US Army Corps
Of Engineers®
Charleston District

Project Management Plan

Lumber River Basin Flood Risk Management Feasibility Study

Project P2# 488285

A Partnership of
the U.S. Army Corps of Engineers and
the North Carolina Department of Environmental Quality

CHANGE MANAGEMENT TABLE			
Original PMP Revision #	*Description & Location within PMP of Revision*	*Date*	*APPROVED BY*

PMP ACCEPTANCE SHEET

I have reviewed this document and certify that it contains accurate content and is sufficient to guide project execution.

ROBBINS.NOVA.L.1157288853 Digitally signed by ROBBINS.NOVA.L.1157288853
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Jonathan M. Jellema, District Counsel Date

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About this Project Management Plan:

The Project Management Plan (PMP) provides a summary of tasks required to complete the Lumber River Basin Flood Risk Management Feasibility Study (the study) It includes schedule and cost information, as well as documents revisions / updates to the PMP over the course of the study. This PMP is one of three concurrent basin studies being executed within the state of North Carolina. In order to maintain consistent management across these studies a Program Management Plan (PgMP) has been developed for the Neuse, Lumber and Tar-Pamlico River Basins. This PgMP contains required sections that are consistent between these three studies including; Critical Assumptions and Constraints, Change Management, Value Engineering, Communications, Risk Management, Quality Management, Acquisition Strategy, Occupational Safety and Health, Data Management Plan, and Project Closeout.

The scope and scale of tasks within the PMP are developed based on the decisions to be made during the study and the Project Delivery Team's (PDT's) use of available management and decision-making tools, such as Decision Management Plans (DMPs) and Risk Registers (RRs).

The PMP is a living document, revised as key study decisions are made that shape the tasks and level of detail of the study, no less frequently than each milestone in the study. The first PMP developed will, by necessity, have less detail on tasks to be completed after initial decision points and milestones, including the selection of a tentatively selected plan / recommended plan. As the PMP is revised, it will provide updates of tasks that have been completed to date and additional tasks required to complete the feasibility study analysis and report.

The non-Federal sponsor and the U.S. Army Corps of Engineers (USACE) acceptance of the task descriptions, and time and cost estimates addressed in this PMP constitute agreement of the PMP overall, with the understanding that more detail will be provided for future tasks and milestones as the study progresses.

The information contained in this PMP will also be used to update appropriate budgetary and other related documents for the feasibility study.

Abbreviations & Acronyms:

ACWP	Actual Cost of Work Performed
BAC	Budgeted Cost at Completion
BCWP	Budgeted Cost for Work Performed
BCWS	Budgeted Cost for Work Scheduled
CEFMS	Corps of Engineers Financial Management System
CMP	Change Management Plan
CPI	Cost Performance Index
CV	Cost Variance
DMP	Decision Management Plan
EA	Environmental Assessment
EAC	Estimated Cost at Completion
ESA	Endangered Species Act
EIS	Environmental Impact Statement
ER	Environmental Regulation
EVM	Earned Value Management
FCSA	Feasibility Cost Sharing Agreement
FY 19	Fiscal Year 2019
GDP	Geospatial Data Management Plan
HUC	Hydrologic Unit Code
SAC	South Atlantic Charleston District
SAD	South Atlantic Division
SAS	South Atlantic Savanah District
SAW	South Atlantic Wilmington District
SEB	Senior Executive Board
LRH	Great Lakes and Ohio Huntington District
NCDEQ	North Carolina Department of Environmental Quality
NEPA	National Environmental Policy Act
P2	Project Management Information System
PCR	Project Change Request
PDT	Project Development Team
PMBP	Project Management Business Process
PMP/PgMP	Project Management Plan
QMS	Quality Management System
SPI	Scheduled Performance Index
SV	Schedule Variance
USACE	United States Army Corps of Engineers

