. Total Costs

The total cost for this subaccount is \$64,000. The District's efforts for the determination of existing conditions for contamination sites under this subaccount will require 637 hours for a subtotal of \$51,000. The non-Federal sponsors will provide in-kind services to review the results of the Corps in the amount of \$13,000.

Federal Effort:	\$51,000
<u>Non-Federal Effort:</u>	<u>\$13,000</u>
Total HTRW Investigation:	\$64,000

22M Other Studies

a. Tasks

The Policy Guidance Letter (PGL) No. 52, Flood Plain Management Plans, provides guidance on Section 202 (c), Flood Plain Management Plans, of the Water Resources Development Act of 1996. This letter states that it is the Corps policy to "...promote prudent flood plain management at the non-Federal level by encouraging a non-Federal sponsor to develop its FPMP during the preparation of the feasibility study." In addition, "Information that is developed as part of the feasibility study will be cost shared 50/50 and must be described in the project study plan." The Flood Management Plan will be developed by the non-federal sponsors and reviewed by the District.

b. Sponsors' in-kind contribution

The sponsor will incorporate all information in this feasibility study into an updated floodplain management plan.

c. Total Costs

The total costs for this subaccount is \$23,200. The sponsor will incorporate this study information into the development of an updated floodplain management plan under this subaccount and will require in-kind credit of \$40,000 to complete this task. The District's review process will require 40 hours in the amount of \$3,200.

Federal Effort:	\$3,200
<u>Non-Federal Effort:</u>	<u>\$40,000</u>

Total Other Studies: \$43,200

22N Surveys and Mapping

a. Tasks

In order to complete the necessary analysis and design work, additional mapping of levee corridor and channel will be obtained by the District. The civil design team member will develop the scope of work obtaining the additional mapping needs. New information that will have to be acquired for the completion of this project includes, but is not limited to: topographic mapping (1 in. = 50 ft., with a contour interval of 1 foot), aerial photography, a top of protection survey, up to fifty (50) floodway cross sections, and a survey of bridge profiles. The District will provide these services.

b. Sponsors' in-kind contribution

The non-federal sponsors will provide all stream and wetland surveys conducted within the Four Mile Run watershed in an electronic format. If an electronic format is not available, hard copies will be provided.

c. Total Costs

The total estimated federal cost for this subaccount is \$153,200. The District will require \$138,000 in contracting services to complete this task. The non-federal sponsors will provide in-kind services in the amount of \$17,200.

Federal Effort:	\$138,000
<u>Non-federal Effort:</u>	<u>\$17,200</u>
Total Surveys & Mapping:	\$155,200

22P Design and Cost Estimates

Engineering documentation will comply with ER 1110-2-1150 (Engineering and Design for Civil Work Projects) for all tasks completed under this subaccount. The purpose of this subaccount is to define tasks to be performed by Civil Design Branch and Cost Engineering Section to complete the feasibility study.

a. Civil Design

The Civil Design Branch will work closely with members of the Hydraulics and Hydrology Work Group and the Environmental/Urban Design group. Civil Design will also be responsible for reviewing all non-Federal sponsor's design work to ensure it complies with appropriate Corps engineering guidelines.

1. Levee Corridor Channel Design

The Civil Design Branch is responsible for preparing all concept plans for improving habitat within the Levee Channel, based on input and models prepared by H&H work group. Detailed

plans will be completed and incorporate public and non-Federal sponsor comments and reviews as necessary. To complete the Levee Corridor Channel Design, the Civil Design Branch will completed the following tasks:

