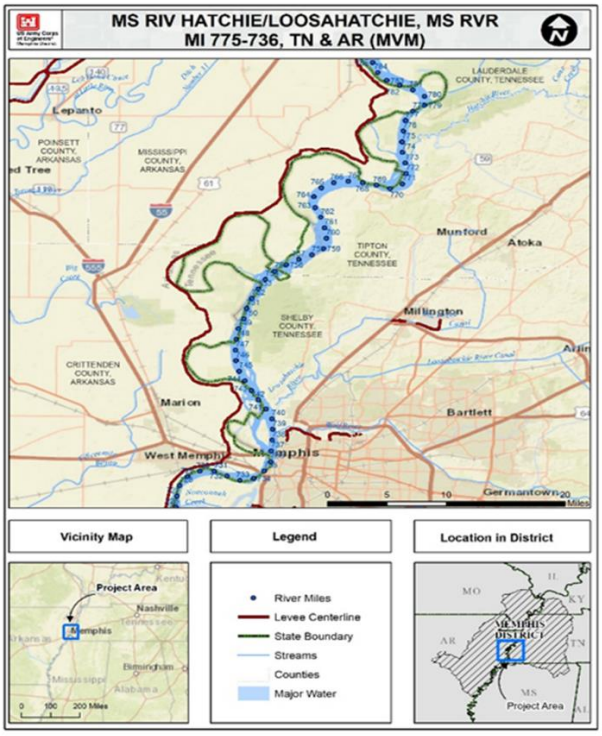
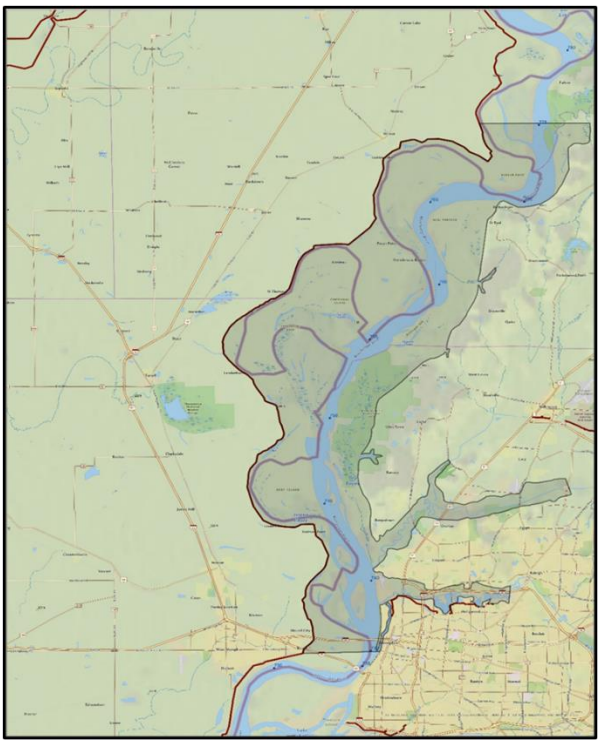
Mississippi Valley Division,
Regional Planning and Environment Division South

Hatchie/Loosahatchie, Mississippi River Mile 775-736, TN and AR Final Integrated Feasibility Report and Environmental Assessment





Appendix 4 – Cost Engineering

February 2024

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SECTION 1
COST ANALYSIS

1.1 MEASURES

A measure is a feature or activity that can be implemented at a specific geographic site that is intended to cause a desirable change and results, preferably, in a positive output. Costs were developed for 83 measures, 58 ecological, and 25 recreational. These calculations and details are available upon request. Costs and benefits were applied to each measure resulting in a cost – habitat benefit ratio. Costs calculated into this ratio included real estate, relocations, construction, planning, engineering, and design (PED), and construction management (CM). Benefits were calculated as cumulative habitat benefits for the study area effected by that measure. Each measure was assigned with a benefit score based off habitat-benefits which took into consideration the protection of wildlife areas, including streams, streambanks, and forest areas for the use of wildlife and humans. These habitat benefits, for example, could be interpreted as an increased spawning area for the wildlife in the study area. After the costs and benefits for each of the measures were developed, measures were screened and combined into different arrangements to form alternative plans.

1.2 COST BENEFIT RATIO

A total of 10 alternative plans were developed from the screened measures. Economic analysis models were run on each alternative to determine the benefit to cost ratio factor of each. The comparison and ranking ultimately provided an array of alternatives that produced the best return in benefit to the study area, based on their costs. The tentatively selected plan (TSP) was selected from the alternative plan that provided the greatest benefit. Table 4-1 includes the measures included in the TSP, 38 ecological measures and 2 recreation measures were included in the final array.

1.3 COST METHODOLOGY

A preliminary design was prepared for each measure, which includes the calculated quantities for construction costs. During analysis, the cost engineer developed cost estimates for all measures using parametric and unit cost methods. The costs for each measure were loaded into an excel spreadsheet which highlighted the costs separated by a code of accounts. Engineer Research and Development Center (ERDC) developed the habitat benefits for each measure to then obtain the optimum measures. Once these measures were selected, see Table 4-3 thru 4-42, they were combined to produce the alternative plans. These measures were combined to make each respective alternative. Alternative C3 was ultimately determined to be the best alternative plan for the project with the best benefit to the community and study areas. Alternative C3 has been selected as the TSP. The quantities are tabulated for each of the 38 ecological measures and 2 recreational measures incorporated in the TSP, as shown in Table 4-2.

Table 4-1 shows first construction costs only and does not include operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs for the project. The lands and damages or real estate cost is lumped into one sum for Table 4-1. The costs per measure also differ from the individual measures shown in Tables 4-3 thru 4-42 due to not including lands and damages, real estate, in each measure.

For the initial phase of this study, parametric costs and awarded work from outside U.S. Army Corps of Engineers, Memphis District (MVM) were used for the cost input on the various alternatives. The crews and productions from previous contracts were used and inflated forward to current day pricing in Micro-Computer Aided Cost Estimating System Second Generation (MII). To do this, the MII software was ran using the latest version of the costbook (2022 MII English Cost Book), equipment manual (2022 Equipment R03_Rev3.mle), and updating labor to current industry standards. All vegetative measure costs were given by ERDC and were confirmed by cost engineering. Other uncommon types of work not performed by MVM such as bridge replacement and pile dike notching, were priced based on recent projects by U.S. Army Corps of Engineers, St. Louis District and Arkansas Department of Transportation. The cost engineer confirmed pricing for reasonability compared to study work items. All unit pricing was escalated forward to current day pricing depending on when the previous cost was performed. All unit pricing included relevant markups such as sales tax, overtime, job office overhead (JOOH), home office overhead (HOOH), and bond. All features include a mobilization and demobilization factor. All quantities at this phase of the study were performed by the project designer. For more information on design quantities and how they were determined, refer to the Engineering Appendix 1.6.2. Cost engineering has verified quantities based on assumptions and limited data on the sites. Most quantities were based off assumptions due to the lack of survey at the current stage of the study. Quantities for vegetative measures, including tree planting, were confirmed using https://www-users.cse.umn.edu/~white004/personal/plantcalc.html.