1. Project Scope

1.1 Background and Objectives

The North Carolina study area begins in the Sandhills eco-region, south of Biscoe in Montgomery County, and extends southeast through Lumberton and Boardman, before reaching the South Carolina border near Fair Bluff. The North Carolina study area extends beyond the North Carolina border into South Carolina until the Lumber River meets the Little Pee Dee River, below Nichols, South Carolina. The basin covers about 1750 square miles and encompasses all or part of 9 counties in North Carolina and 1 county in South Carolina. The communities of Lumberton, Fair Bluff and Boardman, NC and Nichols, South Carolina have a history of riverine flooding that occurs from rainfall during storm and hurricane events. These communities were severely impacted by Hurricanes Matthew (2016) and Florence (2018), when rainfall from these large storm events caused widespread flooding that resulted in damage to residential and commercial buildings and roadways, including the 3 week closure of a 60 mile stretch of Interstate 95 in 2016.

In response to recent flooding that occurred as a result of Hurricanes Matthew (2016) and Florence (2018), North Carolina received funding through the 2019 Additional Supplemental Appropriations for Disaster Relief (H.R. 2157) for a feasibility study to assess and recommend actions that reduce flood risk and increase resiliency within the Lumber River Basin. An initial scoping charrette held on 20 May, 2020 that included members of the USACE study team and the non-Federal sponsor (N.C. Department of Environmental Quality; NCDEQ) and other key stakeholders (N.C. Department of Transportation) resulted in the development of the following study objectives:

- Reduce damage to structures (residential, non-residential) and public infrastructure (critical infrastructure) throughout the study basin over the period of analysis;
- Reduce economic damages to industries (e.g., agriculture) and commerce throughout the study basin over the period of analysis;
- Reduce life and safety risk associated with inundation of structures (residential, non-residential, and critical facilities) and public infrastructure throughout the study basin throughout the basin over the period of analysis;
- Reduce life and safety risk associated with inundation of and damage to transportation infrastructure throughout the basin over the period of analysis.

The Lumber River Basin Flood Risk Management Feasibility Study will seek to meet the above objectives for both major population centers and rural areas within the study area through the development and comparison of alternatives that include structural, non-structural, and natural/nature-based flood risk management measures.

1.2 Study Authorization

The Lumber River Basin Flood Risk Management Feasibility Study (is an interim response to Senate Committee on Public Works Resolution adopted October 15, 1968; House Committee on Public Works Resolution adopted December 11, 1969;

> *"Resolved by the Committee on the Public Works of the United States Senate [House of Representatives], that the Board of Engineers for Rivers and Harbors [Act approved in June 13, 1902], is hereby requested to review the report of the Chief of Engineers on the Yadkin-Pee Dee River*

and its Tributaries, North Carolina and South Carolina,…with a view to determining the advisability of modifying the recommendations contained therein, with particular reference to providing flood protection on the Lumber River and its Tributaries…"

The study was included in the 2019 Additional Supplemental Appropriations for Disaster Relief (H.R. 2157).

1.3 Study Area

The Lumber River Basin is a sub-basin of the Pee Dee River Basin. The Lumber River Basin exists primarily within the borders of North Carolina, with a small portion of the drainage area and stream length within South Carolina. The headwaters of the river are composed of the Drowning Creek drainage area, in Montgomery, Moore, and Richmond Counties in the north eastern Sand Hills region. Drowning Creek becomes the Lumber River approximately 8 miles downstream of Moore and Richmond Counties and 3 miles into the Coastal Plain region, forming the border of Hoke and Scotland Counties. The river then continues through Robeson County, and forms the Robeson and Columbus County border before its confluence with the Little Pee Dee River, approximately 10 miles downstream into South Carolina. While the Pee Dee drains to the Winyah Bay, the study area for this interim study has been limited to the entirety of the 8-digit Lumber River sub-basin, Hydrologic Unit Code (HUC) 03040203, including all associated tributaries, which is 1,753 square miles.

