UPPER MISSISSIPPI RIVER RESTORATION

ENVIRONMENTAL MANAGEMENT PROGRAM

DEFINITE PROJECT REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESMENT

RIP RAP LANDING STATE FISH & MIGRATORY WILDLIFE MANAGEMENT AREA

HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Draft

May 2014

US Army Corps of Engineers ®
St. Louis District

MISSISSIPPI RIVER POOL 25
RIVER MILES 260.5 TO 267
CALHOUN COUNTY, ILLINOIS

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EXECUTIVE SUMMARY

A. Purpose of Report. The purpose of this Draft Definite Project Report with Integrated Environmental Assessment, including the draft Finding of No Significant Impact, is to evaluate and document the decision-making process for the proposed Upper Mississippi River Restoration –Environmental Management Program (UMRR-EMP) Habitat Rehabilitation and Enhancement Project (HREP) at the Rip Rap Landing State Fish and Migratory Wildlife Management Area. This report is being developed by the U.S. Army Corps of Engineers with the Illinois Department of Natural Resources (IDNR) serving as the project sponsor. This report provides planning (including National Environmental Policy Act compliance), engineering, and sufficient construction details of the Tentatively Selected Plan (TSP) to allow final design and construction to proceed subsequent to document approval by the Mississippi Valley Division U.S. Army Corps of Engineers.

B. Project Location. The Rip Rap Landing HREP is located along the left-descending bank of the floodplain within the Upper Mississippi River Navigation Pool 25 between river miles (RM) 260.5 and 267 near the Village of Mozier in Calhoun County, Illinois (Figure 1.1). The historic Sny River channel, now known as Sny Creek traverses the project area from north to south and forms a portion of the east property boundary.

Rip Rap Landing (RRL) covers 2,338 acres of river bottomlands, of which 2,055 acres are owned by the IDNR and 283 acres are owned by the Corps of Engineers as General Plan Lands, known as Dog Island. The Natural Resource Conservation Service has a 792.8 acre Wetland Reserve Program (WRP) easement on a tract owned by IDNR known as the Rust Land Trust tract. The entire area is managed by IDNR as part of the Mississippi River State Fish and Wildlife Area, a complex of mostly wetland habitats along the Illinois and Mississippi Rivers. All project area lands are managed by IDNR.

C. Problem Identification. Historically, RRL provided high quality habitat for a diversity of plant and animal species, including migratory birds and other wetland species. However, in the late 1890s, the Sny Island Drainage and Levee and District (D&LD) was constructed along with a closure levee north of Waverly Lake that left a portion of the Old Sny levee extending south for several miles . The Old Sny Levee extension divides the project area with lands on the riverside being subject to flooding and over-bank scouring, while lands west are less impacted because

this remnant levee acts as a sediment deflection berm reducing scouring flows and river-borne sedimentation.

The main resource problem for the project area is altered hydrology resulting from the operation of navigation lock and dams. These dams have raised water levels on the Mississippi River and have altered much of the natural flooding and drying cycles experienced by historic wetlands. Sedimentation also impacts wetlands in the project area causing them to fill and degrade. RRL is the first opportunity for the Mississippi River to widen and slowdown downstream of the Sny D&LD. With this slowdown, river-borne sediments are deposited within the project area during overbank flooding events degrading wetland habitats. This flooding is scouring other areas and degrading habitat. RRL is unique because a portion of the original levee extended south along the west side of Sny Creek acting like a sediment deflection structure, buffering the impacts of overbank flows from the Mississippi River and creating a backwater flooding effect not typically observed in the region. Additionally, flood waters back into the lands east of the Old Sny Levee extension, depositing progressively less silt as it inundates areas further north.

Land ownership, property use restrictions and levee protection varies throughout the site. Therefore, the site has been divided into zones (Figures 2.1-2.6) for project planning purposes:

Zone 1 is on the northern most end of the project area and is contained within the Sny Island Drainage and Levee District, and therefore, unlikely to be flooded by the river.

Zone 2, State Natural Area, is not protected from Mississippi River flooding and has been designated a State Natural Area due to a significant historic forest composition of bottomland hardwood forest. This zone lost many trees during and after the flood of 1993, and currently the invasive species reed canary grass is becoming established throughout the zone.

Zone 3, Roadside and Waverly Lake Wetland Management Area, is part of the original IDNR acquisition and consists of wetlands managed primarily for migratory wildlife and has a small disconnected lake. IDNR attempts water level management in this zone with spring and early summer drawdowns to promote growth of moist soil vegetation followed by a fall flood to provide habitat during the fall migration. This zone has suffered due to insufficient water conveyance capability.

Zone 4, Rust Land Company-WRP Easement, is located adjacent to the Mississippi River. A natural levee has formed along the river but low spots within this levee allow for headwater flooding resulting in wetland scouring and river-borne sedimentation in the zone. Most of the zone was in agricultural production. The former agricultural fields are dominated by herbaceous vegetation preventing regeneration of trees. Furthermore, the invasive species reed canary grass is becoming established throughout the zone. Generally, insufficient water has been available for optimum wetland management.

Zone 5, General Plan Lands-Dog Island, is the southernmost part of the project area, located at the confluence of Sny Creek with the Mississippi River. The Sny Creek channel has been impacted by sediment from both the river and the hillside watersheds that drain into the creek, reducing depth of the creek to two feet or less and cutting off fish access from the Mississippi River except during periods of flooding.

D. Project Goal and Objectives. The goal of this HREP is *to increase the quality and quantity of aquatic, non-forested wetland, and forested wetland habitats.* The following objectives and structural and natural feasible restoration features were considered in detail to achieve the project goal:

Objective 1. Increase habitat available to fish over the period of analysis.

Zones 3, 4 and 5: Improve fish access into Sny Creek and Roadside Lake from the Mississippi River.

- No Action
- Roadside Lake excavation to Sny Creek,
- Excavating from Roadside Lake to Dog Island, and
- Excavating along Dog Island to the Mississippi River.
- Water control structure at Roadside Lake
- Portable pump

Objective 2. Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management over the period of analysis.

Zone 1: Create a functional management unit by managing water level for enhancement of existing and restored habitats:

- No Action
- Install a 2,500 gpm well and pump
- Install a water control structure in the Sny Levee and Drainage District channel
- Excavate a channel to Goose Pasture Lake

Zones 3 and 4: Improve the water movement, availability, and water level management for Zone 3, Waverly Lake and associated wetlands, and create a wetland management complex in Zone 4.

- No Action
- Widen and deepen channel to Waverly Lake
- Larger water control structure in channel
- Water control structures into north units
- 35,000 gpm pump station
- Pump channel widening
- Pipe and concrete under access road to channel
- Water control structure under Sny levee extension
- Water control structure under road to Zone 4
- South spillway in Zone 4
- Water control structure in South spillway

Objective 3. Reduce impacts of headwater flooding and river-borne sedimentation over the period of analysis

- No Action
- Fill in scour areas in natural river levee in Zone 4

Objective 4. Increase quantity and quality of bottomland hardwood forest over the period of analysis

- Restore 63 acres of cropland to bottomland forest as an enhancement to water control in Zone 1
- Restore 37 acres of cropland to bottomland forest in Zone 3

E. Plan Formulation, Evaluation, and Comparison. A variety of features to restore habitats in the project area were proposed as a result of a Value Engineering Study and hydrogeomorphic-based workshop. Feasible features that met the project goal and objectives, as well as the no action alternative, were evaluated through an environmental benefits analysis to determine the magnitude of ecosystem benefits to be expected if the features were implemented. The benefits of the feasible features were evaluated using the Aquatic Habitat Appraisal Guide (AHAG) and Wildlife Habitat Appraisal Guide (WHAG) methodologies. The benefits were then combined with cost estimates for each feature. Ecosystem benefits and project costs were then run through Cost Effectiveness and Incremental Cost Analysis using the U.S. Army Corps of Engineers Institute of Water Resources Program (IWR). This incremental analysis identifies which combinations of enhancement features and their associated environmental outputs (Habitat Units) will be both cost efficient and cost effective. This analysis also delineates the changes in cost for increasing levels of environmental output. This analysis resulted in 40 cost effective alternatives, and a total of 10 that were considered "Best Buy" Alternatives, including the No Action Alternative. These 10 alternatives were then compared and assessed on their ability to meet project objectives, NEPA compliance, and achieving the USACE Planning and Guidance evaluation criteria of acceptability, completeness, effectiveness, and efficiency (ER 1105-2-100).

F. Plan Selection. The tentatively selected plan (Alternative 8) for the Rip Rap Landing HREP meets the project goal and objectives by implementing the following proposed features within the project area:

- Improved water level management (drainage and delivery) on 713 acres of wetlands in Zones 1, 3, and 4
- Conversion of approximately 100 acres of cropland and former cropland to bottomland forest within Zones 1 and 3
- Riverside ridge scour embankment in Zone 4
- Excavation of Sny Creek to restore year-round access for fish from the Mississippi River to Roadside Lake in Zones 4 and 5.

The tentatively selected plan (TSP) is a best buy alternative that yields 431 net average annual habitat units (AAHUs) at an annual average cost of $1,287 per net habitat unit. It best meets the project objectives and has partner support from IDNR. Implementation of the TSP would increase quality and quantity of ecosystem resources and meet the needs for a variety of native aquatic and floodplain species.

Project features are located on lands owned by Illinois Department of Natural Resources or federally owned (Dog Island, 283 acres). As a result, first cost funding for project features located on non-federal lands will be cost-shared with 65% Federal and 35% non-Federal. The Dog Island excavation feature is located on Federally-owned lands, as a result first cost funding for this feature would be 100% Federal. Based on October 2014 price levels, the estimated project first cost is $9,006,000 not including monitoring and adaptive management costs of $26,000. In accordance with the cost share provisions in Section 1103 of the Water Resources Development Act of 1986 (P.L. 99-662) as amended by Section 509 of the Water Resources

Development Act of 1999 (P.L. 106-53), the Federal share of the project first cost is estimated to be $6,250,000 and the non-Federal share is estimated to be $ 2,756,000 which equates to 69% Federal and 31% non-Federal in total. This final percentage calculation is a result of some of the features being located on Federal lands and thus being a 100% Federal cost with the rest being cost shared at the traditional 65/35 percentages. The non-Federal costs include the value of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas (LERRD) estimated to be $2,886,000. Project operations, maintenance, repair, rehabilitation, and replacement (OMRR&R) at an estimated average annual cost of $141,800 would be accomplished by the cost-sharing project sponsor.

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**NEPA Information can be found in Chapters 1, 2, 3, 4, 5, 6, 9, 13, 14, and 16 (FONSI)*

APPENDICES

PLATES

UPPER MISSISSIPPI RIVER RESTORATION
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1*. INTRODUCTION

A. Location. The Upper Mississippi River Restoration – Environmental Management Program (UMRR-EMP) Rip Rap Landing Habitat Rehabilitation and Enhancement Project (HREP) is located on the left descending bank of the Mississippi River in Pool 25 between Upper Mississippi River Miles (RM) 260.5 and 267, adjacent to the village of Mozier, IL, in Calhoun County, Illinois. The project area is unique because it includes a large contiguous tract (2,338 acres) of primarily river bottomlands. All lands within Rip Rap Landing (RRL) are managed by the Illinois Department of Natural Resources (IDNR). The IDNR owns 2,055 acres of the project lands, while the remaining 283 acres Dog Island Complex is in federal ownership by the U.S. Army Corps of Engineers (Corps or USACE). The Dog Island Complex is part of the General Plan lands owned by the Corps, which is managed by IDNR through a three party agreement with the Corps, the US Fish and Wildlife Service (USFWS), and IDNR Corps-owned lands. Approximately 793 acres of the IDNR-owned land known as the Rust Land Company tract has an easement in place from the Natural Resource Conservation Service (NRCS) under the Wetland Reserve Program (WRP)[1]. IDNR purchased this acreage and incorporated it into the Rip Rap Landing Management Area. Restoration features already built on this portion of the management area under the WRP program are incorporated into the planning of the larger Corps ecosystem restoration project. Any features implemented under the Corps project will comply with the terms of the WRP easement. Vicinity and location information for Rip Rap Landing HREP are provided in Figure 1.1.

B. Purpose. The purpose of this Definite Project Report (DPR) is to present a detailed proposal for the rehabilitation and enhancement of fish and wildlife habitat resources at Rip Rap Landing State Fish and Migratory Wildlife Management Area (Rip Rap Landing) Habitat Rehabilitation and Enhancement Project (HREP). This report provides planning, engineering, and sufficient construction details of the tentatively selected plan (TSP) which will allow final design and construction to proceed subsequent to approval of the document. The Environmental Assessment (EA) for the project is integrated within this DPR. There is also a section devoted to

[1] The WRP is a voluntary program that provides technical and financial assistance to landowners and Tribes to restore, protect, and enhance wetlands in exchange for retiring eligible land from agricultural production. Wetlands are protected under a WRP easement to provide habitat for fish and wildlife, including threatened and endangered species, improve water quality, reduce flooding, recharge groundwater, protect biological diversity, and provide opportunities for educational and scientific investigations and limited recreational activities.

the Finding of No Significant Impact (FONSI). The preparation of the DPR will follow Corps of Engineers planning guidance in ER1105-2-100.

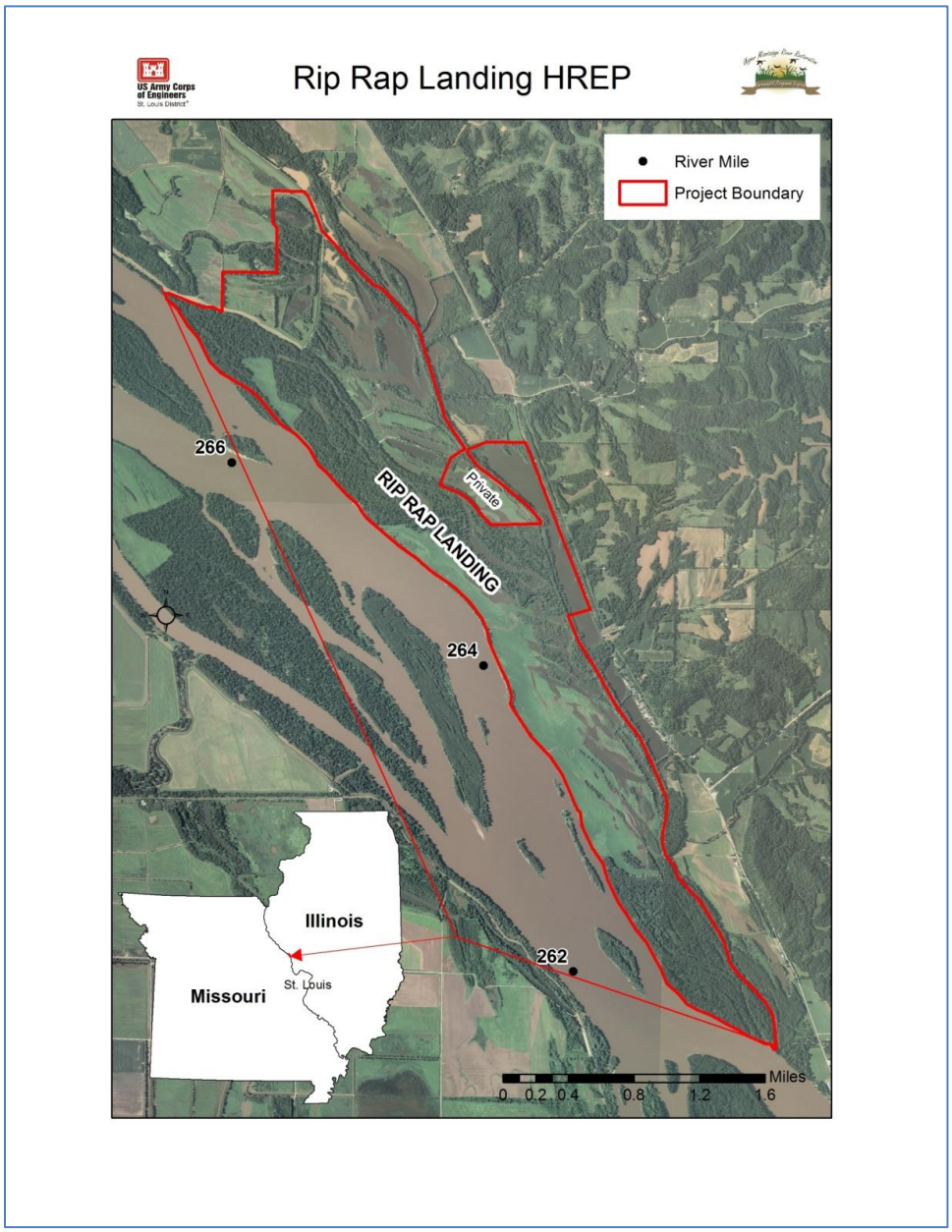

Figure 1. 1. Project Location Map

C. Project Selection. The IDNR identified the Rip Rap Landing HREP for inclusion in the St. Louis District's UMRR-EMP. The River Resources Action Team (RRAT)[2] then ranked the project based on critical habitat needs along the Mississippi and Illinois Rivers. After considering resource needs and deficiencies, the RRAT recommended and supported the Rip Rap Landing HREP because it provides opportunities for significant aquatic, wetland, and floodplain ecosystem benefits. The project will provide enhanced management capability for fish and wildlife and aid rehabilitation of bottomland hardwood forest, a scarce resource along the Mississippi River. Ecosystem restoration and enhanced capability to manage the project area for fish and wildlife would only be achieved by implementing the proposed project enhancement features.

D. Resource Problems and Opportunities**.** The natural habitat value on the Rip Rap Landing Fish and Migratory Wildlife Management Area has been diminished by sedimentation of wetlands and water bodies, loss of bottomland forest, disruption of the hydrologic cycle, loss of connection between water bodies and the river, and clearing for row crop agricultural production.

Historically, RRL provided high quality habitat for a diversity of plant and animal species, including migratory birds and other wetland species. When the Sny Island Drainage and Levee District (D&LD) was originally constructed in the late 1890s, the main levee extended southward, west of Waverly Lake and along Sny Creek. At that time, landowners occupying the RRL project area decided they did not want to be included in the Sny D&LD, so the D&LD constructed a closure levee north of Waverly Lake. This left an extension of the Sny levee that extended south for several miles, but was open on the southern end. The Sny Levee consists of 50 miles of riverside levee constructed to 100-year protection.

The project area's hydrology has been impacted by the operation of locks and dams for navigation purposes. The dams maintain an unnaturally high water level throughout the navigation pool during summer and other naturally low river seasons. This has severely altered the natural flooding and drying cycles necessary for natural wetland functions. The project area's proximity to the hinge point, or middle area of the navigation pool, results in frequent localized river level fluctuations that impact plant growth in neighboring wetlands.

The project area is also impacted by river-borne sediments. RRL is the first opportunity for the Mississippi River to widen and slowdown downstream of the Sny D&LD. With this slowdown, river-borne sediments are deposited within the project area during overbank flooding events degrading wetland habitats. RRL is unique because a portion of the original levee extended south along the west side of Sny Creek acting like a sediment deflection structure, buffering the impacts of overbank flows from the Mississippi River and creating a backwater flooding effect not typically observed in the region.

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[2] The RRAT is comprised of members from the Missouri Department of Conservation (MDC), USFWS (co-chairman), IDNR, participating NGO's, Corps (co-chair), and is the interagency coordination team for the St. Louis District to plan and implement habitat restoration projects on the Upper Mississippi River.

Land purchases by IDNR in 2001 and 2003 increased the size of the state holdings by 836 acres, providing an opportunity to improve management capabilities in the project area. These additional acres were partially under the WRP easement and located in the central portion of the management area, south of the access road and bordering the Mississippi River. Water movement capabilities in the area are inadequate and the opportunity to manage additional areas of habitat has been greatly increased due to land acquisition.

A portion of the project area is designated as a State Natural Area. It was given this status because of the extensive bottomland hardwood forest composition that was present when the tract was acquired. The major Mississippi River flood in 1993 did a tremendous amount of damage to the natural area forest, as well as other wetland and aquatic habitats within the project area due to the height and duration of inundation as well as a breach in the old Sny levee extension causing extensive tree mortality, especially among mature pin oak trees, as well as sedimentation. In addition, river-borne sediment have severely impacted the Sny Creek channel and associated backwater lakes.

Significant opportunities exist to restore, rehabilitate, enhance and increase wetland and aquatic habitat through reforestation of bottomland forest, enhanced water level management and supply, improved side channel and slough habitat and improved depth diversity at RRL. Rip Rap Landing and other floodplain conservation areas located in the vicinity of the confluence of the Illinois, Missouri and Mississippi Rivers provide mid-migration habitat for the Mississippi Flyway, one of the major flight corridors in North America for migratory birds. The Mississippi River and floodplain are the center of this flyway. This mid-migration habitat is recognized in the North American Migratory Wildlife Management Plan as a habitat of major concern. The proposed HREP at RRL has the opportunity to contribute to improving this mid-migration habitat, ecosystem structure and function of Pool 25, and the Upper Mississippi River System as a whole.

E. Resource Significance. The Mississippi River represents the largest riverine ecosystem in North America and the third largest in the world. The Upper Mississippi River is the portion of the Mississippi River upstream of Cairo, Illinois and its watershed encompasses over 2.6 million acres of aquatic, wetland, forest, prairie, and agriculture, supporting over 300 species of birds, 57 species of mammals, 45 species of amphibians and reptiles, 150 species of fish, and nearly 50 species of mussels. More than 40 percent of North America's migratory waterfowl and shorebirds depend on the food resources and other life requisites (shelter, nesting, rearing habitats, etc.) that the watershed provides and is well documented in the literature for its technical significance involving connectivity (*e.g.*, Mississippi River Flyway), biodiversity, and endangered species (*e.g.*, pallid sturgeon). The importance of these resources was recognized by Congress in the Water Resources Development Act of 1986 by their designation of the Upper Mississippi River System (UMRS) as a "nationally significant ecosystem" and a "nationally significant commercial navigation system"(Section 1103(a)(2)). Institutional recognition of this resource's significance was further recognized by Congress' initial and continued authorization of the Upper Mississippi River Restoration - Environmental Management Program (UMRR-EMP) for the planning, construction, and evaluation of features for restoration of fish and

wildlife habitat in the UMRS. Public recognition for the value of this ecosystem comes from several partnerships within the basin wanting to address resource needs and restore the Mississippi River (*e.g.*, Middle Mississippi River Partnership; Floodplain Science Network; River Partnership of Community Foundations; Fishers and Farmers Partnership for the Upper Mississippi River Basin, and many more). Additionally, the National Research Council recognized the ecological significance of large floodplain rivers and identified the Mississippi River and Illinois River as examples of two such rivers in the United States that could become healthy again with proper management and restoration. The Rip Rap Landing State Fish and Wildlife Area is part of this nationally significant ecosystem.

F. Scope of Study. This HREP focuses on proposed project features that would improve aquatic, wetland, and bottomland hardwood forest habitats, and enhance overall resource values of the project area. The project is consistent with IDNR, USFWS and UMRR-EMP management goals.

Aerial photography, topographic surveys, and habitat quantification procedures were completed to support the planning and assessment of proposed project alternatives. Soil borings will be taken to determine soil properties such as gradation, permeability and consolidation, which are required for the design of proposed water control features. Sediment profiles and characteristics will be obtained for Sny Creek and other wetlands where excavation is proposed, as needed.

IDNR has made wildlife observations within the study area. These observations, along with future studies and monitoring for fish and wildlife, will assist in evaluating project performance.

G. Format of Report. The DPR is organized to follow a general problem-solving format. The purpose, problems and project selection process are presented in Section 1. Section 2 establishes the baseline for existing resources. Section 3 presents the objectives of the project. Section 4 describes proposed project features and Section 5 evaluates alternatives for meeting the objectives. Section 6 describes the tentatively selected plan and lists general design and construction considerations. Section 7 proposes the schedule for final design and construction. Section 8 contains cost estimates for initial construction and operations, maintenance, repair, rehabilitation, and replacement. Section 9 assesses the environmental effects of the tentatively selected plan. Section 10 describes a plan for monitoring performance and evaluating progress. Section 11 describes real estate requirements. Section 12 summarizes the roles of each sponsoring agency. Section 13 records the coordination effort with local, state, and federal agencies and comments received through public outreach. Sections 14 and 15 present the conclusions and recommendations. Section 16 includes a Finding of No Significant Impact (FONSI) statement and References follow. Figures, plates and appendices have been furnished to provide sufficient detail to allow review of the existing features and the tentatively selected plan.

H. Authority. The Upper Mississippi River Restoration-Environmental Management Program (UMRR-EMP) is currently a Federal-State partnership designed to (a) plan, construct and evaluate features for fish and wildlife habitat improvement through HREPs and (b) monitor the natural resources of the river system through the Long Term Resource Monitoring Program

(LTRMP) as authorized in the Water Resources Development Act (WRDA) of 1986 (P.L. 99-662), Section 1103(e)(1). This states:

> *To ensure the coordinated development and enhancement of the Upper Mississippi River system, it is hereby declared to be the intent of Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system. Congress further recognizes that the system provides a diversity of opportunities and experiences. The system shall be administered and regulated in recognition of its several purposes (Section 1103(a)(2)).*

Elements of the UMRR-EMP originally included HREP, LTRMP, Computerized Inventory and Analysis System, Recreation Projects, Economic Impacts of Recreation Study and Navigation Traffic Monitoring. Currently, UMRR-EMP is only comprised of two elements: HREP and LTRMP which includes the computerized database for inventory and analysis. The other UMRR-EMP elements either have been successfully completed or are now carried out under other authorities.

The original authorizing legislation has been amended three times since its enactment. The 1990 WRDA (P.L. 101-640), Section 405, extended the original EMP authorization an additional 5 years to FY 2002, which allowed for ramping up of the program. The 1992 WRDA (P.L. 102-580), Section 107, amended the original authorization by allowing limited flexibility in how funds are allocated between HREP and LTRMP. The 1992 WRDA also assigned sole responsibility for operations, maintenance, repair, rehabilitation, and replacement of habitat projects to the agency that manages the lands on which the project is located. The 1999 WRDA (P.L. 106-53), Section 509, reauthorized UMRR-EMP as a continuing authority with reports to Congress every 6 years and changed the cost sharing percentage from 25 percent to 35 percent.

The authority for this DPR is provided by the 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The proposed project would be funded and constructed under this authorization. The RRL HREP has a cost sharing requirement for the state owned lands but not for the Dog Island Complex because those project features are located on federally owned land managed by the IDNR as a fish and wildlife area. General Plan lands in this location are those lands purchased by the Corps for the nine-foot channel project in the late 1930's. The Fish and Wildlife Coordination Act of 1958 allowed for "General Plan and Cooperative Agreements", that were approved in the 1960's, providing for state participation in managing federal lands for wildlife resources and habitat through tripartite agreements among the states, USFWS, and the Corps.

I. Scoping and Coordination. Scoping is an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. Scoping was conducted during the planning process using a variety of communication methods with the affected public, agencies, and organizations. The input received during scoping was incorporated in the process of making decisions for the RRL HREP; however, USACE must ultimately make the decision which direction the HREP will follow.

Development of this report was actively coordinated with the project stakeholders: USFWS, IDNR, and NRCS. Coordination occurred during visits to the project site, team meetings, phone conversations, and a hydrogeomorphic-based Value Engineering Study workshop at the site.

A public meeting will be held to encourage the public to provide comments on the proposed actions.

J. Prior Reports and Existing Projects. The Corps and others have prepared numerous reports on the UMRS near the Rip Rap Landing area. The following reports contain the most relevant information for the current effort:

Upper Mississippi River Restoration-Environmental Management Program, Pools 25 and 26 Islands Habitat Rehabilitation and Enhancement Project. U. S. Army Corps of Engineers, St. Louis District, June 2008. Part of this UMRR-EMP HREP is located just downstream of Rip Rap Landing. The report recommended approval of the proposed project to include reforestation of 110 acres, dredging to restore slough and river connections, and dredging and control structures to improve depth in island sloughs. The project is currently under construction

Upper Mississippi River Restoration-Environmental Management Program, Stag Island Habitat Rehabilitation and Enhancement Project. U. S. Army Corps of Engineers, St. Louis District, 1998. This UMRR-EMP HREP is located just downstream of Rip Rap Landing. The report recommended approval of the proposed project to include the construction of a dike at the head of the island complex to protect the interior sloughs and off-bank revetment along portions of the islands to prevent erosion. The project has completed construction.

Upper Mississippi River Restoration-Environmental Management Program, Batchtown Habitat Rehabilitation and Enhancement Project. U. S. Army Corps of Engineers, St. Louis District, 1997. This UMRR-EMP HREP is located just downstream of Rip Rap Landing. The report recommended approval of the proposed project to include the construction of low levees to reduce sediment influx, gravity drains, pumping facilities, hillside sediment control, and a chevron river training structure. The project is currently under construction.

Mozier Creek Streambank Investigation. R. W. Windhorn, 2000. This report examines the sedimentation and erosion rates for the seven creeks in the Mozier water shed which drains into the Rip Rap Landing site.

Scott and Benn 2011. This report discusses the cultural resources of the project area.

2*. ASSESSMENT OF EXISTING RESOURCES

Overall, RRL includes 2,338 acres of primarily river bottomlands along the Illinois bank of the Mississippi River. The area is managed mainly for migratory and resident wildlife and contains a State Natural Area. Rip Rap Landing is managed as part of the Mississippi River State Fish and Wildlife Area, a complex of mostly wetland habitats along the Illinois and Mississippi Rivers. The entire acreage of RRL included in this UMRR-EMP project is located along the Illinois bank extending between Mississippi River Miles 260.5 and 267. The area is bounded on the north by the Sny Island Drainage and Levee District (D&LD), on the west and south by the Mississippi River, and on the east by the Sny Creek channel and wetlands and private land holdings. Land ownership, property use restrictions and levee protection varies throughout the site. Therefore, the site has been divided into zones for project planning purposes. An aerial view of RRL with the project area outlined and key landscape zones identified (Table 2.1; Figure 2.1).

Table 2. 1. Acreage of each zone at Rip Rap Landing

Zone	Key Landscape Feature	Habitat Type				
		Cropland	Forested Wetland	Non-Forested Wetland	Misc. (Roads, levees)	Total
1	Sny Island Drainage & Levee District	62.9	90.8	42.3	13.7	209.7
2	State Natural Area	34.8	288.9	17.8	10.0	351.5
3	Roadside and Waverly Lakes	36.5	283.5	370.3	9.7	701.0
4	Rust Land Company - WRP	410.0	191.1	191.7	1.0	792.8
5	General Plan Lands - Dog Island	0	240.7	42.3	0	283

Zone 1 – Sny Island Drainage and Levee District. Zone 1 lies at the northernmost end of the project area and is contained within the Sny Island Drainage and Levee District (Sny D&LD) and is subject to their regulations and pumping regimes (Figure 2.2).

Zone 2 – State Natural Area. Zone 2 lies at the north end of the project area and to the west and southwest of Zone 1, and west of the main Sny D&LD levee and the old levee extension to the south (Figure 2.3). This zone has been designated a State Natural Area due to a significant historic forest composition of bottomland hardwood forest. The Mississippi River bounds the west side of the zone, and the river edge is accreting, forming a natural levee. Zone 2 is the first chance the Mississippi River is able to slow down downstream of the extensive Sny D&LD which causes deposition of river-borne sediment degrading the wetland habitats.

Zone 3 – Roadside and Waverly Lake Wetland Management Areas. Zone 3 lies immediately south of Zones 1 and 2 occupying the middle portion of the project area (Figure 2.4). This zone is protected by the old Sny levee extension, which in recent history was breached during the floods of 1993 and 2008. The Waverly Lake Wetland Management Area does have limited water level management through a pump station located on the Mississippi River. This pump station is functional and can supply water to Zone 3, but it currently lacks the capacity to supply water to adjacent zones (i.e. Zone 4).

Zone 4 – Rust Land Company – WRP Easement. Zone 4 occupies the southwest portion of the project area, adjacent to the Mississippi River (Figure 2.5). This area had been cleared from row crop agriculture, but was last farmed in 2003. NRCS holds a WRP easement on this tract. IDNR manages this area, but management is difficult due to lack of sufficient water control abilities.

Zone 5 – General Plan Lands – Dog Island. Zone 5 is the southernmost part of the project area, located at the confluence of Sny Creek (old Sny River channel) with the Mississippi River (Figure 2.6). This area is owned by the Corps as part of its General Plans lands, which are managed by IDNR under an agreement between the Corps, the USFWS, and IDNR.

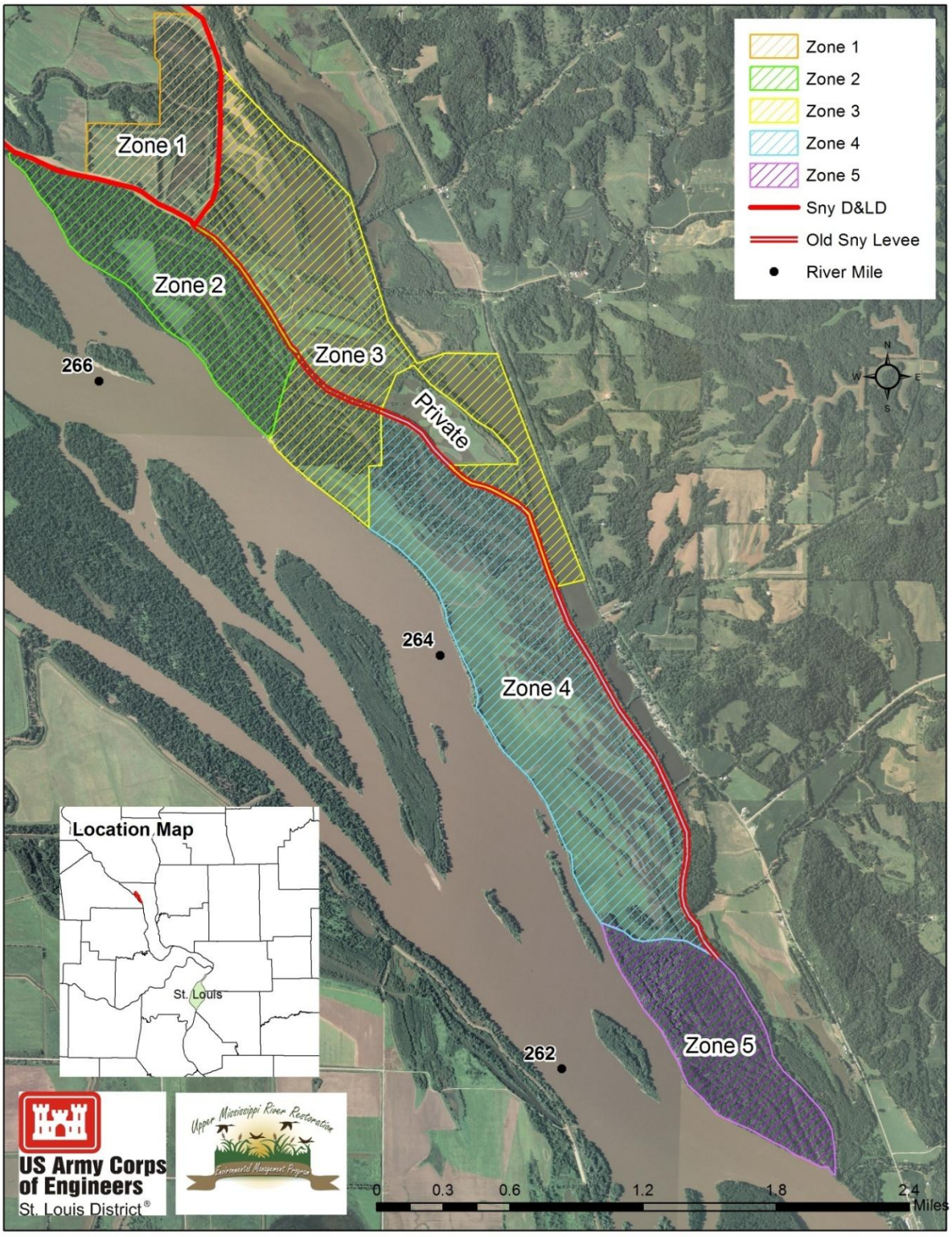

Figure 2.1. Project Zones at Rip Rap Landing

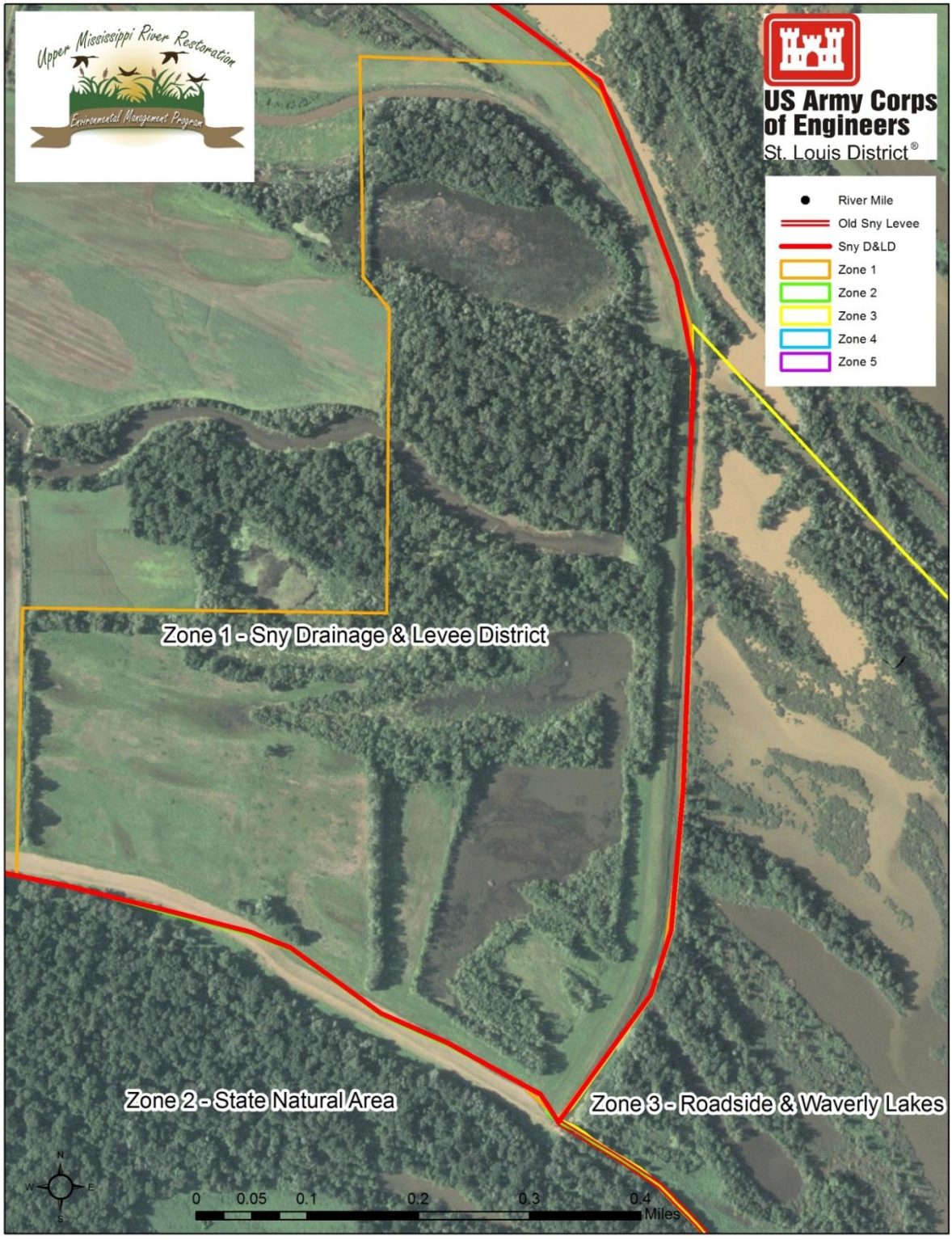

Figure 2.2. Rip Rap Landing Zone 1 – Sny Island Drainage and Levee District

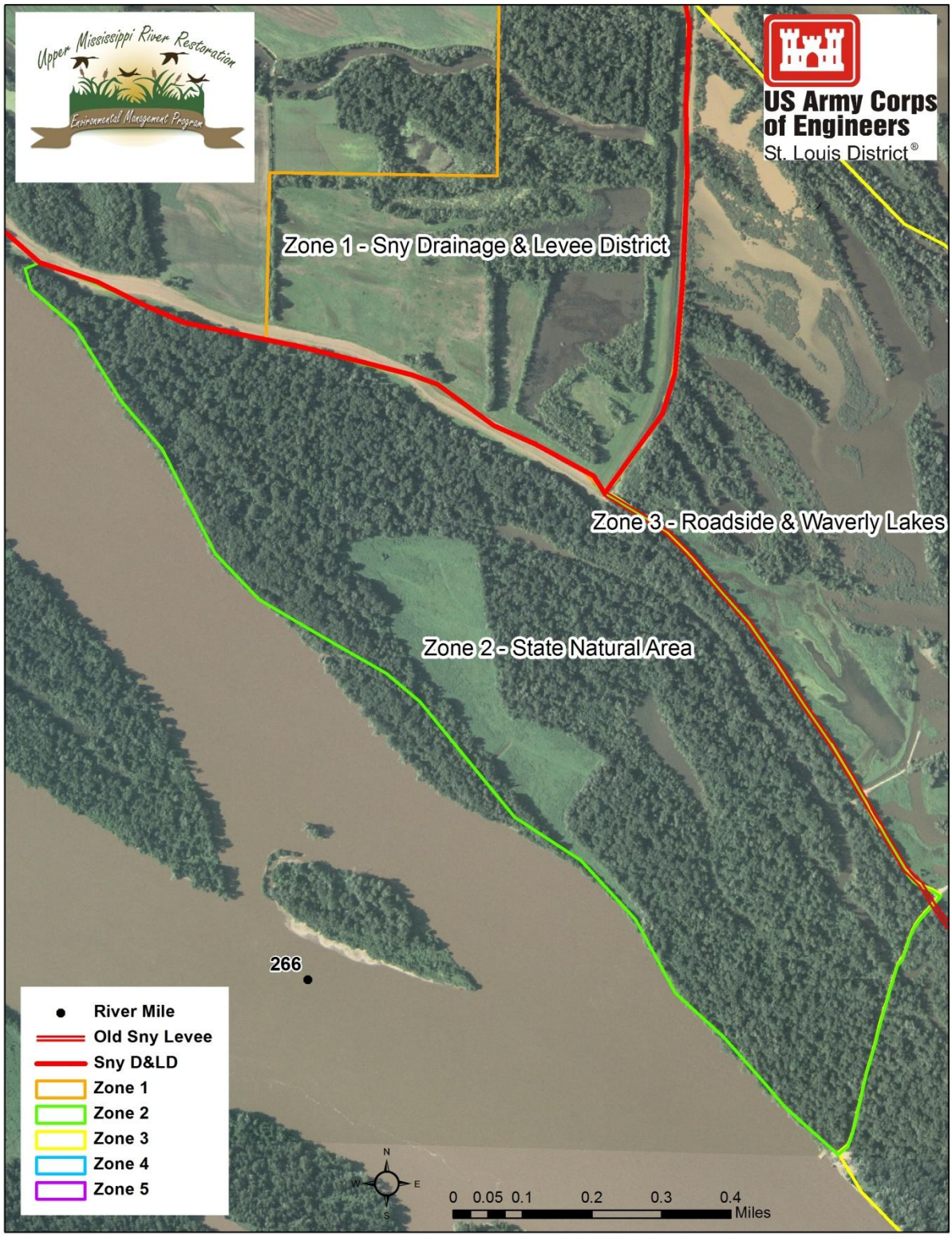

Figure 2.3. Rip Rap Landing Zone 2 – State Natural Area

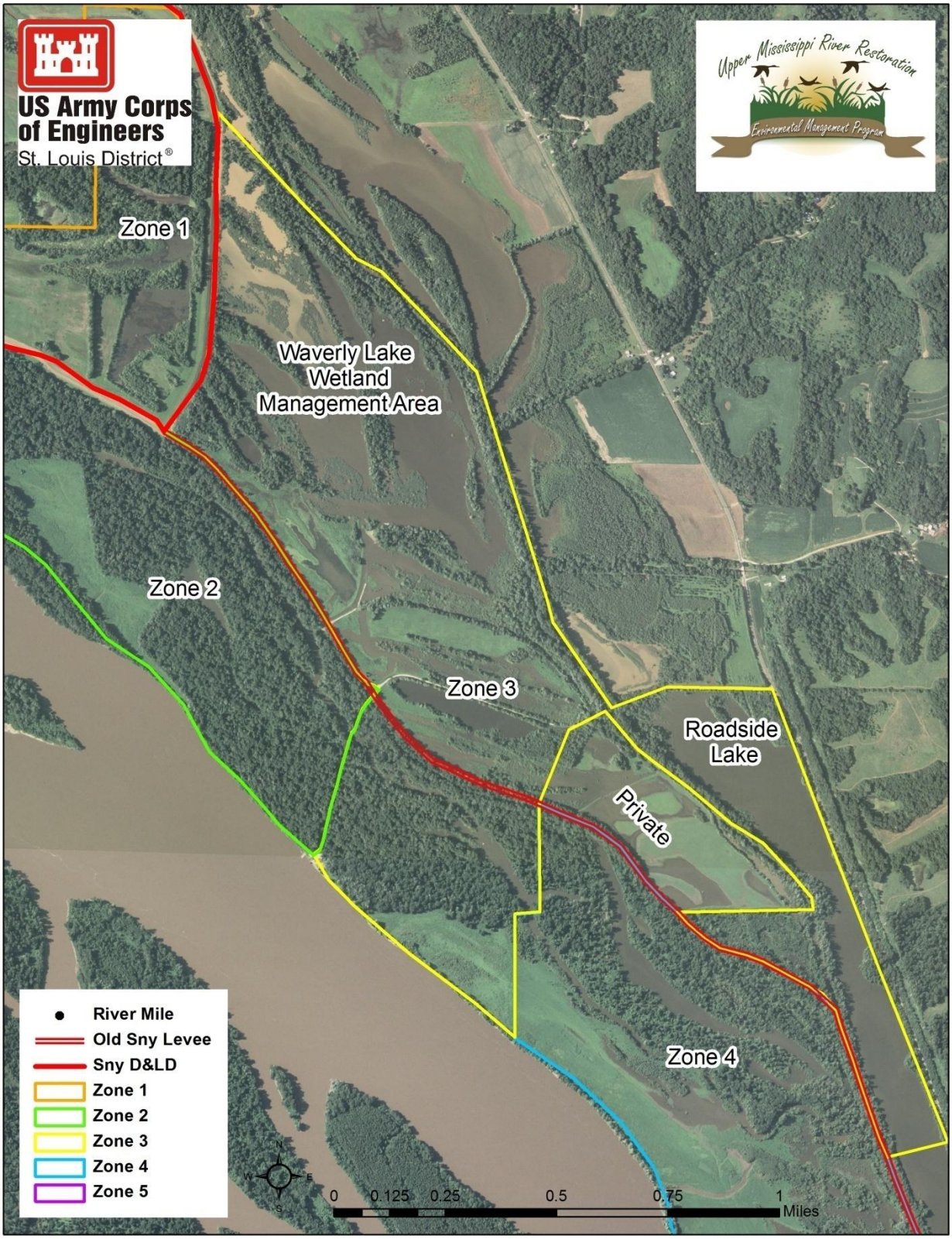

Figure 2.4. Rip Rap Landing Zone 3

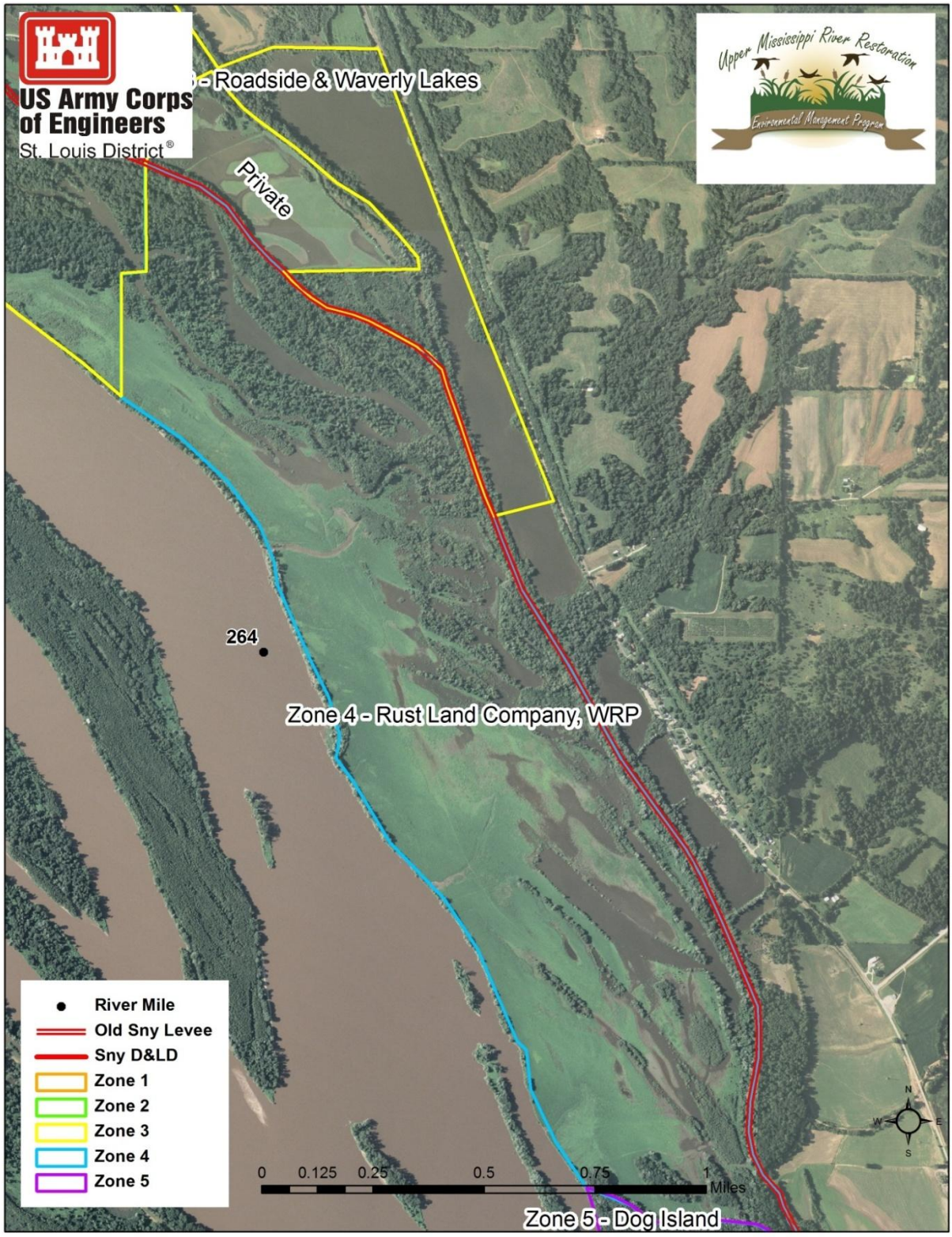

Figure 2.5. Rip Rap Landing Zone 4

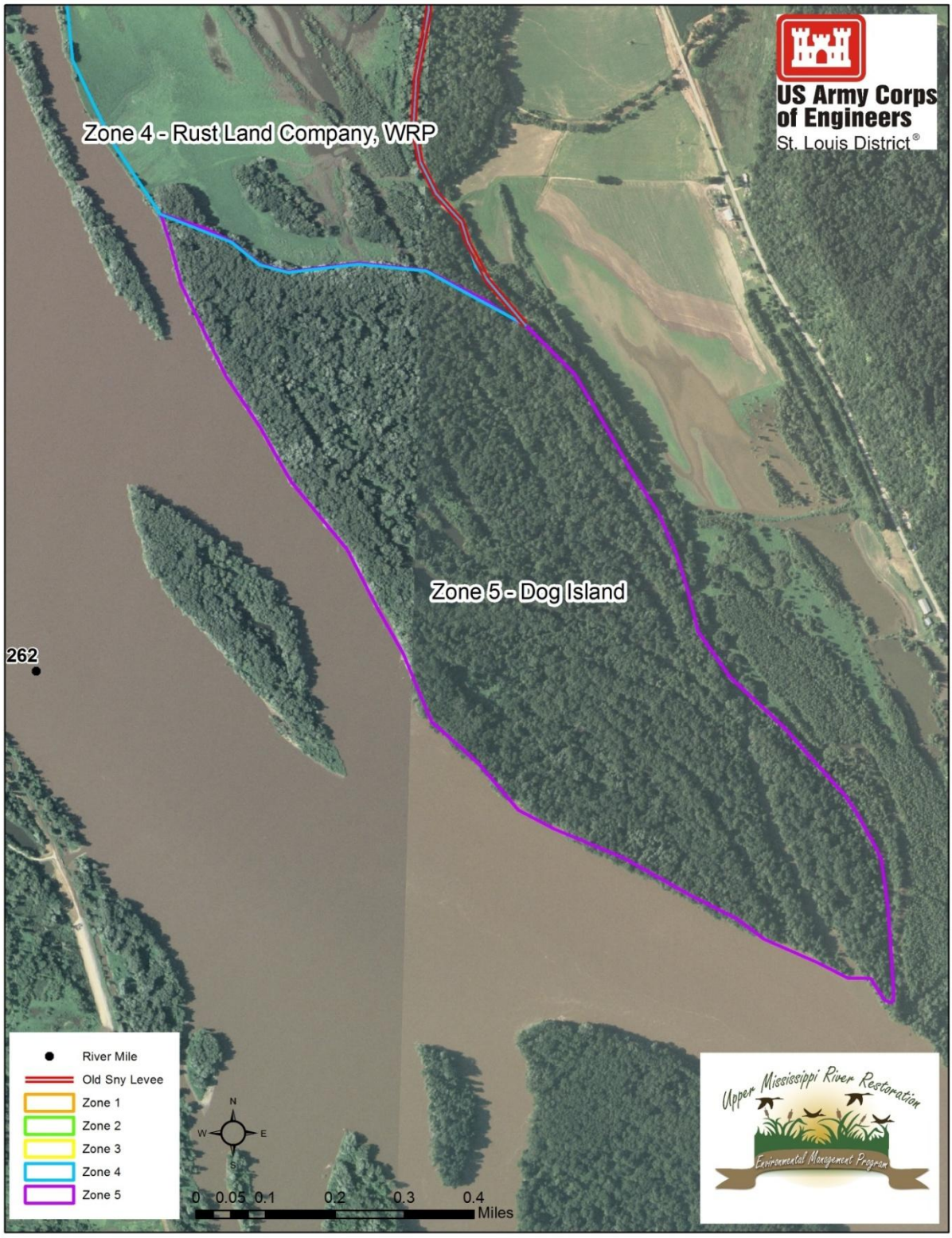

Figure 2.6. Rip Rap Landing Zone 5

A. Resource History and Description of Existing Features**.** The RRL project area is in the alluvial floodplain of the Mississippi River (Hajic, 2000). The Sny Island Drainage District, prior to settlement, was a mosaic of terrestrial and aquatic habitats. Bottomland forests were extensive and were the dominant vegetation, although seasonal herbaceous wet areas and marshes were present adjacent to the forests and wetlands along the Sny Creek channel. The Mississippi River flooded the area frequently, rejuvenating and creating wetlands and providing nutrients for terrestrial vegetation (Heitmeyer, 2009).

By 1890, some higher ridge elevations on the area had already been cleared for agriculture (Figure 2.7). By 2000, much of Zones 1 and 4 were being farmed (Figure 2.8). Today, forest continues to occupy much of Zones 2, 3, and 5 with extensive areas of lower sloughs, swales, and Waverly Lake being occupied by seasonal herbaceous and shrub/scrub communities (Heitmeyer, 2009).

IDNR purchased the first parcel of land in the project area in the 1970s with an acquisition of approximately 1,200 acres, which included Waverly Lake and 160 acres within the Sny D&LD. These acres are primarily in Zones 1,2, and 3. Three wells were constructed to provide water to Waverly Lake for migratory wildlife management, but sands underlying the RRL region are extensive which prohibited efficient pumping. A pump station on the Mississippi River was later constructed along with a channeling system to provide water to Waverly Lake and restore wetland functions disrupted by the operation of the lock and dam system. In the early 2000s, IDNR acquired the 792.8 acre Rust Land Company tract which had a Wetland Reserve Program (WRP) easement held by the Natural Resources Conservation Service (NRCS). An additional 44 acres were acquired after the Rust Land Company addition, giving IDNR access to the Rust Land Company tract and enhancing the potential for wetland preservation and enhancement in the project area.

Construction of Lock and Dam 25 in 1939 and the initiation of hinge-point water management in Pool 25 affected the project area by raising the water table. Zones 3, 4, and 5 are impacted by the water control plan for Mississippi River Pool 25. The water management point for Pool 25 is Mosier Landing which is located at the south end of the project area close to Dog Island and the lower end of Sny Creek. This operation of the pool can lead to fluctuating water levels at the southern end of RRL. The operation of the pool causes relatively stable water levels throughout the year over the rest of the site. This has eliminated the natural wet and dry cycles for these areas. The water control plan for the pool has been modified in recent years for the implementation of a program known as Environmental Pool Management. This method of management allows for seasonal fluctuations of the water level in the pool within normal operating ranges to benefit fish and wildlife. While management of the pool for navigation causes wider fluctuations in water levels for the southern end of the project, the use of Environmental Pool Management has little effect on the site itself. It primarily affects only the main channel border areas and does not affect the wetlands of the RRL.

Sedimentation impacts RRL by filling lowland areas and thus depleting their capacity for holding water. This results in diminished aquatic habitat, reduction in surface area of wetlands, and reduced capability to withstand dry spells. The Mississippi River and, to a lesser extent, the

adjacent uplands along the east side of the area contribute sediment to RRL. At the initiation of planning, sedimentation from the hillsides was assumed to have a large effect on the wetlands of RRL. Further investigations have shown NRCS has already initiated steps to curb hillside sedimentation in the area. This has greatly reduced the amount of hillside sedimentation from what the assumed level was. NRCS has documented some of the changes in the adjacent watershed (Mozier Watershed Planning Committee, 2001; Windhorn, 2000). The source for most upland sedimentation in RRL is in stream (personal comm., Nance). While no detailed analysis exists, NRCS has said that they have used various programs and authorities in recent years to greatly reduce the amount of upland, out stream sources of sedimentation to RRL.

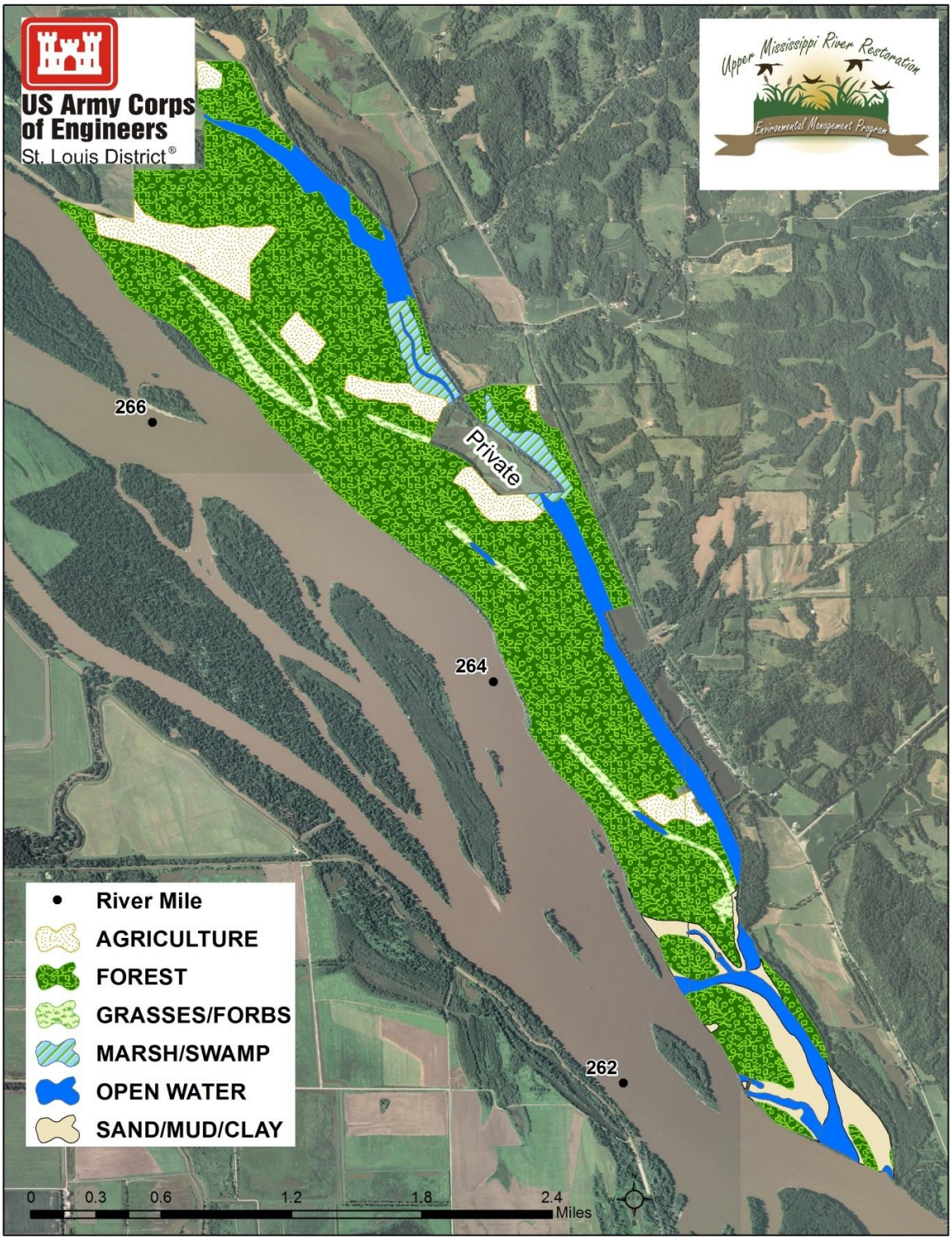

Figure 2.7. Rip Rap Landing Land Cover Classes 1890

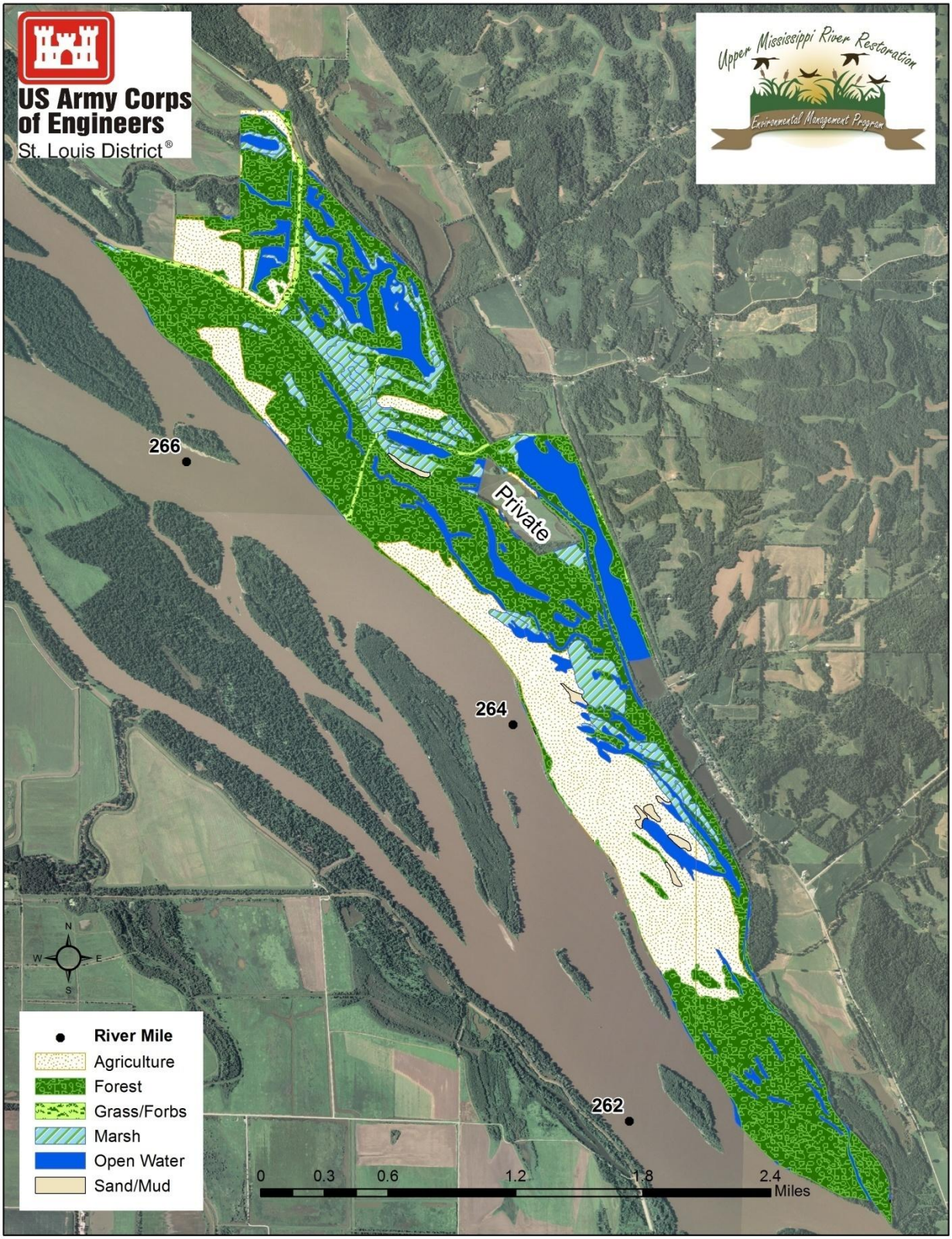

Figure 2.8. Rip Rap Landing Land Cover Classes 2000

B. Land Use and Current Area Management Objectives. The site is currently managed for resident and migratory wildlife and fish as water levels in the sloughs, backwaters and channels allow. Management within each of the management zones varies because each area is affected by different laws, regulations and environmental conditions. Figure 2.9 depicts existing infrastructure within the site.

Zone 1 – Sny Island Drainage & Levee District. Zone 1 is located in the southern portion of the Sny Island Drainage and Levee District, which is considered a 100-year levee. The land within this zone is subject to the pumping regime of the Sny D&LD and thus, the wetlands are usually drier than IDNR would prefer. Within this zone, IDNR utilizes agricultural production as a management tool to combat invasive species, and to keep the site available for tree plantings. Because of the levee protection and pumping by the Sny D&LD, bottomland hardwoods, primarily pin oaks, have not been as adversely affected by flooding as compared to the rest of the project area. Wetlands in this zone are managed for migratory wildlife where possible, and migratory wildlife hunting does occur.

Photo 1. Images of Zone 1 which include the old crop field proposed for reforestation (above left), the dry conditions of Goose Pasture Lake (above right), and the Sny Levee that surrounds Zone 1 (below right).

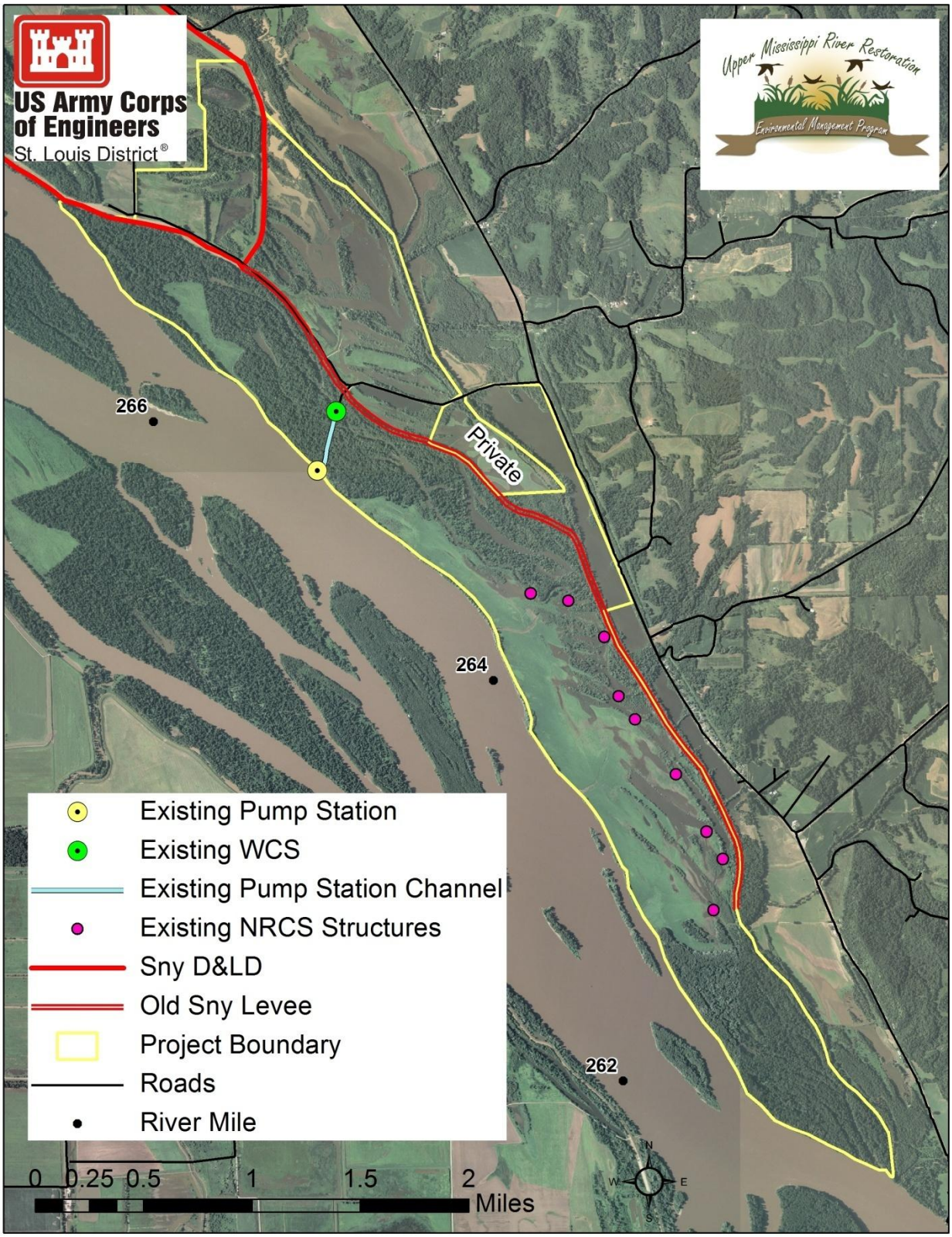

Figure 2.9. Existing Infrastructure on Rip Rap Landing

Zone 2 – State Natural Area. The State Natural Area is on the river side of the old Sny levee extension and subject to flooding from the Mississippi River. A natural levee has formed along the river in this zone with an elevation of approximately 445 feet above mean sea level (AMSL) (Photo 2). The name of the zone is derived from natural area status originally conveyed because of a significant historic forest composition of bottomland hardwood (BLH), especially pin oak and pecan on higher elevation ridges away from the river. A core portion of this area, approximately 20 acres, still meets criteria for State Natural Area status despite extensive damage to the forest resulting from the 1993 flood (IDNR, 2003). State Land and Water Reserve status has been proposed for the zone and would provide permanent protection for the area. However, the BLH forest was negatively impacted by the 1993 flood, and the BLH component is declining and being replaced by Box Elder and Silver Maple species, along with the establishment of reed canary grass. There is also a 35 acre crop field on some of the highest ground in the zone that is leased for agricultural production which IDNR uses as a management tool to combat invasive species. A channel was constructed at the southern edge of this zone, along Rip Rap Landing road, to move water from the pump station (Photo 2) at the landing to Waverly Lake in Zone 3, for migratory wildlife management purposes.

Photo 2. Existing pump station (upper left) and delivery channel (upper right) located at the border between Zone 2 and Zone 3 along the Mississippi River. Lower left shows the natural riverside levee in Zone 2. Lower right depicts the expanse of reed canary grass invading Zone 2.

Zone 3: Roadside Lake and Waverly Lake Wetland Management Area. Much of this zone is protected from Mississippi River headwater flows and sediment by the old Sny levee extension (Photo 3). The presence of the levee causes the area to flood via a backwater action during high water. When breaches (e.g., 1993 and 2008) occur in the levee extension, significant amounts of sediment can be deposited in the zone. Currently, all levee breaches have been repaired. Until the mid-1990s, the largest sediment influx into RRL came from uplands adjacent to this zone. Panther, Infidel, and Wildcat watersheds (19,000 acres) drain into the RRL project area through the Sny Creek channel which overflows into Waverly Lake. A watershed management group was formed in 1996 to look at ways to control sediment from the uplands, resulting in changes in land use in the watersheds (Mozier Watershed Planning Committee, 2001; Windhorn, 2000). IDNR has had some water management capabilities for the zone since 1996. Where possible, the area is managed primarily for annual flooding and drying regimes that encourage moist soil plant production (Photo 3).

Photo 3. Zone 3 Roadside Lake (upper left), Waverly Lake (upper right), the old Sny Levee extension (lower left), and the minimal water in Sny Creek (lower right).

Zone 4: Rust Land Company, WRP Easement. The Rust Land Company parcel contains the 792.8 acre WRP easement (Photo 4). The land parcel was enrolled in WRP in 2002 when the easement was granted by a private landowner. Shortly thereafter, IDNR purchased this land, which included the WRP Easement. Initially, IDNR could not gain land access to the parcel because of a private in-holding. They acquired the 44 acre private in-holding parcel between the WRP easement and the access road in 2005, enabling them to plan for more extensive management. NRCS, in partnership with IDNR, constructed nine water control structures in attempt to restore small wetlands (Photo 5, Figure 10 and Appendix M). These structures are part of a passive system that rely on the river levels of the Mississippi River. While these can convey water into the system in parts of some years, they rely on an unnatural hydrograph and cannot fully restore wetland functions and processes to the site. The southernmost structure, which is a light duty structure not designed to withstand large flood events, has been damaged by headwater flows from the Mississippi River. NRCS still proposes to plant 190 acres of grasses in this zone. IDNR would like to have greater water level management capabilities in Zone 4 and the existing structures lacks the capacity for optimal water conveyance to restore natural wetland function and processes to the area. Any proposed project would have to work with and complement the terms of the WRP easement. NRCS supports efforts to expand ecosystem restoration on the site in order to supplement their work. Their plans for the WRP easement were designed with the intention that the Corps would be able to build a project in the larger area and incorporate their structures. When Zone 4 floods water initially backs up from the south end prior to overbank flooding along the Mississippi River. The overbank flooding creates a headwater scouring situation (Photo 5). A natural levee has formed along the river with an elevation of about 445 AMSL, except for several scoured slough areas that breach the natural levee and allow headwater to enter the zone when backwater flooding is occurring. Most of the zone was cleared for agricultural production in the past, but has not been farmed since 2003. The previously farmed area grows up in herbaceous annuals each year, preventing most tree establishment, and reed canary grass is becoming established (Photo 4).

Photo 4. Zone 4 WRP area dominated by herbaceous annuals (upper left), and reed canary grass is becoming established (lower right).

Photo 5. Zone 4 scouring channel from headwater flooding (upper left); and southern most NRCS structure showing limited water level management capabilities (lower right).

Zone 5: General Plan Lands – Dog Island.

This zone is subject to Mississippi River flooding, resulting in significant sediment deposition in the zone. Approximately 100 acres of land has accreted in the island complex, interspersed by isolated sloughs that were old channels cut off from the river. Much of the land is forested with early successional tree species such as willow, silver maple, cottonwood and sycamore (Photo 6). There is no active management in this zone at the present time, although hunting is allowed. In 2012, a mist net survey was conducted, and several Indiana Bats (federally endangered) were found to be using this area.

Photo 6. Zone 5 showing forest community (left), and poor aquatic conditions of Sny Creek (right)

C. Natural Resources. See Figure 2.8 above for locations of land cover types. Ninety-three percent of the project area is levee-unprotected and only 7% (the northern tip of the site) is levee-protected. Prior to the flood of 1993, the unprotected portion of the RRL HREP site was approximately 25% open water and herbaceous wetland habitats, and the remainder was in woody vegetation, predominantly bottomland forest, except for Zone 4 which was in agricultural production. The protected portion of the site was about one-third open water and herbaceous wetland, about 5% cropland, and the remainder was forested. Zone 2's forested habitat was of exceptional quality prior to the flood of 1993, but the flood was detrimental to this area.

1. Floodplain Forest. Species composition within the project area bottomland forest was dictated by the hydrology and elevation of the area. Historically, most of RRL was forest. Riverfront forest was composed of early succession species such as willow, cottonwood, sycamore and silver maple on newly deposited soil surfaces near the Mississippi River and along the Sny Creek confluence area. Floodplain forest dominated by mixed sugarberry, elm, cottonwood, box elder, and scattered oaks and pecans occurred on large areas of higher floodplain. Sugarberry, pin oaks and pecans were lost due to prolonged flooding, though they may have been impacted and stressed by wetter hydrology in the 80s and early 90s (Heitmeyer, 2008). Today much of the riverfront forest remains the same, and covers the areas identified, including most of Dog Island.

In Zone 2, most of the forest is considered wet-mesic floodplain forest or wet floodplain forest. Based on a forest inventory to this area conducted in 2003, silver maple and green ash were the two most common trees in the wet-mesic forest, even after about 20% of both species had died since the 1993 flood. Box Elder and Pecan suffered minimal mortality. Pin Oak which prior to the flood was as common as Pecan showed approximately 60% mortality. In the wet floodplain forest, silver maples comprised approximately 60% of all living trees. As in the wet-mesic forest, Pin Oak suffered the highest mortality of any species with 80% mortality. Additionally, many trees showed signs of root necrosis. These dead strips of bark occur directly above roots that have died as a consequence of prolonged flooding and fungus infection.

2. Aquatic Habitat. Surface water features on or adjacent to RRL include the main channel of the Mississippi River, Sny Creek, side channels, backwater lakes, sloughs, wetlands and sand and mud flats (Figure 2.10). The Mississippi River adjacent to RRL is controlled by Lock and Dam 25, though nearly all of the project area is above the hinge point, lessening the impact of the dam management on the area and allowing for a more flowing river. The conditions of other named water features within the project area are described below.

- Zone 1 - Goose Pasture Lake and wetlands - 47.8 acres of permanent and seasonal wetlands

- Zone 2 - 5.9 acres of seasonal and permanent wetlands

- Zone 3 - Waverly Lake and associated wetlands- 100.3 acres with depths ranging from a few inches to 6 feet. Submerged aquatic vegetation may establish some years.

It may go completely dry in some years. The lake does provide fish habitat when the Mississippi River is flooding and may be an important spawning area for some species of fish.

Roadside Lake is 99.1 acres, with additional associated wetlands that total 18.8 acres, all are several inches to two feet deep with little habitat for fish, except for Roadside Lake which has a maximum depth of 6 feet. These lakes, ponds and sloughs may go completely dry in some years. The lake and associated wetlands do provide fish habitat when the Mississippi River is flooding and may be an important spawning area for some species of fish.

- Zone 4 - WRP Impoundments and 191.7 acres of permanent and seasonal wetlands.

- Zone 5 - There are several interior sloughs (former side channels) that cannot be accurately measured due to over-hanging trees. These are important areas for fish spawning and rearing depending upon river levels.

- Several lakes and ponds along Route 96 are adjacent to Zones 3 and 4, but are not within the project area. They total 132.2 acres with maximum depths of several inches to a few feet. Habitat and fish populations are both regarded as "poor", but the lakes and ponds do hold water most of the year. These lakes and ponds are interconnected during periods of flooding and may be important fish spawning and rearing habitat.

- Sny Creek (historic Sny River channel) traverses the site for 6.4 miles (33,917 linear feet), though it is currently shallow due to siltation and thought to be less than two feet deep throughout. During periods of high water, the creek and all of the aforementioned lakes and ponds are interconnected, providing fish habitat and may be important spawning and rearing areas when flooding occurs in spring and early summer.

When high water is present, all of the water areas may hold fish. Largemouth bass, bluegill, crappie, channel catfish, white bass, buffalo, gizzard shad, and bighead and silver carp are some of the fish species known to inhabit the area.

All aquatic resources within Zones 1-5 are shown in Figure 2.10. The minimum water surface elevation that can be experienced within the project area is approximately 433.0 ft NGVD at the extreme southern end of the project area (COE, 2008). Water elevations in the zone are usually higher because Pool 25's managed pool elevation is 434.0 NGVD and the interior wetlands respond to water elevations in the river. Minimum water surface elevations increase toward the upper end of RRL to approximately 436.0 ft NGVD. Water levels within the project area can fluctuate depending on river conditions, but the lower part of the project area is impacted to the largest degree because of its lower elevation and hinge point pool management.

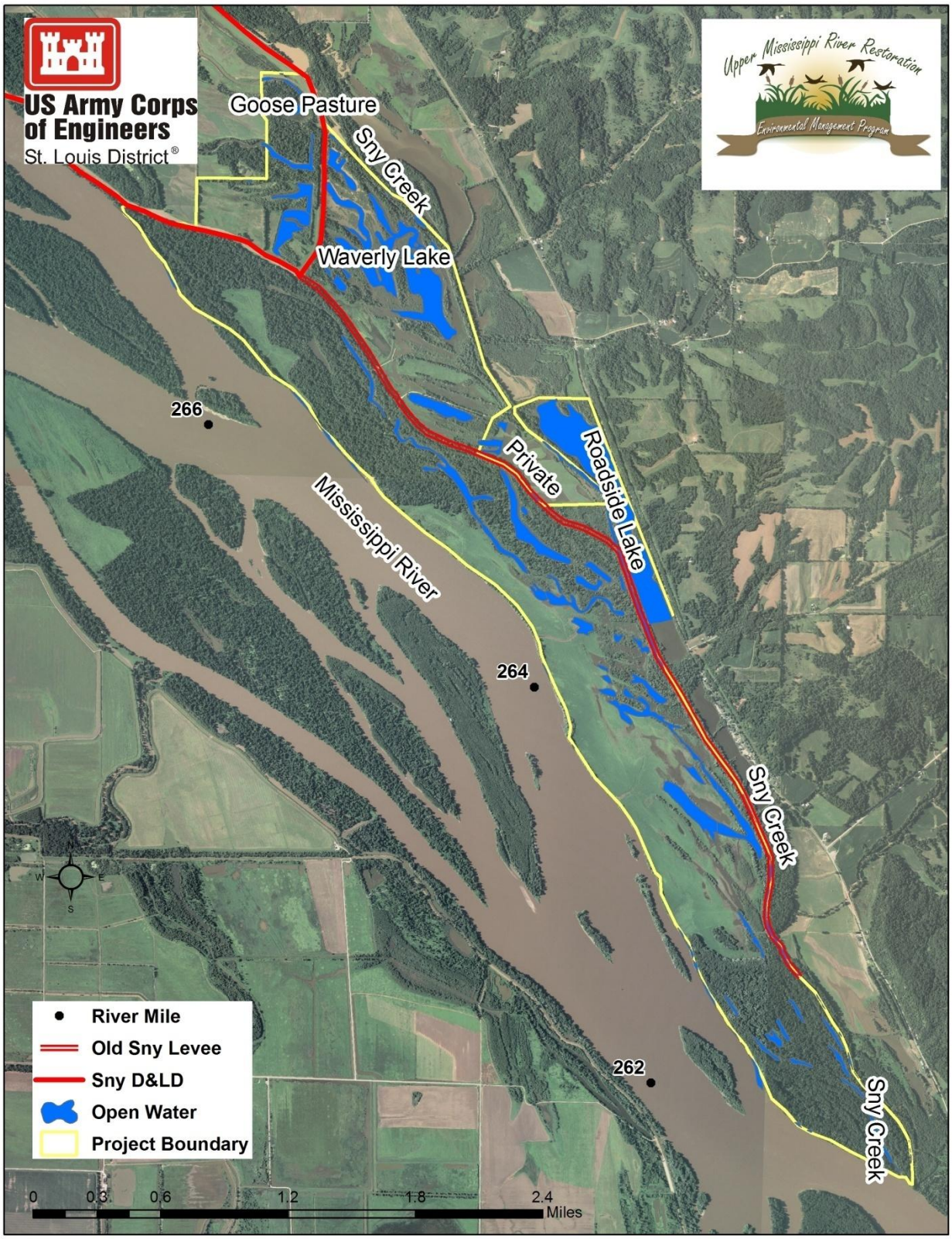

Figure 2.10. Rip Rap Landing Aquatic Habitat

3. Geology and Soils.

a. Geology. The project area is located entirely in bottomland composed of alluvium. The eastern and northern part of the site along the current Sny Creek channel and further northwest is early-middle Holocene channel belt with surfaces at least 7,000 years old. When the Mississippi River migrated west it deposited tributary fan-type surfaces known as the Yazoo Meander Belt and then late Holocene Channel Belt features along the current Mississippi River channel (Hajic, 2000).

b. Soils. The soils on the project area are mostly Beaucoup silty-clay loams in older landform sediment assemblages and Tice silt loam on Late Holocene areas along the Mississippi River (Figure 2.11). Beaucoup soils are poorly drained and very poorly drained, moderately slowly permeable soils on floodplains with 0-2% slope. They are similar and found in conjunction with Tice soils but on slightly lower elevations. Tice soils are somewhat poorly drained, moderately permeable and formed in silty alluvium with 0-2 % slope. Often associated with Beaucoup soils, they are slightly higher in elevation. Beaucoup and Tice soils can be classified as prime farmland if properly drained. Deeper clays and silts occur in the soil stratigraphy of older surfaces while thin veneers of silt and clay on late Holocene surfaces are underlain by coarse sands and some gravel near the Mississippi River. Hamburg silt loam soils occupy small alluvial fan areas on the margins of the floodplain east of the Waverly Lake area (USDA, 1989).

c. Prime Farmland. According to the NRCS, the project site contains 617 acres that qualify as prime farmland and 1,105 acres that qualify as prime farmland if drained.