The cost estimate (CE) developed for the recommended plan is considered a Class 3 level of estimate per the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice. The CE includes construction and non-construction costs. The CE developed for this project utilized October 2020 pricing data. The construction cost is based on MII version 4.4. The non-construction costs were developed using level of effort for activity tasks based on input from the Project Delivery Team (PDT) members. The current or latest versions of the cost book (2022 MII English Cost Book) and equipment manual (2022 Equipment R03_Rev3.mle) were used to develop the estimate for the project. The software was used to build each bid schedule of quantities and then formulate the costs for the TSP such as (alternative C3). There are four subgroups to the direct cost formulation for each bid item. They include labor, equipment, materials, and subcontracting. Labor rates are derived from Davis Bacon wage rates provided at http://www.wdol.gov/dba.aspx. Equipment is selected based on experience, preference, and crew makeup. Within the MII software there is an RS means database from which equipment can be selected. Every couple of years these databases for labor and equipment are reevaluated and indexed to the current year. Material prices were provided by local suppliers within the study or greater Memphis area. The equipment manual is divided based on region. The region that the study area is included in is Region III. Project specific crews have been developed for use in

estimating the direct costs for items not estimated using the MII English Cost Book 2022, vendor quotes, or historical cost information. Crew members consist of selected components of labor classification and equipment pieces assembled to perform tasks. The estimate assumes the contractor will work 6-10 hour days. Once the materials and crews are tied to the quantities, they produce a cost for which gives a direct cost for the group of quantities. Sales tax was applied to material costs at the Mississippi County, AR rate of 9 percent. Productivity has been assigned to each crew reflective of the expected output per unit of measure for the specific task listed in the cost estimate. Notes in the estimate identify specific alterations to productivity due to workspace access. For this job, the acquisition approach assumed there would be subcontracting of various elements of the project such as concrete and turfing. The subcontractor has markups which include JOOH of 8 percent, HOOH of 5 percent, profit of 10 percent, and bond determined by Class B table. The prime contractor would construct the remaining items.

Indirect costs are based on the prime contractor's markups, which include JOOH, HOOH, profit, and bond, and project (owner) costs, which include escalation and contingency. The JOOH was assumed at a rate of 13 percent which is a historical average for local rates. HOOH rate utilized a rate of 7 percent which is a historical average for local rates. A profit rate of 10 percent was utilized. The selected bond is Class B with an approximate rate of 1.58 percent for the prime contractor. The rate is calculated using the bond tables and was applied accordingly. Contingency was calculated using the cost schedule risk analysis (CSRA) process with participation from the PDT. The CSRA was conducted, and a contingency of 38 percent was calculated. This rate was applied in the TPCS. An escalation rate was calculated utilizing the CWCCIS escalation table for a midpoint of construction that is applied to the TPCS.

The recommended plan also considered some major assumptions when determining the cost estimate. The construction procurement method has determined the project will be split into multiple awardable contracts depending on type of work and location. The risk for some awarded contracts being used to meet small business district goals is captured in the CSRA. The design and oversight of construction will be performed primarily by USACE MVM. Real estate was developed by the real estate branch. No borrow material is anticipated for this project. Some excavated or cleanout material is expected to be hauled off. No hazardous materials are anticipated at the project sites. Plans and specifications will be fully developed by USACE.

Once the construction costs were formulated, they were entered into the alternative spreadsheets. Each alternative includes all the costs that would be incurred on the project which for this project include lands and damages or real estate costs, utility relocations, construction costs, planning, engineering and design, and supervision and administration. feasibility costs are not included in the planning portion. These items are broken out by chart of accounts as follows:

01 Lands and Damages

02 Relocations

06 Fish and Wildlife Facilities

06 Adaptive Management (Fish and Wildlife)

08 Bridges and Roadways

09 Channels and Canals

11 Levees and Floodwalls

12 Navigation Ports and Harbors

14 Recreation Facilities

15 Floodway Control and Diversion Structures

16 Bank Stabilization

18 Cultural Resource Preservation

30 Planning, E & D

31 Supervision and Administration

1.4 RISK ANALYSIS

A contingency cost based risk analysis is required to be performed on all studies. The cost engineer can use two different methods during the TSP phase, CSRA or abbreviated risk analysis (ARA) to capture risk and calculate contingency to be applied to the cost estimates.

If the TSP is chosen as the recommended plan at the alternative decision milestone, an ARA can be used for studies less than $40,000,000 or the CSRA must be used for studies of value greater than $40,000,000. Since the TPCS for this study is projected to be greater than $40,000,000, a CSRA was performed once the study progressed to the recommended plan. An ARA was performed on the week of September 1, 2022, to capture risk and contingency. Meetings were held to discuss and determine the risks associated with each of the alternatives for this project. Each risk then was evaluated to determine a contingency factor using the ARA spreadsheet as show in Table 4-58 and 4-59.

The risk analysis spreadsheet defines the risk of each bid item by the likelihood of project scope growth, acquisition strategy, construction elements, and quantities for current scope, specialty fabrication of equipment, cost estimate assumptions, and external project risks. During the course of these meetings, the cost engineer reviewed with the PDT the risk for each of these elements as they pertain to each bid item. The PDT decided the likelihood that each of these elements could impact that bid item or vary from what was assumed in the design process. The PDT went through each item and decided whether the likelihood that each element would vary was very likely, likely, possible, or unlikely. Likewise, the PDT determined the impact of this likelihood as either negligible, marginal, significant, critical, or crisis. Using this matrix, the spreadsheet is designed to formulate a risk for each bid item,

which culminates into an overall risk or contingency for that alternative. The CSRA for the recommended plan was performed during the week of 24 July 2023. The PDT met to discuss all potential risks for the recommended plan that could have cost or schedule impacts on the project. For the CSRA results, see Table 4-57.

The final costs for each respective measure of the preferred alternative (C3) are summarized in Table 4-3 through 4-42 below. These tables also show the risk contingencies developed for the features of work in the PDT's July meeting. The July meeting, CSRA, resulted with a 38 percent contingency for all measures included in the recommended plan. All costs are considered FY24 price levels. (October 2023 First Cost)

1.5 OMRR&R COSTS

In addition to current working costs, operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs are needed to determine the economic costs to the life cycle of a project. The OMRR&R costs or future costs are used in determining the habitat–benefit ratio to the project. The OMRR&R costs are calculated for the life of the project and indexed forward to the life year cycle of each alternative measure. OMRR&R costs are not included in the total project cost due to not being a government responsibility, but the responsibility of the stakeholder. These costs can be seen in current year dollars in Table 4-43 and Table 4-44 below. All costs are considered FY24 price levels. (October 2023 First Cost)

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Table 4-1. Measures included in the Recommended Plan with Associated Costs