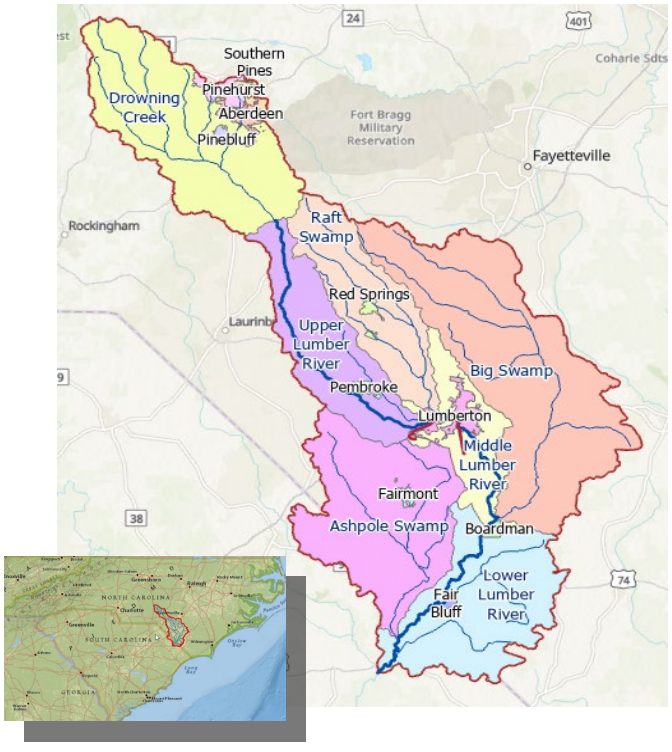

Figure 1. Location of the North Carolina study area.

1.4 Scope Management Plan

The project scope for the study will be monitored by the project manager and guided by continual review of the schedule and budget, as well as by regular communications with the study team and the non-Federal sponsor. Any changes to the scope will constitute an entry into the USACE Charleston District's change management process.

1.5 Scope Expectation Verification

The study team and the non-Federal sponsor worked together to develop the study scope during a study kickoff meeting held in Raleigh, NC on 6 March 2020 and during the scoping charrette held on 20 May 2020. The study team will verify the study scope, schedule, budget, and quality expectations—as described within this project management plan—at each milestone.

2. Enhanced Project Delivery Team

2.1 Governance Structure.

A three-tiered governance structure has been established in order to achieve needed accountability, visibility, understanding, and timely decision-making. (Table 1). This structure is further defined below (Table 1). This study was assigned to USACE Charleston District (SAC) by the South Atlantic Division (SAD) in coordination with the Wilmington District (SAW). As such, SAC is responsible for the successful execution of the study. Both SAD and SAW remain close coordinating partners and will be briefed on project execution; the three-tiered governance structure resides in SAD.

Senior Executive and Senior Executive Board. The Senior Executive Board (SEB) will consist of the Senior Executive and the SAC District Commander. The Senior Executive is accountable to the Director of Civil Works for study success and will provide guidance and mentoring to the enhanced PDT. The SEB advises the Senior Executive. The enhanced PDT will be held accountable to the project Senior Executive.

Mid-Level Executive Leadership. The Mid-Level Executive Leadership Team includes the SAC Deputy for Project Management, SAC Chief of Design Branch, and SAC Chief of Planning and Environmental Branch. The SAC Deputy for Project Management serves as the leader of this team, which is collectively responsible and accountable for making decisions and applying resources to solve problems that rise above the typical day-to-day management of the project.

Project Leadership Team. The Project Leadership Team consists of the Project Manager, the Lead Planner, and the Project Engineer. It is the responsibility of this team to coordinate project requirements with their functional element leadership and lower-level team members to ensure product delivery in accordance with this PMP.

Table 1. Members of the three-tiered governance structure.