4. Wildlife. Rip Rap Landing and other floodplain conservation areas provide mid-migration habitat for the Mississippi Flyway, one of the major flight corridors in North America for migratory birds. The Mississippi River and floodplain are the center of this flyway. This mid-migration habitat is recognized in the North American Migratory Wildlife Management Plan as a habitat of major concern. About 20 species of ducks and geese stop during fall and spring migrations to rest, feed and seek sanctuary in the wetlands and deepwater habitats of Pools 24, 25 and 26 and adjacent floodplain (Havera, 1985). In addition, approximately 285 species of birds including song birds, shorebirds and gulls, migratory wildlife, herons and egrets, and vultures and hawks are known to use or probably use the floodplain habitats of Pool 25 (Terpening et al., 1975).

Numerous reptiles, amphibians and mussels likely inhabit RRL. Approximately 50 species of mammals may inhabit the project area (Terpening et al., 1975). Common species include opossum, raccoon, muskrat, mink, and white-tailed deer.

5. Fisheries. When water is present, all of the water bodies may hold fish. The water bodies in the project interior are isolated from the river. There is no movement of fish between the river and interior water bodies except during periods of high water. Some areas such as Waverly Lake and Roadside Lake are connected less frequently to the river than other water bodies on the site. While no sampling information for the site is available, observations of local fisherman, similarity with other nearby conservation areas and studies on the Upper Mississippi River (Koel, 2004) suggest that largemouth bass, bluegill, crappie, channel catfish, yellow bass, buffalo, gizzard shad, and bighead and silver carp are known to inhabit the area.

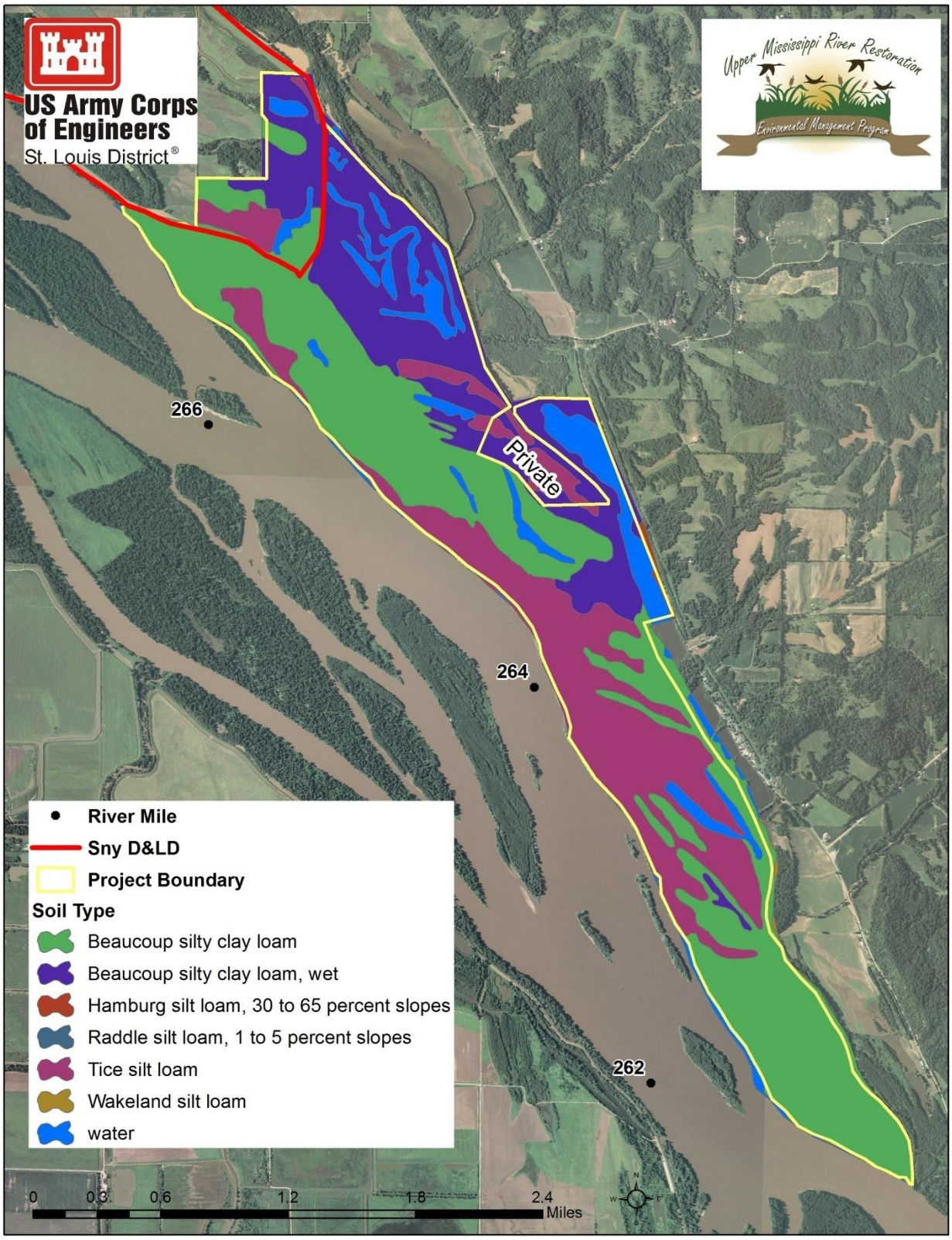

Figure 2. 11. Rip Rap Landing Soils

6. Endangered Species The list of animals and plants below was requested from the USFWS as required by section 7 of the Endangered Species Act. The most up to date information was provided by the USFWS draft Fish and Wildlife Coordination Act Report. This section and chapter 9 of the DPR are being used to satisfy the requirement of completing a Biological Assessment.

Endangered	Indiana Bat	*Myotis sodalis*
Threatened	Decurrent False Aster	*Boltonia decurrens*
Threatened	Eastern Prairie Fringed Orchid	*Platanthacon leucophaea*
Endangered	Spectaclecase	*Cumberlandia monodonta*

a. Indiana Bat. Indiana bats hibernate during winter in caves, or occasionally, in abandoned mines. For hibernation, they require cool, humid caves with stable temperatures, under 50°F but above freezing. Very few caves within the range of the species have these conditions. After hibernation the bats migrate to their summer habitat in wooded areas where they usually roost under loose tree bark on dead or dying trees. Males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. Indiana bats forage in or along the edges of forested areas, and especially prefer forest along rivers or small streams (USFWS, 2006). Mist net surveys on Dog Island in 2012 found several Indiana Bats using the area. Dog Island is forested, and future reforestation efforts throughout Rip Rap Landing should benefit the Indiana Bat.

b. Decurrent False Aster. This plant is found on moist, sandy floodplains and prairie wetlands along the Illinois River. It has been found along the Mississippi River in Madison County, Illinois. The plant relies on periodic flooding to scour away other plants that compete for the same habitat. Excessive silting seems to be a major cause of the plant's decline. Several communities of decurrent false asters have been found in areas of low-intensity agriculture (USFWS, 1997). This plant has not been found in the project area.

c. Eastern Prairie Fringed Orchid. This plant occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, and even bogs. It requires full sun and a grassy habitat with little or no woody encroachment for optimum growth and flowering. Flowering begins from late June to early July, with blossoms often rising just above the height of the surrounding grasses and sedges. The more exposed flower clusters are in great risk of being eaten by deer (USFWS, 2005). This plant is not known to occur in the project area.

d. Spectaclecase. This large mussel is greatly elongated, sometimes curved, and moderately inflated, with solid and moderately thick valves. Key characteristics for distinguishing the spectaclecase from other mussels are the large size, elongate shape, arcuate ventral margin, dark coloration, roughened surface, poorly developed teeth, and white nacre. No other North American mussel species has this suite of characters. The spectaclecase occurs in large rivers and is a habitat-specialist, relative to other mussel species, often occurring on outside river bends below bluff lines. It most often inhabits riverine microhabitats that are sheltered from the main force of current. It occurs in substrates from mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals (USFWS, 2007). The spectaclecase has not been found in or adjacent to the project area.

e. Other. The IDNR EcoCat Natural Heritage Data Base lists the Bald Eagle and Black Sand Shell and Butterfly mussels as occurring in Calhoun County. The Bald Eagle is a frequent visitor to the site and may be nesting within the project area. Information on the Bald Eagle is covered in section 9.16 Bald and Golden Eagle Protection Act. The Black Sand Shell (*Liguma recta)* and Butterfly mussels (*Ellipsaria lineolata)* are State Listed, threatened large river species that have historically occurred in the Mississippi River. They favor small to large gravel substrate and strong current, habitat conditions that may be present in the river adjacent to the project area. Mussel surveys may be required for some areas if thalweg placement is used for sediment excavated from sloughs on Dog Island.

7. Water Quality. Flooding and the associated sedimentation have had the greatest impact on RRL. Many of the sloughs' channels and backwaters have lost much of their depth. Despite depth decreases, in most years, other water quality parameters such as dissolved oxygen remain at least at minimum levels to support aquatic life during much of the year. However, oxygen depletion has likely caused fish kills in some sloughs in both winter and summer, though no empirical data exists to confirm the cause of fish kills. Water temperature and pH are generally conducive to the support of aquatic life, although high summer water temperatures can exacerbate low oxygen levels and contribute to fish kills. Water turbidity in the project area, as measured by secchi disc readings, is generally several inches to two feet. The highest turbidity levels generally occur in spring and the lowest levels during fall and winter. Turbidity increases during periods of flooding, but is higher in the southern portion of the project area and decreases as water extends north behind the old Sny levee extension due to settlement of particles from the water column.

The Mississippi River in Illinois is considered unlisted but impaired on the 2006 USEPA approved State of Illinois List of Impaired Waters. The entire length of the Mississippi River in Illinois is considered impaired and does not meet Total Maximum Dissolved Levels for chlordane and PCBs from non-point (runoff) source pollution (USEPA, 2006).

8. Air Quality. The Environmental Protection Agency (EPA) has identified standards for seven pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and particulate matter less than 10 microns in diameter, and particulate matter less than 2.5 microns. Calhoun County, Illinois, currently meets all EPA air quality standards (EPA 2010 http://epa.gov/airquality/greenbk/ancl3.html).

B. Hazardous, Toxic and Radioactive Waste. A hazardous, toxic, and radioactive waste (HTRW) compliance assessment has been completed for the site. It can be found in Appendix F. Environmental database records and some historical information have been reviewed. No obvious indications of potential contamination sources or migration pathways from surrounding properties and no recognizable environmental conditions (REC) have been identified to date in connection with the project area. The environmental database information suggests that two underground storage tank (UST) sites (owned by William & Barbara Dahlbert and Rubin Marathon) are located on adjoining properties. Additional information for these UST sites was obtained on-line from the Office of the State of Illinois State Fire Marshal (OSFM), Office of Petroleum and Chemical Safety. OSFM indicates that the USTs were removed from these

properties in 1989 and 1991, respectively, and no releases were suggested. Based on the information reviewed, the identified UST sites do not appear to be of concern to the project area.

C. Historic Properties. Minimal systematic archaeological work has been conducted within RRL. Only 82 acres of the 2,475 acres have been covered by four Phase I surveys. In 1978 Carl Udesen and Ann L. Koski performed an intensive spot survey of 52 small, widely separated tracts of Mississippi River shoreline zones. Two of the tracts are located within the RRL. Both were 25 feet wide, and one was 0.2 miles long and the other was 0.3 miles long (Udesen and Koski 1978). In 1984, another spot shoreline survey was completed by Kurt Moore as part of a bank stabilization project. Survey Item 3 of this survey was located within RRL. This item was surveyed from a boat due to a steep bank and old rip rap that covered the bank and shoreline. The length of this survey was 0.1 miles (Moore, 1985). The third known survey was in 1991 by Schroeder and Tankersley and was conducted in conjunction with channel construction to divert water from the Mississippi River to Waverly Lake on RRL. The fourth and final survey in 1999 recorded the only identified archaeological site within RRL (Moffat 1999). This site is a Late Woodland habitation site that has not been evaluated for determination of eligibility to the National Register of Historic Places.

A number of archaeological investigations have been conducted along the eastern side of the project area along the bluff line and uplands of Calhoun County (Cramer, 1995; James et al., 2000a, 2000b; Studenmund, 1990, 1998; Wells and Burns, 1999), and numerous archaeological sites have been reported within the vicinity. The land adjacent to the Mississippi River is rich in prehistoric archaeological sites representing many cultural traditions and stages. Archaeological sites may be abundant on the broad floodplain as well as on the tributary floodplains and surrounding uplands. Potentially the entire prehistoric cultural sequence may be present: Paleo-Indian (10,000–8,000B.C.), Dalton (8,000–7,000 B.C.), Early Archaic (7,000–5,000 B.C.), Middle Archaic (5,000–3,000 B.C.), Late Archaic (3,000–1,000 B.C.), Early Woodland (1,000–200 B.C.), Middle Woodland (200B.C. –A.D. 400), Late Woodland (A.D. 400–900), and Mississippian (A.D. 900–1350). The most numerous archaeological sites were occupied during the Hopewell-influenced Middle Woodland, Late Woodland, and Mississippian period (Rusch et al., 1999).

During the historic period, a number of Native American tribes passed through the project vicinity and remained for various lengths of time. Calhoun County, where RRL is located, is a peninsula of land between the Mississippi River on the west and the Illinois River on the east. This peninsula separates the land areas judicially established by the findings of the Indian Claims Commission as being the aboriginal lands of the Sac and Fox on the western side of the Mississippi and the Kickapoo on the eastern side of the Illinois River (USGS, n.d.). In addition to these two tribes for which the project is in close proximity to their adjudicated aboriginal lands, twenty six other Native American tribes officially wish to be consulted on matters concerning prehistoric and historic Indian sites, as well as any Native American human remains, that may be encountered.

In accordance with Section 106 and Section 101 of the National Historic Preservation Act, and 36 CFR 800.4, the district's tribal coordination efforts were initiated in a letter sent to the tribes regarding this project on 10 July 2010 (Appendix A).

A Phase I archaeological and geomorphological investigation of the previously undisturbed acreage to be impacted by the planned project construction was conducted between November 8 and December 10, 2010. This investigation included archival research and landform evaluations in addition to subsurface testing. The subsurface testing of landforms that have the potential for containing intact cultural resources was performed using shovel and bucket auger tests spaced at a 5 to 15 meter intervals. This investigation identified three previously unrecorded archaeological sites: a prehistoric isolated find; a cluster of Euro-American silo foundations; and a Late Woodland base camp. Of the identified sites only the Late Woodland base camp is recommended potentially eligible for the National Register of Historic Places under Criterion D. The site appears to be a multi-component Late Woodland base camp that was occupied twice, once by early-late Late Woodland peoples (La Crosse phase) and once by Late Woodland peoples (Fall Creek or Poisson phases). Test unit excavations and bucket auger tests at the site yielded 528 historic and prehistoric artifacts, with many of the artifacts occurring within intact buried soil horizons. Additionally, a single feature was uncovered (Scott and Benn, 2011).

The site's location in this public document is not specified. The location is not near any anticipated construction area nor expected to be impacted by any alternative.

In the event that any other cultural properties are located during construction, all activity in the immediate area will halt until the site can be evaluated. The site will be protected from construction impacts until its eligibility for the National Register is determined, in consultation with the Illinois SHPO, and appropriate mitigation measures are completed. Should an inadvertent discovery of human remains occur, then Section 3 of the Native American Graves Protection and Repatriation Act (P.L. 101-601) will be followed on federal lands and the Illinois Human Skeletal Remains Protection Act (Illinois Comp. Stat. Ann. 20 ILCS 3440/0:01, et seq.) will be followed on state owned lands.

D. Socioeconomics and Human Use.

1. Socioeconomics and Environmental Justice (EO 12898). Under Executive Order 12898, a Federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations in the United States". Calhoun County is a rural area bordered by a river on three sides. Aside from traveling to Pike County, residents must use one of two ferries or a bridge to travel outside of the county. The average travel time to work is 40 minutes. Census tract 9512 in Calhoun County, where RRL is located, had a population of 2,681 based on the 2010 U.S. Census. Of this population, 50 percent were male, 99 percent were white, and the median age was 40. The median household income was $53,201. The main industries providing employment include education, healthcare, construction, manufacturing, arts and recreation. The unemployment rate is 5.2% percent. Approximately 14.7 percent of individuals are below poverty level (American Fact Finder August 17, 2012).

2. Aesthetic Resources. Aesthetic resources of the site consist primarily of the natural habitat found on the site. This includes forest, wetlands, and rivers that serve as scenery for visitors. It also acts as habitat for wildlife viewed by the public. Roads, levees, water control structures, and a pump are also present on the site and detract somewhat from the natural views.

3. Noise Levels. Noise levels surrounding the project area are varied depending on the time of day and climatic conditions. The current human activities causing elevated noise levels include diesel powered generators, trucks, and farming equipment. The sound of firearms during hunting seasons is also prevalent. Homes are located along State Route 96 about one tenth of a mile from parts of the project area. They are currently exposed to all of these sources of noise.

3*. PROJECT OBJECTIVES

A. Problem Identification. The extent and quality of forests and wetlands along the Mississippi River have been steadily declining due to pressure from development and agriculture. This is especially true for Pool 25 where levees were established before the 1900s to protect agricultural land converted from bottomland hardwood forest. Wetlands behind these levees have been drained and converted to agricultural land. Outside of the levee protected areas, conversion of bottomlands for agriculture and frequent flooding have taken their toll on bottomland forests and wetlands. The flood of 1993 in particular had a severe impact on the stressed trees and to forests and wetlands that could not be protected from the record flood heights. The result was the loss of high quality, mast bearing forest communities, and sedimentation in bottomland ponds, lakes and sloughs decreasing their area, volume and habitat value.

The degradation of these native habitats coupled with inadequate water level management also provided conditions suitable for the colonization and establishment of reed canary grass (*Phalaris arundinacea*), an invasive wetland grass species, resulting in further ecosystem degradation. This species eventually dominates a site by creating a dense monoculture which adversely effects habitat quality (Kercher and Zedler 2004). A lack of proper water level management abilities (e.g., fall pulse), contributes to the establishment and growth of reed canary grass (Pinkerton and Rice 1993; Miller and Zedler 2003; Kercher and Zedler 2004). Once this species forms a dense stand it prevents growth of other species and traps sediment during flood events, decreasing microtopography, and altering microhabitat conditions (*e.g.*, light, soil moisture, and nutrient acquisition). These changes further benefit reed canary grass (Aniteau 1998; Kercher and Zedler 2004). This species is a major threat to ecosystem resources at Rip Rap Landing and elsewhere.

Habitat quality at RRL has declined because of many of these issues. While sedimentation from the uplands has been reduced in recent years, its effects from past years have filled in many of the aquatic habitats on the site, reducing their quality. Sedimentation resulting from flood events has amplified the problem. Much of the area was at one time forest; however, the majority of the forest on higher elevations had been cleared for agriculture. The forest that remains is located in lower elevations and therefore was not converted to agriculture in the past. Thus, these forests due to their low elevations were more susceptible to extensive damage by flooding that

occurred in 1993. Water management capabilities exist on the site, but are inadequate to manage the entire project area. The existing pump was designed to provide water to a much smaller area. NRCS structures are passive and rely on an unnatural hydrograph to supply water. Low spots in the natural levee along the western edge of the site allow overbank flooding to occur. This type of flooding scours out existing wetlands in the Rust Land tract, reducing their quality and threatening their future. Existing aquatic habitat on the site has been reduced in quality by sediment and is no longer connected to the river, preventing year round use by aquatic species.

B. Opportunities. Opportunities exist to restore, rehabilitate, enhance, and increase wetland and aquatic habitats through increasing forest acreage, improving wetland habitat conditions by providing dependable and controlled water movement that mimics a natural hydrograph, protecting existing wetlands from damaging overbank flows and river-borne sediments, improving aquatic habitat within Sny Creek and reestablishing connection with the Mississippi River. Opportunities to reestablish a historic connection between the river and Roadside Lake as well as for management of lake levels to promote aquatic habitat exist. Previous HREPs have successfully improved the river's floodplain structure and function. For example, HREPs have successfully altered sediment transport and deposition, water levels, and the connections between the river and its floodplain. These types of physical changes have improved water quality and increased habitat diversity. The RRL HREP has the opportunity to contribute to the ecological integrity of Pool 25 and the Upper Mississippi River System as a whole.

C. Project Goals, Objectives, and Potential Enhancement Features. Rip Rap Landing was acquired to protect unique, high quality bottomland forest and to protect and enhance the existing wetlands for the benefit of migratory birds and resident wildlife. IDNR currently uses water level management to enhance growth of moist soil plants in low lying wetland areas. Based on the identified problems and general management goals, an overall project goal, objectives, and potential enhancement features were developed by the interagency planning team during the development of this DPR (Table 3.1). The goal of the RRL HREP is to increase quantity and quality of aquatic, non-forested wetland, and forested wetland habitats. This goal would be achieved by the following objectives, which are to be met over the 50 year period of analysis:

- *Increase habitat available to fish*– In Sny Creek, provide persistent depth and habitat diversity to support aquatic species. Restore seasonal connectivity between Roadside Lake and the Mississippi River via Sny Creek.
- *Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management* – By improving water conveyance throughout the project area (reach 441 in 10 days), management will be able to provide conditions suitable for native plants to thrive.
- *Reduce impacts of headwater flooding and river-borne sedimentation* - Headwater flooding carries river-borne sediments and ultimately fills in wetlands. Protect wetlands from river-borne sediments by limiting areas of known scouring flow.
- *Increase quantity and quality of bottomland hardwood forest* –Restore forest at suitable elevations, soils, and hydrology. This would protect and restore bottomland hardwood forest within RRL.

D. Constraints.

- Project features should not impact Zone 2's designation as a state natural area. It is designated a natural area because of it high quality, remnant forest. The project should strive to avoid negative effects to this area.
- Features, operation of a project, and construction should avoid impacting the Corps' operation of the 9-foot navigation channel on the Upper Mississippi River.
- There is a private inholding that currently operates as a duck hunting club. Any project should seek to avoid negative impacts on this property.

Table 3. 1. Project Goals, Objectives, and Potential Enhancement Features

PROBLEMS	OPPORTUNITIES	GOAL	OBJECTIVES	POTENTIAL ENHANCEMENT FEATURES
Sedimentation in backwater areas	Restore backwater areas to provide year-round aquatic habitat	Increase quantity and quality of aquatic, non-forested wetland, and forested wetland habitats.	Increase habitat available to fish	• Supplemental pump • Opening Roadside Lake to Sny Creek • Installing structure at Roadside Lake to manage connection with Sny Creek • Excavate creek • Hillside sediment retention
Lack of floodplain connectivity	Restore backwater/river connectivity by connecting Roadside Lake to Sny Creek and the Mississippi River			
Unnatural hydrograph reducing normal flooding and drying cycles	Improve water delivery and drainage to simulate pre-impoundment hydrograph preferred by native vegetation"			
Loss of native non-forested wetland habitat	Increase acreage of native vegetation while controlling invasive plant species		Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management	• Larger pump and spillway • Structures in natural levee to allow capture of higher river flows for the site • Well • Supplemental pump • Tree planting • Levee • Hillside sediment retention • Natural Regeneration • Fill low spots in natural levee
Invasive plant species colonization				
River scouring is degrading wetland habitat	Protect wetlands from known scouring flow areas.		Reduce impacts of headwater flooding and river-borne sedimentation	
Sedimentation in non-forested wetland habitat	Restore forest to improve and reduce sedimentation in non-forested wetland habitats			
Loss of forested wetland habitat	Increase acreage of forest that have been lost to extreme high water and clearing		Increase quantity and quality of bottomland hardwood forest	• Tree Planting • Natural Regeneration

E. Future Without Project Condition (No Action Alternative).

Without the project, IDNR would continue to manage the site under their current plan. Without the project, it is assumed that IDNR will not have adequate water management capabilities for the entire site. Without additional water management capability, moist soil and other wetland vegetation is expected to be heavily degraded by year 25 (See Habitat Evaluation Appendix D for more details). It is assumed that sedimentation and scour will further damage existing wetlands. Additionally, inability to manage water levels across the entire site may favor establishment and spread of invasive reed canary grass resulting in a monoculture that has little benefit for wildlife and preventing trees from naturally establishing in some locations. Without the project, the former agricultural field in Zone 4 will continue to be dominated by weedy, herbaceous vegetation, inhibiting the natural regeneration of bottomland forest and other wetland vegetation. Agricultural leasing in others zones would continue to be farmed providing little benefit for wildlife. Sedimentation would continue to fill wetlands in zone 4. Overbank scouring of wetlands would degrade and eventually destroy existing wetlands in zone 4 and potentially zone 3. Aquatic habitats would remain disconnected from the river, providing limited value to native fish species based on the Aquatic Habitat Appraisal Guide evaluation (FWOP AAHUs = 26.9 as compared to With Project AAHUs = 69.2; Appendix D). Overall, the RRL habitat would degrade in quality and quantity.

Other assumptions made to determine the future without project conditions include:

1) Past land use of the site has detrimentally impacted the native plant communities and these communities will not naturally recover.
2) Current Environmental Pool Management of the Mississippi River which has led to an elevated water table at the site is assumed to be sustained during the 50-year period of project analysis.
3) No substantial increases to current operation and maintenance budget for the site would occur while efforts to maintain infrastructure would increase along with increases in projected prices of consumables (i.e., diesel fuel) which will take away from habitat management.
4) IDNR would not effectively be able to manage water in zones 3 and 4.
5) NRCS would continue to work with willing upland landowners in the watershed to reduce upland sedimentation inputs.
6) Some of the negative effects that could occur without the project would be offset by NRCS implementing their current plan for planting 190 acres of grasses in Zone 4.

Without Corps action, the potential for having a long-term, self-sustaining, functioning ecosystem at Rip Rap Landing would be lost and rare wetland and bottomland hardwood habitat along the Mississippi River would be reduced. The No Action Alternative would not include any USACE project features and no additional costs to the USACE would be generated. No habitat units would be gained or lost from USACE activities. The NRCS WRP easement would remain in place in perpetuity. While additional planting by NRCS would occur on the site, water level management capabilities would not be great enough to properly manage the site for optimal ecosystem function. IDNR continued site management would have some limited positive effects

while the continued degradation of ecosystem resources would likely have a negative effect on the habitat and thus habitat units over time.

4*. POTENTIAL PROJECT FEATURES

This section describes the features developed to address the problems and meet the goal of increasing quantity and quality of aquatic, non-forested wetland, and forested wetland habitats. Consideration to natural measures was given where possible. However, there are limited natural measures that would achieve the goals and objectives of the project. Examples of natural measures evaluated were tree planting that would help reduce sedimentation and the use of low spots in the natural levee to capture water to fill the wetlands during high flows of the Mississippi River.

A. Potential Features Not Evaluated.

Hillside Sediment Reduction. The desire to reduce sedimentation from the hillsides is strongly supported by USFWS. Features to reduce the addition of hillside sediment to Sny Creek and Roadside Lake were discussed, but not evaluated for this HREP since it is outside the scope of the USACE mission. In addition, communications with the NRCS District Conservationist suggests that sedimentation input from the hillside was overestimated early in the planning process. Current hillside sediment input is primarily from within the streams. Programs addressing soil erosion in the surrounding watersheds have already been implemented by NRCS in a large majority of the upstream area. Initial planning efforts were unaware of the programs already implemented.

Zone 2 Tree Planting. Tree planting was considered for Zone 2, but was ultimately removed from further consideration because of concerns with potentially altering the area's designation as a state natural area. The state of Illinois has placed this designation on the area due to its significant historic forest composition of bottomland hardwood forest. IDNR will look to promote natural revegetation of hard mast species in the former agricultural field on its own.

Dog Island Backwater Slough Excavation. Excavating remnant sloughs on Dog Island (Zone 5) were removed from consideration after the presence of the federally endangered Indiana Bat was discovered. The number of trees needed to be removed to construct these features could have been detrimental to the bat while the gain in aquatic habitat would have been minimal and not sustainable.

Sny Levee Extension in Zones 2 and 4. This feature consisted of constructing a riverside ridge levee along Zone 2 and Zone 4 to elevation 450. This feature could provide better protection to the area by reducing sedimentation and decreasing the potential impacts of headwater flooding. However this feature was not moved further due to preliminary assessment of the large cost and the relatively modest amount of habitat gains.

Supplemental Pump to Existing IDNR Pump Station. In the early stages of the analysis, it was determined that it was more cost effective and functional to utilize the current pump structure and place a new, larger pump on the existing pump structure than to a build a totally new pump station for Zone 4. The initial cost estimates of this feature would be more expensive then enlarging the existing pump station due to the need to construct new water channels and infrastructure for the supplemental pump. The existing infrastructure of the current pump station can be utilized with minor upgrades when replacing it with a larger pump. The PDT decided to exclude the supplemental pump from further analysis since there was a more cost effective way of accomplishing the same goal.

Pump Size. An analysis of the pump determined that the minimum size needed to maintain water level management capabilities and have similar controls over the newly acquired tract was 35,000 gpm (See Appendix P for additional detail). Smaller pump sizes would not allow the Zone 3 and Zone 4 to be managed at the same time. Larger pump sizes were not evaluated because they would not have any greater benefits than the 35,000 gpm pump, but have a larger cost. Larger pumps would only affect the time required to fill the area and not affect the benefits. Additionally, the PDT looked at a combination of wells, water control structures through the natural levee, and a smaller supplemental pump to provide water to the area; however the initial investigations and cost estimates showed that a 35,000 gpm pump placed on existing infrastructure was the most feasible and cost effective. Thus it was the only water supply feature carried forward for more detailed analysis.

B. Feasible Project Features.

Restoration and enhancement objectives for the project and, therefore, potential project features have been developed by zones within the project area because of the unique management constraints or opportunities within each zone. Consequently, project features will be discussed by zone. Figure 4.1 shows the locations of the feasible project features described below. Table 4.1 provides a brief description and the alpha-numeric identification code for the potential project features. Plates 5-1 through 5-6 show the locations of all feasible project features within the zones as described below.

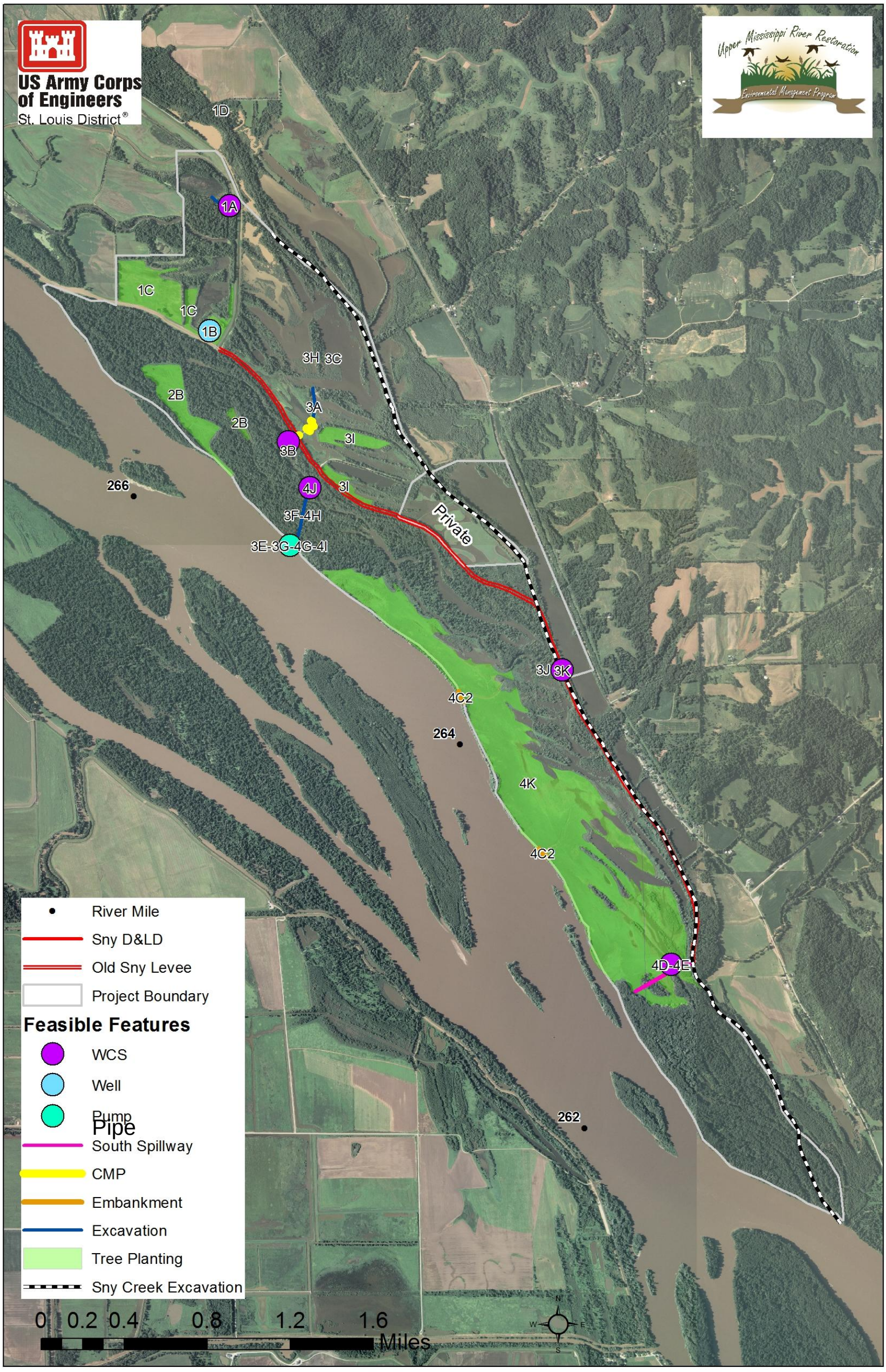

Figure 4. 1. Feasible Features Evaluated for Rip Rap Landing HREP.

Table 4. 1. Brief description of feasible project features. The number in the identification code corresponds to the zone number.

Feature Identification Code	Description
ZONE 1 – Sny Island Drainage & Levee District	
1A	Water Control Structure
1B	2,500 gpm Well
1C	Conversion of Crop to Bottomland hardwoods
1D	Channel to Goose Pasture Lake
ZONE 3 – Roadside Lake and Waverly Lake Wetland Management Areas	
3A	Channel to Waverly Lake
3B	Water Control in Pump Station Channel
3C	WCS in North Units
3D	Sny Creek Excavation from Sny Levee to Bridge
3E	43% of Pump Station
3F	43% Pump Channel Widening
3G	43% Pump Station Pipe and Concrete for Road
3H	WCS Pipes Under Sand Levee
3I	Conversion of Crop to Bottomland hardwoods
3J	Roadside Lake Channel from Sny Creek
3K	Portable pump and water control structure for Roadside Lake
ZONE 4 – Rust Land Company - WRP	
4A	Sny Creek Excavation Bridge-Old Levee End
4B1	Sny Creek Excavation Old Levee to Roadside Lake Channel
4B2	Sny Creek Excavation Roadside to Dog Island
4C2	River Ridge Scour Embankments
4D	South Spillway
4E	WCS South Spillway
4G	57% of Pump Station
4H	57% Pump Channel Widening
4I	57% Pump Station Pipe and Concrete for Road
4J	WCS Pipes Under Road
ZONE 5 – Dog Island	
5B	Sny Creek Excavation @ Dog Island

Zone 1. Sny Drainage and Levee District.

1A. Water Control Structure. Flooding to elevation 441 could be achieved by placing a water control structure across the existing drainage channel within the unit. This drainage channel is part of the overall drainage system utilized by the Sny D&LD to maintain water levels within the adjacent crop fields. By constructing this water control structure, water could be retained in zone 1. Coordination with the drainage district would be required before implementation of this feature.

1B. 2,500 gpm Well. It has been proposed that this portion of the project area be isolated from the Sny D&LD water management and a separate source of water found. This could be accomplished by closing the existing channels that drain to the Sny D&LD and providing a separate water source from a well. Re-supplying the wetland units within Zone 1 would require pumping from the well during dry periods. For practical operation the pumping rates should be sufficient to fill these areas within approximately 10 days of constant, 24-hours per day, pumping. To achieve this time frame for filling the complex to elevation 441, the pump must deliver an average discharge of approximately 2,120 gpm assuming an initial 100% loss associated with absorption and evapotranspiration. Historical reviews of pumping operations along various locations with the Illinois Department of Natural Resources Mississippi River units have indicated that a 100% initial loss does indeed occur. The use of a well for a water supply rather than pumping out of the drainage channel would help insure that undesirable fish do not enter into the wetland management unit.

1C. Conversion of Crop to Bottomland Hardwoods. Reforestation is proposed for this zone, to the extent possible. Approximately 62.9 acres of open land within this zone could be replanted. Mast-producing trees would be planted over former cropland on higher ground on the northwest end of the zone. Planting stock would be container-grown stock from a local nursery. Because of the protection provided by the Sny D&LD's levee flooding of the area from the river will not occur. The planted trees would serve as a seed source for natural re-vegetation, improve terrestrial habitat for resident and migratory birds, and expand habitats for mast consuming species such as turkeys and squirrels. Proposed species include Swamp White Oak, Pin Oak, Overcup Oak, Pecan, and Persimmon (Table 4.2).

Table 4. 2. Rip Rap Landing Mast Tree Planting Rates for all Zones

Common Name	Scientific Name	Planting Rates Per Acre
Swamp White Oak	*Quercus bicolor*	10
Overcup Oak	*Quercus lyrata*	10
Pin Oak	*Quercus palustris*	10
Pecan	*Carya illinoinensis*	8
Persimmon	*Diopyros virginiana*	6
Total		**44**

1D. Channel to Goose Pasture Lake. Water contained behind the structure (1A) would be directed to existing wetlands or new moist soil and bottomland forest units by use of a channel system.

Zone 3. Roadside Lake and Waverly Lake Wetland Management Areas.

3A, 3B, 3C. Waverly Lake Wetland Management Area Water Control. To improve water level management within Waverly Lake several features are proposed which include excavation of a channel (3A) to improve water conveyance from the pump station delivery channel, and placement of water control structures within that channel (3B), and corrugated metal pipes (3C) to direct water to the wetland management units associated with Waverly Lake. It should be noted that the excavation of the channel is included with zone 3 features based on where benefits are accrued, but it is technically on the southern edge of Zone 2.

3D. Sny Creek Excavation from Old Sny Levee to Bridge. Excavation of the historic Sny River (now called Sny Creek) is proposed for this zone, with deposition of the excavated material to the west of the creek channel to improve the existing Old Sny Levee extending from the Sny D&LD and further protect the area from headwater flooding.

3E, 3F, 3G. Pump Station and Delivery System (43%). A new riverside pump (35,000 gpm) would be placed on existing infrastructure (3E), along with widening the existing pump station channel (3F) and increasing the size of existing pump station water control structure under the road (3G). The cost of these features would be shared with Zone 4 (features 4G, 4H, and 4I), 43% of cost allocated to Zone 3 and 57% to Zone 4.

3H. Water Control Pipe under Old Sny Levee. This sluice gate feature is associated with improving water level management within the Waverly Lake Wetland Management Area (3A,3B, 3C) by conveying water under the Old Sny Levee Extension into the Waverly Lake Area.

3I. Conversion of Crop to Bottomland Hardwoods. Approximately 36.5 acres of former agricultural land could be replanted with bottomland hardwoods (see Table 4.2 for planting rates). All tree plantings would be on areas above elevation 441.0, where successful reforestation has a greater chance of survival due to river flood events.

3J. Channel from Roadside Lake to Sny Creek. Excavation of channel to reconnect Roadside Lake to Sny Creek is proposed for this zone which would improve water level management and connectivity.

3K. Water Control to Channel from Roadside Lake to Sny Creek. In conjunction with 3J, a portable pump and water control structure is proposed to facilitate water level management within Roadside Lake and provide connection to Sny Creek and ultimately the Mississippi River.

Zone 4. Rust Land Company - WRP Easement.

4A, 4B1, 4B2. Sny Creek Excavation. Excavation of Sny Creek is proposed for this zone to improve aquatic habitat and connectivity. 4A proposed excavation of Sny Creek from the Bridge

to the end of the Old Sny Levee. 4B1 proposed excavation of Sny Creek from the Old Sny Levee to the Roadside Lake Channel. 4B2 proposed excavation of Sny Creek from the Roadside Lake Channel to Dog Island.

4C2. River Ridge Scour Embankment. To reduce headwater flooding and wetland scouring into this zone, the existing swales along the natural riverside levee are proposed to be filled at the river to the height of the natural levee.

4D, 4E. South Spillway and Corrugated Metal Pipe. To improve water level management within the southern portion of Zone 4, a spillway and associated water control structures are proposed. These structures will be larger than existing NRCS structures and designed and constructed to withstand headwater flooding from the Mississippi River.

4G, 4H, 4I. Pump Station and Delivery System (57%). A new riverside pump (35,000 gpm) would be placed on existing infrastructure (4G), along with widening the existing pump station channel (FH) and increasing the size of existing pump station water control structure under the road (4I). The cost of these features would be shared with Zone 3 (features 3E, 3F, 3G), 43% of cost allocated to Zone 3 and 57% to Zone 4.

4J. Water Control Pipes Under Road. This feature, in conjunction with 4G-4H-4I, provides water control at the road to manage water levels from the pump station to Zones 2, 3, and 4.

Zone 5. General Plan Lands- Dog Island.

5B. Sny Creek Excavation. Excavation is proposed to reconnect Sny Creek to the Mississippi River and provide sufficient depth and habitat diversity for a suite of aquatic species.

5*. EVALUATION OF FEASIBLE PROJECT FEATURES AND FORMULATION OF ALTERNATIVES

This section describes the feasible features that met the goals and objectives of this project. Each feature or combinations of dependent features (i.e., pump station and delivery system) were evaluated through an environmental benefits analysis to determine the magnitude of ecosystem benefits to be expected if implemented. The benefits were then combined with cost estimates (FY12) for the Incremental Cost Analysis (ICA) to determine cost effectiveness. Alternatives were generated by creating all possible combinations of features. A full description of the environmental benefits analysis can be found in Appendix D. The costs and design life of each feature can be seen in table 5.1

A. Environmental Output Evaluation. A habitat analysis was performed for the RRL HREP, with the goal to restore aquatic and wetland habitat quality and diversity. This analysis employed a multi-agency team approach with representatives from the Corps of Engineers, the USFWS, IDNR, and HDR, Inc. Analysis of existing study area conditions, future conditions without the project, and impacts of several proposed features and alternatives were completed using the Wildlife Habitat Appraisal Guide (WHAG) procedures developed by the Missouri Department of Conservation and the USDA Natural Resources Conservation Service. The WHAG is a numerical habitat appraisal methodology based on USFWS Habitat Evaluation Procedures (HEP) (1980). WHAG procedures evaluate the quality and quantity of particular habitats for animal species selected for evaluation by the WHAG team members. The qualitative component of the analysis is known as the Habitat Suitability Index (HSI) and is rated on a 0.1 to 1.0 scale. The quantitative component of the analysis is the measure of acres of habitat that are available for the selected evaluation species. From the qualitative and quantitative determinations, the standard unit of measure, the Habitat Unit (HU), is calculated using the formula HSI x Acres = HUs. Changes in the quality and/or quantity of HUs would occur as a habitat matures naturally or is influenced by development. Cumulative HUs are annualized and averaged. To facilitate comparison, target years were established at 0 (baseline or existing conditions), 1, 5, 25, and 50 years. HSIs and average annual habitat units (AAHUs), for each evaluation species, were calculated to reflect expected habitat conditions over the life of the project. Aquatic habitats were evaluated in a similar manner, but using the Aquatic Habitat Appraisal Guide (AHAG) developed by the Corps of Engineers, Waterways Experiment Station, and modified in 1996. Calculations of habitat units and annualized average habitat units were completed in the same manner as those for the WHAG. Table 5.2 provides a summary of the net AAHUs generated for each grouping of project features that produce habitat benefits. These groupings are referred to as functional units. The base year for analysis was assumed to be one year after construction completion, 2020. For a more detailed description of the habitat analysis, refer to Appendix D of this report.

Table 5. 1. Costs (FY2012) of Each Feasible Feature, rounded to nearest thousand dollar.

Code	Description	Design Life (yr)	Total Cost[1] ($)
1A	Water Control Structure	20	$110,000
1B	2,500 gpm Well	15	$1,166,000
1C	Conversion of Crop to Bottomland hardwoods	50	$208,000
1D	Channel to Goose Pasture Lake	20	$68,000
3A	Channel to Waverly Lake	20	$581,000
3B	Water Control in Pump Station Channel	20	$111,000
3C	WCS in North Units	20	$489,000
3D	Sny Creek Excavation from Sny Levee to Bridge	20	$5,007,000
3E	43% of Pump Station	25	$391,000
3F	43% Pump Channel Widening	20	$81,000
3G	43% Pump Station Pipe and Concrete for Road	20	$17,000
3H	WCS Pipes Under Sand Levee	20	$206,000
3I	Conversion of Crop to Bottomland hardwoods	50	$121,000
3J	Roadside Lake Channel from Sny Creek	20	$35,000
3K	Portable pump and water control structure for Roadside Lake	20	$199,000
4A	Sny Creek Excavation Bridge-Old Levee End	20	$2,790,000
4B1	Sny Creek Excavation Old Levee to Roadside Lake Channel	20	$1,572,000
4B2	Sny Creek Excavation Roadside to Dog Island	20	$2,376,000
4C2	River Ridge Scour Embankments	25	$461,000
4D	South Spillway	25	$1,072,000
4E	WCS South Spillway	20	$109,000
4G	57% of Pump Station	25	$518,000
4H	57% Pump Channel Widening	20	$108,000
4I	57% Pump Station Pipe and Concrete for Road	20	$22,000
4J	WCS Pipes Under Road	20	$155,000
5B	Sny Creek Excavation @ Dog Island	20	$1,914,000

[1]Total Costs includes Contingency, Engineering Fees, Construction Management, Construction Cost, Present Worth of Replacements, and OMRR&R costs. Does not include LERRDs

Model Certification Status: Per EC 1105-2-412: Assuring Quality of Planning Models (dated 31 March 2011), planning models such as the AHAG and WHAG are required to be certified. Under the UMRR-EMP, the model certification process for both of these models has begun with reviewer comments received and are currently being addressed. Consistent with guidance from the National Ecosystem Restoration Planning Center of Expertise (ECO-PCX), the Agency Technical Review (ATR) Team for the Rip Rap Landing HREP conducted an assessment of the models used for this project. This process evaluated the technical quality and appropriateness of

the models utilized. A member of the ATR team evaluated the models during the 2010 ATR. The models were found to be correctly applied and appropriately used for this study. In addition, the ECO-PCX recommended single-use approval of AHAG and WHAG models for use at CCNWR. This recommendation was logged with the Office of Water Project Review for consideration by the Model Certification Team with a memorandum dated 11 October 2013. As of 5 November 2013, the Headquarters Model Certification Team approved the use of AHAG and WHAG for Rip Rap Landing HREP.

B. Cost Effective and Incremental Cost Analysis of Alternatives. Cost effectiveness analysis has been used to assist the decision-making process to determine which project features should be built. The decision is based upon the net habitat benefits (outputs) that meet the goals and objectives of the project in the most cost effective way. The cost effectiveness analysis is conducted to ensure that the least cost solution is identified for each possible level of environmental output. After the cost effectiveness of each alternative has been established, subsequent incremental cost analysis is conducted to reveal changes in costs for increasing levels of environmental output. In the absence of a common measurement unit for comparing the non-monetary benefits with the monetary costs of environmental plans, cost effectiveness and incremental cost analysis are valuable tools to assist in decision making. Appendix E presents the detailed results of the cost effectiveness analysis and incremental cost analysis.

Method. The project was evaluated using guidance and software prepared by the Corps of Engineers' Institute for Water Resources (IWR). Institute for Water Resources-Plan Decision Support Software (Version 2.06) was used in this analysis. The cost effectiveness and incremental cost analysis procedures are presented in nine steps, which can be grouped into four tasks listed below.

Formulation of combinations:

Step 1 – Display outputs and costs (Table 5.2)

Step 2 – Identify combinable management features (Tables 5.1 and 5.2)

Step 3 – Calculate outputs and costs of combinations

Cost effectiveness analysis:

Step 4 – Eliminate economically inefficient solutions

Step 5 – Eliminate economically ineffective solutions

Development of incremental cost curve:

Step 6 – Calculate average costs

Step 7 – Recalculate average costs for additional outputs

Incremental cost analysis:

Step 8 – Calculate incremental costs

Step 9 – Compare successive outputs and incremental costs

The results of these analyses are displayed as graphs and tables (Tables 5.1 through 5.5 and Figure 5.1). They permit the decision makers to progressively compare alternative levels of environmental outputs and ask if the additional environmental output in the next level is worth its additional monetary costs. It is important to note that these analyses would not usually lead, and are not intended to lead, to a single best solution as in economic cost-benefit analysis. They would improve the quality of decision making by ensuring that a rational, supportable, focused, and traceable approach is used for considering and selecting alternative methods to produce environmental outputs.

Basis for Analysis

1. Net AAHUs for each individual feature are based on 50-year period of analysis.
2. The design life of individual features varies from 15 years to 50 years.
3. Functional Units are comprised of dependent individual features, with some having been analyzed at the request of project partners.
4. An interest rate of 4.0 percent was used in the analysis based on Economic Guidance Memorandum, 10-1, Federal Interest Rates for Corps of Engineers Projects for Fiscal Year 2012.
5. Initial Construction Costs of individual features include mobilization and demobilization (5%), contingency (25%), engineering fees (15%), and construction management (10%) above the actual estimated cost for construction. It was assumed that all these costs would occur at Year 0 and represent the present worth (PW).
6. O&M Costs for the analysis represent the replacement costs of the individual enhancement features that will be incurred over the 50-year period of analysis. These future costs are assumed to be the same as initial construction cost, and were then converted to a present worth.

O&M (PW) = Initial Cost × (P/F, i, n_1) + Initial Cost × (P/F, i, n_2)

Where n_x is the year of each replacement over the 50-year period of analysis.

Design Life	Number of Replacements over 50-year Life	Replacement Series
15	3	15, 30, 45
20	2	20, 40
25	1	25
50	0	-

7. Annual Costs were determined by adding the present worth of the Initial Construction Costs and the O & M Costs, then annualizing over the 50-year period of analysis to produce an Equivalent Uniform Annual Cost (EUAC).
8. The Annual Cost for each Functional Unit was determined by summing the EUAC of each component feature.

Formulation of Combinations

Step 1: Display Outputs and Costs. See Table 5.2 for functional groups, their costs, and their net AAHUS.

Step 2: Identify Combinable Management Features. The following describes the functional units that were used during the ICA for each zone. Table 5.2 displays the outputs and costs of potential enhancement features grouped by functional units or as "stand alone" features within each zone, unless features must be combined with those in other zones to act as functional unit. Other features may be combined because of similarity. Outputs were determined using WHAG and AHAG and are presented as net Average Annual Habitat Units. Planning costs were developed in FY12 and annualized based upon a 50-year period of analysis and 3.75 percent interest rate (FY12).

Table 5. 2. Outputs and Costs of Functional Units

ICA Code	Feature Code	Brief Description	Net AAHU	Annual Cost[1]
A1	1A+1B+1D	Zone 1 Water Control	116	$61,000
A2	1C+(1A+1B+1D)	Zone 1 Water Control + Zone 1 Trees	159	$71,000
B1	1C	Zone 1 Trees	43	$19,000
W1	3A + 3B + 3C + (3E, 3F, 3G, 3H) + (4G, 4H, 4I)	Zone 3 Water Control	90	$129,000
W2	4D, 4E + (4G, 4H, 4I, 4J)+ (3E, 3F, 3G)	Zone 4 Water Control	97	$123,000
W3	3A + 3B + 3C + (3E, 3F, 3G, 3H) + 4D, 4E + (4G, 4H, 4I, 4J)	Zones 3 and 4 Water Control	147	$214,000
W4	3A + 3B + 3C + (3E, 3F, 3G, 3H) + (4G, 4H, 4I), 3I	Zone 3 Water Control + Zone 3 Trees	98	$136,000
W5	3A + 3B + 3C + (3E, 3F, 3G, 3H) + 4D, 4E + (4G, 4H, 4I, 4J), 3I	Zones 3 and 4 Water Control + Zone 3 Trees	156	$220,000
C1	3I	Zone 3 Trees Only	8	$10,000
S1	4C2	Zone 4 Scour embankment	15	$16,500
D1	5B	Sny Creek Excavation at Dog Island	29	$58,000
D2	5B, 4B2	Sny Creek Excavation at Roadside-Dog Island & Sny Dredging @ Dog Island	59	$80,000
D3	5B, 4B2, 4B1	Sny Creek Excavation at Levee to Roadside L. Channel , Sny Excavation Roadside-Dog Island, & Sny Excavation @ Dog Island	60	$128,000
D4	5B, 4B2, 4B1, 4A	Sny Creek Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel, Sny Excavation Roadside-Dog Island, & Sny Excavation @ Dog Island	61	$213,000
D5	5B, 4B2, 4B1, 4A, 3D	Sny Creek Excavation to Bridge, Sny Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel, Sny Excavation Roadside-Dog Island, & Sny Excavation @ Dog Island	64	$336,000
R1	3K, 3J	Roadside Lake Water Control	40	$12,000
R2	3K, 3J, 5B, 4B2	Roadside Lake Water Control, Sny Excavation Roadside-Dog Island and Sny Excavation @ Dog Island	101	$92,000
R3	3K, 3J, 5B, 4B2, 4B1	Roadside Lake Water Control., Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside-Dog Island, & Sny Excavation @ Dog Island	102	$140,000
R4	3K, 3J, 5B, 4B2, 4B1, 4A	Roadside Lake Water Control, Sny Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel,	103	$225,000

ICA Code	Feature Code	Brief Description	Net AAHU	Annual Cost[1]
		Sny Excavation Roadside-Dog Island, & Sny Excavation @ Dog Island		
R5	3K, 3J, 5B, 4B2, 4B1, 4A, 3D	Roadside Lake Water Control Sny Creek Excavation to Bridge, Sny Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside- Dog Island, & Sny Excavation @ Dog Island	106	$378,000

[1]Annual cost calculated from total cost in table 5.1 includes OMRR&R and value of land required

Zone 1. Sny Island Drainage and Levee District. The zone will be a management unit without impacts from river flooding and management. Zone 1 features can be implemented exclusive of any other zone within Rip Rap Landing. Features within this zone have been combined to form functional units, which were then used during the ICA.

A1. Zone 1 Water Control. This functional unit consists of drilling a well in the southeast corner of the zone, installing a pump, closing the existing levee district channel with a water control structure, and excavating a channel to Goose Pasture Lake to enhance water level management (1A, 1B, 1D). The zone could be managed without the channel to Goose Pasture Lake (a net of 5 AAHUs), but the opportunity to manage the lake for submerged aquatic vegetation and moist soil plants would be lost. The well and pump (96 net AAHUs) could not function effectively without the water control structure (15 net AAHUs) at the levee and drainage district channel because their pumping requirements would continually remove water from the zone (Plate 5-1). Therefore, these features were grouped together into a function unit. This functional unit yields a net benefit of 116 AAHUs and provides water level management capability for the entire zone.

A2. Zone 1 Water Control + Zone 1 Trees. This functional unit consists of A1 plus the planting of bottomland hardwood trees on 62.9 acres (1C). This functional unit yields a net benefit of 159 AAHUs.

B1. Zone 1 Trees Only. This feature consists of planting bottomland hardwood trees on 62.9 acres (1C) without any proposed water control features. This functional unit yields a net benefit of 43 AAHUs.

Zones 3 – 5. Zones 3 through 5 are presented together because some features on one zone are also needed in another zone. For example, the proposed water control features in Zone 3 (W) are also needed to provide the water to manage wetlands in Zone 4.

W. Improved Water Distribution and Control to Waverly Lake. To improve water distribution and control to Waverly Lake the riverside pump would be upgraded to 35,000 gpm and the pump channel and water control structures would be upgraded and/or increased in size to handle the additional flow (3E, 3F, 3G). A total of 25 net AAHUs were allocated to these features from Zone 3. The cost of these features would be shared with Zone 4 wetland management, 43% of cost allocated to Zone 3 and 57% to Zone 4 based on the amount of water needed for each zone. This allocation made water movement to both zones more economical based upon the net AAHU outputs. Sluice gate water control structures would be located at the Rip Rap Landing road (4J) and at the Sny levee extension (3H) as a means of conveying water to Waverly Lake and associated wetlands. The channel from the Sny Levee extension (3A) would be improved to

allow passage of additional water, and culverts (3B, 3C) would be placed in the channel to direct water to wetland management units associated with the lake. Features 3H, 3A, 3B, and 3C generated a total of 50 net AAHUs. The slough portion of the water conveyance to the Waverly Lake units would be held at a higher level during the fall by the water control structures under the Rip Rap Landing road (4J) and increased pumping capacity providing a benefit to the portion of the slough located in Zone 2 and generating 4 net AAHUs that were allocated to the water control structures under the road. The possible combinations of these features into ICA functional units are as follows:

W1. Zone 3 Water Control Only. To improve water distribution and control this functional unit [(3A + 3B + 3C + (3E, 3F, 3G, 3H) + (4G, 4H, 4I)] would require a water conveyance channel to Zone 3 and associated water control structures, the riverside pump station constructed to 35,000 gpm, and associated pump station channel widening and water control structures. This functional unit yields a net of 90 net AAHUs.

W2. Zone 4 Water Control Only. To improve water distribution and control this functional unit [4D, 4E + (4G, 4H, 4I, 4J)+ (3E, 3F, 3G)] requires the riverside pump station constructed to 35,000 gpm and associated channel excavation and water control structures along with a South Spillway and associated water control structure. This functional unit yields a net benefit of 97 net AAHUs.

W3. Zones 3 and 4 Water Control. To improve distribution and control this functional unit requires [3A + 3B + 3C + (3E, 3F, 3G, 3H) + 4D, 4E + (4G, 4H, 4I, 4J)] a water conveyance channel to Waverly Lake and associated water control structures, the riverside pump station constructed to 35,000 gpm and associated channel and water control structures, and the South Spillway and associated water control structures. This functional unit yields a net benefit of 147 net AAHUs.

W4. Zone 3 Water Control + Zone 3 Trees. This functional unit [3A + 3B + 3C + (3E, 3F, 3G, 3H) + (4G, 4H, 4I), 3I] includes W1 features plus tree plantings in Zone 3. This functional unit yields a net benefit of 98 net AAHUs.

W5. Zones 3 and 4 Water Control + Zone 3 Trees. This functional unit [3A + 3B + 3C + (3E, 3F, 3G, 3H) + 4D, 4E + (4G, 4H, 4I, 4J), 3I] includes W3 features plus tree plantings in Zone 3. This functional unit yields a net benefit of 156 AAHUs.

C1. Zone 3 Trees. This feature consists of planting bottomland hardwood trees on 36.5 acres (3I) on existing crop fields. This feature yields a net benefit of 8 net AAHUs.

S1. Zone 4 Scour Embankments. This feature (4C2) consists of constructing embankment segments across two scour locations in order to maintain normal river ridge control elevation. This feature generates a total of 15 net AAHUs.

D. Sny Creek Excavation. These functional units seek to reconnect Sny Creek to the Mississippi River and provide adequate depth and aquatic habitat diversity throughout the year.

D1. Sny Creek Excavation at Dog Island. This functional unit (5B) consists of excavating 6,257 ft at Sny Creek adjacent to Dog Island in Zone 5. This functional unit generates net 29 net AAHUs.

D2. D1+ Sny Creek Excavation Roadside Lake to Dog Island and at Dog Island. This function unit (5B+4B2) combines D1 with excavating 8,620 ft at Sny Creek from Roadside Lake to Dog Island (Zone 4). This functional unit generates 59 net AAHUs.

D3. D2 + Sny Creek Excavation Old Levee to Roadside Lake. This functional unit (5B+4B2+4B1) combines D2 with excavating 2,880 ft at Sny Creek from the sand levee to Roadside Lake (Zone 4). This functional unit generates 60 net AAHUs.

D4. D3+ Sny Creek Excavation from Bridge to Old Levee. This functional unit (5B+4B2+4B1+4A) combines D3 with excavating 4,516 feet at Sny Creek from the bridge to the sand levee (Zone 4). This functional unit yields 61 net AAHUs.

D5. D4+Sny Creek Excavation to Bridge. This functional unit (5B+4B2+4B1+4A+3D) combines D4 with excavating 8,670 ft at Sny Creek from the bridge to Waverly Lake (Zone 3). This functional unit yields 64 net AAHUs.

R. Roadside Lake and Sny Creek Excavation. These functional units seek to improve aquatic habitat within Roadside Lake and reconnect the lake to the Mississippi River via Sny Creek. The features combined allow for the management of submerged aquatic plants to benefit migratory wildlife. The Roadside Unit can be managed exclusive of any other features implemented in the RRL project area.

R1. Roadside Lake Water Control. This functional unit (3K+3J) includes a portable pump and fish friendly water control structure in Roadside Lake in Zone 3. The purpose of this feature is to be able to periodically manipulate water to foster the growth of submersed aquatic vegetation. This functional unit yields a net benefit of 40 AAHUs.

R2. R1+ Sny Creek Excavation Roadside Lake to Dog Island and at Dog Island. This functional unit (3K+3J+5B+4B2) combines R1 with excavating 6,257 feet at Dog Island (Zone 5) and excavating Sny from Roadside Lake to Dog Island (Zone 4) to provide fish passage to Roadside Lake from the Mississippi River. This functional unit yields 101 net AAHUs.

*R3. R2+ Sny Creek Excavation from Old Levee to Roadside Lake***.** This functional unit (3K+3J+5B+4B2+4B1) combines R2 with excavating 2,880 ft at Sny Creek from old levee to Roadside Lake (Zone 4). This functional unit yields 102 net AAHUs.

*R4. R3 + Sny Creek Excavation from Bridge to Old Levee***.** This functional unit (3K+3J+5B+4B2+rB1+4A) combines R3 with excavating 4,516 ft at Sny Creek from bridge to old levee (Zone 4). This functional unit yields 103 net AAHUs.

R5. R4+Sny Creek Excavation to Bridge. This functional unit (3K+3J+5B+4B2+4B1+ 4A+3D) combines R4 with excavating 8,670 ft from Sny Levee to Bridge (Zone 3). This functional unit yields 106 net AAHUs.

Step 3: Calculate Output and Costs of Combinations. Step 3 calculates the outputs and costs of each of the possible alternatives. For features with only one possible alternative other than No Action, incremental cost analysis is not necessary. Features were grouped into functional units seen in table 5.2. These functional groups could all be standalone alternatives that would accomplish some measure of ecosystem restoration. The costs and outputs of each functional group were entered into IWR Planning Suite. The program combined all possible combinations of these functional groups and produced the incremental cost per AAHU for each.

Steps 4 and 5: Eliminate Economically Inefficient and Ineffective Solutions. Step 4 eliminates economically inefficient solutions and identifies the least cost solution for each level of output. For example, if two plans produce two AAHUs and one costs $3,000 while the other $4,000, the more expensive plan is eliminated. Step 5 eliminates the economically ineffective solutions by identifying and deleting those solutions that would produce less output at equal or greater cost than subsequently ranked solutions. For example, if one plan produces two AAHUs for $8,000 and the next plan produces four AAHUs for $6,000, the first plan would be eliminated because it is not economically effective. Table 5.3 displays the least cost alternatives for project area features with all zones combined. Alternatives that are not cost effective were eliminated in this process because of high cost per AAHU.

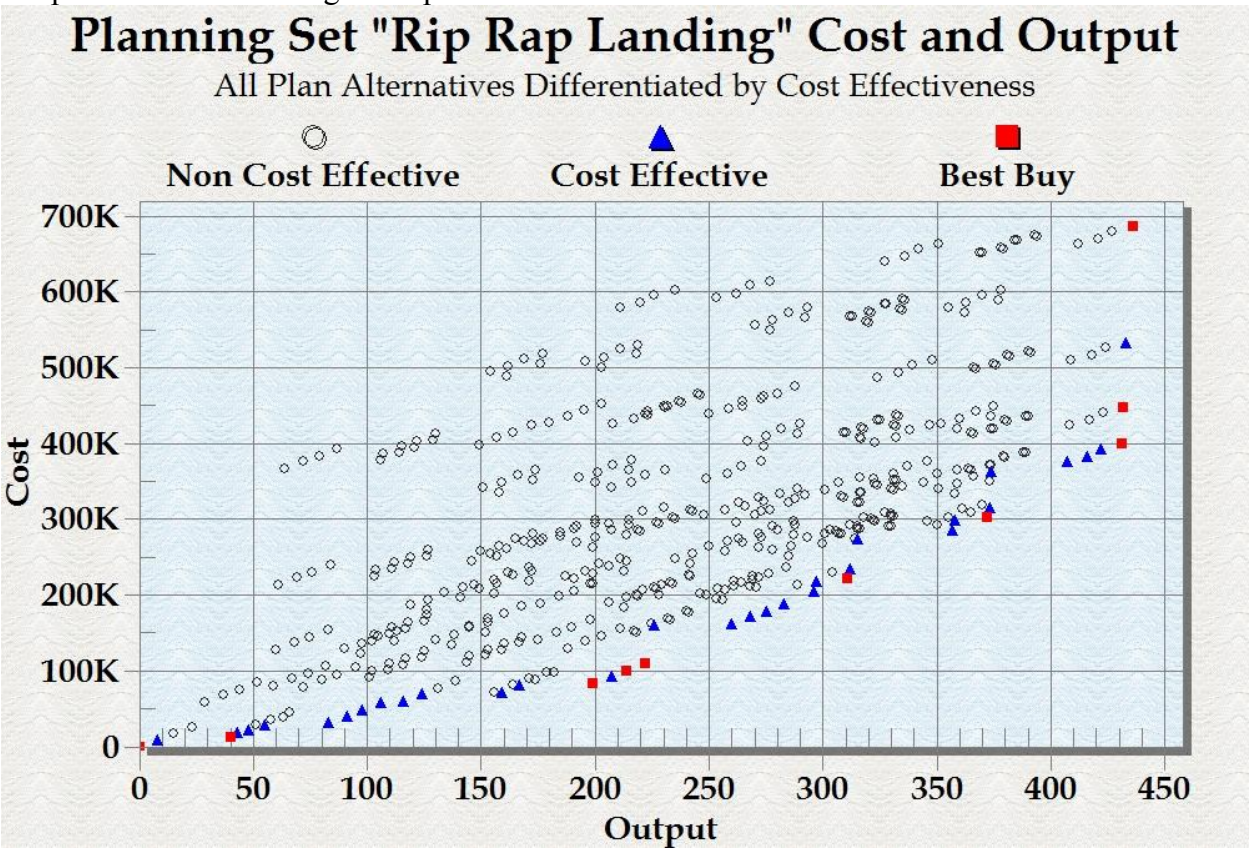

Figure 5. 3. Rip Rap Landing Planning Set.

Table 5. 3. Rip Rap Landing Cost Effective Plans and their Net AAHUs, Cost, and Cost Per Incremental Net AAHU

Total and Average Cost 4/25/2014 12:43:50PM

Cost Effective Plan Alternatives **Planning Set:** Rip Rap Landing

Counter	Name	Output HU	Cost $1000	Average Cost
1	No Action Plan	0.00	0.00	
2	A0B0W0C1S0D0R0	8.00	9,600.00	1,200.00
3	A0B0W0C0S0D0R1	40.00	12,000.00	300.00
4	A0B1W0C0S0D0R0	43.00	19,600.00	455.81
5	A0B0W0C1S0D0R1	48.00	21,600.00	450.00
6	A0B0W0C0S1D0R1	55.00	28,500.00	518.18
7	A0B1W0C0S0D0R1	83.00	31,600.00	380.72
8	A0B1W0C1S0D0R1	91.00	41,200.00	452.75
9	A0B1W0C0S1D0R1	98.00	48,100.00	490.82
10	A0B1W0C1S1D0R1	106.00	57,700.00	544.34
11	A1B0W0C0S0D0R0	116.00	60,500.00	521.55
12	A1B0W0C1S0D0R0	124.00	70,100.00	565.32
13	A2B0W0C0S0D0R0	159.00	71,200.00	447.80
14	A2B0W0C1S0D0R0	167.00	80,800.00	483.83
15	A2B0W0C0S0D0R1	199.00	83,200.00	418.09
16	A2B0W0C1S0D0R1	207.00	92,800.00	448.31
17	A2B0W0C0S1D0R1	214.00	99,700.00	465.89
18	A2B0W0C1S1D0R1	222.00	109,300.00	492.34
19	A2B0W0C1S0D2R0	226.00	160,700.00	711.06
20	A2B0W0C0S0D0R2	260.00	163,100.00	627.31
21	A2B0W0C1S0D0R2	268.00	172,700.00	644.40
22	A2B0W0C0S1D0R2	275.00	179,600.00	653.09
23	A2B0W0C1S1D0R2	283.00	189,200.00	668.55
24	A2B0W2C0S0D0R1	296.00	205,800.00	695.27
25	A2B0W4C0S0D0R1	297.00	218,900.00	737.04
26	A2B0W2C0S1D0R1	311.00	222,300.00	714.79
27	A2B0W4C0S1D0R1	312.00	235,400.00	754.49
28	A2B0W2C0S0D2R0	315.00	273,700.00	868.89
29	A2B0W2C0S0D0R2	357.00	285,700.00	800.28
30	A2B0W4C0S0D0R2	358.00	298,800.00	834.64
31	A2B0W2C0S1D0R2	372.00	302,200.00	812.37
32	A2B0W4C0S1D0R2	373.00	315,300.00	845.31
33	A2B0W4C0S1D0R3	374.00	363,300.00	971.39
34	A2B0W3C0S0D0R2	407.00	376,700.00	925.55
35	A2B0W5C0S0D0R2	416.00	382,900.00	920.43
36	A2B0W3C0S1D0R2	422.00	393,200.00	931.75
37	A2B0W5C0S1D0R2	431.00	399,400.00	926.68
38	A2B0W5C0S1D0R3	432.00	447,400.00	1,035.65
39	A2B0W5C0S1D0R4	433.00	532,800.00	1,230.48
40	A2B0W5C0S1D0R5	436.00	685,900.00	1,573.17

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Step 6: Calculate Average Costs. Average costs for each least-cost, cost-effective plan are determined by dividing the cost of the plan by the net AAHUs are shown in Table 5.3. Average costs are expressed in cost per net AAHU ($/AAHU). The plan with the lowest average cost is identified. Plans with less output at a higher average cost are eliminated.

Step 7: Recalculate Average Costs for Additional Outputs. This step asks the question "of the remaining levels of output, which has the lowest additional cost for additional output?" Using levels of output from Step 6, the average annual costs for additional output are calculated. The previous step's lowest average cost level of output was used as the "zero level." Levels of output less than the lowest average cost level are dropped from further analysis, while level of output greater than the lowest average cost level advance to the next recalculation. Recalculations are then made using the new lowest average cost level as the "zero level." Recalculations are made until the highest level of output is reached.

Step 8: Compare Successive Outputs and Incremental Costs. Table 5.3 and Figure 5.1 were used as decision making tools by progressively proceeding through available levels of output and asking if the next level was worth its additional monetary cost. This step examined the additional habitat value, as measured by increased net AAHU output, for an increase in monetary costs.

Table 5.4. Net AAHUs and Costs of Each Best Buy Alternative (Price Level July 2012). The tentatively selected plan is bolded and shaded in gray

Alt. #	Alternative Symbol	Description – Additional Group Added	Output [1]	Annualized Cost[2]	Average Cost ($/AAHU)	Incremental Cost ($)	Incremental Net Output (AAHU)	Incremental Cost/Output ($/AAHU)	Real Estate Costs
1	No Action	None	0	0	0	0	0	0	0
2	A0B0W0C0S0D0R1	Zone 3 Roadside Lake Water Control	40	$12,000	$300	$12,000	40	$300	$125,235
3	A2B0W0C0S0D0R1	Zone 1 Water Control and Vegetation	199	$83,200	$418	$71,200	159	$448	$702,259
4	A2B0W0C0S1D0R1	Zone 4 Scour Protection	214	$99,700	$466	$16,500	15	$1,100	$714,909
5	A2B0W0C1S1D0R1	Zone 3 Vegetation	222	$109,300	$492	$9,600	8	$1,200	$800,009
6	A2B0W2C0S1D0R1	Water Control Zone 4	311	$222,300	$715	$113,000	89	$1,270	$1,718,054
7	A2B0W2C0S1D0R2	Roadside Lake Reconnection	372	$302,200	$812	$79,900	61	$1,310	$1,730,704
8	**A2B0W5C0S1D0R2**	**Water Control Zones 3 and 4**	**431**	**$399,400**	**$927**	**$97,200**	**59**	**$1,648**	**$2,886,000**
9	A2B0W5C0S1D0R3	Sny Creek to Levee	432	$447,400	$1,036	$48,000	1	$48,000	$2,991,817
10	A2B0W5C0S1D0R5	Sny Creek to Bridge	436	$685,900	$1,573	$238,500	4	$59,625	$3,015,852

[1]Outputs are calculated as Average Annual Habitat Units (AAHUs)

[2]Annualized cost (FY12) includes initial construction, monitoring, LERRDS, and OMRR&R costs based on a 50-year period of analysis, 3.75% (FY12) interest rate.

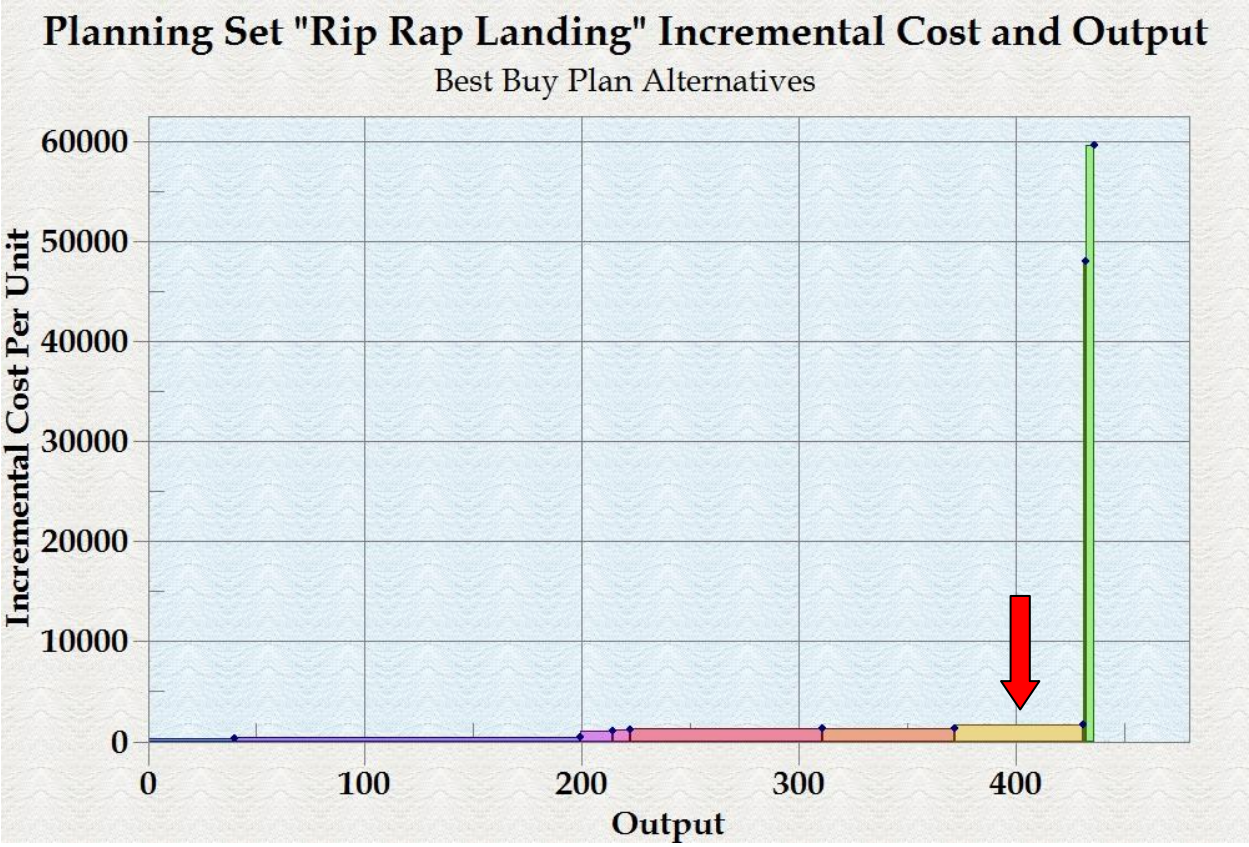

Figure 5. 2. Best Buy Plan Alternatives with tentatively selected plan identified by red arrow

C. ICA Conclusions.

The best buy alternatives presented provide the information necessary to make well-informed decisions regarding desired project scale (Table 5.3, Figure 5.1). Progressing through the increasing levels of output for the alternatives in Table 5.3 helps determine whether the increase in Net AAHUs is worth the additional cost. As long as decision makers consider a level of output to be "worth it", subsequent levels of output are considered. When a level of output is determined to be "not worth it", then subsequent levels of output will also likely be "not worth it", and the final decision regarding desired project scale for environmental restoration planning will have been reached.

Typically in the evaluation of Best Buy Alternatives, 'break points' are identified in either the last column in Table 5.3, or in the stair step progression from left to right in Figure 5.1. Break points are defined as significant increase or 'jumps' in incremental cost per output, such that subsequent levels of output may/may not be considered 'worth it'. Identification of such breakpoints can be subjective. For Rip Rap Landing, the breakpoints are subjectively identified as occurring between Alternative 2 and 3, as well as Alternative 8 and 9. Alternative 3 generates substantially higher levels of output at 199 incremental AAHUs, making the decision to continue elevating and considering Best Buy Alternatives beyond this breakpoint logical.

Alternative 8 generates a total of 431 net AAHUs at an incremental cost of $1,648 per output. Alternative 9 only generates an additional 1 net AAHU at an incremental cost of $48,000 per output. This considerable higher incremental cost per unit was deemed "not worth it". Therefore, Alternative 8, generating a total 431 net AAHUs, is identified as the desired project scale. Additionally, Alternative 8 is recommended as the NER Best Buy Alternative.

D. Selection of the Tentatively Selected Plan. The ICA best buy alternatives were assessed by the PDT on their ability to meet project objectives and achieve the four Planning and Guidance evaluation criteria identified in ER 1105-2-100. The four evaluation criteria are acceptability, completeness, effectiveness, and efficiency. The definitions, as shown below, were provided to the PDT prior to evaluation.

During the evaluation, the PDT evaluated the best buy alternatives' ability to meet the project objectives over the period of analysis identified for RRL. Rip Rap Landing HREP objectives are:

1. Increase habitat available to fish
2. Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management
3. Reduce impacts of headwater flooding and river-borne sedimentation
4. Increase quantity and quality of bottomland hardwood forest

Acceptability is the workability and viability of the alternative plan with respect to acceptance by Federal and non-Federal entities and the public and compatibility with existing laws, regulations, and public policies. Two primary dimensions to acceptability are implementability and satisfaction. Implementability means that the alternative is feasible from technical, environmental, economic, financial, political, legal, institutional, and social perspectives. If it is not feasible due to any of these factors, then it cannot be implemented, and therefore is not acceptable. An infeasible plan should not be carried forward for further consideration. However, just because a plan is not the preferred plan of a non-Federal sponsor does not make it infeasible or unacceptable. The second dimension to acceptability is the satisfaction that a particular plan brings to government entities and the public. Obviously, the extent to which a plan is welcome or satisfactory is a qualitative judgment. Nevertheless, discussions as to the degree of support (or lack thereof) enjoyed by particular alternatives from a community, state (Department of Natural Resources), or other national or regional (Ducks Unlimited) organizations, for example, are additional pieces of information that can help planners evaluate whether to carry forward or screen out alternative plans. Alternatives were assigned an acceptability of low, medium, or high. All alternatives were implementable. Ratings were based on the satisfaction provided to the government, sponsor, and public. Those alternatives not meeting all project objectives were rated low. The medium and high ratings were more subjective and based on discussions with the PDT, sponsor, and stakeholders.

Completeness is the extent to which an alternative plan provides and accounts for all necessary investments or other actions that ensure the realization of the planning objectives. To establish the completeness of a plan, it is helpful to list those factors beyond planning team control which are required to make the plan's effects (benefits) a reality. All alternatives were complete because they did not require outside action to meet the planning objectives. They were all rated

high.

Effectiveness is the extent an alternative plan alleviates the specified problems and achieves the specified opportunities. An effective plan is responsive to the identified needs and makes a significant contribution to the solution of some problem or to the realization of some opportunity. It also contributes to the attainment of planning objectives. The most effective alternatives make significant contributions to all the planning objectives. Alternatives that make little or no contribution to the planning objectives can be rejected because they are relatively ineffective. Another factor that can impact the effectiveness of an alternative is whether there is substantial risk and uncertainty associated with the alternative. If the functioning or success of an alternative is uncertain, or less certain than another alternative, its effectiveness may be compromised and should be discussed. Effectiveness ratings of low, medium, or high were assigned to alternatives. Alternatives not meeting all project objectives were assigned low. Those alternatives that met all project objectives were given a rating of at least a medium. Those alternatives that met objectives and allowed the site to be operated as one functioning system, rather than a collection of parts in the area, were rated high. The high rating was developed from guidance in ER 1105-2-100 and EP 1165-2-502 requiring USACE ecosystem restoration projects to be planned with a focus of operating as a system.

Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment (P&G Section VI.1.6.2(c) (3)).

To allow for easier comparison, the PDT prepared a matrix for ranking each best buy alternative according to how well the alternatives met the four evaluation criteria while considering the project objectives (Table 5.4). The following is a discussion of the factors considered when ranking the alternatives in Table 5.4.

Alternatives 1 – 3: These alternatives were not selected because they do not meet all of the project objectives. This resulted in low effectiveness and acceptability ratings.

Alternatives 4-5: These alternatives do meet all of the objectives. They were assigned a medium acceptability rating as a result. Their effectiveness ratings were also rated a medium. It was not given a higher effectiveness rating because there are alternatives that meet project objectives and more completely follow the USACE guidance requiring planning in a systems context. None of these alternatives improve water level management conditions in zone 4 and a large part of zone 3. This results in an area in the middle of the project area that would not be able to be managed to restore the ecosystem in some form. These alternatives would be a collection of individual managed areas and not a functioning ecosystem.

Alternative 6: This alternative is a collection of all of the features found in alternatives 2-5 with the addition of water level management capabilities for zone 4. Its rating does not change from those for alternatives 4 or 5. While it meets objectives and

introduces management capabilities to more of the area, it does not allow the site to be managed as one functioning ecosystem.