Measures	**Construction & AMM Costs**
01– BR_1 Brandywine	$358,813
02 – BR_2 Brandywine	$158,938
03 – BR_4 Brandywine	$6,852,203
04 – BR_5 Brandywine	$1,309,189
05 – BR_6 Brandywine	$274,501
06 – BR_7 Brandywine	$515,361
07 – BR_8 Brandywine	$1,222,741
08 – BR_11 Brandywine	$3,672,825
09 – D_3 Densford	$151,810
10 – HB_1 Hopefield Point Big River Park	$227,390
11 – HB_2ab Hopefield Point Big River Park	$520,484
12 – HB_2c Hopefield Point Big River Park	$2,375,339
13 – HT_6 Hatchie Towhead Randolph	$54,702
14 – I35_12a Island35_DeanIsland	$44,745
15– I35_12b Island35_DeanIsland	$57,858
16 – I35_2 Island35_DeanIsland	$721,886
17 – I35_6b Island35_DeanIsland	$188,813
18 – I35_7a Island35_DeanIsland	$430,863
19 – I35_7g Island35_DeanIsland	$1,508,848
20 – I35_7h Island35_DeanIsland	$8,416
21 – I35_9b Island35_DeanIsland	$133,226
22 – I40_1a Island40_41	$128,767
23 – I40_1b Island40_41	$295,674
24 - I40_3 Island40_41	$61,619
25 - M_14 Meeman Shelby Forest Eagle Lake	$152,523
26 - M_5 Meeman Shelby Forest Eagle Lake	$172,796
27 - M_6 Meeman Shelby Forest Eagle Lake	$506,806
28 - RCP_1 Richardson Cedar Point	$87,797
29 - RCP_2 Richardson Cedar Point	$281,215
30 - RCP_4 Richardson Cedar Point	$11,589
31 - RL_3 Redman Point Loosahatchie Bar	$123,182
32 - RL_4 Redman Point Loosahatchie Bar	$2,758,401
33 - RL_6 Redman Point Loosahatchie Bar	$157,530
34 - S_10 Sunrise_Island34	$233,914
35 - S_4 Sunrise_Island34	$12,155,030
36 - S_6 Sunrise_Island34	$108,885
37 - S_7 Sunrise_Island34	$155,374
38 - S_8 Sunrise_Island34	$208,521
Rec 1 - LW-1 Wolf River	$168,576
Rec 2 – M_2	$307,184
AM&M Programmatic Costs - Recommened Plan	$3,432,000
AM&M PED/CM Costs - Recommended Plan	$1,589,742
Real Estate Costs - Recommended Plan	$17,575,920
Real Estate Administration Costs - Recommended Plan	$209,880
Cultural Resource Surveys	$452,074
Subtotal - Recommened Plan*	**$62,123,950**
Annualized OMRR&R – Recommened Plan	$150,406

*Subtotal does not include OMRR&R cost only first construction costs. OMRR&R costs are captured in Table 4-43 and 4-44. Cultural Resource Surveys PED & CM cost included in each measasure cost.

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Table 4-2. Items of Work by Measure in Recommended Plan

#	Measure ID	Bridge Replacement [Structure]	Culverts [Structure]	Dike notching - Stone or Pile [Notch]	Earth Work - Tree Clearing/Grubbing [Acres]	Earthwork - Channel Cleanout [Cubic Yards]	Floodplain Vegetative - Seasonal Herbaceous Wetland Seeding [Event]	Floodplain Vegetative - Tree Planting/Reforestation [Event]	Groundwater Wells [Structure]	Pump [Structure]	Riprap Hardpoints [Tons]	Riprap for Control Structure/Weir [Tons]	Riprap R-125 [Tons]	Riprap River Placement [Tons]	Trail Access Improvements [LF]	Walking Trail/Interpretive Signage [Location]	Stop Log Structures [Structure]	Woody Debris Traps [Trap]
01	BR_1			3														
02	BR_2																	1
03	BR_4	1			0.3	166						975						
04	BR_5				2									12222				
05	BR_6							1										
06	BR_7							1										
07	BR_8		3 Box Culvert					1										
08	BR_11		2 Box Culvert & 2 Sluice Gates					1										
09	D_3																	1
10	HB_1						1											
11	HB_2ab		60" at 160 LF			4455.6	1					1200	333.3					
12	HB_2c					89722												
13	HT_6																	
14	I35_12a							1										
15	I35_12b																	

#	Measure ID	Bridge Replacement [Structure]	Culverts [Structure]	Dike notching - Stone or Pile [Notch]	Earth Work - Tree Clearing/Grubbing [Acres]	Earthwork - Channel Cleanout [Cubic Yards]	Floodplain Vegetative - Seasonal Herbaceous Wetland Seeding [Event]	Floodplain Vegetative - Tree Planting/Reforestation [Event]	Groundwater Wells [Structure]	Pump [Structure]	Riprap Hardpoints [Tons]	Riprap for Control Structure/Weir [Tons]	Riprap R-125 [Tons]	Riprap River Placement [Tons]	Trail Access Improvements [LF]	Walking Trail/Interpretive Signage [Location]	Stop Log Structures [Structure]	Woody Debris Traps [Trap]
16	I35_2							1										
17	I35_6b							1										
18	I35_7a			5														
19	I35_7g										16000							
20	I35_7h																	
21	I35_9b							1										
22	I40_1a							1										
23	I40_1b		36" at 100 LF			8333							123					
24	I40_3																	
25	M_5					1793						142					1	
26	M_6					3311		1	1	1							1	
27	M_14																	1
28	RCP_1							1										
29	RCP_2		36" at 60 LF		0.55	3107	1						185					
30	RCP_4																	
31	RL_3			1														
32	RL_4							1										
33	RL_6																	1

#	Measure ID	Bridge Replacement [Structure]	Culverts [Structure]	Dike notching - Stone or Pile [Notch]	Earth Work - Tree Clearing/Grubbing [Acres]	Earthwork - Channel Cleanout [Cubic Yards]	Floodplain Vegetative - Seasonal Herbaceous Wetland Seeding [Event]	Floodplain Vegetative - Tree Planting/Reforestation [Event]	Groundwater Wells [Structure]	Pump [Structure]	Riprap Hardpoints [Tons]	Riprap for Control Structure/Weir [Tons]	Riprap R-125 [Tons]	Riprap River Placement [Tons]	Trail Access Improvements [LF]	Walking Trail/Interpretive Signage [Location]	Stop Log Structures [Structure]	Woody Debris Traps [Trap]
34	S_10							1										
35	S_4	1		1	4	60042								24,800				
36	S_6			1														
37	S_7																	1
38	S_8							1										
Rec-01	LW-1															1		1
Rec-02	M_2				1										5280	1		

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The following tables include construction, PED, Construction Management, and adaptive management & monitoring costs by measure.

Table 4-3. Measure BR 1 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$73,300	$23,456	$96,756
12 Navigation, Ports, and Harbors	$152,714	$48,868	$201,582
30 Planning Engineering and Design	$22,907	$7,330	$30,237
31 Construction Management	$22,907	$7,330	$30,237
Totals	$271,828	$86,985	$358,813

Table 4-4. Measure BR 2 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$65,391	$20,925	$86,316
06 Fish and Wildlife (Adaptive Management)	$35,400	$11,328	$46,728
30 Planning Engineering and Design	$9,809	$3,139	$12,947
31 Construction Management	$9,809	$3,139	$12,947
Totals	$120,408	$38,531	$158,938

Table 4-5. Measure BR 4 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$50,533	$16,171	$66,704
06 Fish and Wildlife Facilities	$2,224	$712	$2,936
08 Roads, Railroads, and Bridges	$3,890,696	$1,245,023	$5,135,719
09 Channels and Canals	$2,532	$810	$3,343
15 Floodway Control and Diversion Structures	$58,801	$18,816	$77,617
30 Planning Engineering and Design	$593,138	$189,804	$782,942
31 Construction Management	$593,138	$189,804	$782,942
Totals	$5,191,063	$1,661,140	$6,852,203

Table 4-6. Measure BR 5 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$61,350	$19,632	$80,982
06 Fish and Wildlife Facilities	$17,792	$5,693	$23,486
15 Floodway Control and Diversion Structures	$697,946	$223,343	$921,289
30 Planning Engineering and Design	$107,361	$34,355	$141,716
31 Construction Management	$107,361	$34,355	$141,716
Totals	$991,810	$317,379	$1,309,189

Table 4-7. Measure BR 6 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$107,065	$34,261	$141,326
06 Fish and Wildlife (Adaptive Management)	$66,851	$21,392	$88,243
18 Cultural Resource Preservation	$6,400	$2,048	$8,448
30 Planning Engineering and Design	$17,020	$5,446	$22,466
31 Construction Management	$17,020	$5,446	$22,466
Totals	$214,355	$68,594	$282,949