- a) Order surveys for all of the sites. The surveys will be tailored to the requirements to the scope of the project. (for example, 1"=30' for small projects, 1"=100' for large scale projects).
- b) Send letters and concept plans to any affected public agencies (Highway Departments, Utility Companies, etc.) Notify them of ponding and other work within their right-of-way. Ask for comments.
- c) Order zoning maps for the pond/wetland drainage areas.
- d) Verify the availability of County and City Soils Map.
- e) Field edit the survey and clean up the plans.
- f) Research utility records or include this in the survey scope. Show utilities on the plans. In investigate potential conflicts. Arrange for test pits if necessary.
- g) Obtain County and City floodplain maps for the sites, and show floodplains on the feasibility plans. If they are not available, use FEMA maps.
- h) Visit sites and look for possible wetlands. Show them on the plans. Request formal wetland delineation.
- i) Investigate the need for temporary stream diversion. Coordinate with Water Resources engineer.
- j) Prepare narrative/engineering appendix. Coordinate with Geotech, H&H, Real Estate, etc.
- k) Send detailed design plans to any affected public agencies (utility companies, highway departments, etc.) and ask for comments.
- l) Obtain as-builts of any existing ponds/developments that impact Levee Channel;
- m) Review the NVRC hydrological watershed model and hydraulic model developed by Water Resources.
- n) Request property plats from sponsor or include plotting of them in the survey scope. Plot property lines, right-of-ways, and easements on plans. Coordinate with Real Estate.
- o) Show the surface water use designation listed in local regulations for any affected streams.
- p) Prepare estimated construction quantities for use by Cost Engineering.

q) Prepare plans, details, cross sections, etc. with enough detail to establish feasibility, limits of disturbance, and construction quantities. Refer to recent examples for level of detail.

r) Prepare Engineering Appendix in accordance with ER 1110-2-1150 (Engineering and Design for Civil Work Projects).

2. Levee Corridor Urban Design

As a member of the Environmental/Urban Design work group, the Civil Design branch will assist in the development and review of the master plan for the Levee Corridor. A consultant hired by the non-Federal sponsors will primarily develop this plan. However, the Civil Design Branch will review all scopes of work and requests for proposals under this task to ensure the final product will provide the data needed to complete the engineering appendix.

Based on the recommended plans completed under subaccount 22R, the non-Federal sponsors will develop 65% designs for one project within the channel. The non-Federal sponsors will be responsible for preparing and delivering design and construction drawings and specifications for the project(s), obtain public input, develop a project budget and funding plan, and prepare a timeline for implementation of the project. The completed project will be a physical demonstration of environmental, engineering and design improvements within the project boundaries. Implementation of early phases of maintenance and management strategies may occur during the Design Synthesis phase of the project but would be funded by the non-federal sponsors.

3. Upstream Watershed Design

The upstream watershed design will complete the tasks outlined in the “Levee Corridor Channel Design” section of this account. These tasks will be applied to 3 sites in the upper watershed. The non-federal sponsors will provide in-kind services to provide necessary data to complete concept designs for various watershed features based on the results of the alternative plans identified in subaccount 22R. Initial sites in the upper watershed will be limited to those identified in the Arlington Storm Water Management Plan. These sites will be located above the levee and urban corridor and include stream restoration, design of best management practices to improve aquatic ecosystem habitat, riparian buffer restoration, and removal of stream blockages.

b. Cost Estimating

The cost engineer will prepare a detailed feasibility-level cost estimate for the each design phase and all recommended projects. The estimate will be developed in accordance with the guidance addressed in ER 1110-2-1302, Civil Works Cost Engineering using the MCACES software and will be presented in the Civil Works Breakdown Structure (CWBS) and E1 01D010 (1 September 1997) will be consulted.

The Cost Engineer will take part in site visits to become acquainted with the project site and to aid in estimating costs at the conclusion of the detailed designs. Costs include travel and per diem. The non-Federal sponsors will participate in the site visit.

The Cost Engineer will develop accurate baseline cost estimates for each of the detailed designs. The cost estimate will be in the MCACES format and include summary sheets for direct costs, indirect costs, and owner costs to the third title level for all features addressing inflation through project completion. It is assumed for this study that District team members will provide all quantities.

In support of the PMP, the Cost Engineer will estimate costs and prepare descriptions for the preparation of plans and specifications for each of the projects. Costs include negotiation with PL personnel, coordination meetings, and estimate and descriptive revisions.