Alternative 7: This alternative introduces a reconnection of Roadside Lake with Sny Creek and the Mississippi River. This reconnection better meets the increase habitat available to fish objective because it allows fish year round access to the lake. The lake habitat is improved with previous alternatives, but they are reliant on high water events to enter and exit the lake. The addition of this feature gave this alternative a high acceptability rating. The effectiveness rating was only a medium however. This is because the area is still only able to be managed as a collection of individual parts under this alternative.

Alternative 8: This is the first alternative that fully meets the goal and objectives for the site and allows the site to be managed as one wholly function unit. It allows for water level management capabilities throughout the site with the addition of Zone 3 features. It was given a high effectiveness rating as a result. Economically it offers a large number of habitat units at a relatively low cost, giving it a high efficiency rating. Alternative 8 generates a total of 431 AAHUs at an incremental cost of $1,648 per AAHU.

Alternatives 9-10: These alternatives meet the goal of the project by restoring ecosystem function across all habitat types, but at a greater cost per habitat unit as compared to alternative 8. Excavating Sny Creek further past Roadside Lake would improve aquatic connectivity to the Mississippi River; but the PDT felt that the greater cost was not justified. For example, Alternative 9 only generates an additional 1 AAHU at an incremental cost of $48,000 per AAHU. These alternatives were rated low in efficiency as a result and were not chosen.

Table 5. 5. The best buy alternatives evaluated on their ability to achieve the four Planning and Guidance Evaluation criteria and achieve project objectives.

Best Buy Alt.	Alternative Symbol	Additional Feature Added[1]	P&G Evaluation Criteria				Features Meeting Project Objectives			
			Acceptability	Completeness	Effectiveness	Efficiency	Increase habitat available to fish	Increase native plant species diversity through water level management	Reduce impacts of headwater flooding and river-borne sedimentation	Increase quantity and quality of bottomland hardwood forest
1	No Action		L	H	L	L	None	None	None	None
2	A0B0W0C0S0 D0R1	Zone 3 Roadside Lake Water Control	L	H	L	L	R1	R1	None	None
3	A2B0W0C0S0 D0R1	Zone 1 Water Control and Vegetation	M	H	L	L	R1	R1, A2	None	A2
4	A2B0W0C0S1 D0R1	Zone 4 Scour Protection	M	H	M	M	R1	R1, A2	S1	A2
5	A2B0W0C1S1 D0R1	Zone 3 Vegetation	M	H	M	M	R1	R1, A2	S1	A2, C1
6	A2B0W2C0S1 D0R1	Water Control Zone 4	M	H	M	M	R1	R1, A2, W2	S1	A2, W2
7	A2B0W2C0S1 D0R2	Roadside Lake Reconnection	H	H	M	H	R2	R2, A2, W2	S1	A2, W2
8[2]	**A2B0W5C0S 1D0R2**	**Water Control Zones 3 & 4**	**H**	**H**	**H**	**H**	**R2**	**R2, A2, W5**	**S1**	**A2, W5**
9	A2B0W5C0S1 D0R3	Sny Creek to Levee	H	H	H	L	R3	R3, A2, W5	S1	A2, W5
10	A2B0W5C0S1 D0R5	Sny Creek to Bridge	H	H	H	L	R5	R5, A2, W5	S1	A2, W5

[1]Each alternative includes its functional group and the groups of the alternatives before it.
[2]Tentatively Selected Plan

E. Summary. The results of the incremental cost analysis in this section were considered with other factors, including physical features on the site, land ownership and easements or use restrictions, management objectives of the resource agencies, critical needs of the region, and ecosystem needs of the Upper Mississippi River System. In cooperation with USFWS, Illinois DNR, and NRCS, a cost effective project has been planned and designed that serves the needs of the site managers and project partners. The preferred alternative has an overall output of 431 AAHUs. These figures are summarized in Table 5.3. Several other alternatives were considered but eliminated during the ICA process because they did not meet one or more of the criteria: acceptability, completeness, effectiveness, or efficiency. Separate systems for water movement were originally thought to be the best approach for Zones 3 and 4 but were eliminated in steps 4 and 5 of the ICA because they were inefficient. The tentatively selected plan was selected because it met the four criteria and best met the project goal of increasing quality and quantity of aquatic, non-forested wetland, *and* forested wetland habitats and the project objectives.

Tentatively Selected Plan. Alternative 8 was selected by the PDT as the tentatively selected plan. This alternative best meets the study objectives and has the support from the USFWS and the IDNR. The plan improves internal and external water drainage, management, and supply. It improves aquatic habitat and increases the bottomland forest and non-forested wetlands on the site. The TSP was calculated to have an average annual cost of $399,400 in FY12 costs. When updated with FY14 costs, the average annual cost is $554,580.

National Ecosystem Restoration (NER) Plan. Engineering Regulation 1105-2-100 directs that Corps of Engineers ecosystem restoration projects should contribute to national ecosystem restoration. The NER plan reasonably maximizes ecosystem restoration benefits compared to costs, considering the cost effectiveness and incremental cost of implementing other restoration options. The average annual habitat units utilized in the plan formulation process quantify the ecosystem restoration benefits. Refer to Appendix D, Habitat Evaluation and Quantification, for a detailed description of the habitat analysis process. Alternative 8 is also the NER Plan. It is a best buy alternative that yields 431 net AAHUs at an incremental cost of $1,648 per net habitat unit at FY12 estimates. The average annual cost per net habitat unit is $927. When adjusted to FY14 costs, the average annual cost per net habitat unit is $1,287.

6*. TENTATIVELY SELECTED PLAN: DESCRIPTION WITH DESIGN, CONSTRUCTION, OPERATIONS, MAINTENANCE, REPAIR, REHABILITATION, AND REPLACEMENT CONSIDERATIONS

A. General Description. Figure 6.1 illustrates the location of project features of Alternative 8, the Tentatively Selected Plan. The following preferred alternatives were developed by the planning team and supported by the project Sponsors (USFWS and IDNR).

- Zone 1- All items within the Zone 1 plan were cost effective and created a functional management unit.
- Zone 3- All items in Zone 3 except for the excavation of the Sny north of the County highway bridge were cost effective and helped form functional units.
- Zone 4- All items within Zone 4 were cost effective and help form functional units, except for the excavation of Sny Creek north of the Roadside Lake connection channel and south of the county highway bridge.
- Zone 5- Excavation of Sny Creek within Zone 5 was the only item that was cost effective and an integral part of a functional unit with other features in Zones 3 and 4.

  Plates 5-1 through 5-5 show the tentatively selected plan.

B. Tentatively selected plan. Note all elevations are above mean seal level (AMSL).

The features of the tentatively selected plan are designed to address the study goals (Table 6.1).

Table 6.1. Study goals and the features of the tentatively selected plan that address them. Some features of the TSP address multiple objectives.

Zone	Enhancement Feature or Functional Unit	Increase quantity and quality of aquatic habitat	Increase quantity and quality of non-forested wetland habitat	Increase quantity and quality of forested wetland habitat
1	Install 2,500 gpm Well and Water Control Structures with Channel to Goose Pasture Lake Conversion of Cropland to BLH		X	X
3&4	Channel to Waverly Lake, Water Control in Channel, WCS in North Units, Pump Station, Pump Channel Widening, Pipe and Concrete at Road, WCS Pipes Under Old Levee, WCS Pipes Under Road, South Spillway, WCS South Spillway, River Ridge Scour Embankment Trees in Zone 3, Trees in Zone 4		X	X
3,4,&5	Water Control at Roadside Lake, Roadside Lake Channel to Sny, Sny Excavation Roadside Channel to Dog Island, Sny Excavation Along Dog Island	X		

A detailed description of the project features included in the tentatively selected plan is given in section 4 above and are summarized in Table 6.2. The tentatively selected plan uses a combination of improved water control (Zones 1, 3, and 4), tree plantings (Zones 1 and 3), riverside ridge scour embankment (Zone 4), excavation of Sny Creek (Zones 4 and 5), and the reconnection of Roadside Lake with Sny Creek and the Mississippi River to increase the quality and quantity of forested wetland, non-forested wetland, and aquatic habitats throughout Rip Rap Landing.

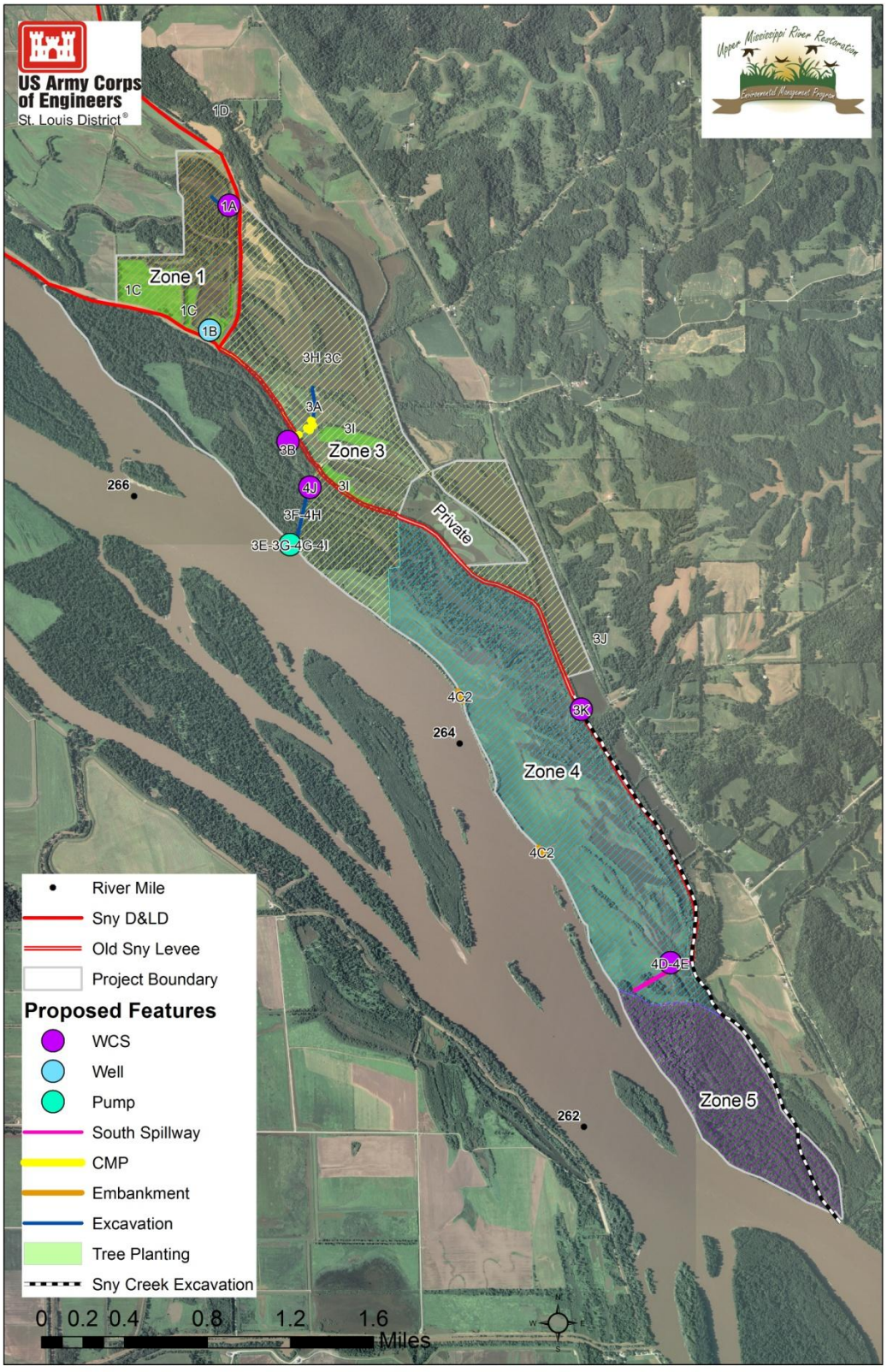

Figure 6. 1. Location of features of the Tentatively Selected Plan

Table 6. 2. Rip Rap Landing Project Feature Summary

Feature	Measurement	Unit of Measure
ZONE 1 – Sny Island Drainage and Levee District		
Water Control Levee Structure (1A)		
Crown Width	12	Feet
Side slopes	3:1	H:V
Levee Length (new)	54	Feet
Compacted Embankment for levee	400	Cubic Yards
Sluice gate, 24"	1	Each
Corrugated metal pipe, 24"	1	Each
Wooden Catwalk	1	Each
Well (1B)		
Well Installation, 2,500 gpm	1	Each
Diesel Power system	1	Each
Mast Tree Planting (1C)	62.9	Acres
Channel to Goose Pasture Lake (1D)		
Channel Length	200	Feet
Side slopes	3:1	H:V
Bottom width	12	Feet
Depth	2	Feet
Channel Excavation	189	Cubic Yards
ZONE 3 – Roadside Lake and Waverly Lake Wetland Management Areas		
Pump Channel from Sny Sand Levee to Waverly Lake, (3A)		
Side slopes	2:1	H:V
Bottom Width	10	Feet
Channel Length	1,636	Feet
Water Depth	5	Feet
Channel Excavation	3,500	Cubic Yards
Compacted Embankment for levee	12,500	Cubic Yards
Water Control Structure in Main channel from Sny Sand Levee to Waverly Lake (3B)		
Crown Width	12	Feet
Side slopes	3:1	H:V
Levee Length (new)	40	Feet
Compacted Embankment for levee	425	Cubic Yards
Corrugated metal pipe, 36"	2	Each
Sluice Gate structure	2	Each
Catwalk	2	Each
WCS in Main channel from Sny Sand Levee to Waverly Lake to northern and southern moist soil units (3C)		
Water control pipe, 24"	44	Feet
Stop log structure	2	Each
Catwalk	2	Each
Pump station (3E) & (4G)		
Removal of existing pump	1	Each
Modifications to existing structure	1	Each
Securing and installing new pump	1	Each
Widening Pump Channel to Sny Sand Levee, 35,000 gpm capacity (3F) & 4H)		

Feature	Measurement	Unit of Measure
Side slopes	1:1	H:V
Bottom Width	18	Feet
Channel Length	1,400	Feet
Channel Excavation	4,000	Cubic Yards
Concrete access across pump channel to Zone 2 (3G) & (4I)		
Length	40	Feet
Width	20	Feet
Water Control Pipes & Structure Under Sny Sand Levee (3H)		
Sluice gate, 36"	2	Each
Water control pipe, 36"	2	Feet
Water control pipe bands, 36"	4	Each
Wooden Catwalk	2	Each
Mast Tree Planting (3I) and/or natural regeneration	36.5	Acres
Roadside Lake Channel to Sny (3J)		
Length	100	feet
Width	40	Feet
Side slopes	1:1	H:V
Channel Excavation	720	Cubic Yards
Water Control Structure in channel from Sny to Roadside Lake (3K)	1	Each
ZONE 4 – Rust Land Company - WRP		
Dredging of Sny from Roadside Lake access channel to Dog Island (4B1 & 4B2)		
Depth	8	Feet
Side slopes	3:1	H:V
Bottom Width	14	Feet
Channel Length	2,880	Feet
Channel Excavation	51,325	Cubic Yards
Water Control Levee Structures in scoured areas along River ridge (4C2)		
Crown Width	12	Feet
Side slopes	3:1	H:V
Levee Length (new)	120	Feet
Compacted Embankment for levee	5,600	Cubic Yards
Water Control Spillway Structure Replacing NRCS Structure #1 (4D & 4E)		
Crown Width	12	Feet
Side slopes	1:1	H:V
Levee Length (new)	1,700	Feet
Compacted Embankment for levee	380	Cubic Yards
Revetment mattresses	2,270	Sq Yds
Water Control pipe, 36"	2	Feet
Stop log structure	2	Each
Catwalk	2	Each
Water Control Structure in Main channel under access road to Zone 4 (4J)		
Water Control pipe, 36"	160	Feet
Stop log structure	1	Each
Catwalk	1	Each
ZONE 5 – Dog Island		

Feature	Measurement	Unit of Measure
Excavation of Sny Creek from southern end of Zone 4 to the Mississippi River (5B)		
Depth	8	Feet
Side slopes	1:1	H:V
Water surface at top	30	Feet
Bottom Width	14	Feet
Channel Length	6,257	Feet
Channel Excavation	27,850	Cubic Yards

Zone 1. Re-supplying the wetland units within Zone 1 would require pumping during dry periods. The use of a well for a water supply rather than pumping out of the drainage channel was to insure that undesirable fish do not enter into the wetland management unit. Flooding to elevation 441 will be achieved by placing a water control structure (1A) across the existing drainage channel within the unit. This drainage channel is part of the overall drainage system utilized by the Sny D&LD to maintain water levels within the adjacent crop fields. By constructing this water control structure, water can be retained behind, south of the structure. Water contained behind structure 1A will then be directed to existing wetlands or new moist soil and bottomland forest units by use of a channel system created within Item 1D. With the improved water control, approximately 62.9 acres of cropland within this zone will be replanted with mast-producing trees (1C).

Zones 3 & 4 Water Control. The cost of expanding the existing pump station from 11,000 gpm to 35,000 gpm and widening the pump channel from the pump station to the Sny sand levee was divided between Zones 3 and 4 based upon a percentage using the original concept of 15,000 gpm for Zone 3 and 20,000 gpm for Zone 4. Having the ability to divert up to 35,000 gpm to either Zone will increase the management flexibility of the site and allow them to "move" water based upon the wetland conditions in either Zone. The cost associated with expanded pump station and widening the existing pump channel for Zone 3 are features 3E and 3F, respectively. For Zone 4 these features are 4G and 4H, respectively. Feature 3A (increasing capacity of channel to Waverly Lake) is needed to accommodate the flow from the new 35,000 gpm pump, along with expanding, moving and/or replacing the existing water control structures (Features 3B and 3C).

As part of the pump and channel analysis required in expanding the pump capacity, the pump supply pipe increased in size. In order to maintain existing water elevation, thus protecting the pump station and boat access road, it was necessary to reduce the amount of earthen cover over the pump supply pipe. While this might be an issue only if heavy equipment were to utilize the existing access road going along the river into Zone 2, it was determined that a concrete entrance slab should be placed along the roadway where it crossed the pump water supply pipe. This cost was split between Zones 3 and 4 as indicated above and are identified as Features 3G & 4I.

The increased water supply from the pump station will terminate in a backwater slough just to the west of the Sny Old Levee extension. At this location, water can then either be directed under the Sny Sand levee though the water control structure identified as Item 3H or it can be directed under the pump station and boat access road south to fill Zone 4 using Item 4J. Water within this

slough will also be directed north into the backwater slough areas in Zone 2. The slough will be used as a water conveyance for Zones 2, 3 and 4.

Generally speaking, the intent of Zone 4 was to continue the water management plan previously developed within the NRCS' WRP project. This is accomplished by three major items within this zone. Feature 4C2 will fill in the low points that are part of the natural ridge along the river and cause periodic, scouring, overbank flooding in the area. Filling in these low points will help limit future overbank flood events and reduce scour associated with them. While the Zone will still flood, most flood events will back fill the site, thus reducing velocities and helping to reduce overbank scouring.

The reconnection of Roadside Lake to Sny Creek and the Mississippi River will be accomplished through a small channel from the creek to the lake separated by a stop log structure. The stop log structure would allow for management of the lake levels if a drawdown is desired to control invasive species as well as allow the lake to hold water in periods when the water stages in the creek are lower.

The flood events that have occurred because of the above mentioned low points were too large for NRCS Structure #1 to accommodate. Items 4D and 4E expand and install a larger water control structure. Revet mattresses will be used for the top of the spillway to provide a more even water control elevation across the spillway and to carry higher velocity flows, when encountered. The new water control structures will utilize sluice gates in lieu of stoplogs for water control as the spillway will be used to maintain water levels throughout the slough and associated wetlands in the zone.

Zones 3 Tree Plantings. Feature 3I consists of reforestation by the cultivation of high forage-value, mast-producing trees. There are currently about 36.5 acres of open land within Zone 3 that will be replanted.

Zone 4 & 5 Sny Creek Excavation. In Zone 4, excavation of Sny Creek from Roadside Lake access channel south to the northern edge of Zone was a cost-effective feature. The only element found to be cost effective within Zone 5 was the continuation of the dredging of the Sny between the southern edge of Zone 4 and Sny Creek's confluence with the Mississippi River.

C. Design Considerations

The Project has been developed to a feasibility level of design. Design details are included in the technical appendices and plates. As with all feasibility level studies, these details will be refined in the Plans and Specifications (P&S) stage.

Hydrologic/Hydraulic. *Division Regulations DIVR 1110-1-403 "Mississippi Valley Division/Mississippi River Commission Policy on River Diversions":* The tentatively selected plan requires construction of a pump station to remove water (and some sediments) from the Mississippi River. Features were designed and constructed to minimize the local and system-wide impacts to hydrologic systems gaining and losing flow and sediments. The proposed

diversion of Mississippi River water for operation of the proposed pump station is 35,000 gpm. Due to its size and localized area of effect, District technical experts have determined that the proposed pump station operation should not impact existing engineering features and projects, such as levees or other river training structures, nor is it expected to have any significant cumulative impacts on the system. Per *DIVR 1110-2-240 "Preparation of Water Control Plans and Manuals*", a water control plan for pump station operation will be developed during Plans and Specifications.

D. Construction Considerations

Storm Water Pollution / Erosion Control. The potential for storm water pollution during construction is minimal for this project with the possible exception of the excavation issues associated with the Sny Creek. Storm water runoff from nearly all construction activity would be contained within the confines of the project. Temporary stabilization measures would be employed on disturbed areas of the main pump channel, Sny Creek and Roadside Lake connection to the Sny Creek until stabilization occurs. Stabilization practices may include mulching, temporary seeding, and /or the erection of silt fencing. Overall, the long-term storm water runoff characteristics of the site would not be expected to change. All areas impacted by construction will re-seed through natural succession with similar vegetation types as before project conditions.

Permits. This project will require that it undergo the process for obtaining a Section 404 joint application review and Public Notice through the Regulatory Branch of the Corps based upon the 404(b)(1) evaluation in Appendix B, and a Section 401 water quality certificate from the Illinois Environmental Protection Agency. The IDNR will also have an internal Comprehensive Environmental Review Process (CERP) which tracks potential impacts to Threatened and Endangered Species, Wetland and Cultural Resources.

Protected Species.

Bald Eagles – Consideration (in coordination with the USFWS) will be given during plans and specifications preparation sequencing construction activities in a manner that minimizes impacts. Specific restrictions relative to any sequencing will be included as part of the contract specifications. The contracting officer will ensure appropriate compliance.

Indiana Bat – Special conditions on the construction work will require that tree clearing activities be scheduled outside May 1 thru August 31 when Indiana bats are known to inhabit summer habitat. If tree clearing activities must occur during this period, coordination with the USFWS will occur. At a minimum, a site visit by a team of biologists will be required to determine if any roost trees are among those proposed for removal. If removal of a roost tree is proposed, then the District must enter into Section 7 consultation with the USFWS. This consultation will determine if the proposed action is likely to jeopardize the continued existence of the Indiana Bat.

Migratory Wildlife – The development of plans and specifications will attempt to minimize disruption of migratory wildlife during fall and early winter.

Construction Sequence. The probable construction sequence is summarized in Table 6.3; however, no sequence will be required contractually.

E. Operational Considerations. A brief description of pump operation, water control structures, pumping station, inlet and outlet structures and fish friendly structures is given here. A complete list of Rip Rap Landing operation needs will be published in an OMRR&R Manual after construction completion.

Pump(s). One 35,000 gpm diesel engine pump is proposed that will be placed at the existing structure adjacent to the main access road and the boat ramp. The pump itself will remain on the structure year round but the pump engine and fuel supply will be portable so they can be removed from the floodplain when not in use. The pump station will have to be operated by manpower from the site to keep it fueled and running.

Water Control Structures. Multiple water control structures are part of the tentatively selected plan. The control structures generally include a gate (sluice) to control water movement. The gate on the pipe will have to be raised and lowered as needed to supply water to the various wetland units within the facility.

F. Maintenance Considerations. The proposed features have been designed to ensure low annual maintenance requirements. Routine maintenance would include periodic inspection and lubrication of the pumps and water control structures. The pump station would require monthly maintenance to include: lubricating flap gate hinges, pillow block bearings, sluice gate operators and stems. The following would need to be checked: lube level in the gear reducer, and diesel engine fluid levels, filters, and battery. To protect the engine and fuel tank, they would be shutdown, disconnected and hauled to and from storage each year. On an annual basis, water control structures would need grease added to the gate hoist operator gear housing, the gate stem threads greased, and debris removed. Berms would require inspection for erosion, mowing, and service road surfacing maintenance. Planted trees would be established prior to project completion and no OMRR&R should be needed. Additional activities that would not occur on an annual basis include pump station rehabilitation. This would involve removing the pump and likely shipping it to a shop. The shop would disassemble the pump rotating elements; blast them clean; inspect: intermediate shafts, impeller, pump column, flange register fits, suction bell and pump bowl; replace: bearings, sleeves, bushings, grease seals, packing, gaskets, pump shaft, enclosing tubes, fasteners, and flexible coupling; and paint and reassemble the pump components. The pump would then be reinstalled and tested. This likely would not be need until at least 20 years after project construction. The estimated annual maintenance costs are presented in Table 8-3. These quantities and costs may change during final design. A complete list of Rip Rap Landing maintenance needs will be published in an OMRR&R Manual after construction completion. The estimated annual maintenance costs are presented in Table 8-3. These quantities and costs may change during final design.

Maintenance after a flood event would be more intensive. The portable pump and engine tanks used at Roadside Lake should be removed before a flood occurs. After a flood, all features must be inspected for erosion and structural damage. When a flood has inundated a pump, it must be

examined and serviced according to the manufacturer's maintenance instructions. Water control structures must also be inspected to determine if gates seal tightly and operators are functional.

G. Repair, Rehabilitation, and Replacement Considerations.

Repair, rehabilitation, and replacement considerations may extend outside the typical 50-year period of analysis; as such, the project partner is expected to maintain the HREP project until it is no longer authorized and should expect to incur costs associated with this responsibility outside of the 50-year period of analysis.

Table 6. 3. Probable Construction Sequence

Sequence	Construction Work Item	Instructions	Purpose
BID PACKAGE #1			
1	Install erosion control features on all portions of the site within this bid package.	Silt fencing will be the most common technique used in Bid Package #1.	Insures construction operations are not allowing for silt to become deposited in water and natural habitats.
2	Fill in and armor low scoured areas along the river ridge in Zone 4.	Structures will be earthen embankment protected by riprap or revet mattresses. Control moisture content	This will eliminate head cutting and development of new swales in zone 4. Controlling moisture content will assist in securing required compaction.
3	Reconstruct and lengthen NRCS structure #1	Spillway water control elevation will be increased and spillway lengthened to provide more water control and less maintenance.	This spillway will set the water control elevation for all of the various potholes and swales within Zone 4.
4	Install new levee across drainage channel and cut channel to Goose Prairie Lake in Zone 1	The water control structure and the channel excavation can be undertaken in conjunction with the well development	Upon the completion of items 10 and 11, this area can be managed independently of the other Zones.
5	Install new well in Zone 1	Drill, test and install power supply to new well in Zone 1. Work can be done in almost any season as the area is protected from flooding.	Allows area to be flooded.
BID PACKAGE #2			
1	Install erosion control features on all portions of the site within this bid package.	Silt fencing will be the most common technique used in Bid Package #2, but coir logs will be used to stabilize the spoil deposition area adjacent to Sny Creek.	Insures construction operations are not allowing for silt to become deposited in water and natural habitats.
2	Prepare existing bank of Sny Creek Diversion Dike.	Material may be cleared during most weather conditions.	The bank must be cleared before or some brush material before the Sny Creek Excavation may be placed upon it.
3	Excavate Sny Creek from Roadside Lake to confluence on Mississippi River	Excavate during low river / groundwater levels and when material can be placed adjacent to Sny Creek high levee.	Material will be used to raise and strengthen the diversion dike.

Sequence	Construction Work Item	Instructions	Purpose
4	Excavation from Sny Creek to Roadside Lake and development of fish friendly stop log structure for water control. Purchase of a portable pump for water level management.	Excavate small channel and construct sheet pile control structure.	Excavating a channel form Roadside lake to the Sny Creek will provide over-wintering and spawning habitat for fish. The stop log structure will allow for water level control when required. The portable pump will assist in water level management when gravity conditions will not allow proper management
BID PACKAGE #3			
1	Install erosion control features on all portions of the site within this bid package.	Silt fencing will be the most common technique used in Bid Package #3.	Insures construction operations are not allowing for silt to become deposited in water and natural habitats.
2	Remove existing 11,000 gpm pump from sheet pile wall	Move and unload pump at MRA headquarters.	Pump will be used in future applications by IDNR.
3	Clear trees along existing pump channel from pump station to Sny Sand Levee.	Material may be cleared during most weather conditions.	The access must be cleared to allow for the expansion of the main pump channel
4	Reconstruct main pump channel.	Widen and deepen channel to carry more flow	Pump capacity will increase from 11,000 gpm to 35,000 gpm
5	Install / construct water control structures	Construct in a manner that minimizes damage to existing berms and maintains access.	Insure water can be controlled to the extent possible in all Zones.
BID PACKAGE #4			
1	Plant mast Trees	Plant during dormant season (Nov 5-Mar 5)	River levels need to be as low as possible to provide suitable conditions for planting

H. Value Engineering. A Value Engineering (VE) study was completed in February 2009 for this project in accordance with ER 11-1-321, Army Programs, Value Engineering, dated 28 February 2005 (formerly EC 11-1-114, Army Programs, Value Management/Value Engineering, dated 28 February 2003). The VE study recommendations have been reviewed for technical acceptance, compatibility with USACE authorities, and coordinated with the sponsor. The feasible recommendations have been incorporated into the features discussed in this DPR.

7. SCHEDULE FOR DESIGN AND CONSTRUCTION

Table 7. 1. The tentative schedule for the project and necessary completion steps

Requirement	Scheduled Date
Value Engineering Functional Analysis Study	Completed February 2009
Distribute Draft DPR	Completed February 2011
Complete Agency Technical Review of Draft DPR	Completed 09 March 2011
Submit Draft DPR for Public and Agency Review	June 2014
Submit Final DPR to Mississippi Valley Division	August 2014
Initiate Plans and Specifications	Phased, 2015-2018
Submit Plans and Specifications for Agency Technical Review	Phased, 2015-2018
Complete Plans and Specifications	Phased, 2016-2019
Advertise Contract	Phased, 2016-2019
Award Contract	Phased, 2016-2019
Complete Construction	Phased, 2016-2019
Prepare OMRR&R Manual	Phased, 2016-2019

8. COST ESTIMATES

Table 8.1 compares the costs for the Total Project Cost (TPC) and the Project First Cost (PFC) (Appendix J). The TPC was calculated based upon the proposed construction schedule, expected escalation costs, and a contingency factor. It represents the money expected to be spent at the end of the project construction.

Table 8. 1. Project Cost Summary, January 2014 Price level, rounded to the nearest thousand dollar

Account	Feature	Total Project Cost[1] (TPC) ($)	Project First Cost (PFC) ($)
01	Lands and Damages	$2,942,000	$2,942,000
02	Relocations	$0	$0
06	Fish and Wildlife Facilities	$4,988,000	$4,789,000
30	Planning, Engineering and Design	$845,000	$785,000
31	Construction Management	$536,000	$490,000
	Total Project Costs	$9,312,000	$9,006,000

[1] Fully funded estimate is marked up to midpoint of construction. Markup equals 4.9%

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An estimate of operation, maintenance, repair, rehabilitation, and repair costs is presented here. For analysis purposes, the costs presented for OMRR&R used the 50-year period of analysis. However, the project sponsor is expected to operate and maintain the project until it is no longer authorized. As such, the project sponsor should expect to incur costs associated with this responsibility outside of the 50-year period of analysis. The estimated total average annualized OMRR&R costs of the tentatively selected plan is $141,800. IDNR is 100% responsible for OMRR&R costs. These quantities and costs may change during final design. A complete list of OMRR&R needs will be provided in the OMRR&R Manual following construction. OMRR&R costs are included in the annualized costs for alternative selection but are not included in the total project construction costs.

Table 8.2 presents estimated total monitoring costs for pre-construction and 10 years post-construction. Quantities and costs may vary during final design. All costs are calculated using present worth (October 2014) and do not include future inflation escalation.

Table 8.3 shows the interest accumulated during construction of the project over 4 fiscal years using the FY14 discount rate of 3.5%.

Table 8.2. Estimated total monitoring costs for 10 years post construction

Item	**Cost**
Pre-construction Monitoring	$2,000
Construction	$0
Post-construction Monitoring[1]	$18,500
Subtotal	$20,500
Contingencies (25%)	$5,125
TOTAL	$26,000
Average Annual Cost	$700

[1]Includes cost of evaluation report

Table 8.3. Estimated interest during construction of the TSP

Construction Period	**Cost**	**Interest Factor**	**Interest**
1	$2,252,000	0.128	$288,500
2	$2,252,000	0.090	$202,600
3	$2,252,000	0.053	$119,600
4	$2,252,000	0.018	$39,400
		Total Interest During Construction	**$650,200**

[1] Based on cost of $9,006,000 spent equally over a 4 year period of construction

[2] IDC calculation uses 2014 Federal discount rate of 3.5%

9*. ENVIRONMENTAL EFFECTS

The tentatively selected plan would result in positive long-term benefits to non-forested wetland, forested wetland, and aquatic habitats in and around RRL (Table 9.1). The project would result in some conversions of cover types, but the resulting changes would provide habitat to a greater diversity of species. No Federally protected species would be negatively affected. Due to construction, the project would result in short-term decreases in water quality, noise, air quality, and aesthetics and disturb area wildlife and public use. Long-term benefits to area habitats would far outweigh the short-term impacts. No significant negative social or economic impacts would result. No impacts to historic properties are anticipated.

Besides the No Action Alternative and Alternative 8 (the tentatively selected plan), the effects of Alternatives 9 and 10 are examined. This is because they contain features that are not present in Alternative 8. Unless otherwise stated only these additional features' potential effects are described and other effects are assumed to be the same as Alternative 8. Alternative 9 includes excavation of Sny Creek from Bridge to Old Levee. Alternative 10 includes same features proposed in the other alternatives with the addition of Sny Excavation to Bridge. The effects of Alternatives 1-7 will not be discussed because Alternative 8 contains all of the features that would be in these alternatives. Unless specifically noted, it is assumed the effects would be the same. Impacts for each zone are evaluated collectively wherever they are expected to be the same.

Table 9. 1. Summary and Comparison of Alternative Environmental Impacts

		No Action	Alternative 8 (Tentatively Selected Plan)	Alternative 9	Alternative 10
Historic & Cultural Resources		No Effect	No Effect	No Effect	No Effect
Natural Resources	**Floodplain Habitat**	Negative	Positive	Positive	Positive
	Geology & Soils	No Effect	Minor	Minor	Minor
	Wildlife	Negative	Positive	Positive	Positive
	Aquatic Resources	Negative	Positive	Positive	Positive
	Water Quality	Negative	Positive	Positive	Positive
	Fisheries	Negative	Positive	Positive	Positive
	Endangered Species	Negative	Positive	Positive	Positive
	HTRW	No Effect	No Effect	No Effect	No Effect
Socioeconomics		Negative	Positive	Positive	Positive

A. Natural Resources.

1. Floodplain Forest.

No Action: Overall, the quantity and quality of existing floodplain forest would continue to age. Approximately 540 acres of former cropland would remain, some to be planted to row crops with the remaining 410 acres planned for reversion to bottomland forest and the establishment of wetland vegetation. However, that acreage is currently covered with herbaceous vegetation that has prevented any re-establishment of bottomland forest even though the area has not been farmed since 2003.

Alternatives 8, 9, and 10: Zones 1, 2, 3, and 4: Positive impacts to floodplain forest would result from tree plantings and increased water control. Approximately 99 acres of bottomland hardwood forest would be planted in the following proportions: 62.9 acres in Zone 1 and 36.5 acres in Zone 3. Enhanced water management in wetland areas would promote greater plant diversity. As planted trees become established and natural regeneration continues, along with the aging of the forest, the project area will become one of the largest areas of contiguous forest in the immediate vicinity. Construction related impacts will be minimal since most of the features are situated in non-forested areas. The exception is the pump channel, located in Zone 2, proposed for widening that will clear a 13 foot-wide strip of bottomland forest, primarily silver maple and cottonwood, for approximately 4000 feet.

Zone 5: No impacts to floodplain forest would be expected.

2. Aquatic Habitat.

No Action: Currently, wetland habitat in the project area relies on river flooding and localized rain events to maintain water levels, except for Waverly Lake which is managed for emergent and moist soil plant production, though water management is frequently impeded by insufficient pump capacity. In general, the duration and severity of Mississippi River floods has increased with floodplain development, channel modifications on tributaries and changes in agriculture; and navigation pool formation has increased sedimentation within the pools and side channels. Backwater sloughs, lakes and ponds in the project area would continue to degrade as a result of siltation from Mississippi River floods. These sediments are generally fine silt and settle out of the flood waters impacting the deeper areas to a larger degree than the shallow areas. Use of the wetlands and backwater lakes in the project area is currently limited for fish and other aquatic species due to the lack of access. High water events allow fish to use some sloughs and bottomland lakes that are in the project area, but no improvement in fish use is anticipated with this alternative.

Alternative 8: Zone 1: Aquatic resources would be improved by installation of a well to supplement water during dry periods and for migratory wildlife management in the fall. Construction of a small berm for a water control structure would impact less than a half of an acre of wetlands in an existing drainage channel. The water control structure in the Sny Levee and Drainage District channel will prevent most dewatering of the wetland areas in the zone, allowing Goose Pasture Lake to be managed as a permanent wetland and promoting the growth of emergent and submerged aquatic vegetation, thus benefitting a variety of aquatic species.

Zone 2: Work in Zone 2 would expand an existing 1,400’ x 14’ drainage channel to allow for the increased pumping capacity. The size of this channel would increase by a total of about 0.5 acres. The material excavated will be spread across the current agriculture field. Improved water control and movement will have a positive impact on the portion of the slough in this zone, resulting in higher water levels for longer periods in the fall and winter.

Zone 3: The pump channel being widened in Zone 2 would continue in Zone 3 and increase the size of the channel by an additional 0.23 acres. This material will be spread in current agricultural areas. Aquatic resources in Zone 3 would be improved by increased water

movement and availability as a result of the replacement of the pump station, and improvements to the water delivery system that will provide additional water in the fall and could be used to supplement water during dry periods.

Zone 4: Sny Creek would be excavated from Roadside Lake to Zone 5. Material would be side-casted along an existing bench next to the Old Sny Levee remnant alignment. This would cover approximately 32.9 acres of previously disturbed habitat. Excavating of the Sny Creek channel will allow fish access to Roadside Lake in Zone 3, while providing fish habitat in the creek proper. Improved water movement and availability, coupled with water control structures, will allow management of the wetlands in the zone on an annual basis. This capability is not currently available. Migratory wildlife, especially migratory birds, will benefit from the increase in diversity and presence of emergent and moist soil plants associated with the wetlands, and over time better access to bottomland forest mast production. The buildup of the existing Sny Levee remnant would provide Zone 4 residual protection from flooding of the Sny and any possible sediment from the hillsides. This alternative would also impact 0.23 acres of wetland by filling in two low spots in the natural levee using rock and some of the material excavated from Sny Creek. This would protect Zone 4 from scouring over bank flows of the Mississippi River, but still allow back flooding. Approximately 0.83 acres of wetlands would be impacted by the expansion of the existing spillway at the south end of Zone 4 that would be necessary for new water control capabilities. A total 34 acres of wetland would potentially be impacted in Zone 4.

Zone 5: Approximately 9.5 acres of Sny Creek would be exposed to excavating the creek from Zone 4 to the Mississippi River. This material would be disposed of in the thalweg of the Mississippi River.

Overall, short-term negative impacts to wetlands would result from construction activities in all zones. However, the long-term impacts of the project would be positive. The areas where excavated material is to be placed along Sny Creek are previously disturbed areas that have been locations for material placement during earlier dredging and levee construction activities. No high-quality wetlands would be impacted. The proposed project features would provide year-round water source and water level control for the project area. Wetlands could be filled or drained for the benefit of migratory wildlife and other wetland species. Summer drawdowns would promote wetland plant germination and allow for sediment consolidation. Ultimately, predictable water control would facilitate the development of quality wetland habitat. The restoration of 355.2 acres of forested wetland and the ability to better manage existing wetlands would outweigh any wetland impacts from project construction.

Alternative 9: Zones 1-5: Impacts would be similar as Alternative 8, with the additional 0.50 acres of Sny Creek would be exposed to excavating the creek from Zone 4 to the Mississippi.

Alternative 10: Zones 1-5: Impacts would be similar as Alternative 9, with the additional 0.70 acres of Sny Creek would be exposed to excavating the creek from Zone 4 to the Mississippi.

3. Geology and Soils.

Geology
No Action: No impacts to the geology of the project site would occur.
Alternatives 8, 9, and 10: No impacts to the geology of the project site would occur.

Soils
No Action: No impacts to soils would occur.
Alternatives 8, 9, and 10: Zones 1-5: Minor impacts to soils would be expected due to construction activities and constructed project features. Construction of water control levee structures and excavation of channels would impact existing topography and drainage. Improved drainage would be expected but would have minimal effects on soil characteristics. Where possible existing terrain features have been utilized to the extent possible to assist with the development of project features.

Prime Farmland
No Action: No impacts to acres that qualify as prime farmland would be expected.
Alternatives 8, 9, and 10: Zones 1-5: Areas previously or currently being farmed are targeted for conversion to permanent land cover, such as bottomland forest or non-forested wetland. No actions are proposed that would affect their status as prime farmland because stopping management actions could allow farming on the site again.

4. Wildlife.

No Action: Wildlife would be negatively impacted through the continued degradation of habitat and natural resources in the project area, including wetlands, bottomland forests, and aquatic resources. There has already been a decline in migratory wildlife use and harvest in the project area since the 1993 flood and this trend is expected to continue if no habitat improvements are initiated.

Alternatives 8, 9 and 10: Zones 1-5: Impacts for each zone would be similar and will be discussed collectively. This alternative would restore the historic native plant community, increase habitat diversity, and improve habitat quality for a variety of resident and migratory wildlife. Mast-consuming species would benefit from tree plantings that will lead to improved forest diversity and an increase in seasonal mast production. Water level management would also improve food resources for migrating wildlife in spring and summer, and increase the presence of moist soil plants, an important food source for managing migratory birds in and around the project area. The long-term impacts of habitat enhancement would be an increase in wildlife populations and diversity. Neotropical migrant warblers especially should benefit from the large, unbroken tract of bottomland forest that will be created by the conversion of cropland to forest.

5. Fisheries.

No Action: Habitat would continue to degrade due to sediment deposits, lack of perennial water sources, and disconnected water features within the project area. More frequent summer and

winter fish kills from low levels of dissolved oxygen would likely occur due to shallow depths. Fish access to aquatic areas would continue to be restricted except at high water levels.

Alternatives 8, 9, 10: Zones 1-5: The proposed features would have a positive impact on fish populations. Increased water level management may be utilized as species population controls. Optimizing water levels would restore habitat for fish species, spring flooding would provide habitat for spawning fish, and inundated emergent herbaceous and woody vegetation would provide beneficial habitat for many life stages of fish species as would submerged aquatic vegetation. Fish use of Zones 3, 4 and 5 would be greatly improved once the access (Sny Creek) to Roadside Lake is excavated. In addition, the use of the spoil to improve the Sny Levee extension would continue to insure that overbank scouring flows would impact the area infrequently, and most flood water from the river would continue to back into the higher quality lakes and wetlands. While alternatives 9 and 10 would excavate a longer segment of Sny Creek, the impacts to fisheries would be positive but not significantly different from the benefits of alternative 8.

6. Endangered Species.

In accordance with the Endangered Species Act (ESA) a list of Federally Threatened and Endangered animals and plants was obtained through the DFWCA. This satisfies the "request for species list requirements" for ESA Section 7 consultation (USFWS 2010). This section along with Section 2.C.6 will also serve as the effects determination portion of the Biological Assessment required by the Endangered Species Act.

The Indiana bat, decurrent false aster, eastern prairie fringed orchid, and spectaclecase are listed as federally threatened or endangered species for Calhoun County, Illinois. Indiana Bats have been documented to occur within the project area in Zone 5, Dog Island. The other listed species have not been documented to occur within the project area and will be discussed together.

Indiana Bats

No Action: Many habitats suitable for Indiana Bat exist within the project area and would continue to degrade if no action is taken. Thus Indiana bat habitat would be negatively impacted by the continued degradation of the existing natural resources in the project area.

Alternatives 8, 9, and 10: Zones 1-5. Mist net surveys on Dog Island (Zone 5) found several Indiana Bats using the area. The project may affect, but is not likely to adversely affect Indiana Bat due to construction activities associated with excavating Sny Creek at Dog Island. In order to avoid adverse effects to summer roosting Indiana bats, the USFWS guidance will be followed which includes: no tree clearing from April 1 to September 30. No tree clearing is proposed in Zone 5 so construction activities associated with excavation should only disturb any bats in the area temporarily. Existing bottomland forest habitat would benefit from the tree plantings providing additional summer roosting and foraging habitat.

Other Listed Species

No Action: No impacts would be expected for these species.

Alternatives 8, 9, and 10: Zones 1-5: No direct impacts would be expected for these species since they are not known to occur within the project area. These species have been known to occur within the region and may potentially benefit from restoring the historic floodplain community, increasing habitat diversity, and improving habitat quality. Therefore, project alternatives are not likely to adversely affect these species.

7. Water Quality.

No Action: Water quality would continue to be impacted by a lack of water management capability and connection with the Mississippi River. Sny Creek would continue to remain shallow and filled with sediment. Roadside Lake would continue to be affected by suspended sediment and low dissolved oxygen levels.

Alternative 8:

Adjacent Water bodies. No major impacts to water quality would be expected for the Mississippi River though incoming tributaries to Sny Creek. Increased turbidity would occur in localized areas due to construction activities but impacts would be minor and temporary.

Sny Creek. Water quality in the creek might improve slightly after completion of the excavation proposed for Zones 4 and 5. Deeper water will be cooler and hold more oxygen than at present, allowing for increased fish use in summer.

Waverly and Roadside Lakes. Both lakes will be managed more intensively due to the availability of additional water and the opportunity to manipulate water levels seasonally or hold them steady. Management activities will be undertaken to promote the growth of emergent and submergent aquatic vegetation which can be beneficial in providing cover and food for aquatic organisms, while providing shade and oxygen. Water quality might improve slightly because of these activities.

Other Aquatic Resources. Zones 1-5: Impacts for each zone would be similar and will be discussed collectively. Water quality would improve over time as a result of improved water management, reduced sedimentation, sediment consolidation, consistent water levels, improved wetlands, improved forests, converted cropland, and excavation in some areas. Indirect benefits would include decreased turbidity, decreased nutrients, decreased suspended solids, and increased dissolved oxygen levels. Increased turbidity would occur in localized areas due to construction activities but impacts would be minor and temporary.

Alternative 9: This alternative would have the same effects as alternative 8 with the addition of improved habitat in the additional excavated area of Sny Creek from the Bridge to the Old Levee.

Alternative 10: This alternative would have the same impacts as alternative 9, with the addition of improved habitat in the additional excavated area of Sny Creek to the Bridge.

8. Air Quality.

No Action: No impacts to air quality would be expected.

Alternatives 8, 9, and 10: Zones 1-5: Fumes and dust generated by heavy equipment during the construction process would have a temporary negative effect on air quality. The pumps to be used to manage water levels will be diesel; consequently, air quality will be affected for a short

time by diesel fumes during pumping activities. The project is not expected to have any long-term adverse affect on the air quality of Calhoun County.

B. Hazardous, Toxic and Radioactive Waste. The Phase I Environmental Site Assessment revealed no obvious indications of potential contamination sources or migration pathways from surrounding properties and no recognizable environmental conditions (REC) in connection with the project area.

No Action: No HTRW impacts would be expected.
Alternatives 8, 9, and 10: Zones 1-5: No major impacts would be expected. A short-term risk for a fuel spill during construction activities would exist. The contractor would be required to have a spill cleanup plan and utilize best management practices during construction.

C. Socioeconomic Resources and Human Use.

1. Socioeconomic Resources and Environmental Justice (EO 12898).

No Action: No impacts to the growth of the community, region, businesses or industries; community cohesion; residences; property values; tax revenues; life, health and safety; or privately owned farms would be expected. Human use of the project area would decline along with the demise of the sport fishery and an expected decline in migratory wildlife use and harvest. No impacts to environmental justice would be expected.

Alternatives 8, 9, and 10: Zones 1-5: Impacts for each zone would be the same and will be discussed collectively. Minor positive impacts to the growth of the community, region, businesses or industries; community cohesion; residences; property values; tax revenues; life, health and safety; or privately owned farms would be expected. No public opposition has been expressed, nor is any expected. The long-term effects of habitat enhancement would increase wildlife populations and diversity, and thus enhance the opportunities for hunting, fishing and sightseeing. There could be an increase in short-term employment opportunities resulting from project construction. No differential impacts to minority or low income populations are expected with any of the action alternatives.

Employment opportunities were evaluated using the U.S Army Corps of Engineers (USACE) Institute for Water Resources and the Louis Berger Group regional economic impact modeling tool called RECONS (Regional Economic System). This modeling tool automates calculations and generates estimates of jobs and other economic measures such as income and sales associated with USACE's ARRA spending and annual Civil Works program spending. This model will be used as a means to document the performance of direct investment spending of the USACE as directed by the American Recovery and Reinvestment Act (ARRA).

The analysis evaluated economic impacts at three levels of geography: region, state, and nation. For this project, the region and state impact areas are as follows: Rural Area of the State of Illinois. USACE would plan on expending an average of $4,000,000 on this project annually for 4 years. Of this total project expenditure, $ 1,434,551 would be captured within the regional impact area. The remainder of the expenditure would be leaked out to the state or the nation.

Construction funds expended on various services and products would be expected to generate additional economic activity measured in both output and jobs (Table 9.2).

Table 9. 2. Summary of economic impact of construction funding on the region, state and nation during project construction.

	Local Capture	Output	Jobs	Labor Income	GRP
Region	$1,434,551	$1,827,857	20.37	$675,742	$756,759
State	$2,227,159	$4,765,638	43.20	$1,862,485	$2,382,295
Nation	$2,708,201	$8,600,070	74.4	$3,185,923	$4,256,894

2. Aesthetic Resources

No Action: A decline in aesthetics may occur due to degrading habitat and declining wildlife populations.

Alternatives 8, 9, and 10: Zones 1-5: Impacts for each zone would be the same and will be discussed collectively. Aesthetic resources of the area would be improved as a result of tree plantings, higher quality habitat and increased wildlife.

3. Noise Levels

No Action: No change in noise levels would be expected.

Alternatives 8, 9, and 10: Zones 1-5: Impacts for each zone would be the same and will be discussed collectively. Project construction would generate a temporary increase in noise levels. This may lead to temporary displacement of some wildlife species. No long-term impacts would result.

D. Cumulative Impacts. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR Section 1508.7). Cumulative effects are defined as, "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions".

The Council on Environmental Quality (CEQ) issued a manual entitled "Considering Cumulative Effects Under the National Environmental Policy Act". The manual addresses an 11 step procedure for addressing cumulative impact analysis. The 11 step procedure is broken down into three main components – scoping, describing the affected environment and determining the environmental consequences. Scoping entails identifying potential cumulative effects associated with the proposed project, defining the assessment goals, establishing spatial and temporal boundaries and identifying other actions affecting the resources, ecosystems and human communities of concern. The second main component, describing the affected environment, is directly related to the scoping component. To describe the affected environment, the baseline condition, response to change, and the capacity of resources, ecosystems and human communities identified in the scoping component to withstand stress must be characterized. The stresses must then be characterized along with their relation to regulatory thresholds. The third and possibly most important component of the cumulative impact analysis is determining the

environmental consequences. Four key steps are recognized in determining the environmental consequences. First, the important effects of activities on the resources, ecosystems and human communities must be identified. Then the magnitude and significance of these cumulative effects must be determined. If significant cumulative effects occur, then project alternatives must be modified or new alternatives proposed that avoid, minimize or mitigate the effects or an environmental impact statement must be completed. Lastly, a monitoring plan must be constructed to appropriately monitor the cumulative effects of the selected alternative and establish adaptive management, if necessary. The following paragraphs will address the 11 step procedure in relation to the Rip Rap Landing Habitat Rehabilitation and Enhancement Project.

1. Scoping: Past and present actions.

The Pool 25 pre-European settlement floodplain historically consisted of 47% prairie, 35% timber, and 18% open water. Contemporary land cover consists of 53% agriculture, 19% timber, 18% open water, 6% prairie and other minor habitats (Theiling et al., 2000). Conversion to agriculture is due in part to farming practices changing dramatically in the mid-70s because of record high prices for soybeans. Much of the landscape that had been in permanent cover was converted to row crops to take advantage of the high prices. The predominance of agriculture is likely to remain so for the foreseeable future. Additionally, 56.9% of the floodplain is leveed, and only 18.3% is in public ownership. The river has also been heavily modified through dredging, dam construction and the construction of river training structures and miles of revetment.

For the Rip Rap Landing HREP, the Master Plan for the Mississippi River, Mississippi River Miles 300 to 0 (USACE 2010) is used to identify all known plans for new channel improvement structures or modifications to existing structures within Pool 25 of the St. Louis District. There are 16,930 feet of revetment and 21 new dikes planned for future construction. There is one planned group of river training structures. One chevron and one dike are planned from RM 266 to 261 along the right descending bank. These structures will narrow the channel in this area. The chevron may also form additional island habitat. A bullnose chevron is proposed at the tip of Howard Island, adjacent to Rip Rap Landing, to protect it from erosion.

There are several environmental restoration projects proposed for Pool 25. Construction to improve habitat conditions on Batchtown State Fish and Wildlife Management Area is currently underway. Restoration efforts at the B.K Leach State Conservation Area, Two Rivers National Wildlife Refuge and Stag and Keeton Islands and their associated side channels have already been completed. Restoration efforts are currently proposed for Clarence Cannon National Wildlife Refuge and islands in both Pools 25 and 26 under UMRR-EMP. Also efforts examining changing the control of water levels in Navigation Pool 25 from a hinge point control system to a dam point control system are underway. Dam point control would allow for greater flexibility in managing the navigation pool in a way that is more beneficial to fish and wildlife.

2. Scoping: Geographic and spatial boundary.

The Rip Rap Landing HREP is located between Mississippi RM 260.5 and 267 along the left descending bank of the Mississippi River. There are several additional protected areas upstream and downstream: Clarksville Island, Clarence Cannon National Wildlife Refuge, Prairie Slough State Wildlife Management Area, Red's Landing Migratory Wildlife Management Area, Two

Rivers National Wildlife Refuge and Batchtown State Fish and Migratory Wildlife Management Area. All of these areas are in the floodplain of navigation pool 25. Pool 25 governs the hydrology of the floodplain and is thus a natural spatial boundary for cumulative effects analysis. To establish the temporal frame for analysis, the most commonly used practice is the length of the period of analysis. The length of the period of analysis has been estimated at approximately 50 years.

3. Determining the affected environment.

The essential components of determining the affected environment is the characterization of stressors and defining the baseline of the environment. Stressors result from natural events or human actions that cause a subsequent population, community or ecosystems level response. The goal of characterizing stressors is to determine whether the resources, ecosystems and human communities of concern are approaching conditions where additional stresses will have an important cumulative effect (CEQ 1997). Generally, those occurring for a short duration at a localized site, such as the Rip Rap Landing HREP, are of less concern than those occurring for an extended time over a wide geographical region. Stressors in the Pool 25 are discussed below.

A detailed description of the Upper Mississippi River Basin, and System, including Pool 25, in terms of formation over geological time; physical, environmental, and cultural characteristics; social and economic conditions; and multi-purpose management is included in several studies incorporated herein by reference:

> Johnson, B.L. and K.H. Hagerty eds. 2008. Status and trends of selected resources of the Upper Mississippi River System. U.S. Geological Survey, La Crosse, WI. Technical Report LTRMP 2008-T002.
>
> Theiling, C.H., C. Korschgen, H. DeHaan, T. Fox, J. Rohweder, and L. Robinson. 2000. Habitat Needs Assessment for the Upper Mississippi River System: Technical Report. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. Contract report prepared for U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.
>
> UMRCC (Upper Mississippi River Conservation Committee). 2000. A river that works and a working river. UMRCC, Rock Island, IL
>
> WEST Consultants, Inc. 2000. Upper Mississippi River and Illinois Waterway Navigation Feasibility Study – Cumulative Effects Study, Volumes 1-2. Prepared by WEST Consultants, Inc. for the U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL.

Major stressors affecting Pool 25 include: agricultural use of the floodplain, dams, channel training structures, dredging, and levees. These factors combine to increase sedimentation, alter the hydrologic regime, disconnect the river from the floodplain, increase nutrient levels and impact floodplain plant communities (Johnson and Hagerty 2008). Land cover along the river is converting to more water tolerant disturbance adapted species while the floodplain levees and development result in more severe and frequent floods. Development and additional agricultural conversion in Pool 25 is minimal; thus, the severity of stressors may not increase. Water quality has improved since the passing of environmental legislation in the 1970s but remains impaired. The influx of sediment exceeds the transport capacity resulting in sediment filled back waters and channels. These factors combine to create an altered hydrologic regime with more frequent floods and fewer to no low water periods. Very little contiguous off-channel aquatic habitat remains and what does remain is greatly affected by sedimentation (WEST 2000). Much of the

landscape that had been in permanent cover was converted to row crops in order for farmers to take advantage of the high prices. One of the results was more rapid runoff within the basin, causing increased turbidity in the rivers and streams with the associated sediment accelerating the deposition in lakes, sloughs, side channels and pooled portions of the Mississippi River. Scientists and natural resource professionals believe that Pool 25 will continue to see a decline in system ecological integrity and populations of native species, resulting from continued habitat loss and fragmentation, altered natural disturbance regimes, and continued invasive species colonization (USACE 2008).

4. Determining the environmental consequences.

The most crucial step in cumulative impact analysis is determining the environmental consequences. Many cumulative effects are discussed in the Navigation Study by WEST (2000) and will not be repeated here. In summary, the assessment acknowledges the tremendous changes brought about by construction of the 9-Foot Channel Project in conjunction with other impacts occurring throughout the watershed resulting in declines in fish, submerged aquatic vegetation, and backwaters/secondary channels. In general, these impacts could be offset by an adaptive environmental restoration approach that focuses on the re-creation or enhancement of key processes (periodic drawdown, connectivity) and habitat features such as island/side channel creation or restoration. Several restoration programs have been initiated to achieve this goal. However, current management and restoration levels have not prevented system-wide habitat degradation in the past and will likely not meet existing habitat needs in the future. Increased efforts to reverse impounded effects on aquatic habitats, vegetation succession and forest health will be required to sustain ecosystem values.

No Action: The density, diversity and quality of bottomland forest and moist soil plants would continue to decline. Backwaters in the project area would continue to degrade due to siltation. This would result in loss of deep-water fish habitat and fish kills due to low dissolved oxygen levels. The gradual deterioration of physical features described above would have a negative impact on the management of the project area and its contribution to natural resources within Pool 25. Public use of the project area would be expected to decline.

Alternative 8(tentatively selected plan), 9 and 10: No negative cumulative impacts would be expected. The proposed features should have positive long-term benefits to fish and wildlife using Rip Rap Landing. Resource managers have noted the continued decline and identified the need for improved management of bottomland hardwood, floodplain forest, and side channels and backwaters in Pool 25 (Theiling et al. 2000). The Rip Rap Landing project will help address this need in the project area. This project, in concert with other UMRR-EMP HREPs on the Upper Mississippi River, should counter some of the long-term adverse impacts to the river ecosystem such as sedimentation, pollution, and general declines in riverine and floodplain habitat and species.

E. Probable Adverse Impacts Which Cannot Be Avoided. Temporary, unavoidable adverse impacts including increased turbidity, noise, and clearing of vegetation would result from construction activities. Turbidity and noise levels would return to normal when construction is completed and vegetation established. Borrow areas, constructed berms, levee setbacks and any other disturbed areas would be re-vegetated after construction with native vegetation.

Approximately 34 acres of wetlands would be converted to non-wetland. However, benefits to floodplain habitat, wildlife, aquatic resources, water quality, fisheries and endangered species would outweigh these unavoidable adverse impacts.

F. Relevant Laws and Regulations. The following is a discussion of the additional laws that are applicable to this project and not discussed above.

1. Protection and Enhancement of the Cultural Environment, Executive Order 11593. Under this Executive Order, federal agencies "shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation". A Phase I archaeological and geomorphological investigation of the previously undisturbed acreage to be impacted by the projects construction, as envisioned, will be conducted. In the event any cultural properties are located, these will be evaluated for National Register eligibility, in consultation with the Illinois Historic Preservation Officer and appropriate mitigation completed before construction. If sites will be impacted, the tribes who have indicated they have an interest in the area will be contacted, and consultation will take place. Should an inadvertent discovery of human remains occur, then Section 3 of the Native American Graves Protection and Repatriation Act (P.L. 101-601) will be followed on federal lands and the Illinois Human Skeletal Remains Protection Act (Illinois Comp. Stat. Ann. 20 ILCS 3440/0:01, et seq.) will be followed on state owned lands.

2. Floodplain Management, Executive Order 11988. Under this Executive Order, federal agencies are to "provide leadership and take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains". There are no practicable alternatives outside of the floodplain. This project seeks to reverse and prevent some of the impacts that have resulted from development of the floodplain. The project structures are designed to resist flood damage, especially overbank, scouring flows from the Mississippi River. Additionally, the proposed riverside structures would insure that backwater flooding would occur before overbank flooding in Zone 4, minimizing additional silt deposition in the existing wetlands. Tree plantings would serve to enhance the "natural and beneficial values served by floodplains."

3. Protection of Wetlands, Executive Order 11990. Under this Executive Order, federal agencies shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. Existing wetland habitat would be temporarily impacted by construction and up to 34 acres would be permanently converted to non-wetland. 1,760 acres of wetlands would be enhanced by the project and 354 acres would be converted from agriculture and low quality habitat to forested wetland.

4. Protection and Enhancement of Environmental Quality, Executive Order 11991. Under this Executive Order, federal agencies shall take action to provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals." The proposed project is designed to protect, restore, and enhance

the habitats of the Rip Rap Landing Project area. Thus, the project will protect and enhance the Nation's environment.

5. Environmental Justice, Executive Order 12898. Under this Executive Order, federal agencies "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States." The unit of analysis for environmental justice was the boundary of Calhoun County, IL. The project area is contained within the county and the county is approximately 284 square miles. The county encompasses the project area, surrounding farmland, and the villages of Hamburg and Kampsville, Illinois. The population within the county is approximately 99% white. Approximately 9% of the population of the county is below the poverty level. No differential impacts to minority or low income populations are expected. Short-term increases in employment could be realized during construction. Additionally economic benefits could be realized from increased commercial and recreational fishing and migratory wildlife hunting due to the project's anticipated habitat enhancements.

6. Responsibilities of Federal Agencies to Protect Migratory Birds, Executive Order 13186. Under this Executive Order, federal agencies "taking actions that have, or likely to have, a measureable negative effect on migratory bird populations are directed to develop and implement, within two years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations". The Rip Rap Landing project will have a positive effect on migratory bird populations, especially migratory wildlife and neotropical migrant songbirds. Other water birds will benefit as well. Any tree removal that would occur would not likely result in take, as defined by this Executive Order, because it would occur to a timeframe outside of the normal nesting period. This restriction is in place in order for the project to comply with the Endangered Species Act and avoid take of the Indiana Bat. In addition, an MOU among the state, USFWS, and the Corps is already in place for the management of federal lands within the project area and all parties have been involved in the planning effort for the site.

7. Bald and Golden Eagle Protection Act of 1940. Bald Eagles (*Haliaeetus leucocephalus*) range over most of North America. They build large nests in the tops of large trees near rivers, lakes, marshes, or other aquatic areas. The staple food of most bald eagle diets is fish, but they will also feed on migratory wildlife, rabbits, snakes, turtles, other small animals, and carrion. In winter, eagles that nest in northern areas migrate south and gather in large numbers near open water areas where fish or other prey are plentiful (USFWS 2006).

On August 9, 2007, the bald eagle was removed from the federal list of threatened and endangered species. It remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The Bald and Golden Eagle Protection Act prohibits unregulated take of bald eagles. The U.S. Fish and Wildlife Service recently finalized a rule defining "take" that includes "disturb." "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal

breeding, feeding, or sheltering behavior." (USFWS 2007b). Based on this rule, the FWS developed the National Bald Eagle Management Guidelines in 2007. These guidelines indicate that in undisturbed areas no construction activities should occur within 660' of a visible eagle's nest and 330' of a non-visible nest during breeding season.

There may be active nests within the project area and eagles frequently utilize the site. Because new nests may be built or old nests abandoned, consultation with the USFWS will continue throughout the design and construction phase to ensure no eagles are impacted. During each design phase, site managers will be consulted and if necessary, site visits conducted to determine the location of all nests and determine if they are active as defined in the USFWS guidelines (USFWS 2007b). The plans and specs will include timelines (December - Aug.) to avoid the 660' area around all active nests. The contractor would be notified of these restrictions.

8. Clean Air Act, as amended. The Clean Air Act sets standards requiring the U.S. Environmental Protection Agency (EPA) to designate measurable targets for various air pollutants: National Ambient Air Quality Standards (NAAQS). They have identified standards for seven pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter, and particulate matter less than 2.5 microns. Calhoun County, Illinois, currently meets all EPA air quality standards. No aspect of the proposed project has been identified that would result in violations of air quality standards.

9. Rivers and Harbors Act. This Act regulates activities in, under, or over navigable water, such as the Mississippi River. The Section 404 permit process would address issues that could be regulated by this Act. Completing the Section 404 permit process would result in full compliance with Section 10 of the Rivers and Harbors Act. Section 10 activities include installation of the pump station pipes, raising low portions of the natural levee, and Sny Creek dredging/excavation. The pump station piping would extend from the pump station, under the access road, to the water conveyance channel for Zones 3 and 4. Stone protection may be placed along the bank of the water conveyance channel to protect the area from erosion. All required permits would be acquired prior to the initiation of project construction.

10. Clean Water Act, as amended. The Clean Water Act permit process will be initiated during or just prior to the release of this document for public review. All required permits will be acquired prior to the initiation of project construction.

Clean Water Act Section 401 - Section 401 requires the state to set water quality standards including designating water use and pollutant levels. The program is administered by the State of Illinois which reviews applications to ensure that the proposed project will not degrade water quality. The Section 401 water quality certification review process will begin when the public notice is released.

Clean Water Act Section 402 - Land disturbances of greater than 5 acres associated with this project require a National Pollutant Discharge Elimination System (NPDES) permit, or Section 402, for storm water discharges. This permit would be acquired prior to construction initiation.

Clean Water Act Section 404 - Section 404 of the Clean Water Act regulates the placement of fill, such as rock, in waters of the United States. This project would undergo the process for a

nationwide permit, The public notice for this project will be released during or just before the release of this document for public review. A Section 404(b)(1) document has been prepared for this project and discusses the impacts of the project (Appendix B).

11. Fish and Wildlife Coordination Act, as amended. Project plans have been coordinated with the USFWS and IDNR. Coordination with these agencies, as well as others, is detailed in Appendix A, Correspondence.

12. Air and Water Pollution Prevention and Control, Executive Order 11282. Under this Executive Order, federal agencies shall ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency. Because no HTRW was found and the project area meets air quality standards, project construction activities are not expected to significantly contribute to air and water pollution. The project would result in dust and exhaust from equipment and slight increases in turbidity within the adjacent waters. Therefore, a minor short-term reduction in air and water quality would occur. The pump station's diesel engines would be a permanent addition to the project area. However, the river pump station would be used to inundate an area that was inundated by another pump. Thus the overall level of pump station operation and thus diesel emissions should remain approximately the same for that location. The portable pump proposed for management of Zone 3, Roadside Lake would be an additional, minor source of diesel emissions for the project area.

13. Invasive Species, Executive Order 13112. This executive order aims "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause".

The effect of this project on invasive species distribution and abundance were considered throughout the planning process. State and Federal natural resource agencies have weighed the benefits that this project will have on non-native organisms, as well as to the native communities that it is intended to help sustain, and fully support this project.

The proposed plan would buffer against reed canary grass population growth through agricultural production, managing water levels, and promoting tree growth as discussed in detail in Chapter 3* Project Objectives.

Invasive aquatic plants may colonize the bathymetric diversity components of this project as sedimentation reduces depths of dredged areas to the point where light can penetrate to the bottom and rooted aquatic plants can become established. This successional process occurs in most backwaters within the Upper Mississippi River as they fill with sediment over time and is unavoidable.

Invasive fish species such as the silver carp and bighead carp will likely use the aquatic components of the project as nursery areas. This additional habitat is unlikely to have a major effect on the abundance of these species because it comprises only a small component of the overall habitat available in Pool 25. The temporarily selected plan is consistent with Strategy 3.2.3 indentified in the Asian Carp Working Group's Management and Control Plan for Bighead,

black, grass, and silver carps in the United States (Conover et al. 2007), which recommends that natural resource managers decide if the native biological communities are more sustainable with or without specific projects to enhance the aquatic environment.

Operation and maintenance of the project would include non-desirable vegetation control. Invasive species management costs are not anticipated to be significant over the life of this project as evidenced by previous backwater restoration projects on the Upper Mississippi River.

Natural resource managers recognize that there will always be some degree of risk that a project will unintentionally enhance the spread of invasive species because of the dynamic nature of dispersal and inter-specific competition that cannot be fully understood until after a nuisance species becomes prolific. Construction best management practices, such as cleaning equipment, would be in place and enforced to prevent the introduction of additional species to the project area and the transfer of species from the project area.

14. Migratory Bird Treaty Act of 1918, as amended. Under this law, federal agencies shall not take, kill or possess migratory birds. Migratory birds are recognized as being of great ecological and economic value. Millions of Americans study, watch, feed, or hunt migratory birds throughout the United States. The proposed project area is commonly used by migratory wildlife. Construction equipment and activities would cause temporary noise affecting and potentially disrupting migratory wildlife and other birds near the proposed project area. Additionally, tree removal for the expansion of the main water channel has the potential to negatively impact nesting birds. Tree removal would not occur from April 1 to September 30 to avoid impacts to Indiana Bat; this would also prevent impacts to nesting birds. The impact from noise would be temporary and cease following construction completion. In the long term, the proposed project would create and enhance forested and emergent wetland habitat benefiting numerous species of migratory birds, especially with the conversion of cropland to forest.

15. Farmland Protection Policy Act, as amended. The proposed action would not result in the conversion of any prime, unique state or locally important farmland to non-agricultural uses. Under the Council on Environmental Quality Memorandum (11 Aug 80), prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Unique farmland is defined as land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as, citrus, tree nuts, olives, cranberries, fruits, and vegetable (7 U.S.C. 4201(c)(1)(A) & (B)).

The Rip Rap Landing project area is classified as prime farmland if drained or prime farmland if drained and protected(NRCS 2006). Approximately 354.2 acres of cropland would be converted to bottomland hardwood forest. Tree planting would not alter the classification of the farmland, as the trees could be removed at a later date and agriculture could return to the site.

16. Noise Control and Quiet Communities Acts. Noise is usually defined as "unwanted sound", and is recognized as an environmental pollutant that can interfere with communication, work, rest, recreation, and sleep. Sound is represented on a logarithmic scale

with a unit called the decibel (dB). The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB. A-weighted decibels (dBA) are used to express the relative loudness of sounds as perceived by the human ear because the human ear is less sensitive at low frequencies than high (Generac Power Systems, Inc. 2004). A 24-hour average of 55 dBA was identified by USEPA as a level below which there are effectively no adverse impacts (USEPA 1974).

Noise levels surrounding the project area are varied depending on the time of day and climatic conditions. The current human activities causing elevated noise levels include diesel powered generators, trucks, and farming equipment.

Project construction would generate a temporary increase in noise levels. Construction would occur during daylight hours. Noise levels would not be altered at night. Common construction equipment for this project generate noise levels of approximately 65 - 95 dBA. Attenuation from

90 dBA to 55 dBA occurs at a distance of approximately 2,600 ft. depending on climatic conditions, topography, vegetation, and man-made barriers (Generac Power Systems, Inc. 2004). There are homes located along State Route 96 about one tenth of a mile from parts of the project area. Construction noise levels would not be expected to be greater than noise levels experienced from current traffic along State Route 96. Increased noise may lead to temporary displacement of wildlife species. After construction completion, noise levels would return to current conditions.

17. National Environmental Policy Act, as amended. The completion of the EA and signing of the Finding of No Significant Impact (FONSI) would fulfill NEPA compliance. The environmental assessment is integrated into this DPR in Sections 1 - 5, 9, 13, 14 and 16. A draft version of the FONSI is provided at the end of this document. The FONSI would be finalized and signed into effect only after having carefully considered all comments on the environmental effects of this project and it is determined that an EIS is not required.

18. Endangered Species Act. In accordance with the Endangered Species Act (ESA) a list of Federally Threatened and Endangered animals and plants was obtained through the DFWCA. This satisfies the "request for species list requirements" for ESA Section 7 consultation (USFWS 2010). Sections on endangered species in Chapters 2 and 9 serve as the biological assessment required by section 7 of the Act. Chapter 9 also serves as the effects determination portion of the Biological Assessment required by the Endangered Species Act. The Corps has determined that the project would have no impact. Documentation of this coordination can be found in Appendix A.

19. Illinois Rivers, Lakes, and Streams Act. The Illinois Department of Natural Resources has the responsibility of regulating development in the floodplain to ensure preservation of the state's waters and hydrologic integrity. This project will not alter river flows and will restore the natural functions of several waterbodies.

20. Compliance with Environmental Quality Statutes. A summary of the projects compliance status with respect to applicable statutes is provided in Table 9.3.

Table 9. 3. Summary of the Project's compliance status with respect to applicable statutes and laws.

Federal Policy	Compliance Status
National Environmental Policy Act, 42 USC 4321-4347	Partial[1]
Water Resources Development Acts of 1986, 1990, 2000 and 2007	Full
Migratory Bird Treaty Act of 1918, 16 USC 703-712	Full
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	Full
Resource Conservation and Recovery Act, 42 USC 6901-6987	Full
Farmland Protection Policy Act, 7 USC 4201-4208	Full
Endangered Species Act, 16 USC 1531-1543	Partial[2]
National Historic Preservation Act, 16 USC 470 et seq.	Partial[2]
Noise Control Act, 42 USC 7591-7642	Full
Clean Air Act, 42 USC 7401-7542	Full
Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities (EO 11282 as amended by EO's 11288 and 11507)	Full
Protection and Enhancement of the Cultural Environment (EO 11593)	Partial[2]
Floodplain Management (EO 11988 as amended by EO 12148)	Full
Protection of Wetlands (EO 11990 as amended by EO 12608)	Full
Protection and Enhancement of Environmental Quality (EO 11991)	Full
Invasive Species, EO 13112	Full
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	Full
Bald and Golden Eagle Protection Act, 42 USC 4151-4157	Full
Clean Water Act, 33 USC 1251-1375	Partial[2]
Rivers and Harbors Act, 33 USC 401-413	Partial[2]
Fish and Wildlife Coordination Act, 16 USC 661-666c	Partial[2]

1 Full compliance after submission for public comment and signing of FONSI
2 Full compliance to be achieved upon receipt of documentation from the appropriate agency

G. Short-Term versus Long-Term Productivity.

Some construction activities may temporarily disrupt fish, wildlife, and human use of the immediate vicinity. However, the long-term health and productivity of the fish and wildlife resources of the area are anticipated to increase with the project. Short-term human use impacts would be offset by long-term fish and wildlife habitat gains and their associated benefits to human use.

H. Irreversible Resource Commitments.

Funds and labor for planning and the purchase of materials and the commitment of labor, fuel, and machinery to construct the project are considered irretrievable. Other than the aforementioned, none of the proposed actions is considered irreversible.

I. Relationship of the Proposed Project to Other Planning Efforts.

The project is consistent with the backwater restoration goal of the Habitat Needs Assessment (HNA) for the Upper Mississippi River developed by the U.S. Army Corps of Engineers and

state and federal resource agencies (Theiling et al. 2000). The Illinois Department of Natural Resources nominated the Rip Rap Landing Habitat Rehabilitation and Enhancement Project for inclusion in the Upper Mississippi River Environmental Management program. The project was recommended and supported by the River Resource Action Team because it would provide significant aquatic, wetland, and terrestrial benefits. The Natural Resource Conservation Service purchased a Wetland Reserve Program easement on part of the project area to insure that the acres formerly converted to cropland would be returned to, and managed as wetlands. The general habitat area is recognized as one of a group of habitats of major concern under the Upper Mississippi River/Great Lakes Joint Venture of the North American Migratory Wildlife Management Plan.

10. PROJECT PERFORMANCE MONITORING & ADAPTIVE MANAGEMENT

This section outlines the monitoring and adaptive management plan proposed to assess performance indicators to the project objectives. The monitoring plan is detailed in Appendix Q. They were developed to be specific, measureable, attainable, realistic, and timely. Current performance indicators for use in the RRL HREP are detailed below (Tables 10.1 – 10.2).

Table 10.1. Project objectives, indicators, and time before the effects become apparent at RRL HREP

Project-Wide Goal	Site-Specific Objective	Performance Indicator	Monitoring Target	Time of Effect	Responsible Party
Increase quantity and quality of aquatic, non-forested, and forestforested wetland habitats	Improve aquatic ecosystem resources	Roadside Lake connected to Sny Creek	365 days per year	Construction Completion	IDNR
	Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management	Water delivery and drainage	Ability to drain or flood zones 3 and 4 in $\leq$ 10 days	Construction Completion	IDNR
		Percent cover of moist soil plants	Desirable plants comprise $\geq$ 50% of the cover estimate for the unit	4 year post construction	IDNR/ USACE
	Reduce impacts of headwater flooding and river-borne sedimentation	Site experiences only back flooding	4 out of 5 years	Construction completion	IDNR
	Increase quantity and quality of bottomland hardwood forest	Survival of planted trees	80% survival of trees	5 years post construction	IDNR/ USACE

Table 10. 2 RRL conceptual monitoring plan. Construction is set at Year 0.

INDICATOR	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Connectivity*		Construction	X	X	X	X	X	X	X	X	X	X
Water*	X		X	X	X	X	X	X	X	X	X	X
Moist Soil							X	X	X	X	X	X
Headwater*			X	X	X	X	X	X	X	X	X	X
Trees			X				X					
Estimated Cost ($)	2000		2500				3000	2000	2000	2000	2000	5000
SUBTOAL	$20,500											
Contingency (25%)	$5,125											
TOTAL	$26,000											
Average Annual Cost	$700											

*** No additional monitoring costs would be required since these observations are part of normal site management**

Because of USACE experience in designing, building, and implementing HREPs, the PDT feels that there is a low risk of project failure. Success of the project primarily relies on the ability to effectively manipulate water levels to mimic the historic hydrograph and produce the desired ecosystem benefits. Results from the monitoring will be used to determine project success and refine the development of the optimal hydrologic regime for the site if necessary. The PDT will use these results in the context of adaptive management to inform the operation of the pumping schedule.

11. REAL ESTATE REQUIREMENTS

The Rip Rap Landing Habitat Rehabilitation and Enhancement Project will be constructed on land owned by the Federal Government (Dog Island, 283 acres) and the Illinois Department of Natural Resources (2,055 acres). The Illinois DNR manages all of the property. Dog Island is managed under a Cooperative Agreement originating on 21 January 1954 between Department of Interior, USFWS, and the Corps. The USFWS and IDNR then executed a subsequent Cooperative Agreement conveying management responsibility of Dog Island to IDNR. The detailed Real Estate Plan is provided in Appendix K.

12. IMPLEMENTATION RESPONSIBILITIES AND VIEWS

A. Corps of Engineers. The U.S. Army Corps of Engineers, St. Louis District, is responsible for project management and coordination with the USFWS, the State of Illinois, and other affected agencies. The St. Louis District will submit the subject Definite Project Report (DPR); program funds; finalize plans and specifications; complete all NEPA requirements; advertise and award a construction contract; and perform construction contract supervision and administration. Section 906(e) of WRDA 1986 states that first cost funding for enhancement features will be 65 percent Federal and 35 percent local cost on project lands not in Federal ownership. Any mutually agreed upon major rehabilitation of the project that exceeds the identified annual operations, maintenance, repair, rehabilitation, and replacement cost requirements will be the Corps of Engineers' responsibility[3]. Major rehabilitation would be considered as a result of specific storm or flood events and is not included in the project cost estimate (Table 8-2). The USACE has agreed to support the HREP's monitoring and data collection needs as outlined in Section 10.

B. U.S. Fish and Wildlife Service. The USFWS has provided a Coordination Act Report (CAR) for this project. The proposed project lands at Dog Island (283 acres) are currently managed under a cooperative agreement between the USFWS and USACE. Management of Dog Island has been assumed by IDNR under a successive cooperative agreement with USFWS; however USFWS is still ultimately responsible for overseeing management of Dog Island.

C. Illinois Department of Natural Resources. The non-Federal sponsor shall, prior to implementation, agree to perform all of the local cooperation requirements and non-Federal obligations. Local cooperation requirements are detailed below and summarized in the draft Project Partnership Agreement (PPA) (Appendix C). The PPA will be modified to reflect guidance received from USACE Headquarters. The guidance dated February 20, 2014 states that the non-federal sponsor will not be reimburse for any excess LERRDs. Through successive cooperative agreement with USFWS, OMRR&R of the project is the responsibility of IDNR as described in Section 6.3 and Table 8.3. This is in accordance with WRDA 1992 Public Law

[3] Major rehabilitation is defined as reconstructive work needed in excess of estimated O&M as a result of specific storm or flood events. Repair and Replacement are considered part of maintenance. Per 4th Annual Addendum, Upper Mississippi River System, Environmental Management Program dated June 1989, Section III.A.1.c.

102-580. The Corps will further specify these functions in the Projects OMRR&R Manual, which will be provided prior to the sponsor's final acceptance of the project.

Federal implementation of the tentatively selected plan would be subject to the sponsor agreeing to comply with applicable Federal laws and policies, including but not limited to:

a. Provide 35 percent of total project costs (on features located on state-owned land) as further specified below:

1. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;
2. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;
3. Provide, during construction, any additional funds, work in kind, necessary to make its total contribution equal to 35 percent of total project costs;

b. The non-Federal sponsor shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized.

c. The non-Federal sponsor shall prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function.

d. The non-Federal sponsor shall not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project.

e. The non-Federal sponsor shall comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

f. For so long as the project remains authorized, the non-Federal sponsor shall operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, shall be performed at no cost to the Federal Government, in a

manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government except as laid out in the 4th Annual Addendum of the Upper Mississippi River System - Environmental Management Program (USACE 1989).

g. The non-Federal sponsor shall give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project.

h. The non-Federal sponsor shall hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors.

i. The non-Federal sponsor shall maintain and keep books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

j. The non-Federal sponsor shall comply with all applicable Federal and State laws and regulations including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);

k. The non-Federal sponsor shall perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction.

l. The non-Federal sponsor shall assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project.

m. The non-Federal sponsor shall agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA.

n. The non-Federal sponsor shall comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

13*. COORDINATION, PUBLIC VIEWS AND COMMENTS

Coordination has been made throughout the planning and design process with the following State and Federal agencies:

Illinois Department of Natural Resources
U.S. Natural Resource Conservation Service
U.S Fish and Wildlife Service.

IDNR has coordinated with the private inholding. The site is managed as a duck hunting club and should benefit from the increased surrounding habitat resulting from an implemented project.