Table 4-8. Measure BR 7 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$269,036	$86,091	$355,127
06 Fish and Wildlife (Adaptive Management)	$35,999	$11,520	$47,519
18 Cultural Resource Preservation	$15,600	$4,992	$20,592
30 Planning Engineering and Design	$42,695	$13,663	$56,358
31 Construction Management	$42,695	$13,663	$56,358
Totals	$406,025	$129,928	$535,953

Table 4-9. Measure BR 8 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$281,944	$90,222	$372,166
06 Fish and Wildlife (Adaptive Management)	$37,967	$12,150	$50,117
15 Floodway Control and Diversion Structures	$397,582	$127,226	$524,808
18 Cultural Resource Preservation	$16,560	$5,299	$21,859
30 Planning Engineering and Design	$104,413	$33,412	$137,825
31 Construction Management	$104,413	$33,412	$137,825
Totals	$942,879	$301,721	$1,244,600

Table 4-10. Measure BR 11 Brandywine

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$814,818	$260,742	$1,075,560
06 Fish and Wildlife (Adaptive Management)	$118,258	$37,842	$156,100
15 Floodway Control and Diversion Structures	$1,223,478	$391,513	$1,614,991
18 Cultural Resource Preservation	$48,000	$15,360	$63,360
30 Planning Engineering and Design	$312,944	$100,142	$413,087
31 Construction Management	$312,944	$100,142	$413,087
Totals	$2,830,443	$905,742	$3,736,185

Table 4-11. Measure D 3 Densford

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$65,391	$20,925	$86,316
06 Fish and Wildlife (Adaptive Management)	$30,000	$9,600	$39,600
30 Planning Engineering and Design	$9,809	$3,139	$12,947
31 Construction Management	$9,809	$3,139	$12,947
Totals	$115,008	$36,803	$151,810

Table 4-12. Measure HB_1 Hopefield Point Big River Park

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$105,939	$33,900	$139,839
06 Fish and Wildlife (Adaptive Management)	$29,865	$9,557	$39,421
18 Cultural Resource Persevation	$15,600	$4,992	$20,592
30 Planning Engineering and Design	$18,231	$5,834	$24,065
31 Construction Management	$18,231	$5,834	$24,065
Totals	$187,865	$60,117	$247,982

Table 4-13. Measure HB_2ab Hopefield Point Big River Park

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$59,761	$19,123	$78,884
06 Fish and Wildlife (Adaptive Management)	$25,633	$8,203	$33,836
09 Channels and Canals	$67,973	$21,751	$89,724
15 Floodway Control and Diversion Structures	$153,830	$49,226	$203,056
18 Cultural Resource Preservation	$8,800	$2,816	$11,616
30 Planning Engineering and Design	$43,675	$13,937	$57,612
31 Construction Management	$43,675	$13,976	$57,650
Totals	$403,346	$129,032	$532,378

Table 4-14. Measure HB_2c Hopefield Point Big River Park

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$20,094	$6,430	$26,523
09 Channels and Canals	$1,368,774	$438,008	$1,806,781
30 Planning Engineering and Design	$205,316	$65,701	$271,017
31 Construction Management	$205,316	$65,701	$271,017
Totals	$1,799,499	$575,840	$2,375,339

Table 4-15. Measure HT_6 Hatchie Towhead Randolph

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$35,201	$11,264	$46,465
18 Cultural Resource Preservation	$20,800	$6,656	$27,456
30 Planning Engineering and Design	$3,120	$998	$4,118
31 Construction Management	$3,120	$998	$4,118
Totals	$62,241	$19,917	$82,158

Table 4-16. Measure I35_12a Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$17,180	$5,498	$22,677
06 Fish and Wildlife (Adaptive Management)	$9,884	$3,163	$13,047
18 Cultural Resource Preservation	$5,600	$1,792	$7,392
30 Planning Engineering and Design	$3,417	$1,093	$4,510
31 Construction Management	$3,417	$1,093	$4,510
Totals	$39,498	$12,639	$52,137

Table 4-17. Measure I35_12b Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$37,232	$11,914	$49,146
18 Cultural Resource Preservation	$22,000	$7,040	$29,040
30 Planning Engineering and Design	$3,300	$1,056	$4,356
31 Construction Management	$3,300	$1,056	$4,356
Totals	$65,832	$21,066	$86,898

Table 4-18. Measure I35_2 Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$387,860	$124,115	$511,975
06 Fish and Wildlife (Adaptive Management)	$37,625	$12,040	$49,666
18 Cultural Resource Preservation	$16,800	$5,376	$22,176
30 Planning Engineering and Design	$60,699	$19,424	$80,123
31 Construction Management	$60,699	$19,424	$80,123
Totals	$563,683	$180,379	$744,062

Table 4-19. Measure I35_6b Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$101,438	$32,460	$133,898
06 Fish and Wildlife (Adaptive Management)	$9,851	$3,152	$13,004
18 Cultural Resource Preservation	$4,400	$1,408	$5,808
30 Planning Engineering and Design	$15,876	$5,080	$20,956
31 Construction Management	$15,876	$5,080	$20,956
Totals	$147,440	$47,181	$194,621

Table 4-20. Measure I35_7a Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$31,633	$10,123	$41,756
12 Navigation, Ports, and Harbors	$226,753	$72,561	$299,313
30 Planning Engineering and Design	$34,013	$10,884	$44,897
31 Construction Management	$34,013	$10,884	$44,897
Totals	$326,412	$104,452	$430,863

Table 4-21. Measure I35_7g Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$61,350	$19,632	$80,982
15 Floodway Control and Diversion Structures	$832,090	$266,269	$1,098,358
30 Planning Engineering and Design	$124,813	$39,940	$164,754
31 Construction Management	$124,813	$39,940	$164,754
Totals	$1,143,066	$365,781	$1,508,848

Table 4-22. Measure I35_7h Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$5,416	$1,733	$7,148
18 Cultural Resource Preservation	$3,200	$1,024	$4,224
30 Planning Engineering and Design	$480	$154	$634
31 Construction Management	$480	$154	$634
Totals	$9,576	$3,064	$12,640

Table 4-23. Measure I35_9b Island35_DeanIsland

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$69,023	$22,087	$91,110
06 Fish and Wildlife (Adaptive Management)	$9,759	$3,123	$12,882
18 Cultural Resource Preservation	$4,800	$1,536	$6,336
30 Planning Engineering and Design	$11,073	$3,543	$14,617
31 Construction Management	$11,073	$3,543	$14,617
Totals	$105,729	$33,833	$139,562

Table 4-24. Measure I40_1a Island40_41

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$51,419	$16,454	$67,873
06 Fish and Wildlife (Adaptive Management)	$26,266	$8,405	$34,671
18 Cultural Resource Preservation	$14,800	$4,736	$19,536
30 Planning Engineering and Design	$9,933	$3,179	$13,111
31 Construction Management	$9,933	$3,179	$13,111
Totals	$112,350	$35,952	$148,303

Table 4-25. Measure I40_1b Island40_41

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$25,633	$8,203	$33,836
09 Channels and Canals	$127,126	$40,680	$167,806
15 Floodway Control and Diversion Structures	$25,460	$8,147	$33,607
30 Planning Engineering and Design	$22,888	$7,324	$30,212
31 Construction Management	$22,888	$7,324	$30,212
Totals	$223,995	$71,678	$295,674