Name	Functional Area	Office Symbol
Senior Executive Board		
Dr. Larry D. McCallister	SAD Regional Programs Director	CESAD-PD

LTC Rachel Honderd	SAC District Commander	CESAC-EO
Eric L. Bush	SAD Chief, Planning and Policy Division	CESAD-PD
Mid-Level Executive Leadership Team		
Lisa Metheney	SAC Deputy for Project Management	CESAC-DDPM
Nancy Parrish	SAC Chief of Planning and Environmental Branch	CESAC-PME
Carol Works	SAC Chief Engineering Division	CESAC-EN
Project Leadership Team		
Nova Robbins	Project Manager	CESAC-PMP
Jami Buchanan	Lead Planner	CELRH
Lindsey Larocque	Project Engineer	CESAC-EN

2.2 Customer Representative.

The non-Federal sponsor is the North Carolina Department of Environmental Quality (NCDEQ). NCDEQ will provide a single point of contact for coordination between the PDT and various state agencies contributing to the overall study effort.

2.3 Project Delivery Team

2.3.1 Current Team Members.

The project delivery team (PDT) represents a multi-disciplinary group of professionals with the expertise required to successfully complete the current feasibility study (Table 2).

Table 2. PDT Members and Contact Information.

Name/Position	Phone Number	E-Mail
Nova Robbins, Project Manager	(843) 329-8096	Nova.l.robbins@usace.army.mil
Nancy Parrish, Chief, Plan and Env	(843) 329-8050	Nancy.a.parrish@usace.army.mil
Susan Horton, Plan Formulation	(843)287-9356	Susan.f.horton@usace.army.mil
Jami Buchanan, Senior Planner	(304) 399-5347	Jami.l.buchanan@usace.army.mil
Steven Yates, Economist	(304) 399-5697	Steven.b.yates@usace.army.mil
Kurt Buchanan	(304) 399-5187	Kurt.l.buchanan@usace.army.mil
Andrea Hughes, Environmental	(843) 329-8145	Andrea.w.hughes@usace.army.mil
Nathan Bryan, Geotechnical Eng	(912) 652-5314	Nathan.h.bryan@usace.army.mil
Thomas Murphy, Civil Engineer	(843) 329-8137	Tom.p.murphy@usace.army.mil
Rico Jenkins, Cost Engineer	(843) 329-8236	Rico.jenkins@usace.army.mil
Mikala Randich,	TBD	Mikala.r.randich@usace.army.mil

Geospatial		
Lindsey Larocque, H&H Engineer	TBD	Lindsey.larocque@usace.army.mil
John Hinely, Realty Specialist	(912) 652-5914	John.s.hinely@usace.army.mil
Brian Choate, Cultural Specialist	(904) 232-1806	Brian.c.choate@usace.army.mil
James F. Choate III, Office of Counsel	(843) 329-8176	James.f.choate@usace.army.mil
Dr. Coley Cordeiro Assistant Director	(919) 717-9013	Coley.cordeiro@ncdent.gov

2.3.2 Roles & Responsibilities

Project Delivery Team: The PDT will coordinate and manage all activities documented in the PMP. The planning team will prepare draft and final reporting documents. The project planning team will conduct all necessary public involvement in accordance with the National Environmental Policy Act (NEPA) and project needs.

Project Manager: The project manager is responsible and accountable for the overall management and leadership of the project. Responsibilities of the project manager include (but are not limited to): coordinating team members and resources as necessary to execute activities outlined in this PMP; managing project scope, schedule, and budget; evaluating progress and providing project reports; ensuring product requirements are met; coordinating with the non-Federal sponsor representatives, and the USACE vertical team.

Project Engineer: The project engineer is responsible for coordinating and overseeing the development and review of engineering documentation in accordance with applicable regulations and USACE guidance. The project engineer will provide structural engineering components to designs and quantities for the various alternatives considered. The project engineer will communicate technical information and issues with the PDT between the project planning team and project manager.

Project Planner: The project planner will coordinate and manage all activities documented in the PMP. The planning team will prepare draft and final reporting documents. The project planner will oversee execution of all necessary public involvement in accordance with the National Environmental Policy Act (NEPA) and project needs.

Civil Engineer: The civil engineer is responsible for producing designs and quantities for civil engineering components of the various alternatives considered. The civil engineer will support the project engineer in project engineer in development and review of technical documentation.

