Anacostia River and Tributaries (Phase 2) Feasibility Study Project Study Plan

October 22, 1996

TABLE OF CONTENTS

Section	*Page*
I. PURPOSE OF PROJECT STUDY PLAN	***1***
II. RECONNAISSANCE AND PHASE 1 FEASIBILITY STUDY OVERVIEW	***1***
III. PHASE 2 FEASIBILITY STUDY	**2**
A. Federal Interest	**2**
B. Mission	**6**
C. Work Tasks	**8**
1. Plan Formulation and Evaluation	***8***
2. Public Involvement	***9***
3. Hydrologic and Hydraulic Investigations	***10***
4. Environmental Studies	***11***
a) Biology	***11***
b) Recreation	***12***
c) Aesthetics	***13***
d) National Environmental Policy Act Compliance	***13***
5. Hazardous, Toxic, and Radioactive Waste Studies	***13***
6. Cultural Resource Studies	***14***
7. Surveys and Mapping	***15***
8. Real Estate Studies	***15***
9. Geotechnical Investigations	***16***
10. Design and Cost Estimates	***17***
a) Design	***17***
b) Cost Engineering	***18***
11. Economic Analyses	***18***
12. Socio-Economic Analyses	***20***
13. U.S. Fish and Wildlife Service Studies	***21***
14. Financial Capability Assessment	***21***
15. Report Preparation	***23***
16. Study Management	***23***
17. Technical Review	***24***
18. Project Management	***24***

D. Cost *25*
E. Organization *25*
1. Executive Committee *25*
2. Study Team *26*
F. Schedule *26*

Figures

1. Map of study area *5*
2. Schedule **27**

Tables

1. Estimated Northwest Branch Project Costs **6**

PROJECT STUDY PLAN

I. PURPOSE OF PROJECT STUDY PLAN

The Project Study Plan (PSP)for the *Anacostia River and Tributaries (Phase 2) Feasibility Study* was developed in accordance with EC 1105-2-208, *Preparation and Use of Project Study Plans* and ER 1105-2-100, *Planning Guidance*. The PSP has been developed by the Baltimore District in conjunction with Montgomery County who is the primary study sponsor.

The PSP is used to define and manage the development and conduct of the feasibility study. The PSP documents the assumptions, work tasks, level of detail necessary to accomplish the tasks, and products that will be used to 1) determine the existing and the future without project conditions, 2) formulate a range of alternatives, 3) assess their effects, and 4) present a clear rationale for the selection of a plan. The PSP includes the baseline study cost, schedule, and assignment of responsibilities.

II. RECONNAISSANCE AND PHASE 1 FEASIBILITY STUDY OVERVIEW

The *Anacostia River and Tributaries Reconnaissance Study* was authorized by a resolution of the Committee on Public Works and Transportation, U.S. House of Representatives which stated:

> *"Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Anacostia River and Tributaries, District of Columbia and Maryland, published as House Document No. 202, 81st Congress, 1st Session, with a view to determining if further improvements for flood control, navigation, erosion, sedimentation, water quality and other related water resources needs are advisable at this time."*

Further authorization for this study was contained in the June 25, 1990 *Statement of New Environmental Approaches* by the Assistant Secretary of the Army (Civil Works) which gave fish and wildlife restoration the status of a priority project output.

The *Anacostia River Basin Reconnaissance Study* report, dated December 1990, recommended that a feasibility study for environmental restoration of the Anacostia River basin be conducted. The reconnaissance report was approved with the following comments:

> 1) Projects are to be justified based on their contribution to restoration of fish and wildlife habitat.

2) A quantitative and qualitative methodology must be used to evaluate the most technically sound and cost-effective ways to provide varying levels of fish and wildlife habitat-related outputs.

3) The significance of the restored resources will be determined based on public, scientific and institutional considerations and the cost-effectiveness of implementation.

4) The linkage between previous Corps of Engineers activities and the proposed projects will be clearly established.

The Baltimore District conducted the Phase 1 feasibility study to examine and evaluate the problems and opportunities related to restoration of fish and wildlife habitat in the entire Anacostia River basin; formulate plans to address those problems and opportunities; and recommend cost effective solutions for implementation. The *Anacostia River and Tributaries, District of Columbia and Maryland, Integrated Feasibility Report and Final Impact Statement* documented the plan formulation, engineering and design, cost and benefit analyses, and the National Environmental Policy Act (NEPA) evaluation process for alternatives which were considered in the Phase 1 feasibility study.

III. PHASE 2 FEASIBILITY STUDY

A. Federal Interest

The Phase 1 feasibility study determined that previous Corps water resource projects had destroyed approximately 2,600 acres of freshwater tidal and non-tidal wetlands, 500 acres of aquatic habitat, and 800 acres of bottomland hardwoods. The Phase 1 feasibility study recommended projects that would restore of 80 acres of wetlands, 33 acres of bottomland hardwoods, and 5 miles of streams. The study also concluded that further feasibility level investigations of fish and wildlife habitat restoration be pursued.

For environmental restoration projects, the Federal objective is to restore significant fish and wildlife habitat. As defined by Engineering Regulation (ER) 1105-2-100, significance is based on institutional, public, and technical recognition. The significance of the fish and wildlife resources of the Anacostia River basin is widely recognized by the institutional, public, and technical sectors.

The Anacostia watershed has long been recognized as a significant resource by the Federal government. There are extensive reaches of stream valley parkland in the Anacostia watershed because U.S. Representative Louis Cramton wished to preserve the natural beauties of the National Capital Area and secured passage of the Capper-Cramton Act in 1930. In 1994, thirty high-level Federal officials representing twenty-nine agencies and departments

signed the Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay which commits Federal support for the Anacostia restoration effort.

Maryland's Scenic and Wild Rivers Act of 1968 recognizes that the Anacostia River is a significant environmental resource for the state. The Act directs the Secretary of the Department of Natural Resources to "provide for wise management...and preservation" of the land resources as well as the scenic and wild qualities of the Anacostia River.

The 1987 Anacostia Watershed Restoration Agreement recognizes the "seriously degraded condition and ultimate resource potential" of the Anacostia watershed for the region. As signatories of the agreement, the State of Maryland, Montgomery County, Prince George's County, and the District of Columbia committed to a regional effort intended to improve water quality and restore aquatic resources in the Anacostia watershed. This regional partnership has recommended approximately 450 stormwater management, stream restoration, wetland creation, fish passage, reforestation, and small habitat improvement projects in the Anacostia watershed.

An environmental goal of Montgomery County and the Maryland National Capital Park and Planning Commission is to protect and enhance the Anacostia watershed's natural resources for the enjoyment of residents and to sustain a stable and healthy biological environment for native plant and animal communities. It should be noted that he County and the Commission have designated the down-County portion of the Northwest Branch as an Environmental Restoration Area where restoration programs are needed to address the most severe environmental effects of existing development.