Table 4-26. Measure I40_3 Island40_41

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$39,601	$12,672	$52,273
18 Cultural Resource Preservation	$23,600	$7,552	$31,152
30 Planning Engineering and Design	$3,540	$1,133	$4,673
31 Construction Management	$3,540	$1,133	$4,673
Totals	$70,281	$22,490	$92,771

Table 4-27. Measure M5 Meeman Shelby Forest Eagle Lake

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$4,947	$1,583	$6,530
09 Channels and Canals	$27,354	$8,753	$36,107
15 Floodway Control and Diversion Structures	$69,538	$22,252	$91,791
30 Planning Engineering and Design	$14,534	$4,651	$19,185
31 Construction Management	$14,534	$4,651	$19,185
Totals	$130,906	$41,890	$172,796

Table 4-28. Measure M6 Meeman Shelby Forest Eagle Lake

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$112,422	$35,975	$148,397
06 Fish and Wildlife (Adaptive Management)	$22,973	$7,351	$30,325
09 Channals and Canals	$50,512	$16,164	$66,675
15 Floodway Control and Diversion Structures	$111,967	$35,829	$147,796
18 Cultural Resource Preservation	$12,000	$3,840	$15,840
30 Planning Engineering and Design	$43,035	$13,771	$56,806
31 Construction Management	$43,035	$13,771	$56,806
Totals	$395,944	$126,702	$522,646

Table 4-29. Measure M_14 Meeman Shelby Forest Eagle Lake

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$65,391	$20,925	$86,316
06 Fish and Wildlife (Adaptive Management)	$30,540	$9,773	$40,313
30 Planning Engineering and Design	$9,809	$3,139	$12,947
31 Construction Management	$9,809	$3,139	$12,947
Totals	$115,548	$36,975	$152,523

Table 4-30. Measure RCP_1 Richardson Cedar Point

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$45,431	$14,538	$59,969
06 Fish and Wildlife (Adaptive Management)	$6,493	$2,078	$8,570
18 Cultural Resource Preservation	$3,200	$1,024	$4,224
30 Planning Engineering and Design	$7,295	$2,334	$9,629
31 Construction Management	$7,295	$2,334	$9,629
Totals	$69,713	$22,308	$92,021

Table 4-31. Measure RCP_2 Richardson Cedar Point

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$54,757	$17,522	$72,279
06 Fish and Wildlife (Adaptive Management)	$15,008	$4,803	$19,811
09 Channels and Canals	$72,608	$23,234	$95,842
15 Floodway Control and Diversion Structures	$23,953	$7,665	$31,619
18 Cultural Resource Preservation	$4,400	$1,408	$5,808
30 Planning Engineering and Design	$23,358	$7,474	$30,832
31 Construction Management	$23,358	$7,474	$30,832
Totals	$217,442	$69,581	$287,023

Table 4-32. Measure RCP_4 Richardson Cedar Point

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$7,459	$2,387	$9,846
18 Cultural Resource Preservation	$4,400	$1,408	$5,808
30 Planning Engineering and Design	$660	$211	$871
31 Construction Management	$660	$211	$871
Totals	$13,179	$4,217	$17,397

Table 4-33. Measure RL_3a Redman Point Loosahatchie Bar

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$23,533	$7,531	$31,064
12 Navigation, Ports, and Harbors	$53,682	$17,178	$70,860
30 Planning Engineering and Design	$8,052	$2,577	$10,629
31 Construction Management	$8,052	$2,577	$10,629
Totals	$93,319	$29,862	$123,182

Table 4-34. Measure RL_4a Redman Point Loosahatchie Bar

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$1,439,890	$460,765	$1,900,654
06 Fish and Wildlife (Adaptive Management)	$192,665	$61,653	$254,318
18 Cultural Resource Preservation	$83,920	$26,854	$110,774
30 Planning Engineering and Design	$228,571	$73,143	$301,714
31 Construction Management	$228,571	$73,143	$301,714
Totals	$2,173,618	$695,558	$2,869,175

Table 4-35. Measure RL_6a Redman Point Loosahatchie Bar

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$65,391	$20,925	$86,316
06 Fish and Wildlife (Adaptive Management)	$34,333	$10,987	$45,320
30 Planning Engineering and Design	$9,809	$3,139	$12,947
31 Construction Management	$9,809	$3,139	$12,947
Totals	$119,341	$38,189	$157,530

Table 4-36. Measure S_10a Sunrise Island 34

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$120,792	$38,653	$159,445
06 Fish and Wildlife (Adaptive Management)	$20,178	$6,457	$26,635
30 Planning Engineering and Design	$18,119	$5,798	$23,917
31 Construction Management	$18,119	$5,798	$23,917
Totals	$177,208	$56,706	$233,914

Table 4-37. Measure S_4 Sunrise Island 34

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$70,017	$22,405	$92,422
06 Fish and Wildlife Facilities	$35,584	$11,387	$46,971
08 Roads, Railroads, and Bridges	$3,890,696	$1,245,023	$5,135,719
09 Channels and Canals	$1,651,049	$528,336	$2,179,385
12 Navigation, Ports, and Harbors	$45,351	$14,512	$59,863
15 Floodway Control and Diversion	$1,406,812	$450,180	$1,856,992
30 Planning Engineering and Design	$1,054,424	$337,416	$1,391,839
31 Construction Management	$1,054,424	$337,416	$1,391,839
Totals	$9,208,356	$2,946,674	$12,155,030

Table 4-38. Measure S_6a Sunrise Island 34

Feature	Cost	Contingency	Total
06 Fish and Wildlife (Adaptive Management)	$23,533	$7,531	$31,064
12 Navigation, Ports, and Harbors	$45,351	$14,512	$59,863
30 Planning Engineering and Design	$6,803	$2,177	$8,979
31 Construction Management	$6,803	$2,177	$8,979
Totals	$82,489	$26,396	$108,885

Table 4-39. Measure S_7a Sunrise Island 34

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$65,391	$20,925	$86,316
06 Fish and Wildlife (Adaptive Management)	$32,700	$10,464	$43,164
30 Planning Engineering and Design	$9,809	$3,139	$12,947
31 Construction Management	$9,809	$3,139	$12,947
Totals	$117,708	$37,667	$155,374

Table 4-40. Measure S_8a Sunrise Island 34

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$107,900	$34,528	$142,428
06 Fish and Wildlife (Adaptive Management)	$15,420	$4,934	$20,354
18 Cultural Resource Preservation	$7,600	$2,432	$10,032
30 Planning Engineering and Design	$17,325	$5,544	$22,869
31 Construction Management	$17,325	$5,544	$22,869
Totals	$165,570	$52,982	$218,553

Table 4-41. Measure LW-1 Wolf River

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$65,391	$20,925	$86,316
14 Recreation Facilities	$32,847	$10,511	$43,358
30 Planning Engineering and Design	$14,736	$4,715	$19,451
31 Construction Management	$14,736	$4,715	$19,451
Totals	$127,709	$40,867	$168,576

Table 4-42. Measure M_2 Meeman Shelby

Feature	Cost	Contingency	Total
06 Fish and Wildlife Facilities	$8,896	$2,847	$11,743
14 Recreation Facilities	$170,116	$54,437	$224,553
30 Planning Engineering and Design	$26,852	$8,593	$35,444
31 Construction Management	$26,852	$8,593	$35,444
Totals	$232,716	$74,469	$307,184