A. Coordination Meetings. Coordination with project sponsors occurred during the meetings listed in Table 13.1.

Table 13. 1. Rip Rap Landing Coordination Meetings

Date	Subject	Attendance
29-Jan-09	Kickoff Meeting, Stage I	Corps, Illinois DNR, NRCS,HDR
24-Feb-09	Value Engineering & HGM Meeting	Corps, USF&WS, Illinois DNR, HDR
14-May-09	Sponsor Progress Meeting	Corps, USF&WS, Illinois DNR, HDR
29-Jul-09	Sponsor Progress Meeting	Corps, USF&WS, Illinois DNR, HDR
1-Oct-09	Kickoff Meeting, Stage I	Corps, USF&WS, Illinois DNR, HDR
25-Mar-10	Sponsor Progress Meeting	Corps, USF&WS, Illinois DNR, HDR
26-Apr-10	Sponsor Progress Meeting	Corps, USF&WS, Illinois DNR, HDR

B. Coordination by Correspondence. See Appendix A.

14*. CONCLUSIONS

The natural habitat value on the Rip Rap Landing Fish and Migratory Wildlife Management Area has been diminished by sedimentation of wetlands and water bodies, loss of bottomland forest, and clearing for row crop agricultural production. Reestablishing terrestrial food sources and reliable wetland habitats and reconnecting backwater lakes and Sny Creek to the Mississippi River would benefit migratory birds, local wildlife, and fish. The recommended project features for the Rip Rap Landing HREP are designed to meet the project's goal to increase quality and quantity of aquatic, non-forested wetland, and forested wetland habitats. These goals would be met by reducing forest fragmentation and enhancing forest diversity; enhancing, improving and expanding existing wetlands; and by restoring fish access from the river to Sny Creek and Roadside Lake.

The future with-project scenario shows increased habitat value over the 50-year period of analysis for the target species. This increase represents measurable outputs of improved habitat quality and preferred habitat quantity. The project is consistent with and fully supports the overall goals and objectives of the Upper Mississippi River Restoration-Environmental Management Program, the North American Migratory wildlife Management Plan, and the Partners in Flight Program.

15. DRAFT RECOMMENDATIONS

I have weighed the outputs to be obtained from the full implementation of this habitat rehabilitation and enhancement project against its estimated cost and have considered the various alternatives proposed, impacts identified, and overall scope. In my judgment, this project, as proposed, justifies expenditure of Federal funds. I recommend that the Mississippi Valley Division Engineer approve the proposed project to include: converting 99 acres of cropland and former cropland to bottomland forest; installing water supply and control facilities for enhancement of 713 acres of wetland habitat; excavating and reconnecting Sny Creek to the Mississippi River to provide fish access to the creek and backwater lakes; and constructing embankment in low spots along the natural levee to reduce scouring of wetlands. The wetland enhancement facilities would include three water supply pumps, eight culverts, three water control structures, excavation, and embankment.

The current estimated contract cost of this project is $9,006,000. Total estimated project cost, including contingency, is $9,312,000. The full implementation of this project would generate 431 average annual habitat units at a cost of $1,287 per net unit at FY14 costs.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

_____ _____

(Date) Christopher G. Hall
Colonel, U.S. Army
District Commander

16*. DRAFT FINDING OF NO SIGNIFICANT IMPACTS (FONSI)

Significant opportunities exist to restore, rehabilitate, enhance and increase wetland and aquatic habitat for migratory birds, aquatic species, amphibians, and terrestrial species through re-forestation of bottomland forest, enhanced water conveyance and supply, improved aquatic habitat and improved depth diversity at the Rip Rap Landing Fish and Migratory Wildlife Management Area.

The Rip Rap Landing Habitat Rehabilitation and Enhancement Project is authorized by the 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The proposed project would be funded and constructed under this authorization.

An array of enhancement features and alternatives were considered for habitat enhancement, including: No Action, Wetland Enhancement, Reforestation of Cropland, River Reconnection, Riverside Levees, Excavation of Channels and Sloughs, and River Scour Embankment.

Alternative 8, the preferred alternative includes: Reforestation of Cropland, Wetland Enhancement through improved water level management, and River Scour Embankment, and River Reconnection. This alternative includes 99 acres of cropland and former cropland converted to bottomland forest, 713 acres of wetland enhancement, excavation of Sny Creek to Roadside Lake for fish access to the Mississippi River, and constructing embankment in low spots along the natural levee to reduce scouring of wetlands. The reforestation would convert current open cropland into bottomland forest planting of containerized trees. The wetland enhancement includes development of a new water source, increased pumping capacity at an existing pump station, and portable pumping capabilities along with construction of water control structures and channels to improve water movement capabilities and better manage water levels in the project area. The improvements would provide the capability to lower water levels in the spring and early summer to promote plant growth that would provide additional forage for migrating birds when wetlands are re-charged in the fall. Excavation of Sny Creek to Roadside Lake would allow fish passage from the Mississippi River to off-channel areas for spawning, rearing and over-wintering. Filling in low spots along the natural riverside levee would reduce scouring of wetlands and river-borne sedimentation.

Approximately 34 acres of wetland would be converted to non-wetland with the construction of an earthen spillway, filling of scour breaches in the natural riverside levee, and the excavation of the Sny Creek channel from Roadside Lake to the lower end of Zone 4 and associated excavated material placement. However, these impacts would be offset by the reforestation of over 99 acres of cropland, restoration of over 700 acres of wetlands through improved water level management and reconnection of over 150 acres of aquatic habitat to the Mississippi River.

Factors considered in making a determination that an Environmental Impact Statement was not required are as follows:

A. The project is anticipated to improve the value of Rip Rap Landing Fish and Migratory Wildlife Management Area for migratory and resident wildlife, including aquatic species.

B. Aside from temporary disturbance, no long-term adverse impacts to natural or cultural resources are anticipated. No endangered or threatened species, either State or Federal, would be adversely impacted by the proposed action.
C. The project is in compliance with Sections 401 and 404 of the Clean Water Act.
D. The project is in compliance with Section 106 of the National Historic Preservation Act.
E. No significant social or economic impacts are expected to occur as a result of this action.
F. No hazardous and toxic waste issues are expected.
G. No adverse significant cumulative impacts are anticipated.

I have also evaluated other pertinent data and information on the habitat rehabilitation and enhancement project. As part of this evaluation, I have considered the following project alternatives:

a. No Federal Action ("No Action" Alternative). This alternative would be unacceptable to recommend as it does not meet the project goal to restore as much of the historic ecological functions and values that current conditions and constraints of the project area will allow.

b. Constructing the preferred alternative of the habitat rehabilitation and enhancement project. All feasible combinations of features (10 best buy alternatives) were analyzed for environmental benefits and costs. The proposed project provided the most environmental benefits and best met the four plan formulation criteria of acceptability, completeness, effectiveness, and efficiency.

I have reviewed the information provided by this Environmental Assessment, along with data obtained from Federal and State agencies having jurisdiction by law or special expertise, and from the interested public. Based on my analysis and evaluation of the alternative courses of action presented in the Environmental Assessment I find that the proposed rehabilitation and enhancement project at Rip Rap Landing Fish and Wildlife Area would not significantly affect the quality of the human environment. Therefore, it is my determination that an Environmental Impact Statement is not required prior to proceeding with this action. This determination may be reevaluated if warranted by further developments.

_____ _____

Date

Christopher G. Hall
Colonel, U.S. Army
District Commander

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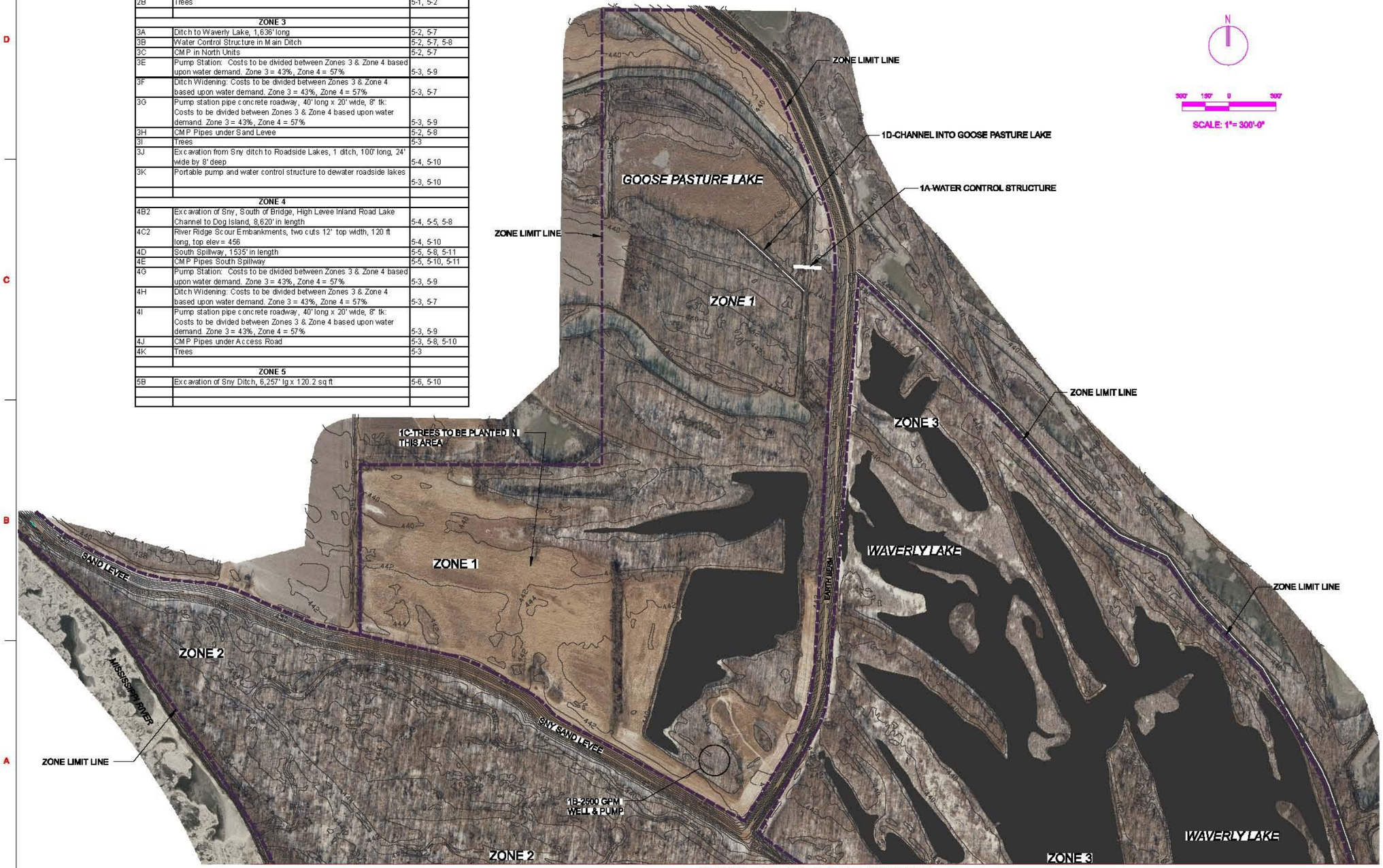
ZONE 1		Plate Location
1A	Water Control Structures	5-1, 5-7
1B	2,500 gpm well	5-1, 5-11
1C	Trees	5-1
1D	Channel into Goose Pasture Lake, 200' long, 12' wide 2' deep	5-1, 5-7
ZONE 2		
2B	Trees	5-1, 5-2
ZONE 3		
3A	Ditch to Waverly Lake, 1,636' long	5-2, 5-7
3B	Water Control Structure in Main Ditch	5-2, 5-7, 5-8
3C	CMP in North Units	5-2, 5-7
3E	Pump Station: Costs to be divided between Zones 3 & Zone 4 based upon water demand. Zone 3 = 43%, Zone 4 = 57%	5-3, 5-9
3F	Ditch Widening: Costs to be divided between Zones 3 & Zone 4 based upon water demand. Zone 3 = 43%, Zone 4 = 57%	5-3, 5-7
3G	Pump station pipe concrete roadway, 40' long x 20' wide, 8" tk: Costs to be divided between Zones 3 & Zone 4 based upon water demand. Zone 3 = 43%, Zone 4 = 57%	5-3, 5-9
3H	CMP Pipes under Sand Levee	5-2, 5-8
3I	Trees	5-3
3J	Excavation from Sny ditch to Roadside Lakes, 1 ditch, 100' long, 24' wide by 8' deep	5-4, 5-10
3K	Portable pump and water control structure to dewater roadside lakes	5-3, 5-10
ZONE 4		
4B2	Excavation of Sny, South of Bridge, High Levee Inland Road Lake Channel to Dog Island, 8,620' in length	5-4, 5-5, 5-8
4C2	River Ridge Scour Embankments, two cuts 12' top width, 120 ft long, top elev = 456	5-4, 5-10
4D	South Spillway, 1535' in length	5-5, 5-8, 5-11
4E	CMP Pipes South Spillway	5-5, 5-10, 5-11
4G	Pump Station: Costs to be divided between Zones 3 & Zone 4 based upon water demand. Zone 3 = 43%, Zone 4 = 57%	5-3, 5-9
4H	Ditch Widening: Costs to be divided between Zones 3 & Zone 4 based upon water demand. Zone 3 = 43%, Zone 4 = 57%	5-3, 5-7
4I	Pump station pipe concrete roadway, 40' long x 20' wide, 8" tk: Costs to be divided between Zones 3 & Zone 4 based upon water demand. Zone 3 = 43%, Zone 4 = 57%	5-3, 5-9
4J	CMP Pipes under Access Road	5-3, 5-8, 5-10
4K	Trees	5-3
ZONE 5		
5B	Excavation of Sny Ditch, 6,257' lg x 120.2 sq ft	5-6, 5-10



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300' 150' 0 300'

SCALE: 1"= 300'-0"

MATCHLINE SEE PLATE 5-2 FOR CONTINUATION

US Army Corps of Engineers® St. Louis District

MARK	DESCRIPTION	DATE	APPR. MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: K. ROADS
DRAWN BY: M. GRONG
SUBMITTED BY: -
PLOT SCALE: 1:1
SIZE: ARCH D
DATE: MARCH XXX, 2010
SOLICITATION NO.: -
CHIEF BY: J. BUTVICH
CONTRACT NO.: -
PLOT DATE: -
FILE NUMBER: -
FILE NAME: -

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

PARTIAL GENERAL SITE PLAN ZONES 1,2,3

PLATE 5-1

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MATCHLINE SEE PLATE 5-1 FOR CONTINUATION

ZONE 2

ZONE 3

2B-TREES TO BE PLANTED IN THIS AREA

SAND LEVEE

GRAVEL RD.

3A-CHANNEL TO WAVERLY LAKE LAKE

EXISTING BOAT RAMP & PARKING LOT

ZONE LIMIT LINE

WCS

3H-PIPES UNDER SAND LEVEE

3C-WATER CONTROL STRUCTURE TO UNIT 8

3B-CONTROL LEVEE

3I-TREES TO BE PLANTED IN THIS AREA

EXISTING WAVERLY LAKE SPILLWAY AND CONTROL STRUCTURE

MISSISSIPPI RIVER

3E-WATER CONTROL STRUCTURE

ZONE LIMIT LINE

ZONE 2

ZONE 3

EXISTING GRAVEL RD.

WCS

EXISTING COUNTY BRIDGE

N

300' 150' 0 300'

SCALE: 1"= 300'-0"

MATCHLINE SEE PLATE 5-3 FOR CONTINUATION

US Army Corps of Engineers®
St. Louis District

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: S. TRAGO
DRAWN BY: M. CHOVIL
CHECKED BY: J. MATTHICK
SUBMITTED BY:
PLOT SCALE: 1:1
PLOT DATE: -
FILE NAME: -
AUTO CAD 2010

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

PARTIAL GENERAL SITE PLAN
ZONES 2,3

PLATE 5-2

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MATCHLINE SEE PLATE 5-2 FOR CONTINUATION

ZONE 2

4J CMP PIPES UNDER ACCESS ROAD

GRAVEL RD

3E-4H PUMP DITCH WIDEN

ZONE 3

3E-3G-4H PUMP STATION ROADWAY

3G-4H PUMP STATION

PUMP STATION ACCESS ROAD EXISTING PUMP STATION

3I TREES TO BE PLANTED IN THIS AREA

MISSISSIPPI RIVER

ZONE 4

ZONE LIMIT LINE

4K-TREES TO BE PLANTED IN THIS AREA

ZONE 3

ROADSIDE LAKE

ZONE LIMIT LINE

SAND LEVEE

ROUTE 100

3K-PORTABLE PUMP

PRIVATE PROPERTY

SAND LEVEE

ROADSIDE LAKE

ZONE 3

NRCS STRUCTURE #9

NRCS STRUCTURE #9

N

300' 150' 0 300'

SCALE: 1"= 300'-0"

MATCHLINE SEE PLATE 5-4 FOR CONTINUATION

US Army Corps of Engineers
St. Louis District

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: B. ROADS
DRN BY: M. CHOVIL
CHD BY: J. MATTHICK
SUBMITTED BY:
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ARCH D
F.I.E. NUMBER: -
F.I.E. NAME: -
CONTRACT NO.: -
SOLICITATION NO.: -
DATE: MARCH 24TH, 2010

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

PARTIAL GENERAL SITE PLAN
ZONES 2,3,4

PLATE 5-3

auto_tree

...\RR_LANDINGCI403P53.dgn 10/6/2010 3:22:39 PM

MATCHLINE SEE PLATE 5-3 FOR CONTINUATION

ZONE 4

4C2-RIVER RIDGE BREACH

NRCS STRUCTURE #7

3J-EXCAVATION OF CHANNEL TO ROADSIDE LAKE
3K-WATER CONTROL STRUCTURE IN CHANNEL

CROOKED CREEK

ZONE LIMIT LINE

ZONE 4

ZONE LIMIT LINE

NRCS STRUCTURE #6

NRCS STRUCTURE #5

MISSISSIPPI RIVER

4B2-SNY DITCH EXCAVATION

NRCS STRUCTURE #4

ROADSIDE LAKE

4C2-RIVER RIDGE BREACH

ZONE 4

MATCHLINE SEE PLATE 5-5 FOR CONTINUATION

N

300' 150' 0 300'

SCALE: 1"= 300'-0"

US Army Corps of Engineers
St. Louis District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DATE: MARCH 24th, 2010
SOLICITATION NO.: -
CONTRACT NO.: -
FILE NUMBER: -

DESIGNED BY: S. ROADS
DRN. BY: M. GROVE
CKD BY: J. SUTTWICK
SUBMITTED BY: -
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ANSI D
FILE NAME: -

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

PARTIAL GENERAL SITE PLAN
ZONES 3,4

PLATE 5-4

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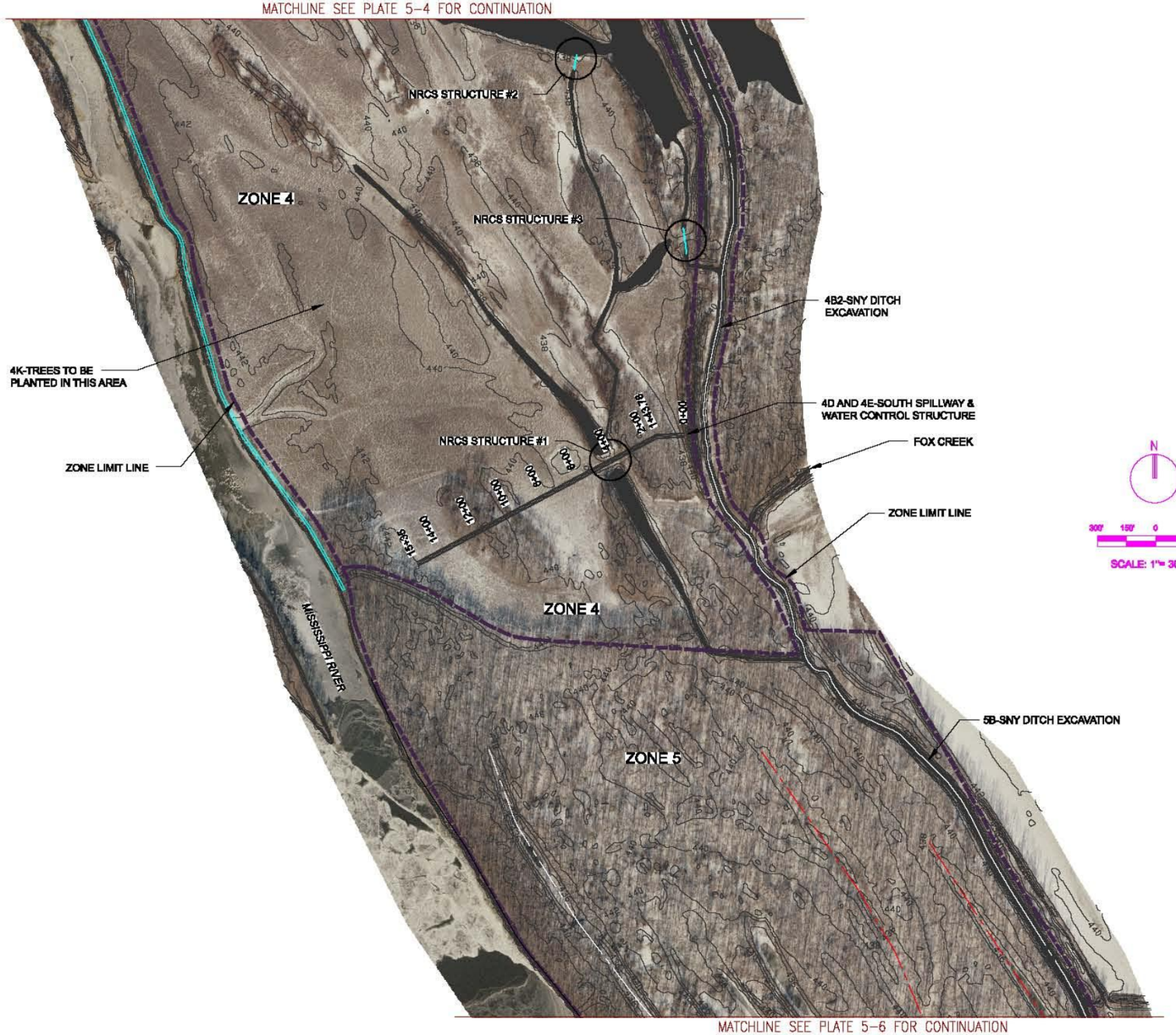
MATCHLINE SEE PLATE 5-4 FOR CONTINUATION



N

300' 150' 0 300'

SCALE: 1"= 300'-0"

MATCHLINE SEE PLATE 5-6 FOR CONTINUATION

US Army Corps of Engineers
St. Louis District

MARK	DESCRIPTION	DATE	APPR.

DRAWING BY: D. ROADS
CKD BY: J. MATTHOCK
DWN BY: M. GROVE
SUBMITTED BY:
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ANSI D
FILE NAME: -
DATE: MARCH 24TH, 2010
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER: -

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ST. LOUIS, MISSOURI 63103-2833

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POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

PARTIAL GENERAL SITE PLAN
ZONES 4,5

PLATE 5-5

autoCAD file

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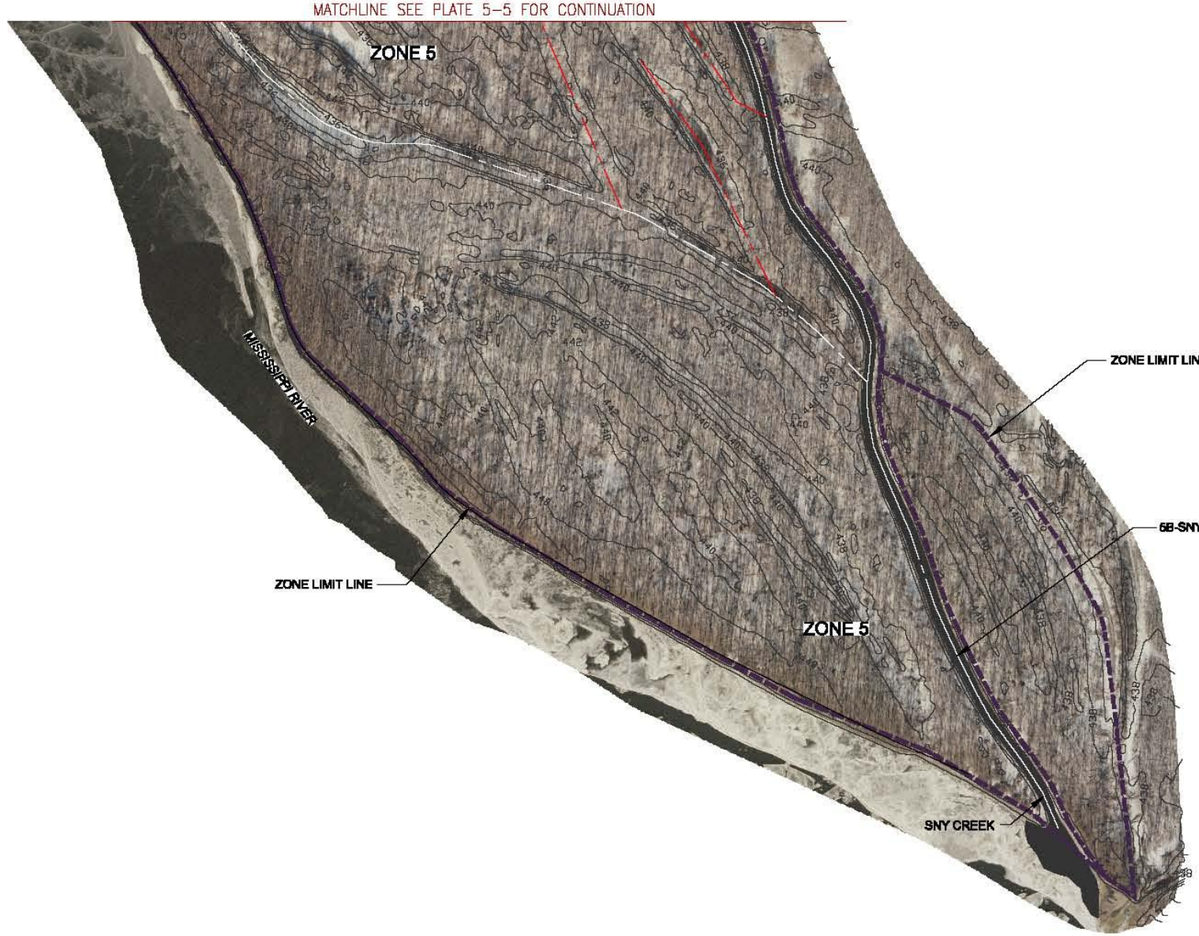
MATCHLINE SEE PLATE 5-5 FOR CONTINUATION



N

300' 150' 0 300'

SCALE: 1"= 300'-0"

US Army Corps of Engineers
St. Louis District

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: S. ROADS
DRAWN BY: A. BUTTWICK
SUBMITTED BY: -
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ANSI D
FILE NUMBER: 1
CONTRACT NO.: -
FILE NAME: -
DATE: MARCH 24TH, 2010
SOLICITATION NO.: -

U.S. ARMY CORPS OF ENGINEERS
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POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

PARTIAL GENERAL SITE PLAN
ZONE 5

PLATE 5-6

auto-line

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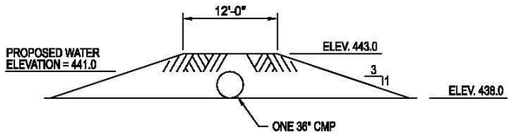
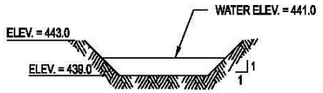


1A SECTION
NOT TO SCALE



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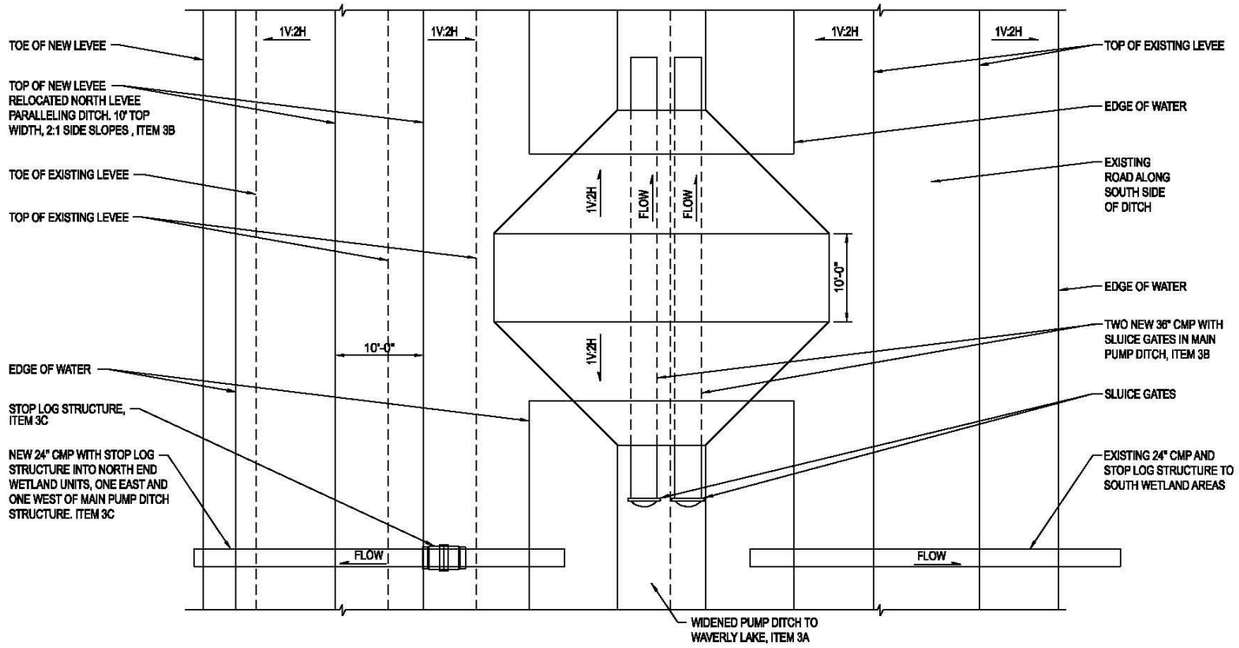
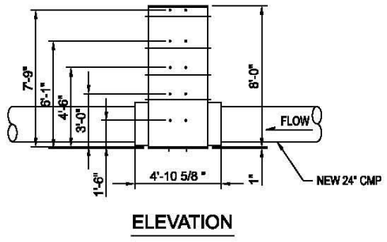


3A 3B 3C RIP RAP LANDING PUMP DITCH TO WAVERLY LAKE AND UNITS NORTH AND SOUTH PARTIAL PLAN
NOT TO SCALE

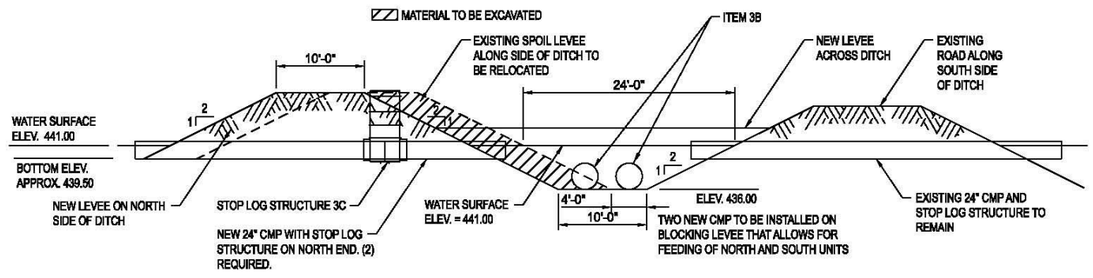
N

PLAN



ELEVATION

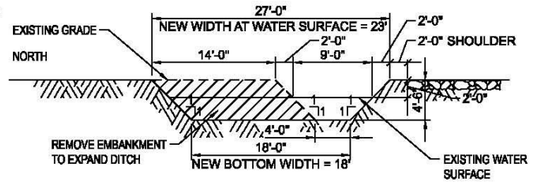
3C RIP RAP LANDING STOP LOG STRUCTURE
NOT TO SCALE



3A 3B 3C RIP RAP LANDING PUMP DITCH TO WAVERLY LAKE AND UNITS NORTH AND SOUTH
NOT TO SCALE

THE EXISTING DITCH WILL BE WIDENED BUT THE 1:1 SIDE SLOPES AND THE 2.5' WATER DEPTH WILL REMAIN THE SAME. THE BOTTOM WIDTH WILL INCREASE FROM 4' WIDE TO 18' AND THE WIDTH AT THE WATER SURFACE WILL INCREASE FROM 9' WIDE TO 23'.

ALL THE DITCH WORK WILL TAKE PLACE ON THE NORTH SIDE OF THE DITCH AND THE WIDTH INCREASE, 14' WILL BE CONSIDERED TO BE TIMBERED.



3F 4H RIP RAP LANDING PUMP DITCH CROSS SECTION
NOT TO SCALE

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St. Louis District

MARK	DESCRIPTION	DATE	APPR.
-	-	-	-
-	-	-	-

DESIGNED BY: S. ROADS
DRN BY: M. GROVE
CHD BY: J. BUTTVICK
SUBMITTED BY:
DATE: MARCH 24th, 2010
SOLICITATION NO.: -
CONTRACT NO.: -
FILE NUMBER: -
PLOT DATE: -
PLOT SCALE: 1:1
SIZE: ANSI D
FILE NAME: -

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

MISCELLANEOUS DETAILS

PLATE 5-7

auto_title

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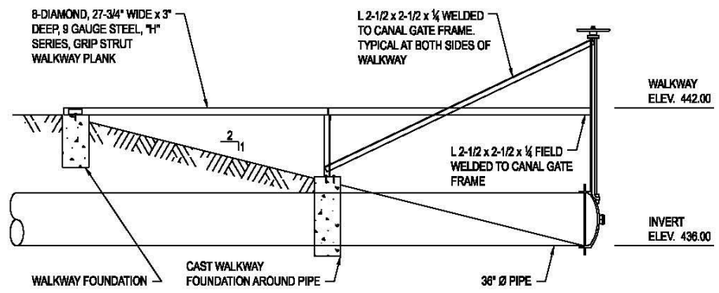
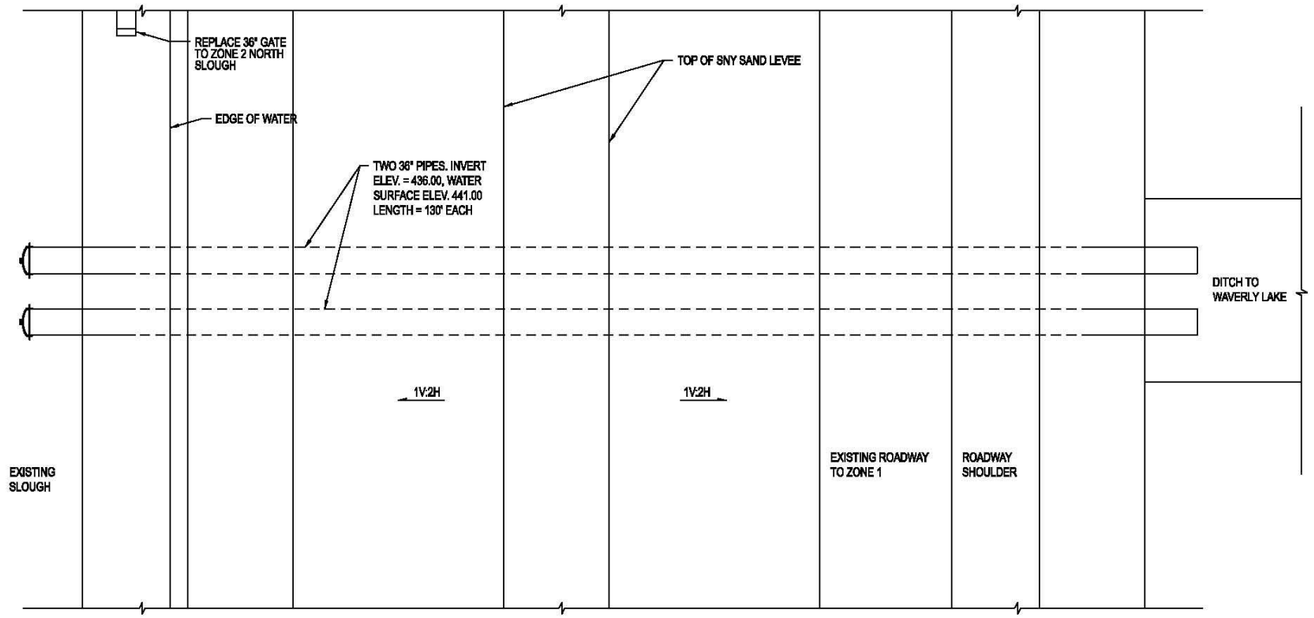
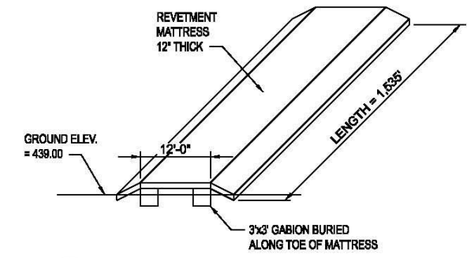


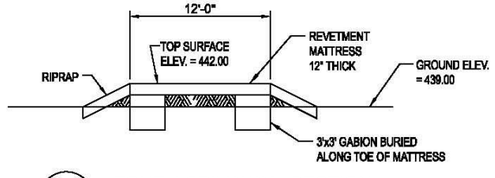
3B 3H 4J **PUMP DITCH SLUICE GATE DETAIL**
NOT TO SCALE (VARIOUS LOCATIONS)



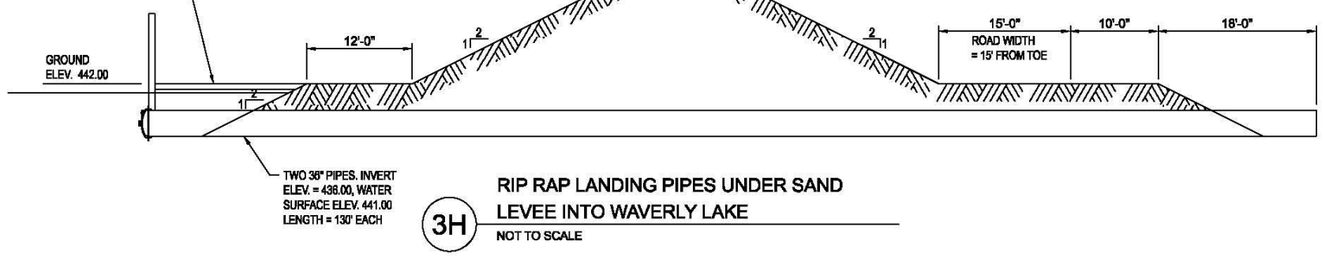
3H **RIP RAP LANDING PIPES UNDER SAND LEVEE INTO WAVERLY LAKE PARTIAL PLAN**
NOT TO SCALE



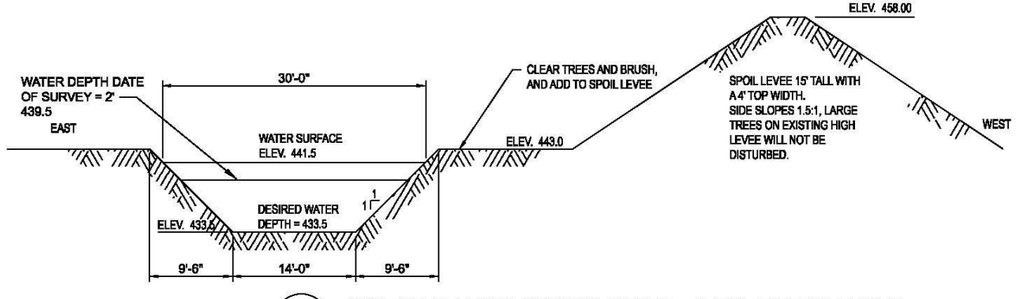
4D **ZONE 4 SPILLWAY - ISOMETRIC**
NOT TO SCALE



4D **ZONE 4 SPILLWAY - SECTION**
NOT TO SCALE



3H **RIP RAP LANDING PIPES UNDER SAND LEVEE INTO WAVERLY LAKE**
NOT TO SCALE



4B2 **SNY DITCH ALONG SNY HIGH LEVEE - 11,500 FEET IN LENGTH**
NOT TO SCALE

US Army Corps of Engineers®
St. Louis District

MARK	DESCRIPTION	DATE	APPR.
-	-	-	-
-	-	-	-

DESIGNED BY: B. ROADS
DRAWN BY: M. GROVE
SUBMITTED BY:
CHKD BY: J. BUTTWICK
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ANSI D
DATE: MARCH 24th, 2010
SOLICITATION NO.: -
CONTRACT NO.:
FILE NUMBER: -
FILE NAME: -

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

MISCELLANEOUS DETAILS

PLATE 5-8

auto_title

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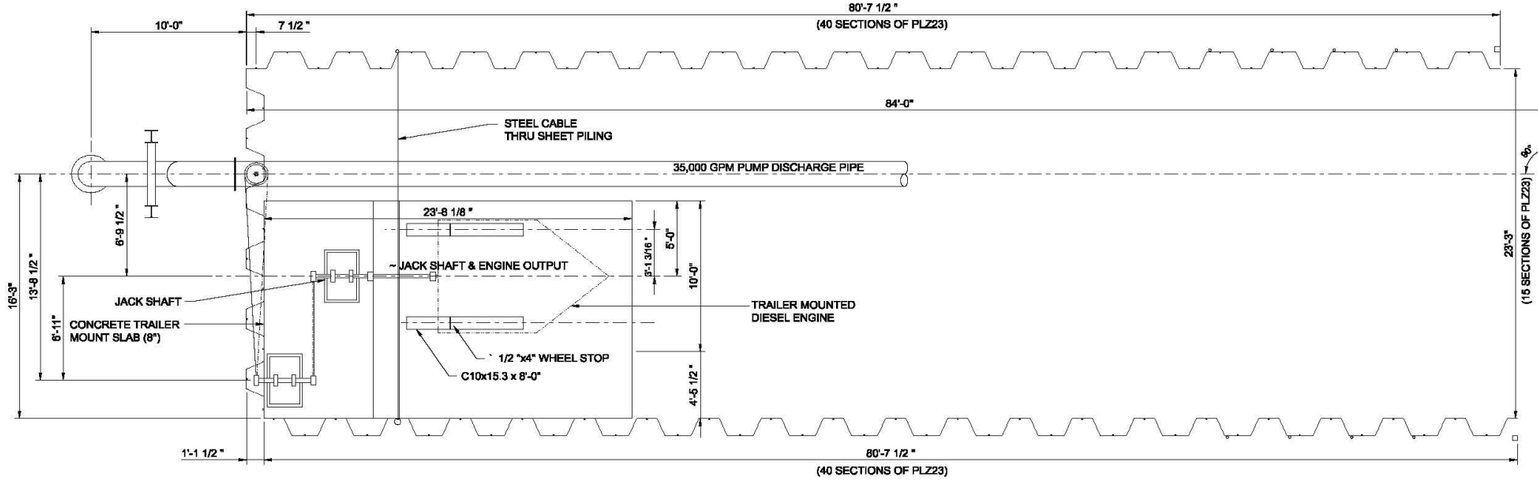
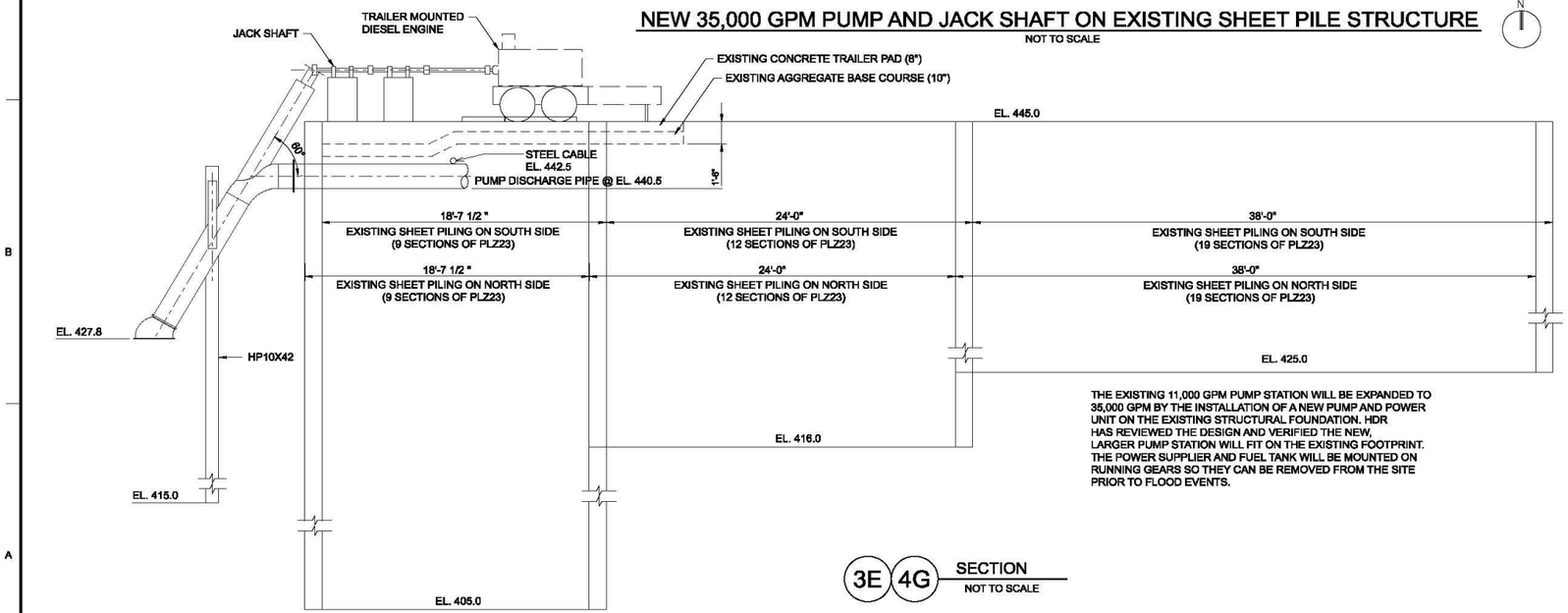


NEW 35,000 GPM PUMP AND JACK SHAFT ON EXISTING SHEET PILE STRUCTURE

NOT TO SCALE



THE EXISTING 11,000 GPM PUMP STATION WILL BE EXPANDED TO 35,000 GPM BY THE INSTALLATION OF A NEW PUMP AND POWER UNIT ON THE EXISTING STRUCTURAL FOUNDATION. HDR HAS REVIEWED THE DESIGN AND VERIFIED THE NEW, LARGER PUMP STATION WILL FIT ON THE EXISTING FOOTPRINT. THE POWER SUPPLIER AND FUEL TANK WILL BE MOUNTED ON RUNNING GEARS SO THEY CAN BE REMOVED FROM THE SITE PRIOR TO FLOOD EVENTS.

3E 4G SECTION

NOT TO SCALE

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MARK	DESCRIPTION	DATE	APPR.
-	-	-	-

MARK	DESCRIPTION	DATE	APPR.
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ST. LOUIS, MISSOURI 63103-2833

DESIGNED BY: B. ROACH
DRAWN BY: M. MITCHELL
SUBMITTED BY: -
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SIZE: ANSI D
DATE: MARCH 24th, 2010
CAD DT: 1.4.8 ATTY-CX
CONTRACT NO.: -
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FILE NAME: -

HDR

POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
REPAIR LANDING WALL FEATURE REHABILITATION &
ENHANCEMENT PROJECT - STAGE II

PUMP STATION DETAILS

PLATE 5-9

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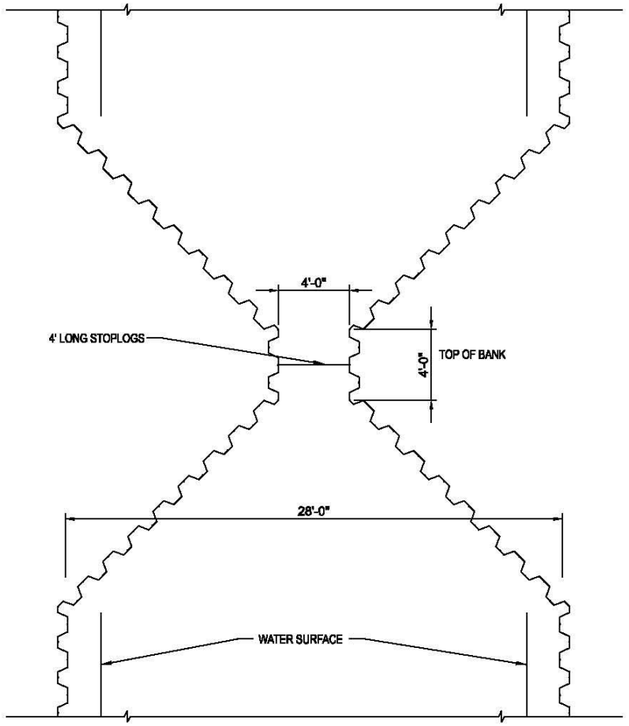
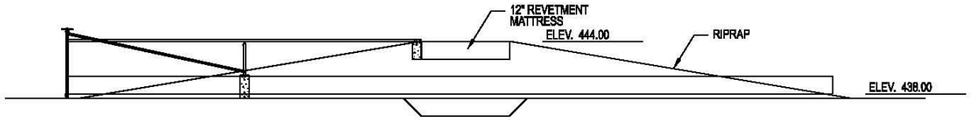


3J 3K 3J & 3K PLAN VIEW
NOT TO SCALE



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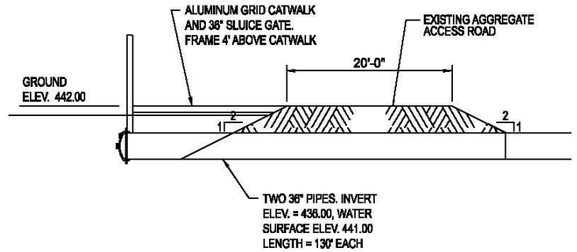
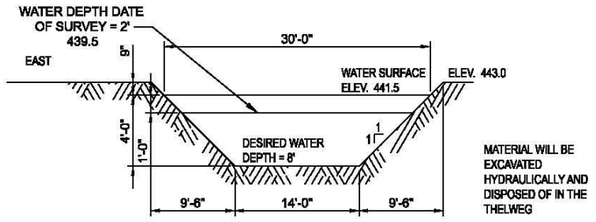
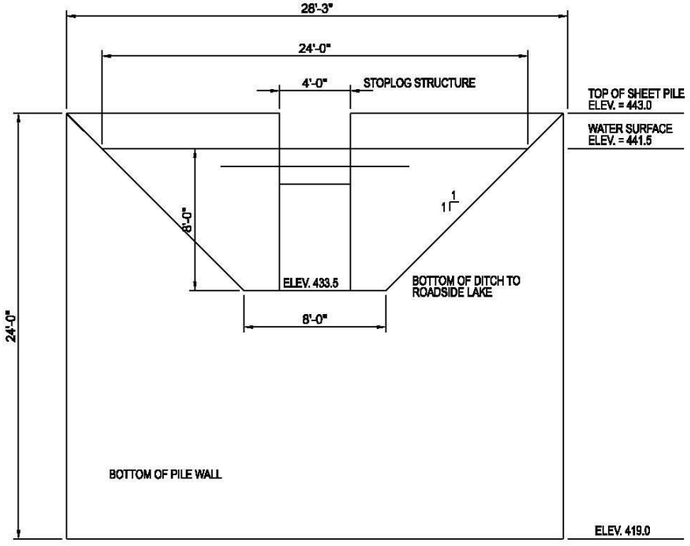


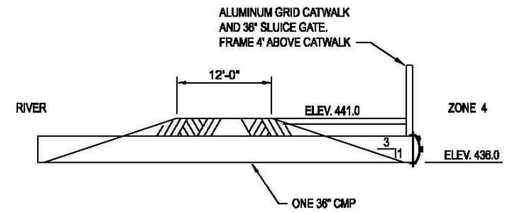
4J SECTION
NOT TO SCALE



5B SNY DITCH ALONG SNY HIGH LEVEE - 11,500 FEET IN LENGTH
NOT TO SCALE



3J 3K 3J & 3K ELEVATION VIEW
NOT TO SCALE



4C2 SECTION
NOT TO SCALE

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DRN BY: M. GROVE
CHKD BY: J. BUTTVICK
SUBMITTED BY:
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ANSI D
FILE NAME: -
DATE: MARCH 24TH, 2010
SOLICITATION NO.: -
CONTRACT NO.: -
FILE NUMBER: -

U.S. ARMY CORPS OF ENGINEERS
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ST. LOUIS, MISSOURI 63103-2833

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POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

MISCELLANEOUS DETAILS

PLATE 5-10

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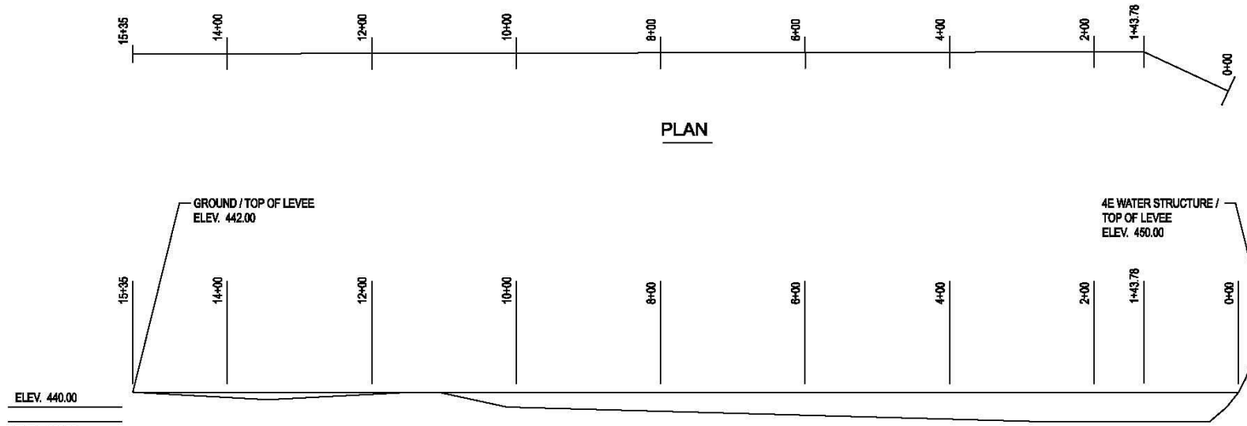
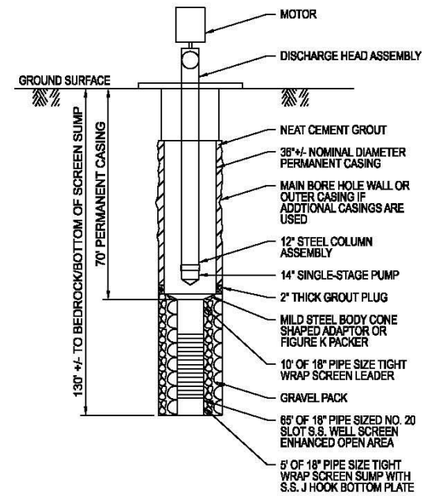


4D ZONE 4 SPILLWAY
NOT TO SCALE



1B WELL
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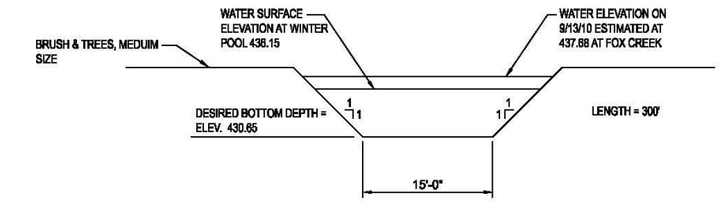
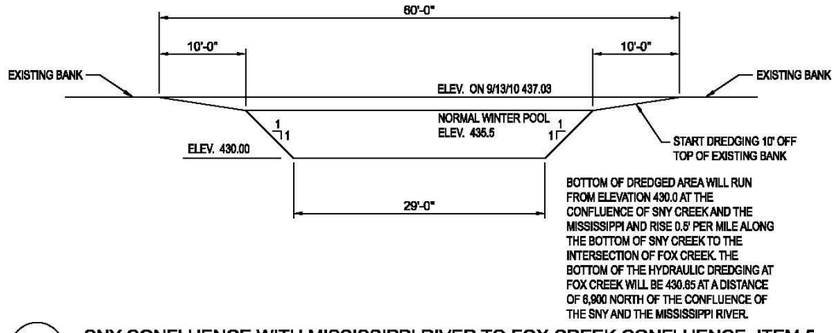


5B2 SNY DITCH FROM FOX CREEK TO SNY CREEK HIGH LEVEE, ZONES & 5
NOT TO SCALE



5B1 SNY CONFLUENCE WITH MISSISSIPPI RIVER TO FOX CREEK CONFLUENCE, ITEM 5
NOT TO SCALE

US Army Corps of Engineers®
St. Louis District

MARK	DESCRIPTION	DATE	APPR.
-	-	-	-

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: E. KNAUS
DRAWN BY: M. GROVE
CHKD BY: J. BUTWICK
SUBMITTED BY: -
CONTRACT NO.: -
PLOT SCALE: 1:1
PLOT DATE: -
SIZE: ANSI D
FILE NUMBER: -
FILE NAME: -
DATE: MARCH 24th, 2010
SOLICITATION NO.: -

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103-2833

HDR

POOL 25, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
RIPRAP LANDING HABITAT REHABILITATION & ENHANCEMENT PROJECT - STAGE II

MISCELLANEOUS DETAILS

PLATE 5-11

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APPENDIX A

CORRESPONDENCE

ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

May 30, 2013

Christopher G. Hall
Colonel, U.S. Army
District Commander
U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Colonel Hall:

The Illinois Department of Natural Resources (IDNR) supports the U.S. Army Corps of Engineers' recommended ecosystem restoration plan for Rip Rap Landing and Dog Island, Calhoun County, Illinois as presented in the draft Rip Rap Landing Habitat Rehabilitation and Enhancement Project Report. The project would result in long term benefits to fish, birds, and other species that utilize the ecosystem at this area. The proposed restoration may involve placement of water control structures, pump stations, sedimentation control berms, dredging, and other features consistent with ecosystem restoration. This work is currently planned to be accomplished under the authority of Section 1103 of the WRDA 1986 as amended.

IDNR understands that the current estimated project costs are $10,856,954 with the IDNR being responsible for 35% of these costs after execution of a Project Partnership Agreement. Additionally, annual operation and maintenance (O&M) costs are estimated to be $10,390. This project would be constructed at 100% federal cost for those portions of the project occurring on federal land and a cost share of 65% federal 35% state for those portions on state land. The state is seeking land, easement, rights-of-way, relocation, and disposal areas (LERRD) credits towards its 35 % cost-share. As the project sponsor, IDNR would be responsible for 100% of the O&M costs of the project.

We continue to support development of the Rip Rap Landing Habitat Rehabilitation and Enhancement Project subject to the State Legislature providing adequate and appropriate funds for this project.

IDNR looks forward to working with the U.S. Army Corps of Engineers on the Rip Rap Landing Habitat Rehabilitation and Enhancement Project. If you have any questions or require more information, please contact Mr. Randy Holbrook, Division of Private Lands & Watersheds at 618-462-1181.

Sincerely,

Marc Miller
Director

cc: Jim Herkert, Ron House, Debbie Bruce

October 20, 2009

Brian Markert
Project Manager
US Army Corps of Engineers, St. Louis District
122 Spruce Street
St. Louis, MO 63103-2833Wisconsin Division of State Facilities

Re: Rip Rap Landing Conservation Area
Environmental Management Program
Habitat Rehabilitation and Enhancement Project
Task Order W912ES-07-D-005
HDR# 101500

Dear Brian:

Attached you will find the final submittal of the Rip Rap Landing Habitat Rehabilitation and Enhancement Project Stage I which has incorporated all of the review comments received. I have provided hard copies to all of the individuals noted below and I am including a CD with the PDF's, drawings and word documents on this submittal.

Sincerely,

Bob Roads
RAR/rar

cc: w/attachment:

Archie Ringgenberg	Charles D. Hanneken	Kip	Runyon
Lara Anderson	Russell Errett	Nancy	Tokraks
Kevin Slattery	Dawayne Sanders	John	Maybery
Ronald J. Dieckmann	Joyce Collins	Crystal	Nance
Jim Mick	Kim Postlewait	Kenny	Scott
Gary A. Wilken	Thixton Miller	Neil	Booth
Joe Bartletti			

HDR
5201 South Sixth Street Road
Springfield, IL 62703-5143
Phone: (217) 585-8300
Fax: (217) 585-1890
www.hdrinc.com

August 26, 2009

Brian Markert
Project Manager
US Army Corps of Engineers, St. Louis District
122 Spruce Street
St. Louis, MO 63103-2833Wisconsin Division of State Facilities

Re: Rip Rap Landing Conservation Area
Environmental Management Program
Habitat Rehabilitation and Enhancement Project
Task Order W912ES-07-D-005
HDR# 101500

Dear Brian,

Per the schedule, attached you will find the final submittal of the Rip Rap Landing Habitat Rehabilitation and Enhancement Project Stage I for your review and comment. I have provided hard copies to all of the individuals noted below and I am including a CD with the PDS's of this submittal to you.

Per my understanding, the review comments will be returned on or about September 9.

Sincerely,

Bob Roads

CC w/attachment:

Archie Ringgenberg	Charles D. Hanneken	Kip	Runyon
Lara Anderson	Russell Errett	Nancy	Tokraks
Kevin Slattery	Dawayne Sanders	John	Maybery
Ronald J. Dieckmann	Joyce Collins	Crystal	Nance
Jim Mick	Kim Postlewait	Kenny	Scott
Gary A. Wilken	Thixton Miller	Neil	Booth
Joe Bartletti			

HDR | FISHPRO
5201 South Sixth Street Road
Springfield, IL 62703-5143
Phone: (217) 585-8300
Fax: (217) 585-1890
www.hdrinc.com

June 11, 2009

Brian Markert
Project Manager
US Army Corps of Engineers, St. Louis District
122 Spruce Street
St. Louis, MO 63103-2833Wisconsin Division of State Facilities

Re: Rip Rap Landing Conservation Area
Environmental Management Program
Habitat Rehabilitation and Enhancement Project
Task Order W912ES-07-D-005
HDR# 101500

Dear Brian,

Per the schedule, attached you will find the draft submittal of the Rip Rap Landing Habitat Rehabilitation and Enhancement Project for your review and comment. I have provided hard copies to all of the individuals noted below and I am including a CD with the PDS's of this submittal to you.

Per my understanding, the review comments will be returned on or about July 13 and the 3rd Sponsor meeting is tentatively set for July 20th at the Riverlands office. The meeting time, agenda and location will be subsequently verified.

Sincerely,

Bob Roads

CC w/attachment:

Archie Ringgenberg	Charles D. Hanneken	Kip Runyon
Lara Anderson	Russell Errett	Nancy Tokraks
Kevin Slattery	Dawayne Sanders	John Maybery
Ronald J. Dieckmann	Joyce Collins	Crystal Nance
Jim Mick	Kim Postlewait	Kenny Scott
Gary A. Wilken	Thixton Miller	Neil Booth
Joe Bartletti		

HDR | FISHPRO
5201 South Sixth Street Road
Springfield, IL 62703-5143
Phone: (217) 585-8300
Fax: (217) 585-1890
www.hdrinc.com

March 10, 2009

Ms. Joyce A. Collins, Field Supervisor
U.S. Fish and Wildlife Service
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, Illinois 62959

Re: Rip Rap Landing – Planning Aid Letter for
Fish and Wildlife Coordination Act
Corps Task Order: W912ES-07-D-005
HDR #101500

Dear Ms. Collins:

The St. Louis District, U.S. Army Corps of Engineers (Corps) has initiated the preparation of a Definite Project Report (DPR) for the Rip Rap Landing Habitat Rehabilitation and Enhancement Project located in Calhoun County, Illinois, along the left descending bank of Mississippi River Pool 25, between river miles 267 and 260.5 above the Ohio River. The project area will encompass Rip Rap Landing Fish and Wildlife Area, owned by the Illinois Department of Natural Resources (IDNR), and Dog Island, owned by the Corps of Engineers, but managed by IDNR as General Plan lands under the tripartite agreement among the Fish and Wildlife Service, Corps and IDNR. The St. Louis District has entered into a contract with HDR Engineering, Inc., through their Springfield, Illinois, office for preparation of Phase I of the DPR.

The project area consists of 175 acres of open water; 540 acres of old agricultural fields; 1,100 acres of floodplain forest; and roughly 450 acres of wet meadows, scrub/shrub, and emergent and aquatic vegetation. Backwater habitats within Rip Rap Landing have been degraded due to sedimentation and lack of hydrological connection. Sedimentation has decreased water depths along the lower portion of Sny Creek to approximately two feet. The result has been a loss of backwater fish habitat, property flooding, and little to no hydrologic connection between Sny Creek and adjacent backwater lakes and sloughs. Most of the sedimentation along the lower portion of Sny Creek has resulted from hillside erosion rather than

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deposition from the river, except during major flood events. In addition, the existing pumping system cannot supply sufficient water for the management area at present and became even more inadequate with the purchase of additional acreage in 2001 and 2003. Without supplemental river water many interior lakes and ponds go dry and management capability on an additional 750 acres of isolated backwater habitat is limited.

The EMP fact sheet for the project has an overall goal to "Maintain, Enhance, and Restore Wetland and Aquatic Habitat to Benefit Fisheries and Wetland Communities". This would be achieved by increasing acreage and functionality of isolated backwaters by improving water management capability through the installation of pumps and water control structures; improving backwater habitat by restoring connectivity and increasing the average depth of Sny Creek; and reducing sedimentation in Sny Creek and adjacent wetlands.

Pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*), as amended, we are requesting, as the St. Louis District contractor, that your agency provide a Planning Aid Letter or Fish and Wildlife Coordination Act Report for this project. Funding requirements and timeline issues should be discussed with T. Miller (217) 585-8300 or thixton.b.miller@hdrinc.com, for coordination with St. Louis District.

Please contact Mr. Miller at (217) 585-8300 if you have any questions or need additional information.

Sincerely,

Robert Roads, ms

Robert A. Roads
Project Manager
BAR/bar

cc: Mr. Brian Market
Mr. Charlie Hanneken

HDR Engineering, Inc.

5201 South Sixth Street Road
Springfield, IL 62703-5143

Phone: (217) 585-8300
Fax: (217) 585-1890
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Ms. Joyce A. Collins, Field Supervisor
U.S. Fish and Wildlife Service
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, Illinois 62959

Ms. Joyce A. Collins, Field Supervisor
U.S. Fish and Wildlife Service
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, Illinois 62959

MY COPY

July 9, 2010

Engineering and Construction Division
Curation and Archives Analysis Branch

Mr. Scott Miller, Governor
Absentee-Shawnee
2025 South Gordon Cooper Drive
Shawnee, Oklahoma 74810-9381

Dear Governor Miller:

This letter addresses the proposed habitat rehabilitation and enhancement project at Illinois Rip Rap Landing State Waterfowl Conservation Area in Calhoun County, Illinois. Rip Rap Landing lies along the left descending bank of the Mississippi River near Mozier, in Calhoun County, Illinois. The 2,214 acre site is managed by the Illinois Department of Natural Resources (IDNR) as a State Fish and Waterfowl Management Area. Currently, the site consists of 300 acres of isolated backwater wetlands (80 acres of which have the potential to be managed as moist soil units), 880 acres of old agriculture fields, 15 acres of feed plots, 1,000 acres of bottomland forest, and roughly four moles of Sny Creek channel (see enclosed Map).

The project seeks to: (1) increase acreage and functionality of isolated backwater habitat by improving water-management capability through the installation of pumps and water control structures, (2) improve contiguous backwater habitat by restoring connectivity and increasing average depth of lower Sny, and (3) reduce sediment load to the Sny and adjacent wetlands by reducing hillside sediment load. The Rip Rap Landing Project is being planned under the authority of the Upper Mississippi River System—Environmental Management Program-(EMP). The EMP was authorized by Section 1103 of the Water Resource Development Act (WRDA) of 1986, and reauthorized by WRDA 1999.

The existing system at Rip Rap Landing is inadequate to meet IDNR'S water management needs. Without supplemental river water, Waverly Lake and other interior ponds go dry each year. An opportunity exists to upgrade the site's water transfer and wetland management capability. In addition, sedimentation has decreased depths along the lower Sny to approximately two feet. This has resulted in little to no hydrologic connection between the Sny and the backwater lakes adjacent to this segment of channel, and the loss of backwater fish habitat. Except during major flood events, most of the sedimentation along the lower Sny is hillside rather than river borne. This Habitat Rehabilitation and Enhancement plan will include the following impacts.

a. Replacement of 10,000 gales-per-minute pump with a larger pump to facilitate movement of sufficient river water to manage interior wetlands.
b. Enlargement of the existing ditch supply water from the pump to the wetlands.
c. Replacement of existing conveyance pipes with larger pipes.
d. Dredging of approximately four miles of the lower Sny ditch to a bottom width of 20 feet and a total water depth at normal pool of eight feet to restore hydrology connections to backwater lakes and improve fish habitat.
e. Installation of gated water control structures at roadside lake/borrow pits to allow the influx of water from the Sny ditch during higher pool levels.
f. Replacement of croplands with tree planting.
g. Possible construction of upland sediments traps to reduce hillside sediment load reaching the lower Sny and adjacent wetlands.

There is one known historic property located within the project boundary. This site is a Late Woodland habitation identified by Charles Moffat in the fall of 1999 as part of an archaeological survey of Rip Rap Landing. This site has not been evaluated for National Register eligibility. Four other cultural surveys have taken place within the project boundaries; none of which have identified historic properties. Impacts to potentially significant historic properties are not anticipated during this activity. However, an archaeological survey of the proposed project elements will be conducted to locate any historic properties. In the event any cultural properties are located, these will be evaluated for National Register eligibility. If sites will be impacted, the tribal nations who have indicated they have an interest in the area will be contacted, and consultation will take place. Should an inadvertent discovery of human remains occur, then Section 3 of the Native American Graves Protection and Repatriation Act will be followed.

The U.S. Army Corps of Engineers, St Louis District is requesting you review and notify our office no later than August 31, 2010 if you would like to enter into formal consultation regarding this project. If you have any questions regarding this matter, please contact Ms. Roberta L. Hayworth, Native American Coordinator directly at (314) 331-8833, or by electronic mail at roberta.l.hayworth@usace.army.mil. Thank you in advance, for your timely review of this request.

Sincerely,

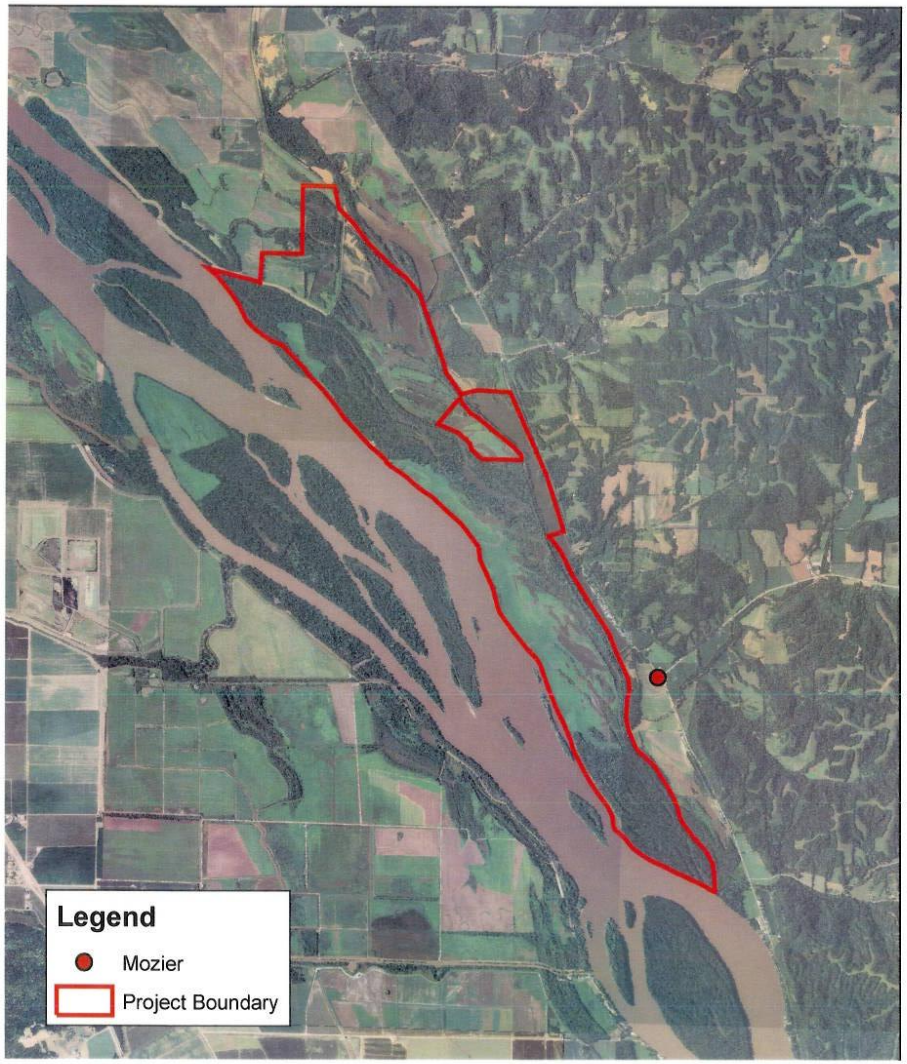
Michael K. Trimble, Ph.D.
Chief, Curation and Archives
Analysis Branch

Enclosure

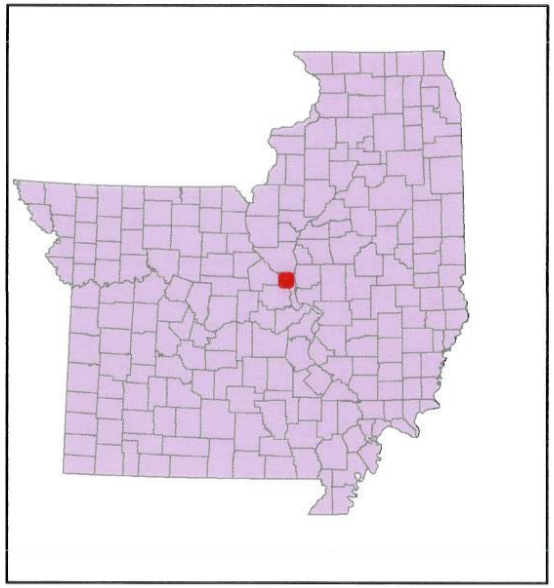
Copy Furnished:
Ms. Karen Kaniatobe

US Army Corps of Engineers
St. Louis District

Rip Rap Landing HREP



Location Map



4/26/2010

SAME LETTER SENT:

TRIBAL CHAIRPERSONS

Mr. Scott Miller, Governor
Absentee-Shawnee Tribe
2025 S. Gordon Cooper Drive
Shawnee, OK 74810-9381

Ms. Glenna J. Wallace, Chief
Eastern Shawnee Tribe
P.O. Box 350
Seneca, MO 64865

Mr. Ron Sparkman, Chairman
Shawnee Tribe
P.O. Box 189
Miami, Oklahoma 74355

Mr. Chad Smith, Principal Chief
Cherokee Nation
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Tahlequah, OK 74465

Mr. George Wickliffe, Chief
United Keetoowah Band of Cherokee
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Tahlequah, OK 74464

Mr. Kerry Holton, President
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

Mr. Jerry Douglas, chief
Delaware Tribe of Oklahoma
170 N. Barbara
Bartlesville, OK 74006

Mr. John Barrett, Chairman
Citizen Potawatomi Nation
1601 S. Gordon Cooper Drive
Shawnee, OK 74801

Mr. Harold Frank, Chairman
Forest County Potawatomi
P.O. Box 340
Crandon, WI 54520

Mr. D.K. Sprague, Chairman
Match-e-be-nash-she-wish Potawatomi
P.O. Box 218
Dorr, MI 49323

Mr. Kenneth Meshigand, Chairman
Hannahville Indian Community
N14911 Hannahville Blvd. Rd.
Wilson, MI 49896-9728

Mr. Homer Mandoka, Chairman
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2221—1 ½ Mile Road
Fulton, MI 49052

Mr. Matthew Wesaw, Chairman
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Ho-Chunk Nation
P.O. Box 667
Black River Falls, WI 54675

Mr. John Blackhawk, Chairman
Winnebago Tribe of Nebraska
P.O. Box 687
Winnebago, NE 68071

Mr. Leon Campbell, Chairman
Iowa Tribe of Kansas
3345 Thrasher Road # 8
White Cloud, KS 66094

Ms. Christine Modlin, Chairwoman
Iowa Tribe of Oklahoma
Route 1, Box 721
Perkins, OK 74059

Mr. Juan Garza, Chairman
Kickapoo Traditional Tribe of Texas
HC 1, Box 9700
Eagle Pass, TX 78853

Mr. Tony Salazar, Chairman
Kickapoo Tribe of Oklahoma
P.O. Box 70
McCloud, OK 74851

Mr. Arlan Whitebird, Chairman
Kickapoo Tribe of Kansas
P.O. Box 271
Horton, KS 66439

Mr. George Thurman, Principal Chief
Sac & Fox Nation of Oklahoma
Route 2, Box 246
Stroud, OK 74079

Mr. Twen Barton, Chairman
Sac & Fox Nation of Missouri
Rt. 1, Box 60
Reserve, KS 66434

Mr. Adrian Pushetonequa, Chairman
Sac & Fox Tribe of Mississippi in Iowa
3137 F. Avenue
Tama, IA 52339

Mr. Thomas E. Gamble, Chief
Miami Tribe of Oklahoma
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Miami, OK 74355

Mr. Jim Gray, Principal Chief
Osage Nation of Oklahoma
P.O. Box 779
Pawhuska, OK 74056

Mr. John Froman, Chief
Peoria Tribe
P.O. Box 1527
Miami, OK 74355

Mr. John Berrey, Chairman
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363

SAME LETTER SENT:

TRIBAL REPRESENTATIVE:

Ms. Karen Kaniatobe
Absentee-Shawnee Tribe
2025 Gordon Cooper Drive
Shawnee, Oklahoma 74810-9381

Ms. Robin DuShane
Eastern Shawnee Tribe
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Mr. Floyd Rhode
Hannahville Indian Community
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Harris, Michigan 49845

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Potawatomi
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Fulton, MI 49052

Mr. Mark Parrish
Pokagon Band of Potawatomi
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58620 Stink Road
Dowagiac, MI 49047

Mr. Rey Kitchkumme
Prairie Band Potawatomi
Government Center
16281 Q Road
Mayetta, KS 66509

Mr. Larry Garvin
Ho-Chunk Nation of Wisconsin
P.O. Box 667
Black River Falls, WI 54615

Delaware Tribe of Indians
170 NE Barbara
Bartlesville, Oklahoma 74006
(918) 336-5272 FAX (918) 337-6591

July 18, 2010

Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, MO
63106-2833

Re: Proposed Habitat Rehabilitation and Enhancement Project at Illinois Rip Rap Landing State Waterfowl Conservation Area, Calhoun County, Illinois

Dear Michael K. Trimble, PhD,

Our review indicates that this project is located in an area that was not inhabited by the Delaware Tribe. As such, this project will not impact unknown archaeological sites culturally affiliated with the Delaware Tribe and/or sites of cultural and religious significance. We therefore have no objection to the project.

However, our suggestion is that if any human remains are accidentally unearthed during the course of the project that you cease development immediately and inform the appropriate Indian Tribes of the inadvertent discovery.

If you have any questions, feel free to contact this office by phone at (918) 335-7026.

Sincerely,

Brice Obermeyer

Brice Obermeyer
Delaware Tribe Historic Preservation Office
1417 West St
Emporia, KS 66801

PEORIA TRIBE OF INDIANS OF OKLAHOMA
118 S. Eight Tribes Trail (918) 540-2535 FAX (918) 540-2538
P.O. Box 1527
MIAMI, OKLAHOMA 74355

CHIEF
John P. Froman

SECOND CHIEF
Jason Dollarhide

July 14, 2010

Department of the Army
St. Louis District Corps of Engineers
Attn: Ms. Roberta L. Hayworth
1222 Spruce Street
St. Louis, MO 63103

RE: Limited reevaluation study of alternative ways to correct deficiencies in the design of under-seepage and through-seepage controls for the Metro East Sanitary District levee system

Thank you for notice of the referenced project. Please note that the contact person has changed, Frank Hecksher is the new Section 106/NAGPRA representative. The Peoria Tribe of Indians of Oklahoma is currently unaware of any documentation directly linking Indian Religious Sites to the proposed construction. In the event any items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) are discovered during construction, the Peoria Tribe request notification and further consultation.

The Peoria Tribe has no objection to the proposed construction. However, if any human skeletal remains and/or any objects falling under NAGPRA are uncovered during construction, the construction should stop immediately, and the appropriate persons, including state and tribal NAGPRA representatives contacted.

John P. Froman
Chief

xc: Bud Ellis, Repatriation/NAGPRA Committee Chairman

KIKAAPOA - He who moves about
KICKAPOO TRIBE IN KANSAS

1107 Goldfinch Road • Horton, Kansas 66439
phone 785.486.2131 • fax 785.486.2801

SUBJECT: SECTION 106 RESPONSE

REGARDING: habitat rehabilitation and enhancement project

LOCATION: Calhoun County, Illinois

DATE OF MAILING: 9 July 10

TO: Roberta Hayworth

☑ No further Section 106 consultation is required Concurrence of "no effect" or "no adverse effect" to historic structures or culturally significant sites (as defined in 36 CFR 800) is granted.

☐ You may proceed with construction, but if there are any burial sites or other cultural properties discovered in the area, please notify this office immediately and your state or local historical agency.

☐ Additional information is required, including:

_____

_____

FROM:

Kickapoo Tribe in Kansas (Consulting Party)

Mark Kahbeah (Designated Contact)

Mark Kahbeah (Signature)

5 August 10 (Date)

Hayworth, Roberta L MVS

From: Jason Ross [JRoss@delawarenation.com]
Sent: Wednesday, August 25, 2010 11:20 AM
To: Hayworth, Roberta L MVS
Subject: re: Habitat Rehabilitation and Enhancement Project
Attachments: image001.jpg

Hello Ms. Hayworth,

The Delaware Nation received information from St. Louis District, Corps of Engineers regarding habitat rehabilitation and enhancement project at Illinois Rip Rap Landing State Waterfowl Conservation Area located in the area of Calhoun County, Illinois.

The Cultural Preservation Director, Ms. Tamara Francis has reviewed the information provided and has determined that the project is not the Delaware Nation's Area of Interest and will not be a consulting party on the project. Please continue with the project and if you have any questions please do not hesitate to contact our office.

Thank you again for taking the time and effort to properly consult with the Delaware Nation,

Tamara Francis

Cultural Preservation Director

The Delaware Nation

31064 State Highway 281

P.O. Box 825

Anadarko, OK 73005

(405)247-2448 x1180 phone

(405)247-8905 fax

Jason Ross

Museum/Section 106 Assistant

Cultural Preservation Department

The Delaware Nation

P.O. Box 825

Anadarko, OK 73005

PH# 405) 247-2448

FAX# 405) 247-8905

www.delawarenation.com

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

January 25, 2011

Curation and Archives Analysis Branch
Engineering and Construction Division

Ms. Anne E. Haaker
Deputy State Historic Preservation Officer
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

Re: Rip Rap Landing State Waterfowl Conservation Area Environmental Management Program (EMP) Habitat Rehabilitation and Enhancement Project

Dear Ms. Haaker:

Pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended), the St. Louis District requests your review and comments on the potential effect of this proposed project upon significant historic properties (archaeological remains). From November 8 through December 10, 2010, a Phase I cultural resources and geomorphological investigation was conducted at the Rip Rap Landing Conservation Area in advance of a habitat rehabilitation and enhancement project. Three previously unrecorded archaeological sites were identified during this survey. These sites, 11C555, 11C556, and 11C557, are all located within the proposed tree planting areas. Only 11C557 is recommended potentially eligible for the National Register of Historic Places under Criterion D. The recommendation of the draft report is that the planned reforestation will have no effect on the deeply buried intact cultural materials at this site; however, the St. Louis District will recommend project avoidance within the site limits of 11C557. A copy of the draft survey report has been included for your review.

Given this information, the St. Louis District asks for your review of the report and concurrence that with avoidance of site 11C557 no significant impact will occur to historic properties as a result of this EMP project at Rip Rap Landing State Waterfowl Conservation Area. Once this report is finalized two copies of the survey report will be forwarded to your office for your use and distribution. If you have any questions regarding this matter, please contact Ms. Lara Anderson at (314) 331-8779 or Lara.Anderson@usace.army.mil.