The total project cost summary will be escalated to the midpoint of construction with a contingency to cover unknown conditions or uncertainties. The estimate will be documented with notes to explain the assumed construction methods, crews, productivities, sources of materials, and other specific information. Labor costs will be based on the prevailing Davis-Bacon wage rates for each trade. Equipment costs will be based on the EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule. Contingencies will be developed and applied where areas of uncertainty exist. Detailed costs for all of the non-construction cost items (lands and damages, pre-construction engineering and design, construction management) will be provided by the appropriate offices and incorporated into the estimate. The Cost Engineering Appendix will include a written description of the methodology used in the development of the baseline cost estimate. The appendix will also include a description of the scope of the projects included in the estimate and a description of the potential risks associated with the estimate.

The cost estimator will review and prepare written responses to the final formal comments generated by the sponsor, and other reviewers on the completed detail designs, participate in team meetings each month throughout the study and coordinate any actions in response to the team meeting.

c. Sponsor's In-kind Contributions

The non-federal sponsors will be responsible for managing and participating in the Environmental / Urban Design workgroup. This work group will provide all necessary data to complete this task. Both Arlington and Alexandria have extensive monitoring programs in Four Mile Run. The data from these monitoring efforts prior and during the feasibility study process are necessary in order to determine design constraints and objectives under this subaccount. Technical staff from Arlington and Alexandria will also provide design support and assist in development of all plans for inclusion in the final feasibility report.

d. Total Costs

The total cost for this subaccount is \$379,000. The District's efforts for providing input into the evaluation of sites, developing conceptual and detailed designs, reviewing the operations and maintenance of the levee under this subaccount, and reviewing cost estimates will require 1990

hours for a sub-total of \$159,200. The non-Federal sponsors will provide in-kind services in the amount of \$219,800.

Total Civil Design Effort:	\$119,200
Total Cost Engineering Effort:	\$40,000
<u>Non-Federal Effort:</u>	<u>\$219,800</u>
Total Design:	\$379,000

22Q Technical Management

Work under this subaccount will be performed by the study manager, the design manager, and the non-Federal sponsor manager(s). Specific work tasks include all activities related to the management of the study including providing input into the study schedule, coordinating with the sponsor, preparing and tracking budgets, monitoring study progress, and communicating via written and oral correspondence.

1. Study Management

The study manager is responsible for executing the feasibility study and leading the team throughout the planning process- identifying problems within the study area, formulating plan alternatives, evaluating solutions, and preparing the feasibility report. In addition, the study manager will ensure that all required tasks and coordination are performed in accordance with the project study plan to ensure the production of a high-quality feasibility report. Technical coordination and interdisciplinary planning are the responsibilities of the study manager. In addition, the study manager will monitor the scope and progress of study activities ensure that the study is consistent with all relevant planning guidelines and policies. Technical study management of Alexandria and Arlington staff resources will be the responsibility of the non-federal sponsors project managers.

The study manager's responsibility is to coordinate with all the District Divisions, all study team members including the sponsor, and all higher Corps authorities and other agencies. The study manager is responsible for management of overall project resources and is responsible for preparing the periodic reports and for managing and tracking Planning Division's budgets. Specific work tasks include facilitating coordination between team members, monitoring the study progress, and communicating with the sponsor. This work effort assumes coordinating and attending a minimum monthly staff meeting, preparing monthly progress reports, providing monthly fact sheets to higher authorities, and preparing scheduling and budgeting information.

a. Provide input to study schedule

The study manager will provide the project manager in PPMD input on the study schedule. Updates will be provided on a monthly basis to the Agency Coordination team to provide a status on the feasibility study. This schedule will be developed using Microsoft Project.

b. Coordination

The study manager is responsible for coordination with the team, the non-Federal sponsors, and higher Corps of Engineers offices throughout the study process. As part of this coordination, the study manager is responsible for disseminating appropriate information among the study team, non-Federal sponsors, USACE Headquarters, North Atlantic Division, and Baltimore District managers.