Geotechnical Engineer: The geotechnical engineer is responsible for ensuring the geotechnical portions of the design conform to all relevant regulations and USACE guidance. The geotechnical engineer will review all existing geotechnical information and develop necessary design assumptions. The geotechnical engineer will assist the PDT in alternative development and support the project engineer in development of technical documentation.

Cost Engineer: The cost engineer is responsible for developing estimated costs for identified alternatives. The cost engineer will prepare a working estimate for construction of the government-preferred alternative. The cost engineer will support the project engineer in development of technical documentation.

Hydrology & Hydraulics Engineer: The hydrology & hydraulics engineer is responsible for modeling hydrologic and hydraulic conditions and characteristics under current conditions and in response to project alternatives. The hydrology & hydraulics engineer will support the engineering team in development and review of technical documentation.

Economist: The economist will be responsible for determining Federal interest in the proposed project. This will involve calculating damage cost estimates associated with future flood events, as well as cost benefit ratios associated with both structural and non-structural flood risk mitigation alternatives. The economist will also be responsible for calculating life safety risk for current conditions and with project conditions. The economist will develop and refine the documentation of their analysis for the feasibility report.

Environmental Specialist: The environmental specialist will be responsible for ensuring the project is completed in accordance with Federal environmental laws and regulations. The environmental specialist will work with local natural resource agencies to identify, characterize, and document environmental resources (e.g., threatened or endangered species, wetland habitats) and hazardous, toxic, or radioactive wastes potentially impacted by the project. The environmental specialist will consult with appropriate Federal agencies to ensure NEPA compliance, as well as compliance with all relevant laws and regulations (e.g., Endangered Species Act). The environmental specialist will develop necessary environmental documentation (i.e., Environmental Assessment or Environmental Impact Statement) and work with translators to translate final documents to facilitate the public review process.

Cultural Specialist: The cultural specialist will be responsible for ensuring the project is completed in accordance with Federal environmental laws and regulations governed by Section 106 of the National Historic Preservation Act. Additionally, the cultural specialist will coordinate with the State Historic Preservation Officer (SHPO) and will work as a liaison with the identified tribes that may have an interest in the study.

Geospatial Specialist: The geospatial specialist will compile all existing geospatial data and information for the project area. The geospatial specialist will create detailed maps of project reach and study basin. The geospatial specialist will work with the project engineer to ensure all geospatial data necessary for design (e.g., hydraulic modeling) are available. The geospatial specialist will also assist the hydrology & hydraulics engineer with the development of hydrologic and hydraulic models as requested by the project manager.

Realty Specialist: The realty specialist is responsible for development of a real estate plan for the project, as well as acquiring necessary real estate. The realty specialist will identify real estate required for project implementation; communicate with property owners and the non-Federal sponsor regarding acquisition of identified properties; and provide real estate certification for project work.

Project Scheduler: The project scheduler and controls specialist are responsible for tracking spending and schedule progress, resourcing, future planning, and earned value management within the P2 system. The project scheduler will also be responsible for troubleshooting and rectifying issues with project schedules.

2.3.3 Supporting Team Members

The supporting team is comprised of individuals and expertise required for project completion outside of the technical expertise contained in the PDT. The supporting team includes:

Public Affairs Officer: The public affairs officer screens media and general public inquiries and offers general information where appropriate. They also schedule and support the PDT with public meetings and interviews.

Non-Federal Sponsor the state of North Carolina Department of Environmental Quality: The non-Federal sponsor for the feasibility study is the State of North Carolina Department of Environmental Quality (NCDEQ); they have entered into a Feasibility Cost Sharing Agreement (FCSA) with USACE. NCDEQ will be involved in all aspects of the feasibility study to ensure agreement with the findings of the study. NCDEQ will attend progress meetings and public workshops, participate in the plan formulation process, provide scientific and technical input to field studies, assist in the development of recommended plans, provide traffic information and facility associated cost information, perform quality assurance, and review the reports

3. Study Schedule:

3.1 Project Milestones and Associated Tasks

The baseline schedule for the study follows these key milestones:

Table 3. Study Schedule and Key Milestones.