Table 4-43. AMM, OMRR&R Measures for TSP

Description	AM&M	OMRR&R
BR_1	$ 96,756.00	$ 106,289.50
BR_2	$ 46,728.00	$ -
BR_4	$ 66,704.00	$ 41,315.73
BR_5	$ 80,982.00	$ 690,966.65
BR_6	$ 88,243.08	$ -
BR_7	$ 47,518.51	$ -
BR_8	$ 50,116.79	$ 11,706.00
BR_11	$ 156,100.29	$ 14,153.62
D_3	$ 39,600.00	$ -
HB_1	$ 39,421.27	$ -
HB_2ab	$ 33,836.00	$ 287,439.56
HB_2c	$ 26,523.44	$ 1,355,085.97
HT_6	$ 46,465.06	$ -
I35_2	$ 49,665.55	$ -
I35_6b	$ 13,003.75	$ -
I35_7a	$ 41,756.00	$ -
I35_7g	$ 80,982.00	$ 823,768.70
I35_7h	$ 7,148.47	$ -
I35_9b	$ 12,882.23	$ -
I35_12a	$ 13,046.88	$ -
I35_12b	$ 49,145.73	$ -
I40_1a	$ 34,670.75	$ -
I40_1b	$ 33,836.00	$ 177,083.17
I40_3	$ 52,273.19	$ -
M_5	$ 6,530.22	$ 4,616,605.22
M_6	$ 30,324.55	$ 4,639,531.82
M_14	$ 40,312.80	$ -
RCP_1	$ 8,570.11	$ -
RCP_2	$ 19,810.68	$ 106,497.49
RCP_4	$ 9,846.38	$ -
RL_3	$ 31,064.00	$ 53,144.75
RL_4	$ 254,317.96	$ -
RL_6	$ 45,320.00	$ -
S_4	$ 92,422.00	$ 3,027,282.46
S_6	$ 31,064.00	$ -
S_7	$ 43,164.00	$ -
S_8	$ 20,354.18	$ -
S_10	$ 26,634.95	$ -
LW_1	$ -	$ 43,358.41
M_2	$ -	$ 336,829.48

Table 4-44. OMRR&R Cost for Each Alternative

Alternative	OMRR&R Cost
A1	$ 2,412,297
B1	$ 3,818,143
C1	$ 1,455,283
C2	$ 2,513,671
C3	$ 7,520,288
C4	$ 4,072,862
C5	$ 3,371,976
C6	$ 1,364,661
C7	$ 2,462,897

1.6 PLAN ALTERNATIVES

The various measures considered were combined to produce 10 alternatives (including the no action alternative). The remaining alternatives are shown in the following tables 4-44 to 4-51. All costs are considered FY24 price levels. (October 2023 First Cost)

Table 4-45. Alternative A1

Description	Cost w/ Contingency
Lands and Damages	$ 4,288,800
Construction Costs	$ 20,425,414
Adaptive Management (Fish and Wildlife)	$ 3,454,987
Total A1	$ 28,169,201

Table 4-46. Alternative B1

Description	Cost w/ Contingency
Lands and Damages	$ 938,400
Construction Costs	$ 22,717,891
Adaptive Management (Fish and Wildlife)	$ 3,293,458
Total B1	$ 26,949,750

Table 4-47. Alternative C1

Description	Cost w/ Contingency
Lands and Damages	$ 10,953,600
Construction Costs	$ 6,900,799
Adaptive Management (Fish and Wildlife)	$ 3,743,372
Total C1	$ 21,597,771

Table 4-48. Alternative C2

Description	Cost w/ Contingency
Lands and Damages	$ 10,953,600
Construction Costs	$ 18,439,589
Adaptive Management (Fish and Wildlife)	$ 3,789,856
Total C2	$ 33,183,045

Table 4-49. Alternative C4

Description	Cost w/ Contingency
Lands and Damages	$ 13,884,480
Construction Costs	$ 44,830,678
Adaptive Management (Fish and Wildlife)	$ 4,393,988
Total C4	$ 63,109,146

Table 4-50. Alternative C5

Description	Cost w/ Contingency
Lands and Damages	$ 11,620,800
Construction Costs	$ 20,982,424
Adaptive Management (Fish and Wildlife)	$ 3,893,367
Total C5	$ 36,496,592

Table 4-51. Alternative C6

Description	Cost w/ Contingency
Lands and Damages	$ 5,948,400
Construction Costs	$ 5,198,147
Adaptive Management (Fish and Wildlife)	$ 3,397,198
Total C6	$ 14,543,745

Table 4-52. Alternative C7

Description	Cost w/ Contingency
Lands and Damages	$ 9,648,000
Construction Costs	$ 18,072,273
Adaptive Management (Fish and Wildlife)	$ 3,672,726
Total C7	$ 31,392,999

1.7 RECOMMENDED PLAN C3

Alternative C3 was considered the preferred alternative and is the alternative that is being used for the Hatchie-Loosahatchie project study and is shown in Table 4-53. The cost shown in Table 4-53 considers the contingency determined by the CSRA, 38 percent, performed by the PDT. The current estimated project schedule is also shown in Tables 4-54 thru 4-56.

Table 4-53. Recommended Plan C3

Feature	Cost	Contingency	Total
01 Lands & Damages	$14,646,600	$2,929,320	$17,575,920
06 Fish and Wildlife Facilities	$4,603,514	$1,473,125	$6,076,639
06 Fish and Wildlife (Adaptive Management)	$4,014,501	$1,284,640	$5,299,141
08 Roads, Railroads, and Bridges	$7,781,393	$2,490,046	$10,271,438
09 Channels and Canals	$3,367,927	$1,077,737	$4,445,664
12 Navigation, Ports, and Harbors	$523,849	$167,632	$691,480
14 Recreation Facilities	$202,963	$64,948	$267,911
15 Floodway Control and Diversion	$5,001,456	$1,600,466	$6,601,922
18 Cultural Resource Preservation	$342,480	$109,594	$452,074
30 Planning Engineering and Design	$4,034,712	$1,291,108	$5,325,820
31 Construction Management	$3,875,712	$1,240,228	$5,115,940
Totals	$48,395,107	$13,728,842	$62,123,949.90

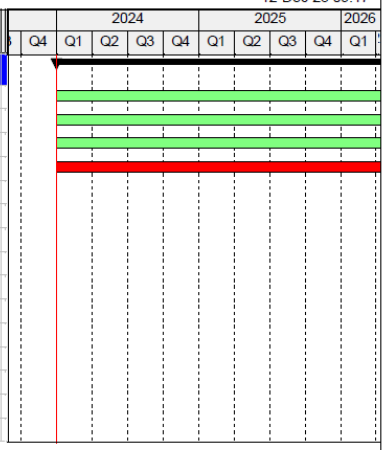
Table 4-54. Recommended Plan C3 Measure Schedule

Measures	Description	River Work Days	Bridge Replacement Work Days	Tree Planting Contract	Land Work Days
01	BR_1	13			
02	BR_2	10			
03	BR_4		365		
04	BR_5	15			
05	BR_6			33.84	
06	BR_7			85.03	
07	BR_8			89.11	365.00
08	BR_11			257.54	
09	D_3	10		-	
10	HB_1			-	46.19
11	HB_2ab			-	31.06
12	HB_2c			-	69.85
13	HT_6			-	20.38
14	I35_12A			5.43	
15	I35_12B			-	
16	I35_2			122.59	
17	I35_6B			32.06	
18	I35_7A	9		-	
19	I35_7G	16		-	
20	I35_7H			-	
21	I35_9b			21.82	
22	I40_1A			16.25	
23	I40_1B			-	13
24	I40_3			-	
25	M5			-	10
26	M6			35.53	20
27	M_14	10		-	
28	RCP_1			14.36	
29	RCP_2			-	28.00
30	RCP_4			-	
31	RL_3	9		-	
32	RL_4			455.11	
33	RL_6	10		-	
34	S_10			38.18	
35	S_4	29	365	-	120.00
36	S_6	9		-	
37	S_7	10		-	
38	S_8			34.10	
39	LW_1	10		-	20
40	M_2				20
Totals		**160**		**1240.96**	**763.47**
Calendar Days		**186.67**		**1447.78**	**890.72**