Throughout the study process, higher authority will be kept apprised of the study progress. Several in-progress review meetings will be conducted with the North Atlantic Division, some to include USACE Headquarters. These meetings will require preparing read-ahead material for the attendees, preparing the agenda, coordinating with the study team and non-Federal sponsors, preparing the presentations, coordinating and disseminating responses, and preparing memorandums for the record after each meeting.

The study manager will also coordinate routine activities by telephone conversations between the study manager and the non-Federal cost-sharing partners; fax or written communication will be used when necessary. The study manager will also coordinate with the Study and Management Team. Periodic study team meetings will be held as well as meetings between individual elements and the study manager. The study manager is responsible for organizing and facilitating the meetings.

As part of the team coordination, the study manager will arrange study team meetings, including visits to project sites, sponsors' office; and outside meetings to better understand the efforts required for each discipline. Costs include travel time and cost of Government vehicles. The non-Federal cost-sharing partners will participate in all site visits.

c. Monitor Study Progress

The study manager will oversee the progression of the study and will work to solve unexpected issues that arise. If there are deviations from the baseline work progress schedule, then explanations will be provided to the managers to determine the appropriate course of action.

d. Study Schedule

The study manager will provide input to the project manager for the development of the study schedule. It will be the study manager's responsibility to oversee the completion of the Planning Division tasks.

e. Tracking Planning Division Obligations & Expenditures

The study manager will coordinate with project manager on preparing the initial 2101 showing the scheduled obligations and expenditures for each study element, obtain the actual obligations and expenditures each month for Planning Division, and compare the actuals with the scheduled. The study manager will also investigate any major deviations from the scheduled funding for the division.

f. Task Management

In addition to the above tasks, the study manager will work closely with other elements of the study, including plan formulation, environmental assessment, and public involvement to ensure that the study is maintaining the preferred course of action. The study manager will lead the plan formulation process for the team, will work with the public involvement coordinator to coordinate with interested citizens and citizen groups, and will coordinate closely with the environmental team member(s) to ensure sound decisions are being made.

g. Sponsors' in-kind contribution

The sponsors will participate in the necessary study management meetings throughout the study process, including monthly team meetings, key decision making meetings, and meeting to brief higher authority. The sponsors will be responsible for briefing higher authority during key decision points. In addition, the sponsor will provide status reports on the tasks and reports performed as in-kind services. They will also be responsible for ensuring that the necessary information is transferred from the sponsor to the Corps team members.

2. Design Management

The Engineering Design Team Leader (Design Manager) is responsible for technical management for the Engineering Division and will be completed in accordance with ER 1110-2-1150. Duties include assuring that all technical requirements are met, and coordinating activities relating to the Engineering Division technical work, scopes, schedules, and budgets. The Design Manager is the Engineering Division point of contact for team members outside the Engineering Division and works in the Civil Design Management Branch.

a. Technical Management

The Design Manager will provide input to the Project Manager on preparing the initial study schedule and budget (2101) showing the scheduled obligations and expenditures for each engineering study element, in coordination with other elements of the Baltimore District. As the feasibility study progresses, the design manager will monitor progress of the technical tasks and expenditures in order to revise the budgets and schedules accordingly. Scope changes, if needed, will also require budget and schedule adjustments, and the design manager will work with elements of the Engineering Division and other team members to accomplish this.

b. Coordination of Project Designs and Studies.

The Design Manager will take part in field investigations and assist in site selection. For selected sites, the Design Manager will attend field evaluations and assess the scope issues associated with potential solutions, in order to coordinate scope development in later project phases. As the study evolves, the Design Manager will attend meetings with the sponsor and the various working groups to advise the team on technical issues and provide engineering guidance to the team.

c. Engineering Resource Management

The Design Manager is responsible for coordinating the scheduling and funding information among the engineering team members and coordinate with PPMD and Planning Divisions regarding scheduling, funding, plan formulation, and justification. The Design Manager will also obtain the actual expenditures each month for Engineering Division on this study and compare the

actual expenditures with the scheduled expenses. Any significant deviations from the scheduled funding for the division will be investigated.