Sincerely,

Michael K. Trimble, Ph.D.
Chief, Curation and Archives
Analysis Branch

CONCUR
By: Anne E. Haaker
Deputy State Historic Preservation Officer
Date: Illinois 2/8/11

Enclosure

APPENDIX B

CLEAN WATER ACT

APPENDIX B
Clean Water Act
Section 404 (b)(1) Evaluation

I. PROJECT DESCRIPTION

A. Location. Rip Rap Landing is located in Pool 25 of the Mississippi River (Figure B.1). It includes 2,338 acres of primarily river bottomlands along the left descending bank of the Mississippi River in Calhoun County, Illinois adjacent to the Village of Mozier. All of the state and federal lands included in this EMP project are between Mississippi River Miles 260.5 and 267. The IDNR owns approximately 2,055 acres of project lands, while the remaining 283 acre Dog Island complex is federally owned but managed by IDNR. There are 793 acres of IDNR owned property enrolled in the NRCS Wetland Reserve Program.

B. General Description. By definition and Federal regulatory jurisdiction, much of the site is classified as wetland or "waters of the United States" and is therefore subject to evaluation and regulation under Section 404 of the Clean Water Act.

This evaluation focuses on the proposed project features that would improve aquatic and wetland habitat and enhance overall value of the bottomland forest. The project is consistent with USFWS, HREP and the St. Louis District's EMP management goals and was planned for the benefit of fish, resident and migratory birds and other wildlife.

C. Authority and Purpose. The Upper Mississippi River System – Environmental Management Program (UMRS-EMP) is currently a federal-State partnership designed to (a) plan, construct and evaluate measures for fish and wildlife habitat improvement through HREPs and (b) monitor the natural resources of the river system through the Long Term Resource Monitoring Program (LTRMP). The Water Resources Development Act (WRDA) of 1986 (P.L. 99-662) states:

To ensure the coordinated development and enhancement of the Upper Mississippi River system, it is hereby declared to be the intent of Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system. Congress further recognizes that the system provides a diversity of opportunities and experiences. The system shall be administered and regulated in recognition of its several purposes (Section 1103).

D. General Description of Dredged and Fill Material.

1. General Characteristics of Material (grain size. soil type)

a. Fill Material. Fill materials include rock (quarry run limestone consisting of graded A stone, concrete, corrugated metal culvert pipes, water control structures and earthen materials including silt, sand and clays.

b. Dredged Material. Dredged material is defined as material that is either hydraulically dredged or mechanically excavated from waters of the United States. Earthen material excavated/ dredged from Sny Creek and the backwater sloughs within Dog Island will consist of alluvial sand, silt and clay and will be beneficially reused within the site for construction of various project features where feasible. Mechanically excavated sediments may be placed on the existing levee embankments where vegetation makes it feasible.

2. Quantity of Material. An estimated 38,500 cubic yards of material will be removed from Sny Creek in Zone 4 and an estimated 27,860 cubic yards of material will be removed from Sny Creek in Zone 5. These estimates will be confirmed prior to construction.

3. Source of Material. Stone used for the project will be obtained from commercial stone quarries in the vicinity of the project area. Concrete will be obtained commercially. Earthen material will be obtained onsite from borrow areas associated with dredging and or water conveyance channel excavation.

E. Description of Proposed Placement Sites

1. Location. The proposed placement sites are located in the interior of the project area and are shown on the Project Features Map (Figure B.2) and design plates 5-1 through 5-5. Exact placement locations for each zone have not been identified; however, final placement for each project feature will be done as to avoid and minimize impacts to wetlands and other aquatic resources. Placement sites will also target specific areas that may be enhanced though the beneficial reuse of dredged materials. Temporary stabilization measures will be employed on disturbed areas of the main pump channel, Sny Creek and Roadside Lake connection to Sny Creek until stabilization occurs. Stabilization practices may include mulching, temporary seeding, and /or the erection of silt fencing.

In summary, placement sites within Zone 1 will include a 25 foot corridor adjacent to the small excavated channel to connect Goose Pasture Lake. Additionally, material excavated as part of the installation of the shallow well will be placed within a 50 foot radius of the proposed shallow well. Placement site within Zone 2 will be limited to open agriculturally influenced areas that are currently disturbed from annual tilling. Beneficial reuse of recovered soil may be used to create slightly higher ridges within the open cropland for bottomland hardwood establishment. The existing channel along the boundary of Zone 2 and Zone 3 between the pump and the water control structures will be mechanically excavated. The mechanically excavated material will be used in adjacent croplands within Zone 2 to create ridge topography. Placement sites within Zone 3 will be associated with various sized corridors around the new pump station, water conveyance channel to Waverly Lake, culverts associated with water control in the north units and dredging with Sny Creek. Placement sites within Zone 4 will result from repair of two scours in the riverfront levee and construction of a water control levee at the south end of this zone. Mechanically dredged sediments from Sny Creek in Zones 3, 4 and 5 will be placed adjacent to Sny Creek. The material will be side cast onto the adjacent bankline and will provide additional flood protection. Material will be placed at or above flood elevation on the existing levee crown and will be stabilized with a small ridge constructed with earthen material to prevent erosion.

2. Size (acres) and Types of Habitat. Final placement of project features will result in the loss or conversion of minor amounts of natural habitat. Existing areas of cropland that are annually disturbed will be used to the greatest extent possible for placement of excess sediment. Approximately 99 acres of cropland will be converted to bottomland hardwood forest through installation of mast trees. Prior to planting, these areas may be used for excess soil placement if required. Soil placement within the cropland of Zone 2 (approximately 36 acres) will used to create slightly higher ridges within the open cropland for bottomland hardwood establishment. Previously disturbed sites such as existing levees, roads, and other existing infrastructure will also be used to the greatest extent possible to avoid loss of additional natural habitat.

Temporary, short-term impacts to wetlands would result from construction activities in Zones 1, 2, 3, and 4. Less than 0.5 acres of wetland could be converted to non-wetland depending on final placement of water control structures, levees, pump station, well, water conveyance channels, etc.

Permanent impacts from construction activities in Zones 1, 2, 3, and 4 (water control structures, levees, pump stations and water conveyance channels) will result in the conversion of approximately 20 acres of wetland habitat to non-wetland.

Mechanically dredged sediments from Sny Creek in Zones 3, 4 and 5 will be placed onto the adjacent bankline at or above flood elevation on the existing levee crown. Approximately 20,767 linear feet of existing levee has been targeted for potential placement; however, final placement will be determined during final design.

Scour repair within the river ridge levee will result in the placement of sediment within approximately 500 linear feet of the existing levee embankment. Permanent placement of material will result in approximately 0.5 acres of habitat conversion.

Overall, installation and construction of the project features will cumulatively enhance the functionality of these aquatic resources, making them more predictable for refuge management.

3. Type of Site

a. Permanent Deposits of Dredged and Fill Material. The construction sites for the pump station, water control structures, well, levees, and roads will be impacted by permanent placement of these features. Additionally, material excavated as part of the water conveyance channel feature will be used in nearby cropland areas to create elevated ridges for regeneration of bottomland hardwood tree species. Material dredged from Sny Creek will also be permanently placed within the site in various disturbed cropland fields, along existing levees, and will also be used to aid the creation of topographic variation within the site.

Sny Creek Dredging and Zone 2 Water Conveyance Channel. Dredged material from the Sny Creek and the water conveyance channel from the new pump station will be beneficially reused and placed in areas that are currently being used as cropland. Sediments placed within the cropland will be spread and compacted as necessary to create higher ridges that will aid in the establishment of mast producing bottomland hardwood forest. This area is currently low quality and annually farmed when conditions are suitable. When the dredged material has dried sufficiently, it will be graded to the proper slope, and planted to bottomland mast producing trees. The species to be planted include northern pecan, swamp white oak, bur oak, pin oak, sycamore, and shellbark hickory. The final elevation of the ridges will be approximately 2 to 3 feet higher and enhance likelihood of producing and maintaining desirable bottomland hardwood tree species.

b. Temporary Deposits of Fill Materials. Temporary cofferdams may be used in some aquatic areas to construct water control structures; however, temporary placement of fill material will be done in such a manner as to avoid and minimize impacts to wetlands and other natural features. Temporary stockpiles of material may also be necessary during construction of the various project features. Construction staging areas will be created in a logical manner that avoids impacts to wetlands.

4. Timing and Duration of Placement. Work to be performed will need to be accomplished during normal (non-flood) pool conditions. Depending on local weather and river flooding conditions, the construction period may occur over several years.

F. Description of Placement Method. Sediment removed from Sny Creek will be dredged mechanically and placed on the existing levee (side cast) adjacent to the creek bank. Some mechanically excavated material will also be hauled and placed into disturbed croplands. Bulldozers or other earth-moving equipment will be used to grade and shape the material. Minor clearing and grubbing may be required in some areas. After the material has been placed to the desired depth, the sediments would be re-graded. Croplands will be planted with bottomland hardwood mast plantings. Shoreline disturbance is expected to be minimal.

Material excavated from the water conveyance channel will be placed either on nearby agricultural land or adjacent to the channel on the north side using a mechanical excavator. If cropland is used, the material would be placed to a 1-foot depth and worked into the existing soil. After the material has dried sufficiently, the area would be graded and planted with mast trees.

Placement of material for water control structures includes: pumps, riprap, corrugated metal culverts and concrete would typically involve use of trucks, backhoes, and bulldozers. Placement of the rock may involve the use of deck-mounted cranes with draglines, barges, end loaders, quarter boats, and tender craft.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations

1. Substrate Elevation and Slope. Rip Rap Landing lies in the floodplain of the upper Mississippi River and consists of typical alluvial material and maintains typical LSA for its location. The floodplain area is relatively flat, with elevations ranging from about 450 up to 440 feet NOVO, but much of the area is below 445 NOVO. The minimum water surface elevation ranges from 438.0 to 441.0 ft NGVD. Much of the project site is sloped no greater than 1-2 percent.

Areas dredged in the Sny Creek would be cut to a final water depth of 4 to 8 feet with final slopes to be 6H: 1V side slopes, based on a winter pool water elevation of 441.5 MSL (plate 5-8 of the DPR). Over the life of the project, flood flows would reintroduce sediment into the dredged areas. Silty fine grained material excavated or dredged from the creek would be placed onto disturbed agricultural fields would be graded and planted to mast trees. Although a 2- to 3-foot increase in elevation will occur, the site is expected to retain bottomland forest characteristics and hydrology. However, the increase in elevation is expected to increase survival and regeneration of mast trees. Following placement, the dredged material will be incorporated into the existing material to a depth of 1 foot. This work will create a better seal between the new and existing materials. It is anticipated that natural herbaceous wetland vegetation will germinate on the site after construction.

2. Sediment Type. The soil survey for Calhoun County describes the soils within the project area as silt loams and silty clay loams (Beaucoup, Hamburg, Raddle, Tice, and Wakeland). Sediments within the interior sloughs consist of fine silts, clays, and organics. All sediments to be dredged from the interior of Sny Creek are expected to be of fine silt; however, it

is possible that significant areas of sand may also be present. Two representative samples will be taken (as soon as river levels are conducive to allow site access). These materials will be classified for particle size, 24 hr-supernatant, and settling rates respectively. Analysis of this material is discussed in Appendix G, Water Quality.

3. Dredged/Fill Material Movement. Earthen material used for levee construction, levee repair, and as backfill will be compacted. Stone riprap used in water control structures and other project features on the interior dike/levees has been sized to withstand the force of flood waters, and is not expected to move. Earthen material used for levees is subject to erosion but will be stabilized through the use of relatively flat side slopes and re-vegetation measures. For all of the proposed dredge cuts within the Sny, normal flood flows would reintroduce sediment into the dredged areas.

4. Physical Effects on Benthos. Material placement should not significantly affect benthic inhabitants. Benthos are found only in the aquatic portions of the project area. Replacement of the water control structure and pump may result in the loss of some benthic organisms. Removal of sediment from Sny Creek and the channel will also result in loss of benthic organisms. However, these areas are expected to be re-colonized within one year, possibly with different assemblages of benthic organisms. Effects to existing benthos populations along the shoreline are expected to be minimal due to the degraded and unstable condition of the banks.

5. Actions Taken to Minimize Impacts. Numerous actions will be taken to avoid adverse effects of sediment related impacts. Project features will be designed with stable slopes will incorporate the use of immobile stone (rather than earthen material). Earthen embankments will be properly compacted and provided with the proper re-vegetation features to minimize erosion. All fills will be controlled and placed in appropriate non-wetland locations.

Minimal vegetation impacts are expected to result from the proposed action. Projects features will be positioned to minimize impacts to vegetation. Existing vegetative communities in areas of disturbance would be removed. Areas of disturbance will be confined and re-vegetated at the completion of the project. Sediment placement along the Sny Levee will temporarily disrupt vegetative communities established along the levee. Sediment placement will be done in a manner to avoid vegetative impacts outside of the existing levee.

Faunal impacts from the construction of project features would be limited to short-term disruption of the aquatic and terrestrial shoreline community in the areas of the disturbance. Removal of the fine grained silt within Sny Creek will temporarily displace aquatic species during dredging; however, these species and/or different benthos will return quickly and re-colonize the freshly disturbed substrates. Construction would be scheduled in such a way as to avoid impacting threatened and endangered species. The proposed actions would also provide a more diverse aquatic substrate than presently exists within the channel.

B. Water Circulation, Fluctuation, and Salinity Determinations

1. Water.

a. Salinity - Not applicable.

b. Water Chemistry - Mechanical excavation or hydraulic dredging is expected to have a short-term temporary effect on water chemistry. Increased turbidity in the areas

of sediment removal is expected; however; turbidity levels are not expected to significantly affect any aquatic organisms or downstream habitat. Non-riverine originated components such as rock fill, capstone, concrete, and steel that may be placed temporarily or permanently during construction would be physically stable and chemically non-contaminating. Water chemistry will be dramatically improved through the removal of fine grained sediments that currently impair the functionality of Sny Creek. By removing accumulated sediment Sny Creek will provide a functional backwater connection to Roadside and Waverly Lakes.

c. Clarity - Elevated suspended sediment levels are expected to occur in a localized nature within Sny Creek during dredging. Likewise, slightly elevated suspended sediment levels can be expected during the replacement of the pump and water control structure. Decreased water clarity is expected to be short-term at these sites.

d. Color - No change is expected.

e. Odor - The project is not expected to have an impact on water odors.

f. Taste - The project is not expected to impact water taste.

g. Dissolved Gas Levels - Construction activities associated with the project are not expected to have a significant adverse impact on dissolved gas levels.

h. Nutrients - Nutrients will be released to the water column during sediment removal; however, this will represent a temporary increase and is not considered significant.

i. Eutrophication - The project is not expected to contribute toward eutrophication of the water column.

j. Water Temperature - Temperatures are not expected to change.

2. Current Patterns and Circulation.

a. Current Patterns and Flow - Small floods (those occurring once every one to two years) will be excluded from the project area by repairing the existing scour holes in the exterior dike/levee. Overall, the project will slightly alter circulation and flow patterns; however, these alterations are not expected to significantly change river hydraulics.

b. Velocity - There should be no detectible changes in current velocity in the Mississippi River or Sny Creek.

c. Stratification - Stratification does not occur within the project area because of flowing water and shallow depths.

d. Hydrologic Regime - The project will not alter the hydrologic regime of Pool 25 or the flood profile of the Mississippi River.

Dredging Sny Creek would have positive impacts on current patterns, backwater connectivity and circulation of water from the Sny to the Mississippi River. Increased

water depths from sediment removal will provide access to overwintering habitat that is currently thought to be limiting for aquatic organisms. Dredging the access channels would improve water circulation to those areas as well as provide improved escape routes for fish should water conditions become unfavorable. There would not be any noticeable alteration in current patterns upstream or downstream of the project. Main stem river channel or interior velocities would not be affected by the proposed action.

3. Normal Water Level Fluctuations. The project will not affect normal water fluctuations in the elevation of Pool 25. No effects on normal seasonal river or project area interior stages are anticipated to result from any of the proposed placements. Levee restoration is expected to increase flood protection to the project area.

4. Salinity Gradients. The proposed action would take place in a freshwater river system. Therefore, no consideration of salinity gradients is warranted for these actions.

5. Actions Taken to Minimize Impacts. Measures taken to avoid state water quality standard exceedances could include avoidance of hydraulic dredging activities in the toxic, un-ionized during the summer months when water temperatures are higher and a greater percentage of the ammonia is form, and/or utilizing a confined placement facility to allow for settling of the suspended solids. A relatively small mixing zone can also be effective at reducing ammonia-nitrogen and metal concentrations to acceptable levels.

C. Suspended Particulate/Turbidity Determinations. In an effort to assess existing sediment characteristics within the vicinity of the proposed project, bed sediment samples and overlying water will be collected for analysis. Elutriate and grain size analyses will performed on two samples collected from potential dredging areas within Sny Creek. Sediment analysis results will dictate the proper treatment alternatives.

1. Expected Changes in Suspended Particles and Turbidity Levels in Vicinity of Placement Sites. The proposed project would have short-term adverse impacts during construction due to localized turbidity plumes, but long-term beneficial effects would occur from improved fisheries habitat, riverine-backwater connectivity and protection of the interior wetlands from flood related scour or levee failure. Increases in suspended particulates and turbidity due to construction of water control structures are expected to be minimal because cofferdams and/or turbidity curtains and silt fence will confine the construction sites, during dewatering and for the duration of the construction process.

2. Effects on Chemical and Physical Properties of Water Column. The proposed project would have short-term adverse impacts to the chemical and physical properties within Sny Creek during construction due to turbidity. As sediment is removed plumes of sediment become suspended in the water; however, as dredging ceases Turbidity returns to normal. The positive effects from dredging include improved fisheries habitat and protection of the interior from flooding or levee failure. No impacts are anticipated for the dredging actions with confined placement sites or those to be accomplished through mechanical dredging.

The proposed action is not expected to have any long-term impacts on light penetration, dissolved oxygen levels, toxic metals and organics, pathogens, or aesthetics.

Short Term Impacts from Dredging or Excavation

a) Light Penetration	Slight reductions in light penetration will last up to several days; however, will return to pre dredging conditions.
b) Dissolved Oxygen	Localized decrease in dissolved oxygen (DO) levels are expected during dredging; however oxygen levels will reestablish to pre dredging concentrations quickly after dredging halts
c) Toxic Metals and Organics	Results of the sediment sample analysis have not been received.
d) Pathogens	It is unlikely that pathogens exist in any of the proposed areas of construction.
e) Aesthetics	Increased levels of suspended particulates and turbidity could be aesthetically unpleasant to the visiting public.
f) Water Temperature	No short-term changes in water temperatures are expected

3. Effects on Biota.

a. Primary Production, Photosynthesis - Minor short-term impacts to primary production and photosynthetic processes are expected to occur locally.

b. Suspension/Filter Feeders - A localized, short-term, and minor reduction in benthos production due to increased suspended sediments is expected for Sny Creek.

c. Sight Feeders - Impacts to sight-feeders associated with dredging are expected to be short-term and range from slight to substantial.

Adverse effects to biota, including primary producers (i.e. zooplankton and phytoplankton), suspension/filter feeders, and sight feeders, are expected to be short-term. Invertebrate populations of mayflies, caddisflies, stoneflies, and other aquatic insects, as well as fish use, would increase on the rock substrate used for future project construction. Areas of deeper water or access to deeper water would result in increased survival of fish during freezing or low oxygen conditions. This project should have net beneficial impacts to the Rip Rap Landing complex and to the regional ecosystem. This project facilitate the creation of habitat connectivity to Roadside and Waverly Lake, while also enhancing the moist soil management units, and increasing the sustainability an diversity of the bottomland hardwood forest. Actions taken to minimize impacts associated with suspended particulates and turbidity include encircling the dredging areas with turbidity curtains. Furthermore, proper detention of return water from dewatering sites will allow particulate and turbidity levels to return to ambient condition before returning back into the Mississippi River.

D. Contaminant Determinations. The 404(b)(1) Guidelines provide, in part, that chemical and biological testing will not be required "Where the discharge site is adjacent to the extraction site and subject to the same sources of contaminants, and materials at the two sites are substantially similar,... and "when dissolved material and suspended particulates can be controlled to prevent carrying pollutants to

less contaminated areas,..." A phase I environmental assessment has been done for the site and found no contamination issues. Rock fill material would be clean, uncontaminated stone from an approved source. No significant increase in contaminants in the aquatic environment would result from dredging or placing sediments from the Mississippi River or from the sites inside the main stem levee. Possible introduction of equipment or construction-related contaminants would be controlled by adherence to strict disturbance minimization during construction activity. Soil and erosion control plans will also be used to minimize impacts. No toxic materials would be introduced into the area because of construction.

E. Aquatic Ecosystem and Organism Determinations. The proposed project features are anticipated to benefit fish and wildlife at Rip Rap Landing through enhancement of the moist soil management units, increased diversity and regeneration of bottomland hardwood forest, fisheries enhancements (deepwater and access), and increased protection of the interior features from flood events.

1. Effects on Plankton. Effects on plankton are anticipated to be minimal and associated with increased suspended sediments and turbidity levels. This impact will be short-term for the duration of the dredging. Long term, the project will help to maintain and protect plankton production by preventing the conversion of aquatic habitat to terrestrial habitat due to sedimentation.

2. Effects on Benthos. Negative effects on benthos would be limited to elimination of those organisms currently inhabiting the immediate dredging sites, and water control structure sites. Benthic organisms in the immediate vicinity of open-water sites designated for the placement of earthen material or rock for the water control structures will be lost due to burial; however, the placement of rock fill for site protection should provide interstitial spaces for invertebrate production and limited vertebrate spawning potential. Impacts to benthos are likely short-term as re-colonization from impacts sediment is expected to occur soon after dredging.

3. Effects on Nekton. One of the primary purposes of this project is to restore aquatic habitat connectivity. Dredging will re-create deep-water habitat, as well as restore access within Sny Creek, Roadside Lake and Waverly Lake. Fish will benefit greatly from these habitat improvements. Increased water exchange, resulting in improved dissolved oxygen concentrations during seasonal stress periods would be an additional benefit. Negative effects on nekton would be limited to displacement and temporary disruption of foraging patterns. Dredging of known overwintering areas or hard bottom habitat in Sny Creek will be avoided, further reducing any adverse fisheries impacts.

4. Effects on Aquatic Food Web. Effects on the aquatic food web are expected to be beneficial overall by increasing production at the lower trophic levels.

5. Effects on Special Aquatic Sites. Effects on special aquatic sites should be negligible in the project area; no sanctuaries or refuges would be adversely affected by the proposed action. Project goals and features have been developed in coordination with multiple state and federal partners. Project goals and features have been specifically chosen to match the management objectives of the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources, and these features are expected to be enhanced by implementation of the project.

a. Sanctuaries and Refuges. The project area is located within the Upper Mississippi River Fish and Wildlife Refuge System, and is managed by the Illinois Department of Natural Resources, NRCS and U.S. Fish and Wildlife Service as a migratory wildlife management area. The project is expected to greatly benefit migratory and resident migratory wildlife, fisheries, and other wetland wildlife and vegetation.

b. Wetlands, Mud Flats, and Vegetated Shallows. No wetlands or mudflats, vegetated shallows, coral reefs, or riffle and pool complexes would be adversely affected over the long-term by the proposed action. Levee restoration activities and new slopes may extend beyond the existing levee footprint, affecting existing wetland areas and open water areas; however, the protection provided by the levee restoration and the large acreage of wetlands within the levee area offset any impacts to wetlands by construction activities. The placement of dredged material in previously disturbed agricultural areas would avoid impacts to wetlands and would create slightly higher topographic elevations. The final elevations would still be considered wetland, and the mast tree planting would increase bottomland forest diversity, resulting in improved value of the area for wildlife. Project planning considered to the full extent the minimization of wetland loss, and it is intended that wetland values and extent would be improved as a result of project implementation.

6. Threatened and Endangered Species. The list of animals and plants below was compiled from the USFWS website for Calhoun County, Illinois and satisfies the "request for species list requirement" for Section 7 consultation.

Endangered	Indiana Bat	*Myotis sodalis*
Threatened	Decurrent False Aster	*Boltonia decurrens*
Threatened	Eastern Prairie Fringed Orchid	*Platanthacon leucophaea*
Endangered	Spectaclecase	*Cumberlandia monodonta*

Indiana Bat. Indiana bats hibernate during winter in caves, or occasionally, in abandoned mines. For hibernation, they require cool, humid caves with stable temperatures, under 50 degrees F but above freezing. Very few caves within the range of the species have these conditions. After hibernation the bats migrate to their summer habitat in wooded areas where they usually roost under loose tree bark on dead or dying trees. Males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. Indiana bats forage in or along the edges of forested areas, and especially prefer forest along rivers or small streams. They have been found recently along the Illinois River in Pike County, the next county north of the project area.

Construction activities would be timed to avoid impacts Indiana bats. During the summer, Indiana bats roost in trees and forage for insects in or near floodplain and upland forests. Tree clearing would not be conducted during the April 1-September 30 timeframe. Prohibiting clearing activity during this 6-month time window would avoid potential impacts to summer roosting Indiana bats.

Decurrent False Aster. This plant is found on moist, sandy floodplains and prairie wetlands along the Illinois River. It has been found along the Mississippi River in Madison County, Illinois. The plant relies on periodic flooding to scour away other plants that compete for the same habitat. Excessive silting seems to be a major cause of the plant's decline. Decurrent false asters have been known to occur in areas of low-intensity agriculture. This plant has not been found in the project area.

Eastern Prairie Fringed Orchid. This plant occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, and even bogs. It requires full sun and a grassy habitat with little or no woody encroachment for optimum growth and flowering. Flowering begins from late June to early July, with blossoms often rising just above the height of the surrounding grasses and sedges. This plant is not known to occur in the project area.

Spectaclecase. This large mussel is greatly elongated, sometimes curved, and moderately inflated, with solid and moderately thick valves. Key characteristics for distinguishing the spectaclecase from other mussels are the large size, elongate shape, arcuate ventral margin, dark coloration, roughened surface, poorly developed teeth, and white nacre. No other North American mussel species has this suite of characters. The spectaclecase occurs in large rivers and is a habitat-specialist, relative to other mussel species, often occurring on outside river bends below bluff lines. It most often inhabits riverine microhabitats that are sheltered from the main force of current and occurs in substrates from mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals. The spectaclecase has not been found in or adjacent to the project area.

The IDNR EcoCat Natural Heritage Data Base lists the Bald Eagle and Black Sand Shell and Butterfly mussels as occurring in Calhoun County. The Bald Eagle is a frequent visitor to the site and may be nesting within the project area. Information on the Bald Eagle is covered elsewhere in this document. The Black Sand Shell (*Liguma recta*) and Butterfly mussels (*Ellipsaria lineolata*) are State Listed, threatened large river species that have historically occurred in the Mississippi River. They favor small to large gravel substrate and strong current, habitat conditions that may be present in the river adjacent to the project area. Mussel surveys may be required for some areas if thalweg placement is used for sediment dredged from sloughs on Dog Island.

No significant impacts to threatened or endangered species are anticipated to result from the proposed project as none of these species listed above, except for the Indiana Bat have been documented within the project area. In terms of the Indiana Bat, the proposed project feature may affect, but not likely to adversely affect this species because the project features are aimed to improve the species' summer roosting habitat of bottomland hardwood forest.

F. Proposed Placement Site Determinations

1. Mixing Zone Determination. The material dredged from the Sny Creek for fisheries access is fine-grained material. This material will be removed via both hydraulic and mechanical dredging and placed into designated placement sites. Mechanical dredging along Sny Creek will result in the placement of excavated material along the existing levee embankment. A small amount of fine-grained material would migrate from placement sites and quickly become diluted with the creek waters. In addition, during construction, this fine material would result in temporary localized increases in suspended material. A confining turbidity curtain may be used to minimize the zone of influence during removal. The riprap fill material, used for water control structure protection, is inert and would not mix with the water. The lack of fine particulates typically contained in rock fill and main channel sand, used for levee restoration, indicates negligible chemical or turbidity effects resulting from this action.

2. Determination of Compliance with Applicable Water Quality Standards. The project is expected to comply with applicable water quality standards. The District will coordinate with the Illinois Environmental Protection Agency (IEPA) in regard to water quality requirements for dredging and incorporate that agency's recommendations into the proposed project. Elutriate analyses will be performed in order to evaluate the impacts of dredged material placement on water quality.

3. Potential Effects on Human Use Characteristics. The proposed project would have no adverse effects on municipal and private water supplies; recreational and commercial fisheries;

water-related recreation; or parks, national and historic monuments, wilderness areas, research sites, or similar preserves.

a. Municipal and Private Water Supply - No municipal water supply will be adversely impacted by project construction.

b. Recreational and Commercial Fisheries - The proposed project is expected to improve winter and summer habitat conditions for fish, and thereby the likelihood of successful recreational fishing opportunities.

c. Water Related Recreation - Water-related recreation (hunting, boating, fishing, etc.) is not expected to be adversely impacted by the project in the long-term. Certain opportunities may be unavailable during the construction period, such as boating in Sny Creek while dredging is in progress. Hunting is not expected to be adversely affected.

d. Aesthetics - Construction activities will have minor impacts on the aesthetic quality of the project area during the duration of the work. The most visible activities will occur adjacent to the Illinois River. Most construction activities will not be visible except from the main channel of the Mississippi River.

e. Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites and Similar Preserves - The project will not impact any of these resources.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. No negative cumulative impacts are expected to result from this action. The Environmental Management Program should have a positive impact on the Upper Mississippi River System. Habitat modifications should have long-term benefits to the fish and wildlife utilizing this area. Long-term productivity would be enhanced by the proposed action. This project, in concert with other EMP projects in the Upper Mississippi River System, should counter other impacts to the river ecosystem such as sedimentation, pollution, and general decline in riverine habitats.

H. Determination of Secondary Effects on the Aquatic Ecosystem. Any negative impacts resulting from the proposed placement are expected to remain localized and short-term in nature. Re-suspension of existing substrate material during project construction would not contribute to any significant impacts to the aquatic ecosystem. No significant negative secondary impacts to the aquatic ecosystem have been identified for this project. Long-term benefits to aquatic vegetation, fish, and wildlife are expected.

III. FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation. No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. Alternatives that were considered for the proposed action were as follows:

No Federal Action. No Federal action in this instance means no change in land use, land cover or current management practices or facilities.

Preferred Alternative. The preferred alternative components for the project are listed in the following table.

Zones	Features, Measures or Functional Units
Zone 1	2,500gpm Well and water control Structures w/Channel to Goose Pasture Lake
Zones 1 and 3	Conversion of Cropland to BLH
Zone 3	Water Control, Roadside Lake
Zones 3 and 4	Channel to Waverly Lake, Water Control in Channel, WCS in North Units, Pump Station, Pump Channel Widening, Pipe and Concrete at Road, WCS Pipes Under Sand Levee, WCS Pipes Under Road, South Spillway, WCS South Spillway, River Ridge Scour Swales
Zones 3, 4, and 5	Roadside Lake Channel to Sny, Sny Dredging Roadside Channel to Dog Island, Sny Dredging Along Dog Island

Management Features Considered but Not Selected. Several management features were considered for construction, but not selected based on engineering feasibility, environmental impacts, cost, and/or inability to meet the goals and objectives of the Corps of Engineers, the U.S. Fish and Wildlife Service, and the State of Illinois. The management features considered but not selected for the project are listed in the following table.

Zones	Features, Measures or Functional Units
Zone 1	All items within the Zone 1 plan were approved.
Zone 2	The River Ridge Levee System
Zone 3	Dredging of the Sny north of the County highway bridge
Zone 4	The river ridge levee system; Dredging of the Sny north of the roadside lake connection channel and south of the County highway bridge, tree planting
Zone 5	Dredging of backwater sloughs within Dog Island; Water control structures in Dog Island sloughs

C. Compliance with Applicable State Water Quality Standards. Permits, certification, or waiver of certification under Section 404 of the Clean Water Act would be obtained before construction begins. The project would be in compliance with water quality standards of the State of Illinois, as applicable.

D. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act. The project is not anticipated to introduce toxic substances into nearby waters or result in appreciable increases in existing levels of toxic materials. The proposed activity is in compliance with Applicable Toxic Effluent Standards or Prohibition under Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973. No significant impact to Federal or state listed threatened or endangered species would result from the proposed action. Prior to construction, full compliance with the Endangered Species Act would be documented.

F. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972. The project is situated along an inland freshwater river system. No marine sanctuaries are involved or would be affected by the proposed action.

G. Findings of Significant Degradation of the Waters of the United States. The proposed activities would not have a significant adverse effect on human health and welfare, municipal and private water supplies, recreation and commercial fisheries, plankton, fish, shellfish, wildlife or special aquatic sties. No significant adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems are expected to result. The proposed activities would have no significant adverse effects on aquatic ecosystem diversity, productivity, and stability.

No significant adverse effects on recreational, aesthetic, and economic values would occur. Environmental improvements resulting from the proposed actions would outweigh short-term construction impacts and offset some of the habitat degradation caused by siltation and levee failures. No long-term adverse effects to the river ecosystem are expected to result from this action.

H. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem. Steps taken to minimize potential adverse impacts on the aquatic ecosystem include the use of previously disturbed habitat such as croplands and existing infrastructure. Furthermore the beneficial reuse of sediment recovered from the Sny Creek will minimize the need for additional borrow and habitat conversion.

I. On the Basis of the Guidelines the Proposed Disposal Sites for the Discharge of Dredged and Fill Material. No other practical alternatives have been identified. The proposed action is in compliance with Section 404(b)(1) of the Clean Water Act, as amended. The proposed action would not significantly impact water quality. On the basis of the guidelines, the proposed placement sites for the discharge of dredged material are specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the environment.

Approved by: _____ Date:_____

Christopher G. Hall
Colonel, U.S. Army
District Commander

Figure B.1 - Project Location Map
UMRS EMP
Rip-Rap Landing Conservation Area
Habitat Rehabilitation and Enhancement Project
Mississippi River, Pool 25, Calhoun County, IL

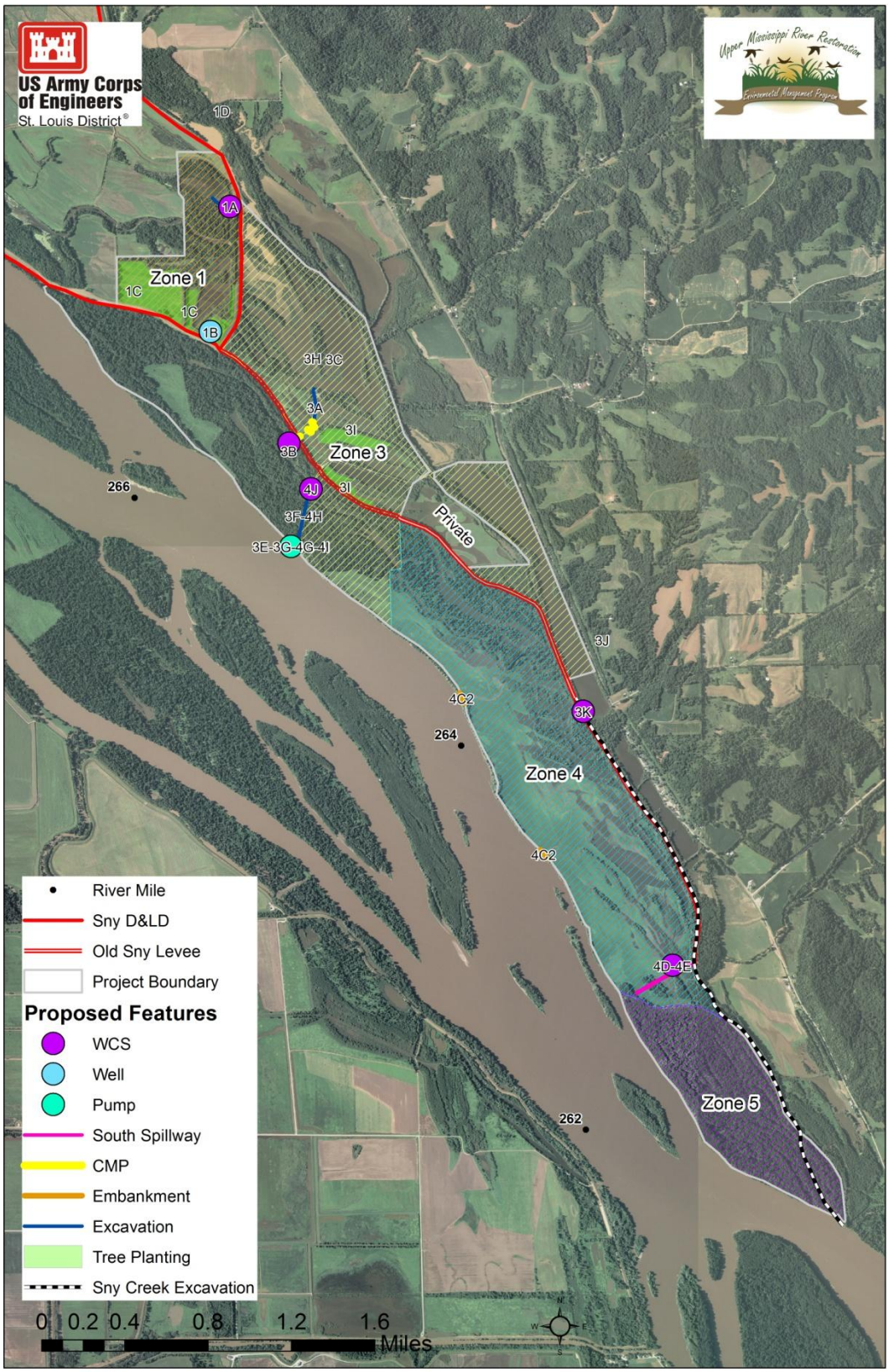

Figure B-2. Proposed Project Features of Preferred Alternative at Rip Rap Landing

APPENDIX C

DRAFT PROJECT PARTNERSHIP AGREEMENT

The Project Partnership Agreement (PPA) shown is the model template used by U.S. Army Corp of Engineers. If the project's tentatively selected plan is chosen and the project is approved, the PPA will be modified to reflect that the non-federal sponsor will not be reimbursed for any excess LERRDs credit over the 35% cost share per Headquarters guidance.

DRAFT

PROJECT PARTNERSHIP AGREEMENT
BETWEEN
THE DEPARTMENT OF THE ARMY
AND
ILLINOIS DEPARTMENT OF NATURAL RESOURCES
FOR
DESIGN AND CONSTRUCTION
OF THE
RIP RAP LANDING
HABITAT REHABILITATION AND ENHANCEMENT PROJECT

THIS AGREEMENT is entered into this _____ day of _____, ____, by and between the Department of the Army (hereinafter the "Government"), represented by the U.S. ARMY ENGINEER, ST. LOUIS DISTRICT and ILLINOIS DEPARTMENT OF NATURAL RESOURCES (hereinafter the "Non-Federal Sponsor"), represented by the DIRECTOR.

WITNESSETH, THAT:

WHEREAS, design and construction of the RIP RAP LANDING HABITAT REHABILITATION AND ENHANCEMENT PROJECT for ecosystem restoration (hereinafter the "*Project*", as defined in Article I.A. of this Agreement) at Calhoun County, Illinois between river mile 260.5 and 267.0 was approved by Commander, Mississippi Valley Division on _____ day of _____, _____ pursuant to the authority contained in Section 1103(e)(1)(A)(i) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 652(e)(1)(A)(i); hereinafter "Section 1103 HREP");

WHEREAS, performance of *monitoring* (as defined in Article I.M. of this Agreement) of the *Project* will be conducted at Federal expenses through the Upper Mississippi River Restoration – Environmental Management Program Long Term Resource Monitoring Program pursuant of Section 1103(e)(1)(A)(ii) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 652(e)(1)(A)(ii) and is not part of the *total project costs*;

WHEREAS, the Government and the Non-Federal Sponsor desire to enter into a Project Partnership Agreement (hereinafter the "Agreement") for design and construction of the *Project*;

WHEREAS, Section 1103(e)(7)(A) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 652(e)(7)A)); specifies the cost-sharing requirements applicable to the *Project*;

WHEREAS, Section 221 of the Flood Control Act of 1970, Public Law 91-611, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), provide, *inter alia*, that the Secretary of the Army shall not commence construction of any water resources project, or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element;

WHEREAS, Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, establishes the maximum amount of cost for the habitat rehabilitation component of the Upper Mississippi River Restoration Environmental Management Program;

WHEREAS, the Government and Non-Federal Sponsor have the full authority and capability to perform as hereinafter set forth and intend to cooperate in cost-sharing and financing of the *Project* in accordance with the terms of this Agreement; and

WHEREAS, the Government and the Non-Federal Sponsor, in connection with this Agreement, desire to foster a partnering strategy and a working relationship between the Government and the Non-Federal Sponsor through a mutually developed formal strategy of commitment and communication embodied herein, which creates an environment where trust and teamwork prevent disputes, foster a cooperative bond between the Government and the Non-Federal Sponsor, and facilitate the successful implementation of the *Project*.

NOW, THEREFORE, the Government and the Non-Federal Sponsor agree as follows:

ARTICLE I - DEFINITIONS

A. The term "*Project*" shall mean designing and constructing a pump station, installing a second portable pump to facilitate water conveyance throughout the project, excavating lower Sny Creek from the Roadside Lake to the mouth near Dog Island , and installing three gated water control structures as generally described in the UPPER MISSISSIPPI RIVER RESTORATION ENVIRONMENTAL MANAGEMENT PROGRAM DEFINITE PROJECT REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (R-17F) for the RIP RAP LANDING HABITAT REHABILITATION AND ENHANCEMENT PROJECT, dated _____ and approved by the Commander, Mississippi Valley Division on _____, _____.

B. The term "*total project costs*" shall mean the sum of all costs incurred by the Non-Federal Sponsor and the Government in accordance with the terms of this Agreement directly related to design and construction of the *Project* and the *pre-Agreement planning and design costs* incurred by the Government. Subject to the provisions of this Agreement, the term shall include, but is not necessarily limited to: the Government's *pre-Agreement planning and design costs* and the Government's design costs incurred after the effective date of this Agreement; the Government's costs of preparation of environmental compliance documentation in accordance with Article II.A.2. of this Agreement; the Government's engineering and design costs during construction; the Non-Federal Sponsor's and the Government's costs of investigations to identify the existence and extent of hazardous substances in accordance with Article XIV.A. of this Agreement; the Government's costs of historic preservation activities in accordance with Article XVII.A. and Article XVII.B.1. of this Agreement; the Government's actual construction costs; the Government's supervision and administration costs; the Non-Federal Sponsor's and the Government's costs of participation in the Project Coordination Team in accordance with Article V of this Agreement; the Government's costs of contract dispute settlements or awards; the value of lands, easements, rights-of-way, *relocations*, and improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material for which the Government affords credit in accordance with Article IV of this Agreement or for which reimbursement by the

Government is required pursuant to Article II.B.3. of this Agreement; and the Non-Federal Sponsor's and the Government's costs of audit in accordance with Article X.B. and Article X.C. of this Agreement. The term does not include any costs for operation, maintenance, repair, rehabilitation, or replacement of the *Project*; any costs of *betterments* under Article II.H.2. of this Agreement; any costs of dispute resolution under Article VII of this Agreement; the Government's costs for data recovery activities associated with historic preservation in accordance with Article XVII.B.2. and Article XVII.B.3. of this Agreement; or the Non-Federal Sponsor's costs of negotiating this Agreement.

C. The term "*period of design and construction*" shall mean the time from the effective date of this Agreement to the date that construction of the *Project* is complete, as determined by the Government, or the date that this Agreement is terminated in accordance with Article XIII or Article XIV.C. of this Agreement, whichever is earlier.

D. The term "*financial obligations for design and construction*" shall mean the financial obligations of the Government that result or would result in costs that are or would be included in *total project costs* except for obligations pertaining to the provision of lands, easements, and rights-of-way, the performance of *relocations*, and the construction of improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material.

E. The term "*non-Federal proportionate share*" shall mean the ratio of the Non-Federal Sponsor's total contribution of funds required by Article II.B.2. of this Agreement to *financial obligations for design and construction*, as projected by the Government.

F. The term "*highway*" shall mean any highway, roadway, street, or way, including any bridge thereof, which is owned by a public entity.

G. The term "*relocation*" shall mean providing a functionally equivalent facility to the owner of a utility, cemetery, *highway*, railroad, or public facility when such action is authorized in accordance with applicable legal principles of just compensation. Providing a functionally equivalent facility may take the form of alteration, lowering, raising, or replacement and attendant demolition of the affected facility or part thereof.

H. The term "*functional portion of the Project*" shall mean a portion of the *Project* for which construction has been completed and that can function independently, as determined by the U.S. Army Engineer, St. Louis District (hereinafter the "District Engineer") in writing, although the remainder of the *Project* is not complete.

I. The term "*betterment*" shall mean a difference in the design or construction of an element of the *Project* that results from the application of standards that the Government determines exceed those that the Government would otherwise apply to the design or construction of that element. The term does not include any design or construction for features not included in the *Project* as defined in paragraph A. of this Article.

J. The term "*Federal program funds*" shall mean funds provided by a Federal agency, other than the Department of the Army, plus any non-Federal contribution required as a matching share therefore.

K. The term "*fiscal year*" shall mean one year beginning on October 1 and ending on September 30.

L. The term "*pre-Agreement planning and design costs*" shall mean all costs that were incurred by the Government prior to the effective date of this Agreement for planning and design of the *Project*.

M. The term "*monitoring*" shall mean activities, including the collection and analysis of data, which are necessary to determine if predicted outputs of the *Project* are being achieved.

N. The term "*Section 1103 HREP Annual Program Limit"* shall mean the statutory limitation on the Government's annual appropriations for planning, design, and construction of all projects implemented pursuant to Section 1103 (e)(1)(A)(i) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 652(e)(1)(A)(i)). As of the effective date of this Agreement, such limitation is $22,750,000.

ARTICLE II - OBLIGATIONS OF THE GOVERNMENT AND THE NON-FEDERAL SPONSOR

A. The Government, subject to receiving funds appropriated by the Congress of the United States (hereinafter the "Congress") and using those funds and funds provided by the Non-Federal Sponsor, expeditiously shall design and construct the *Project*, applying those procedures usually applied to Federal projects, in accordance with Federal laws, regulations, and policies.

1. The Government shall not issue the solicitation for the first contract for design of the *Project* or commence design of the *Project* using the Government's own forces until the Non-Federal Sponsor has confirmed in writing its willingness to proceed with the *Project*.

2. The Government shall develop and coordinate as required, an Environmental Assessment and Finding of No Significant Impact or an Environmental Impact Statement and Record of Decision, as necessary, to inform the public regarding the environmental impacts of the *Project* in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4347; hereinafter "NEPA"). However, the Government shall not issue the solicitation for the first construction contract for the *Project* or commence construction of the *Project* using the Government's own forces until all applicable environmental laws and regulations have been complied with, including, but not limited to NEPA and Section 401 of the Federal Water Pollution Control Act (33 U.S.C. 1341).

3. The Government shall afford the Non-Federal Sponsor the opportunity to review and comment on the solicitations for all contracts, including relevant plans and specifications, prior to the Government's issuance of such solicitations. To the extent possible, the Government shall afford the Non-Federal Sponsor the opportunity to review and comment on all proposed contract

modifications, including change orders. In any instance where providing the Non-Federal Sponsor with notification of a contract modification is not possible prior to execution of the contract modification, the Government shall provide such notification in writing at the earliest date possible. To the extent possible, the Government also shall afford the Non-Federal Sponsor the opportunity to review and comment on all contract claims prior to resolution thereof. The Government shall consider in good faith the comments of the Non-Federal Sponsor, but the contents of solicitations, award of contracts or commencement of design or construction using the Government's own forces, execution of contract modifications, resolution of contract claims, and performance of all work on the *Project* shall be exclusively within the control of the Government.

4. At the time the District Engineer furnishes the contractor with the Government's Written Notice of Acceptance of Completed Work for each contract awarded by the Government for the *Project*, the District Engineer shall furnish a copy thereof to the Non-Federal Sponsor.

B. The Non-Federal Sponsor shall contribute 35 percent of *total project costs* located on Non-Federal lands in accordance with the provisions of this paragraph.

1. In accordance with Article III of this Agreement, the Non-Federal Sponsor shall provide all lands, easements, and rights-of-way, including those required for *relocations*, the borrowing of material, and the disposal of dredged or excavated material, shall perform or ensure performance of all *relocations*, and shall construct improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material that the Government determines to be required or to be necessary for construction, operation, and maintenance of the *Project*.

2. The Non-Federal Sponsor shall provide funds in accordance with Article VI.B. of this Agreement in the amount necessary to meet the Non-Federal Sponsor's required share of 35 percent of *total project costs* if the Government projects at any time that the collective value of the following contributions will be less than such required share: (a) the value of the Non-Federal Sponsor's contributions under paragraph B.1. of this Article as determined in accordance with Article IV of this Agreement; and (b) the value of the Non-Federal Sponsor's contributions under Article V, Article X, and Article XIV.A. of this Agreement.

3. The Government, subject to the availability of funds and as limited by the *Section 1103 HREP Annual Program Limit*, shall refund or reimburse to the Non-Federal Sponsor any contributions in excess of 35 percent of *total project costs* if the Government determines at any time that the collective value of the following contributions has exceeded 35 percent of *total project costs*: (a) the value of the Non-Federal Sponsor's contributions under paragraph B.1. of this Article as determined in accordance with Article IV of this Agreement; (b) the value of the Non-Federal Sponsor's contributions under paragraph B.2. of this Article; and (c) the value of the Non-Federal Sponsor's contributions under Article V, Article X, and Article XIV.A. of this Agreement. After such a determination, the Government, in its sole discretion, may acquire any remaining lands, easements, and rights-of-way required for the *Project*, perform any remaining *relocations* necessary for the *Project*, or construct any remaining improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material required for the *Project* on behalf of the Non-Federal Sponsor. Notwithstanding the acquisition of lands, easements, and rights-of-

way, performance of *relocations*, or construction of improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material by the Government under this paragraph, the Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for any costs of cleanup and response in accordance with Article XIV.C. of this Agreement.

C. Notwithstanding any other provision of this Agreement, Federal financial participation in the *Project* is limited by the following provisions of this paragraph.

1. In the event the Government projects that the amount of Federal funds the Government will make available to the *Project* through the then-current *fiscal year*, or the amount of Federal funds the Government will make available for the *Project* through the upcoming *fiscal year*, is not sufficient to meet the Federal share of *total project costs* and the Federal share of costs for data recovery activities associated with historic preservation in accordance with Article XVII.B.2. and Article XVII.B.3. of this Agreement that the Government projects to be incurred through the then-current or upcoming *fiscal year*, as applicable, the Government shall notify the Non-Federal Sponsor in writing of such insufficiency of funds and of the date the Government projects that the Federal funds that will have been made available to the *Project* will be exhausted. Upon the exhaustion of Federal funds made available by the Government to the *Project*, future performance under this Agreement shall be suspended and the parties shall proceed in accordance with Article XIII.B. of this Agreement.

2. As of the effective date of this Agreement, $_____ (FFE) of Federal funds is currently projected to be available for the *Project*. The Government makes no commitment to request Congress to provide additional Federal funds for the *Project*. Further, the Government's financial participation in the *Project* is limited to the Federal funds that the Government makes available to the *Project*.

D. When the District Engineer determines that the entire *Project*, or a *functional portion of the Project*, is complete, the District Engineer shall so notify the Non-Federal Sponsor in writing and furnish the Non-Federal Sponsor with a final Operation, Maintenance, Repair, Rehabilitation, and Replacement Manual (hereinafter the "OMRR&R Manual") or, if the final OMRR&R Manual is not available, an interim OMRR&R Manual for the entire *Project* or such completed portion. Upon such notification, the Government also shall furnish to the Non-Federal Sponsor a copy of all final as-built drawings for the entire *Project* or such completed portion if such drawings are available. Not later than 6 months after such notification by the Government that the entire *Project* is complete, the Government shall furnish the Non-Federal Sponsor with the final OMRR&R Manual and all final as-built drawings for the entire *Project*. In the event the final OMRR&R Manual or all final as-built drawings for the entire *Project* cannot be completed within the 6 month period, the Government shall provide written notice to the Non-Federal Sponsor, and the Government and the Non-Federal Sponsor shall negotiate an acceptable completion date for furnishing such documents. Further, after completion of all contracts for the *Project*, copies of all of the Government's Written Notices of Acceptance of Completed Work for all contracts for the *Project* that have not been provided previously shall be provided to the Non-Federal Sponsor.

E. Upon notification from the District Engineer in accordance with paragraph D. of this Article, the Non-Federal Sponsor shall operate, maintain, repair, rehabilitate, and replace the entire *Project*, or the *functional portion of the Project* as the case may be, in accordance with Article VIII of this Agreement.

F. Upon conclusion of the *period of design and construction*, the Government shall conduct an accounting, in accordance with Article VI.C. of this Agreement, and furnish the results to the Non-Federal Sponsor.

G. The Non-Federal Sponsor shall not use *Federal program funds* to meet any of its obligations for the *Project* under this Agreement unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is expressly authorized by Federal law.

H. The Non-Federal Sponsor may request the Government to perform or provide, on behalf of the Non-Federal Sponsor, one or more of the services (hereinafter the "additional work") described in this paragraph. Such requests shall be in writing and shall describe the additional work requested to be performed or provided. If in its sole discretion the Government elects to perform or provide the requested additional work or any portion thereof, it shall so notify the Non-Federal Sponsor in a writing that sets forth any applicable terms and conditions, which must be consistent with this Agreement. In the event of conflict between such a writing and this Agreement, this Agreement shall control. The Non-Federal Sponsor shall be solely responsible for all costs of the additional work performed or provided by the Government under this paragraph and shall pay all such costs in accordance with Article VI.D. of this Agreement.

1. Acquisition of lands, easements, and rights-of-way; performance of *relocations*; or construction of improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material for the *Project*. Notwithstanding acquisition of lands, easements, and rights-of-way, performance of *relocations*, or construction of improvements by the Government, the Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for any costs of cleanup and response in accordance with Article XIV.C. of this Agreement.

2. Inclusion of *betterments* in the design or construction of the *Project*. In the event the Government elects to include any such *betterments*, the Government shall allocate the costs of the *Project* features that include *betterments* between *total project costs* and the costs of the *betterments*.

I. The Non-Federal Sponsor shall prevent obstructions or encroachments on the *Project* (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on *Project* lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the *Project*, hinder operation and maintenance of the *Project*, or interfere with the *Project's* proper function.

J. The Non-Federal Sponsor shall not use the *Project*, or the lands, easements, and rights-of-way required pursuant to Article III of this Agreement, as a wetlands bank or mitigation credit for any other project.

ARTICLE III - LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS, DISPOSAL AREA IMPROVEMENTS, AND COMPLIANCE WITH PUBLIC LAW 91-646, AS AMENDED

A. The Government, after consultation with the Non-Federal Sponsor, shall determine the lands, easements, and rights-of-way required for construction, operation, and maintenance of the *Project*, including those required for *relocations*, the borrowing of material, and the disposal of dredged or excavated material. The Government in a timely manner shall provide the Non-Federal Sponsor with general written descriptions, including maps as appropriate, of the lands, easements, and rights-of-way that the Government determines the Non-Federal Sponsor must provide, in detail sufficient to enable the Non-Federal Sponsor to fulfill its obligations under this paragraph, and shall provide the Non-Federal Sponsor with a written notice to proceed with acquisition of such lands, easements, and rights-of-way. Prior to the issuance of the solicitation for each Government contract for construction of the *Project*, or prior to the Government initiating construction of a portion of the *Project* using the Government's own forces, the Non-Federal Sponsor shall acquire all lands, easements, and rights-of-way the Government determines the Non-Federal Sponsor must provide for that work and shall provide the Government with authorization for entry thereto. Furthermore, prior to the end of the *period of design and construction*, the Non-Federal Sponsor shall acquire all lands, easements, and rights-of-way required for construction, operation, and maintenance of the *Project*, as set forth in such descriptions, and shall provide the Government with authorization for entry thereto. The Non-Federal Sponsor shall ensure that lands, easements, and rights-of-way that the Government determines to be required for the *Project* and that were provided by the Non-Federal Sponsor are retained in public ownership for uses compatible with the authorized purposes of the *Project*.

B. The Government, after consultation with the Non-Federal Sponsor, shall determine the *relocations* necessary for construction, operation, and maintenance of the *Project*, including those necessary to enable the borrowing of material or the disposal of dredged or excavated material. The Government in a timely manner shall provide the Non-Federal Sponsor with general written descriptions, including maps as appropriate, of such *relocations* in detail sufficient to enable the Non-Federal Sponsor to fulfill its obligations under this paragraph, and shall provide the Non-Federal Sponsor with a written notice to proceed with such *relocations*. Prior to the issuance of the solicitation for each Government contract for construction of the *Project*, or prior to the Government initiating construction of a portion of the *Project* using the Government's own forces, the Non-Federal Sponsor shall prepare or ensure the preparation of plans and specifications for, and perform or ensure the performance of, all *relocations* the Government determines to be necessary for that work. Furthermore, prior to the end of the *period of design and construction*, the Non-Federal Sponsor shall perform or ensure performance of all *relocations* as set forth in such descriptions.

C. The Government, after consultation with the Non-Federal Sponsor, shall determine the improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material associated with construction, operation, and maintenance of the *Project*. Such improvements may include, but are not necessarily limited to, retaining dikes, waste weirs, bulkheads, embankments, monitoring features, stilling basins, and de-watering pumps and pipes. The Government in a timely manner shall provide the Non-Federal Sponsor with general written descriptions, including maps as appropriate, of such improvements in detail sufficient to enable the Non-Federal Sponsor to fulfill its obligations under this paragraph, and shall provide the Non-Federal Sponsor with a written notice to proceed with construction of such improvements. Prior to the issuance of the solicitation for each Government contract for construction of the *Project*, or prior to the Government initiating construction of a portion of the *Project* using the Government's own forces, the Non-Federal Sponsor shall prepare plans and specifications for all improvements the Government determines to be required for the disposal of dredged or excavated material under that contract, submit such plans and specifications to the Government for approval, and provide such improvements in accordance with the approved plans and specifications. Furthermore, prior to the end of the *period of design and construction*, the Non-Federal Sponsor shall provide all improvements set forth in such descriptions.

D. The Non-Federal Sponsor shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the *Project*, including those required for *relocations*, the borrowing of material, or the disposal of dredged or excavated material, and shall inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - CREDIT FOR VALUE OF LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS, AND DISPOSAL AREA IMPROVEMENTS

A. The Government shall include in *total project costs* and afford credit toward the Non-Federal Sponsor's share of *total project costs* for the value of lands, easements, and rights-of-way that the Non-Federal Sponsor must provide pursuant of Article III.A. of this Agreement; for the value of the *relocations* that the Non-Federal Sponsor must perform or for which it must ensure performance pursuant to Article III.B. of this Agreement; and for the value of improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material that the Non-Federal Sponsor must provide pursuant to Article III.C. of this Agreement. However, no amount shall be included in *total project costs*, no credit shall be afforded, and no reimbursement shall be provided for the value of any lands, easements, rights-of-way, *relocations*, or improvements required on lands, easements, rights-of-way to enable the disposal of dredged or excavated material that have been provided previously as an item of cooperation for another Federal project. In addition, no amount shall be included in *total project costs*, no credit shall be afforded, and no reimbursement shall be provided for the value of lands, easements, rights-of-way, *relocations*, or improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material that were acquired or performed using *Federal program funds* unless the Federal agency providing the Federal portion of such

funds verifies in writing that affording credit for the value of such items is expressly authorized by Federal law.

B. The Non-Federal Sponsor in a timely manner shall provide the Government with such documents as are sufficient to enable the Government to determine the value of any contribution provided pursuant to Article III.A., Article III.B., or Article III.C. of this Agreement. Upon receipt of such documents, the Government in a timely manner shall determine the value of such contributions for the purpose of including such value in *total project costs* and for determining the amount of credit to be afforded or reimbursement to be provided in accordance with the provisions of this Agreement.

C. For the purposes of determining the value to be included in *total project costs* and the amount of credit to be afforded or reimbursement to be provided in accordance with this Agreement and except as otherwise provided in paragraph G. of this Article, the value of lands, easements, and rights-of-way, including those required for *relocations*, the borrowing of material, and the disposal of dredged or excavated material, shall be the fair market value of the real property interests, plus certain incidental costs of acquiring those interests, as determined in accordance with the provisions of this paragraph.

1. Date of Valuation. The fair market value of lands, easements, or rights-of-way owned by the Non-Federal Sponsor on the effective date of this Agreement shall be the fair market value of such real property interests as of the date the Non-Federal Sponsor provides the Government with authorization for entry thereto. The fair market value of lands, easements, or rights-of-way acquired by the Non-Federal Sponsor after the effective date of this Agreement shall be the fair market value of such real property interests at the time the interests are acquired.

2. General Valuation Procedure. Except as provided in paragraph C.3. or paragraph C.5. of this Article, the fair market value of lands, easements, or rights-of-way shall be determined in accordance with the provisions of this paragraph.

a. The Non-Federal Sponsor shall obtain, for each real property interest, an appraisal that is prepared by a qualified appraiser who is acceptable to the Non-Federal Sponsor and the Government. The Non-Federal Sponsor shall provide the Government with the appraisal no later than 6 months after the Non-Federal Sponsor provides the Government with an authorization for entry for such real property interest. The appraisal must be prepared in accordance with the applicable rules of just compensation, as specified by the Government. The fair market value shall be the amount set forth in the Non-Federal Sponsor's appraisal, if such appraisal is approved by the Government. In the event the Government does not approve the Non-Federal Sponsor's appraisal, the Non-Federal Sponsor may obtain a second appraisal, and the fair market value shall be the amount set forth in the Non-Federal Sponsor's second appraisal, if such appraisal is approved by the Government. In the event the Government does not approve the Non-Federal Sponsor's second appraisal, the Non-Federal Sponsor chooses not to obtain a second appraisal, or the Non-Federal Sponsor does not provide the first appraisal as required in this paragraph, the Government shall obtain an appraisal, and the fair market value shall be the amount set forth in the Government's appraisal, if such appraisal is approved by the Non-Federal Sponsor. In the event the Non-Federal Sponsor does not approve the Government's appraisal, the Government, after

consultation with the Non-Federal Sponsor, shall consider the Government's and the Non-Federal Sponsor's appraisals and determine an amount based thereon, which shall be deemed to be the fair market value.

b. Where the amount paid or proposed to be paid by the Non-Federal Sponsor for the real property interest exceeds the amount determined pursuant to paragraph C.2.a. of this Article, the Government, at the request of the Non-Federal Sponsor, shall consider all factors relevant to determining fair market value and, in its sole discretion, after consultation with the Non-Federal Sponsor, may approve in writing an amount greater than the amount determined pursuant to paragraph C.2.a. of this Article, but not to exceed the amount actually paid or proposed to be paid. If the Government approves such an amount, the fair market value shall be the lesser of the approved amount or the amount paid by the Non-Federal Sponsor, but no less than the amount determined pursuant to paragraph C.2.a. of this Article.

3. Eminent Domain Valuation Procedure. For lands, easements, or rights-of-way acquired by eminent domain proceedings instituted after the effective date of this Agreement, the Non-Federal Sponsor, prior to instituting such proceedings, shall submit to the Government notification in writing of its intent to institute such proceedings and an appraisal of the specific real property interests to be acquired in such proceedings. The Government shall have 60 calendar days after receipt of such a notice and appraisal within which to review the appraisal, if not previously approved by the Government in writing.

a. If the Government previously has approved the appraisal in writing, or if the Government provides written approval of, or takes no action on, the appraisal within such 60 day period, the Non-Federal Sponsor shall use the amount set forth in such appraisal as the estimate of just compensation for the purpose of instituting the eminent domain proceeding.

b. If the Government provides written disapproval of the appraisal, including the reasons for disapproval, within such 60 day period, the Government and the Non-Federal Sponsor shall consult in good faith to promptly resolve the issues or areas of disagreement that are identified in the Government's written disapproval. If, after such good faith consultation, the Government and the Non-Federal Sponsor agree as to an appropriate amount, then the Non-Federal Sponsor shall use that amount as the estimate of just compensation for the purpose of instituting the eminent domain proceeding. If, after such good faith consultation, the Government and the Non-Federal Sponsor cannot agree as to an appropriate amount, then the Non-Federal Sponsor may use the amount set forth in its appraisal as the estimate of just compensation for the purpose of instituting the eminent domain proceeding.

c. For lands, easements, or rights-of-way acquired by eminent domain proceedings instituted in accordance with paragraph C.3. of this Article, fair market value shall be either the amount of the court award for the real property interests taken, to the extent the Government determined such interests are required for construction, operation, and maintenance of the *Project*, or the amount of any stipulated settlement or portion thereof that the Government approves in writing.

4. Incidental Costs. For lands, easements, or rights-of-way acquired by the Non-Federal Sponsor within a five year period preceding the effective date of this Agreement, or at any time after the effective date of this Agreement, the value of the interest shall include the documented incidental costs of acquiring the interest, as determined by the Government, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs. In the event the Government modifies its determination made pursuant to Article III.A. of this Agreement, the Government shall afford credit for the documented incidental costs associated with preparing to acquire the lands, easements, or rights-of-way identified in the original determination, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs. Such incidental costs shall include, but not necessarily be limited to, closing and title costs, appraisal costs, survey costs, attorney's fees, plat maps, mapping costs, actual amounts expended for payment of any relocation assistance benefits provided in accordance with Article III.D. of this Agreement, and other payments by the Non-Federal Sponsor for items that are generally recognized as compensable, and required to be paid, by applicable state law due to the acquisition of a real property interest in accordance with Article III of this Agreement. The value of the interests provided by the Non-Federal Sponsor in accordance with Article III.A. of this Agreement also shall include the documented costs of obtaining appraisals pursuant to paragraph C.2. of this Article, as determined by the Government, and subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs.

5. Waiver of Appraisal. Except as required by paragraph C.3. of this Article, the Government may waive the requirement for an appraisal pursuant to this paragraph if it determines that an appraisal is unnecessary because the valuation is uncomplicated and that the estimated fair market value of the real property interest is $10,000 or less based upon a review of available data. In such event, the Government and the Non-Federal Sponsor must agree in writing to the value of such real property interest in an amount not in excess of $10,000.

D. After consultation with the Non-Federal Sponsor, the Government shall determine the value of *relocations* in accordance with the provisions of this paragraph.

1. For a *relocation* other than a *highway*, the value shall be only that portion of *relocation* costs that the Government determines is necessary to provide a functionally equivalent facility, reduced by depreciation, as applicable, and by the salvage value of any removed items.

2. For a *relocation* of a *highway*, the value shall be only that portion of *relocation* costs that would be necessary to accomplish the *relocation* in accordance with the design standard that the State of Illinois would apply under similar conditions of geography and traffic load, reduced by the salvage value of any removed items.

3. *Relocation* costs shall include, but not necessarily be limited to, actual costs of performing the *relocation*; planning, engineering and design costs; supervision and administration costs; and documented incidental costs associated with performance of the *relocation*, as determined by the Government. *Relocation* costs shall not include any costs due to *betterments*, as determined by the Government, nor any additional cost of using new material when suitable used

material is available. *Relocation* costs shall be subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs.

E. The value of the improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material shall be the costs of the improvements, as determined by the Government, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs. Such costs shall include, but not necessarily be limited to, actual costs of providing the improvements; planning, engineering and design costs; supervision and administration costs; and documented incidental costs associated with providing the improvements, but shall not include any costs due to *betterments*, as determined by the Government.

F. Any credit afforded or reimbursement provided under the terms of this Agreement for the value of *relocations*, or improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material, performed within the *Project* boundaries is subject to satisfactory compliance with applicable Federal labor laws covering non-Federal construction, including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)). Notwithstanding any other provision of this Agreement, credit or reimbursement may be withheld, in whole or in part, as a result of the Non-Federal Sponsor's failure to comply with its obligations under these laws.

G. Where the Government, on behalf of the Non-Federal Sponsor pursuant to Article II.H.1. of this Agreement, acquires lands, easements, or rights-of-way, performs *relocations*, or constructs improvements required on lands, easements, or rights-of-way to enable the disposal of dredged or excavated material, the value to be included in *total project costs* and the amount of credit to be afforded or the amount of reimbursement provided in accordance with this Agreement shall be the costs of such work performed or provided by the Government that are paid by the Non-Federal Sponsor in accordance with Article VI.D. of this Agreement. In addition, the value to be included in *total project costs* and the amount of such credit to be afforded or the amount of reimbursement provided in accordance with this Agreement shall include the documented costs incurred by the Non-Federal Sponsor in accordance with the terms and conditions agreed upon in writing pursuant to Article II.H.1. of this Agreement subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs.

ARTICLE V - PROJECT COORDINATION TEAM

A. To provide for consistent and effective communication, the Non-Federal Sponsor and the Government, not later than 30 calendar days after the effective date of this Agreement, shall appoint named senior representatives to a Project Coordination Team. Thereafter, the Project Coordination Team shall meet regularly until the end of the *period of design and construction*. The Government's Project Manager and a counterpart named by the Non-Federal Sponsor shall co-chair the Project Coordination Team.

B. The Government's Project Manager and the Non-Federal Sponsor's counterpart shall keep the Project Coordination Team informed of the progress of design and construction and of significant pending issues and actions, and shall seek the views of the Project Coordination Team on matters that the Project Coordination Team generally oversees.

C. Until the end of the *period of design and construction*, the Project Coordination Team shall generally oversee the *Project*, including matters related to: design; completion of all necessary environmental coordination and documentation; plans and specifications; scheduling; real property and *relocation* requirements; real property acquisition; contract awards and modifications; contract costs; the application of and compliance with 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)) for *relocations* and improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material; the investigations to identify the existence and extent of hazardous substances in accordance with Article XIV.A. of this Agreement; historic preservation activities in accordance with Article XVII of this Agreement; the Government's cost projections; final inspection of the entire *Project* or *functional portions of the Project*; preparation of the proposed OMRR&R Manual; anticipated requirements and needed capabilities for performance of operation, maintenance, repair, rehabilitation, and replacement of the *Project* including issuance of permits; and other matters related to the *Project*. This oversight of the *Project* shall be consistent with a project management plan developed by the Government after consultation with the Non-Federal Sponsor.

D. The Project Coordination Team may make recommendations to the District Engineer on matters related to the *Project* that the Project Coordination Team generally oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider the recommendations of the Project Coordination Team. The Government, having the legal authority and responsibility for design and construction of the *Project*, has the discretion to accept or reject, in whole or in part, the Project Coordination Team's recommendations.

E. The Non-Federal Sponsor's costs of participation in the Project Coordination Team shall be included in *total project costs* and shared in accordance with the provisions of this Agreement, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs. The Government's costs of participation in the Project Coordination Team shall be included in *total project costs* and shared in accordance with the provisions of this Agreement.

ARTICLE VI - METHOD OF PAYMENT

A. In accordance with the provisions of this paragraph, the Government shall maintain current records and provide to the Non-Federal Sponsor current projections of costs, financial obligations, contributions provided by the parties, the value included in *total project costs* for lands, easements, rights-of-way, *relocations*, and improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material determined in accordance with Article IV of this Agreement.

1. As of the effective date of this Agreement, *total project costs* are projected to be $_____ Fully Funded Estimate (FFE); the Non-Federal Sponsor's contribution of funds required by Article II.B.2. of this Agreement is projected to be $_____; the *non-Federal proportionate share* is projected to be _____ percent; the Non-Federal Sponsor's contribution of funds required by Article XVII.B.3. of this Agreement is projected to be $_____; the value included in *total project costs* for lands, easements, rights-of-way, *relocations*, and improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material determined in accordance with Article IV of this Agreement is projected to be $_____ (FFE); and the Government's total financial obligations for the additional work to be incurred and the Non-Federal Sponsor's contribution of funds for such costs required by Article II.H. of this Agreement are projected to be $_____. These amounts and percentage are estimates subject to adjustment by the Government, after consultation with the Non-Federal Sponsor, and are not to be construed as the total financial responsibilities of the Government and the Non-Federal Sponsor.

2. By [INSERT DATE] and by each quarterly anniversary thereof until the conclusion of the *period of design and construction* and resolution of all relevant claims and appeals and eminent domain proceedings**,** the Government shall provide the Non-Federal Sponsor with a report setting forth all contributions provided to date and the current projections of the following: *total project costs*; the Non-Federal Sponsor's total contribution of funds required by Article II.B.2. of this Agreement; the *non-Federal proportionate share*; the Non-Federal Sponsor's total contribution of funds required by Article XVII.B.3. of this Agreement; the value included in *total project costs* for lands, easements, rights-of-way, *relocations*, and improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material determined in accordance with Article IV of this Agreement; and the Government's total financial obligations for additional work incurred and the Non-Federal Sponsor's contribution of funds for such costs required by Article II.H. of this Agreement.

B. The Non-Federal Sponsor shall provide the contributions of funds required by Article II.B.2. and Article XVII.B.3. of this Agreement in accordance with the provisions of this paragraph.

1. Not less than 60 calendar days prior to the scheduled date for issuance of the solicitation for the first contract for design of the *Project* or commencement of design of the *Project* using the Government's own forces, the Government shall notify the Non-Federal Sponsor in writing of such scheduled date and the funds the Government determines to be required from the Non-Federal Sponsor to meet its projected share under Article II.B.2. and Article XVII.B.3. of this Agreement. Not later than such scheduled date, the Non-Federal Sponsor shall provide the Government with the full amount of such required funds by delivering a check payable to "FAO, USAED, St. Louis (B3)" to the District Engineer, or verifying to the satisfaction of the Government that the Non-Federal Sponsor has deposited such required funds in an escrow or other account acceptable to the Government, with interest accruing to the Non-Federal Sponsor, or by presenting the Government with an irrevocable letter of credit acceptable to the Government for such required funds, or by providing an Electronic Funds Transfer of such required funds in accordance with procedures established by the Government.

2. The Government shall draw from the funds provided by the Non-Federal Sponsor such sums as the Government deems necessary to cover: (a) the *non-Federal proportionate share* of *financial obligations for design and construction* incurred prior to the commencement of the *period of design and construction*; (b) the *non-Federal proportionate share* of *financial obligations for design and construction* as *financial obligations for design and construction* are incurred; and (c) the Non-Federal Sponsor's share of financial obligations for data recovery activities associated with historic preservation pursuant to Article XVII.B.3. of this Agreement as those financial obligations are incurred. If at any time the Government determines that additional funds will be needed from the Non-Federal Sponsor to cover the Non-Federal Sponsor's share of such financial obligations, the Government shall notify the Non-Federal Sponsor in writing of the additional funds required and provide an explanation of why additional funds are required. Within 60 calendar days from receipt of such notice, the Non-Federal Sponsor shall provide the Government with the full amount of such additional required funds through any of the payment mechanisms specified in paragraph B.1. of this Article.

C. Upon conclusion of the *period of design and construction* and resolution of all relevant claims and appeals and eminent domain proceedings, the Government shall conduct a final accounting and furnish the Non-Federal Sponsor with written notice of the results of such final accounting. If outstanding relevant claims and appeals or eminent domain proceedings prevent a final accounting from being conducted in a timely manner, the Government shall conduct an interim accounting and furnish the Non-Federal Sponsor with written notice of the results of such interim accounting. Once all outstanding relevant claims and appeals and eminent domain proceedings are resolved, the Government shall amend the interim accounting to complete the final accounting and furnish the Non-Federal Sponsor with written notice of the results of such final accounting. The interim or final accounting, as applicable, shall determine *total project costs* and the costs of any data recovery activities associated with historic preservation. In addition, for each set of costs, the interim or final accounting, as applicable, shall determine each party's required share thereof and each party's total contributions thereto as of the date of such accounting.

1. Should the interim or final accounting, as applicable, show that the Non-Federal Sponsor's total required shares of *total project costs* and the costs of any data recovery activities associated with historic preservation exceed the Non-Federal Sponsor's total contributions provided thereto, the Non-Federal Sponsor, no later than 90 calendar days after receipt of written notice from the Government, shall make a payment to the Government in an amount equal to the difference by delivering a check payable to "FAO, USAED, St. Louis (B3)" to the District Engineer or by providing an Electronic Funds Transfer in accordance with procedures established by the Government.

2. Should the interim or final accounting, as applicable, show that the total contributions provided by the Non-Federal Sponsor for *total project costs* and the costs of any data recovery activities associated with historic preservation exceed the Non-Federal Sponsor's total required shares thereof, the Government, subject to the availability of funds and as limited by the *Section 1103 HREP Annual Program Limit*, shall refund or reimburse the excess amount to the Non-Federal Sponsor within 90 calendar days of the date of completion of such accounting. In the event the Non-Federal Sponsor is due a refund or reimbursement and funds are not available

to refund or reimburse the excess amount to the Non-Federal Sponsor, the Government shall seek such appropriations as are necessary to make the refund or reimbursement.

D. The Non-Federal Sponsor shall provide the contribution of funds required by Article II.H. of this Agreement for additional work in accordance with the provisions of this paragraph.

1. Not less than 60 calendar days prior to the scheduled date for the first financial obligation for additional work, the Government shall notify the Non-Federal Sponsor in writing of such scheduled date and of the full amount of funds the Government determines to be required from the Non-Federal Sponsor to cover the costs of the additional work. No later than 30 calendar days prior to the Government incurring any financial obligation for additional work, the Non-Federal Sponsor shall provide the Government with the full amount of the funds required to cover the costs of such additional work through any of the payment mechanisms specified in paragraph B.1. of this Article.

2. The Government shall draw from the funds provided by the Non-Federal Sponsor such sums as the Government deems necessary to cover the Government's financial obligations for such additional work as they are incurred. If at any time the Government determines that the Non-Federal Sponsor must provide additional funds to pay for such additional work, the Government shall notify the Non-Federal Sponsor in writing of the additional funds required and provide an explanation of why additional funds are required. Within 30 calendar days from receipt of such notice, the Non-Federal Sponsor shall provide the Government with the full amount of such additional required funds through any of the payment mechanisms specified in paragraph B.1. of this Article.

3. At the time the Government conducts the interim or final accounting, as applicable, the Government shall conduct an accounting of the Government's financial obligations incurred for additional work and furnish the Non-Federal Sponsor with written notice of the results of such accounting. If outstanding relevant claims and appeals or eminent domain proceedings prevent a final accounting of such financial obligations for additional work from being conducted in a timely manner, the Government shall conduct an interim accounting of such financial obligations for additional work and furnish the Non-Federal Sponsor with written notice of the results of such interim accounting. Once all outstanding relevant claims and appeals and eminent domain proceedings are resolved, the Government shall amend the interim accounting of such financial obligations for additional work to complete the final accounting of such financial obligations for additional work and furnish the Non-Federal Sponsor with written notice of the results of such final accounting. Such interim or final accounting, as applicable, shall determine the Government's total financial obligations for additional work and the Non-Federal Sponsor's contribution of funds provided thereto as of the date of such accounting.

a. Should the interim or final accounting, as applicable, show that the Government's total financial obligations for additional work exceed the total contribution of funds provided by the Non-Federal Sponsor for such additional work, the Non-Federal Sponsor, no later than 90 calendar days after receipt of written notice from the Government, shall make a payment to the Government in an amount equal to the difference by delivering a check payable

to "FAO, USAED, St. Louis (B3)" to the District Engineer or by providing an Electronic Funds Transfer in accordance with procedures established by the Government.

b. Should the interim or final accounting, as applicable, show that the total contribution of funds provided by the Non-Federal Sponsor for additional work exceeds the Government's total financial obligations for such additional work, the Government, subject to the availability of funds, shall refund the excess amount to the Non-Federal Sponsor within 90 calendar days of the date of completion of such accounting. In the event the Non-Federal Sponsor is due a refund and funds are not available to refund the excess amount to the Non-Federal Sponsor, the Government shall seek such appropriations as are necessary to make the refund.

ARTICLE VII - DISPUTE RESOLUTION

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to both parties. Each party shall pay an equal share of any costs for the services provided by such a third party as such costs are incurred. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VIII - OPERATION, MAINTENANCE, REPAIR, REHABILITATION, AND REPLACEMENT (OMRR&R)

A. Upon receipt of the notification from the District Engineer in accordance with Article II.D. of this Agreement and for so long as the *Project* remains authorized, the Non-Federal Sponsor, pursuant to Article II.E. of this Agreement, shall operate, maintain, repair, rehabilitate, and replace the entire *Project* or *functional portion of the Project*, at no cost to the Government. The Non-Federal Sponsor shall conduct its operation, maintenance, repair, rehabilitation, and replacement responsibilities in a manner compatible with the *Project's* authorized purposes and in accordance with applicable Federal and State laws as provided in Article XI of this Agreement and specific directions prescribed by the Government in the interim or final OMRR&R Manual and any subsequent amendments thereto.

B. The Non-Federal Sponsor hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor now or hereafter owns or controls for access to the *Project* for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, rehabilitating, or replacing the *Project*. If an inspection shows that the Non-Federal Sponsor for any reason is failing to perform its obligations under this Agreement, the Government shall send a written notice describing the non-performance to the Non-Federal Sponsor. If, after 30 calendar days from receipt of such written notice by the Government, the Non-Federal Sponsor continues to fail to perform, then the Government shall have the right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor now or hereafter owns or controls for the purpose of completing, operating,

maintaining, repairing, rehabilitating, or replacing the *Project*. No completion, operation, maintenance, repair, rehabilitation, or replacement by the Government shall relieve the Non-Federal Sponsor of responsibility to meet the Non-Federal Sponsor's obligations as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity to ensure faithful performance pursuant to this Agreement.

ARTICLE IX – HOLD AND SAVE

Subject to the provisions of Article XIX of this Agreement, the Non-Federal Sponsor shall hold and save the Government free from all damages arising from design, construction, operation, maintenance, repair, rehabilitation, and replacement of the *Project* and any *betterments*, except for damages due to the fault or negligence of the Government or its contractors.

ARTICLE X - MAINTENANCE OF RECORDS AND AUDIT

A. Not later than 60 calendar days after the effective date of this Agreement, the Government and the Non-Federal Sponsor shall develop procedures for keeping books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to this Agreement. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 C.F.R. Section 33.20. The Government and the Non-Federal Sponsor shall maintain such books, records, documents, or other evidence in accordance with these procedures and for a minimum of three years after completion of the accounting for which such books, records, documents, or other evidence were required. To the extent permitted under applicable Federal laws and regulations, the Government and the Non-Federal Sponsor shall each allow the other to inspect such books, records, documents, or other evidence.

B. In accordance with 32 C.F.R. Section 33.26, the Non-Federal Sponsor is responsible for complying with the Single Audit Act Amendments of 1996 (31 U.S.C. 7501-7507), as implemented by Office of Management and Budget (OMB) Circular No. A-133 and Department of Defense Directive 7600.10. Upon request of the Non-Federal Sponsor and to the extent permitted under applicable Federal laws and regulations, the Government shall provide to the Non-Federal Sponsor and independent auditors any information necessary to enable an audit of the Non-Federal Sponsor's activities under this Agreement. The costs of any non-Federal audits performed in accordance with this paragraph shall be allocated in accordance with the provisions of OMB Circulars A-87 and A-133, and such costs as are allocated to the *Project* shall be included in *total project costs* and shared in accordance with the provisions of this Agreement.

C. In accordance with 31 U.S.C. 7503, the Government may conduct audits in addition to any audit that the Non-Federal Sponsor is required to conduct under the Single Audit Act Amendments of 1996. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits performed in accordance with this paragraph shall be included in *total project costs* and shared in accordance with the provisions of this Agreement.

ARTICLE XI - FEDERAL AND STATE LAWS

In the exercise of their respective rights and obligations under this Agreement, the Non-Federal Sponsor and the Government shall comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)).

ARTICLE XII - RELATIONSHIP OF PARTIES

A. In the exercise of their respective rights and obligations under this Agreement, the Government and the Non-Federal Sponsor each act in an independent capacity, and neither is to be considered the officer, agent, or employee of the other.

B. In the exercise of its rights and obligations under this Agreement, neither party shall provide, without the consent of the other party, any contractor with a release that waives or purports to waive any rights the other party may have to seek relief or redress against that contractor either pursuant to any cause of action that the other party may have or for violation of any law.