The existence of over 28 local citizens groups with a specific interest in the Anacostia restoration effort indicates the level of significance placed on this resource by the public. Some of the citizen groups are listed below.

- Alliance for the Chesapeake Bay
- American Rivers
- Anacostia Watershed Society
- Audubon Naturalist Society
- Chesapeake Bay Foundation
- Chesapeake Bay Trust
- Izaak Walton League
- Maryland Save Our Streams
- Metropolitan Washington Council of Governments
- One Million Marylanders Chesapeake Cleanup Campaign
- Prince George's County Stream Teams
- Trout Unlimited

Technically it is recognized that the stream restoration and stormwater management facilities

are particularly valuable to the Anacostia watershed restoration effort. Urban development in the Anacostia watershed has increased stormwater runoff volumes, rates, and velocities. This change in hydrology and hydraulics is causing excessive channel erosion and sedimentation, making stream channels highly unstable, destroying aquatic and riparian habitat, lowering water quality, and degrading the ecosystem. The *Conceptual Restoration Plan for the Anacostia River Tributaries* (September 1993) developed by Dynamac Corp. and Biohabitats, Inc. during the Phase 1 feasibility study also noted that high rates of channel erosion and sedimentation and channel instability may compromise the proper functioning of planned habitat enhancement structures. Channel erosion, sedimentation, and instability in the Anacostia watershed need to be addressed in order to effectively achieve agency habitat goals. Of the tributaries shared by Montgomery and Prince George's County, *the Conceptual Restoration Plan for the Anacostia River Tributaries* noted that the problem is most severe in the Northwest Branch watershed, where some degree of channel stabilization must occur before habitat enhancement structures can be installed. According to the *Anacostia Watershed Erosion - Sedimentation Control Study* prepared by Century Engineering, Inc. in 1981, channel erosion in the Northwest Branch is estimated to produce a sediment load of 8,300 tons/year. The Northwest Branch watershed is shown in Figure 1.

While commenting on the *Anacostia River and Tributaries District of Columbia and Maryland Integrated Feasibility Report and Final Environmental Impact Statement,* completed in July 1994, the U.S. Fish and Wildlife Service stated,

> *"The stream habitat improvement measures proposed for Northwest Branch...should be effective in stabilizing banks and restoring riffles, pools, and instream overhead cover. They should significantly improve the aquatic habitat conditions in these areas...The invertebrate and fish populations can be expected to respond accordingly. However, the long-term success of those measures may depend on how well the stream hydrology is brought into equilibrium with its hydraulic capacity. The upper Northwest Branch, in particular, has sections where the channel is unstable due to increased runoff, sediment deposition, and related causes. In such areas it may be prudent to implement runoff controls prior to installation of sensitive stream habitat improvement measures."*

In addition to destroying habitat, excessive erosion is degrading water quality. High rates of channel erosion result in high inputs of sediment and high total suspended solid (TSS) concentrations in the water. High rates of channel erosion also cause substantial tree loss and induce higher stream temperatures. The *Anacostia Watershed Water Quality Report: 1987 - 90* prepared by the Metropolitan Washington Council of Governments indicates that of the tributaries in Montgomery County, (TSS) and temperature levels are highest in the Northwest Branch watershed.

It is assumed that the Phase 2 feasibility study will result in detailed designs for 5 stream restorations, 2 new stormwater management facilities, and 5 stormwater management facility retrofits. These projects are expected to restore 25,000 feet of stream habitat, provide 9 acres of wetland habitat, and improve water quality by lowering total suspended solids, biochemical oxygen demand, total phosphorous, and contaminant levels. Estimated project construction costs are shown in Table 1. Average project costs are based on estimates developed for similar Montgomery County projects in the Phase 1 study.

Table 1

Preliminary Estimate of Project Costs

Project Types	No. of Projects	Size of Projects	Ave. Cost per Project	Total Cost
Stream Restoration	**5**	**5,000 ft**	**$857,000**	**$4,285,000**
New SWM Facilities	**2**	**2 ac**	**$849,000**	**$1,698,000**
SWM Facility Retrofits	**5**	**1 ac**	**$388,000**	**$1,940,000**
				$7,923,000

It is expected that the habitat and water quality improvements provided by these projects would support an increase in macroinvertebrate, fish and wildlife populations and their diversity. A 1990 fish sampling survey found American eel, swallowtail shiner, satinfin shiner, spottail shiner, common shiner, silverjaw minnow, cutlips minnow, bluntnose minnow, white sucker, northern hog sucker, margined madtom, yellow bullhead, bluegill sunfish, redbreast sunfish, pumpkinseed sunfish, tesselated darter, fantail darter, rosyside dace, blacknose dace, longnose dace, and northern creek chub in the project area. These fish species, as well as rainbow trout that is stocked yearly for recreational purposes, would benefit from stream habitat enhancements. Wildlife that would benefit include mallards, Canadian geese, great blue herons, killdeer, kingfishers, gulls, raccoons, and opossums.

B. Mission

The planning goals of this study are to restore aquatic and riparian habitat, improve water quality, and contribute to the restoration of the Anacostia River ecosystem by reducing stormwater runoff rates, velocities, and pollutant loads and by stabilizing stream channels that make significant contributions to stream channel erosion and sedimentation. To achieve this goal, the study team will further define the problems and opportunities; analyze and forecast environmental resource conditions; formulate, evaluate, and compare alternative

plans; and recommend a cost effective plan for the Montgomery County portion of the Northwest Branch watershed.

Public, sponsor, and study team input will be used to further define the erosion, sedimentation, channel stability, habitat, and water quality problems in the Northwest Branch. The team H&H engineers will identify the most unstable reaches of the Northwest Branch stream channels and determine how the existing hydrology may contribute to excessive erosion and sedimentation. The primary sponsor's biologist will assess the quality of existing aquatic and riparian habitat and the biotic integrity of the Northwest Branch stream channels. In addition, the primary sponsor will provide stream monitoring data and the team HTRW specialist will use existing HTRW data to identify potential sources of pollutants that would impair the health of living resources. In reaches where the hydrology, geomorphic assessment, habitat assessment, and biotic assessment indicate that the stream channels are unstable, the habitat and health of living resources is degraded, and the water quality is impaired, opportunities to stabilize the stream channel, improve water quality, and restore the habitat and health of living resources will be identified. The team GIS mapping specialist will obtain topographic, wetland, stormwater drainage system, land use, impervious area, HTRW site, soils, and forestation mapping, and develop unstable stream channel, degraded habitat, fish barrier, and substandard water quality mapping. Information on historic and current conditions will be used to identify trends and forecast future conditions. The primary sponsor will lead an effort to seek public input in identifying additional study problems, opportunities, and goals.

Using information provided by the H&H engineers, biologist, HTRW specialist, GIS mapping specialist, public, and sponsors, the study team will prioritize problem areas and set planning objectives and constraints. High quality undisturbed natural areas and environmentally degraded areas will be prioritized based on their significance to the restoration of the watershed ecosystem. It is assumed that the objectives will be to reduce the rate of channel erosion, stabilize the stream channel morphology, reduce TSS concentrations, reduce the stream water temperature, restore aquatic habitat, and restore riparian habitat. Sponsor project funding limitations will be considered when setting the planning objectives.