The Design Manager will coordinate the actions of the engineering team throughout the study, and ensure both an upward and downward flow of information with regard to the study. The Design Manager's task will include, but not be limited to, briefing District management on technical issues, preparing fact sheets, and preparing briefing material for District management and sponsors. The Design Manager will also take part in study team meetings, meeting with sponsors, and sites visits as needed throughout the study.

d. Study Team Meetings and Coordination

The Design Manager will be responsible for ensuring coordination and dissemination of information among the engineering team members. As appropriate, the Design Manager will hold engineering team meetings, prepare handouts, agendas, and minutes of meetings with regard to the engineering team. The Design Manager will also be required to assist in the plan formulation and determining the selected plan(s). This also includes on-site meeting with the sponsors to define the scope and extent of the study and to provide technical guidance and information to the sponsor during the selection process.

e. Coordinate A/E Contracts and Scoping

The design manager will work with other study team members as needed to prepare the scope of work for Engineering Division contracts and is responsible for all associated contract documentation, negotiating, and award. The design manager will coordinate and oversee the work of the A/E and ensure adequate review and payment of contractors work.

f. Independent Technical Review

The Design Manager is responsible for coordinating, consolidating, and resolving all technical review issues and responses among the Engineering Division team members, Planning Division, and the non-Federal cost-sharing partner for each report required by the study. In addition, the Design Manager is responsible for coordinating an external review with another District of all engineering documents produced during the feasibility phase.

g. Input to PMP

The Design Manager is responsible for estimating costs and preparing descriptions for the work for all engineering disciplines required for the preparation of plans and specifications for each project. To accomplish this, the Design Manager will coordinate efforts among Engineering Division and work with other study team members and the sponsor on the PMP. The Design Manager will also take part in negotiations with Planning Division personnel, and in coordination meetings with other District elements and non-Federal cost-sharing partner.

i. Total Costs

The total cost for this subaccount is \$386,292. The District's efforts for overseeing the study specific tasks for Planning Division and Engineering Division under this subaccount will require 1676 hours for a sub-total of \$183,492. The non-Federal sponsors will provide in-kind services for their management of the project in the amount of \$202,800.

Study Management Effort:	\$108,892
Design Management Effort:	\$74,600
Non-Federal Effort:	\$202,800
Total Management Effort:	\$386,292

22R Plan Formulation and Evaluation

a. Plan Formulation Six Step Planning Process

This subaccount includes the effort required for formulation and evaluation of levee channel and corridor environmental/urban designs and the upper watershed designs by the Corps study team and the non-Federal cost-sharing partners. The plan formulation process is based six iterative steps: (1) specify the problems, needs, and opportunities for the study area, (2) inventory and forecast resources, (3) formulate alternative plans, (4) evaluate alternative plans, (5) compare alternative plans, and (6) select the recommended plan(s). This process is repeated, in full or in part, until a final, justifiable plan is selected. At the beginning of the feasibility phase, the study team and non-Federal sponsor will agree to the study goal and objectives. This will form the basis for specifying problem identification; forecasting resources; formulating, evaluating, and comparing alternatives; and selecting the recommended plans for both the levee corridor and the upper watershed.

1-Determination of problems, needs, and opportunities for the study area

Existing conditions data used to identify problems will be discussed in the appropriate subaccount. However, this information will then be brought together for the study team, including the non-Federal sponsor, to determine the problems, needs, and opportunities for the study area.

2-Inventory and forecast resources

Formulation and evaluation of alternative plans should be based on the most likely condition expected to exist in the future with and without the plan. The without-plan condition is the condition expected to prevail if no action is taken. The with-plan condition is the condition expected to prevail with the particular plan under consideration. The conditions include direct, indirect, and cumulative effects (Chapter 5 of ER 1105-2-100, *Planning Principles*).