Table 4-55. Recommended Plan C3 Schedule

Hatchie-Loosahatchie Feasability Study | Classic Schedule Layout | 12-Dec-23 09:17

Activity ID	Activity Name	Planned Duration	Remaining Duration	Start	Finish
HL - 1	Hatchie-Loosahatchie Feasability Study	2320	2320	01-Jan-24	21-Nov-32
A1000	E&D RE Acqusition River Work	1253	1253	01-Jan-24*	01-Jan-28
A1010	E&D RE Acquisition - Earthwork	1253	1253	01-Jan-24*	01-Jan-28
A1020	E&D RE Acquisition - Bridges	1253	1253	01-Jan-24*	01-Jan-28
A1030	E&D RE Acquisition - Tree Planting	1253	1253	01-Jan-24*	01-Jan-28
A1040	NTP River Contract	30	30	01-Jan-28	05-Feb-28
A1050	NTP Bridge 1 Contract	30	30	01-Jan-28	05-Feb-28
A1060	NTP Tree Contract	30	30	01-Jan-28	05-Feb-28
A1070	River Contract	190	190	05-Feb-28	14-Sep-28
A1080	Bridge 1 Contract	365	365	05-Feb-28	06-Apr-29
A1090	Tree Contract	1500	1500	05-Feb-28	20-Nov-32
A1100	NTP Bridge 2 Contract	30	30	05-Mar-29*	08-Apr-29
A1110	Bridge 2 Contract	365	365	09-Apr-29	08-Jun-30
A1120	NTP Earthworks Contract	30	30	04-Mar-30*	07-Apr-30
A1130	Earthworks Contract	525	525	08-Apr-30	09-Apr-32
A1140	Project Completion	1	1	20-Nov-32	21-Nov-32

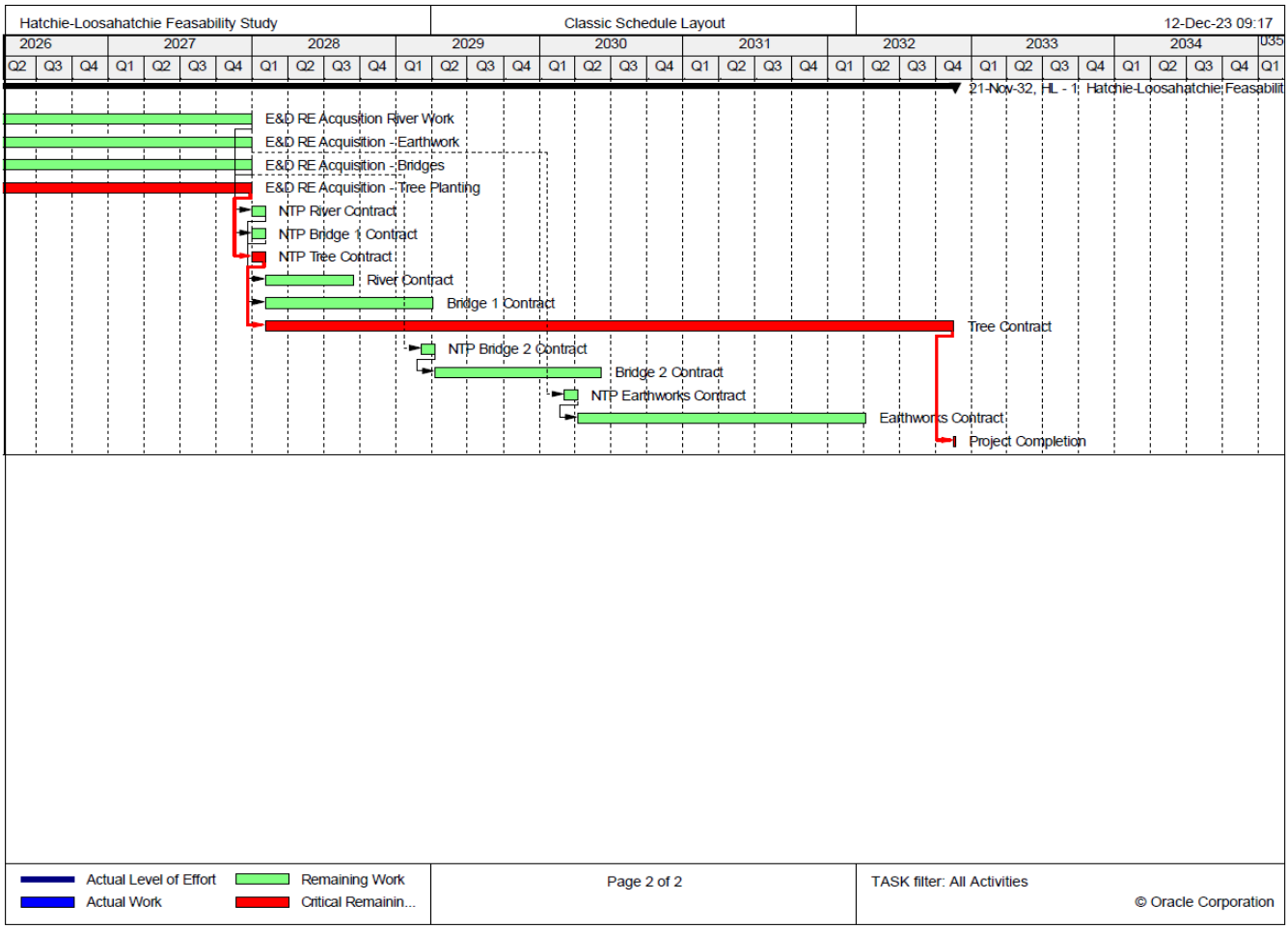


Actual Level of Effort | Remaining Work
Actual Work | Critical Remainin...

Page 1 of 2

TASK filter: All Activities

Table 4-56. Recommended Plan C3 Schedule



1.8 COST SCHEDULE RISK ANALYSIS

Table 4-57. Cost Schedule Risk Analysis CSRA

Cost & Schedule Summary for Risk Register Development

Project: Hatchie-Loosahatchie Study
Project Development Phase: Current Working Estimate
Meeting Date: 7/24/2023

Schedule Start: January 2024 *Month/Year*
Schedule Finish: November 2032 *Month/Year*
Duration: 106.7 Months

Schedule Contingency Duration: 8.5 Months
Schedule Contingency: 8%
Schedule with Contingency (80% Confidence): 115.2 Months
Finish Date with Contingency (80% Confidence): August 2033