Once problem areas are prioritized and planning objectives are established, the study team will propose alternative projects to address the problems and objectives. Working with the study team, the biologist and H&H engineers will identify projects that will reduce channel erosion, stabilize the stream channels, restore aquatic and riparian habitat, and improve water quality. The team archeologist and HTRW specialist will identify cultural and HTRW sites to be generally excluded from further consideration as potential project sites. The GIS mapping specialist will add cultural site, floodplain, and general property ownership mapping to the GIS database. It is assumed that stormwater management and stream restoration projects will be identified. The team biologist, H&H engineers, geotechnical engineer, landscape architect, and design engineer will work together to develop conceptual project drawings.

The study team will evaluate the effectiveness of alternative projects in meeting the planning objectives. The H&H engineers will evaluate project effectiveness in increasing channel stability and reducing channel erosion and sedimentation. The biologist will evaluate project effectiveness in improving water quality and providing aquatic and riparian habitat. The biologist will also determine the ecological significance of the projects

Once the alternative project effectiveness is evaluated, the alternatives will be compared. In addition to benefits, cost effectiveness and impacts will be considered. The design engineer will estimate quantities for project cost estimates. The real estate specialist will estimate project real estate costs. The team cost engineer will estimate project costs. The team economist will conduct cost effectiveness and incremental cost analyses. The team environmental planner will identify project impacts on recreation, the landscape architect will identify project impacts scenic views, and the team sociologist will identify project impacts on communities. Public reaction to the proposed projects will be solicited. Projects identified as being the most cost effective and most significant to the restoration of the ecosystem will be recommended for implementation unless a recommendation based on other criteria is justified. The public's reaction to proposed alternatives and ideas for additional alternatives will be solicited.

Once a plan is identified for recommendation, more detailed designs and cost estimates and a plan for project implementation will be developed, and the NEPA public review process will be initiated. The geotechnical engineer will analyze the soil foundation while the archeologist and HTRW specialist confirm site conditions at the recommended project sites. The H&H engineers will provide final design criteria; the design engineer will develop design drawings; the real estate specialist will produce a gross appraisal and Real Estate Plan; the cost engineer will develop a final cost estimate; and the primary sponsor, working with the team financial analyst, will develop a project financing plan. The environmental planner will manage the NEPA and Fish and Wildlife coordination process. The study manager will prepare the study report while Planning Resources Branch provides quality assurance and the project manager develops a project management plan.

C. Work Tasks

Major work tasks for the Phase 2 feasibility study are identified in terms of the general activities which are included in the Corps of Engineers standard Study Cost Estimate for General Investigations. For accounting and administrative purposes, all tasks, including in-kind services provided by the sponsors, are identified by cost subaccount. The following is a listing of each subaccount and a general description of what each entails:

1. Plan Formulation and Evaluation (Subaccount 22R)

The primary objective of the feasibility study is to formulate a plan and plan scale to be recommended for implementation in accordance with National Environmental Policy Act

requirements. The study team will use the following plan formulation process:

1) The specific problems and opportunities that will be addressed by the study will be identified, and causes of the problems will be discussed and documented. Planning goals will be set and objectives will be established. Constraints will be identified. Ecosystem structures and functions that will influence the success of the effort, as well as, information to be collected, appropriate techniques, and appropriate quantitative and/or qualitative measurements to be used during an environmental resource inventory will be identified.

2) Environmental resources will be analyzed and forecast. The existing condition of resources, problems, and opportunities will be characterized. By referring to patterns in natural systems and human behavior and relationships among variables and systems the timing, nature, and magnitude of future conditions will be estimated.

3) With public input, the study team will formulate alternative stream restoration and stormwater management project plans that will address the planning objectives. Concept designs will be prepared for an assumed 8 stream restoration projects, 5 new stormwater management facilities, and 8 stormwater management facility retrofits.

4) Alternative project plans will be evaluated using hydrologic, hydraulic, sediment transport, and pollutant removal efficiency models and estimated habitat benefits. A project will be judged as significant if it provides a net gain in habitat, improves water quality, and reduces channel erosion and sedimentation while expanding an existing area of good quality habitat.

5) Alternative project plans will be compared. Cost effectiveness and incremental cost analysis will be the principal organizing framework for comparison. Project impacts will also be considered.

6) A plan will be selected for recommendation and a justification for the selection will be provided. Detailed designs will be developed for an assumed 5 stream restoration, 2 new stormwater management facilities, and 5 stormwater management facility retrofits.

The study manager, with assistance from the study sponsors, will review information provided by the study team and lead the plan formulation process. The study manager will provide an account of the plan formulation process in the study report.

This sub-account will require 527 hours of Federal effort and 279 hours of sponsor effort for a sub-total of $66,600.

2. Public Involvement (Subaccount 22A)

This study will include a sponsor-lead public involvement program designed to meet National Environmental Policy Act requirements; inform the public and government agencies

about the watershed condition and its problems; ensure that public and agency concerns are addressed; and keep the public and agencies apprised of the study goals, study progress, and proposed projects. Initial background presentations will be made to civic and advisory groups active in the watershed. Community input will be solicited when establishing study goals and objectives and when developing project alternatives. Briefings will be conducted to discuss the scope and scheduling of the feasibility study; detail the extent of watershed problems observed; explain the study goals, objectives, and project evaluation criteria; identify alternative projects considered; and present feasibility study results and recommendations. Civic, advisory, and neighborhood groups will be consulted when making siting and design decisions. A landscape architect will work with the public to develop attractive project landscape designs. The public's commitment to a comprehensive restoration package will be sought. Preliminary agency approval will be sought when proposing projects on public land. Agencies will be notified of public meetings, provided with copies of newsletters, and solicited for report review comments. Agencies to be solicited for comments include WSSC, MWCOG, ICPRB, MdDNR, MDE, MdDOT, and USFWS.
Work under this subaccount will be performed by the primary sponsor and closely coordinated with the Corps of Engineers' Study Manager. The public involvement process will be divided into three phases. The first phase will focus on watershed problems, goals, and objectives; phase two will focus on project alternatives; and phase three will focus on plan selection. It is anticipated that three general public meetings and six study briefings will be held during the feasibility study. Other work tasks to be performed include preparing public notices, responding to inquiries from the general public and Congressional interests, coordination with the media, briefing various committees and private organizations, and preparing materials, including visual aids, for meetings. Three newsletters will be printed and distributed during the study. The existing mailing list will be expanded and updated throughout the study. An account of public involvement activities that includes a discussion of the public's goals and objectives for the watershed and their concerns about the proposed projects will be provided by the primary sponsor.

This subaccount will require 760 hours of sponsor labor, $5,000 for sponsor-provided visual aids, 96 hours of effort from the study manager for a sub-total of $73,800.