3-Formulate alternative plans

This stage of the plan formulation process will (1) identify measures available to address the identified problems and opportunities for each project component, (2) provide reasons for selecting and combining measures to formulate alternative plans that meet the identified problems and opportunities, (3) screen alternative plans, and (4) reformulate alternative plans, as necessary.

An alternative plan consists of a system of structural and non-structural measures, strategies, or programs formulated to alleviate specific problems or take advantage of specific opportunities associated with water and related land resources. Alternative plans should not be limited to those the Corps could implement directly under current authorities. Plans that could be implemented under the authority of other Federal agencies, state and local entities, and non government interests should also be considered (Chapter 5 of ER 1105-2-100, *Planning Principles*).

4 & 5-Evaluate and compare alternative plans

During the evaluation and comparison stage the study team, led by the study manager, will present and evaluate a final array of alternative plans, include a trade-off analysis, will describe and discuss the selection of the final plan, and discuss risks and uncertainties. The selected plan components, including mitigation, design and construction considerations, O&M considerations, plan accomplishments, and a summary of economic, environmental, and social effects will be described in detail for the levee corridor and the watershed.

When synthesizing both plans, the following tasks will be completed and summarized in the feasibility report and master plan appendix:

1. Identify and assess growth management tools and opportunities, and broad watershed improvement strategies for further exploration by the local jurisdictions
2. Identify and develop watershed management practices, policies and action strategies to reduce runoff and improve stream quality over the long term. Management practices and strategies identified in this phase should maintain the capacity of the channel at maximum future build out. Incorporate this information into the computer models and refine them as the design of the channel is being developed.
3. Identify channel maintenance requirements and strategies. Begin implementation of maintenance and management strategies as part of the demonstration project. Monitor and evaluate results for long term viability as possible solutions. Provide park management recommendations if necessary.

6-Selection of recommended plan

Multiple purpose plans that include ecosystem restoration contribute to both the national economic development (NED) and national ecosystem restoration (NER). Multipurpose plans are developed and evaluated so that an optimum tradeoff plan maximizing the sum of the net contributions to NED and NER is designated, and usually recommended. Contributions to restoration of the Nation's ecosystems are net improvements in national environmental health. Protection of the Nation's environment is achieved when damage to the environment is eliminated or avoided and important cultural and natural aspects of our Nation's heritage is preserved (Chapter 5 of ER 1105-2-100, *Planning Principles*).

Because the study will evaluate multiple purpose plans, the study team, including the sponsor, will work closely with the technical review team and decision makers on developing an agreed upon process for selecting the recommended plan.

b. Geographic Information System (GIS)

GIS-Based Modeling and Analysis

The GIS will be used to assist the study team in formulating and evaluating solutions. In the feasibility phase, GIS will be employed extensively to provide analytical functionality. This analytical functionality may include development of watershed and hydrologic models, cumulative impact analysis, sensitivity analysis of the identified problem areas, map overlay, and topographic analyses, environmental restoration screening, and aesthetics among other potential uses. All of the analytical

functions will be developed in a manner that will allow them to be used by others for planning purposes. The nonfederal sponsors have GIS capabilities and will be actively involved in completing all GIS tasks identified during the feasibility phase.

c. Documentation

Documentation of the project formulation process will be prepared by the Corps Planning Division and the non-Federal sponsors contractors, which includes in the feasibility report and the master plan appendix. In addition, a hydrological and hydraulic model of the channel and the upper watershed will also be developed

The non-Federal cost-sharing partners will participate in the plan formulation process for all of the potential projects and will be responsible for providing guidance on local acceptability of plan alternatives and input regarding locally preferred plans, if any, other than the recommended plan.

d. Sponsors' in-kind contribution

The sponsors will have multiple agencies participating in the plan formulation process. Tasks to be completed under this task includes attending site visits and decision-making meetings for the alternative analyses, developing concept plans for the levee, urban corridor and upper watershed. Both Arlington and Alexandria will also provide GIS services in support of this study. They will also assist in developing portions of the final feasibility report to reflect their efforts under this subaccount.

e. Total Costs

The total cost for this subaccount is \$442,552. The District's efforts for selecting the recommended plan under this subaccount will require 776 hours for a sub-total of \$77,522. The non-Federal sponsors will provide in-kind services in the amount of \$365,000.