Milestone Name	Scheduled Date	Actual Date
Feasibility Cost Sharing Agreement	8 April 2020	8 April 2020 (A)
Alternatives Milestone	21 July 2020	21 July 2020 (A)
TSP Milestone	18 June 2021	
Release of Draft Report	20 August 2021	
Agency Decision Milestone	6 December 2021	
Final Report Transmittal	22 November 2022	
Chief's Report	14 April 2023	

The PDT has outlined the following tasks necessary for successful completion of each milestone.

Milestone 1: Alternatives Milestone Meeting (AMM)

- Hold interagency meeting;
- Conduct scoping charrette;
- Send out NEPA scoping letters and begin environmental coordination;
- Obtain existing reports, data, and models from the non-Federal sponsor and other stakeholders;

- Develop and screen list of management measures;
- Develop preliminary alternatives;
- Develop AMM read aheads.

Milestone 2: Tentatively Selected Plan Milestone (TSP)

- Conduct site visit and meet with representatives of focal areas (i.e., mayors and county officials);
- Create a structure inventory from existing national and state-derived datasets. The structure inventory must account for historic and ongoing acquisitions/relocations;
- Acquire, evaluate, and update existing hydrologic and hydraulic models;
- Leverage the updated structure inventory and hydrologic/hydraulic models to create economics models (e.g., HEC-FDA, RECONS, HEC-LifeSim);
- Refine alternatives and create final array;
- Finalize conceptual designs and develop quantities and costs for final array;
- Evaluate and compare the final array of alternatives;
- Draft real estate plan and develop rough order of magnitude costs for the TSP;
- Continue environmental coordination, including (but not limited to) development of the biological assessment, Fish and Wildlife Coordination Act (FWCA) report, phase 1 environmental site assessment, and cultural resources survey;
- Prepare draft integrated feasibility report and environmental assessment;
- Develop TSP meeting read aheads.

Milestone 3: Agency Decision Milestone (ADM)

Milestone 4: Chief Report (CR)

3.2 Project Schedule and Performance

A detailed schedule outlining SAD-tracked milestones for all milestones is provided in Appendix 1. The project study has a three-year timeline and thus is scheduled to end in April 2023. Detailed task for all milestones will be inserted into the Project Schedule and included in subsequent updates of the PMP.

Schedule performance will be measured through the tracking of milestones. All milestones will be tracked by SAC leadership through the SAC integrated change control management process. Any necessary milestone changes must be approved prior to update in P2. Internal SAC activities may be moved at the discretion of the project manager and PDT.

4. Summary Cost Estimates:

A total of $3 million was provided for completion of this study under the FY 19 Emergency Supplemental Appropriation. Funding for this project is 100% federal with no cost share requirement for the feasibility phase.

4.1 Anticipated Funding Stream:

Funding will be requested for this project by milestone at a set schedule. The baseline funding stream for this study is:

Table 4. Baseline Funding Stream

Activity	Cost
Alternatives Milestone	$158,500
Tentatively Selected Plan	$1,341,500
Agency Decision Milestone	$1,100,000
Chief's Report	$400,000
Total	***$3,000,000***

4.2 Funding Breakdown by Organization

Funding for each milestone and associated tasks will be allocated internally to the appropriate USACE SAD division.