3. Hydrologic and Hydraulics Investigations (Subaccount 22J)

Geomorphic assessments and hydrologic, hydraulic, and sediment transport models will be used to further define channel stability problems in the watershed and evaluate the effectiveness of alternative stormwater management and stream restoration projects in increasing channel stability.

A geomorphic evaluation will be performed for the basin using historical and field gathered data. Natural, existing, and future flow rates, depths, and widths will be graphed. Aggrading, degrading, and stable reaches; grade controls; top-of-bank frequencies; and problem reaches will be mapped. Bank stability will be analyzed, and bank resistance, bank stress, and critical

bank heights will be calculated. Hydraulic parameters will be computed as necessary using either existing HEC-2 modeling or normal depth computations. The 100-year floodplain will be delineated for Batchelor's Run.

The primary sponsor will use a contractor to map the 95 miles of storm drains in the watershed. The mapping shall be provided in GIS format. The mapping, in conjunction with existing topographic and landuse mapping and stormwater management facility plans, will establish a hydrologic database for a TR-20 model.

The team H&H engineers will model the entire watershed using the Watershed Modeling System (WMS) which integrates TR-20 and GIS and facilitates model applications. The hydrologic model will be calibrated, and events of a 2, 10, and 100 year frequency and 3 events less than the 2-year storm will be modeled. One projection of ultimate development flows will also be modeled. Pre-development flows will be estimated using gage data and empirical equations for ungaged areas. It is assumed that approximately 100 miles of stream channel and 25 existing stormwater management facilities will be included in the model. Frequency curves will be developed for pre-development, existing, and post-development conditions.

For proposed channel realignments, the Sediment Assessment Methodology (SAM) model will be used to determine the net stream bed aggradation or degradation for existing and with-project conditions. The average annual sediment transport capacities will be determined in terms of tons of sediment per year. The model outputs will also allow the H&H engineers to identify the channel forming discharges for selected problem reaches.

Before final selection of the combination of projects that will be recommended, concept designs will be prepared for an assumed 8 stream restoration projects, 5 new stormwater management facilities, and 8 stormwater management facility retrofits. Stream channel erosion rates and length of stable stream will be calculated for existing and with-project conditions. The hydrologic model will be run with an assumed 10 combinations of proposed projects to include the combination finally selected. The resulting changes in flow rates, depths, and velocities will be determined. In addition, changes in the rate of stream channel erosion will be forecast in order to determine the combination of proposed projects that will most benefit stream channel stability.

After the study team selects a combination of projects for recommendation, detailed designs will be developed for an assumed 5 stream restoration, 2 new stormwater management facilities, and 5 stormwater management facility retrofits. An account of the H&H investigations and their results will be presented in a report appendix. In addition, a scope and cost estimate for final design work will be provided. Options for use of bioretention techniques, imbricated rip-rap, and other stream restoration measures that involve the use of natural or habitat enhancing materials will be considered.

The H&H engineers will provide a WMS model of the watershed; TR-20 model results for existing and future conditions; geomorphic, hydrologic, hydraulic, and bank stability assessment results; a map prioritizing the most unstable reaches in the watershed; an assessment of alternative project benefits to stream channel stability; and a delineation of the 100-year floodplain for Batchelor's Run; and an account of H&H activities to include a discussion of stream channel stability problems in the watershed and an assessment of how well alternative projects will address those problems.

This sub-account will require 5,808 hours of Federal effort and $65,800 for storm drain mapping that will be provided by the primary sponsor. The sub-total for this account is $484,000.

4. Environmental Studies (Subaccount 22E)

a) Biology

The primary sponsor's biologist will assess the biotic integrity and condition of aquatic and riparian habitat within the entire watershed. Fish, macroinvertebrate, habitat, and physio/chemical data will be obtained from 21 monitoring stations set up in accordance with Montgomery County Water Quality Monitoring Program Stream Monitoring Protocols. Field gathered and existing natural resource data will be analyzed to determine the condition of stream reaches in the Northwest Branch watershed. County identified reference streams will be used for a comparison to existing and expected with-project conditions. The biologist will prioritize the stream reaches according to their potential for improvement if environmental restoration projects were implemented.

The primary sponsor's biologist will accompany the H&H engineers on a field investigation of the stream reaches which are identified as having a high potential for improvement. The field investigation will involve a comprehensive assessment of the existing habitat within those reaches. The habitat assessment will be closely coordinated with the geomorphic assessment to be performed by the H&H engineers.

Once problem areas are clearly defined by the study team, the biologist will assist the H&H engineers in identifying sites for potential stormwater management and stream restoration projects. The biologist and H&H engineers will expand upon sites identified in the *Montgomery County Stormwater Retrofit Inventory* and the *Blueprint for the Restoration of the Anacostia Watershed* prepared by the Metropolitan Washington Council of Governments. The biologist will also assist the H&H engineers in developing concept designs for projects that will address the specific causes of watershed problems, restore habitat, and improve the functioning of the ecosystem.

The primary sponsor's biologist will estimate the habitat and water quality benefits that would be provided by the alternative projects . Existing habitat assessment scores will be compared

to projected habitat assessment scores. The additional amount of pollutants that will be removed by proposed stormwater wetlands will be estimated using the Screening-Level Model for Estimating Pollutant Removal by Wetlands or a similar method. Fish and wildlife species that would benefit from the projects will also be identified.

The primary sponsor's biologist will provide an account of the biological investigations and an analysis of their results to include a characterization of the existing and future conditions, problem areas, potential project benefits, and the significance of those benefits. A Federal biologist will review the biological findings, provide policy guidance, and assist with identifying alternative projects.

The biological studies will require 1,580 hours of sponsor labor, $104,000 for monitoring stations and data collection, and 434 hours of Federal effort.

b) Recreation

The team environmental planner will coordinate with the study sponsors and determine the impacts of proposed projects (21 assumed) on recreation. The significance of those impacts will be evaluated in terms of the recreational demands of the local communities. Specific opportunities to combine environmental restoration and recreation projects will also be identified for the recommended projects (12 assumed). Recreational projects that would reduce the environmental outputs of the recommended projects will be discouraged. Though this study may identify recreational benefits, plans to be formulated are intended to provide environmental outputs. Therefore, recreational benefits will be considered incidental and not quantified. The team environmental planner will provide an account of recreational impacts and opportunities and include a discussion of their significance.

The recreational studies will require 48 hours of Federal effort and 34 hours of sponsor labor.

c) Aesthetics

The team landscape architect and Maryland National Capital Park and Planning Commission will evaluate the aesthetic impacts of the proposed projects and work with civic, advisory, and neighborhood groups to develop aesthetically acceptable project designs. This will require 144 hours of Federal effort and 56 hours of sponsor effort.

d) National Environmental Policy Act Compliance

The team environmental planner will ensure that the environmental requirements of the National Environmental Policy Act, Clean Water Act, Endangered Species Act, Clean Air Act, U.S. Fish and Wildlife Coordination Act, Farmland Protection Policy Act, and National Pollutant Discharge Elimination System Act are addressed and that information on the environmental impacts of the recommended projects is provided to other agencies and the public. The environmental planner will document the NEPA process for inclusion in the study report. This will require 204 hours of Federal effort.