ARTICLE XIII - TERMINATION OR SUSPENSION

A. If at any time the Non-Federal Sponsor fails to fulfill its obligations under this Agreement, the Assistant Secretary of the Army (Civil Works) shall terminate this Agreement or suspend future performance under this Agreement unless he determines that continuation of work on the *Project* is in the interest of the United States or is necessary in order to satisfy agreements with any other non-Federal interests in connection with the *Project*.

B. In the event future performance under this Agreement is suspended pursuant to Article II.C. of this Agreement, such suspension shall remain in effect until such time that the Government notifies the Non-Federal Sponsor in writing that sufficient Federal funds are available to meet the Federal share of *total project costs* and the Federal share of costs for data recovery activities associated with historic preservation in accordance with Article XVII.B.2. and Article XVII.B.3. of this Agreement the Government projects to be incurred through the then-current or upcoming *fiscal year*, or the Government or the Non-Federal Sponsor elects to terminate this Agreement.

C. In the event that the Government and the Non-Federal Sponsor determine to suspend future performance under this Agreement in accordance with Article XIV.C. of this Agreement, such suspension shall remain in effect until the Government and the Non-Federal Sponsor agree to proceed or to terminate this Agreement. In the event that the Government suspends future performance under this Agreement in accordance with Article XIV.C. of this Agreement due to

failure to reach agreement with the Non-Federal Sponsor on whether to proceed or to terminate this Agreement, or the failure of the Non-Federal Sponsor to provide funds to pay for cleanup and response costs or to otherwise discharge the Non-Federal Sponsor's responsibilities under Article XIV.C. of this Agreement, such suspension shall remain in effect until: 1) the Government and Non-Federal Sponsor reach agreement on how to proceed or to terminate this Agreement; 2) the Non-Federal Sponsor provides funds necessary to pay for cleanup and response costs and otherwise discharges its responsibilities under Article XIV.C. of this Agreement; 3) the Government continues work on the *Project*; or 4) the Government terminates this Agreement in accordance with the provisions of Article XIV.C. of this Agreement.

D. If after completion of the design portion of the *Project* the parties mutually agree in writing not to proceed with construction of the *Project*, the parties shall conclude their activities relating to the *Project* and conduct an accounting in accordance with Article VI.C. of this Agreement.

E. In the event that this Agreement is terminated pursuant to this Article or Article XIV.C. of this Agreement, both parties shall conclude their activities relating to the *Project* and conduct an accounting in accordance with Article VI.C. of this Agreement. To provide for this eventuality, the Government may reserve a percentage of total Federal funds made available for the *Project* and an equal percentage of the total funds contributed by the Non-Federal Sponsor in accordance with Article II.B.2., and Article XVII.B.3. of this Agreement as a contingency to pay costs of termination, including any costs of resolution of contract claims and contract modifications.

F. Any termination of this Agreement or suspension of future performance under this Agreement in accordance with this Article or Article II.C. or Article XIV.C. of this Agreement shall not relieve the parties of liability for any obligation previously incurred. Any delinquent payment owed by the Non-Federal Sponsor shall be charged interest at a rate, to be determined by the Secretary of the Treasury, equal to 150 per centum of the average bond equivalent rate of the 13 week Treasury bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3 month period if the period of delinquency exceeds 3 months.

ARTICLE XIV - HAZARDOUS SUBSTANCES

A. After execution of this Agreement and upon direction by the District Engineer, the Non-Federal Sponsor shall perform, or ensure performance of, any investigations for hazardous substances that the Government or the Non-Federal Sponsor determines to be necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601-9675; hereinafter "CERCLA"), that may exist in, on, or under lands, easements, and rights-of-way that the Government determines, pursuant to Article III of this Agreement, to be required for construction, operation, and maintenance of the *Project*. However, for lands, easements, and rights-of-way that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigations unless the District Engineer provides the Non-Federal Sponsor with prior specific written direction, in which case the Non-Federal Sponsor shall perform such investigations in accordance with such written direction.

1. All actual costs incurred by the Non-Federal Sponsor for such investigations for hazardous substances shall be included in *total project costs* and shared in accordance with the provisions of this Agreement, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of such costs.

2. All actual costs incurred by the Government for such investigations for hazardous substances shall be included in *total project costs* and shared in accordance with the provisions of this Agreement.

B. In the event it is discovered through any investigation for hazardous substances or other means that hazardous substances regulated under CERCLA exist in, on, or under any lands, easements, or rights-of-way that the Government determines, pursuant to Article III of this Agreement, to be required for construction, operation, and maintenance of the *Project*, the Non-Federal Sponsor and the Government, in addition to providing any other notice required by applicable law, shall provide prompt written notice to each other, and the Non-Federal Sponsor shall not proceed with the acquisition of the real property interests until the parties agree that the Non-Federal Sponsor should proceed.

C. The Government and the Non-Federal Sponsor shall determine whether to initiate construction of the *Project*, or, if already in construction, whether to continue with construction of the *Project*, suspend future performance under this Agreement, or terminate this Agreement for the convenience of the Government, in any case where hazardous substances regulated under CERCLA are found to exist in, on, or under any lands, easements, or rights-of-way that the Government determines, pursuant to Article III of this Agreement, to be required for construction, operation, and maintenance of the *Project*. Should the Government and the Non-Federal Sponsor determine to initiate or continue with construction of the *Project* after considering any liability that may arise under CERCLA, the Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for the costs of cleanup and response, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination. Such costs shall not be considered a part of *total project costs*. In the event the Non-Federal Sponsor does not reach agreement with the Government on whether to proceed or to terminate this Agreement under this paragraph, or fails to provide any funds necessary to pay for cleanup and response costs or to otherwise discharge the Non-Federal Sponsor's responsibilities under this paragraph upon direction by the Government, the Government, in its sole discretion, may either terminate this Agreement for the convenience of the Government, suspend future performance under this Agreement, or continue work on the *Project*.

D. The Non-Federal Sponsor and the Government shall consult with each other in accordance with Article V of this Agreement in an effort to ensure that responsible parties bear any necessary cleanup and response costs as defined in CERCLA. Any decision made pursuant to paragraph C. of this Article shall not relieve any third party from any liability that may arise under CERCLA.

E. As between the Government and the Non-Federal Sponsor, the Non-Federal Sponsor shall be considered the operator of the *Project* for purposes of CERCLA liability. To the maximum

extent practicable, the Non-Federal Sponsor shall operate, maintain, repair, rehabilitate, and replace the *Project* in a manner that will not cause liability to arise under CERCLA.

ARTICLE XV - NOTICES

A. Any notice, request, demand, or other communication required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and delivered personally or sent by telegram or mailed by first-class, registered, or certified mail, as follows:

If to the Non-Federal Sponsor:
Director
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702-1271

If to the Government:
The District Engineer
United States Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

B. A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this Article.

C. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at the earlier of such time as it is actually received or seven calendar days after it is mailed.

ARTICLE XVI - CONFIDENTIALITY

To the extent permitted by the laws governing each party, the parties agree to maintain the confidentiality of exchanged information when requested to do so by the providing party.

ARTICLE XVII - HISTORIC PRESERVATION

A. The Government, as it determines necessary for the *Project*, shall perform any identification, survey, or evaluation of historic properties. Any costs incurred by the Government for such work shall be included in *total project costs* and shared in accordance with the provisions of this Agreement.

B. The Government, as it determines necessary for the *Project*, shall perform or ensure the performance of any mitigation activities or actions for historic properties or that are otherwise associated with historic preservation including data recovery activities.

1. Any costs incurred by the Government for such mitigation activities, except for data recovery activities associated with historic preservation, shall be included in *total project costs* and shared in accordance with the provisions of this Agreement.

2. As specified in Section 7(a) of Public Law 86-523, as amended by Public Law 93-291 (16 U.S.C. 469c(a)), the costs of data recovery activities associated with historic preservation shall be borne entirely by the Government and shall not be included in *total project costs*, up to the statutory limit of one percent of the total amount authorized to be appropriated to the Government for the *Project*.

3. The Government shall not incur costs for data recovery activities associated with historic preservation that exceed the statutory one percent limit specified in paragraph B.2. of this Article unless and until the Assistant Secretary of the Army (Civil Works) has waived that limit and the Secretary of the Interior has concurred in the waiver in accordance with Section 208(3) of Public Law 96-515, as amended (16 U.S.C. 469c-2(3)). Any costs of data recovery activities associated with historic preservation that exceed the one percent limit shall not be included in *total project costs* but shall be shared between the Non-Federal Sponsor and the Government consistent with the cost sharing requirements for aquatic ecosystem restoration, as follows: 35 percent will be borne by the Non-Federal Sponsor and 65 percent will be borne by the Government.

C. If, during its performance of *relocations* or construction of improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material in accordance with Article III of this Agreement, the Non-Federal Sponsor discovers historic properties or other cultural resources that have not been evaluated by the Government pursuant to this Article, the Non-Federal Sponsor shall provide prompt written notice to the Government of such discovery. The Non-Federal Sponsor shall not proceed with performance of the *relocation* or construction of the improvement that is related to such discovery until the Government provides written notice to the Non-Federal Sponsor that it should precede with such work.

ARTICLE XVIII - THIRD PARTY RIGHTS, BENEFITS, OR LIABILITIES

Nothing in this Agreement is intended, nor may be construed, to create any rights, confer any benefits, or relieve any liability, of any kind whatsoever in any third person not party to this Agreement.

ARTICLE XIX - OBLIGATIONS OF FUTURE APPROPRIATIONS

A. Nothing herein shall constitute, nor be deemed to constitute, an obligation of future appropriations by the Department of Natural Resources of the State of Illinois, where creating such an obligation would be inconsistent with Illinois statutes, including but not limited to 30 ILCS 105/30, or Article VIII, Section 2 of the Constitution of the State of Illinois.

B. The Non-Federal Sponsor intends to fulfill its obligations under this Agreement. The Non-Federal Sponsor shall include in its budget request or otherwise propose appropriations of funds in amounts sufficient to fulfill these obligations for that year, and shall use all reasonable and lawful means to secure those appropriations. The Non-Federal Sponsor reasonably believes that funds in amounts sufficient to fulfill these obligations lawfully can and will be appropriated and made available for this purpose. In the event funds are not appropriated in amounts sufficient to fulfill these obligations, the Non-Federal Sponsor shall use its best efforts to satisfy any requirements for payments or contributions of funds under this Agreement from any other

source of funds legally available for this purpose. Further, if the Non-Federal Sponsor is unable to fulfill these obligations, the Government may exercise any legal rights it has to protect the Government's interests related to this Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the District Engineer.

DEPARTMENT OF THE ARMY	ILLINOIS DEPARTMENT OF NATURAL RESOURCES
BY: _____	BY: _____
Christopher G. Hall Colonel, US Army Commander & District Engineer	Marc Miller Director Illinois Department of Natural Resources
DATE: _____	DATE: _____

CERTIFICATE OF AUTHORITY

I, _____, do hereby certify that I am the principal legal officer of the Illinois Department of Natural Resources, that the Illinois Department of Natural Resources is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army and the Illinois Department of Natural Resources in connection with the Rip Rap Landing Habitat Rehabilitation and Enhancement Project, and to pay damages, if necessary, in the event of the failure to perform in accordance with the terms of this Agreement, as required by Section 221 of the Flood Control Act of 1970, Public Law 91-611, as amended (42 U.S.C. 1962d-5b), and that the persons who have executed this Agreement on behalf of the Illinois Department of Natural Resources have acted within their statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this _____ day of _____ 20___.

_____
Mitchell Cohen
Counsel
Illinois Department of Natural Resources

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____

Marc Miller
Director
Illinois Department of Natural Resources

DATE: _____

APPENDIX D
HABITAT EVALUATION & QUANTIFICATION

RIP RAP LANDING HABITAT REHABILITATION AND ENHANCEMENT PROJECT

APPENDIX D
HABITAT EVALUATION AND QUANTIFICATION

1. INTRODUCTION

This appendix provides documentation of the habitat evaluation and quantification process that was conducted to evaluate the potential benefits of various habitat improvement features for Rip Rap Landing. Active participants included biologists from the St. Louis District of the Corps of Engineers; the U.S. Fish and Wildlife Service, Southern Illinois Ecological Service Office; the Illinois Department of Natural Resources; and HDR, Inc., the contractor assisting with preparation of the Definite Project Report with Integrated Environmental Assessment.

Table D-1. The team that participated in the Habitat Benefits Evaluation for the Rip Rap Landing Habitat Rehabilitation and Enhancement Project.

Team Member	Discipline	Affiliation
Elmer "Butch" Atwood	Fishery Biologist	Illinois Department of Natural Resources
Jon Handel	Wildlife Biologist	Illinois Department of Natural Resources
Kim Postlewait	Site Superintendent	Illinois Department of Natural Resources
Neal Booth	Former Site Superintendent	HDR, Inc.
T. Miller	Fish and Wildlife Biologist	HDR, Inc.
Joe Bartletti	Environmental Scientist	HDR, Inc.
Charley Hanneken	Ecologist	Corps of Engineers
Brandon Schneider	Biologist	Corps of Engineers
Matt Mangan	Fishery Biologist	U S Fish and Wildlife Service

Quantification is needed in the project planning process to evaluate benefits of project features because traditional benefit/cost evaluation is not applicable. To determine environmental restoration project benefits, models have been developed to quantify habitat benefits of project features for selected species.

We used both wildlife and fisheries based models to evaluate the effects of project features on habitat at Rip Rap Landing. For wildlife, we used the Wildlife Habitat Appraisal Guide (WHAG) developed by the Missouri Department of Conservation and the U.S. Department of Agriculture, Soil Conservation Service (now NRCS) (MDC and NRCS 1990). The WHAG was adapted from the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (USFWS 1976). WHAG is widely accepted by local agencies, and it has become the primary terrestrial habitat evaluation method used in the St. Louis District.

The aquatic model that has gained the most acceptance within the St. Louis District and along the entire Upper Mississippi River is the Aquatic Habitat Appraisal Guide (AHAG) (Killgore &

Hardy 1992; Mathias et al. 1996). It was developed by the Corps of Engineers Waterways Experiment Station (WES) and the Rock Island District Corps of Engineers (Killgore & Hardy 1992; Mathias et al. 1996). The layout and methods to use the AHAG follow the format of the Wildlife Habitat Appraisal Guide (WHAG; MDC and USDA 1990).

The WHAG and AHAG models for Rip Rap Landing were endorsed by the ECO-PCX. After evaluation of the models, methods, and assumptions, the Rip Rap Landing WHAG and AHAG were approved for single use by the headquarters model certification team on November 5 2013.

2. HABITAT EVALUATION METHODOLOGY

The WHAG and AHAG are numerical models that evaluate the quality and quantity of particular habitats for species selected by team members (Table 1). The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0 (AHAG) and 0.1 (WHAG) to 1.0 scale, with higher values indicating better habitat. The evaluation team determines the HSI for a particular habitat type by answering questions that establish values for various biotic and abiotic conditions under present and future conditions. Future conditions are determined using management plans and best professional judgment. The quantitative component is the number of acres of the habitat being evaluated. From the calculated qualitative and quantitative values, the standard unit of measure, the habitat unit (HU) is calculated using the formula (HSI x Acres = HUs). Habitat units are calculated for specific target years to forecast changes in habitat values over the life of the project for with-project and without-project conditions and are then annualized to yield the Average Annual Habitat Unit (AAHU). Target years are set to capture the change in habitat that occurs with habitat maturation and changes caused by constructed features. The benefits of each proposed project feature are then determined by subtracting with-project benefits from without-project benefits, expressed as net AAHUs. The effects of various habitat improvement feature combinations (alternatives) can then be evaluated by comparing the net AAHUs and costs for each alternative considered.

In preparation for using the WHAG and AHAG models, the evaluation team conducted a site visit and took part in a Value Engineering Study that included a Hydrogeomorphic-Based Workshop. They also reviewed aerial photography, topographic maps, and preliminary design drawings. During the field evaluation, assumptions were developed regarding existing conditions and projected post-project conditions relative to limiting factors, habitat changes over time and management practices.

For the purpose of planning, design, and impact analysis, period of analysis was established as 50 years. To facilitate comparison, target years were established at 0 (existing conditions), 1, 5, 25, and 50 years. HSIs and average annual habitat units (AAHUs) for each evaluation species were calculated at each of these target years.

It was assumed by the evaluation team that the project with all of the potential features would generate the most habitat units. The team then used best professional judgment to determine at what percentage each individual feature would contribute to the total number of habitat units. This was done prior to calculating the habitat units so that the team was not biased in their decision. The total of the percentages for all the potential project features had to equal 100%.

This approach allowed the team to utilize one spreadsheet for each habitat type. Developing multiple spreadsheets for each habitat type and each feature would have quickly become cumbersome and would have resulted in hundreds of spreadsheets. The St. Louis District has previously used this approach on other EMP-HREP sites such as the approved and completed Swan Lake and Batchtown HREPS.

3. EVALUATION SPECIES SELECTION

To begin the habitat evaluation process, the team reviewed the species that can be evaluated under each model. They selected two fish species and two wildlife species. Each species was chosen by the team because it represents a guild of species that is unique from other species within the model. Also, these species were used in the habitat analysis because the site is managed for these species and because they utilize habitat that will be restored by the project.

Table D-2. Aquatic and wildlife evaluation species selected for analysis.

Species Evaluated	Scientific Name	Family	Habitat Type
	Aquatic (AHAG)		
Smallmouth Buffalo	*Ictiobus bubalus*	Catostomidae	Lentic
Bluegill	*Lepomis macrochirus*	Centrarchidae	Lentic
	Terrestrial (WHAG)		
Mallard	*Anas platyrhynchos*	Anatidae	Non-forested Wetland, Cropland to Bottomland Forest, Bottomland Forest
Northern Parula	*Parula americana*	Emberizidae	Bottomland Forest

AHAG species chosen were the smallmouth buffalo and the bluegill. The smallmouth buffalo is in the family Catostomidae and is an important commercial fish in the Mississippi River drainage. This riverine species occurs in deep, flowing water, but also frequents sloughs, oxbow lakes and other backwaters for resting, spawning, and rearing. They feed on organisms in the substrate of large rivers and backwater lakes. Bluegill are in the family Centrarchidae and are abundant in the Mississippi River system. They are popular panfish and prefer backwaters of rivers where they feed on zooplankton, aquatic and terrestrial insects, and some plant materials. (AHAG Default Matrix, 1996)

WHAG species chosen were the mallard and the northern parula. The mallard is a migratory wildlife species that utilize early successional non-forested wetland habitats and forage in bottomland forest and cropland. Mallards are an important game species and the focus of much of the site management efforts. The Northern parula is a Neotropical migratory songbird that seems to prefer riparian vegetation, especially large tracts of mature bottomland forest, where they often nest in flood-deposited debris caught in the branches of trees overhanging water. It is considered a species of concern by the U.S. Fish and Wildlife Service. (Moldenhauer and Regelski, 1996).

4. SITE SPECIFIC ASSUMPTIONS AND METHODOLOGY

During the second step of the evaluation process, the team determined what habitats would be affected by the project features and locations in the project area to evaluate these changes. The project area was divided into five zones, each having a feature unique to that zone. The following WHAG spreadsheets were used: Zone 1, non-forested wetlands, and bottomland hardwood wetlands; Zone 2-5, non-forested wetlands and bottomland hardwood wetlands. There were fourteen evaluation locations, one in the center of each habitat type in each zone.

For the AHAG, the 1996 AHAG was used to evaluate aquatic areas in Roadside Lake and various sections of Sny Creek and Roadside Lake proposed for dredging. The 1996 AHAG was selected because it was thought to provide a better analysis of the aquatic habitats in the project area, all of which are currently and proposed to remain connected to the Mississippi River.

Final calculations included determining the acreage of non-forested, cropland, bottomland hardwood, and aquatic habitats using topographical data, management plans, land coverage data files, and aerial photography. Finally, the habitat units for each measure were determined by the habitat units generated for each species. Single species were used for WHAG and AHAG features, while WHAG and AHAG AAHUs were summed if both were affected by a particular feature.

Table D-3. Table of feasible project features analyzed in the incremental cost analysis (ICA)

Feature Code	Description	Purpose
Zone 1 – Sny Island Drainage and Levee District		
1A	Water Control Structure	Water level control
1B	2,500 gpm Well	Maintain water levels
1C	Tree planting – 62.9 acres	Convert cropland to bottomland forest
1D	Channel to Goose Pasture Lake	Water Control to Goose Pasture Lake
Zone 2 – State Natural Area		
2B	Tree Planting – 34.8 acres	Convert cropland to bottomland forest
Zone 3 – Roadside Lake and Waverly Lake Wetland Management Areas		
3A	Channel to Waverly Lake	Water Control to Waverly Lake
3B	Water Control in Pump Station Channel	
3C	WCS in North Units	
3D	Sny Creek Excavation from Sny Levee to Bridge	Water conveyance
3E	43% of Pump Station	Water conveyance
3F	43% Pump Channel Widening	
3G	43% Pump Station Pipe and Concrete for Road	
3H	WCS Pipes Under Sand Levee	Water control
3I	Tree planting – 36.5 acres	Convert cropland to bottomland forest
3J	Roadside Lake Channel from Sny Creek	Deepen connection from Sny Creek to Roadside Lake

Feature Code	Description	Purpose
3K	Portable pump and water control structure for Roadside Lake	Water control at Roadside Lake
Zone 4 – Rust Land Company - WRP		
4A	Sny Creek Excavation Bridge-Old Levee End	Reconnection to Mississippi River
4B1	Sny Creek Excavation Old Levee to Roadside Lake Channel	Reconnection to Mississippi River
4B2	Sny Creek Excavation Roadside to Dog Island	Reconnection to Mississippi River
4C2	River Ridge Scour Embankments	Reduce scouring flows into wetlands
4D	South Spillway	Water control
4E	WCS South Spillway	Water control
4G	57% of Pump Station	Increased water conveyance
4H	57% Pump Channel Widening	
4I	57% Pump Station Pipe and Concrete for Road	
4J	WCS Pipes Under Road	Water control
4K	Tree planting 220 acres	Convert cropland to bottomland forest
Zone 5 – Dog Island		
5B	Sny Creek Excavation @ Dog Island	Reconnection to Mississippi River

General Assumptions and Habitat Characteristics

1. It was assumed that target years of 0 (baseline condition), 1, 5, 25, and 50 (future without and future with project conditions) are sufficient to analyze HUs and characterize habitat changes over the estimated period of analysis.

2. Two floods have breached the sand levee extension from the Sny Levee in the last 50 years: 1993, 2005. It was assumed that at least two more floods will breach the levee over the period of analysis, the next 50 years, resulting in some amount of sediment accumulation in and around Waverly Lake and upper Sny Creek.

3. The duration, elevation, and severity of Mississippi River floods have increased with floodplain development and changes in agriculture. Navigation pool formation has increased sedimentation within the pools and side channels. We expect that this will not change in the next 50 years but flood event impacts to the project area from overbank scouring are expected to be less severe as the natural levee along the river increases in elevation and riverfront forest becomes better established.

4. After the flood of 1993, tree mortality was severe in the old growth bottomland hardwood forested natural area in Zone 2. Most of the oaks and some pecans have died in the period after the flood, likely due to stress from the flood height, duration and a later flood event in 1995. The area has been resurveyed recently, and still retains enough of the old growth forest component to justify the natural area designation.

5. Scouring, overbank flows from the river as flood waters rise have damaged some of the structures installed to enhance wetlands as part of the WRP easement acquired by NRCS. They also have provided funding for establishment of approximately 190 acres of wet prairie in 2010. Without the project, the continued existence of the prairie after establishment is unknown. With or without the project, some of the prairie area established may revert to bottomland forest and/or wet meadow, depending upon the hydrology and management at some of the prairie sites.

6. Without the project, IDNR will continue to manage the project area as in the past except for the WRP lands in Zone 4 that have the NRCS easement in place, and thus have restrictions on the type of management actions that can occur.

7. Without the project, IDNR will not have adequate water management capabilities for the entire site. Without additional water management capability, moist soil and other wetland vegetation will be heavily degraded by year 25. Sedimentation and scour will further damage existing wetlands. Additionally, inability to manage water levels across the entire site may favor establishment of invasive reed canary grass resulting in a monoculture that has little benefit for wildlife, especially migratory birds.

8. Without the project, the former cropland in Zone 4 will continue to be dominated by herbaceous vegetation, inhibiting the natural conversion of those acres to bottomland forest, except along the riverfront. Cropland in the other zones would continue to be farmed providing little benefit to migratory birds. With project, the conversion to bottomland forest in Zone 4 will be a management objective requiring the chemical or mechanical manipulation of the herbaceous vegetation to favor natural bottomland forest establishment. Other cropland acres in Zones 1, 2 and 3 would be converted to bottomland forest through the use of containerized or other planting stocks of trees, thus allowing the forest canopy to close in those areas over time.

9. Under with-project conditions water control and movement would be enhanced and operated at a higher level of effectiveness throughout the 50-year planning period.

10. We assumed that operation of Rip Rap Landing Fish and Wildlife Area would continue with the current management objectives and plans for at least the life of the HREP.

11. Without the project, fish use of the backwaters and Sny Creek will continue to be restricted in many years by the lack of access for spawning, rearing and overwintering.

Site Specific Assumptions and Methodology

a. Zone 1.

This zone is within and protected by the Sny Island Drainage and Levee District levee, a 100-year levee that has only failed once (1993) in the past 50 years. The water level in this zone is also influenced by pumping from the Sny Island Drainage and Levee District, resulting in drier conditions than are desired in the remaining native habitats. The area in Zone 1 is comprised of wet marsh, cropland and regenerating and maturing bottomland forest. Without the project, the

area is likely to be managed as at present, given the influence of dewatering as a result of Sny D&LD pumping. With or without project there are no fish habitat units generated for this zone, consequently there was no AHAG evaluation.

WHAG Evaluation – The four features proposed for this zone will allow the area to be managed more intensively for migratory wildlife and other migratory birds. We evaluated the habitat benefits using the non-forested wetland matrix for the marsh/wetland acres (Goose Pasture Lake), and the bottomland hardwood matrix for the existing forest and the cropland proposed for conversion to bottomland forest. The addition of three features to facilitate water level management greatly enhance the habitat benefits for migratory wildlife, consequently the mallard was used as the indicator species and is the management focus for the site. The water control structure in the Sny D&LD channel will prevent the area from being drained by pumping except as is required for water management to maintain water levels in Goose Pasture Lake and facilitate the growth of submersed aquatic vegetation and moist soil plants, emergent and herbaceous vegetation, and/or to dewater the bottomland forested areas as required in the annual cycle. The pump station will allow most of the zone to be flooded during the fall and winter as needed, facilitated by the channel to Goose Pasture Lake to maintain water levels during the summer, if required. The cropland acres will be planted to bottomland hardwood species such as pin oak, overcup oak, swamp white oak, pecan, green ash, hawthorn, and persimmon using containerized trees, bare root stock and transplanted stock from within the zone. Over time the reforested area canopy will close benefitting prothontary warblers which prefer to nest near or over water and the northern parula which prefers unbroken tracts of bottomland forest.

b. Zone 2.

The zone is outside the Sny D&LD and subject to flooding from the Mississippi River. It is also designated as a State Natural Area due to the presence of high quality bottomland forest that is within the zone. The high quality forest was severely impacted by the flood of 1993 causing mortality of some of the trees, likely due to stress. A more recent assessment of the area has been conducted and determined that it remains of high enough quality to retain the natural area designation. The only features proposed for the zone include reforestation of the existing cropland. A feature was originally proposed to establish a riverside levee at elevation 450 msl, but the construction cost could not be justified by the benefits and the levee feature was dropped from consideration. No fisheries benefits are generated within the zone, consequently no AHAG evaluation was conducted.

WHAG Evaluation – We evaluated benefits in the zone using the bottomland hardwood forest matrix for the existing forest and the cropland proposed for conversion to bottomland forest. We used the non-forested wetland matrix to evaluate the slough that runs through the zone and connects with Zones 3 and 4. The slough is impacted by features proposed for zone 3 since it is an integral part of water movement to Waverly Lake and associated wetlands. The impact results from pumping water through the slough, which provides a water source for an area that likely goes nearly dry in late summer and fall. Although the habitat benefits from pumping accrue in Zone 2, the habitat units are added to the water control feature within Zone 3 since that is the structure responsible for maintaining the higher water level. The water control structure is located in the pump channel that traverses the south edge of the zone. The mallard was used as the indicator species. The northern parula was the indicator species chosen for the forested

portion of the zone because that species benefited most from the continued aging of the existing forest and the conversion of cropland to bottomland forest. Conversion of the cropland to bottomland forest generated sufficient habitat units over the life of the project to make it a viable feature, though the aging of the existing forest did not generate enough habitat units with the addition of a levee to 450 to justify the construction cost. The cropland acres would be reforested with a variety of bottomland species, utilizing containerized and bare root stock. Some of the zone may be allowed to reforest naturally. The forest canopy will ultimately close over the life of the project making Zone 2 nearly a solid block of bottomland forest. The forested riverfront natural levee is accreting and will result in fewer scouring overbank flows in the future. These features were removed from final analysis because they were determined to not be a Federal responsibility

c. Zone 3.

This zone encompasses both the Waverly Lake and Roadside Lake Wetland Management Areas. The zone includes nonforested wetlands, bottomland forest and cropland, along with a portion of Sny Creek.

WHAG Evaluation – We chose to evaluate features in the zone using the bottomland hardwood and nonforested wetlands spreadsheets. The mallard was used as the indicator species for the nonforested wetlands, while the northern parula was used for the forested and cropland conversion areas. Two features were proposed for Roadside Lake, a fish-friendly water control structure to provide control of the water level in the lake and a portable pump to allow drawdowns of the lake to solidify bottom material every five to seven years and facilitate the growth of submersed aquatic vegetation. Based upon the habitat units generated these two features were justified. The conversion of cropland to bottomland hardwoods was also justified and the cropland areas will be planted to hardwood species similar to Zone 1, with containerized or bare root stock. Waverly Lake and the associated wetlands are currently managed for migratory wildlife, but the existing pump and channel are inadequate to fill the wetland areas in some years. We assumed this zone would be overrun with non-desirable vegetation without the project. The with project condition would replace the pump, increase the size of the pump channel and provide new water control structures all with sufficient capacity to provide water to Zones 3 and 4. Based upon the amount of water needed in each zone, the project features costs were split 43 percent to Waverly Lake and associated wetlands, and 57 percent to wetlands in Zone 4.

AHAG Evaluation – The AHAG matrix was used to evaluate fish benefits in Sny Creek from Waverly Lake downstream to the entrance to Roadside Lake. One species was used representing the lentic-large fishes guild, smallmouth buffalo a common Mississippi River species frequents backwaters, bottomland lakes and sloughs. The lentic-large fish guild was selected because the fishes represented in this guild were thought to benefit the most from the proposed project. Without project conditions will have little benefit for spawning, rearing, or overwintering of fish due to the lack of access from the river caused by shallow water. We assumed that no fisheries benefits would accrue without a deeper water connection to the river. Excavating upper Sny Creek down to Roadside Lake could not be justified based upon the small number of habitat units generated compared to the high cost, there simply wasn't enough acres affected. Roadside Lake was also evaluated along with the remainder of Sny Creek, downstream to the confluence

with the Mississippi River. The dredge cut to the lake from Sny Creek, coupled with excavation down to the river confluence at Dog Island was justified because it provided a year round river connection for spawning, rearing and overwintering within Sny Creek and allowing fish access to Roadside Lake. The Sny Creek excavation to Dog Island is actually in Zone 4, while the excavation along Dog Island is in Zone 5. We assumed placement of excavated material along Sny Creek to strengthen the Sny levee extension down to Dog Island. Thalweg disposal of the excavated material was assumed for the excavation along Dog Island.

d. Zone 4.

Zone 4 encompasses all of the Rust Land Company property, on which NRCS holds a WRP easement and has developed some of the wetlands. Mississippi River overbank, scouring flows have damaged some of the water control structures, especially the one located at the lower end of the slough that traverses Zones 2 and 4. Included in the NRCS management plan for the property is the establishment of approximately 190 acres of prairie in conjunction with the wetlands and below approximate elevation 440. The balance of the zone would be reforested. Without project, management capabilities in the zone are limited because of a lack of water during much of the year. The area previously cropped is covered by herbaceous vegetation and very little bottomland forest regeneration is occurring. Areas adjacent to the existing wetlands are being invaded by willow and soft maple with little habitat benefit to migratory birds.

AHAG Evaluation – The portion of Sny Creek that is in Zone 4 was discussed with features in Zone 3. No other fisheries benefits will be generated by the features in proposed for the zone.

WHAG Evaluation – With project, wetlands in the zone were evaluated using the nonforested wetland matrix and included the area proposed for the establishment of prairie and wet prairie. The remaining forested area and the remaining cropland proposed for reforestation was evaluated using the bottomland hardwood matrix. The mallard was used the indicator species for the wetlands and the northern parula for the bottomland forest and the cropland area proposed for reforestation. The riverside levee was not justified based upon the construction cost and the small amount of habitat units generated by that feature. The slough that begins in Zone 2, is utilized as part of the water conveyance for Zone 3, and traverses nearly all of Zone 4 down almost to Dog Island, and its associated wetlands provides another opportunity for managed wetlands. The pump channel from the riverside pump station crosses the slough north of and adjacent to the Rip Rap Landing road. Water control structures at the road will enable the entire slough and wetlands in Zone 4 to be managed for moist soil plants. Fifty-seven percent of the cost of construction of the pump station and pump channel are allocated to the zone based upon the amount of water required. Chemical or mechanical manipulation of the herbaceous vegetation on the cropland will be required to facilitate regeneration of bottomland forest on most of the area. Bottomland forest was evaluated for this zone, but was not included in the final incremental cost analysis because it was determined that this feature was a responsibility of the NRCS as dictated by the existing WRP easement. Over time, fewer scouring river events will occur in the zone and the bottomland forest canopy will close providing a large unbroken tract of bottomland forest favored by the Northern parula.

e. Zone 5.

This zone encompasses all of Dog Island and is general plan lands owned by the Corps of Engineers and managed by IDNR. The entire zone is forested except for internal sloughs and the side of the island bounded by Sny Creek. Without project the bottomland forest will continue to age, the sloughs will become shallower due to siltation and the lack of water depth in Sny Creek will inhibit use of the upstream lake and wetlands by fish.

AHAG Evaluation – The portion of Sny Creek adjacent to Dog Island proposed for dredging was evaluated as part of the fisheries benefits including Sny Creek in Zone 4, and Roadside Lake and the dredge cut into the lake in Zone 3.

WHAG Bottomland Hardwood Evaluation – The bottomland forest on the island was evaluated using the bottomland forest matrix, and showed an increase in habitat benefits as the forest aged over the life of the project. However, no additional benefits accrued because no project features are proposed for the forested area of the island.

WHAG Nonforested Wetland Evaluation – Sloughs and rudimentary side channels traverse Dog Island in several locations. Without the project these areas are expected to disappear over the next 50 years due primarily to siltation from frequent river flooding. With project features proposed for these sloughs and side channels would deepen them and provide rock structures that would scour and maintain connections to the river.

5. RESULTS

WHAG habitat units were calculated at the six evaluation locations. For agency evaluation, the project effects on all species were evaluated (Table D-4 – D-10). However, only those species indicated were used to determine project benefits. This was done to avoid using species with similar habitat uses which could result in double counting benefits when Net AAHU were summed and to focus on those species of management and conservation concern.

Table D-4. Zone 1. With, without and net annualized habitat units for Zone 1. Only mallard values were used to evaluate project benefits.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler	Sum
Bottomland Hardwoods	With	**72.27**						54.02	50.80	46.24		43.14	43.58	
	W/O	**0.00**						49.29	44.81	42.53		43.05	42.53	72.27
	Net	**72.27**						4.73	5.99	0.08		0.08	1.06	
Nonforested Wetlands	With	**35.42**	25.69	26.29	28.86	26.40	20.13	35.05			32.69			
	W/O	**0.00**	0.00	29.08	28.86	6.28	23.86	32.20			27.92			35.42
	Net	**35.42**	25.69	-2.79	0.00	20.12	-3.72	2.85			4.77			
Cropland to Bottomland Hardwoods	With	**51.16**						19.15		14.18		14.18	4.49	
	W/O	**0.00**						0.00		0.00		0.00	0.00	51.16
	Net	**51.16**						19.15		14.18		14.18	4.49	

Table D-5. Zone 2. With, without and net annualized habitat units for Zone 2. Only Northern parula values were used to evaluate project benefits.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler	Sum
Bottomland Hardwoods	With							125.67	138.82	114.12		**144.45**	198.62	
	W/O							125.67	134.48	114.12		**144.45**	192.12	
	Net							0.00	4.33	0.00		**0.00**	6.50	
Nonforested Wetlands	With													
	W/O													
	Net													
Cropland to Bottomland Hardwoods	With							20.55	3.45	18.70		**11.90**	3.18	
	W/O							0.00	0.00	0.00		**0.00**	0.00	**11.90**
	Net							20.55	3.45	18.70		**11.90**	3.18	

Table D-6. Zone 2 (With Riverside Levee). With, without and net annualized habitat units for Zone 2. Only Northern parula values were used to evaluate project benefits.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler	Sum
Bottomland Hardwoods	With							137.89	142.99	118.77		**154.56**	204.69	10.11
	W/O							125.67	138.82	114.12		**144.45**	198.62	
	Net							12.22	4.17	4.65		**10.11**	6.07	
Nonforested Wetlands	With													
	W/O													
	Net													
Cropland to Bottomland Hardwoods	With							16.46	17.06	14.17		**18.44**	24.42	18.44
	W/O							0.00	0.00	0.00		**0.00**	0.00	
	Net							16.46	17.06	14.17		**18.44**	24.42	

Table D-7. Zone 3 (Roadside Lake). With, without and net annualized habitat units for Zone 3, Roadside Lake and associated wetlands. Only the mallard values were used to evaluate project benefits for bottomland hardwoods and nonforested wetlands.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler	Sum
Bottomland Hardwoods	With	**12.89**						29.95	26.91	31.38		20.60	24.60	**2.22**
	W/O	**10.67**						29.95	24.08	30.57		20.60	24.60	
	Net	**2.22**						0.00	2.84	0.81		0.00	0.00	
Nonforested Wetlands	With	**37.81**	38.57	74.43	68.13	29.44	200.38	80.55			72.35			**37.81**
	W/O	**0.00**	0.00	0.00	66.43	66.87	157.10	82.85			61.34			
	Net	**37.81**	38.57	74.43	1.70	-37.42	43.28	-1.70			11.02			

Table D-8. Zone 3 (Waverly Lake). With, without and net annualized habitat units for Zone 3, Waverly Lake and associated wetlands. Only mallard and Northern parula values were used to evaluate project benefits. Mallard for bottomland hardwoods and nonforested wetlands and Northern parula for converted cropland.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler	Sum
Bottomland Hardwoods	With	**63.24**						146.95	132.04	153.94		100.12	120.69	
	W/O	**53.35**						146.95	118.13	149.98		100.14	120.69	**10.88**
	Net	**10.88**						0.00	13.92	3.97		-0.02	0.00	
Nonforested Wetlands	With	**93.29**	86.66	215.3	180.67	140.30	200.38	193.63			172.22			
	W/O	**37.50**	35.35	163.96	164.07	131.33	157.10	228.68			160.09			**55.79**
	Net	**55.79**	51.31	51.34	16.60	8.97	43.28	-35.04			12.12			
Cropland to Bottomland Hardwoods	With							11.11		11.74		8.23	10.61	
	W/O							0.00		0.00		0.00	0.00	**8.23**
	Net							11.11		11.74		8.23	10.61	

Table D-9. Zone 4. With, without and net annualized habitat units for Zone 4. Only mallard and Northern parula values were used to evaluate project benefits. Mallard for nonforested wetlands and Northern parula for converted cropland.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yel. legs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Proth. Warbler	Sum
Nonforested Wetlands	With	**77.78**	77.42	151.83	124.03	44.91	131.36	139.75			124.39			
	W/O	**0.00**	0.00	0.00	120.94	76.10	0.00	142.97			99.78			**77.78**
	Net	**77.78**	77.42	151.83	3.09	-26.19	131.36	-3.22			24.61			
Cropland to Bottomland Hardwoods	With							242.15		220.34		**140.22**	149.65	
	W/O							0.00		0.00		**0.00**	0.00	**140.22**
	Net							242.15		220.34		**140.22**	149.65	

Table D-10. Zone 5. With, without and net annualized habitat units for Zone 5. Only Northern Parula values were used to evaluate project benefits for bottomland hardwoods.

WHAG Evaluation		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler	Sum
Bottomland Hardwoods	With							166.47	181.21	146.55		**150.10**	201.95	
	W/O							166.47	181.21	146.55		**150.10**	201.95	
	Net							0.00	0.00	0.00		**0.00**	0.00	

AHAG habitat units were calculated at the six evaluation locations. AHAG evaluation questions are species specific unlike the evaluation questions for the WHAG. Therefore, habitat suitability indices and habitat units were only generated for species used to determine project benefits (Table D-11). Species were selected because they utilize the current or are anticipated to use the future habitat at Rip Rap Landing; they represented different guilds from different taxonomic families and because they are of management interest. Species from different guilds and taxonomic families were chosen to avoid using species with similar habitat uses which could result in double counting benefits when Net AAHU were summed.

Table D-11. With, without and net habitat units were determined using the AHAG evaluation in identified linear sections of Sny Creek and in Roadside Lake. Only the smallmouth buffalo values were used to evaluate project benefits.

Net AAHU for AHAG Evaluation				
Location AAHUs	**Smallmouth Buffalo**		**Bluegill**	
Sny Creek Waverly L. to Bridge	With Without Net	4.172 1.624 2.548	4.004 1.652 2.352	**2.55**
Sny Creek Bridge to Sand Levee	With Without Net	2.175 0.847 1.328	2.088 0.861 1.227	**1.33**
Sny Creek Sand Levee to Roadside L. Cut	With Without Net	1.388 0.539 0.849	1.320 0.549 0.771	**.85**
Roadside Lake	With Without Net	69.200 26.900 42.300	66.500 27.600 38.900	**42.3**
Sny Creek Roadside L. Cut to Dog Island	With Without Net	4.157 1.618 2.539	3.990 1.646 2.344	**2.54**
Sny Creek Adjacent to Dog Island	With Without Net	3.001 1.172 1.829	2.887 1.192 1.695	**1.83**

The alternatives used in the incremental cost analysis are single components of project features that could be implemented separately or in combination (Table D-3). The alternatives generate a variety of habitat units determined by how well they address the problems discussed in the DPR.

Table D-12. Rip Rap Landing AAHUS allocation by project feature

ZONE 1

ID#	**Project Feature**	**AAHUs Allocated**	**Origin of AAHUs & Indicator Species**
1A	**Water Control Structures**	**15**	**Habitats Combined BLH/NFW- Mallard**
1B	**2,500 gpm Well**	**96**	**Habitats Combined BLH/NFW/Crop to BLH-Mallard**
1C	**Conversion of Crop to BLH**	**43**	**Conversion of Crop to BLH – Mallard**

1D	**Channel to Goose Pasture L.**	**5**	**Non-forested Wetland - Mallard**

Zone 2

ID #	Project Feature	AAHUs Allocated	Origin of AAHUs & Indicator Species
2A	River Levee @ 450'	17	BLH/Conversion of Crop – Northern Parula
2B	Conversion of Crop to BLH	12	Conversion of Crop to BLH – Northern Parula

Zone 3

ID#	Project Feature	AAHUs Allocated	Origin of AAHUs & Indicator Species
3A	Channel to Waverly Lake	20	Non-forested Wetland/BLH - Mallard
3B	Water Control in Channel	3	Non-forested Wetland - Mallard
3C	WCS in North Units	21	Non-forested Wetland/BLH - Mallard
3D	Sny Creek Dredging to Bridge	3	AHAG for Sny – Smallmouth Buffalo
3E	43% of Pump Station	20	Non-forested Wetland/BLH - Mallard
3F	Widening Pump Channel	3	Non-forested Wetland/BLH - Mallard
3G	Pump Station Pipe & Concrete for Roadway	2	Non-forested Wetland/BLH - Mallard
3H	WCS Pipes Under Sand Levee	6	Non-forested Wetland/BLH - Mallard
3I	Conversion of Crop to BLH	8	Crop Conversion to BLH – Northern Parula
3J	Roadside L. Channel from Sny	2	AHAG for Roadside – Smallmouth Buffalo
3K	Water Control Roadside L.	40	Non-forested Wetland Roadside - Mallard

Zone 4

ID#	Project Features	AAHUs Allocated	Origin of AAHUs & Indicator Species
4A	Sny Dredging Bridge-Levee	1	AHAG for Sny –Smallmouth Buffalo
4B1	Sny Dredging Levee to Roadside L. Channel	1	AHAG for Sny –Smallmouth Buffalo
4B2	Sny Dredging Roadside to Dog Island	30	AHAG for Sny & Roadside Lake –Smallmouth Buffalo
4C1	River Ridge Levee	39	Mallard & Northern Parula
4C2	River Ridge Scour Swales	15	Crop to BLH Conversion – Northern Parula
4D	South Spillway	50	Non-forested Wetland - Mallard
4E	WCS South Spillway	4	Non-forested Wetland - Mallard
4F	Diversion Levee on slough	6	Non-forested Wetland - Mallard
4G	57% of Pump Station	12	Non-forested Wetland - Mallard
4H	57% Pump Channel Widening	2	Non-forested Wetland - Mallard
4I	57% Pipe and Concrete @ Road	1	Non-forested Wetland - Mallard
4J	WCS Pipes Under Road	3	Non-forested Wetland - Mallard
4K	Cropland to BLH	125	Crop to BLH – Northern Parula

Zone 5

ID#	Project Feature	AAHUs Allocated	Origin of AAHUs & Indicator Species
5B	Sny Dredging @ Dog Island	15	AHAG for Sny and Roadside Lake - Smallmouth Buffalo

6. REFERENCES

MDC (Missouri Department of Conservation), and NRCS (U.S.D.A. Soil Conservation Service). 1990. Wildlife habitat appraisal guide (WHAG), User's Guide. Jefferson City, Missouri. 102 pp.

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APPENDIX E

INCREMENTAL COST ANALYSIS

RIP RAP LANDING HABITAT REHABILITATION AND ENHANCEMENT PROJECT

APPENDIX E
INCREMENTAL COST ANALYSIS (ICA)

1. PURPOSE

Corps of Engineers guidance requires a cost effectiveness analysis and an incremental cost analysis for recommended environmental restoration and mitigation plans. A cost effectiveness analysis is conducted to ensure that the least cost solution is identified for each possible level of environmental output. An incremental cost analysis of the solutions is conducted to reveal changes in costs for increasing levels of environmental outputs. In the absence of a common measurement unit for comparing the nonmonetary benefits with the monetary costs of environmental plans, cost effectiveness and incremental cost analysis are valuable tools to assist in decision making. This appendix presents the results of the cost effectiveness analysis and incremental cost analysis of the Rip Rap Landing Habitat Rehabilitation and Enhancement Project, Calhoun County, Illinois.

2. METHOD

The project was evaluated using guidance documents and software prepared by the Corps of Engineers' Institute for Water Resources (IWR). IWR –Planning Suite Software (Version 1.0.11.0, Sept 24, 2008) was used to automate steps in the cost effectiveness and incremental cost analysis. Much of the text of this appendix was borrowed from IWR Report (IWR 94-PS-2), *Cost Effectiveness Analysis for Environmental Planning: Nine EASY Steps* (Orth, 1994). The cost effectiveness and incremental cost analysis procedures are presented in nine steps, which are grouped into four tasks listed below.

A. Formulation of Combinations

Step 1 Display outputs and costs
Step 2 Identify combinable management features
Step 3 Calculate outputs and costs of combinations

B. Cost Effectiveness Analysis

Step 4 Eliminate economically inefficient solutions
Step 5 Eliminate economically ineffective solutions

C. Development of Incremental Cost Curve

Step 6 Calculate average costs
Step 7 Recalculate average costs for additional outputs

D. Incremental Cost Analysis

Step 8 Calculate incremental costs
Step 9 Compare successive outputs and incremental costs

The results of these analyses are displayed as graphs and tables at the end of this appendix. They allow the decision makers to progressively compare alternative levels of environmental

outputs and ask if the next level is "worth it" – that is, is the additional environmental output in the next level worth its additional monetary costs. It is important to note that these analyses will not usually lead, and are not intended to lead, to a single best solution as in economic cost-benefit analyses. They will improve the quality of decision making by ensuring that a rational, supportable, focused and traceable approach is used for considering and selecting alternative methods to produce environmental outputs.

A. Formulation of Combinations

Step 1. Display outputs and costs. Table E-1 at the end of this appendix displays the outputs and costs of potential management features. Outputs were determined using Habitat Evaluation Procedures and are presented as net Average Annual Habitat Units. Costs were annualized over a 50-year period of analysis at an interest rate of 3.75% based on Economic Guidance Memorandum, 10-1, Federal Interest Rates for Corps of Engineers Projects for Fiscal Year 2012. These costs include initial construction (with mobilization & demobilization (5%), contingency (25%), engineering fees (15%), and construction management (10%) above the actual estimated cost for construction) and the cost of replacing each management feature during the 50-year period of analysis.

Step 2. Identify combinable management features. The management features were reviewed to determine which were dependent on other features and which were logically combinable into functional alternatives (Table E-2), either by the zone within the project area where the proposed features would impact, or by the type of feature being proposed, such as vegetation conversion. Outputs were determined using Habitat Evaluation Procedures and are presented as net Average Annual Habitat Units. On this project, each of the alternatives was evaluated separately because they each provide unique conditions that are not duplicated by other alternatives.

Step 3. Calculate output and costs of combinations. Step 3 calculates the outputs and costs of each of the possible alternatives. ICA generated 506 plans. For features with only one possible alternative other than No Action, incremental cost analysis is not necessary.

B. Cost Effectiveness Analysis

Steps 4 and 5. Eliminate economically inefficient solutions and economically ineffective solutions. Steps 4 and 5 were carried out using the IWR-Planning Suite software. Step 4 eliminates economically inefficient solutions and identifies the least cost solution for each level of output. For example, if two plans produce two AAHUs and one costs $3,000 while the other costs $4,000, the more expensive plan is eliminated.

Step 5 eliminates the economically ineffective solutions by identifying and deleting those solutions that will produce less output at equal or greater cost than subsequently ranked solutions. For example, if one plan produces 2 AAHUs for $8,000 and the next plan produces 4 AAHUs for $6,000, the first plan would be eliminated because it is not economically effective.

Of the 506 generated plans, 40 were considered cost effective.

C. Development of Incremental Cost Curve

Step 6. Calculate average costs. Average costs for each least-cost, cost-effective plan are determined by dividing the cost of the plan by the output (AAHUs). Average costs are expressed in cost per AAHU ($/AAHU). The plan with the lowest average cost is identified. Plans with less output at a higher average cost are eliminated.

Step 7. Recalculate average costs for additional outputs. This step asks the question: "of the remaining levels of output, which has the lowest additional cost for additional output?" Using levels of output from Step 6, the average annual costs for additional output are calculated. The previous step's lowest average cost level of output is used as the "zero level." Levels of output less than the lowest average cost level are dropped from further analysis, while levels of output greater than the lowest average cost level advance to the next recalculation. Recalculations are then made using the new lowest average cost level as the "zero level" until the highest level of output is reached. The incremental costs for additional outputs were applicable to alternatives in groups D and L as these alternatives represented lengthening or extensions of a specific feature. Steps 6 and 7 were carried out using the IWR-Planning Suite software.

D. Incremental Cost Analysis

Step 8. Calculate incremental costs. Step 8 was carried out using the IWR-Planning Suite software. The 10 plans listed in Table E-3 are the "best buys," meaning these plans produce the most AAHUs per dollar. The incremental costs shown in Table E-3 are calculated by dividing the difference between the different plans output. Figure E-1 is a graph of the incremental costs of alternatives as listed in Table E-3. As shown in the chart, there are seven "best buy" combinations. Table E-3 and Figure E-1 are included at the end of this appendix.

Step 9. Compare successive outputs and incremental costs. Table E-3 and Figure E-1 were used as decision making tools by progressively proceeding through available levels of output and determining if the next level is worth its additional monetary costs. This step examined the additional habitat value, as measured by increased AAHU output, for an increase in monetary costs. Federal planning for water resources development is conducted in accordance with the requirements of the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G). The P&G provides a decision rule for selecting a tentatively selected plan where both outputs and costs are measured in dollars. This rule states: "The alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment (National Economic Development Plan, NED Plan) is to be selected… (Paragraph 1.10.2)". There is no similar rule for plan selection where the outputs are not measured in dollars, as is the case in planning for restoration and mitigation. In the absence of such a decision-making rule, cost-effectiveness and incremental cost analyses helps to better understand the consequences of the preferred plan in relation to other choices.

E . ICA Conclusions & Selection of Tentatively Selected Plan.

The best buy alternatives presented provide the information necessary to make well-informed decisions regarding desired project scale (Table E-3, Figure E-1). Progressing through the increasing levels of output for the alternatives in Table 7 helps determine whether the increase in Net AAHUs is worth the additional cost. As long as decision makers consider a level of output to be "worth it", subsequent levels of output are considered. When a level of output is

determined to be “not worth it”, then subsequent levels of output will also likely be “not worth it”, and the final decision regarding desired project scale for environmental restoration planning will have been reached.

Typically in the evaluation of Best Buy Alternatives, ‘break points’ are identified in either the last column in Table E-3, or in the stair step progression from left to right in Figure E-1. Break points are defined as significant increase or ‘jumps’ in incremental cost per output, such that subsequent levels of output may/may not be considered ‘worth it’. Identification of such breakpoints can be subjective. For Rip Rap Landing, the breakpoints are subjectively identified as occurring between Alternative 3 and 4; Alternative 8 and 9; and between Alternatives 11 and 12. Alternatives 4 and generate substantially higher levels of output, 125 incremental AAHUs and 89 incremental AAHUs, respectively, making the decision to continue elevating and considering Best Buy Alternatives beyond the first two breakpoints logical.

Alternative 8 generates a total of 431 AAHUs at an average cost of $927 per output. Alternative 9 only generates an additional 1 AAHU at an incremental cost of $48,000 per output. This considerable higher incremental cost per unit was deemed “not worth it”. Therefore, Alternative 8, generating a total 431 Net AAHUs, is identified as the desired project scale.

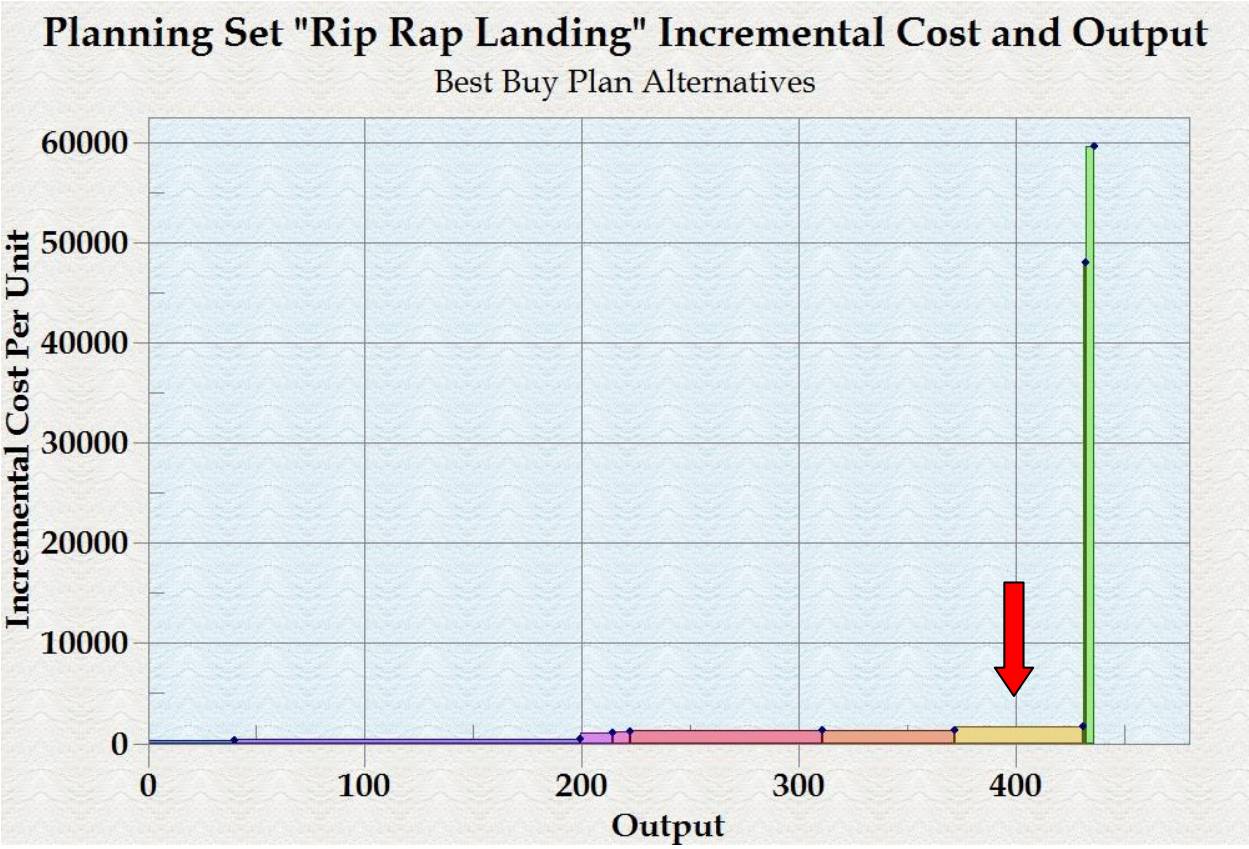


Figure E.1 Rip Rap Landing Best Buy Alternatives. The Tentatively Selected Plan (Alternative 11) is highlighted in Red.

Table E-1. Total Costs (FY12) and Design Life of Environmental Enhancement Features

Code	Description	Design Life (yr)	Total Cost[1] ($)
Zone 1 – Sny Island Drainage and Levee District			
1A	Water Control Structure	20	$44,052
1B	2,500 gpm Well	15	$349,852
1C	Conversion of Crop to Bottomland hardwoods	50	$207,689
1D	Channel to Goose Pasture Lake	20	$27,245
Zone 3 – Roadside Lake and Waverly Lake Wetland Management Areas			
3A	Channel to Waverly Lake	20	$232,220
3B	Water Control in Pump Station Channel	20	$44,521
3C	WCS in North Units	20	$195,761
3D	Sny Creek Excavation from Sny Levee to Bridge	20	$2,002,965
3E	43% of Pump Station	25	$195,444
3F	43% Pump Channel Widening	20	$32,480
3G	43% Pump Station Pipe and Concrete for Road	20	$6,780
3H	WCS Pipes Under Sand Levee	20	$82,569
3I	Conversion of Crop to Bottomland hardwoods	50	$120,519
3J	Roadside Lake Channel from Sny Creek	20	$13,943
3K	Portable pump and water control structure for Roadside Lake	20	$79,583
Zone 4 – Rust Land Company - WRP			
4A	Sny Creek Excavation Bridge-Old Levee End	20	$1,115,856
4B1	Sny Creek Excavation Old Levee to Roadside Lake Channel	20	$628,953
4B2	Sny Creek Excavation Roadside to Dog Island	20	$277,043
4C2	River Ridge Scour Embankments	25	$230,625
4D	South Spillway	25	$535,996
4E	WCS South Spillway	20	$43,689
4G	57% of Pump Station	25	$259,076
4H	57% Pump Channel Widening	20	$43,055
4I	57% Pump Station Pipe and Concrete for Road	20	$8,987

Code	Description	Design Life (yr)	Total Cost[1] ($)
4J	WCS Pipes Under Road	20	$61,977
4K	Conversion of Crop to Bottomland hardwoods	50	$905,932
Zone 5 – Dog Island			
5B	Sny Creek Excavation @ Dog Island	20	$765,692

[1]Total Costs includes Contingency, Engineering Fees, Construction Management, Construction Cost, Present Worth of Replacements, and OMRR&R costs

Table E-2. Cost and Outputs (FY12) for Alternatives Analyzed during ICA.

ICA Code	Feature Code	Brief Description	Output (AAHU)	Average Annual Cost[1] ($)
A1	1A+1B+1D	Zone 1 Water Control	116	$61,000
A2	1C+(1A+1B+1D)	Zone 1 Water Control + Zone 1 Trees	159	$71,000
B1	1C	Zone 1 Trees	43	$19,000
W1	3A + 3B + 3C + (3E, 3F, 3G, 3H) + (4G, 4H, 4I)	Zone 3 Water Control	90	$129,000
W2	4D, 4E + (4G, 4H, 4I, 4J)+ (3E, 3F, 3G)	Zone 4 Water Control	97	$123,000
W3	3A + 3B + 3C + (3E, 3F, 3G, 3H) + 4D, 4E + (4G, 4H, 4I, 4J)	Zones 3 and 4 Water Control	147	$214,000
W4	3A + 3B + 3C + (3E, 3F, 3G, 3H) + (4G, 4H, 4I), 3I	Zone 3 Water Control + Zone 3 Trees	98	$136,000
W5	3A + 3B + 3C + (3E, 3F, 3G, 3H) + 4D, 4E + (4G, 4H, 4I, 4J), 3I	Zones 3 and 4 Water Control + Zone 3 Trees	156	$220,000
C1	3I	Zone 3 Trees Only	8	$10,000
S1	4C2	Zone 4 Scour embankment	15	$16,500
D1	5B	Sny Creek Excavation at Dog Island	29	$58,000
D2	5B, 4B2	Sny Creek Excavation at Roadside to Dog Island and Sny Dredging @ Dog Island	59	$80,000
D3	5B, 4B2, 4B1	Sny Creek Excavation at Levee to Roadside L. Channel , Sny Excavation Roadside to Dog Island, and Sny Excavation @ Dog Island	60	$128,000
D4	5B, 4B2, 4B1, 4A	Sny Creek Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside to Dog Island, and Sny Excavation @ Dog Island	61	$213,000
D5	5B, 4B2, 4B1, 4A, 3D	Sny Creek Excavation to Bridge, Sny Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside to Dog Island, and Sny Excavation @ Dog Island	64	$366,000

ICA Code	Feature Code	Brief Description	Output (AAHU)	Average Annual Cost[1] ($)
R1	3K, 3J	Roadside Lake Water Control	40	$12,000
R2	3K, 3J, 5B, 4B2	Roadside Lake Water Control, Sny Excavation Roadside to Dog Island and Sny Excavation @ Dog Island	101	$92,000
R3	3K, 3J, 5B, 4B2, 4B1	Roadside Lake Water Control., Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside to Dog Island, and Sny Excavation g @ Dog Island	102	$140,000
R4	3K, 3J, 5B, 4B2, 4B1, 4A	Roadside Lake Water Control, Sny Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside to Dog Island, and Sny Excavation @ Dog Island	103	$225,000
R5	3K, 3J, 5B, 4B2, 4B1, 4A, 3D	Roadside Lake Water Control Sny Creek Excavation to Bridge, Sny Excavation Bridge-Levee, Sny Excavation Levee to Roadside L. Channel , Sny Excavation Roadside to Dog Island, and Sny Excavation @ Dog Island	106	$378,000

[1]Average Annual Costs includes Contingency, Engineering Fees, Construction Management, Construction Cost, Present Worth of Replacements, LERRDS, and OMRR&R costs

Table E-3. Incremental Costs of Best Buy Plans. Price Level July 2012.

Alt #	Alternative Symbol	Description – Additional Group Added	Output[1]	Annualized Cost[2]	Average Cost ($/AAHU)	Incremental Cost ($)	Incremental Output (AAHU)	Incremental Cost/Output ($/AAHU)	Acreages Required (Acres)	Real Estate Costs
1	No Action	None	0	0	0	0	0	0	0	0
2	A0B0W0C0S0D0R1	Zone 3 Roadside Lake Water Control	40	$12,000	$300	$12,000	40	$300	99	$125,235
3	A2B0W0C0S0D0R1	Zone 1 Water Control and Vegetation	199	$83,200	$418	$71,200	159	$448	259	$702,259
4	A2B0W0C0S1D0R1	Zone 4 Scour Protection	214	$99,700	$466	$16,500	15	$1,100	269	$714,909
5	A2B0W0C1S1D0R1	Zone 3 Vegetation	222	$109,300	$492	$9,600	8	$1,200	306	$800,009
6	A2B0W2C0S1D0R1	Water Control Zone 4	311	$222,300	$715	$113,000	89	$1,270	1062	$1,718,054
7	A2B0W2C0S1D0R2	Roadside Lake Reconnection	372	$302,200	$812	$79,900	61	$1,310	1072	$1,730,704
8	**A2B0W5C0S1D0R2**	**Water Control Zones 3 and 4**	**431**	**$399,400**	**$927**	**$97,200**	**59**	**$1,648**	**1618**	**$2,886,000**
9	A2B0W5C0S1D0R3	Sny Creek to Levee	432	$447,400	$1,036	$48,000	1	$48,000	1622	$2,991,817

10	A2B0W5C0S1D0R5	Sny Creek to Bridge	436	$685,900	$1,573	$238,500	4	$59,625	1641	$3,015,852

[1]Outputs are calculated as Average Annual Habitat Units (AAHUs)
[2]Annualized cost (FY12) includes initial construction, monitoring, and OMRR&R costs based on a 50-year period of analysis, 3.75% interest rate

APPENDIX F

HAZARDOUS, TOXIC & RADIOACTIVE WASTES

APPENDIX F
HAZARDOUS, TOXIC AND RADIOACTIVE WASTES

A phase I HTRW Study for the Rip Rap Landing HREP was completed in October of 2010. Generally, the project area contains no major sites of interest, which pose significant environmental concerns. The environmental records search as well as the interviews and site visit found minimal data suggesting environmental concerns to be present in this project area. Regarding the portable pumps and ASTs that are temporarily used on site, historic off-site dumping, and periodic flooding that brings occasional materials on-site, these issues are either considered de-minimus conditions or only as potential RECs that are not expected to impact activities due to their infrequent and monitored use, distance from the site, topographic locations, etc. Pesticide application can be a potential REC for agricultural properties. However, the properties where this could occur appear to be routinely farmed and still in production. Therefore, land management practices would include routine ground tilling that would induce phyto- and biodegradation of residual pesticides thus are not likely to impact the site.

Based upon the present and historic usage of this site, environmental records search, site reconnaissance, and personal interviews, no known or suspect environmental conditions were identified that impact the site.

A full copy of the HTRW report is available on request.

APPENDIX G

WATER QUALITY

APPENDIX G
WATER QUALITY

1. PURPOSE

The purpose of this appendix is to discuss the past and present water quality within Sny Creek, its tributaries, and the Mississippi River. Removing sediment from Sny Creek and building up the levee to provide enhanced flood protection will improve water quality. The Mississippi River will be the source for additional water pumped to Zones 3 and 4.

2. INTRODUCTION

Increasing water depths within Sny Creek will have a long term beneficial effect on the surface water quality within Sny Creek. Water level management within the interior wetlands through the use of a new pump station, water conveyance channels, and enhanced water control structures will allow site mangers to effectively enhance wetlands within the various ecological zones, improve surface water quality, and maintain desirable vegetation communities.

3. METHODS

Water quality data for the Mississippi River were evaluated for this DPR from samples collected and analyzed by the Illinois EPA at a sampling station located at Winfield Ferry DS and Lock and Dam 25, Upper Mississippi River, Mississippi River North Central. The sampling station (ID 48467) is located approximately 20 miles south of the Rip Rap Landing Conservation Area. Limited historical data from this station was available from 1972 through 1977 (USEPA Storet, 2010). Selected data from the station is presented in the attached table below.

Unfortunately, no other sampling stations (i.e., USGS or IL EPA) were identified for the Sny Creek within the vicinity of the project area.

Upper Mississippi River System
Environmental Management Program

Rip Rap Landing HREP
Pool 25, Mississippi River Miles 260.5 through 267
Calhoun County, Illinois

Parameters	Temp.	pH	Spec. Cond.	Ammonia	Total Phos.	NO_2-NO_3	Diss. Oxygen	Total Filt. Resid. (TSS)
Units	F	SU	umhos/cm	mg/l	mg/l	mg/l	mg/l	mg/l
1/17/1972		7.7	400	0.5	0.8	1.4	12.8	
2/2/1972		7.8	417	1.5	0.55	1.3		
3/27/1972		7.8	350	0.1	0.1	1.6	10.1	
4/24/1972		8	350	0.2	0.6	2.1	7	
5/22/1974		7.8	367	0.1	0.1	2.2	4.4	
6/26/1972		8.1	433	0.1	0.15	3.8	6.4	
9/5/1972		7.7	350	0.9	0.5	1.4	6.7	
10/2/1972		8.2	417	0.2	0.34	1.8	2.5	
11/8/1972		8.2	433	0	0.14	2.9	10.4	
12/7/1972		8.1	483	0	0.14	3.2	14	
1/4/1973		7.4	433	0.3	0.25	2.5	12.4	
2/5/1973		7.8	383	0.5	0.44	2.2	9.7	
3/1/1973		8.3	467	0.2	0.25	2.4	13.3	
6/21/1973		7.9	367	0.1	0.35	2.1	5.4	
7/12/1973		8.2	433	0.1	0.25	1	5.9	
8/9/1973		8.5	433	0	0.21	2.2	8.5	
10/1/1973		8	340	0.6	0.33	1	5	
11/5/1973		8.2	433	0.2	0.39	2.1	10.2	
12/3/1973		8.6	433	0.1	0.25	2.4	11.3	
1/16/1974		8.2	533	0.3	0.19	2.7	12.4	
2/13/1974		8.2	417	0.7	0.27	2.7	13.3	
3/7/1974		8.2	433	0.7	0.48	2.7	10.9	
4/17/1974		8.3	550	0.3	0.3	3	9.3	
5/15/1974		8.4	583	0.6	0.17	1.8	8.3	
7/17/1974		8.4	550	0.1	0.28	3.7	6.4	
8/19/1974		8.5	517	0.1	0.1	1.4	7.2	
9/18/1974		8.4	567	0	0.25	0.7	9.7	
10/23/1974	55	8.4	517	0	0.14	0.4	8.3	310
11/20/1974	47	8.3	600	0.2	0.61	1	10.7	360
12/30/1974	37	8.7	433	0	0.17	1.3	17	260
1/29/1975		8.5	433	0	0.34	1.6	15.4	
3/4/1975		8.2	467	0.42	0.54	1.8		
4/14/1975		8.2	417	0.45	0.36	2.4	10.6	
6/4/1975		8.1	433	0.14	0.28	2.1	5.7	
7/30/1975		8.3	467	0.24	0.21		7.3	
9/15/1975		8.3	400	0.08	0.2	0.8	9.1	
10/8/1975		8.7	350	0.11	0.14	0.1	9.3	
11/3/1975		8.4	367	0.18	0.13	0.2	9.1	
12/3/1975		8.3	367	0.08	0.25	2	13	
3/3/1976		8	400	0.26	0.34	1.5		
4/19/1976		8.1	283	0.07	0.23	0.08	8.1	
6/14/1976		8.4	433	0.01	0.19	2.9	9.4	
7/7/1976		8.1	420	0.06	0.19	2.1		
8/11/1976		8.3		0.07	0.19	0.6		
9/13/1976		8.2	417	0.01	0.32	0.4	8.3	
11/17/1976		8.3	433	0.11		2		
12/15/1976		8.6	467	0.09	0.14			
3/30/1977			383	0.07				
4/27/1977			433	0.01				
5/19/1977			367	0.33				
6/15/1977			433	0.39				
Mean	46.3	8.2	432	0.23	0.29	1.81	9.37	310
Min	37	7.4	283	0.00	0.10	0.08	2.50	260
Max	55	8.7	600	1.50	0.80	3.80	17.00	360
Source: USEPA Legacy Storet, 2010								
Sampling Station: IL EPA 48467 - Mississippi River Winfield Ferry DS L&D 25								

4. RESULTS AND DISCUSSION

Historical data suggests that physical water quality parameters (i.e., pH and dissolved oxygen) within the river have been generally been good. Dissolved oxygen values varied from 17.0 to 2.5 mg/l (9.37 mg/l mean) from 1972 through 1977. The historical mean is above the State of Illinois water quality standard of 5.0 mg/l. Historical pH values averaged 8.2 with minimum and maximum values of 7.4 and 8.7, respectively. Specific conductance at the sampling station varied historically from 283 to 600 umhos/cm.

Historical chemical parameters included ammonia, total phosphorus, nitrate-nitrite, and total filterable residue (now called total suspended solids). Historical total filterable solids or total suspend solids (TSS) values are an indication of typical river turbidity. While no federal or state phosphorus water quality standards have been set, a desired goal of 0.1 mg/l of total phosphorus in stream and rivers is noted in the national water quality criteria document (USEPA 440/5-86-001, 1986) to prevent algal nuisances. Historical total phosphorus values exceeded this level averaging 0.29 mg/l.

Current nitrogen concentrations throughout the river have likely increased compared to concentrations observed during 1970s. Increased nonpoint source runoff in the 1990s likely favored mobilization of nitrite nitrate-nitrogen from heavily tiled agricultural watersheds, resulting in excess nitrogen delivered to the river during this period.

Overall, the Rip Rap Landing HREP will help to improve water quality and aquatic habitat through a more controlled management effort. Desirable wetland communities can be manipulated more easily and will provide better functional habitat.

A. Mississippi River. The Federal Water Pollution Control Act, Section 303(d), requires all states to identify waters for which existing required pollution controls are not stringent enough to implement state water quality standards. Total maximum daily loads (TMDLs) must then be developed for these waters so they will meet water quality standards in the future. The Mississippi River in Illinois has been placed in the Medium Priority Category of impaired waters. Medium priority waters are watersheds containing one or more waters that are not supporting aquatic life use, fish consumption use, or primary contact (swimming) use.

Most of the entire length of the Mississippi River in Illinois is considered impaired (due to habitat loss) for one or more of the these parameters: Manganese, Mercury, Polychlorinated biphenyls, Fecal Coliform, Total Dissolved Solids, Iron, Total Suspended Solids (TSS), and pH.

B. Sny Creek. Sny Creek is not listed on the States 303(d) list.

5. CONCLUSIONS

Currently, water on the site is augmented by pumping river water into the wetlands. Upgrades to the pumping capabilities will allow managers more flexibility to establish the desired water levels. Site-specific water quality and its impact on wetland augmentation should be monitored pre-and-post project implementation. Water samples should be collected from the project area and analyzed for temperature, pH, specific conductance, total ammonia-nitrogen, nitrite-nitrate, total phosphorus, total suspended solids, dissolved oxygen, manganese, mercury, polychlorinated biphenyls, fecal coliform, total dissolved solids, and iron.

Water quality in the Mississippi River and in groundwater within the floodplain is generally of good enough quality for wetland supply enhancement. The tentatively selected plan does include using surface water from Mississippi River for supply to the wetlands. Both groundwater and Mississippi River surface water would be used under the plan. No significant water quality concerns have been identified for using groundwater or Mississippi River water for wetland enhancement supply.

APPENDIX H

GEOTCHNICAL CONSIDERATIONS

APPENDIX H
GEOTECHNICAL CONSIDERATIONS

1. PURPOSE

This appendix presents the general geology (physiography) and specific geotechnical analysis relevant to the project. Geotechnical data was secured from various sources related to the project site location in general and previous site related projects.

2. PROJECT FEATURES

Key features of the project include wetland enhancement, mast tree plantings and overwintering habitat for fish species as shown on Plates 5-1 through 5-5. The features are designed to protect and /or enhance wetland and terrestrial habitat.

3. LOCATION

The project features are located between Mississippi River Miles (RM) 260.5 and 267 along the Illinois side of the Mississippi River in Calhoun County, Illinois as indicated on Figure 2.1. Enhancement features and locations are identified in Plates 5-1 through 5-5.

4. PHYSIOGRAPHY

The geology of this region has been greatly influenced by several major land forming factors including bedrock formation and tectonic movements prior to the Pleistocene Period on the geological time scale, and the action of water and wind. A mantel of loessial material overlies deposits of glacial drift in most of Calhoun County. The thickness of this loess (windblown silt), ranges from up to twenty feet at the Illinois River bluffs to less than ten feet at the east side of the County.

The underlying glacial drift is primarily Illinoisan stage terminal moraines. These moraines consist of relatively hard glacial till, which is a heterogeneous mixture of sands and gravels bound in a compact clay to silt matrix. Boulders are often found in the glacial till.

In the ancient Illinois River floodplain, bedrock is overlain by glacio-fluvial outwash. These deposits are of variable texture, but consist primarily of poorly sorted silts, sands and gravels.

Soil types and historical floodplain data are indicated on Figures 2.5, 2.6. And 2.7

5. SUBSURFACE EXPLORATION

In conjunction with the installation of the pump stations in various migratory wildlife areas within the Mississippi River Area, the Illinois Department of Natural Resources secured a geotechnical report on various pump station locations. The report, which includes Rip Rap Landing, is bound within this appendix section.

6. LABORATORY TESTING

As part of the work undertaken in conjunction with dredging portions of Sny Creek, Samples were taken and analyzed to determine their suitability with regard to THALWAG disposal. The results of this testing are bound within this appendix section.

7. HYDROLOGIC SOIL GROUP

Using Natural Resource Conservation Service data and land maps for the area, the soils within the Rip Rap Landing unit were broken down into either Hydrologic Soil Group B or D. The definitions of these groups are listed below.

GROUP B: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderate coarse texture. These soils have a moderate rate of water transmission.

GROUP D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink – swell potential, spoils that have a high permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material.

CL classified material is considered impervious and is considered to be average to below average for channel sections. CH classified material is considered to be impervious and is considered to be above average for channel sections. ML material is considered to impervious and is considered to be slightly above average for channel sections.

7. CONSTRUCTION SUITABILITY

The site soils were also analyzed using the US Bureau of Reclamation's Earth Manual, Second Addition, Figure 8, with regard to general suitability with regard to construction. This table, G-1 is bound within this appendix section.

Prairie Analytical Systems, INCORPORATED

Thursday, September 30, 2010

Peter Berrini
HDR Engineering, Inc.
5201 South Sixth Street
Springfield, IL 62703
TEL: (217) 585-8300
FAX: NA

RE: Rip Rap Landing DPR / Sny Ditch Calhoun County PAS WO: 10I0185

Prairie Analytical Systems, Inc. received 2 sample(s) on 9/14/2010 for the analyses presented in the following report.

All applicable quality control procedures met method specific acceptance criteria unless otherwise noted.

If you have any questions, please feel free to contact me at (217) 753-1148.

Respectfully submitted,

Michael D. Brophy
Project Manager

Certifications: NELAP/NELAC - IL #100323

LABORATORY RESULTS

Client: HDR Engineering, Inc.
Project: Rip Rap Landing DPR / Sny Ditch Calhoun County **Lab Order:** 10I0185
Client Sample ID: Core #1 **Lab ID:** 10I0185-01
Collection Date: 9/13/10 10:30 **Matrix:** Solid

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Organochlorine Pesticides by GC-ECD									
*Aldrin	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*alpha-BHC	U	0.692		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*beta-BHC	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*delta-BHC	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*gamma-BHC	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*alpha-Chlordane	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*gamma-Chlordane	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Chlordane (total)	U	69.2		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*4,4'-DDD	U	4.15		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*4,4'-DDE	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*4,4'-DDT	U	4.15		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Dieldrin	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Endosulfan I	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Endosulfan II	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Endosulfan sulfate	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Endrin	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Endrin aldehyde	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Endrin ketone	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Heptachlor	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Heptachlor epoxide	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Methoxychlor	U	2.08		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
*Toxaphene	U	1.38		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:22	SW 8081A	SCW
Polychlorinated Biphenyls by GC-ECD									
*Aroclor 1016	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
*Aroclor 1221	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
*Aroclor 1232	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
*Aroclor 1242	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
*Aroclor 1248	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
*Aroclor 1254	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
*Aroclor 1260	U	45.7		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:10	SW 8082	SCW
Metals by ICP-MS									
***Antimony**	**1.03**	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
***Arsenic**	**5.96**	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
*Beryllium	U	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
*Cadmium	U	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
***Chromium**	**22.5**	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
***Copper**	**12.3**	1.44		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
***Lead**	**13.3**	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
*Mercury	U	0.144		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
***Nickel**	**17.3**	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
*Selenium	U	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
*Silver	U	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
*Thallium	U	0.719		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
***Zinc**	**49.3**	1.44		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:05	SW 6020A	JTC
Conventional Chemistry Parameters									

LABORATORY RESULTS

Client: HDR Engineering, Inc.
Project: Rip Rap Landing DPR / Sny Ditch Calhoun County **Lab Order:** 10I0185
Client Sample ID: Core #1 **Lab ID:** 10I0185-01
Collection Date: 9/13/10 10:30 **Matrix:** Solid

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Organic Matter	**3.50**	0.100		%	1	9/24/10 16:10	9/24/10 17:20	ASTM D2974	AJD
Percent Solids	**67.9**	0.0100		%	1	9/20/10 11:40	9/21/10 9:00	ASTM D2216	RMN

Reynolds Drilling Corporation

Geotechnical Parameters									
Gravel	0			%	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
Sand	**1.1**			%	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
Silt and Clay	**98.9**			%	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
1/2" 12.5 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#4 4.75 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#10 2.0 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#20 0.85 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#40 0.425 mm	**99.925**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#70 0.212 mm	**99.675**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#100 0.15 mm	**99.45**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#200 0.075 mm	**98.9**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#230 0.064 mm	**98.225**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB

LABORATORY RESULTS

Client: HDR Engineering, Inc.
Project: Rip Rap Landing DPR / Sny Ditch Calhoun County **Lab Order:** 10I0185
Client Sample ID: Core #2 **Lab ID:** 10I0185-02
Collection Date: 9/13/10 11:00 **Matrix:** Solid

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Organochlorine Pesticides by GC-ECD									
*Aldrin	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*alpha-BHC	U	0.771		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*beta-BHC	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*delta-BHC	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*gamma-BHC	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*alpha-Chlordane	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*gamma-Chlordane	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Chlordane (total)	U	77.1		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*4,4'-DDD	U	4.63		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*4,4'-DDE	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*4,4'-DDT	U	4.63		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Dieldrin	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Endosulfan I	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Endosulfan II	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Endosulfan sulfate	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Endrin	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Endrin aldehyde	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Endrin ketone	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Heptachlor	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Heptachlor epoxide	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Methoxychlor	U	2.31		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
*Toxaphene	U	1.54		µg/Kg dry	1	9/15/10 14:33	9/15/10 16:55	SW 8081A	SCW
Polychlorinated Biphenyls by GC-ECD									
*Aroclor 1016	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
*Aroclor 1221	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
*Aroclor 1232	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
*Aroclor 1242	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
*Aroclor 1248	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
*Aroclor 1254	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
*Aroclor 1260	U	50.9		µg/Kg dry	1	9/15/10 14:34	9/15/10 19:44	SW 8082	SCW
Metals by ICP-MS									
***Antimony**	**1.07**	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Arsenic**	**6.67**	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Beryllium**	**0.803**	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
*Cadmium	U	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Chromium**	**27.1**	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Copper**	**14.0**	1.49		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Lead**	**15.7**	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
*Mercury	U	0.149		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Nickel**	**19.7**	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
*Selenium	U	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
*Silver	U	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
*Thallium	U	0.743		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
***Zinc**	**55.8**	1.49		mg/Kg dry	2	9/17/10 12:00	9/28/10 5:13	SW 6020A	JTC
Conventional Chemistry Parameters									

LABORATORY RESULTS

Client: HDR Engineering, Inc.
Project: Rip Rap Landing DPR / Sny Ditch Calhoun County **Lab Order:** 10I0185
Client Sample ID: Core #2 **Lab ID:** 10I0185-02
Collection Date: 9/13/10 11:00 **Matrix:** Solid

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Organic Matter	**3.97**	0.100		%	1	9/24/10 16:10	9/24/10 17:20	ASTM D2974	AJD
Percent Solids	**64.8**	0.0100		%	1	9/20/10 11:40	9/21/10 9:00	ASTM D2216	RMN

Reynolds Drilling Corporation

Geotechnical Parameters									
Gravel	0			%	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
Sand	**12.2**			%	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
Silt and Clay	**87.8**			%	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
1/2" 12.5 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#4 4.75 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#10 2.0 mm	**100**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#20 0.85 mm	**99.6**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#40 0.425 mm	**98.7**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#70 0.212 mm	**92.7**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#100 0.15 mm	**90.375**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#200 0.075 mm	**87.8**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB
#230 0.064 mm	**87.1**			% Finer	1	9/16/10 0:00	9/16/10 0:00	ASTM D422	SUB

LABORATORY RESULTS

Client: HDR Engineering, Inc.
Project: Rip Rap Landing DPR / Sny Ditch Calhoun County **Lab Order:** 10I0185

Notes and Definitions

*	NELAC certified compound.
U	Analyte not detected (i.e. less than RL or MDL).