Table 5: Funding Breakdown by Organization

	Project Milestone				
	AMM	TSP	ADM	Chief's Report	***TOTAL***
Charleston District (SAC)					
Planning	**$40,000.00**	$125,000.00	$75,000.00	$60,000.00	***$300,000.00***
Project Management	**$30,000.00**	$105,000.00	$80,000.00	$103,488.00	***$318,488.00***
H&H	**$27,000.00**	$200,000.00	$70,000.00	$10,600.00	***$307,600.00***
Environmental	**$22,500.00**	$170,000.00	$150,000.00	$40,000.00	***$382,500.00***
Civil Engineering	**$6,000.00**	$30,000.00	$40,000.00	$11,112.00	***$87,112.00***
Geospatial	**$5,000.00**	$40,000.00	$20,000.00	$0.00	***$65,000.00***
Cost Engineering	**$1,000.00**	$75,000.00	$30,000.00	$9,300.00	***$115,300.00***
SAC Labor Subtotal	***$131,500.00***	*$745,000.00*	*$465,000.00*	*$234,500.00*	***$1,576,000.00***
Huntington District (LRH)					***0***
Planning	**$8,500.00**	$150,000.00	$200,000.00	$100,000.00	***$458,500.00***
Economics	**$6,000.00**	$80,000.00	$15,000.00	$12,000.00	***$113,000.00***
LRH Labor Subtotal	***$14,500.00***	*$230,000.00*	*$215,000.00*	*$112,000.00*	***$571,500.00***
Savanah District (SAS)					***0***
Real Estate	**$500.00**	$25,000.00	$40,000.00	$7,500.00	***$73,000.00***
Geotechnical	**$10,000.00**	$150,000.00	$105,000.00	$11,000.00	***$276,000.00***
Cultural	**$2,000.00**	$40,000.00	$15,000.00	$10,000.00	***$67,000.00***
LRC Subtotal	***$12,500.00***	*$215,000.00*	*$160,000.00*	*$28,500.00*	***$416,000.00***
Total Labor	***$158,500.00***	*$1,190,000.00*	*$840,000.00*	*$375,000.00*	***$2,563,500.00***
Field Work	***$0.00***	*$130,000.00*	*$200,000.00*	*$0.00*	***$330,000.00***
Study Contingency		*$21,500.00*	*$60,000.00*	*$25,000.00*	***$106,500.00***
TOTAL	**$158,500.00**	**$1,341,500.00**	**$1,100,000.00**	**$400,000.00**	**$3,000,000.00**

****Includes cost of Risk Analysis est. $75K****

5. Earned Value Management

Earned Value Management (EVM) is a tool utilized to track and assess the project expenditures and progress, as well as to forecast the cost and time needed to complete the project. Project curves (S curves) track what work was scheduled to happen, what work did happen, and the actual cost of the work completed. EVM will be conducted through various software packages and visualized graphically using project curves. EVM data will be summarized at each of the four project milestones.

5.1 Earned Value Management Definitions & Metrics

Budgeted Cost for Work Scheduled (BCWS): The cumulative budget for all work activities scheduled to be completed to date, plus the cumulative partial budgets of those activities that are scheduled for partial completion to date (i.e., budgeted cost of all work scheduled in the measurement period).

Actual Cost of Work Performed (ACWP): The cumulative cost actually incurred and recorded in accomplishing the work performed during the measurement period. This is obtained from actual costs pulled from the Corps of Engineers Financial Management System (CEFMS).

Budgeted Cost for Work Performed (BCWP): The "Earned Value" or the planned value of work completed by the end of the measurement period. For any scheduled activity that was completed in the measurement period, the BCWP is equal to the budgeted amount for that work. For work that has been started but not completed by the end of the measurement period, the BCWP is the most objective determination by the project manager of the amount of work accomplished.

Cost Variance (CV): The difference between the BCWP and the ACWP at the end of the measurement period (CV = BCWP-ACWP). A positive CV indicates you are under budget and a negative CV indicates you are over budget for the work performed.

Schedule Variance (SV): The difference between the BCWP and BCWS at the end of the measurement period (SV=BCWP-BCWS). A positive SV indicates you are ahead of schedule and a negative CV indicates you are behind schedule.

Budgeted Cost at Completion (BAC): The total cost for the completed project as budgeted in the baseline.

Estimated Cost at Completion (EAC): The sum of the cost to date (i.e., at the end of the measurement period) plus the best estimate of the cost for the authorized work remaining.