The environmental studies sub-account will require 830 hours of Federal effort, 1,670 hours of sponsor effort, and $104,000 for monitoring stations and data collection. The resulting subtotal for this sub-account is $303,700.

5. Hazardous, Toxic, and Radioactive Waste Studies (Subaccount 22L)

The Hazardous, Toxic, and Radioactive Waste (HTRW) specialist will conduct HTRW investigations in accordance with guidance provided in ER 1165-2-132. The investigations will identify the existence of, or potential for, HTRW contamination on lands in the study area and qualitatively evaluate the risk each potential HTRW source may present to proposed restoration activities. The investigations will be conducted in two phases. The first phase will

consist of using available information to identify known HTRW sites within the Northwest Branch watershed. In general, sites identified as having a potential for HTRW contamination will be excluded from consideration as potential project sites. Once alternative project sites are selected for further study, present and past maps, aerial photos, and community records for those sites will be reviewed; visual site surveys will be conducted; and land owners and knowledgeable individuals will be interviewed. If it is determined that there is no suspected HTRW problem, the investigation and findings to support this determination will be clearly indicated in the feasibility report. If, on the other hand, it is determined that there is a potential HTRW problem, regulatory agencies will be notified, and the site will be dropped from consideration as a potential project site. The HTRW specialist will provide an account of the HTRW investigation and a map which identifies the location of the known, reported, or suspected HTRW sites.

This sub-account will require 232 hours of Federal effort and $5,000 of contracts for a sub-total of $23,050.

6. Cultural Resources Studies (Subaccount 22D)

Section 106 of the Historic Preservation Act of 1966 requires Federal agencies, or project sponsors seeking Federal funding and/or permits, to conduct cultural resource surveys to locate, identify, and evaluate historic and prehistoric resources in advance of project approval. The team archeologist, with assistance from the study sponsors, will conduct cultural resource investigations after specific restoration sites have been identified. The investigations will consist of literature reviews, disturbance surveys, and field investigations, when warranted. In general, sites identified as having potentially important cultural resources will be excluded from further consideration as potential project sites.

The cultural resource investigations will be conducted in a phased approach. Step 1 will consist of collecting information from regional histories and historic maps to identify known cultural site locations in the Northwest Branch watershed. In general, sites identified as having a potential for containing significant cultural resources will be excluded from consideration as potential project sites. A thematic model and maps will be developed to identify zones to be excluded from consideration. Step 2 will use this model to review an assumed 21 proposed alternative projects, identify any projects that could affect cultural resources, and make site specific recommendations. Step 3 will involve the field survey of recommended project sites which have potential cultural resources. It is anticipated that 12 project sites will require a field survey. The survey will not consist of subsurface testing, but will include a walk-over and an inspection of exposed surfaces. Step 4 will consist of field testing areas of recommended project sites with the potential to contain cultural resources. Field testing will be conducted at the Phase I level, and consist of randomly placed shovel tests. Comprehensive documentation of these results will be provided to the SHPO for Section 106 consultation and review. No Phase II site evaluation will be conducted.

The Advisory Council on Historic Preservation and the Maryland State Historic Preservation Officer will be consulted to ensure compliance with the National Historic Preservation Act and the Maryland Comprehensive Historic Plan. The archeologist will provide and account of the cultural resource investigations, a map which identifies the location of the known, reported, or suspected cultural sites, and recommendations for the appropriate treatment of cultural resources on proposed project sites.

This sub-account will require 232 hours of Federal effort and 40 hours of sponsor effort for a sub-total of $21,250.

7. Surveys and Mapping (Subaccount 22N)

Surveys will be performed at recommended project sites. Streambed and water surface profiles, cross sections, and topographic data for alternative project sites will be defined in digital format for use with HEC-2, CADD, and GIS. Survey data will be taken to establish cross sections and streambed and water surface profiles along the entire length of stream restoration sites. Cross section shots will be taken as needed and shall extend to top of high bank. Profile elevation shots will be taken at intervals of 100 feet or less. Topographic data will be obtained at stormwater management facility sites that have no existing detailed topographic data and at stream restoration sites that require major reconfiguration. As-built information for existing stormwater management facilities will be verified. The topographic data will be provided with 1' contours and spot elevations as necessary. Topographic data will include top of bank, bottom of bank, edge of water, gravel bars, debris dams, structures, improved paths and walkways and any significant topographic or man-made features. The location, type, and size of mature trees, 8" caliper or greater at breast height, will be shown. Any utility structures will be shown with a description.

The study team will use sponsor Geographic Information System (GIS) capabilities to integrate and expand the current extent of water resource evaluations. The team GIS specialist will provide assistance with developing a hydrologic model of the watershed and use GIS to assist the study team in assessing problems, formulating and evaluating solutions, and presenting study findings.

The sponsors will provide soils, vegetative, stormwater drainage system, property ownership, impervious area, and zoning mapping in digital format. Additional sources of data will be investigated after the National Geospacial Data Clearinghouse is checked to ensure that data gathering efforts are not being duplicated. The GIS mapping specialist will obtain topographic, wetland, HTRW site, cultural site, and forestation mapping, and develop unstable stream channel, degraded habitat, fish barrier, floodplain, and substandard water quality mapping. GIS data will be evaluated and adjusted so that it is registered accurately to other data sets in the database. The proprietaries of all GIS data generated during this study will be Montgomery County, Maryland National Capital Park and Planning Commission, and the Army Corps of Engineers.

The GIS specialist will provide disks containing and map overlays displaying all GIS information generated under this study.

This sub-account will require 560 hours of Federal effort, 100 hours of sponsor effort, and $5,000 of contracts for a sub-total of $172,200.

8. Real Estate Studies (Subaccount 22H)

The real estate specialist will develop preliminary cost estimates for approximately 21 alternative projects sites in order to assist the study team in selecting projects for recommendation. It is assumed that 45 percent of the project sites will require the acquisition and/or use of private property. Available information will be used to predict the impact of the proposed alternatives on property values in the vicinity of the project sites.

The real estate specialist will prepare maps showing the potential lands, easements, rights-of-way, and temporary work areas/staging areas required for the recommended projects. These maps will be superimposed on the project site plans. A gross appraisal which will provide a detailed estimate of all real estate costs associated with the acquisition of real property interests will also be prepared.

The real estate specialist will prepare a real estate plan (REP) that will describe the real estate requirements for the recommended projects. 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 property required, PL 91-646 relocation payments, the sponsors' administrative costs to accomplish the project's real property requirements, and the Corps' administrative costs to assist and monitor the sponsors' 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. A detailed acquisition schedule will also be developed and included in the REP.