Federal Effort:	\$77,752
Non-Federal Effort:	\$365,000
Total Plan Formulation:	\$442,522

22S Report Preparation

a. Tasks

Work under this subaccount will be primarily performed by the Baltimore District Planning Division. Work tasks include assembling, writing, editing, typing, drafting, reviewing, reproducing, and distributing study reports, environmental statements/assessments, surveying and design appendices, and other related documentation required for transmittal by the Corps to higher authorities. The feasibility report will consist of a main report summarizing the technical findings and containing the study conclusions and recommendations, and including an integrated technical appendix covering work accomplished in the various task subaccounts.

- An appendix containing the non-Federal cost-sharing partner's financial capability statements, along with preliminary financing plans for project implementation;

- An appendix developed by the Non-Federal sponsor with a stand alone master plan for the levee corridor; and
- Other supporting documentation, including the PMP.

Other work to be accomplished includes preparing draft feasibility reports, including draft NEPA documentation, covering the work accomplished during the feasibility study process, and also incorporating the results of the Feasibility Review Conference. Other work involves preparation of final reports incorporating any changes necessary to respond to comments made during the review of the draft reports.

b. Sponsors In-kind Contributions

The non-Federal cost-sharing partners will be responsible for providing comments and guidance throughout the report preparation phase. In addition, the non-Federal cost-sharing partners will be responsible for assisting in documentation of that portion of the work provided as in-kind service, including preparation of the Master Plan appendix for the final report by the design consultant team.

c. Total Costs

The total cost for this subaccount is \$88,366. The District’s efforts for preparing, editing, and copying the draft and final reports under this subaccount will require 344 hours for a subtotal of \$34,366, with an additional \$5,000 for printing. The non-Federal sponsors will provide in-kind services in the amount of \$49,000

Total Federal Effort:	\$39,366
<u>Non-Federal Effort:</u>	<u>\$48,500</u>
Total Report Preparation Effort:	\$88,366

22T Project Management

The Corps of Engineers’ project manager provides overall management of the project from planning through design and construction. The project manager is responsible for managing the project parameters (cost, budget, schedule, scope, and quality), as well as interfacing with those involved in the project process (non-Federal sponsors, District elements, Corps command channels, and government and non-government entities). The project manager serves as the leader of the project team of technical managers and District elements.

The project manager will serve as the primary point-of-contact with the non-Federal sponsor on project-related issues, such as scheduling, funding, budgeting, and implementation. The project manager will (1) regularly update the sponsor on feasibility study progress, (2) review and monitor the District’s and sponsor’s compliance with study commitments (both fiscal and technical), (3) participate in resolution of technical issues as necessary, and (4) ensure the sponsor’s understanding of funding and schedule requirements for project execution.

a. Upward Reporting

The project manager is responsible for upward reporting on budget and schedule issues via the life-cycle project management reporting system. This system includes (1) preparing budget and schedule meetings and briefings, and (2) completing necessary tracking sheets.

b. Project Schedule

The project manager is responsible for completing the project schedule with the input of the study team, especially the study manager and design manager, and tracking the schedule's and study's progress.

c. Budgetary Tracking

The project manager will schedule the study funds with input from both the study manager and design manager, and will track the overall study costs. This task also includes monitoring the overall project performance relative to the network schedule and coordination of schedule revisions with the District elements and non-Federal sponsor to achieve the overall project commitments. Included in this task is coordinating with the non-Federal sponsors on funding and tracking of the in-kind service credits.