Chain of Custody Record

Central IL- 1210 Capital Airport Drive - Springfield, IL 62707-8490 - Phone (217) 753-1148 - Facsimile (217) 753-1152
Chicago Office - PO Box 2116 - Crystal Lake, IL 60039-2116 - Phone (847) 651-2604 - Facsimile (847) 458-9680
www.prairieanalytical.com

Prairie Analytical Systems, INCORPORATED

Client	HDR Engineering
Address	5201 South 6th St.
City, State Zip Code	
Phone / Facsimile No.	/
Client Project	Rip Rap Landing DPR
Location	Smy Ditch, Calhoun County, IL
Sampler(s) / Phone	~~Smy Ditch, Calhoun~~ 217 585 8300
Turnaround Time	Standard [✓] Rush [ ] Date Required:
P.O. # or Invoice To	
Contact Person	Peter Berrini

Analysis and/or method Requested

Reporting: TACO; ___ Resid; ___ Ind/Comm; CALM; __ A __ B __ C; RISC; ___ Resid; ___ Indust

Sample Description	Sampling Date	Sampling Time	Matrix Code[1]	Total # of Containers	Sample Comp	Sample Grab	Priority metals (Cd,Pb)	PCB's/ pesticides	particle size (by sieve to #230)	water/moisture content	Total organic content				Laboratory Comments
Core #1	9-13-10	10:30 am		1	✓		✓	✓	✓	✓	✓				
Core #2	9-13-10	11:00 am		1	✓		✓	✓	✓	✓	✓				

[1] M = Matrix Code: A - Aqueous; DW - Drinking Water; GW - Groundwater; NA - Non-aqueous Liquid; S - Solids; O - Other (Specify)

Relinquished By	Date	Time	Received By	Date	Time	Method of Shipment
	9-14-10	1:20 pm		9-14-10	1:20 pm	HAND

Special Instructions: Analyze composite of core sample per EPA 401/ No Sig. Act Test WB 9-14-10

Q/C Level: 1✓ 2__ 3__ 4__

On Wet Ice (Y) / N

Proper Preservation (Y) / N

Temperature (°C): 12.2°C

Copies: White - Client Yellow - PAS, Inc. Pink - Sampler

RIP RAP LANDING STAGE II - SOILS

TABLE H-1

	IMPORTANT ENGINEERING PROPERTIES					RELATIVE DESIRABILITY FOR VARIOUS USES - #1 IS BEST, #14 IS WORST									
						ROLLED EARTH FILLED DAMS			CANAL SECTIONS	FOUNDATIONS			ROADWAYS FILLS		
TYPICAL NAME OF SOILS GROUPS	GROUP SYMBOL	PERME-ABILITY WHEN COMPACTED	SHEAR STRENGTH WHEN COMPACTED AND SATURATED	COMPRESS-IBILITY WHEN COMPACTED AND SATURATED	WORK-ABILITY AS A CONSTRUC-TION MATERIAL	HOMO-GENOUS EMBANK-MENT	CORE	SHELL	EROSION RESISTANCE	COMPACTED EARTH LINING	SEEPAGE IMPORTANT	SEEPAGE NOT IMPORTANT	FROST HEAVE NOT POSSIBLE	FROST HEAVE POSSIBLE	SURFACING
Inorganic silts and very fine sands, rock flour, silty or Clayey fine sandswith slight plasticity	ML		Fair	Medium	Fair	6	6			6 Erosion Critical	6	9	10	11	
Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays	CL	Impervious	Fair	Medium	Good to Fair	5	3	_	9	3	5	10	9	7	7
Inorganic Clays of High Plasticity, Fat Clays	CH	Impervious	Poor	High	Poor	7	7	_	10	8 Volume Change Critical	9	13	13	8	_

MAP SYMBOL	UNIT NAME	Unified Classification Symbol	Hydrologic Group
70	Beaucoup Silty Loam Clay	CL, ML	B/D
1070	Beaucoup Silty Loam Clay, Wet	CL, ML	B/D
284	Trice Silt Loam	CL, CH	B

SOILS EXPLORATION
WATERFOWL PUMPING STATIONS
MISSISSIPPI RIVER AREA
CDB # 102-000-010
PSI Number: 020-55021

Professional Service Industries, Inc.

Professional Service Industries, Inc.

March 14, 1995

Mr. Reginald H. Benton, PE, LS
Benton & Associates, Inc.
1970 West Lafayette Avenue
Jacksonville, Illinois 62650

Re: Soils Exploration
Waterfowl Pumping Stations
Mississippi River Area
CDB # 102-000-010
PSI File Number: 020-55021

Gentlemen:

In compliance with your instructions, we have conducted a soils exploration for the above referenced project.

The results of this investigation, together with our recommendations, are to be found in the accompanying report, four (4) copies of which are being transmitted herewith.

Often, because of design and construction details which occur on a project, questions arise concerning soil conditions, and we would be pleased to continue our role as geotechnical engineers during the project implementation. If you will advise us of the appropriate time to discuss these engineering services, we will be pleased to meet with you at your convenience.

Very truly yours,

PROFESSIONAL SERVICE INDUSTRIES, INC.

William P. Pongracz, P.E.
Branch Manager

Ralph P. Reuss, P.E.
Senior Author

308 North Street • Springfield, IL 62704 • Phone: 217/544-6663 • Fax: 217/544-6148

SOILS EXPLORATION AND DESIGN RECOMMENDATIONS

FOR THE PROPOSED

WATERFOWL PUMPING STATIONS

MISSISSIPPI RIVER AREA

PREPARED FOR

BENTON AND ASSOCIATES, INC.

1970 WEST LAFAYETTE AVENUE

JACKSONVILLE, ILLINOIS 62650

BY

PROFESSIONAL SERVICE INDUSTRIES, INC.

TABLE OF CONTENTS

SUBSURFACE EXPLORATION

INTRODUCTION

This report presents the results of a soils exploration for the proposed Waterfowl Pumping Stations at the Mississippi River Area, conducted for Benton & Associates, Inc..

Authorization

The work for this project was performed in accordance with PSI proposal No. 020-015 dated February 10, 1994 to Benton & Associates, Inc.. The PSI proposal included a proposed scope of work, estimated cost, unit rates and PSI's general conditions. Authorization to perform this exploration and analysis was in the form of a signed copy of this proposal.

Purpose

The purpose of this soil exploration was to evaluate the various soil and groundwater conditions at the proposed pumping station sites and to provide data for use in sheetpile wall design.

Scope

The scope of the exploration and analysis included a review of geological maps of the area and a review of geologic and related literature, a reconnaissance of the immediate site, the subsurface exploration, field and laboratory testing, and an engineering analysis and evaluation of the subsurface materials encountered.

The scope of the services did not include any environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, ground water, or air, on or below or around this site. Any statements in this report on the boring logs regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

General

The exploration and analysis of the soil conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the sheetpile wall design. The recommendations submitted for the proposed pumping stations are based on the preliminary design details furnished by Mr. Reginald H. Benton, PE, SE, representing Benton & Associates, Inc. If any revisions are made to the plans for the proposed pumping stations, or if deviations from the surface conditions noted in this report are encountered during construction, PSI should be retained to determine if changes in our recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the performance of the structures.

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein, have been presented after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

After the plans and specifications are more complete, it is recommended that Professional Service Industries, Inc. be provided the opportunity to review the final design and specifications, in order to verify that the sheetpile design recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations.

This report has been prepared for the exclusive use of Benton & Associates, Inc. exclusively for the application to the proposed Pumping Stations at the Mississippi River Area.

DESCRIPTION OF SITES

Site Locations

Four (4) of the five (5) proposed pumping stations sites, including Diamond Island, Helmbold Slough, Hurricane Island, and Michael Landing, lie on the Illinois River. The Riprap Landing site lies on the Mississippi River. Site locations are depicted on a location map located in the Appendix of this report.

GEOLOGY

General Geology of Calhoun County

The geology of this region has been greatly influenced by several major landforming factors including bedrock formation and tectonic movements prior to the Pleistocene Period on the geological time scale, and the action of water and wind. A mantle of loessial material overlies deposits of glacial drift in most of Calhoun County. The thickness of this loess (windblown silt), ranges from up to twenty feet at the Illinois River bluffs, to less than ten feet at the east side of the county.

The underlying glacial drift is primarily Illinoisan stage terminal moraines. These moraines consist of a relatively hard glacial till, which is heterogeneous mixture of sands and gravels bound in a compact clay to silt matrix. Boulders are often found in the glacial till.

In the ancient Illinois River floodplain, bedrock is over lain by glacio-fluvial outwash. These deposits are of variable texture, but consist primarily of poorly-sorted silts, sands and gravels.

A cursory review of the available data indicates no coal mining activity in Calhoun County.

FIELD EXPLORATION

Scope

The field exploration to evaluate the engineering characteristics of the foundation materials included a reconnaissance of the project sites, drilling the test borings, performing standard penetration tests and recovering disturbed split barrel samples.

One (1) soil test boring was drilled at each of the five sites, and boring depths ranged from approximately thirteen (13) to twenty-six (26) feet below the existing ground surface. Water level measurements were recorded in each test boring after completion, and after removal of the augers.

The borings were drilled in the locations determined and staked in the field by Benton & Associates, Inc. personnel. After completion of the field operations, the drill holes were backfilled with excavated soil.

Drilling and Sampling Procedures

The test borings for the Riprap Landing and Michael's Landing sites were made with a drilling rig equipped with a rotary head. Hollow-stem augers were used to advance the holes. Representative samples were obtained with split-barrel sampling procedures in accordance with "Penetration Test and Split Barrel Sampling of Soils" (ASTM D-1586).

Borings for the Diamond Island, Hurricane Island and Helmbold Island sites were performed with hand augering techniques due to soft, wet surface conditions. Split-spoon samples were advanced with hand methods to obtain representative samples.

Field Tests and Measurements

Penetration Tests - During the sampling procedure at the Rip-Rap and Michael's Landing sites, standard penetration tests (SPT) were performed at pre-determined intervals to obtain the standard penetration value of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer falling thirty (30) inches, required to advance the split-barrel sampler one (1) foot into the soil. The sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows are recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density of cohesionless soils and comparative consistency of the cohesive soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Strength Tests - During the field boring operations, selected samples of the cohesive soil from the split-barrel sampling device were tested for unconfined compressive strength by use of a calibrated soil penetrometer evaluating the shear strength of the soil. The values of the unconfined compressive strength, obtained from tests on samples of soil from the split-barrel sampling, must be evaluated recognizing the manner in which they were obtained, because the split-barrel sampling techniques provide a representative, but somewhat disturbed, soil sample.

Water Level Measurements - Water level depths were obtained during the test boring operations. They are noted on the test boring logs presented in the Appendix. In relatively impervious soils, the suitable estimate of the groundwater depth may not be possible even after several days of observation. Seasonal variations, temperature, land-use, and recent rainfall conditions may influence the depths to the groundwater.

Ground Surface Elevations - Ground surface elevations for the test borings were not provided to PSI. The depths indicated on these boring logs are referenced from the existing ground surface at the time of drilling.

LABORATORY TESTING PROGRAM

In addition to the field exploration, a supplemental laboratory testing program was conducted to evaluate additional pertinent engineering characteristics of the materials encountered.

The laboratory testing program included supplementary visual classification and water content determinations on all samples. The shear strengths of the various cohesive soils were evaluated from unconfined compressive strength tests on disturbed samples obtained from split-spoon samplers.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM specifications. The results of these tests are to be found on the accompanying boring logs and data sheets located in the Appendix.

SUBSURFACE CONDITIONS

General

The types of foundation bearing materials encountered in the test borings have been visually classified. They are described in detail on the boring logs. The results of the field penetration tests, strength tests, water level observations and other laboratory tests are presented on the boring logs in graphical and numerical form. Representative samples of the soils were placed in sample jars. They are now stored in the laboratory for further analysis if desired. Unless notified to the contrary, all samples will be disposed of after sixty (60) days.

The stratification of the soil as shown on the boring logs, represents the soil conditions at the actual boring locations, and variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual, or not clearly defined.

It is to be noted that, whereas the test borings are drilled and sampled by experienced drillers, it is sometimes difficult to record changes in stratification within narrow limits.

Soil Conditions

The soils at the sites generally consist of clayey silt to silty clay materials with varying amounts of sand. The soils are mostly saturated below three (3) to eight (8) feet below the existing ground surface. Typical to alluvial deposits, the clays are of relatively low strength, with standard penetration values ranging from approximately two (2) to eight (8) blows per foot, and unconfined compressive strengths of 0.3 to 1.0 tons per square foot (t.s.f.).

More detailed descriptions of the subsurface materials encountered can be found on the boring logs, located in the Appendix of this report.

Groundwater Observations

Groundwater was encountered during the drilling operations at depths ranging from approximately three (3) to eight (8) feet below the existing ground surface after removal of the augers. It should be noted that groundwater levels on this site may vary due to seasonal condition, recent rainfall or drought.

PROJECT DISCUSSION AND RECOMMENDATIONS

Project Description

It is understood that the proposed project will involve construction of sheetpile walls to accommodate the proposed pump stations. Preliminary sheetpile wall design calculations, conducted by Benton & Associates, Inc., were provided to PSI for review and comment.

Recommendations

Upon review of the provided preliminary design calculations, and considering the soil conditions at the sites, the sheetpile wall design approach is satisfactory for this project. However, the values of the coefficients for active and passive soil pressures need to be adjusted, based upon soil conditions observed at the

individual sites. The following soil parameters should be used in the sheetpile wall design:

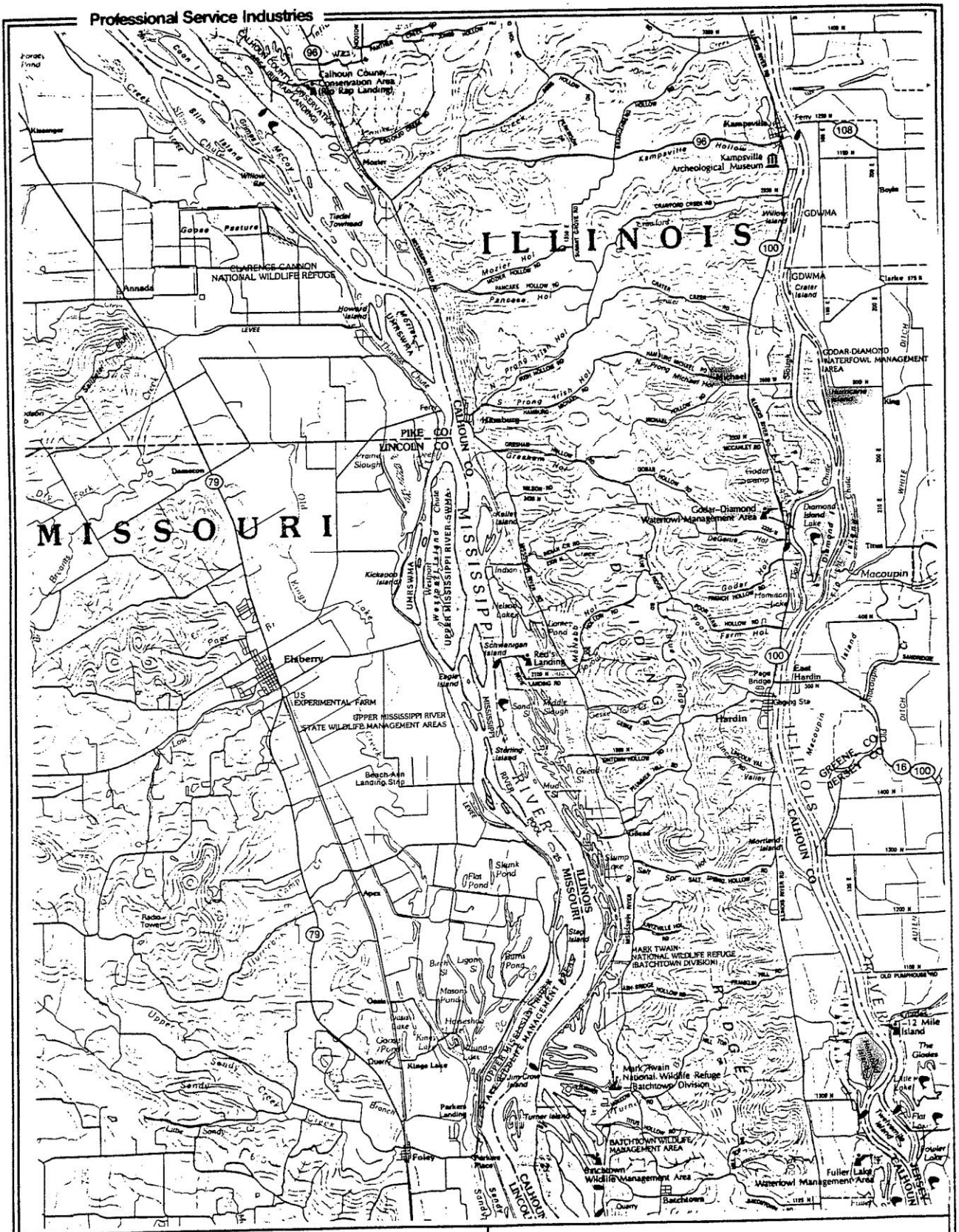
Site	Recommended Soil Parameters	
Diamond Island	$\phi = 27^\circ$, c = 0 psf	
Michael's Landing	$\phi = 25^\circ$, c = 0 psf	
Rip-Rap Landing	$\phi = 25^\circ$, c = 0 psf	above -10'
	$\phi = 30^\circ$, c = 0 psf	below -10'
Hurricane Island	$\phi = 27^\circ$, c = 0 psf	
Helmbold Island	$\phi = 25^\circ$, c = 0 psf	

GENERAL COMMENTS

When the plans and specifications are more complete, or if significant changes are made in the character or location of the proposed structures, a consultation should be arranged to review them with respect to the prevailing soil conditions. At that time, it may be necessary to submit supplementary recommendations.

APPENDIX

Professional Service Industries



PROJECT NAME Proposed Waterfowl Pumping Stations Mississippi River Area	Site Locations Scale: 1" = 2.4 miles
PROJECT NO. 020-55021	DATE March 6, 1995

PSI A-300-7

Professional Service Industries, Inc.
RECORD OF SUBSURFACE EXPLORATION

Boring: B-1*

Project Name: Diamond Island - Waterfowl Pumping Station Date of Boring: December 29, 1994

Site: Mississippi River Area, CDB No. 102-000-010 Project No: 020-55021

DESCRIPTION	DEPTH ft.	SAMPLE	N	Q_u tsf	Q_p tsf	M_c %	REMARKS
SURFACE							
Clayey silt, brown, gray		1-AU	-	-	-	23	
Clayey silt, some sand, fine, brown		2-SS	-	-	0.5	24	
	5	3-SS	-	-	-	42	0 Hour
		4-SS	-	-	0.5	36	
Clayey silt, brown, gray, stiff	10	5-SS	-	1.5	0.3	34	
		6-SS	-	-	-	48	
	15	7-SS	-	1.0	0.3	36	
END OF BORING							
	20						
* Boring performed with hand augering equipment.							
Split-spoon samples driven by hand	25						
	30						
	35						
	40						
	45						
	50						

Professional Service Industries, Inc.
RECORD OF SUBSURFACE EXPLORATION

Boring: B-2*

Project Name: Hurricane Island - Waterfowl Pumping Station Date of Boring: December 29, 1994

Site: Mississippi River Area, CDB No.: 102-000-010 Project No: 020-55021

DESCRIPTION	DEPTH ft.	SAMPLE	N	Q_u tsf	Q_p tsf	M_c %	REMARKS
SURFACE							
Clayey silt, brown, gray		1-AU	-	-	-	30	
Clayey silt, brown		2-SS	-	-	-	13	0 Hour
	5	3-SS	-	1.5	0.5	27	
		4-SS	-	1.3	0.3	39	
Clayey silt, brown, gray, stiff	10	5-SS	-	0.8	0.3	39	
		6-SS	-	1.0	0.3	35	
	15	7-SS	-	1.3	0.5	34	
END OF BORING	20						
* Boring performed with hand augering equipment Split-spoon samples driven by hand.	25						
	30						
	35						
	40						
	45						
	50						

Professional Service Industries, Inc.
RECORD OF SUBSURFACE EXPLORATION

Boring: B-3

Project Name: Riprap Landing - Waterfowl Pumping Station Date of Boring: June 17, 1994

Site: Mississippi River Area, CDB No.: 102-000-010 Project No: 020-55021

DESCRIPTION	DEPTH ft.	SAMPLE	N	Q_u tsf	Q_p tsf	M_c %	REMARKS
SURFACE							
Silty sand, brown, trace organics		1-AU	-	-	-	11	
		2-SS	11	2.0	2.8	21	
Silty clay, dark brown, very stiff	5						Caved in upon completion @ 4'
		3-SS	7	-	1.8	23	
		4-SS	2	-	-	25	0 Hour
Clayey silt, trace sand, fine, brown	10						
		5-SS	3	-	-	29	
Silty sand, fine, brown, slightly compact		6-SS	3	-	-	26	
	15						
		7-SS	8	-	-	26	
		8-SS	16	-	-	15	
Sand, medium to coarse, brown, gray dense	20						
		9-SS	21	-	-	24	
		10-SS	14	-	-	16	
	25						
		11-SS	18	-	-	18	
END OF BORING	30						
	35						
	40						
	45						
	50						

Professional Service Industries, Inc.
RECORD OF SUBSURFACE EXPLORATION

Boring: B-4

Project Name: Michael's Landing - Waterfowl Pumping Station Date of Boring: June 17, 1994

Site: Mississippi River Area, CDB No.: 102-000-010 Project No: 020-55021

DESCRIPTION	DEPTH ft.	SAMPLE	N	Q_u tsf	Q_p tsf	M_c %	REMARKS
SURFACE							
Clayey silt, trace sand, fine, brown, gray		1-AU	-	-	-	15	
		2-SS	8	-	2	15	Caved in upon completion @ 4'
	5	3-SS	5	-	1.3	31	
		4-SS	3	-	0.3	46	
Silty clay, gray	10	5-SS	3	-	0.3	43	
		6-SS	3	-	0.3	32	
	15	7-SS	2	-	0.3	44	
		8-SS	3	-	0.3	34	
	20	9-SS	4	-	0.3	33	
		10-SS	3	-	0.3	33	
	25	11-SS	5	-	0.3	32	
END OF BORING	30						
	35						
	40						
	45						
	50						

Professional Service Industries, Inc.
RECORD OF SUBSURFACE EXPLORATION

Boring: B-5*

Project Name: Helmbold Island - Waterfowl Pumping Station Date of Boring: March 3, 1995

Site: Mississippi River Area, CDB No.: 102-000-010 Project No: 020-55021

DESCRIPTION	DEPTH ft.	SAMPLE	N	M_c %	REMARKS
SURFACE					
Silty clay, brown, trace organics		1-AU	-	25	
		2-AU	-	16	
		3-AU	-	20	
		4-AU	-	22	
Silty clay, brown	5	5-AU	-	29	0 Hour
		6-AU	-	34	
		7-AU	-	28	
	10	8-AU	-	27	
END OF BORING	15				
* Boring performed with hand augering equipment.	20				
	25				
	30				
	35				
	40				
	45				
	50				

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.

Qu: Unconfined compressive strength, TSF

Qp: Penetrometer value, unconfined compressive strength, TSF

Mc: Water content, %

LL: Liquid limit, %

PI: Plasticity Index, %

δ d: Natural dry density, PCF

▼: Apparent groundwater level at time noted after completion.

DRILLING AND SAMPLING SYMBOLS

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
DB: Diamond Bit.
CB: Carbide Bit.
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

TERM (NON-COHESIVE SOILS)	STANDARD PENETRATION RESISTANCE
Very Loose	0 - 2
Loose	2 - 4
Slightly Compact	4 - 8
Medium Dense	8 - 16
Dense	16 - 26
Very Dense	Over 26

TERM (COHESIVE SOILS)	Qu - (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in. +	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

APPENDIX I

HYDROLOGY & HYDRAULICS

APPENDIX I
HYDROLOGY & HYDRAULICS

1. LOCATION

The project features are located between Mississippi River Miles (RM) 260.5 and 267 along the Illinois side of the Mississippi River in Calhoun County, Illinois as indicated on Figure 2.1. Enhancement features and locations are identified in Plates 5-1 through 5-5.

2. HYDROLOGY & HYDRAULICS

Two major features control the hydrology and hydraulics associated with Rip Rap Landing, the Mississippi River and Sny Creek. Generally speaking the site is subjected to flood events associated with both water bodies.

SNY CREEK WATERSHED - Sny Creek was investigated to determine the engineering requirements for keeping storms within the banks of the Sny Creek. Table J.1 indicates the 50 year and the 2 year storm events associated with the Sny Creek and the required channel to keep the storm event within the creek banks.

Table J-1. Sny Runoff Calculations

	2-year storm	**50-year storm**	**2-year storm**	**50-year storm**
	Ac-ft/day		CFS	
Wildcat Watershed	295	480		
Bellview Watershed	818	1,297		
#2 watershed	77	130		
Infidel Watershed	187	303		
West Panther Watershed	500	794		
Crooked Creek Watershed	166	265		
Fox Creek Watershed	1,156	1,834		
Subtotal	**3,199**	**5,103**	**1,613**	**2,573**
Sny Channel, 2-year storm				
Slope: 0.0005 ft/ft Hydraulic Radius: 5.13				
'n' value: 0.04 Area: 704.00 sq ft				
Velocity: 2.47 ft/sec				
Capacity: 1738.62 cfs				
Sideslope: 6:1				
Bottom Width: 40 ft				
Depth of Flow: 8 ft.				
Width @ surface 136 ft				
Sny Channel, 50-Year storm				

Slope: 0.0005 ft/ft Hydraulic Radius: 6.19				
'n' value: 0.04 Area: 1000.00 sq ft				
Velocity: 2.80 ft/sec				
Capacity: 2799.12 cfs				
Side slope: 6:1				
Bottom Width: 40 ft				
Depth of Flow: 10 ft.				
Width @ surface 160 ft				

Based upon the above data, it was not deemed to be cost effective to try and increase the width and the depth of the Sny Creek to allow for major storm events to be kept within the banks of the channel. Therefore another analysis was undertaken to provide the required creek configuration to allow for overwintering of fish. This basic channel cross section then became the basis for developing cost estimates. Another analysis was undertaken to determine if the velocities within the Sny Creek during storm events would have a negative impact on the ability of over-wintering fish to remain in the creek and not be flushed out into the river

Based upon the cross section of the Sny proposed, it was determined that a 3.11 inch storm event would create velocities that might impact the ability of fish to stay with the Sny Creek. Based on ISWS/CIR-172/89, the data indicates that from 1940 – 2009 only 2 times during the months of November – February is the daily maximum precipitation over 3.11 inches.

Dec 1982 = 5.12 inches; Nov 2003 = 3.52 inches

The above analysis took into account 247 total measurements over this time period. Two out of 247 measurements exceeded the 3.11 inch design rainfall total, or 0.81% of total time fish would have been flushed out of the creek during over-wintering. Based upon this data it was decided that developing habitat for over-wintering of fish within the Sny Creek would produce successful results.

MISSISSIPPI RIVER - It was never deemed practical to try and keep all flood events out of Rip Rap Landing, but the river was analyzed to determine what historical water levels might be encountered during critical management months. Daily gage readings were reviewed from 1973 to 2009 to secure an idea of water levels. No data was available for 1995. 1973 was chosen as it was after the development of Mark Twain Lake in Missouri which would have some local impact on Rip Rap Landing. The information in Table J-2 was utilized to determine the required invert elevation of the proposed pump station to insure that adequate water depth would be available when the area is to be flooded in the fall.

Table J-2. Rip Rap Landing Stage II- Mosier Gage Reading

Year	April		May		June		July		August		September		October		November	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1973	443.9	451.4	443.7	448.4	437.7	445.7	434.7	438.8	434.7	436.6	434.4	438.7	436.7	441.8	432.9	437.4

1974	436.6	441	438.3	447.7	442.5	447.5	434.3	445.6	434.2	435.6	434.3	435	434.3	434.9	434.5	435.8
1975	438.1	443.9	438.3	445.9	435.7	439.2	434.5	438.8	434	435.7	434.1	435.3	433.9	434.6	434.1	435.6
1976	436.6	446.7	434.5	444.5	434	435.4	434.1	435.5	433.8	434.4	433.9	434.6	434	434.7	433.9	434.6
1977	434	435.6	434	435.9	433.8	434.9	433.9	435.4	433.9	436.6	434.1	436.2	435	438.8	433.8	442.1
1978	436.5	443.3	435.2	443	434.1	439.1	434.4	438.8	434.3	438	434.4	439	434.2	436.4	434.4	435.7
1979	444.4	448.9	440.4	445.2	436.1	440.2	434.6	437.8	434.6	438.9	434.4	439.3	434.3	436.2	435.4	436.3
1980	434.9	438.8	434.1	435.3	434.5	440.6	433.9	435.3	434	439.4	435.7	439.6	434.3	438.9	434.2	435.5
1981	434.4	441.8	434.6	442.6	434.4	441.1	434.8	443.1	434.1	438.2	433.9	437.5	434.6	436.7	435	439.6
1982	441.1	446.5	439.7	443.9	435.7	443.0	435.6	443.6	434.1	437.1	434.3	436.2	434.3	437.1	436.3	439.6
1983	443.7	449.3	440.2	445.7	435.9	441.3	435.0	440.6	434.3	435.5	434.4	436.8	434.6	436.9	435.4	440.1
1984	438.8	443.5	441.2	444.4	439.0	444.5	436.1	444.7	436.0	436.0	434.4	435.4	434.7	438.2	435.6	443.2
1985	437.8	441.9	435.8	439.6	435.2	436.7	434.5	435.7	434.3	436.4	434.2	435.7	435.4	440.4	437.0	443.4
1986	441.6	444.5	440.7	447.2	436.7	445.2	437.1	443.4	435.2	437.6	435.2	443.0	443.7	449.1	436.4	444.0
1987	435.4	439.9	434.5	436.7	434.3	436.2	434.1	435.0	434.2	436.7	434.3	436.2	434.0	435.3	434.4	435.4
1988	435.0	436.8	434.0	435.2	434.1	434.6	434.0	434.4	433.9	434.4	433.3	434.3	433.6	434.3	434.0	434.8
1989	435.4	437.8	434.5	435.4	434.1	436.0	434.0	434.5	433.9	434.7	434.0	435.8	434.0	434.6	434.0	434.4
1990	434.2	435.4	435.5	444.3	435.7	446.7	432.7	444.1	435.2	440.2	434.8	440.4	434.5	435.4	434.1	435.7
1991	440.1	444.2	441.2	444.4	439.8	444.0	435.9	439.7	434.6	436.2	434.3	435.6	434.2	436.2	434.8	438.3
1992	437.3	442.8	435.7	434.4	434.4	435.8	434.9	439.0	434.4	437.4	434.4	438.5	434.8	436.3	435.0	442.5
1993	441.5	449.0	442.7	448.4	442.0	448.3	448.7	454.3	447.0	453.4	442.7	447.2	436.7	443.0	436.1	437.7
1994	437.0	442.0	436.4	442.0	436.2	438.6	435.8	437.9	435.0	435.9	434.6	437.0	435.4	436.9	435.2	436.2
1996	436.4	440.7	440.7	448.8	440.0	448.2	435.5	441.8	434.3	436.0	434.2	435.1	434.3	435.6	434.9	437.1
1997	439.0	446.7	437.3	445.3	434.5	437.4	435.7	437.7	435.1	436.8	434.5	435.7	434.2	435.6	434.1	435.6
1998	440.9	448.4	435.5	443.4	436.0	442.6	436.3	445.7	434.1	436.9	434.5	436.0	434.6	441.1	436.1	438.1
1999	435.7	445.4	439.5	445.7	438.7	444.7	436.9	440.9	435.0	441.3	434.8	435.9	434.5	435.1	434.3	434.9
2000	437.1	434.6	434.8	437.0	435.5	444.4	435.1	442.5	434.5	435.7	434.5	435.2	434.3	435.1	434.4	435.7
2001	438.1	448.3	443.4	450.7	441.9	446.5	435.7	442.1	434.0	436.1	434.5	435.7	434.5	436.6	434.8	435.8
2002	435.1	444.3	438.1	447.3	436.8	445.2	435.2	438.3	434.5	438.1	434.6	436.5	435.0	437.4	434.8	436.1
2003	435.0	438.5	438.6	442.9	434.4	440.9	434.4	439.9	434.1	435.0	434.3	435.4	434.1	435.1	434.2	435.3
2004	435.9	439.2	435.4	444.0	443.8	446.1	434.8	443.6	434.6	439.5	434.6	436.4	434.9	435.9	435.3	437.9
2005	436.1	442.0	436.0	438.9	436.2	437.7	434.6	437.4	434.3	435.2	434.3	435.1	434.7	436.7	434.8	435.4
2006	436.0	441.1	436.9	439.0	434.8	437.4	434.6	435.4	434.3	435.0	434.4	435.0	434.3	434.9	434.4	435.2
2007	439.1	444.1	436.1	442.7	434.5	439.5	434.6	436.6	434.5	443.9	435.4	443.2	435.5	440.3	435.3	439.2
2008	439.1	446.8	441.4	448.2	441.5	452.3	440.8	450.4	434.7	443.7	434.8	445.5	434.4	435.5	434.5	435.7
Min	**434.0**		**434.0**		**433.8**		**432.7**		**433.8**		**433.3**		**433.6**		**432.9**	
Max		**451.4**		**450.7**		**452.3**		**454.3**		**453.4**		**447.2**		**449.1**		**444.0**

The flowing table is a structure inventory of all the current drainage structures on the site. It is provided for informational purposes.

Table J-3. Current Drainage Structures

Structure Location	Name	Invert Elev.	Outlet Elev.	Length	Size	Purpose/Notes

WATER CONTROL STRUCTURES						
Sny Sand Levee	Waverly Lake Supply Pipe	436.1	436	40	36	Water from the existing pump station flows under the Sny Dike to Waverly Lake through this structure. Sluice gate. Headwater elev = 440, tailwater = 439. Capacity = 37.2 cfs
NRCS Structure 1	Drainage pipe	441.8	441.8	86	24	6' tall in-line water control structure
NRCS Structure 2	Drainage pipe	444.2	440	60	24	4' tall in-line water control structure
NRCS Structure 3	Drainage pipe	445.2	445	75	24	5' tall in-line water control structure
NRCS Structure 4	Drainage pipe	446.1	445.6	50	24	5' tall in-line water control structure
NRCS Structure 5	Drainage pipe	442.9	442.4	60	24	4' tall in-line water control structure
NRCS Structure 6	Drainage pipe	442.9	442.4	55	24	4' tall in-line water control structure
NRCS Structure 7	Drainage pipe	444	443.5	45	24	3' tall in-line water control structure
NRCS Structure 8	Drainage pipe	444.6	444	35	24	2' tall in-line water control structure
PUMP STATIONS						
Miss. River Pump Station						Installed 1993.
WATER IMPOUNDMENTS						
Waverly Lake						Surface elevation = 440.2
EXISTING CHANNELES & DIKES						
Pump Channel		441.65 at Pump	440.16 at Slough	1,400'		Slope = 0.001, Design Q = 23.5 cfs, depth = 2.5', bottom width = 4', starts 2' off the edge of the road, width at flow = 9' 1:1 side slopes
Channel to Waverly Lake				1,800'		Slope = 0.0001, bottom width = 4' 1:1 side slopes, depth = 4.5 feet.
NRCS Structure 1		447.7 top	10' width	1000'		Proposed water level = 446.7, 6:1 side slopes
NRCS Structure 2		447.7 top	10' width	115'		Proposed water level = 446.8, 6;1 side slopes
NRCS Structure 3		450.3 top	10' width	120'		Proposed water level = 449.3. 6:1 side slopes
NRCS Structure 4		448.8 top	10' width	125'		Proposed water level = 447.83. 6:1 side slopes
NRCS Structure 5		446.5 top	10' width	37'		Proposed water level = 445.5. 6:1 side slopes
NRCS Structure 6		446.3 top	10' width	60'		Proposed water level = 445.3. 6:1 side slopes
NRCS Structure 7		446.3 top	10' width	140'		Proposed water level = 445.3. 6:1 side slopes
NRCS Structure 8		446.2 top	10' width	82'		Proposed water level = 445.2. 6:1 side slopes

APPENDIX J

COST ESTIMATE

APPENDIX J
COST ESTIMATE

1 INTRODUCTION

Rip Rap Landing (RRL) which is part of the Upper Mississippi River System Navigation and Ecosystem Sustainability Program, is proposed to be implemented by the United States Army Corps of Engineers (USACE) St. Louis District. This report describes in detail the project costs and scheduled execution for all appropriate feature accounts in support of the HREP.

2. REFERENCES

- ER 1110-1-1300, Cost Engineering Policy & General Requirements, 26 Mar 1993.
- ER 1105-2-100, Planning Guidance Notebook, 22 Apr 2000.
- ER 1110-2-1302, Civil Works Cost Engineering, 15 Sept 2008.
- EI 01D010, Construction Cost Estimates, 1 Sept 1997.
- ER 1110-2-1150, Engineering & Design for Civil Works Projects, 31 Aug 1999.
- EP 1110-1-8 Volume 2, Construction Equipment Ownership and Operating Expense Schedule – Region V, July 2007.
- EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS), 31 Mar 2010.
- EC 1105-2-410, Review of Decision Documents, 1 July 2008—DRAFT
- ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works, 30 Sept 2008.

3. PROJECT LOCATION AND DESCRIPTION

The Rip Rap Landing Habitat Rehabilitation and Enhancement Project is located in Pool 25 of the Mississippi River along the left descending bank between river miles (RM) 260.5 and 267 near the Village of Mozier in Calhoun County, Illinois (Fig. 1.1).

Rip Rap Landing Fish and Wildlife Area covers 2,338 acres of river bottomlands, of which 2,055 acres is owned by the Illinois Department of Natural Resources (IDNR) and 283 acres owned by the Corps of Engineers as General Plan Lands, known as Dog Island.

Natural Resource Conservation Service owns a 792.8 acre Wetland Reserve Program easement on a tract owned by IDNR known as the Rust Land Trust tract. The area is managed by IDNR as part of the Mississippi River Fish and Wildlife Area, a complex of mostly wetland habitats along the Illinois and Mississippi Rivers, primarily for migratory birds, especially migratory wildlife, and resident wildlife and contains a high quality bottomland forest designated as a State Natural Area. The historic Sny River channel, now known as Sny Creek traverses the project area from

north to south and forms a portion of the east property boundary. Land ownership, property use restrictions and levee protection varies throughout the site.

3.1 PROJECT FEATURES

Therefore, the site has been divided into zones for project planning purposes. Zone 1, Sny Levee District is on the northern most end of the project area and is contained within the Sny Island Drainage and Levee District, and therefore, unlikely to be flooded by the river. Zone 2, State Natural Area is on the river side of the Sny Levee, north of Rip Rap Landing road, and is not protected from Mississippi River flooding. This zone has been designated a State Natural Area due to a significant historic forest composition of bottomland hardwood forest. Zone 3, Roadside and Waverly Lake Wetland Management Area is part of the original IDNR acquisition and occupies the northeast, central section and part of the east side adjacent to Illinois Route 96. Zone 4, Rust Land Company – WRP Easement is located along the west side of the project area, south of the Rip Rap Landing road and immediately adjacent to the Mississippi River. Zone 5, General Plan Lands – Dog Island is the southernmost part of the project area, located at the confluence of Sny Creek with the Mississippi River.

3.2 BASIS OF DESIGN

Documents used in the design of the project include

- IDNR Migratory wildlife Pump Station Design for various locations within the IDNR Mississippi River Area, CDB# 102-000-016, IDNR# 4-93-025, 2/15/1996, used in the estimating of the new pump station.
- NRCS Rust land Trust WRP Restoration 5/04, plans located in Appendix O.

4. PROJECT FEATURE ACCOUNTS

4.1 (01) LANDS AND DAMAGES

This cost account includes the costs for both permanent and temporary acquisitions

4.2 (02) RELOCATIONS

This cost account includes the costs for all permanent and temporary relocations

4.3 (06) FISH AND WILDLIFE FACILITIES

This cost account includes the costs for all permanent and temporary structures and facilities related to providing the upgrade of the facility per the study and value engineering reports

4.4 (30) PLANNING, ENGINEERING AND DESIGN

The work covered under this account includes project management, project planning, preliminary design, final design, geotechnical and HTRW investigations, preparations of plans and specifications, engineering during construction, contract advertisement, opening of bids and contract award. The cost for this account was provided by the St. Louis District Corps of Engineers staff to be 16% of the Fish and Wildlife Facilities cost account.

4.5 (31) CONSTRUCTION MANAGEMENT

The work covered under this account includes engineering during construction, contract supervision, contract administration, construction administration, technical management activities, and District office supervision and administration costs. The cost for this account has been estimated based upon a historical factor of 10% of the total construction cost accounts.

5. METHODOLOGY

5.1 GENERAL

5.2 BASIS OF QUANTITIES

The cost estimate is based upon project take-offs that have been calculated from the study document. Quantity summaries along with detailed quantity take-offs are presented in Attachment A. The quantities within this study do not include waste/loss factors for the project.

5.3 CONSTRUCTION METHODOLOGY

5.3.1 Mobilization/Demobilization

Mobilization costs are based on transporting the land-based loaders, cranes, bulldozers, and trucks within 150-miles of the project site. All equipment and labor is assumed to be available in the St. Louis area which is approximately 60 miles downstream of the site, by road.

5.3.2 Staging and Site Access

The main staging area for the project will be set up south of the pump station in southwest corner of Zone 3. Most of the land based equipment and materials would be located here. The small amounts of concrete and stone required for the project will come from local batch plants and quarries.

5.3.2.1 Resident Engineer Office

Due to flooding concerns, the resident engineers' office will be set up in Mozier, either in a rented structure or in a temporary mobile facility. This area would be utilized for the resident engineer and contractor's offices. Utilities are accessible at this location and costs would be minimal to complete the required hookups.

5.3.2.2 Construction Staging Areas

There are multiple adjoining agricultural fields near the project site that would be used for the construction staging area. These areas are located such that access routes to the site can be obtained. The intended use of these parcels is for contractor material storage and equipment staging and temporary excavated material disposal area.

5.3.2.3 State Highway 96

State Highway 96 is the main access to Rip Rap landing. The existing roadway surface and subgrade is sufficient to handle the anticipated increase in traffic volume and weights.

5.3.2.4 Perimeter Access and Haul Roads

Construction access and haul roads would be required around the staging area parcels to allow movement of material and equipment.

5.3.2.5 Barge Access

The assumed river access is located at the mouth of Sny Creek. Sny Creek runs parallel to the Mississippi River and is hydraulically connected. Excavation of portions of the Sny Creek is within the project description and access by boat may be required to facilitate some of this excavation. Presently the lower portion of the Sny Creek is proposed to be hydraulically dredged.

5.3.3 Borrow/Disposal Areas and Material

Borrow materials are available on the project site and their excavation will be used to enhance associated adjacent management units. Topsoil will be stockpiled and used for final finishing of constructed embankments. Any excess overburden excavation material will be spread about areas to receive timber plantings.

5.3.4 Structures

5.3.4.1 Pump Station

The new pump station will utilize the existing sheet pile pump station structure. Minor modifications to the river side wall will be required to facilitate the installation of a large pump pipe. Because the discharge pipe of the pump station will have minimal fill where it crosses a farm access road, a concrete slab will be placed in this location to facilitate future equipment crossings.

5.3.4.2 Water Control Structures.

References to water control structures within the report refer to either earthen levee embankments with a corrugated metal pipe running through the levee to facilitate water level control, or rock spillways or a combination of both.

Where corrugated metal pipes are used, two types of water control structures will be used in the development of this project; sluice gates and inline stoplog structures. Each water control structure will include a corrugated metal pipe and connecting bands. Sluice gates will be put on the upstream side of the structure and will be connected to the associated level by a catwalk that thatches to the pie and the sluice gate. In this fashion safe access to the gate is supplied and the catwalk frame acts to resist ice damage to the gate. Most of the water control structures will utilize sluice gates due to issues associated with beavers.

In locations where stop log structures are utilized, these will either be prefabricated inline units that eliminate the need for catwalks, or fabricated corrugated metal pipe structures. Generally stated, the inline prefabricated structures are limited to 24” diameter and smaller pipes.

The “fish friendly” stoplog structure connecting the Roadside Lake and the Sny Creek will be developed by driving sheet pile walls and installing a wooden stoplogs between the walls. In this fashion, when fish passage is desired, the structure will act as an open channel and not deter fish passage.

In Zone 4, a spillway structure will be developed to maintain water levels within Zone 4 and portions of Zone 3. The base of this spillway will be a small earthen embankment running

somewhere between 1 and 3 feet in height. Revetment mats will be used to provide the top of the spillway and will be secured by developing a revetment toe at each side of the spillway. Erosion stabilization and erosion control fabric will be placed between the earthen embankment and the revetment mats. The toe and the fabric is will prevent water from running under the revetment mats and eroding away the embankment. The use of revetment mats will facilitate maintaining a level horizontal elevation across the spillway. Small amounts of riprap will be placed on the upstream and downstream slopes of the revetment mat. Because of the small vertical height of the spillway and its length, approximately 1,700 feet, minimal velocities are expected.

5.3.5 Unusual Conditions

Unusual Conditions: High river levels for good portions of the year, flooding that could lead to scour before protection is placed, winter weather and ice.

5.3.6 Unique Construction Techniques

Mostly in-channel work with specialty equipment. Depending upon water levels, use of excavation equipment on the Sny Creek might require mats.

5.3.7 Environmental Concerns

Construction activity would likely increase turbidity in Sny Creek. There is a potential for construction equipment to leak or spill contaminates. Costs associated with these potential environmental concerns were not included in this estimate. Delays to construction to avoid impacts to endangered species were not considered in the cost estimate. Minimal tree clearing required is not likely to impact trees suitable for Indiana Bat roosting habitat.

5.4 COST METHODOLOGY

5.4.1 Historical Unit Pricing

In some instances, historical cost information was referenced and documented accordingly. These historical references include past contract bid prices for projects of similar design and magnitude, and recent government studies and cost estimates.

5.4.2 Quote-in-place

In some instances a quote from a subcontractor or supplier may have been received and utilized, see following table on estimate development.

Estimated by	Bob Roads, HDR
Designed by	Bob Roads, HDR
Prepared by	Michelle Puzach
Preparation Date	9/13/2010
Effective Date of Pricing	12/19/2013
Estimated Construction Time	Days

Description	UOM	Quantity	ContractCost	Contingency	ProjectCost
Owner Level 1			7,110,404.17	1,694,286.89	8,804,691.06
01 Lands and Damages	LS	1.0000	2,513,650.00	371,797.50	2,885,447.50
06 Fish and Wildlife Facilities	LS	1.0000	3,648,229.17	1,049,598.75	4,697,827.91
30 Planning, Engineering, and Design	LS	1.0000	583,700.00	167,930.49	751,630.49
31 Construction Management	LS	1.0000	364,825.00	104,960.15	469,785.15

Description	UOM	Quantity	ContractCost	Contingency	ProjectCost
Owner Level 2			7,110,404.17	1,694,286.89	8,804,691.06
01 Lands and Damages	LS	1.0000	2,513,650.00	371,797.50	2,885,447.50
06 Fish and Wildlife Facilities	LS	1.0000	3,648,229.17	1,049,598.75	4,697,827.91
Phase 1	LS	1.0000	1,070,332.37	300,541.22	1,370,873.59
Phase 2	LS	1.0000	1,036,290.40	391,820.17	1,428,110.57
Phase 3	LS	1.0000	1,083,389.08	302,526.20	1,385,915.28
Phase 4	LS	1.0000	458,217.32	54,711.15	512,928.46
30 Planning, Engineering, and Design	LS	1.0000	583,700.00	167,930.49	751,630.49
Phase 1 PED	LS	1.0000	171,250.00	49,268.63	220,518.63
Phase 2 PED	LS	1.0000	165,800.00	47,700.66	213,500.66
Phase 3 PED	LS	1.0000	173,350.00	49,872.80	223,222.80
Phase 4 PED	LS	1.0000	73,300.00	21,088.41	94,388.41
31 Construction Management	LS	1.0000	364,825.00	104,960.15	469,785.15
Phase 1 CM	LS	1.0000	107,035.00	30,793.97	137,828.97
Phase 2 CM	LS	1.0000	103,630.00	29,814.35	133,444.35
Phase 3 CM	LS	1.0000	108,340.00	31,169.42	139,509.42
Phase 4 CM	LS	1.0000	45,820.00	13,182.41	59,002.41

Description	UOM	Quantity	ContractCost	Contingency	ProjectCost
Owner Level 3			7,110,404.17	1,694,286.89	8,804,691.06
01 Lands and Damages	LS	1.0000	2,513,650.00	371,797.50	2,885,447.50
06 Fish and Wildlife Facilities	LS	1.0000	3,648,229.17	1,049,598.75	4,697,827.91
Phase 1	LS	1.0000	1,070,332.37	300,541.22	1,370,873.59
1A Water Control Structures	LS	1.0000	39,798.78	7,478.19	47,276.97
1B 2500 GPM Well	LS	1.0000	334,309.13	113,431.09	447,740.21
1D Channel into Goose Pasture Lake	LS	1.0000	24,722.61	4,645.38	29,367.99
4C2 River Ridge Scour Embankments	LS	1.0000	186,945.93	58,962.75	245,908.67
4D South Spillway	LS	1.0000	444,408.63	108,480.15	552,888.77
4E CMP Pipes South Spillway	LS	1.0000	40,147.30	7,543.68	47,690.97
Phase 2	LS	1.0000	1,036,290.40	391,820.17	1,428,110.57
3J Excavation from Sny Ditch to Roadside Lakes	LS	1.0000	12,257.05	2,303.10	14,560.15
3K Portable pump and water control structure	LS	1.0000	85,055.73	15,981.97	101,037.70
4B2 Excavation of Sny, S. of Br., High Levee Inland Road Lake Channel to Dog Island	LS	1.0000	254,969.83	25,853.94	280,823.77
5B Sny Ditch	LS	1.0000	684,007.79	347,681.16	1,031,688.95
Phase 3	LS	1.0000	1,083,389.08	302,526.20	1,385,915.28
3A Ditch to Waverly Lake	LS	1.0000	218,904.58	22,196.92	241,101.50
3B Water Control Structure in Main Ditch	LS	1.0000	39,966.65	7,509.73	47,476.38
3C CMP in North Units	LS	1.0000	171,891.93	38,486.60	210,378.53
3E/4G Pump Station	LS	1.0000	441,171.14	194,600.59	635,771.73
3F/4H Ditch Widening	LS	1.0000	67,686.70	12,718.33	80,405.03
3G/4I Pump station pipe concrete roadway	LS	1.0000	13,958.05	2,622.72	16,580.77
3H CMP Pipes Under Sand Levee	LS	1.0000	73,787.01	13,864.58	87,651.58
4J CMP Pipes Under Access Road	LS	1.0000	56,023.03	10,526.73	66,549.75
Phase 4	LS	1.0000	458,217.32	54,711.15	512,928.46
1C Trees	LS	1.0000	289,958.44	34,621.04	324,579.48
3I Trees	LS	1.0000	168,258.87	20,090.11	188,348.98
30 Planning, Engineering, and Design	LS	1.0000	583,700.00	167,930.49	751,630.49
Phase 1 PED	LS	1.0000	171,250.00	49,268.63	220,518.63
Phase 2 PED	LS	1.0000	165,800.00	47,700.66	213,500.66

Description	UOM	Quantity	ContractCost	Contingency	ProjectCost
Phase 3 PED	LS	1.0000	173,350.00	49,872.80	223,222.80
Phase 4 PED	LS	1.0000	73,300.00	21,088.41	94,388.41
31 Construction Management	LS	1.0000	364,825.00	104,960.15	469,785.15
Phase 1 CM	LS	1.0000	107,035.00	30,793.97	137,828.97
Phase 2 CM	LS	1.0000	103,630.00	29,814.35	133,444.35
Phase 3 CM	LS	1.0000	108,340.00	31,169.42	139,509.42
Phase 4 CM	LS	1.0000	45,820.00	13,182.41	59,002.41

5.4.3 Detailed MII Cost Estimate

The MII estimating software was used to develop a construction sequence for major items of work and applying detailed line items and crews to perform the work. Crews were developed in correspondence with major work items being performed and estimated productivities. The labor rates were adjusted to the local and current Davis-Bacon wage determinations. The latest MII equipment database was also used and adjusted for current fuel and energy costs. Material prices were obtained through telephone solicitations with vendors, Internet suppliers, the 2012 MII Cost Book, and R.S.MEANS.

6. PROJECT SCHEDULE

6.1 The development schedule for the project is shown on Table 7.1 within the report.

6.2 The development sequence for the project is as indicated below.

RIP RAP LANDING HREP -STAGE II

Item	Construction Work Item	Instructions	Purpose	Design Package
1A	Zone 1 - Water Control Structure	Install small levee segment across existing Levee district drainage channel with WCS and sluice gate.	This will allow the site to manipulate water levels within Zone 1 independent of the drainage district's needs	1
1B	Zone 1 - 2,500 gpm well	Install a diesel powered well to provide a "clean" water supply for moist soil areas within the Zone.	With Item 1A providing water control, the well will provide the ability to manage water levels within the Zone.	1
1D	Zone 1 - Channel into Goose Lake Pasture	After the water control structure is complete, Item 1A, construct a small open channel into Goose lake Pasture from the upstream side of the structure.	Working in conjunction with Items 1A & 1 B, this will allow the site to provide water to the Goose Lake Pasture area and associated wetlands.	1
4C2	Zone 4 - River Ridge Scour Embankments	Construct levee segments across two scour locations, maintaining the normal river ridge control elevation	These two levees will stop the ongoing scour and erosion being caused by smaller flood events and allow the site to flood in more of a backwater fashion. It will also reduce the flows and velocities across the southern spillway, Item 4D.	1
4D	Zone 4 -South Spillway	The existing south spillway will be increased in length to lessen the velocities going across the spillway and to eliminate problems of water cutting around the spillway.	The south spillway, provides the water control elevation for all moist soil units within Zone 4. Lengthening this spillway and using revetment mats to maintain a "flat" spillway elevation will reduce the problems that have occurred due to high flood flow velocities	1
4E	Zone 4 -WCS Pipe in South Spillway	The existing water control pipe in the main slough will be replaced. The inline stoplog structure will be replaced by a sluice gate	The water control structure will be placed at the edge of the new spillway but not in the main spillway flow channel. This will eliminate problems associated with flood debris. The sluice gate will assist in eliminating problems with beavers clogging up the discharge.	1

3J	Zone 3- Excavation of channel between Roadside lake and Sny Creek	Mechanically excavate /improve the water connection between Roadside Lake and the Sny Creek	This will provide some level of water level management within Roadside Lake	2
3K	Zone 3- Provide a portable pump and "fish friendly" sheet pile water control structure	Construct a sheet pile stoplog structure across the channel constructed in Item 3L and purchase a portable pump system	This structure will allow for fish passage when the stoplogs are removed and for water level management within Roadside Lake when the stop logs are in place. The portable pump will allow for water level management in Roadside lake if it cannot be accomplished by gravity.	2
4B2	Zone 4- Excavation of Sny Creek, from the Sny Creek High Levee to Dog Island	Mechanically dredge the existing Sny Creek and place material adjacent to the Sny High Levee	Dredging this portion of the Sny Creek will provide deeper water for fisheries purposes and allow some water level management of the Roadside Lake.	2
5B	Zone 5 - Excavation of the Sny Creek from the edge of Zone 4 to the confluence of the Mississippi River	Hydraulically dredge the existing Sny Creek and place material in thalweg of the Mississippi River.	Dredging this portion of the Sny Creek will provide deeper water for fisheries purposes.	2
3A	Channel to Waverly Lake	Widen the existing water supply pump channel from the Sny Sand Levee to Waverly Lake.	This will allow for an increase in water supply from 11, 000 to 35,000 gpm to be supplied to Waverly lake and adjacent moist soil units.	3
3B	Water Control Structure in Main Channel	A levee structure with two 36" diameter WCS pipes with sluice gates will be installed across the channel indicated in Item 3A.	This will allow water to be diverted either into Waverly lake or the north and/or south water moist soil units adjacent to Waverly Lake.	3
3C	WCS in North Units	The channel to Waverly lake, Item 3A will be widened on the north side of the existing channel so as to not impact the existing roadway.	The existing stoplog structures and WCS pipes will need to be replaced and relocated as the levee is being slightly shifted to the north.	3
3E & 4G	Zone 3 & 4 , New Pump Station	Increase the size of the existing pump station from 11,000 gpm to 35,000 gpm.	Increasing the size of the pump station on the existing sheet pile structure will allow for more water level management options.	3
3F & 4H	Zone 3 & 4, Channel Widening	Widen the existing water supply channel to carry 35,000 gpm.	The existing channel will be widened to increase its capacity from 11,000 to 35,000 gpm.	3
3G & 4I	Zone 3 & 4, Pump station Concrete road	Provide a concrete roadway across the discharge pipe of the new pump station.	Because of limited gravity elevation options, the discharge pipe from the new pump station to the pump channel will have minimal cover. The roadway will protect the pipe form machinery entering and leaving Zone 2.	3
3H	WCS Pipes under the Sny Sand Levee & Sluice Gate to North Slough	Two existing 36" diameter pipes with sluice gates under the Sny Sand Levee will be replaced.	Water pumped from the river will enter the slough west of the Sny Sand Levee and then will be directed under the Sny Sand Levee towards Waverly Lake or it can be directed north to feed the existing northern portion of the slough	3

4J	WCS Pipes under Access Road	Replace the existing 36" diameter WCS pipes under the access road leading to the pump station from the Sny Sand Levee.	Water from the new pump station will accumulate in the existing slough west of the Sny Sand Levee. It can either be directed north to the remaining sloughs in Zone 2, east under the Sny sand Levee to Waverly lake or south through these pipes to feed Zone 4 units.	3
1C	Trees	Plant container grown hardwood trees in the upland portion of Zone 1.	Replace farming practices and provide hardwood trees for area and for future transplanting.	4
2B	Trees	Plant container grown hardwood trees in the upland portion of Zone 2.	Replace farming practices and provide hardwood trees.	4
3I	Trees	Plant or allow for natural re-vegetation of former crop land on higher portions of Zone 3 outside of the WRP lands.	Replace farming practices and provide hardwood trees.	4
4K	Trees	Plant or allow for natural re-vegetation of former crop land on higher portions of Zone 4 along the river ridge.	Replace farming practices and provide hardwood trees.	4

7. COST & SCHEDULE RISK ANALYSIS

The purpose for a cost and schedule risk analysis (CSRA) is to identify potential events that could positively or negatively affect the project cost or schedule, analyze their impacts, and then be used as a project management tool to plan, track or control these risks. This document will be prepared during the design portion of the contract.

8 TOTAL PROJECT COST SUMMARY

A total project cost summary (TPCS) has been developed for the estimated construction costs. The TPCS was developed using an excel spreadsheet which incorporates the cost for all feature accounts developed in the MII, a contingency of 29% and escalation to the midpoint of construction for each contract. This document will be updated during the design portion of the contract with a contingency developed using CSA.

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: Rip Rap Landing HREP
PROJECT NO: P2 143665
LOCATION: Clahoun County, IL

DISTRICT: MVS
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 1/14/2014

This Estimate reflects the scope and schedule in report; Rip Rap Landing Program Management Plan

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2015								
						Effective Price Level Date: 1 OCT 14								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 19-Dec-13 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
06	FISH & WILDLIFE FACILITIES	$3,648	$1,049	29%	$4,697	1.9%	$3,719	$1,070	$4,789	$0		$3,874	$1,115	$4,988
	CONSTRUCTION ESTIMATE TOTALS:	$3,648	$1,049		$4,697	1.9%	$3,719	$1,070	$4,789	$0		$3,874	$1,115	$4,988
01	LANDS AND DAMAGES	$2,514	$372	15%	$2,886	2.0%	$2,563	$379	$2,942	$0		$2,563	$379	$2,942
30	PLANNING, ENGINEERING & DESIGN	$588	$169	29%	$757	3.7%	$610	$175	$785	$0		$656	$189	$845
31	CONSTRUCTION MANAGEMENT	$367	$106	29%	$473	3.7%	$380	$109	$490	$0		$416	$120	$536
	PROJECT COST TOTALS:	$7,117	$1,696	24%	$8,813		$7,272	$1,734	**$9,006**	$0		$7,510	$1,802	$9,312

Gary Lee, PE	CHIEF, COST ENGINEERING, xxx	ESTIMATED FEDERAL COST:	69%	$6,464
Brian Markert	PROJECT MANAGER, xxx	ESTIMATED NON-FEDERAL COST:	31%	$2,848
Tim Nelson	CHIEF, REAL ESTATE, xxx	**ESTIMATED TOTAL PROJECT COST:**		$9,312
	CHIEF, PLANNING,xxx			
	CHIEF, ENGINEERING, xxx			
	CHIEF, OPERATIONS, xxx			
	CHIEF, CONSTRUCTION, xxx			
	CHIEF, CONTRACTING,xxx			
	CHIEF, PM-PB, xxxx			
	CHIEF, DPM, xxx			

Filename: Rip Rap Landing_TPCS_Jan2014.xlsx
TPCS

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Rip Rap Landing HREP
LOCATION: Clahoun County, IL
This Estimate reflects the scope and schedule in report; Rip Rap Landing Program Management Plan

DISTRICT: MVS PREPARED: 1/14/2014
POC: CHIEF, COST ENGINEERING, xxx

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 12/19/2013 Effective Price Level: 41627				Program Year (Budget EC): 2015 Effective Price Level Date: 1 OCT 14								
				RISK BASED										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$1,070	$308	29%	$1,378	1.9%	$1,091 $0	$314	$1,405	2016Q1	1.9%	$1,112	$320	$1,431
	CONSTRUCTION ESTIMATE TOTALS:	$1,070	$308	29%	**$1,378**		$1,091	$314	$1,405			$1,112	$320	$1,431
01	LANDS AND DAMAGES	$2,514	$372	15%	$2,886	2.0%	$2,563	$379	$2,942	2015Q1	0.0%	$2,563	$379	$2,942
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	$11	$3	29%	$14	3.7%	$11	$3	$15	2015Q3	2.1%	$12	$3	$15
1.0%	Planning & Environmental Compliance	$11	$3	29%	$14	3.7%	$11	$3	$15	2015Q3	2.1%	$12	$3	$15
8.0%	Engineering & Design	$86	$25	29%	$111	3.7%	$89	$26	$115	2015Q3	2.1%	$91	$26	$117
1.0%	Reviews, ATRs, IEPRs, VE	$11	$3	29%	$14	3.7%	$11	$3	$15	2015Q3	2.1%	$12	$3	$15
0.0%	Life Cycle Updates (cost, schedule, risks)	$0	$0	29%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Contracting & Reprographics	$11	$3	29%	$14	3.7%	$11	$3	$15	2015Q3	2.1%	$12	$3	$15
1.0%	Engineering During Construction	$11	$3	29%	$14	3.7%	$11	$3	$15	2016Q1	4.2%	$12	$3	$15
2.0%	Planning During Construction	$21	$6	29%	$27	3.7%	$22	$6	$28	2016Q1	4.2%	$23	$7	$29
1.0%	Project Operations	$11	$3	29%	$14	3.7%	$11	$3	$15	2015Q3	2.1%	$12	$3	$15
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$86	$25	29%	$111	3.7%	$89	$26	$115	2016Q1	4.2%	$93	$27	$120
1.0%	Project Operation:	$11	$3	29%	$14	3.7%	$11	$3	$15	2016Q1	4.2%	$12	$3	$15
1.0%	Project Management	$11	$3	29%	$14	3.7%	$11	$3	$15	2016Q1	4.2%	$12	$3	$15
	CONTRACT COST TOTALS:	$3,865	$761		**$4,626**		$3,945	$777	$4,722			$3,975	$786	**$4,761**

Filename: Rip Rap Landing_TPCS_Jan2014.xlsx
TPCS

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Rip Rap Landing HREP
LOCATION: Clahoun County, IL
This Estimate reflects the scope and schedule in report; Rip Rap Landing Program Management Plan

DISTRICT: MVS PREPARED: 1/14/2014
POC: CHIEF, COST ENGINEERING, xxx

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: / Effective Price Level:			12/19/2013 / 41627	Program Year (Budget EC): / Effective Price Level Date:			2015 / 1 OCT 14					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 2													
06	FISH & WILDLIFE FACILITIES	$1,036	$298	29%	$1,334	1.9%	$1,056	$304	$1,360	2017Q1	3.8%	$1,097	$316	$1,413
	CONSTRUCTION ESTIMATE TOTALS:	$1,036	$298	29%	**$1,334**		$1,056	$304	$1,360			$1,097	$316	$1,413
01	LANDS AND DAMAGES	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	$10	$3	29%	$13	3.7%	$10	$3	$13	2016Q3	6.4%	$11	$3	$14
1.0%	Planning & Environmental Compliance	$10	$3	29%	$13	3.7%	$10	$3	$13	2016Q3	6.4%	$11	$3	$14
8.0%	Engineering & Design	$83	$24	29%	$107	3.7%	$86	$25	$111	2016Q3	6.4%	$92	$26	$118
1.0%	Reviews, ATRs, IEPRs, VE	$10	$3	29%	$13	3.7%	$10	$3	$13	2016Q3	6.4%	$11	$3	$14
0.0%	Life Cycle Updates (cost, schedule, risks)	$0	$0	29%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Contracting & Reprographics	$10	$3	29%	$13	3.7%	$10	$3	$13	2016Q3	6.4%	$11	$3	$14
1.0%	Engineering During Construction	$10	$3	29%	$13	3.7%	$10	$3	$13	2017Q1	8.7%	$11	$3	$15
2.0%	Planning During Construction	$21	$6	29%	$27	3.7%	$22	$6	$28	2017Q1	8.7%	$24	$7	$30
1.0%	Project Operations	$10	$3	29%	$13	3.7%	$10	$3	$13	2016Q3	6.4%	$11	$3	$14
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$83	$24	29%	$107	3.7%	$86	$25	$111	2017Q1	8.7%	$93	$27	$120
1.0%	Project Operation:	$10	$3	29%	$13	3.7%	$10	$3	$13	2017Q1	8.7%	$11	$3	$15
1.0%	Project Management	$10	$3	29%	$13	3.7%	$10	$3	$13	2017Q1	8.7%	$11	$3	$15
	CONTRACT COST TOTALS:	$1,303	$375		**$1,678**		$1,333	$384	$1,717			$1,395	$401	**$1,796**

Filename: Rip Rap Landing_TPCS_Jan2014.xlsx
TPCS

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Rip Rap Landing HREP
LOCATION: Clahoun County, IL
This Estimate reflects the scope and schedule in report; Rip Rap Landing Program Management Plan

DISTRICT: MVS
POC: CHIEF, COST ENGINEERING, xxx
PREPARED: 1/14/2014

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 12/19/2013 Effective Price Level: 41627				Program Year (Budget EC): 2015 Effective Price Level Date: 1 OCT 14								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	PHASE 3													
06	FISH & WILDLIFE FACILITIES	$1,083	$312	29%	$1,395	1.9%	$1,105	$318	$1,422	2018Q1	5.8%	$1,169	$336	$1,505
	CONSTRUCTION ESTIMATE TOTALS:	$1,083	$312	29%	**$1,395**		$1,105	$318	$1,422			$1,169	$336	$1,505
01	LANDS AND DAMAGES	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	$11	$3	29%	$14	3.7%	$11	$3	$15	2017Q3	11.0%	$13	$4	$16
1.0%	Planning & Environmental Compliance	$11	$3	29%	$14	3.7%	$11	$3	$15	2017Q3	11.0%	$13	$4	$16
8.0%	Engineering & Design	$87	$25	29%	$112	3.7%	$90	$26	$116	2017Q3	11.0%	$100	$29	$129
1.0%	Reviews, ATRs, IEPRs, VE	$11	$3	29%	$14	3.7%	$11	$3	$15	2017Q3	11.0%	$13	$4	$16
0.0%	Life Cycle Updates (cost, schedule, risks)	$0	$0	29%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Contracting & Reprographics	$11	$3	29%	$14	3.7%	$11	$3	$15	2017Q3	11.0%	$13	$4	$16
1.0%	Engineering During Construction	$11	$3	29%	$14	3.7%	$11	$3	$15	2018Q1	13.3%	$13	$4	$17
2.0%	Planning During Construction	$22	$6	29%	$28	3.7%	$23	$7	$29	2018Q1	13.3%	$26	$7	$33
1.0%	Project Operations	$11	$3	29%	$14	3.7%	$11	$3	$15	2017Q3	11.0%	$13	$4	$16
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$87	$25	29%	$112	3.7%	$90	$26	$116	2018Q1	13.3%	$102	$29	$132
1.0%	Project Operation:	$11	$3	29%	$14	3.7%	$11	$3	$15	2018Q1	13.3%	$13	$4	$17
1.0%	Project Management	$11	$3	29%	$14	3.7%	$11	$3	$15	2018Q1	13.3%	$13	$4	$17
	CONTRACT COST TOTALS:	$1,367	$393		**$1,761**		$1,399	$402	$1,801			$1,499	$431	**$1,930**

Filename: Rip Rap Landing_TPCS_Jan2014.xlsx
TPCS

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: Rip Rap Landing HREP
LOCATION: Clahoun County, IL
This Estimate reflects the scope and schedule in report; Rip Rap Landing Program Management Plan

DISTRICT: MVS
POC: CHIEF, COST ENGINEERING, xxx
PREPARED: 1/14/2014

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 12/19/2013 Effective Price Level: 41627				Program Year (Budget EC): 2015 Effective Price Level Date: 1 OCT 14				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 4													
06	FISH & WILDLIFE FACILITIES	$458	$132	29%	$590	1.9%	$467 $0	$134	$602	2018Q2	6.3%	$497	$143	$640
	CONSTRUCTION ESTIMATE TOTALS:	$458	$132	29%	$590		$467	$134	$602			$497	$143	$640
01	LANDS AND DAMAGES	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	$5	$1	29%	$6	3.7%	$5	$1	$7	2017Q4	12.1%	$6	$2	$7
1.0%	Planning & Environmental Compliance	$5	$1	29%	$6	3.7%	$5	$1	$7	2017Q4	12.1%	$6	$2	$7
8.0%	Engineering & Design	$37	$11	29%	$48	3.7%	$38	$11	$49	2017Q4	12.1%	$43	$12	$55
1.0%	Reviews, ATRs, IEPRs, VE	$5	$1	29%	$6	3.7%	$5	$1	$7	2017Q4	12.1%	$6	$2	$7
0.0%	Life Cycle Updates (cost, schedule, risks)	$0	$0	29%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Contracting & Reprographics	$5	$1	29%	$6	3.7%	$5	$1	$7	2017Q4	12.1%	$6	$2	$7
1.0%	Engineering During Construction	$5	$1	29%	$6	3.7%	$5	$1	$7	2018Q2	14.5%	$6	$2	$8
2.0%	Planning During Construction	$9	$3	29%	$12	3.7%	$9	$3	$12	2018Q2	14.5%	$11	$3	$14
1.0%	Project Operations	$5	$1	29%	$6	3.7%	$5	$1	$7	2017Q4	12.1%	$6	$2	$7
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$37	$11	29%	$48	3.7%	$38	$11	$49	2018Q2	14.5%	$44	$13	$57
1.0%	Project Operation:	$5	$1	29%	$6	3.7%	$5	$1	$7	2018Q2	14.5%	$6	$2	$8
1.0%	Project Management	$5	$1	29%	$6	3.7%	$5	$1	$7	2018Q2	14.5%	$6	$2	$8
	CONTRACT COST TOTALS:	$581	$167		$748		$595	$171	$766			$641	$184	$826

Filename: Rip Rap Landing_TPCS_Jan2014.xlsx
TPCS

APPENDIX K
REAL ESTATE PLAN

Real Estate Plan

Upper Mississippi River System
ENVIRONMENTAL MANAGEMENT PROGRAM

RIP RAP LANDING
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
Pool 25
Calhoun County, Illinois

TABLE OF CONTENTS

1. PURPOSE

The Water Resources Development Act of 1986, as amended, authorizes the Rip Rap Landing Project as part of the Upper Mississippi River System – Environmental Management Program.

The Upper Mississippi River system is a vital part of this nation's ecology. The Rip Rap Landing project area consists of a series of backwater lakes, sloughs, wetlands, and floodplain and bottomland forest. Backwater habitats with the project area have been degraded due to sedimentation and lack of hydrological connection. Continued deterioration of this ecology threatens the long-term stability of important fish and wildlife resources.

This Real Estate Plan (REP) has been prepared, in accordance with ER 405-1-12, to present the real estate requirements and support the Rip Rap Landing Feasibility Report. Information contained in this report is based on preliminary data and is subject to change.

2. DESCRIPTION OF LANDS, EASEMENT, AND RIGHT-OF-WAY (LER)

a. Description of Lands, Easements and Rights-of-Way (LER) required for the construction, operation and maintenance of the project

This project is located with the Rip Rap Landing Conservation Area, located in Calhoun County, Illinois along the left descending bank of the Mississippi River between river miles 267 and 260.5 in Pool 25. The project area contains of total of 2,338 acres, 2,055 acres of which are owned by the State of Illinois and managed by the Illinois Department of Natural Resources (IDNR). Of the 2,055 acres owned by the IDNR, 793 acres are encumbered by a Wetlands Reserve Program (WRP) easement. This project is in compliance with the Natural Resource Conservation Service's Wetlands Reserve Program. 1,618 acres within the project area are required for the construction, operation, maintenance, rehabilitation and replacement of the project. Although 1,618 acres are considered creditable for the non-federal sponsor, not all lands necessary for the project are valued the same. For example, those lands encumbered with a permanent WRP easement are valued as encumbered.

The remaining 283 acres, known as Dog Island, are owned by the United States. Dog Island is managed under a Cooperative Agreement originating on 21 January 1954 between the Department of the Interior, U.S. Fish and Wildlife Service (USFWS), and the U.S. Army Corps of Engineers (Corps). The USFWS and IDNR then executed a subsequent Cooperative Agreement conveying management responsibility of Dog Island to IDNR.

b. Total LER required for each project purpose and feature

The project area is divided into five separate zones for organizational purposes. Land in zones 1-4 are owned by the IDNR. Land in zone 5 is owned by the Corps.

Zone 1: A ditch will be created in order to improve hydrologic connectivity. In addition, a water control structure will be constructed to improve water management capability within this zone. In order to supplement water level management throughout the project area, a new well will be installed. Finally, floodplain forest will be planted throughout 63 acres of zone 1.

Zone 3: A new, larger pump will be installed to help increase the functionality of isolated backwater habitat by improving water management capability. In addition, water conveyance ditches in this area will be widened and new larger water control structures will be installed increasing connectivity. Finally, trees will be planted throughout 37 acres of zone 3.

Zone 4: Sny Creek will be dredged to Roadside Lake. Dredged material will be placed both on the existing bench along Sny Creek as well as in the river. In addition to the pump from Zone 3, a spillway will be constructed which is designed to protect the water control structure from erosion during high water events. A water control structure will also be constructed between Roadside Lake and Sny Creek. All these features are designed to restore the hydrologic connection to backwater lakes and improve water management capability.

Zone 5: The only project feature proposed in zone 5 is the dredging of Sny Creek to the Mississippi River to fully restore connectivity to backwater area. Dredged material will be placed both on the existing bench along Sny Creek as well as in the river.

c. Estates to be acquired.

Where project features exist, either the NFS or the Federal Government owns the right-of-way (ROW) required. Therefore, no additional acquisition is required for project features. However, a temporary work area easement is necessary for dredge material transport.

Because dredged material will be transported via a temporary road on the existing bench/berm, a 2.1-acre temporary road easement will be required from one private landowner since a portion of the berm is on privately owned land. Therefore, there is one estate proposed for use in this project.

Temporary Road Easement (standard estate)
A temporary easement and right-of-way in, on, over and across (the land described in Schedule A)(Tract No. ___) for a period not to exceed two (2) years, beginning with the date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors for the location, construction, operation, maintenance, alteration and replacement of a road and appurtenances thereto; together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; (reserving, however, to the owners, their heirs and assigns, the right to cross over or under the right-of-way as access to their adjoining land at the locations indicated in Schedule B); subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

3. LERRD OWNED BY THE NON-FEDERAL SPONSOR

The Illinois Department of Natural Resources owns 2,055 acres of land within the project area, 1,618 of which will be used or impacted by the project.

4. NON-STANDARD ESTATES DISCUSSION

There are no non-standard estates required.

5. EXISTING FEDERAL PROJECTS WITHIN THE LERRD REQUIRED FOR THE PROJECT

The Mississippi River 9-foot navigation channel is within the LERRD required for the project. In 1939, the land currently known as the Dog Island complex was acquired in fee title for the Mississippi River 9-foot navigation channel project. At the time of acquisition, the Dog Island complex consisted of two tracts; tract C-277 and tract C-278 (see Exhibit A-1). Tract C-277 was an island in the Mississippi River known as Dog Island consisting of approximately 16.04 acres. Tract C-278 consisted of four unnamed islands in the Mississippi River totaling approximately 208.46 acres. Since the acquisition of the islands in 1939, accretion has occurred, increasing the size of the Dog Island complex to approximately 283 acres at normal pool.

6. FEDERALLY OWNED LAND REQUIRED FOR THE PROJECT

The 283 acre Dog Island complex is the only Federally-owned land required for the project. There is no other Federally-owned land in the vicinity of the project.

7. NAVIGATION SERVITUDE

Navigation Servitude allows acquisition of shore lands extending to the ordinary high-water mark thereof and may be exercised under statutory rights and powers without obligation for compensation to the riparian landowners. It is not anticipated that Navigation Servitude will be exercised for this project.

8. MAPS

A map depicting the area and project features is included as Exhibit A.

9. INDUCED FLOODING

Rip Rap Landing is located within the Mississippi River floodplain. The Rip Rap Landing project features are designed to modify existing flow and drainage patterns in order to better approximate the patterns that used to naturally occur benefitting habitat in the area. Any locations within the project area that experience increased water levels as a result of the project are currently owned in fee by the non-federal sponsor and will be provided for use in conjunction with the project. These lands will be addressed in the Project Partnership Agreement (PPA).

In addition, this project will not cause induced flooding outside of the project area.

10. BASELINE COST ESTIMATE

The original gross appraisal has an effective date of valuation of November 1, 2011. An Addendum to that appraisal evaluating 1,618 acres was performed with a date of value of August 23, 2013. Cost estimate table 10.1 is provided below.

Table 10.1	Land Area	Federal Costs	NFS Costs	Total
Property Acquisitions		-		
Temporary Road Easement	2.1 acres		$1,050	
Fee Acquisition	1,618 acres		$2,477,600	
Total Property	1620.1 acres		$2,478,650	
Incremental Costs (15%)			$371,850	
Sub-Total				$3,851,900
Administrative Expenses		$10,000	$25,000	$35,000
Total		**$10,000**	**$2,875,500**	**$2,885,500**
Total Federal/NFS Costs		**$2,886,000 (rounded)**		

11. RELOCATION ASSISTANCE BENEFITS

There are no relocations associated with this project.

12. MINERAL ACTIVITY/TIMBER HARVESTING IN PROJECT AREA

No mineral activity is known to exist within the project area.

13. NON-FEDERAL SPONSOR ASSESSMENT

The Non-Federal Sponsor is assessed to be fully capable to perform all acquisition activities associated with this project. The Sponsor has the capability to acquire and hold real estate as well as the ability to contract for real estate services to supplement its staff in order to meet project schedules.

The Assessment of the Non-Federal Sponsor's Real Estate Acquisition Capabilities is attached as Exhibit C.

14. ZONING IN LIEU OF ACQUISITION

There will be no zoning ordinances enacted to facilitate acquisition of land for the project.

15. SCHEDULE

A detailed schedule will be developed when the final ROW is determined. Normally, an estimate of one year is allowed to acquire ROW for a project. However, because a temporary construction easement is the only acquisition proposed for this project, it is anticipated that acquisition can be completed more quickly than the typical one year time-frame.

16. FACILITY OR UTILITY RELOCATION

There are no utility relocations proposed as a result of this project.

17. HTRW AND OTHER ENVIRONMENTAL CONSIDERATIONS

No known contaminants exist within the project area.

18. LANDOWNER ATTITUDE

There is no known opposition to this project. The community views this project very positively and fully supports this environmental asset.

19. NOTIFICATION TO THE NFS REGARDING THE RISKS ASSOCIATED WITH ACQUIRING LAND BEFORE EXECUTION OF THE PROJECT PARTNERSHIP AGREEMENT

As project right-of-way is finalized, the non-federal sponsor will be issued a risk letter explaining the risk of acquiring lands prior to the execution of the PPA and advised to wait on coordination of the acquisition plan and notice to proceed with acquisition.

20. OTHER REAL ESTATE ISSUES RELEVANT TO THE PROJECT

There are no other know real estate issues relevant to the project.

Timothy J. Nelson
Chief of Real Estate
USACE, St. Louis District

Prepared by:
Real Estate Plan – Lynn Hoerner, Realty Specialist
Cost Estimate – Doug Nelson, Appraiser
Bonnie Tanamor, Appraiser Trainee

Exhibit A

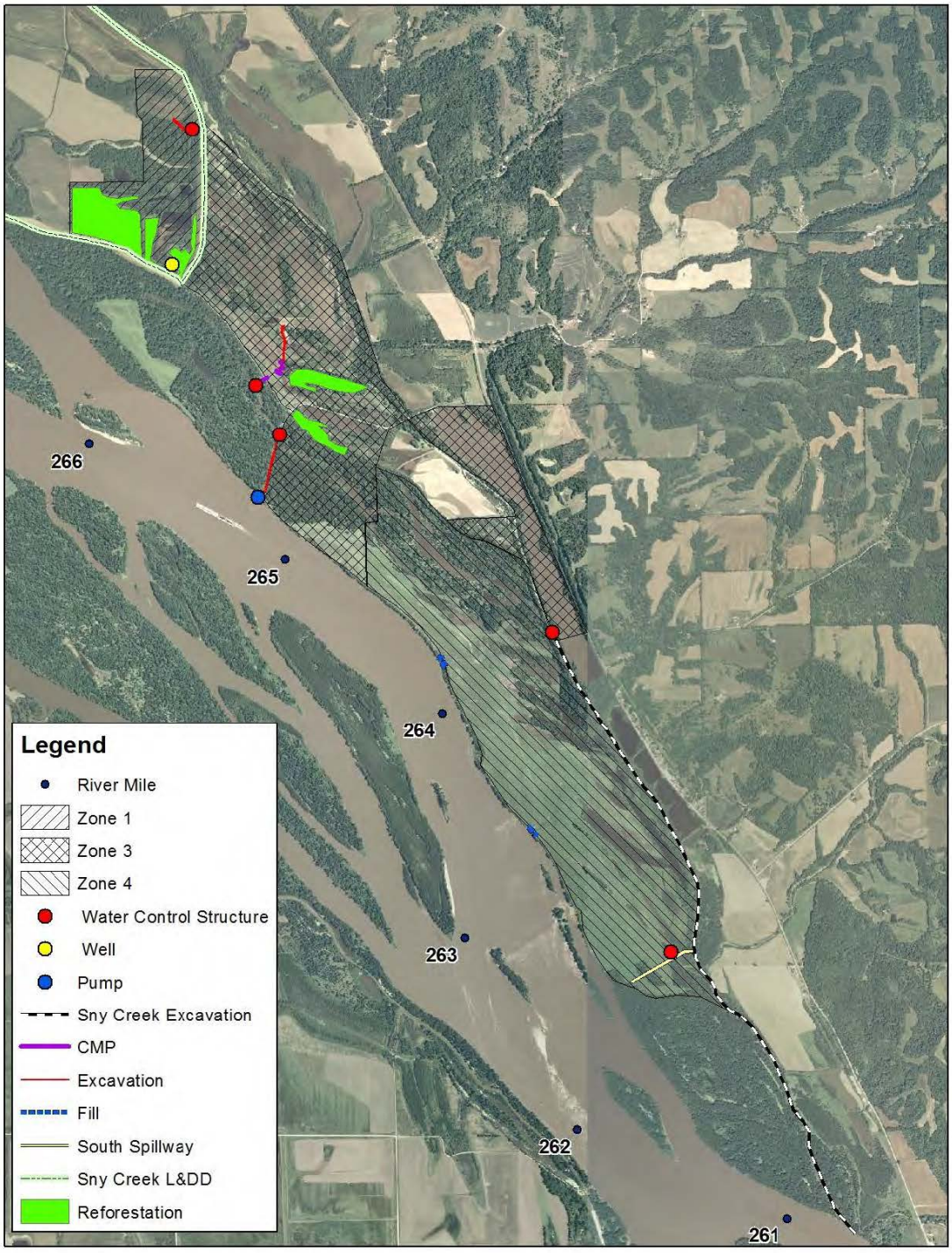

266
265
264
263
262
261
Legend
River Mile
Zone 1
Zone 3
Zone 4
Water Control Structure
Well
Pump
Sny Creek Excavation
CMP
Excavation
Fill
South Spillway
Sny Creek L&DD
Reforestation

Exhibit B
Quality Control Checklist

Quality Control Plan Checklist

Real Estate Plans
And other similar Feasibility-Level Real Estate Planning Documents

ER 405-1-12, Section 12-16, Real Estate Handbook, 1 May 1998

A Real Estate Plan (REP) is prepared in support of a decision document for full-Federal or cost shared specifically authorized or continuing authority projects. It identifies and describes lands, easements and rights-of-way (LER) required for the construction, operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of a proposed project including requirements for mitigation, relocations, borrow material, and dredged or excavated material disposal. It also identifies and describes facility/utility relocations, LER value, and the acquisition process. The REP does not just cover LER to be acquired by the non-Federal sponsor (NFS) or Government. The report covers all LER needed for the project, including LER already owned by the NFS, Federal Government, other public entities, or subject to the navigation servitude.