The real estate specialist and sponsors will draft a project cooperation agreement (PCA) for the construction of selected alternatives. The PCA is a legally binding agreement that sets forth the terms of the relationship between the Federal government and the sponsors for construction, operation, and maintenance of projects approved through the feasibility process.

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

The real estate specialist will provide the cost estimates, maps, gross appraisal, REP, and draft PCA for inclusion in the feasibility report.

This sub-account will require 440 hours of Federal effort and 32 hours of sponsor effort for a

sub-total of $30,100.

9. Geotechnical Investigations (Subaccount 22K)

This task will consist of providing technical design assistance for stream restoration and SWM facility retrofits and providing detailed designs for the embankments required to construct SWM facilities. The team geotechnical engineer will be responsible for foundation exploration and testing to the extent necessary to assess the foundation at one recommended SWM facility project site. It is assumed that 2 new SWM facilities will be recommended and that 4 borings will be required at one of the two sites. The amount of drilling and testing necessary will depend on the size of the proposed embankment and the anticipated complexity of the foundation. The estimate provided assumes an embankment height of about 20 feet. Options for the least disruptive embankment designs will be considered. Based on the results of the foundation exploration program, and utilizing Corps and/or local design criteria, an embankment will be designed, and typical sections and a geologic profile will be provided for inclusion in the report.

This sub-account will require 759 hours of Federal effort and $23,000 worth of drilling and testing for a sub-total of $79,800.

10. Design and Cost Estimates (Subaccount 22P)

This subaccount includes the development of designs, plates, and quantity estimates, as well as, abbreviated cost estimates for alternative projects, final cost estimates for recommended projects, cost estimates for average annual project operation and maintenance, and cost estimates for project pre-construction engineering and design.

a) Design

The design cost estimate is based on the following project assumptions:

- All streambank restoration projects are assumed to be 5,000 linear feet in length and 40 feet wide on each side of the stream.
- All new stormwater management ponds are assumed to be 2 acres in size.
- All stormwater management pond retrofits are assumed to be 1 acre in size.
- It is assumed that 8 preliminary conceptual designs for stream restoration, 5 preliminary conceptual designs for new stormwater management ponds, and 8 preliminary conceptual designs for stormwater management pond retrofits will be prepared.

- It is assumed that 5 detailed designs for stream restoration, 2 detailed designs for new stormwater management ponds, and 5 detailed designs for stormwater management pond retrofits will be prepared.

The team design engineer will refine alternative project design sketches, so as to describe the proposed projects in enough detail to obtain a reasonable preliminary cost estimate. The design engineer will prepare detailed designs for the recommended projects up to a 65% completeness level. Cost estimate quantities will be calculated for each alternative and recommended project.

This sub-account will require 2,490 hours of Federal effort for a sub-total of $212,500.

b) Cost Engineering

The team cost engineer will prepare reconnaissance-level cost estimates for each alternative design. Unit costs for miscellaneous construction items will be based on historical cost data that is available and will be adjusted to meet the needs of the current site conditions.

The cost engineer will prepare a detailed feasibility-level cost estimate for the 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). 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 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.

This sub-account will require 280 hours of Federal effort for a sub-total of $22,400.

11. Economic Analyses (Subaccount 22G)

Work identified under this subaccount will be performed by the team economist.

a) National Economic Development Benefit Evaluation (NED)

As stated in Engineering Circular (EC) 1105-2-210, dated 1 June 1995, measures to restore

ecosystem resources "do not need to exhibit net NED benefits." At the same time, the circular states in paragraph 7.c. that "planners must continue to remain aware of opportunities to also contribute to NED when formulating plans for ecosystem restoration." What this means is that although the monetary values of outputs from restoration will not be used to determine project feasibility, they can be useful in describing the significance of the resources involved in the restoration.

b) *Economic Analyses*

Cost effectiveness and incremental cost analyses will be used by the team economist to evaluate environmental restoration project alternatives. The purpose of the analyses is twofold: 1) to ensure that the economically efficient, least cost solution is identified for each possible level of environmental output, and 2) to produce a comparison of the changes in costs associated with increasing levels of outputs that will allow the study team to make informed decisions on project recommendations. The cost effective and incremental cost analyses will not be used to determine the selection of project sites. Instead, the analyses will be part of the decision-making process to select environmental alternatives at identified project sites. The analyses will require environmental outputs and implementation costs for each alternative in the study resource objective category. In order to determine the expected project outputs, the team economist must coordinate with the team H&H engineer, biologist, environmental planner, and cost estimator.

The cost effectiveness analysis will be performed prior to the incremental analysis in order to eliminate environmental measures which are economically inefficient and ineffective. This process will be accomplished by first determining the outputs and the costs for each environmental measure and combining measures that can be implemented together. Measures will be sorted by level of output and economically inefficient measures, those which have the same level of output as a lower cost measure, will be eliminated from consideration. The remaining measures will be ranked by ascending order of output. Economically ineffective measures, those whose cost is higher than the next successive level of output, will be eliminated. The remaining environmental measures will be identified as the most cost effective for each possible level of environmental output.

The incremental cost analysis will evaluate the "worthiness" of a measure by calculating the change in cost based on the incremental increase in the level of output. This process will be accomplished by sorting the least cost, economically efficient measures which were determined in the cost effectiveness analysis in ascending order by level of output. Average costs for each of the measures will then be calculated and analyzed using the environmental measure with the lowest average cost as the "baseline" and calculating the additional costs of all other measures against its cost. The measure with the lowest average cost for additional output will be determined. Measures with levels of output less than the lowest average cost level will be eliminated.

The follow-on analysis will be iterative. In each iteration the measure with the lowest cost per output in comparison with the base measure becomes the base measure in the succeeding iteration. In each iteration, measures preceding the lowest cost measure in the table are eliminated from the remaining measures because the average cost is greater than, and the unit yield lower than, the lowest cost measure. The lowest cost measure in each iteration is retained for further analysis in the incremental analysis. These lowest cost measures will be retained for the final incremental analysis computations. Measures with less output will be eliminated, and the iterative elimination process will end when the final level of output is identified as the lowest cost measure.

The lowest cost measures that were retained from each iteration will be sorted by output in ascending order, and the difference in cost per output unit gained (the incremental cost) will be computed. The difference in cost from one measure to the next highest output measure will be divided by the gain in output units between the two measures. The resulting amount will be a quantitative assessment of the incremental or additional cost per output unit to increase output from one remaining measure to the next highest output measure. The results of this analysis will be presented in tabular/graphic form in order that it can be used as a decision-making tool. The table will show that the incremental costs increase from least to greatest as output in environmental units is gained.

Although the cost effectiveness and incremental analyses will not provide the study team with the means to make a definitive project decision, the analyses will provide the study team with the data to make an informed decision. Once the environmental measures have been analyzed and the outputs have been arranged according to their incremental costs, the study team can refer to the study goals and objectives to determine which levels of output are "worth" the additional costs. The analyses will conclude with a written justification supporting the selection of certain projects for recommendation.