d. Coordination

The project manager will coordinate with the sponsor on budget- and schedule-related issues for the project. The project manager will also coordinate with District participants and the non-Federal sponsor to facilitate resolution of potential or existing study issues to minimize impacts to project progress. Also included in this task is coordinating and preparing for any potential Executive Committee meetings.

e. Project Management Plan

The project manager will develop and coordinate the project management plan, which provides the overall framework for the preconstruction engineering and design phase and the construction phase itself, in conjunction with District elements and the non-Federal sponsors. This task includes the preparation and negotiation of the preconstruction engineering and design agreement.

f. Other Tasks:

The project manager will participate in relevant team meetings and external meetings, particularly those that address the overall project-related issues, such as project schedule, budget, and implementation. The types of meetings include study team meetings, decision meeting, meetings with District managers, District technical review meetings, and public and agency meetings. The project manager will also review relevant study documents, including the plan formulation report and draft and final feasibility reports, to ensure that the District is meeting the project commitments.

g. Assumptions

For the project management tasks, it was assumed that the feasibility study would last 36 months, from study initiation to the Division Engineer's notice. Following completion of the feasibility phase, it was assumed that the project would proceed through the typical Civil Works process, including up-front funding of the preconstruction engineering and design phase. Therefore, the feasibility phase would include negotiation and execution of a PED agreement. In order to

minimize project management costs, it has been assumed that the project will proceed normally without interruption or the need for any feasibility study cost-sharing agreement amendments.

h. Sponsors' in-kind contribution

The sponsor will need to coordinate with the Corps' project manager on budget and schedule issues, tracking the status in-kind services, and provide input, where appropriate, into the Project Management Plan.

i. Total Cost

The total cost for this subaccount is \$187,400. The District's efforts for managing the budget and schedule of the study under this subaccount will require 1012 hours for a sub-total of \$135,900 and \$19,000 in other services. The non-Federal sponsors will provide in-kind service in the amount of \$32,500.

Federal Effort:	\$154,900
<u>Non-Federal Effort:</u>	<u>\$32,500</u>
Total Project Management:	\$187,400

22Y Technical Review

This subaccount incorporates both quality control and quality assurance for both technical and policy issues relating to the project. Baltimore District will perform quality control on the technical issues; North Atlantic Division will perform quality assurance on technical issues and quality control on policy issues; and, USACE Headquarters will perform quality assurance on policy issues. All technical review certification and independent technical review will be consistent with EC 1165-2-203.

a. Quality Control- District

An independent technical review team of Baltimore District personnel will be established that will represent all technical elements providing significant input to the feasibility report. The team members will be selected based on their experience and knowledge relative to the subject matters under review. The technical review team has the credentials and experience necessary to provide a comprehensive review, particularly as it relates to plan formulation, environmental, economic, engineering, and public involvement matters. The team members will not have been involved in the technical products under review.

The technical managers from each division will coordinate the quality control reviews in accordance with guidance. The comments will be consolidated by each division and provided to the study manager.

- All members of the TRT will sign the Quality Control Review report (reference sample certification provided as Appendix A of EC 1165-2-203).
- All major and significant assumptions during the study process will be discussed with, validated by, and documented by the Technical Review Team.

- Since the local sponsor is scheduled to perform a significant portion of the feasibility study efforts as "in-kind" services, the TRT will monitor and evaluate all local sponsor work as part of its quality control (QC) responsibilities.
- Engineering Division's portion of the QCP will be prepared in accordance with guidance contained in CENAD-ET-ET memorandum dated 25 Mar 97, subject: Design Quality Management for Civil Works.

b. Total Costs

The total cost for this subaccount is \$45,984. The District and Division efforts for providing quality control and quality assurance throughout the study process under this subaccount will require \$45,984.

<u>Federal Effort:</u>	<u>\$45,984</u>
Total Technical Review:	\$45,984