	CW_WBS	Feature of Work	Base Cost	80% Confidence	80% Confidence ($)	80% Total
	Risk Not Included In CSRA					
1	01 - LANDS AND DAMAGES	Civil Works only; not included on MILCON Projects.	$14,646,600	20%	$2,929,320	$17,575,920
	Risk Included In CSRA					
2	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	CMP Culvert Demolition/Replacement	$115,658	32%	$37,011	$152,669
3	09 - CHANNELS AND CANALS	Channel Cleanout	$3,367,927	32%	$1,077,737	$4,445,664
4	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	Riprap Protection and Placement	$1,708,735	32%	$546,795	$2,255,530
5	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	River Training Structures (Chevron & Hardpoints)	$1,406,812	32%	$450,180	$1,856,992
6	06 - FISH AND WILDLIFE FACILITIES	Seasonal Herbaceous Wetland Seeding	$215,564	32%	$68,980	$284,544
7	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	Stop Log Structure	$139,077	32%	$44,505	$183,582
8	06 - FISH AND WILDLIFE FACILITIES	Tree Clearing/Grubbing	$69,389	32%	$22,204	$91,593
9	06 - FISH AND WILDLIFE FACILITIES	Tree Planting (Reforestation)	$3,926,217	32%	$1,256,389	$5,182,606
10	14 - RECREATION FACILITIES	Walking Trail/ Signage/Other Recreational Features	$170,116	32%	$54,437	$224,553
11	08 - ROADS, RAILROADS, AND BRIDGES	Bridge Replacement	$7,781,393	32%	$2,490,046	$10,271,439
12	14 - RECREATION FACILITIES	Interpretive Signage	$32,847	32%	$10,511	$43,358
13	12 - NAVIGATION, PORTS AND HARBORS	Stone & Pile Dike Notching	$523,849	32%	$167,632	$691,481
14	06 - FISH AND WILDLIFE FACILITIES	Woody Debris Traps	$392,344	32%	$125,550	$517,894
15	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	Concrete Box Culvert 6x4	$589,097	32%	$188,511	$777,608
16	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	Sluice Gates	$999,649	32%	$319,888	$1,319,537
17	15 - FLOODWAY CONTROL AND DIVERSION STRUCTURES	Pumps	$42,428	32%	$13,577	$56,005
18	18 - CULTURAL RESOURCE PRESERVATION	Cultural Resource Surveys	$342,480	32%	$109,594	$452,074
19	06 - FISH AND WILDLIFE FACILITIES	Adaptive Management	$4,014,501	32%	$1,284,640	$5,299,141
20			$0	0%	$0	$0
21			$0	0%	$0	$0
22			$0	0%	$0	$0
18	30 - PLANNING, ENGINEERING, AND DESIGN	Civil Works only; not included on MILCON Projects.	$4,034,712	32%	$1,291,108	$5,325,820
19	31 - CONSTRUCTION MANAGEMENT	Civil Works only; not included on MILCON Projects.	$3,875,712	32%	$1,240,228	$5,115,940
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)				$0	$0

TOTALS				
Risk Not Included In CSRA	$14,646,600	20%	$2,929,320	$17,575,920
Total Construction Estimate	$25,838,083	32%	$8,268,187	$34,106,270
Total Planning, Engineering & Design	$4,034,712	32%	$1,291,108	$5,325,820
Total Construction Management	$3,875,712	32%	$1,240,228	$5,115,940
Total EXCLUDING Risk Not Included In CSRA	**$33,748,507**	**32%**	**$10,799,523**	**$44,548,030**
Total INCLUDING Risk Not Included In CSRA	**$48,395,107**	**28%**	**$13,728,843**	**$62,123,950**
PROGRAMMED AMOUNT (IF KNOWN)				**$0**

Table 4-58. Abbreviated Risk Analysis ARA 001

CWWBS	Feature of Work	Contract Cost		% Contingency	$ Contingency	Total
01 LANDS AND DAMAGES	Real Estate	$ 1		20.00%	$ 0	$ 1.20
18 CULTURAL RESOURCE PRESERVATION	Cultural Resources	$ 1		11.93%	$ 0	$ 1.12
12 NAVIGATION, PORT S AND HARBORS	Pile Dike Notching	$ 1		9.09%	$ 0	$ 1.09
12 NAVIGATION, PORT S AND HARBORS	Stone Dike Notching	$ 1		9.09%	$ 0	$ 1.09
09 01 CHANNEL S	Channel Cleanout	$ 1		58.80%	$ 1	$ 1.59
15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	CMP Culvert	$ 1		33.82%	$ 0	$ 1.34
15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Concrete Box Culvert	$ 1		51.27%	$ 1	$ 1.51
09 03 WILDLIFE FACILITIES AND SANCTUARIES	Tree Planting	$ 1		26.41%	$ 0	$ 1.26
02 01 ROADS, Construction Activities	Bridge Replacement	$ 1		88.47%	$ 1	$ 1.88
09 FISH AND WILDLIFE FACILITIES	Woody Debris Traps	$ 1		26.68%	$ 0	$ 1.27
09 FISH AND WILDLIFE FACILITIES	Borrow Pit Excavation	$ 1		59.22%	$ 1	$ 1.59
09 FISH AND WILDLIFE FACILITIES	Ground Water Wells	$ 1		13.35%	$ 0	$ 1.13
	Remaining Construction Items	$ -	0.0%	0.00%	$ -	$ -
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	$ 1		18.59%	$ 0	$ 1.19
31 CONSTRUCTION MANAGEMENT	Construction Management	$ 1		20.30%	$ 0	$ 1.20
	Totals					
	Real Estate	$ 1		20.00%	$ 0	$ 1.20
	Total Construction Estimate	$ 11		35.28%	$ 4	$ 15
	Total Planning, Engineering & Design	$ 1		18.59%	$ 0	$ 1
	Total Construction Management	$ 1		20.30%	$ 0	$ 1
	Total	$ 14			$ 4	$ 18

Table 4-59. Abbreviated Risk Analysis ARA 002

	CWWBS	Feature of Work	Contract Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ 1		20.00%	$ 0	$ 1.20
1	06 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	Mobilization/Demobilization	$ 1		15.72%	$ 0	$ 1.16
2	06 01 ROADS	Gravel Resurfacing	$ 1		14.21%	$ 0	$ 1.14
3	12 NAVIGATION, PORTS AND HARBORS	Riprap Hardpoints	$ 1		20.41%	$ 0	$ 1.20
4	18 BANK STABILIZATION	Riprap Bank Protection	$ 1		27.47%	$ 0	$ 1.27
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Riprap Inlet/Outlet Protection	$ 1		46.13%	$ 0	$ 1.46
6	12 NAVIGATION, PORTS AND HARBORS	River Training Structure	$ 1		27.47%	$ 0	$ 1.27
7	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Stop Log Structures	$ 1		54.98%	$ 1	$ 1.55
8	14 RECREATIONFACILITIES	Clearing and Grubbing	$ 1		43.04%	$ 0	$ 1.43
9	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Dewatering/Unwatering	$ 1		65.69%	$ 1	$ 1.66
10	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Other Excavation	$ 1		49.28%	$ 0	$ 1.49
11	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Stone Structures (Weirs, Grade Control)	$ 1		25.49%	$ 0	$ 1.25
12		Remaining Construction Items	$ 1	9.1%	46.13%	$ 0	$ 1.46
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	$ 1		29.39%	$ 0	$ 1.29
14	31 CONSTRUCTIONMANAGEMENT	Construction Management	$ 1		32.35%	$ 0	$ 1.32

Totals					
Real Estate	$ 1	20.00%	$ 0	$	1.20
Total Construction Estimate	$ 12	36.34%	$ 4	$	16
Total Planning, Engineering & Design	$ 1	29.39%	$ 0	$	1
Total Construction Management	$ 1	32.35%	$ 0	$	1
Total	$ 15		$ 5	$	20