The economist will provide a display of project outputs and costs in table format, a display of incremental costs in graph format, and an account of the economic analyses which identifies the most economical combination of projects.

This sub-account will require 270 hours of effort for a sub-total of $22,700.

12. Socio-Economic Analysis (Subaccount 22C)

Work under this subaccount will be conducted by the team sociologist and include development and documentation of baseline demographic data in the study area and the affected county under existing conditions, as well as projections of future conditions both with and without project implementation. This assessment will draw upon data gathered during the Phase 1 feasibility report, updated and supplemented by data available from local, regional, state, and Federal agencies. Demographic data parameters presented in the report will include, but will not be limited to: population; age and gender profiles; employment and

unemployment data; household information; and land use development.

Work under this subaccount also will include identification of social impacts likely to result under with project and without project scenarios. This assessment will consider and compare social benefits or drawbacks of the existing conditions (without project) with the proposed plans from both a technical perspective and a perceived citizen perspective, based on study correspondence, public involvement, and media coverage of the study. Social resources that could be affect include, but are not limited to: population, land use, community development, economic and employment opportunities, health, and safety.

The sociologist will provide an account of the existing and projected future social conditions with and without project implementation for inclusion in the study report.

The socio-economic analysis subaccount will require 42 hours of efforts for a sub-total of $3,500.

13. U.S. Fish and Wildlife Service Studies (Subaccount 22F)

As per the Fish and Wildlife Coordination Act (FWCA), the environmental planner will actively coordinate with the U. S. Fish and Wildlife Service (USFWS) throughout the study. The only product requested from USFWS will be the preparation of a draft and final Fish and Wildlife Coordination Act (FWCA) report , as per Section 2(b) of the FWCA. The FWCA report will include the Section 7 consultation of the Endangered Species Act (ESA). The FWCA report will be included as an appendix to the feasibility study report.

This sub-account will require 123 hours of Federal effort for a sub-total of $9,500.

14. Financial Capability Assessment (Subaccount 22B)

Work under this subaccount will include the primary sponsor's preparation of project financing plans and statements of financial capability, as well as the team financial analyst's assessment of the primary sponsor's financial capability. These financial documents and analysis are required in accordance with Corps of Engineers guidance contained in Engineering Regulation 1105-2-100, Chapter 6, Section XIV, 28 December 1990.

a) Sponsor Financing Plans

The primary sponsor will prepare a financing plan, providing clear and convincing information about how financial obligations for the project will be met, in accordance with the project construction funding and operation and maintenance schedules. The purpose of the financing plan is to reduce the risk that the sponsor will lack sufficient funds to allow completion of the project, after construction has been started, and to reduce the risk that the sponsor will be unable to afford required project maintenance following construction

completion.

The sponsor will prepare a preliminary financing plan for submission to Corps of Engineers Headquarters, along with the draft Feasibility Report. The financing plan can be prepared in letter report format, using copies of sponsor financial documents as attachments. Project construction and operation and maintenance cost data, including the funding schedule, will be provided to the sponsor by the Corps of Engineers study manager immediately following completion of the Corps M-CACES project cost estimate. The financial analyst will also provide the sponsor with a sample financing plan, and detailed guidance regarding financial data requirements for inclusion in the plan.

In general, the financing plan must include the following information:

● A current schedule of estimated Federal and non-Federal expenditures by Federal fiscal year (October - September). This schedule should include Federal expenditures; non-Federal cash contributions; and non-Federal lands, easements, rights-of-ways, relocations, and disposal areas (LERR&D) broken out by Federal fiscal year. The total Federal and non-Federal share of project costs displayed in the schedule will reflect current Corps of Engineers cost-sharing policy, and Corps of Engineers cost data as presented in the draft Project Cooperation Agreement and the Corps M-CACES cost estimate.

● 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.

● An explanation of the method of finance for all non-Federal outlays including operation and maintenance expenditures associated with the project.

b) Statement of Financial Capability

The sponsor is required to provide a statement of financial capability. The team financial analyst will provide the sponsor with a sample statement of financial capability. The statement must provide evidence of the sponsor's authority to utilize the funding source(s) identified in the sponsor's financing plan. The statement must also provide information on the sponsor's capability to obtain remaining funds, if any. The information must be presented at a level of detail sufficient to demonstrate the sponsor's financial capability for the projects recommended in the feasibility study, and will vary depending upon the methods the sponsor uses to finance the project and obtain remaining funds.

If the sponsor will rely on its full faith and credit to obtain remaining funds (i.e., general obligation bonds, appropriations, or a repayment agreement), the statement of financial capability must include a credit analysis demonstrating that the sponsor is credit worthy for the required amount and purpose.

If the sponsor will rely on non-guaranteed debt (e.g., a particular revenue source of limited tax, or bonds backed by such a source) to obtain remaining funds, the statement must include an analysis that demonstrates that the projected revenues or proceeds are reasonably certain and are sufficient to cover the sponsor's stream of costs through time.

If the sponsor will rely on third party contributions, the statement must include comparable data for the third party together with evidence of its legal commitment to the sponsor.

c) Corps of Engineers Assessment of Financial Capability

The financial analyst will prepare a detailed assessment of the sponsor's financial capability, based on the sponsor's initial draft financing plans and statements of financial capability. The purpose of this assessment is to determine whether it is reasonable to expect that ample funds will be available to satisfy the sponsor's financial obligations for its project. The assessment will give consideration for the certainty of revenue sources and method of payment, as well as for the overall financial position of the sponsor.

This sub-account will require 96 hours of Federal effort and 96 hours of sponsor effort for a sub-total of $15,800.

15. Report Preparation (Subaccount 22S)

The team study manager will be responsible for assembling, writing, reviewing, editing, revising, reproducing, and distributing the study report. The feasibility report will document the technical findings, plan formulation process, and study conclusions. The feasibility report and Environmental Impact Statement will be integrated. Report appendices will include supporting technical information, sponsor financial capability statements and financing plans, and a project management plan. The study sponsors will review and comment on the content of the report.

This sub-account will require 285 hours of Federal effort, 80 hours of sponsor effort, and $7,500 of printing costs for a sub-total of $37,800.

16. Study Management (Subaccount 22O)

The study manager will be responsible for coordinating study tasks, coordinating with Federal, state, regional and local agencies, developing a quality control plan, leading the plan formulation process, preparing study correspondence, presenting study findings and recommendations, and preparing the feasibility report. The study manager and design manager will ensure that all applicable policy and regulations are followed. The design manager will be responsible for managing the Engineering Division contribution to the feasibility study. This includes coordinating and monitoring technical evaluation of the alternatives; assuring that the level of detail for the engineering studies and field

investigations comply with the PSP, EC 1110-2-268, dated 1 Jul 1991, and ER 1110-2-1150 (31 March 1994) as amended by CECW-EP memorandum dated 31 May 1995; monitoring and evaluating refinement of the project features and baseline cost estimates; developing a design and construction schedule; providing support to the Project Manager in presenting study findings and recommendations to the public; and assisting the Project Manager developing the Project Management Plan (PMP) for the subsequent phase of investigation.