Schedule Performance Index (SPI): SPI=BCWP/BCWS. Values greater than one indicate the project is ahead of schedule compared to a project baseline. Values less than one indicate the project is behind schedule as compared to a project baseline.

Cost Performance Index (CPI): CPI=BCWP/ACWP. Values greater than one indicate the project is under budget as compared to a project baseline. Values less than one indicate the project is over budget as compared to a project baseline.

It is important to establish reasonable variance thresholds that will trigger the initiation of certain reporting forms such as project change requests. The project manager is responsible for examining, evaluating the cause of, and determining corrective action to remedy project variance.

5.2 Earned Value Management Goals.

Members of the expanded PDT team will track EVM at each of the four major project milestones. PDT members tracking EVM will include the project manager and project scheduler/program analyst. The following EVM goals have been identified for the study:

- SPI will remain at or greater than 1.0 for the entire study; and
- CPI will remain at or above 1.0 for the entire study.

6. Change Management

Changes to the project as outlined in this PMP should be avoided and minimized to the greatest extent possible to maximize overall efficiency and efficacy with which the project is completed. In the event that a change is required, change management will be conducted in accordance with the Project Management Business Process (PMBP), Change Management Plan (CMP) – REF8009G and Engineering Regulation (ER) 1110-2-1156, 30 April 2010. All proposed changes that impact project scope, effort, schedule, and/or milestones will require a project change request (PCR) to be prepared and submitted to the project manager by the appropriate member of the PDT or the PDT's chain of command. PCRs will describe the necessary change and the reason for the requested change, as well as anticipated project impacts. The project manager will approve or seek approval authority for each PCR and will update the project schedule, budget, and/or PMP. Specific actions that require a PCR include:

Scope changes: The scope of the project is well-defined. However, any changes to overall project scope can only be made via a post-authorization change request. Changes to the scope of individual efforts within the framework of the authorized project are subject to a PCR.

Effort changes: A PCR will be required when the level of effort for a particular activity is expected to exceed the budgeted amount by 10% or more. The resulting PCR shall identify why the budget was exceeded and provide a new cost for completion.

Schedule changes: A PCR will be required when the time required to complete a given activity is expected to exceed the established schedule by 10% or more. The resulting PCR shall identify why the schedule was exceeded and provide a new completion date.

Milestone changes: A PCR will be required if a major milestone is expected to be missed. Immediately upon realization of the anticipated missed milestone, a PCR shall be submitted that details the cause of the missed milestone and a recovery schedule.

7. Data Management

7.1 Planning Data & Document Management.

All project records will be maintained in appropriate official project directories in accordance with Quality Management System (QMS) 640 and per local requirements. The current project directory for planning documents is located on the Projects Drive at the following location:

P:\Lumber_River_NC

All working documents will be made available to the PDT via the above project directory. All draft reports will be posted for review and comments from team members. When making any changes, team members will use Track Changes to allow for version control. Planning team members will responsible for quality control of all draft documents and may choose to lock files for editing.

7.2 Engineering Data & Document Management.

All engineering and design documents will be stored on ProjectWise at the following location:

pw:\\COE-SACPWP01CHS.sac.ds.usace.army.mil:K2PRJWP1\Documents\Civil Works\Lumber River Basin, NC\

The project engineer will be responsible for quality control of all draft documents located on ProjectWise.

7.3 Geospatial Data & Document Management.

The Geospatial Data Management Plan (GDP) integrates geospatial data management into the Project Management Business Process (PMBP) and facilitates the implementation of enterprise data management. This data collection and management plan covers Geographic Information System (GIS) products. Implementation of this plan will allow the PDT to work collaboratively on the Lumber River Basin Flood Risk Management Feasibility Study. For this collaboration to become a reality, the USACE must follow established criteria, policy and guidance for the acquisition, processing, storage, distribution, and use of geospatial data. PDT members who are responsible for collecting spatial data and producing GIS products have a major role to play in the success for the Lumber River Basin Flood Risk Management Feasibility Study.

8. Appendix

8.1 Appendix 1: Work Structure, Activities, and Milestones