Work effort under this subaccount assumes a minimum of three meetings of the feasibility study Executive Committee and monthly progress reports by telephone or by meetings between the Study Manager and the sponsors' counterparts. In addition, there will be an in-progress review (IPR) meeting held during the 13th month of the study and a feasibility resolution conference (FRC) held during the 32nd month of the study. The sponsors will attend study team meetings, be responsible for management of the in-kind work to be provided under other subaccounts, and provide monthly progress reports to the study manager for all tasks performed as in-kind services.

This sub-account will require 504 hours of effort from the study manager, 456 hours of effort from the design manager, and 281 hours of sponsor effort for a sub-total of $105,900.

17. Technical Review (Subaccount 22U)

Work under this subaccount includes quality control activities and technical review of the study report by Planning Resources Branch staff. Quality control activities include reviewing the Project Study Plan, Quality Control Plan, Plan Formulation Document, and draft and final reports. Other activities include participating in the In-Progress Review Conference, Planning Board meetings, and Feasibility Review Conference.

The technical review of the feasibility report will focus on compliance with established policy, principles, and procedures. The following will be examined:

1) Assumptions;
2) Methods, procedures, and material used in plan formulation;
3) Alternatives evaluated;
4) Appropriateness of data used to evaluate the alternatives; and
5) Reasonableness of the report conclusions, including whether the recommendations meet the sponsors' needs consistent with law and existing public policy.

A Quality Control Report (QCR) will be prepared that includes all technical review comments with responses and actions and the executive level certification that the review process has been conducted in accordance with the QCP and other pertinent regulations and guidelines.

This sub-account will require a Federal effort amounting to $30,000.

18. Project Management (Subaccount 22T)

The team project manager will provide overall management of the project from planning through design and construction. This subaccount includes costs for macro-level management of the feasibility study. Work tasks under this account include: managing study scope, schedule, and budget; monitoring study performance relative to PSP network schedule; preparing and reviewing budgetary documents; developing and negotiating study schedule and cost change requests; developing a Project Management Plan; participating in public meetings, meetings with the sponsors, other agencies, and Corps higher authority staff; resolving potential or existing study issues; preparing monthly Project Executive Summary reports and reporting study progress at Corps of Engineers Project Review Board meetings and meetings with the sponsors; and coordinating with the Corps of Engineers Headquarters, Division offices, and sponsor. The sponsors will provide project management direction for their respective projects, including coordination, negotiation of the construction PCA, budget preparation, and participation in development and negotiation of the Project Management Plan.

This sub-account will require 1,004 hours of Federal effort and 192 hours of sponsor effort for a sub-total of $114,800.

D. Cost

The cost estimate for the feasibility study of the *Anacostia River and Tributaries (Phase 2) Feasibility Study* is $1.92 million. The sponsors will provide in-kind service with an estimated value of $480,000 and a cash contribution of $480,000. The in-kind service will include 3,529 hours of effort described under public involvement, financial capability assessment, cultural studies, biological studies, recreation, real estate, surveys and mapping, study management, plan formulation, report preparation, and project management sub-accounts. The primary sponsor will lead the public involvement and biological studies activities and obtain storm drain mapping, monitoring, and visual information worth $174,800.

Study sub-total cost	$1,828,500
Contingency/Escalation @ 5%	+ 91,500
Estimated Total Cost (Rounded)	$1,920,000
Non-Federal Cash	$ 480,000
Non-Federal In-Kind Service Credit	+ 480,000
Non-Federal Share (50%)	$ 960,000

E. Organization

The study organization, roles, and authorities are as follows:

1. Executive Committee

As indicated in Article IV of the Feasibility Cost-Sharing Agreement (FCSA), overall study management is the responsibility of the Executive Committee, which is comprised of the Baltimore District Engineer; the Chief of Programs and Project Management Division; the Chief of Planning Division; Director, Department of Environmental Protection, Montgomery County; and Chairman, Maryland National Capital Park and Planning Commission (or their representatives). The Executive Committee will meet periodically throughout the study to review study progress, finances, and findings as developed and reported by the study team. The Chief of Project Development Branch, Baltimore District, will act as alternate for the Chief of Planning Division while also serving as liaison to the study team. The committee will appoint appropriate representatives to serve on the study team.

2. Study Team

The study team is responsible for accomplishment of the study in accordance with the FCSA, PSP, and appropriate Federal and State guidance and regulations. The study team will regularly meet to coordinate on study progress, interim findings, financial status, and all matters related to conduct and completion of the study.

The study team is composed of representatives from the Baltimore District Programs and Project Management Division, Planning Division, Engineering Division, Real Estate Division, Operations Division, and Construction Division. Representatives of Montgomery County and Maryland National Capital Park and Planning Commission are also included as part of the study team.

The study team has the responsibility of technical project management, plan formulation, and development of the feasibility report. A technical manager (TM) will be assigned as the representative of each of the technical divisions. Individual elements are responsible for developing scopes of work, negotiating contracts, and reviewing work to be completed by consultants or other Federal agencies. The development of a timely, quality product within the established task budget is the responsibility of the TM, and ultimately, of the project manager (PM).

The sponsors will be involved in all aspects of the feasibility study to ensure that they agree with the findings of the study. The Corps will fully coordinate with the sponsors for their experience and expertise concerning certain issues. They will attend progress meetings and public workshops, participate in the plan formulation process, and review the reports. The in-kind services that the sponsors are responsible for are described in this PSP.

F. Schedule

The schedule for the feasibility study is expected to cover 36 months, including a public review period. Development of a firm schedule for the *Anacostia River and Tributaries (Phase 2) Feasibility Study* will be part of the negotiations leading to a final FCSA. The feasibility study initiation date is scheduled for August 1996. The feasibility study can begin only after negotiation and signature of the FCSA, and receipt of both Federal and non-Federal funds. This PSP reflects Baltimore District capability. The preliminary milestone schedule assumes that funding for the study is provided as required to effectively accomplish the study. A preliminary schedule of project tasks is shown in Figure 2.

Milestone	*Action*
Aug 96	Execute Feasibility Cost Sharing Agreement (FCSA) with the Sponsors
Aug 96	Study Initiation Meeting (P3)
Feb 98	Formulation Briefing (P4)
Mar 98	Formulation Analysis Approval (P5)
Oct 98	Division Receives Draft Feasibility Report/Environmental Impact Statement (P6)
Nov 98	Feasibility Resolution Conference (FRC)
Dec 98	Division Approves Draft Feasibility Report (P7)
Mar 99	Division Receives Final Feasibility Report/Environmental Impact Statement (P8)
Mar 99	Division Engineer's Public Notice (P9)