The REP must contain a detailed discussion of the following 20 topics, as set out in Section 12-16 of the ER, including sufficient description of the rationale supporting each conclusion presented. If a topic is not applicable to the project, this should be stated in the REP. The pages of a REP should be numbered.

PROJECT: RIP-RAP LANDING, HABITAT REHABILITATION AND ENHANCEMENT PROJECT

REPORT TITLE: UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM (EMP), DEFINITE PROJECT REPORT STAGE I, RIP RAP LANDING CONSERVATION AREA HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Date of Report_____ **Date of REP: November 7, 2011**

1. **Purpose of the REP**. __X__
   a. Describe the purpose of the REP in relation to the project document that it supports.
   b. Describe the project for the Real Estate reviewer.
   c. Describe any previous REPs for the project.

2. **Describe LER**. ___X___
   a. Account for all lands, easements, and rights-of-way underlying and required for the construction, OMRR&R of the project, including mitigation, relocations, borrow material and dredged or excavated material disposal, whether or not it will need to be acquired or will be credited to the NFS.
   b. Provide description of total LER required for each project purpose and feature.
   c. Include LER already owned by the Government, the NFS and within the navigation servitude.

d. Show acreage, estates, number of tracts and ownerships, and estimated value.

e. Break down total acreage into fee and the various types and durations of easements.

f. Break down acreage by Government, NFS, other public entity, and private ownership, and lands within the navigation servitude.

3. **NFS-Owned LER**.___X___

a. Describe NFS-owned acreage and interest and whether or not it is sufficient and available for project requirements.

b. Discuss any crediting issues and describe NFS views on such issues.

4. Include any proposed **Non-Standard Estates**. _N/A_

a. Use Standard Estates where possible.

b. Non-standard estates must be approved by HQ to assure they meet DOJ standards for use in condemnations.

c. Provide justification for use of the proposed non-standard estates.

d. Request approval of the non-standard estates as part of document approval.

e. If the document is to be approved at MSC level, the District must seek approval of the non-standard estate by separate request to HQ. This should be stated in the REP.

f. Exception to HQ approval is District Chiefs of RE approval of non-standard estate if it serves intended project purposed, substantially conforms with and does not materially deviate from the standard estates found in the RE Handbook, and does not increase cost or potential liability to the Government. A copy of this approval should be included in the REP. (See Section 12-10c. of RE 405-1-12)

g. Although estates are discussed generally in topic 2, it is a good idea to also state in this section which standard estates are to be acquired and attach a copy as an appendix. The duration of any temporary estates should be stated.

5. **Existing Federal Projects**. __X__

a. Discuss whether there is any existing Federal project that lies fully of partially within LER required for the project.

b. Describe the existing project, all previously-provided interests that are to be included in the current project, and identify the sponsor.

c. Interest in land provided as an item of local cooperation for a previous Federal project is not eligible for credit.

d. Additional interest in the same land is eligible for credit.

6. **Federally-Owned Lands** __X__

a. Discuss whether there is any Federally owned land included within the LER required for the project.

b. Describe the acreage and interest owned by the Government.

c. Provide description of the views of the local agency representatives toward use of the land for the project and issues raised by the requirement for this land.

7. **Navigation Servitude**. __X__

a. Identify LER required for the project that lies below the Ordinary High Water Mark, or Mean High Water Mark, as the case may be, of a navigable watercourse.

b. Discuss whether navigation servitude is available

c. Will it be exercised for project purposes? Discuss why or why not.

d. Lands over which the navigation servitude is exercised are not to be acquired nor eligible for credit for a Federal navigation or flood control project or other project to which a navigation nexus can be shown.

e. See paragraph 12-7 of ER 405-1-12.

8. **Map** __X__

a. An aid to understanding

b. Clearly depicting project area and tracts required, including existing LER, LER to be acquired, and lands within the navigation servitude.

c. Depicts significant utilities and facilities to be relocated, any known or potential HTRW lands.

9. **Induced Flooding** can create a requirement for real estate acquisition. ___X___

a. Discuss whether there will be flooding induced by the construction and OMRR&R of the project.

b. If reasonably anticipated, describe nature, extent and whether additional acquisition of LER must or should occur.

c. Physical Takings Analysis (separate from the REP) must be done if significant induced flooding anticipated considering depth, frequency, duration, and extent of induced flooding.

. d. Summarize findings of Takings Analysis in REP. Does it rise to the level of a taking for which just compensation is owed?

10. **Baseline Cost Estimate** as described in paragraph 12-18. __X__

a. Provides information for the project cost estimates.

b. Gross Appraisal includes the fair market value of all lands required for project construction and OMRR&R.

c. PL 91-646 costs

d. Incidental acquisition costs

e. Incremental real estate costs discussed/supported.

f. Is Gross Appraisal current? Does Gross Appraisal need to be updated due to changes in project LER requirements or time since report was prepared?

11. **Relocation Assistance Benefits** Anticipated. __X__

a. Number of persons, farms, and businesses to be displaced and estimated cost of moving and reestablishment.

b. Availability of replacement housing for owners/tenants

c. Need for Last Resort Housing benefits

d. Real Estate closing costs

e. See current 49 CFR Part 24

12. **Mineral Activity**. __X__

a. Description of present or anticipated mineral activity in vicinity that may affect construction, OMRR&R of project.

b. Recommendation, including rationale, regarding acquisition of mineral rights or interest, including oil or gas.

c. Discuss other surface or subsurface interests/timber harvesting activity

d. Discuss effect of outstanding 3rd party mineral interests.

e. Does estate properly address mineral rights in relation to the project?

13. **NFS Assessment** __X__

a. Assessment of legal and professional capability and experience to acquire and provide LER for construction, OMRR&R of the Project.

b. Condemnation authority

c. Quick-take capability

d. NFS advised of URA requirements

e. NFS advised of requirements for documenting expenses for credit.

f. If proposed that Government will acquire project LER on behalf of NFS, fully explain the reasons for the Government performing work.

g. A copy of the signed and dated Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability (Appendix 12-E) is attached to the REP.

14. **Zoning** in Lieu of Acquisition __X__

a. Discuss type and intended purpose

b. Determine whether the proposed zoning proposal would amount to a taking for which compensation will be due.

15. **Schedule** __X__

a. Reasonable and detailed Schedule of land acquisition milestones, including LER certification.

b. Dates mutually agreed upon by Real Estate, PM, and NFS. _____

16. **Facility or Utility Relocations** __X__

a. Describe the relocations, identity of owners, purpose of facilities/utilities, whether owners have compensable real property interest.

b. A synopsis of the findings of the Preliminary Attorney's Investigation and Report of Compensable Interest is included in the REP as well as statements required by Sections 12-17c.(5) and (6).

c. Erroneous determinations can affect the accuracy of the project cost estimate and can confuse Congressional authorization.

d. Eligibility for substitute facility

1. Project impact
2. Compensable interest
3. Public utility or facility
4. Duty to replace
5. Fair market value too difficult to determine or its application would result in an injustice to the landowner or the public.

e. See Sections 12-8, 12-17, and 12-22 of ER 405-1-12.

17. **HTRW** and Other Environmental Considerations ___X___

a. Discussion the impacts on the Real Estate acquisition process and LER value estimate due to known or suspected presence of contaminants.

b. Status of District's investigation of contaminants.

c. Are contaminants regulated under CERCLA, other statues, or State law?

d. Is clean-up or other response required of non-CERCLA regulated material?

e. If cost share, who is responsible for performing and paying cost of work?

f. Status of NEPA and NHPA compliances

g. See ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects.

18. **Landowner Attitude**. __X__

a. Is there support, apathy, or opposition toward the project?

b. Discuss any landowner concerns on issues such as condemnation, willing seller provisions, estates, acreages, etc.?

19. A statement that the **NFS has been notified in writing about the risks of acquiring LER before the execution of the PPA**. If not applicable, so state. __X__

20. **Other Relevant Real Estate Issues**. Anything material to the understanding of the RE aspects of the project. ___X___

A copy of the completed Checklist is attached to the REP. __X___
(Draft REPs must contain a draft checklist and draft Technical Review Guide)

I have prepared and thoroughly reviewed the REP and all information, as required by Section 12-16 of ER 405-1-12, is contained in the Plan.

Lynn Haerer — Preparer

4-17-12 — Date

A copy of the Real Estate Internal Technical Review Guide for Civil Works Decision Documents is attached and signed by me as the Reviewer

RE Internal Technical Reviewer

7/17/12 — Date

The REP has been signed and dated by the Preparer and the District Chief of Real Estate.

Exhibit C
Sponsor Capability Checklist

ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE CAPABILITY

Legal Authority:

Does the sponsor have legal authority to acquire and hold title to real property for project purposes?

Yes

Does the sponsor have the power of eminent domain for this project?

The sponsor does not have specific power to use eminent domain on this project (requires signoff from Governor). Recently there has been no will to exercise eminent domain on any IDNR projects. If eminent domain is necessary, COE would have to use it at the FED level.

Does the sponsor have "quick-take" authority for this project?

No

Are any of the lands/interests in land required for the project located outside the sponsor's political boundary?

Project land already owned by the Federal Government would be outside of the sponsor's political boundary and would not be subject to eminent domain.

Human Resource Requirements:

Will the sponsor's in-house staff require training to become familiar with the real estate requirements of the Federal project including P.L. 91-646, as amended?

No. The sponsor has a well trained, fully capable staff for real estate acquisition.

If the answer to II.a. is "yes has a reasonable plan been developed to provided such training?
N.A.

Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project?

Yes

Is the sponsor's projected in-house staffing level sufficient considering its other workload, if any, and the project schedule?

Yes

Can the sponsor obtain contractor support, if required in a timely fashion?

No. Due to the financial condition of the State of Illinois, contractor support is not currently being utilized.

Will the sponsor likely request USACE assistance in acquiring real estate?

Conditionally yes.

Other Project Variables

Will the sponsor's staff be located within reasonable proximity to the project site?

Yes. The Illinois real estate staff is located approximately 90 miles away.

Has the sponsor approved project/real estate schedule/milestones?

No milestones have been developed for the project at this time.

Overall Assessment

Has the sponsor performed satisfactorily on other USACE projects?

Yes

With regard to this project, the sponsor is anticipated to be fully capable.

Yes. The sponsor is considered fully capable of successfully complying with all real estate requirements.

Coordination:

Has this assessment been coordinated with the sponsor?

Yes. It was coordinated with Pat Brannan from the Illinois Department of Natural Resources, Office of Realty Division.

Does the sponsor concur with this assessment?

Yes.

APPENDIX L

HISTORIC PROPERTIES DOCUMENTATION – Not For Public Distribution

APPENDIX M

NRCS WRP PLANS

Doc. No. 53863
STATE OF ILLINOIS)
COUNTY OF CALHOUN) SS
Filed for record this 14th day of December A.D., 2001 at 1:45 o'clock P.M. and recorded in Deed Record Book 42, Page 293.

Recorder

Deputy

$22.00 pd.

exempt under paragraph (b) of 35 ILCS 305/4

Jacqueline D. Dixon, DC for NRCS

U.S. DEPARTMENT OF AGRICULTURE
COMMODITY CREDIT CORPORATION

CCC-1255
10-25-00
OMB No. 0578-0013

WARRANTY EASEMENT DEED

WETLANDS RESERVE PROGRAM
AGREEMENT NO. 66-5A12-1-1015

THIS WARRANTY EASEMENT DEED is made by and between **RUST LAND CO., an Illinois Corporation, of 154 High Street, Winchester, Illinois 62694**, (hereafter referred to as the "Landowner"), Grantor(s), and the UNITED STATES OF AMERICA, by and through the Commodity Credit Corporation (CCC) (hereafter referred to as the "United States"), Grantee. The Landowner and the United States are jointly referred to as the "Parties." The acquiring entity of the United States is the Commodity Credit Corporation (CCC). A cooperating Federal agency is the Fish and Wildlife Service of the United States Department of the Interior.

Witnesseth

Purposes and Intent. The purpose of this Conservation Easement is to restore, protect, manage, maintain, and enhance the functional values of wetlands and other lands, and for the conservation of natural values including fish and wildlife habitat, water quality improvement, flood water retention, groundwater recharge, open space, aesthetic values, and environmental education. It is the intent of the CCC to give the Landowner the opportunity to participate in the restoration and management activities on the easement area.

Authority. This Conservation Easement acquisition is authorized by Title XII of the Food Security Act of 1985, as amended (16 U.S.C. § 3837), for the Wetlands Reserve Program.

NOW THEREFORE, for and in consideration of the sum of **SEVEN HUNDRED NINETY-TWO THOUSAND EIGHT HUNDRED and NO/100 DOLLARS ($792,800.00)**, the Grantor(s) hereby grant(s) and convey(s) with general warranty of title to the UNITED STATES OF AMERICA and its assigns, the Grantee, forever, all rights, title and interest in 792.8 acres of land, more or less, in Calhoun County, Illinois, which lands comprise the easement area described in Part I together with appurtenant rights of access to the easement area, but reserving to the Landowner only those rights, title and interest expressly enumerated in Part II. It is the intention of the Landowner to convey and relinquish any and all other property rights not so reserved. This easement shall constitute a servitude upon the land so encumbered, shall run with the land in perpetuity and shall bind the Landowner, (the Grantor(s)), (his/her/its/their) heirs, successors, assigns, lessees, and any other person claiming under them.

SUBJECT, however, to Right of Way Easement to Calhoun County Rural Water District recorded November 21, 1997 in Misc. Record 28 page 578 as Doc. No. 49577.

Under date of October 26, 2001, Nancy F. Phalen, Acting State Conservationist has determined that these outstanding rights are compatible with the purposes for which this conservation easement is being purchased.

PART I. Description of the Easement Area. The lands encumbered by this easement deed, referred to hereafter as the easement area, are described in EXHIBIT A and depicted generally on EXHIBIT A-1, both of which are appended to and made a part of this easement deed.

TOGETHER with a right of access for ingress and egress to the easement area across adjacent or other properties of the Landowner. Such a right-of-way for access purposes is described in EXHIBIT B, which is appended to and made a part of this easement deed.

PART II. Reservations in the Landowner on the Easement Area. Subject to the rights, title, and interest conveyed by this easement deed to the United States, the Landowner reserves:

A. Title. Record title, along with the Landowner's right to convey, transfer, and otherwise alienate title to these reserved rights.

B. Quiet Enjoyment. The right of quiet enjoyment of the rights reserved on the easement area.

C. Control of Access. The right to prevent trespass and control access by the general public subject to the operation of State and Federal Law.

D. Recreational Uses. The right to undeveloped recreational uses, including hunting and fishing, and including leasing of such rights to economic gain, pursuant to applicable State and Federal regulations that may be in effect at the time.

E. Subsurface Resources. The right to oil, gas, minerals, and geothermal resources underlying the easement area, provided that any drilling or mining activities are to be located outside the boundaries of the easement area.

PART III. Obligations of the Landowner. The Landowner shall comply with all terms and conditions of this easement, including the following:

A. Prohibitions. Unless authorized as a compatible use under Part IV, it is expressly understood that the rights to the following activities and uses have been acquired by the United States and are prohibited of the Landowner on the easement area:

1. haying, mowing or seed harvesting for any reason;
2. altering of grassland, woodland, wildlife habitat or other natural features by burning, digging, plowing, disking, cutting or otherwise destroying the vegetative cover;
3. dumping refuse, wastes, sewage or other debris;
4. harvesting wood products;
5. draining, dredging, channeling, filling, leveling, pumping, diking, impounding or related activities, as well as altering or tampering with water control structures or devices;
6. diverting or causing or permitting the diversion of surface or underground water into, within or out of the easement area by any means;
7. building or placing buildings or structures on the easement area;
8. planting or harvesting any crop;
9. grazing or allowing livestock on the easement area; and
10. disturbing or interfering with the nesting or brood-rearing activities of migratory birds.

B. Noxious plants and pests. The Landowner is responsible for noxious weed control and emergency control of pests as required by all Federal, State and local laws. A plan to control noxious weeds and pests must be approved in writing by the CCC prior to implementation by the Landowner.

C. Fences. Except for establishment cost incurred by the United States and replacement cost not due to the Landowner's negligence or malfeasance, all other costs involved in maintenance of fences and similar facilities to exclude livestock shall be the responsibility of the Landowner.

D. Taxes. The Landowner shall pay any and all real property and other taxes and assessments, if any, which may be levied against the land.

E. Reporting. The landowner shall report to the CCC any conditions or events which may adversely affect the wetlands, wildlife, and other natural values of the easement area.

PART IV. Allowance of Compatible Uses by the Landowner.

A. General. The United States may authorize, in writing and subject to such terms and conditions the CCC may prescribe at its discretion, the use of the easement area for compatible economic uses, including, but not limited to, managed timber harvest, periodic haying, or grazing.

B. Limitations. Compatible use authorizations will only be made if such use is consistent with the long-term protection and enhancement of the wetlands and other natural values of the easement area. The CCC shall prescribe the amount, method, timing, intensity, and duration of the compatible use.

PART V. Rights of the United States. The rights of the United States include:

A. Management Activities. The United States shall have the right to enter onto the easement area to undertake, at its own expense or on a cost share basis with the Landowner or other entity, any activities to restore, protect, manage, locate and mark the boundary, maintain, enhance, and monitor the wetlands and other natural values of the easement area. The United States, at its own cost, may apply to or impound additional waters on the easement area in order to maintain or improve wetland and other natural values.

B. Access. The United States has a right of reasonable ingress and egress to the easement area over the Landowner's property, whether or not the property is adjacent or appurtenant to the easement area, for the exercise of any of the rights of the United States under this easement deed. The authorized representatives of the United States may utilize vehicles and other reasonable modes of transportation for access purposes.

C. Easement Management. The Secretary of Agriculture, by and through the CCC may delegate all or part of the management, monitoring or enforcement responsibilities under this easement to any entity authorized by law that the CCC determines to have the appropriate authority, expertise and resources necessary to carry out such delegated responsibilities. State or federal agencies may utilize their general statutory authorities in the administration of any delegated management, monitoring or enforcement responsibilities for this easement. The authority to modify or terminate this easement (16 U.S.C. § 3837e(b)) is reserved to the CCC in accordance with applicable law.

D. Violations and Remedies - Enforcement. The Parties agree that this easement deed may be introduced in any enforcement proceeding as the stipulation of the Parties hereto. If there is any failure of the Landowner to comply with any of the provisions of this easement deed, the United States or other delegated authority shall have any legal or equitable remedy provided by law and the right:

1. To enter upon the easement area to perform necessary work for prevention of or remediation of damage to wetlands or other natural values; and,

2. To assess all expenses incurred by the United States (including any legal fees or attorney fees) against the Landowner, to be owed immediately to the United States.

PART VI. General Provisions.

A. Successors in Interest. The rights granted to the United States shall accrue to any of its agents, successors, or assigns. All obligations of the Landowner under this easement deed shall also bind the Landowner's heirs, successors, agents, assigns, lessees, and any other person claiming under them. All the Landowners who are parties to this easement deed shall be jointly and severally liable for compliance with its terms.

B. Rules of Construction and Special Provisions. All rights in the easement area not reserved by the Landowner shall be deemed acquired by the United States. Any ambiguities in this easement deed shall be construed in favor of the United States to affect the wetlands and conservation purposes for which this easement deed is being acquired. The property rights of the United States acquired under this easement shall be unaffected by any subsequent amendments or repeal of the Wetlands Reserve Program. If the Landowner receives the consideration for this easement in installments, the Parties agree that the conveyance of this easement shall be totally effective upon the payment of the first installment.

PART VII Special Provisions. None.

TO HAVE AND TO HOLD, this Warranty Easement Deed is granted to the United States of America and its successors and assigns forever. The Landowner covenants that he, she or they are vested with good title to the easement area and will warrant and defend the same on behalf of the United States against all claims and demands. The Landowner covenants to comply with the terms and conditions enumerated in this document for the use of the easement area and adjacent lands for access, and to refrain from any activity not specially allowed or that is inconsistent with the purposes of this easement deed.

Dated this 13th day of December, 2001.

Landowners:

RUST LAND CO., an Illinois Corporation

By: Demetra B. Cherry
DEMETRA B. CHERRY, President

RAYMOND CHERRY, Jr., Secretary

Acknowledgment

STATE OF Illinois)
) ss
COUNTY OF Greene)

The foregoing instrument was subscribed, sworn to and acknowledged before me this 13th day of December, 2001, by Demetra B. Cherry as President and Raymond Cherry, Jr. as Secretary of Rust Land Co., an Illinois Corporation and the Grantors in this easement deed, and who did state that they are duly authorized by resolution of said Rust Land Co., dated June 17, 2001, to execute said easement deed on behalf of said Rust Land Co., and that they have done so as their free act and deed and the free act and deed of Rust Land Co.

JoAnn Harness
Notary Public

(NOTARIAL SEAL)

My Commission Expires:

OFFICIAL SEAL
JOANN HARNESS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES: 05/16/04

This instrument was drafted by the Office of the General Counsel, U.S. Department of Agriculture, Washington, D.C. 20250-1400.

OMB DISCLOSURE STATEMENT

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0578-0013. The time required to complete this information collection is estimated to average 0.69 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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WRP CONSERVATION EASEMENT AREA

RUST LAND CO.

NRCS #66-5A12-1-1015

CALHOUN COUNTY, ILLINOIS

EASEMENT DESCRIPTION

That part of the West Half and that part of the Southeast Quarter of Section 4 lying West of Hamburg Bay; the Fractional East Half of Section 5; the Fractional Northeast Quarter of Section 8; the Fractional West Half of Section 9; that part of the East half of Section 9 lying West of Hamburg Bay; also all that part of Section 16 lying West of Hamburg Bay north of Dora's Chute and East of the Mississippi River, the same being the South point of Bay Island; together with all natural accretions thereto. All situated in Township 9 South, Range 3 West of the Fourth Principal Meridian, EXCEPTING from the above described land, that part thereof heretofore conveyed to Sny Island Levee and Drainage District, situated in Calhoun County, Illinois.

ALSO, commencing at a point which is 1267 feet South and South 57 degrees West, 496 feet and North 31 degrees West 250 feet, running thence South 57 degrees West 554 feet to the East bank of the Sny ditch, thence North 27 degrees West 85 feet along the East Bank, thence North 56 degrees East, 540 feet to State Route #96; thence South 31 degrees East, 85 feet to the point of beginning, the above described tract of land is lying in the Northeast Quarter of Section 9, Township 9 South, in Range 3 West of the Fourth Principal Meridian, together with all accretions to the above described lands, and together with all rights in and to roadways leading to and from said described lands and Illinois State Highway No. 96 situated in the County of Calhoun in the State of Illinois.

TOTAL WRP EASEMENT AREA CONSISTS OF 792.8 ACRES, MORE OR LESS

EXHIBIT -A-

WRP CONSERVATION EASEMENT AREA

RUST LAND CO.

NRCS #66-5A12-1-1015

CALHOUN COUNTY, ILLINOIS

EASEMENT ACCESS DESCRIPTION

Appurtenant access to and onto the WRP easement area is more particularly described as: Commencing at the Rip Rap Landing located on the Mississippi River thence South to the Duck Blind #5 trail, thence in a Easterly and Southerly direction to the North boundary line of the WRP easement area, all in Section 32, Township 8 South, Range 3 West, Calhoun County, Illinois.

EXHIBIT -B-

RIP RAP LANDING STATE FISH & WILDLIFE AREA

RUST LAND ACQUISITION

WETLANDS RESERVE PROGRAM

MANAGEMENT PLAN

DESCRIPTION

The Rust Land Company parcel lies along the left descending bank of the Mississippi River between river miles 262.5 and 265.0, in Pool 25, Calhoun County, Illinois. The Eastern boundary of the parcel is the old Sny Creek north of the confluence of the Sny Creek and the Mississippi River, at Dog Island. Given it's location all things associated with this parcel is intricately linked to the daily stage elevation of the Mississippi River.

FLOODING HISTORY

To understand the effects of the Mississippi River it is necessary to review the flooding history of this parcel of land. In July of 1939, Lock and Dam 25 reached maximum regulated pool 434.0, creating pool 25. There are two Army Corps of Engineers river stage gauges in close proximity to the Rust land parcel. At river mile 265.0 there is a gauge at Rip Rap landing, this gauge is a manual read gauge, it lies just north of the north boundary of the Rust Land parcel and is no longer functional . Down stream at river mile 260.3 is the Mosier Landing gauge, this is a telemetered data collection platform. The following chart is a review of the Mosier Landing gauge, where a stage elevation of 441.0 is considered flood level.

MISSISSIPPI RIVER AT MOZIER RM 260.3- POOL 25
Regulated Pool Elevation 434.0 - Flood Level 441.0

Time Period	Average Number of Days Above Flood	Number of Years Levels exceeded Flood	Actual Number of Days Above 445.0	Number of Years Levels exceeded 445.0	Actual Number of Days Above 450.0	Number of Years Levels exceeded 450.0	
1940 - 49	30.4	7	54	4			
1950 - 59	15.5	6	32	2			

MISSISSIPPI RIVER AT MOZIER RM 260.3- POOL 25 Regulated Pool Elevation 434.0 - Flood Level 441.0							
1960 - 69	29.1	7	79	4			
1970 - 79	43.9	9	145	6	5	1	
1980 - 89	51.3	6	80	4			
1990 - 99	74.5	9	220	6	36	1	
2000 - 06	34.0	7	68	3	4	1	

This chart reflects a 66 year review of daily stage readings divided into 10 year segments. The purpose of dividing the data into the time segments helps depict the changes in flood levels, duration and frequency. Starting in the 1950's there has been a steady increase in the average number of days when the river level was at or above flood (441.0) level. The average number of days went from 15.5 (1950's) to 74.5 (1990's). While the average number of days fell in the 2000 to 2006 period to 34.0, flood levels were exceeded every year during the time period. During the 1970 to 79 period was the first time that water levels exceeded an elevation of 450.0, for 5 days. By the 1990's water levels exceeded 450.0, for 36 days. In the latest time period (2000 thru 2006) only a 7 year time frame river levels have already exceeded 450.0 one year for 4 days. Understanding the influence that the Mississippi River exerts on this parcel is extremely important to any management plans.

MANAGEMENT PLAN

This management plan was prepared by Illinois Department of Natural Resources staff, with the input of the Site Superintendent at the Mississippi River State Fish and Wildlife Area, the District Wildlife Biologist, District Heritage Biologist and the District Forester. This plan is developed utilizing topographic relief to identify various habitat and community zones.

All areas below an elevation of 440.0 is zone number one, this area is considered the wetland

zone. The area from 440.0 to 442.0 will be zones two and three, (440.0 to 441.0 = zone 2 and 441.0 to 442.0 = zone 3) both of these will be the grassland zones. The area from 442.0 to 446.0 (highest elevation on the property) is zone four, the reforestation zone.

Management objectives for each zone are provided in the following sections of this plan.

ZONE 1 - WETLANDS

HYDROLOGY

In the following chart the first column identifies the design elevations used during the construction of the nine water control structures on the Rust Land Company Wetland Reserve Project. The second column identifies the elevations of the control structures after the topographical map was corrected and the third column gives the variance between the two.

CONTROL STRUCTURE ELEVATION CORRECTIONS			
Structure Number	Design Top of Berm	Actual Top of Berm	Elevation Variance
Structure # 1	447.7	439.4	8.3
Structure # 2	447.8	439.83	8.0
Structure # 3	450.03	441.2	9.0
Structure # 4	448.8	440.23	8.57
Structure # 5	446.5	438.67	7.83
Structure # 6	446.3	438.64	7.66
Structure # 7	446.3	438.71	7.59

CONTROL STRUCTURE ELEVATION CORRECTIONS			
Structure # 8	441.2	438.67	2.53
Structure # 9	442.6	438.81	3.79

The above chart shows a maximum elevation variance of 9.0 feet and an average variance of 7.03 feet. The corrected topographical map reflects a completely different picture of the existing wetlands and the overall potential for wetland development on the project site.

Water from the Mississippi River enters the Rust land property in a variety of ways which are determined by the stage elevation of the Mississippi River. The water begins to inundate the property from the south as the water backs up the old Sny creek from the Mississippi River and flows through structure number one. As the river levels continue to rise, there are natural ditch's which run east to west through the parcel at approximately river mile 263.5 and 264.3. Water begins to enter the project site at an elevation on 440.0. Finally when the river gets three or more feet above flood stage the water flows from the north through an old side channel and over the access road to Rip Rap Landing river parking lot.

The Mosier Landing gauge is located at river mile 260.3, water levels of 441.0 on the Mosier gauge is considered flood level. The Mosier gauge readings were used for the purposes of determining water levels of the Mississippi River in proximity of the project site. Since the gauge lies approximately 2.2 miles south of the property boundary the Mosier gauge readings will reflect a water level which is actually lower than the level at the site due to flow gradient.

Levels at Mosier Gauge - River Mile 260.3												
1941 thru 2006 (66 yr. period)	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
# of years > 438.0	13	19	38	55	49	44	33	12	13	14	13	11

Levels at Mosier Gauge - River Mile 260.3												
1941 thru 2006 (66 yr. period)	J	F	M	A	M	J	J	A	S	O	N	D
% of period > 438.0	20 %	29 %	58 %	83 %	74 %	67 %	50 %	18 %	20 %	21 %	20 %	17 %
# of years > 441.0	4	8	29	43	38	27	18	2	5	4	5	2
% of period > 441.0	6 %	12 %	44 %	65 %	58 %	41 %	27 %	3 %	8 %	6 %	8 %	3 %

The above chart looks at two river stage elevations on the Mosier Landing gauge, over a sixty six year period. The chart reflects the number of years, each month, during the period of record, that water levels were at or above 438.0 and also 441.0. Additionally the chart shows what percent of the time period that it represents. The elevation of 438.0 was chosen since it would represent a maximum water level for the majority of the constructed wetlands. The 441.0 elevation was chosen since it is flood level and it is also the elevation of the entrance road to Rip Rap Landing at it' lowest point. At 441.0 the river is free flowing across the Rust Land parcel through the natural ditches. At this level the sloughs on the Rust Land property begin to back fill, inundating the Rip Rap Landing entrance road. Using the corrected topographical map and the stage elevation of the Mississippi River the following water level management plan is proposed.

WATER LEVEL MANAGEMENT PLAN

The ability to manage water levels is totally dependent on the stage elevation of the Mississippi River. Given that all existing water bodies are interconnected and are commonly influenced by the river stage it becomes apparent that the most logical approach would be to manage the water levels as a single unit. Vegetative communities and diversity of wetlands will be accomplished through water level manipulation's over a diverse topography. Consequently in this management plan all areas up to an elevation of 440.0 will be subjected to seasonal flooding and water level manipulations.

To achieve this capability the earthen berm at structure number one would be raised to an elevation of 442.0 and extended west to where the natural ridge reaches an elevation of 442.0. A notched, armored spillway set at an overflow elevation of 440.5 would be incorporated in the berm. This would set the maximum, managed, internal water level between the entrance road at Rip Rap landing and structure number one at an elevation of 440.5. The existing 24 inch plastic pipe and inline stop log structure would be removed and replaced with a 36 inch cmp with a screw gate.

Additionally the two natural ditches which run east to west at river miles 263.5 and 264.3 would be modified. Presently the bottom of these ditches are at an elevation of 440.0. These ditches would be excavated to a bottom elevation of 437.5. Where the ditches meet the river 36 inch cmp's with screw gates would be installed at an invert elevation of 437.5. The earthen cover would exceed the height of the existing bank by one foot and have rip rap armoring. These structures will provide controllable water intake's.

According to the Mosier gauge readings it can be expected that the maximum internal water levels will be achieved 44% of the time in March, 65% in April and 58% in May, when the stage elevation reaches 441.0 or higher. By June the river level can be expected to be below 441.0, 59% of the time and that increases to 73% during the month of July. This will facilitate a timely slow gravity draw down which will be done in eight inch increments. As each draw down level is reached the gravity drain will be closed to maintain soil saturation while moist soil vegetation begins to germinate on the exposed areas. Once the exposed areas show growth another eight inches of water

will be drained. Since the hydrology is reflective of the pool's level, timing, duration and level of the draw downs will change annually . This dynamic will allow widely diverse plant communities to develop. Draw downs will be discontinued at an elevation of 437.5. Natural evaporation and ground seepage will continue to lower internal water levels.

On years when the site is not inundated to maximum pool the two established intakes will be utilized to provide the wetlands a Spring recharge. The Mosier gauge readings show the intakes can supply water 83% of the time in April, 74% in May and 67% of the time in June. On those years the site will be allowed to draw down via evaporation and seepage providing a very different dynamic for plant community development.

In the Fall wetland recharge to a minimum elevation of 438.0 is desirable. Efforts will be limited to gravity flow from the river when available, rainfall and supplemental pumping. The Mosier gauge reading show that the gravity intakes will be able to supply water around 20% of the time in Sept.,Oct. and/or Nov. and will be utilized when possible. Supplemental pumping for the short term will come from the existing 10,000 GPM pump station presently used to provide water for Rip Rap Landing.

The Illinois Department of Natural Resources is presently working with the Army Corps of Engineers - St Louis District to develop a Habitat Enhancement and Rehabilitation Project (HREP) under the Environmental Management Program (EMP) for the Rip Rap Landing / Dog Island properties. Check the EMP section for details of the proposed project.

HERBACEOUS WETLAND

The water level management plan is intended to promote moist soil plant communities with a variety of annual species. Presently since the water control capabilities are not fully developed there are a number of problems which will need to be addressed.

On much of the area between elevations 437.5 to 439.0 encroachment by cottonwood and silver maple is spreading rapidly. The majority of these trees are in the one to two inch diameter at breast height. These trees will be mowed and allowed to stump sprout, the sprouts will then be chemically treated.

In several locations in the elevation zones between 436.0 and 437.0 there are large stands of willow which have become established. These blocks will be treated by aerial application of Hi-Dep applied at a brush control rate. Once the canopy of the treated willows has died, the sunlight will promote a good stand of grasses and sedges. The following year these grasses and sedges will provide the fuel for a controlled burn to remove the willow stems.

Long term management will include both mechanical and chemical control of woody vegetation and large blocks of perennial communities. Where practical controlled burns will be utilized as a replacement or as a follow up to chemical treatments. Overall successful water level manipulations will offer the best management strategy.

FORESTED WETLANDS

There are ridges and humps within the wetland zone where the topography exceeds 440.0. On these higher elevations attempts will be made to move some of the one to three inch caliper hard mast stock to these locations. This will be on an experimental basis to determine survivability.

Between elevations 437.5 and 439.0 where the land was once in agricultural production will be broken up with desirable woody planting's. Islands and rows of button bush and bald cypress will be planted.

In the north east corner of the parcel there is a large block of bottom land forest. The great flood of 1993 killed the timber in many areas of the lower elevations. In these opening below an elevation of 437.5 some random clumps of bare root stock bald cypress will be planted.

ZONES 2 AND 3 - GRASSLANDS

ZONE 2

This zone lies between elevation 440.0 and 441.0. The planting's in this zone will be dominated by prairie cordgrass and eastern gama grass.

ZONE 3

This zone lies between elevation of 441.0 and 442.0. The planting's in this zone will be dominated by big blue stem, switch grass and Indian grass.

PLANTING PLAN

Due to the cost associated with native grassland re-establishment the emphasis will be on establishing target dominant species. The prairie cordgrass will be planted in one gallon pots, while the cost is higher than direct seeding, there is no comparison in survivability and speed of establishment. All other dominant species will be direct seeded in strips of one planter width with 25 feet between the strips. The unplanted strips will fill in through the natural spread of seed from the planted strips. Over the long term as funding can be obtained, additional grass species and forbs will be added to the planting.

GRASSLAND MANAGEMENT

Both zones will be burned a minimum of every other year as the grass stands develop. A mowed road will be maintained along the 442.0 elevation break. This will provide vehicular service access and accommodate public foot traffic. It will also serve as a fire break during controlled burns.

ZONE 4 - <u>REFORESTATION</u>

The reforestation efforts will be targeted to the land's which lie at an elevation of 442.0 or higher. These elevations are located on the west side of the parcel along the bank of the Mississippi River. The highest elevation identified on the topographic map is 446.0. The river bank fluctuates from 442.0 to 446.0 hence reforestation efforts will extend the length of the Mississippi River bank.

Reforesting the length of the river bank will offer protection to the interior wetlands. When over bank flooding occurs the band of timber will provide a barrier, which will trap flood debris. The trees will reduce the flood water velocities causing sediment to drop out thereby reducing the sediment load entering the interior wetlands.

The reforestation effort will include natural regeneration of invasion species such as silver maple, cottonwood, willow and ash. Additionally hard mast species will be randomly planted adding diversity and a variety of preferred wildlife food. Hard mast species will include but are not limited to, pin oak, pecan, swamp white oak and burr oak.

Like all things on this parcel the flooding regime of the Mississippi River dictates. Over time the flooding regime has been changing. Flood timing, frequency, duration and height have increased making it extremely difficult for slow growing hard mast species to regenerate on their own. To improve survivability larger stock of the hard mast species will be randomly planted. This will be a long term planting program first, so no single flood event can cause a total loss, second, for fiscal reasons and third, the availability of large stock.

The planting plan will include annually mowing random strips through the areas of natural regeneration. The hard mast will be planted on the edges of the strips in an effort to hide the new stock to protect it from deer depravation while still allowing access to full sun. Once the trees are well established mowing will be discontinued allowing the strips to fill in.

Part of the Rip Rap Landing property lies within the Sny Island Levee and Drainage District. These areas are protected from the Mississippi River floods and sediment loads. Consequently hard mast trees in these areas can and do naturally regenerate. Annually each winter 35 to 40 trees of 1 inch to 3 inch caliper will be moved from the protected area using a large Vermeer tree spade. Additionally any potted stock which may be available from the IDNR nurseries will be planted each fall. In the long term three abandoned agricultural fields will be planted with 1000 pin oak, 1000 pecan, 1000 burr oak and 1000 swamp white oak . This will be bare root stock provided by the IDNR nurseries. These trees will be planted in February 2008 providing a nursery of larger stock for future use on the site.

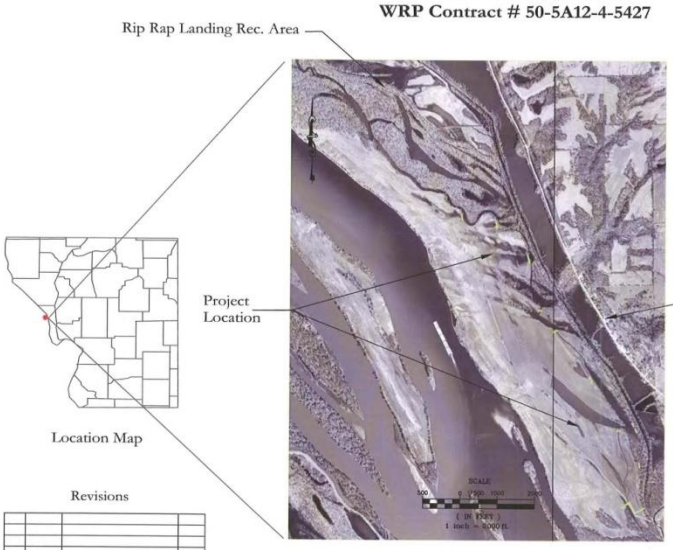
Detail Plans for

Rust Land Trust WRP Restoration

Structural Measures

Calhoun County, Illinois

WRP Contract # 50-5A12-4-5427



Sheet Listing

1) Cover Sheet
2) Plan View – Structues 1, 2, 3, and Levee Breaches
3) Plan View – Structures 4, 5, 6 & 7
4) Plan View – Structures 8 & 9
5) Profile/Section – Str. 1
6) Profile/Section – Str. 2
7) Profile/Section – Str. 3
8) Profile/Section – Str. 4
9) Profile/Section – Str. 5
10) Profile/Section – Str. 6
11) Profile/Section – Str. 7
12) Profile/section – Str. 8
13) Profile/Section – Str. 9
14) Profile Levee Breaches –#1 & #2
15) Antiseep Collar Butyl Rubber
16) Antiseep Collar CMP

Estimated Quantities

1) Earth Fill Class C -------- 10,853 Cu.Yd.
2) Seeding ---------- 3.1 Acres
3) 24 inch dia. Aluminum CMP -- 261 Lin. Ft.
4) 12 inch dia. PVC pipe -------- 245 Lin. Ft.

Earth Fill and Seeding will not be measured.

Wetlands Reserve Program

Revisions

NO.	DATE	DESCRIPTION	BY

Location: Section 5, Twp. 9S, Range 3W

Prepared by
USDA - Natural Resources Conservation Service
www.il.nrcs.usda.gov

Cost-share Assistance Provided through
Wetlands Reserve Program

Designed ANDREAS/GRAB 5/06
Drawn M. ANDREAS 5/06
Checked Michael E. Andreas
Approved

USDA NRCS Natural Resources Conservation Service

Rust Land Trust WRP
Calhoun County, Illinois
Cover Sheet

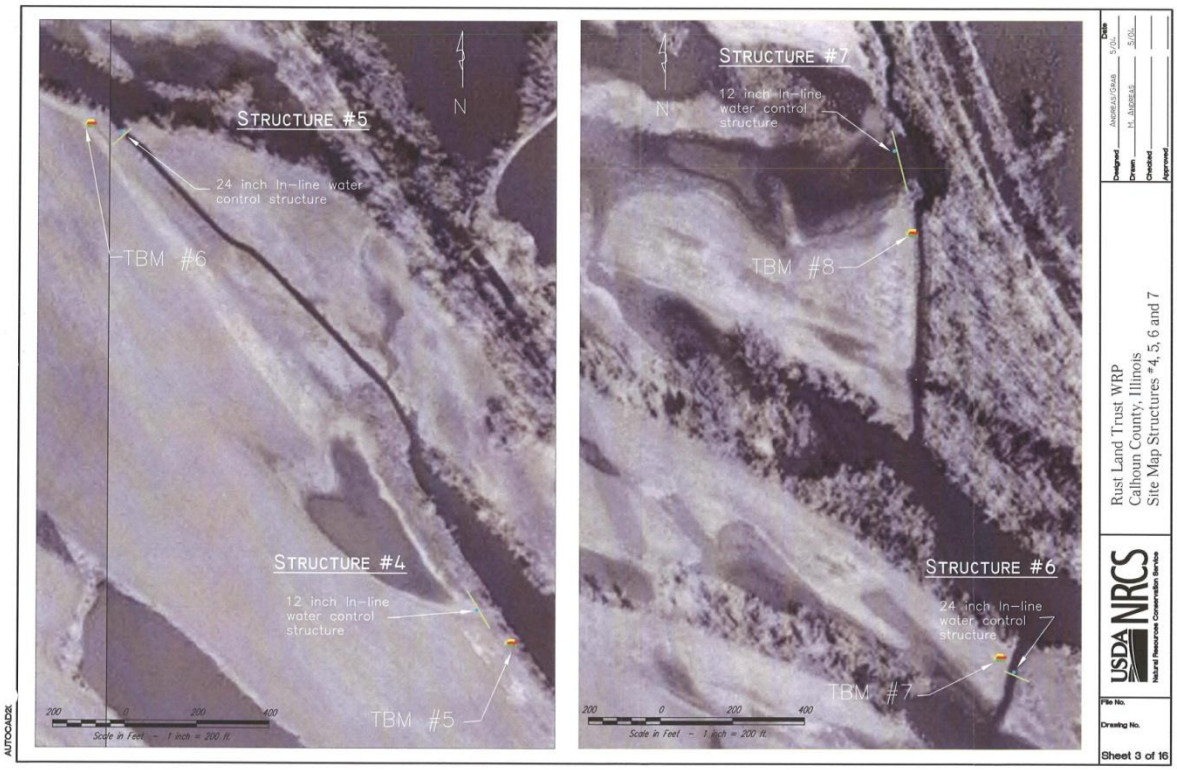
File No.
Drawing No.
Sheet 1 of 16

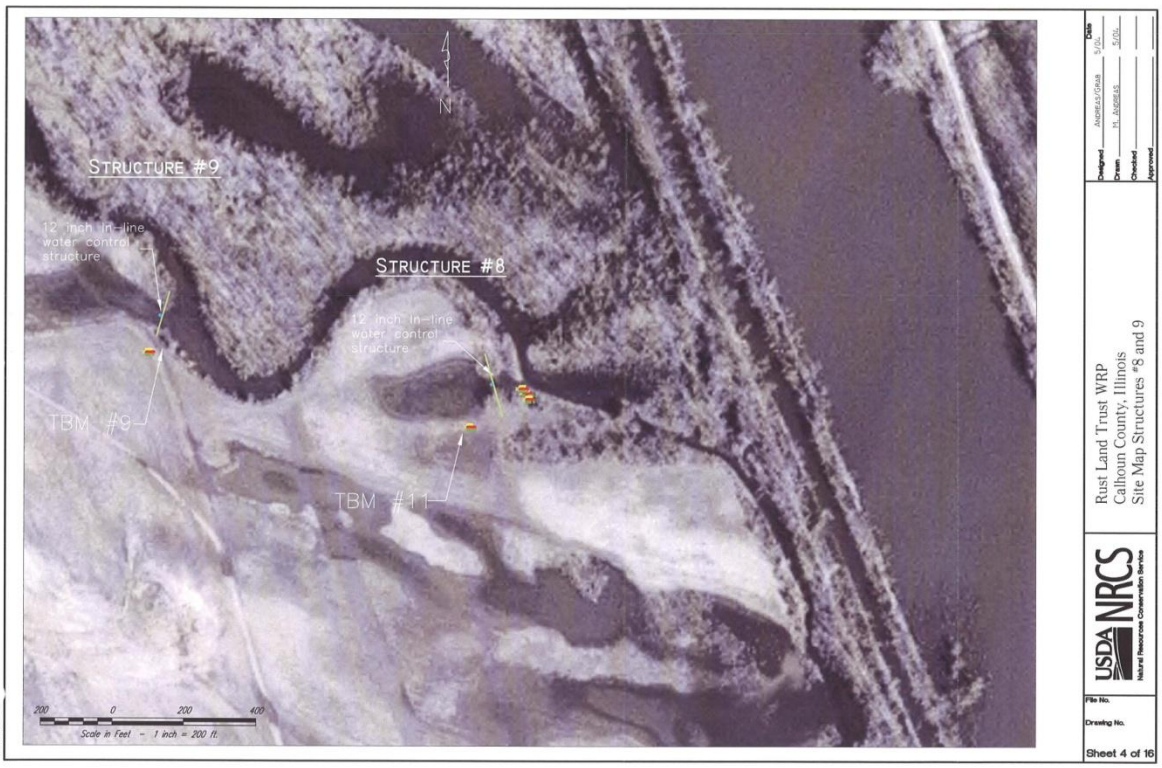
Designed ANDREAS/GRAB 5/06
Drawn M. ANDREAS 5/06
Checked
Approved

USDA NRCS Natural Resources Conservation Service

Rust Land Trust WRP
Calhoun County, Illinois
Site Map Structures #1, 2, 3 and Levee Breaches

File No.
Drawing No.
Sheet 2 of 16


STRUCTURE #5
N
24 inch In-line water control structure
TBM #6
STRUCTURE #4
12 inch In-line water control structure
TBM #5
200 0 200 400
Scale in Feet - 1 inch = 200 ft.
STRUCTURE #7
N
12 inch In-line water control structure
TBM #8
STRUCTURE #6
24 inch In-line water control structure
TBM #7
200 0 200 400
Scale in Feet - 1 inch = 200 ft.
Rust Land Trust WRP
Calhoun County, Illinois
Site Map Structures #4, 5, 6 and 7
USDA NRCS
Natural Resources Conservation Service
Sheet 3 of 16

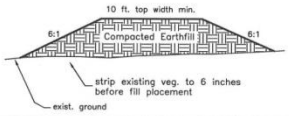

N
STRUCTURE #9
12 inch In-line water control structure
STRUCTURE #8
12 inch In-line water control structure
TBM #9
TBM #11
200 0 200 400
Scale in Feet - 1 inch = 200 ft.
Rust Land Trust WRP
Calhoun County, Illinois
Site Map Structures #8 and 9
USDA NRCS
Natural Resources Conservation Service
Sheet 4 of 16

Item	Materials	Estimated Quantity
1.	24 inch dia. Corrugated Aluminum Pipe, 12 Guage.	86 feet
2.	6 feet high, 31" wide x 39" deep in-line water control valve for 24 inch dia. cmp with stoplog flapper.	1 each
3.	6 feet x 6 feet Aluminum antiseep collar	1 each
4.	Earthfill, Class C	7,420 Cubic Yards
5.	Core Trench Excavation	52 Cubic Yards

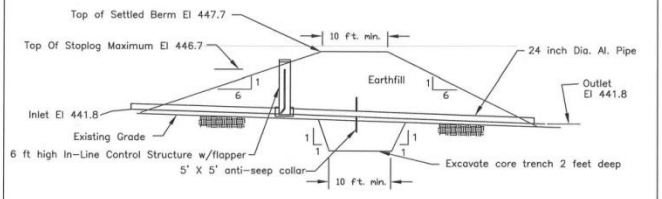
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.

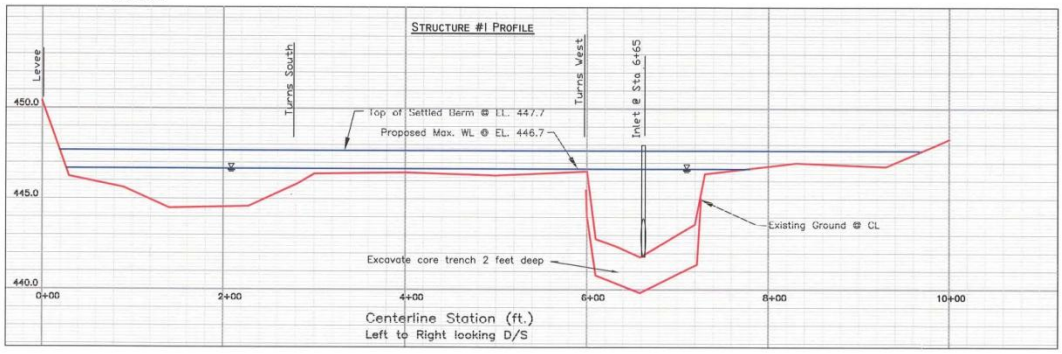
–Typical berm x section – not to scale –



Typical Cross Section at Pipe Location -- Structure #1 -- 6+65



TBM#1 – EL 445.93 Top of CMP culvert on east end of field road.



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #1

USDA NRCS Natural Resources Conservation Service

File No.
Drawing No.
Sheet 5 of 16

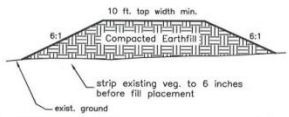
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	24 inch dia. Corrugated Aluminum Pipe, 12 Guage.	60 feet
2.	4 feet high, 31" wide x 39" deep in-line water control valve for 24 inch dia. cmp with stoplog flapper.	1 each
3.	6 feet x 6 feet Aluminum antiseep collar	1 each
4.	Earthfill, Class C	278 Cubic Yards
5.	Core Trench Excavation	31 Cubic Yards

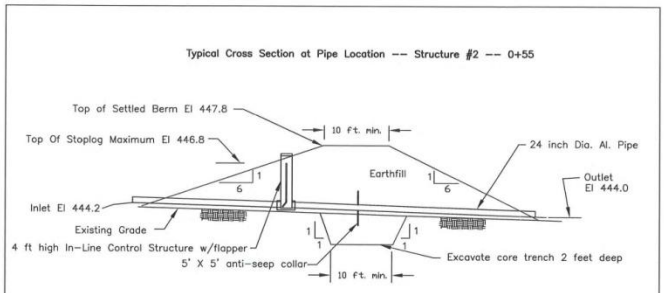
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.

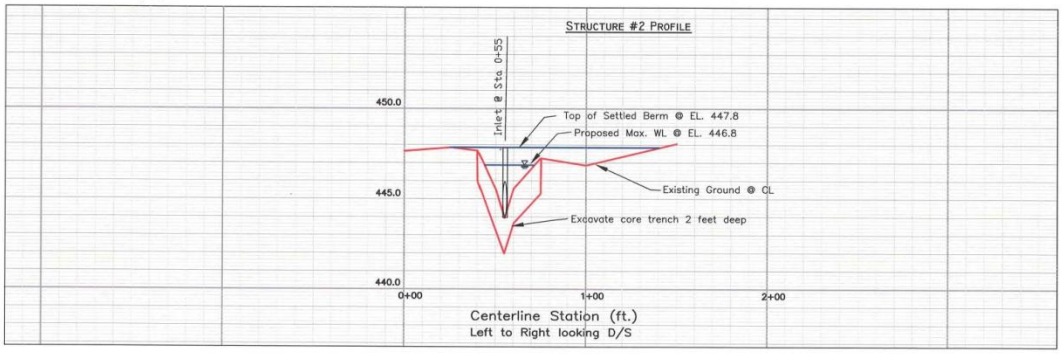
–Typical berm x section – not to scale –



Typical Cross Section at Pipe Location -- Structure #2 -- 0+55



TBM#3 – EL 447.34 Top of 1" x 2" hub stake west of structure



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #2

USDA NRCS Natural Resources Conservation Service

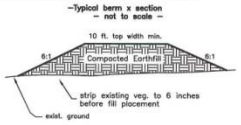
File No.
Drawing No.
Sheet 6 of 16

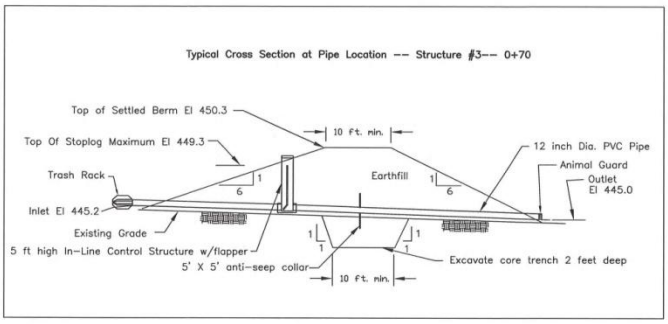
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	12 inch dia. Schedule 40 PVC pipe	75 feet
2.	5 feet high, 16" wide x 20" deep in-line water control valve for 12 inch dia. PVC pipe with stoplog flapper.	1 each
3.	5 feet x 5 feet Butyl Rubber antiseep collar	1 each
4.	12 inch dia. trash rack	1 each
5.	12 animal guard	1 each
4.	Earthfill, Class C	591Cubic Yards
5.	Core Trench Excavation	45 Cubic Yards

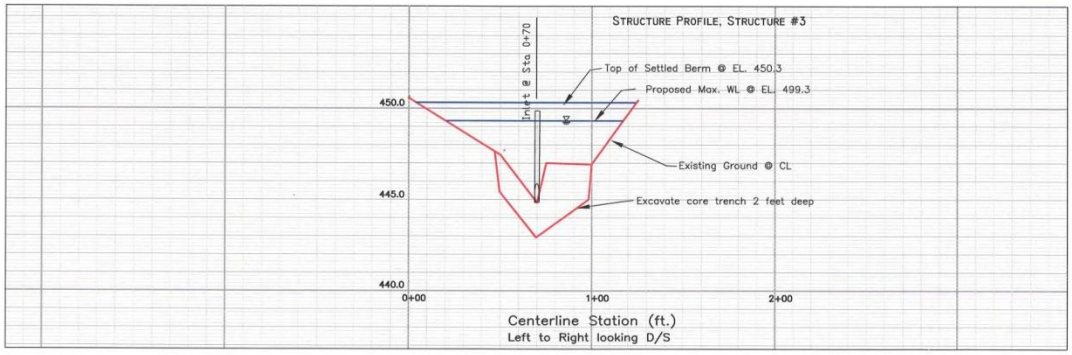
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.





TBM#4 – EL 449.27 Top of 1" x 2" hub stake south of structure



AUTOCAD2004

Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #3

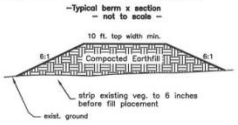
USDA NRCS Natural Resources Conservation Service

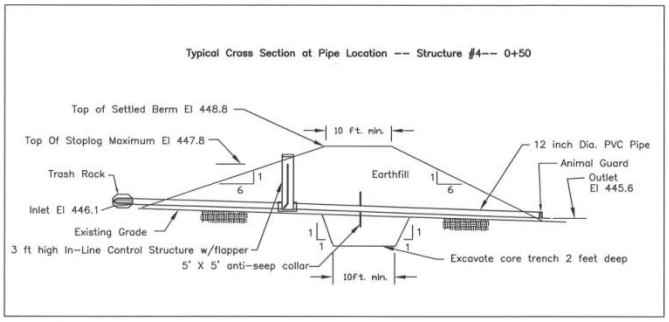
File No.
Drawing No.
Sheet 7 of 16

Item	Materials	Estimated Quantity
1.	12 inch dia. Schedule 40 PVC pipe	50 feet
2.	3 feet high, 16" wide x 20" deep in-line water control valve for 12 inch dia. PVC pipe with stoplog flapper.	1 each
3.	5 feet x 5 feet Butyl Rubber antiseep collar	1 each
4.	12 inch dia. trash rack	1 each
5.	12 animal guard	1 each
4.	Earthfill, Class C	300 Cubic Yards
5.	Core Trench Excavation	45 Cubic Yards

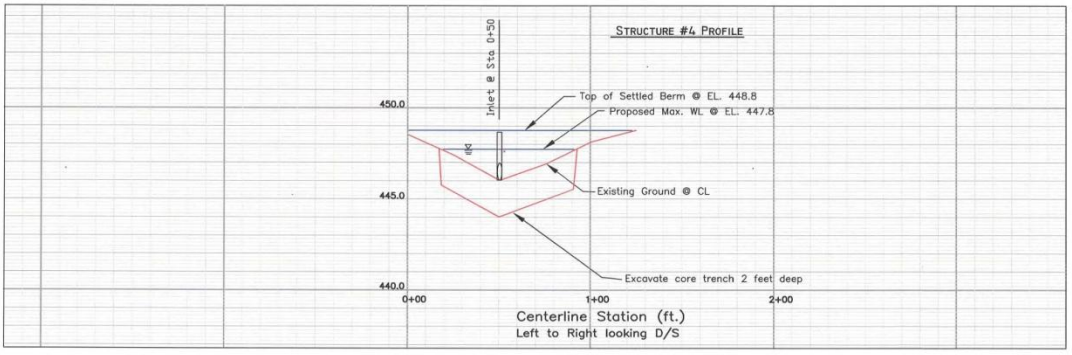
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.





TBM#5 – EL 450.27 Top of 1" x 2" hub stake



AUTOCAD2004

Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #4

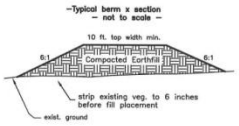
USDA NRCS Natural Resources Conservation Service

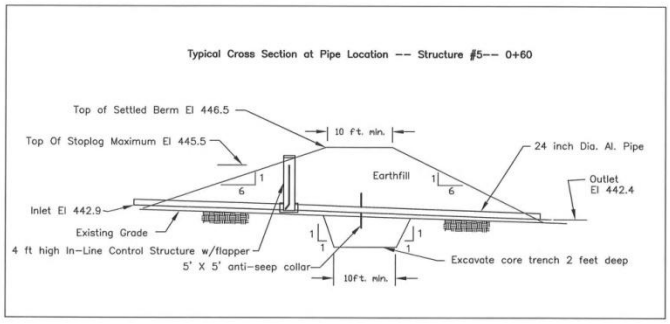
File No.
Drawing No.
Sheet 8 of 16

Item	Materials	Estimated Quantity
1.	24 inch dia. Corrugated Aluminum Pipe, 12 Guage.	60 feet
2.	4 feet high, 31" wide x 39" deep in-line water control valve for 24 inch dia. cmp with stoplog flapper.	1 each
3.	6 feet x 6 feet Aluminum antiseep collar	1 each
4.	Earthfill, Class C	120 Cubic Yards
5.	Core Trench Excavation	44 Cubic Yards

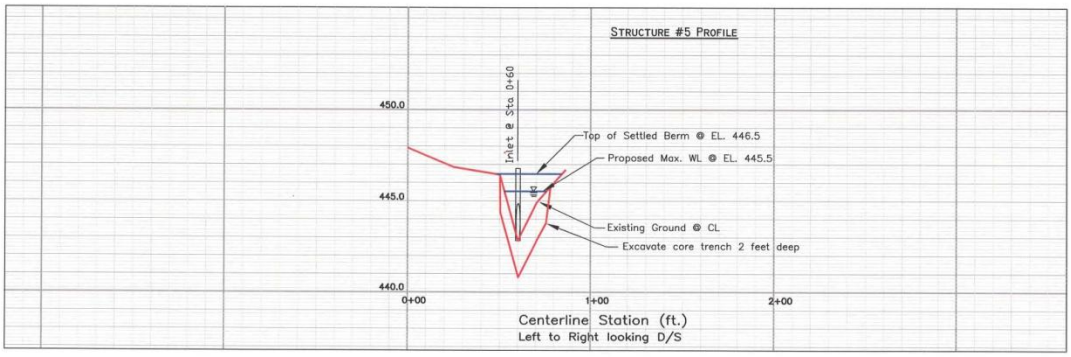
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.





TBM#6 – EL 448.41 Top of 1" x 2" hub stake NW of structure



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #5

USDA NRCS Natural Resource Conservation Service

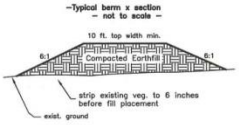
File No.
Drawing No.
Sheet 9 of 16

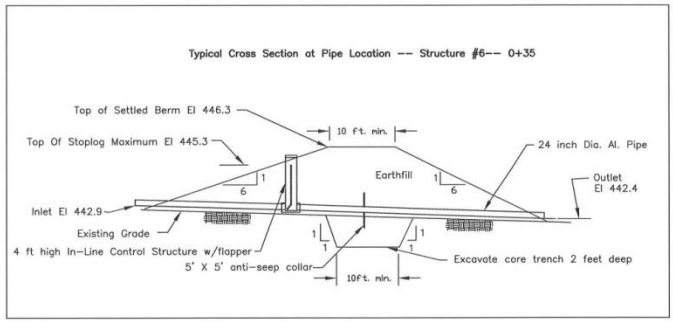
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	24 inch dia. Corrugated Aluminum Pipe, 12 Guage.	55 feet
2.	4 feet high, 31" wide x 39" deep in-line water control valve for 24 inch dia. cmp with stoplog flapper.	1 each
3.	6 feet x 6 feet Aluminum antiseep collar	1 each
4.	Earthfill, Class C	143 Cubic Yards
5.	Core Trench Excavation	50 Cubic Yards

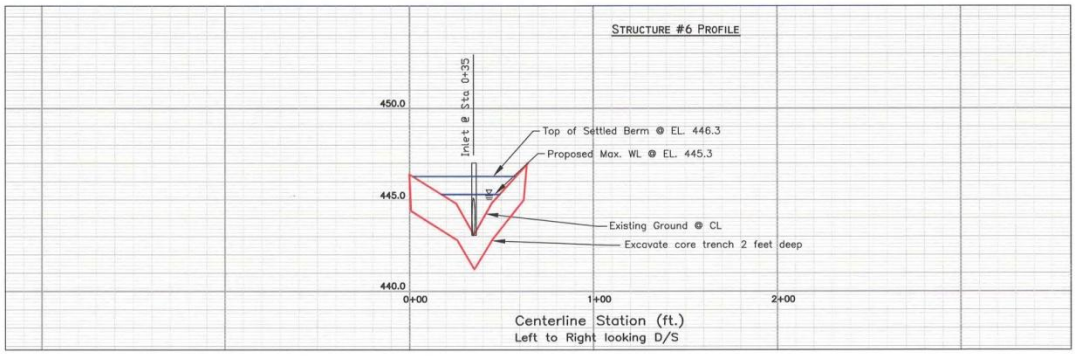
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.





TBM#7 – EL 447.15 Top of 1" x 2" hub stake NW of structure at edge of trees



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #6

USDA NRCS Natural Resource Conservation Service

File No.
Drawing No.
Sheet 10 of 16

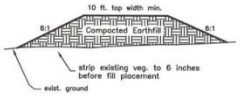
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	12 inch dia. Schedule 40 PVC pipe	45 feet
2.	3 feet high, 16" wide x 20" deep in-line water control valve for 12 inch dia. PVC pipe with stoplog flapper.	1 each
3.	5 feet x 5 feet Butyl Rubber antiseep collar	1 each
4.	12 inch dia. trash rack	1 each
5.	12 animal guard	1 each
4.	Earthfill, Class C	310 Cubic Yards
5.	Core Trench Excavation	90 Cubic Yards

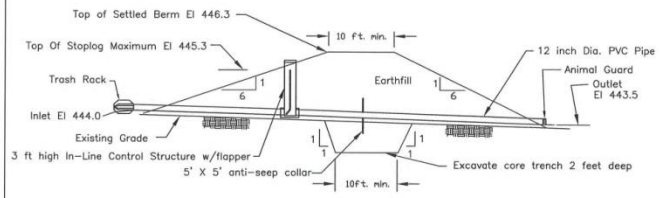
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.

–Typical berm x section – not to scale –

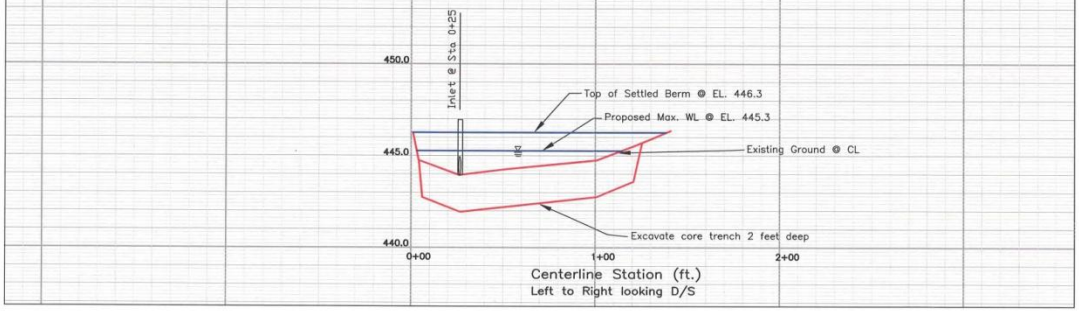


Typical Cross Section at Pipe Location -- Structure #7-- 0+25



TBM#8 – EL 447.53 Top of 1" x 2" hub stake south of structure

STRUCTURE #7 PROFILE



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #7

USDA NRCS Natural Resources Conservation Service

Designed ANDREAS/GRAB 5/04
Drawn M. ANDREAS 5/04
Checked
Approved

File No.
Drawing No.
Sheet 11 of 16

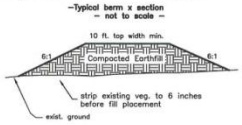
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	12 inch dia. Schedule 40 PVC pipe	35 feet
2.	2 feet high, 16" wide x 20" deep in-line water control valve for 12 inch dia. PVC pipe with stoplog flapper.	1 each
3.	5 feet x 5 feet Butyl Rubber antiseep collar	1 each
4.	12 inch dia. trash rack	1 each
5.	12 animal guard	1 each
4.	Earthfill, Class C	110 Cubic Yards
5.	Core Trench Excavation	75 Cubic Yards

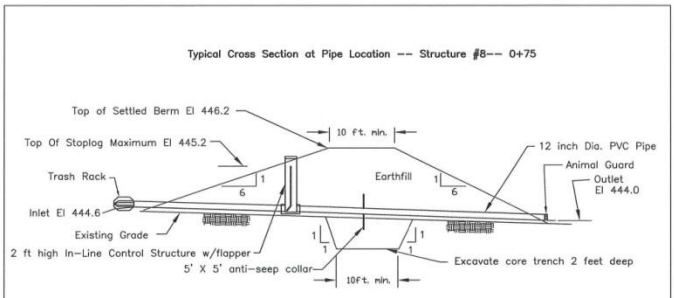
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.

–Typical berm x section – not to scale –

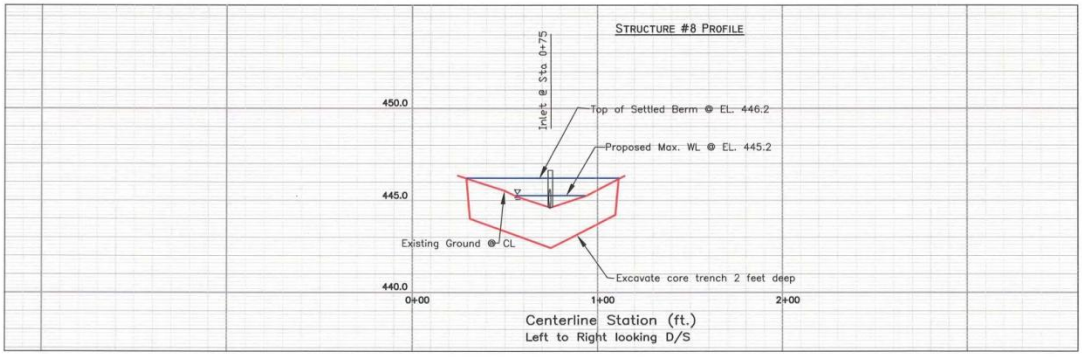


Typical Cross Section at Pipe Location -- Structure #8-- 0+75



TBM#9 – EL 447.17 Top of 1" x 2" hub stake SW of structure

STRUCTURE #8 PROFILE



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #8

USDA NRCS Natural Resources Conservation Service

Designed ANDREAS/GRAB 5/04
Drawn M. ANDREAS 5/04
Checked
Approved

File No.
Drawing No.
Sheet 12 of 16

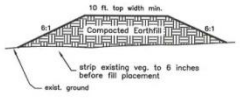
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	12 inch dia. Schedule 40 PVC pipe	40 feet
2.	3 feet high, 16" wide x 20" deep in-line water control valve for 12 inch dia. PVC pipe with stoplog flopper.	1 each
3.	5 feet x 5 feet Butyl Rubber antiseep collar	1 each
4.	12 inch dia. trash rack	1 each
5.	12 animal guard	1 each
4.	Earthfill, Class C	372 Cubic Yards
5.	Core Trench Excavation	90 Cubic Yards

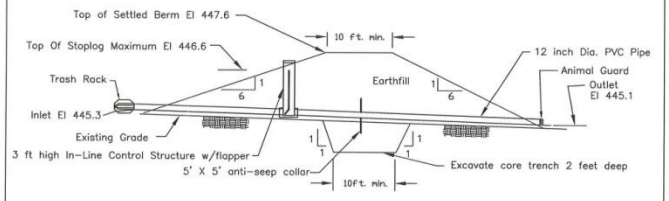
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.

–Typical berm x section – not to scale –

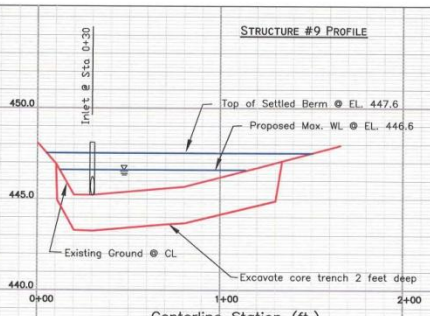


Typical Cross Section at Pipe Location –– Structure #9–– 0+30



TBM#11 – EL 445.96 Top of 1" x 2" hub stake west of structure #9

STRUCTURE #9 PROFILE



Rust Land Trust WRP
Calhoun County, Illinois
Profile-Cross Section Structure #9

USDA NRCS Natural Resources Conservation Service

Designed ANDREAS/GRAB 5/04
Drawn M. ANDREAS 5/04
Checked
Approved

File No.
Drawing No.
Sheet 13 of 16

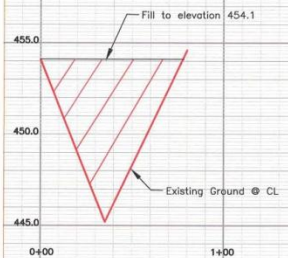
AUTOCAD2004

Item	Materials	Estimated Quantity
1.	Earthfill Breach #1, Class C	280 Cubic Yards
2.	Earthfill Breach #2, Class C	415 Cubic Yards

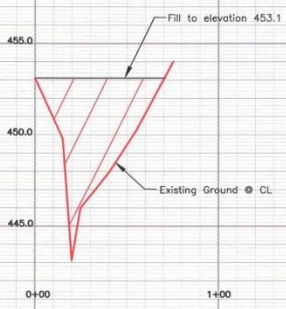
Earth fill includes 10% settlement and 6 inch stripping depth at the base.

See specs for seeding & mulching details for all structures.

LEVEE BREACH #1 (NORTH)



LEVEE BREACH #2 (SOUTH)



Note: Finished top width and fill slopes on the levee repairs shall match the exisiting levee cross section. Minimum 2:1 side slopes.

TBM#3 – EL 447.38 Top of 1"x2" hubstake Fill to elevation 453.1

Rust Land Trust WRP
Calhoun County, Illinois
Profile Sections - Levee Breach #1 & #2

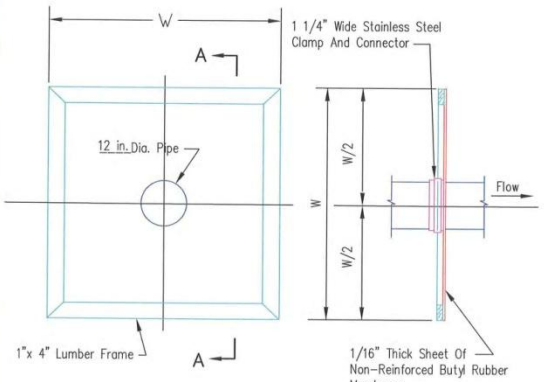
USDA NRCS Natural Resources Conservation Service

Designed ANDREAS/GRAB 5/04
Drawn M. ANDREAS 5/04
Checked
Approved

File No.
Drawing No.
Sheet 14 of 16

AUTOCAD2004

NOTES:
1. Coat pipe at collar location with butyl roof cement patch sealer or other butyl rubber sealer. (Do not use asphalt roof patch).
2. Completed installation must be watertight.
3. Force butyl rubber sheet over upstream end of pipe and over butyl roof sealer.
4. Install a 1 1/4" wide stainless steel strap. Clamp around pipe over butyl rubber sheet and tighten until sealer is forced out.
5. Stable butyl rubber sheet to lumber frame.
6. For pipe diameter of less than 6" cut a hole (centered) in butyl rubber sheet, approximately 1/2" diameter; and for pipe diameter 6" to 15" cut a hole 3" smaller than diameter of pipe and force butyl rubber sheet over upstream end of pipe end over butyl roof sealer.
7. Wood Frame shall be rigid enough to withstand backfill operation.



ELEVATION SECTION A–A

QUANTITIES					
Pipe Dia. Inches	"W" Feet	Butyl Sheet Sq. Ft.	Stainless Steel Strap	1"x 4" Lumber Lin Ft.	Number Of Collars
~~Less than 6~~	~~2.5~~	~~6.3~~	~~1~~	~~8.83~~	
USE → 6 To 15	5.0	25.0	1	18.83	5
Total					5

Note: For Structures No. 3,4,7,8 & 9

1/16" thick sheet of non-reinforced butyl rubber membrane as supplied by Watersaver Co., INC. 3560 Wynkoop St., Denver, Colorado or equal. Antiseep Collar Kit includes butyl rubber membrane, butyl adhesive and stainless steel clamp and connector.

Adapted From Wisc.Dwg. WI-24

BUTYL RUBBER MEMBRANE ANTISEEP COLLAR FOR 1" TO 15" DIA. SMOOTH WALL PIPE

Designed M. Andrews Drawn M. CUNCHEEN Checked Approved Date 05/04 8/01

NRCS Natural Resources Conservation Service

File No. IL-ENG-201 Drawing No. Sheet 15 of 16

AUTOCAD2000

Landowner | Rust Land Trust WRP | Location | Calhoun County, Illinois

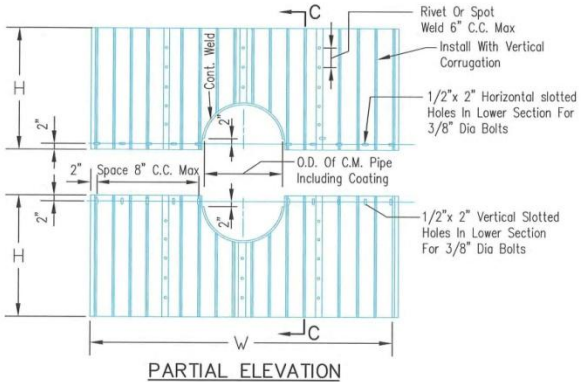
Use Rods And Lugs To Clamp Bands Securely To Pipe — 12" Min — Band Of Helical Pipe — Metal Diaphragm To Be Welded To Center Of Helical Pipe Band

Size And Spacing Of Slotted Openings Shall Be The Same As Shown For C.M. Diaphragms

Bend A 90 Degree Angle 1 1/8" Wide As Shown In Drawing — 1 1/8" Min — 2" — Flat Sheet Metal Diaphragm Shall Be Be Cut To Fit Corrugations Of Helical Band And Welded With A Continuos Weld. — 1/2" Dia Rod And Lug 2 Required Per Band

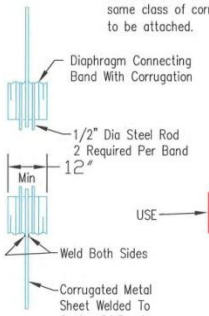
PARTIAL ELEVATION ISOMETRIC VIEW

DETAILS OF HELICAL PIPE DIAPHRAGMS



PARTIAL ELEVATION

Notes For Diaphragms
1. Materials and coating for all diaphragms shall be the same as that specified for the pipe.
2. Diaphragms shall be shop fabricated, assembled and marked by painting to identify matching half sections each diaphragm.
3. The laps between the half sections and between the pipe and connecting bands shall be caulked with fibrated asphalt mastic at the time of installation.
4. All tank lugs, rods, and nuts shall be Galvanized steel. Where aluminum diaphragms are used, the rods and lugs shall be separated from the aluminum bands by at least two layers of 2" wide plastic tape with a total thickness of 24 mils or more.
5. The diaphragms shall be welded to the connecting band as shown on the drawings. All welds shall be treated as specified for class I, II and III welds, miscellaneous.
6. Bands shall be fabricated from material having the same class of corrugations as the pipe to which it is to be attached.



DIAPHRAGM DIMENSION TABLE		
Nominal Diaphragm	Fabrication Diaphragm	
Size	W(Width)	H(Height)
~~4' x 4'~~	~~4'-0"~~	~~2'-2"~~
~~6' x 2'~~	~~6'-0"~~	~~1'-8"~~
~~5' x 5'~~	~~5'-0"~~	~~2'-8"~~
~~6' x 3'~~	~~6'-0"~~	~~2'-8"~~
USE → 6' x 6'	6'-0"	3'-2"
~~8' x 6'~~	~~8'-0"~~	~~3'-2"~~
~~8' x 7'~~	~~8'-0"~~	~~3'-8"~~
~~8' x 8'~~	~~8'-0"~~	~~4'-2"~~
~~10' x 6'~~	~~10'-0"~~	~~3'-2"~~
~~10' x 7'~~	~~10'-0"~~	~~3'-8"~~

SECTION C–C

DETAILS OF ANNULAR PIPE DIAPHRAGMS

Note: For Structures No. 1,2,5 & 6

APPURTENANCES FOR CORRUGATED METAL PIPE STRUCTURES

Designed M. Andrews Drawn M. CUNCHEEN Checked Approved Date 05/04 8/01

NRCS Natural Resources Conservation Service

File No. IL-ENG-200C Drawing No. Sheet 16 of 16

AUTOCAD2000

Landowner | Rust Land Trust WRP | Location | Calhoun County, Illinois

APPENDIX N

DRAFT USFWS COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, IL 62959
(618) 997-3344

November 4, 2010

Colonel Thomas E. O'Hara, Jr.
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attn: Mr. Charles D. Hanneken, CEMVS-PM-E

Dear Colonel O'Hara:

This letter constitutes our Draft Fish and Wildlife Coordination Act Report (Report) for the Rip Rap Landing Habitat Rehabilitation and Enhancement Project (HREP) located in Calhoun County, Illinois. This report is intended to provide partial compliance with Subsection 2(b) of the Fish and Wildlife Coordination Act, (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); Section 7 of the Endangered Species Act of 1973, as amended; and, the National Environmental Policy Act. This Report has been reviewed by the Illinois Department of Natural Resources and their concurrence is noted.

The Rip Rap Landing HREP is a component of the Upper Mississippi River System Environmental Management Program (EMP) authorized by Section 1103 of the Water Resources Development Act (WRDA) of 1986. The goal of the EMP is to implement "numerous enhancement efforts...to preserve, protect, and restore habitat that is deteriorating due to natural and man-induced activities." The Rip Rap Landing project addresses habitat rehabilitation and enhancement at Rip Rap Landing Fish and Wildlife Area.

Rip Rap Landing Fish and Wildlife Area is located in Pool 25 between Upper Mississippi River Miles 260.5 and 267 and contains approximately 2,338 acres of river bottomlands. Rip Rap Landing Fish and Wildlife Area includes both U.S. Army Corps of Engineers (Corps) General Plan lands (283 acres) and Illinois Department of Natural Resources (IDNR) owned lands (2,055 acres). The Corps property is managed by the IDNR through a cooperative agreement between the IDNR, Corps, and U.S. Fish and Wildlife Service (Service). A portion of the IDNR land known as the Rust Land Company tract has a Natural Resources Conservation Service (NRCS) Wetland Reserve Program (WRP) easement in place. Another portion of the IDNR land was previously designated a State Natural Area due to the significant historic forest composition of bottomland hardwood forest.

RESOURCE PROBLEMS AND OPPORTUNITIES

Historically the Rip Rap Landing Fish and Wildlife Area provided high quality habitat for a variety of fish and wildlife resources. Over the years a large portion of the area was cleared for farming and the 1993 and 1995 floods severely degraded the remaining bottomland hardwood forest, wetland, and aquatic habitats within the project area. Other factors contributing to the degradation include an increased water table from the construction of Lock and Dam 25 and the inability to properly drain the area following flooding. The inability to properly drain the area is primarily due to hillside born sediment deposition within the Sny Creek channel. This sediment deposition within Sny Creek has also resulted in the loss of connectivity between the Mississippi River, Sny Creek and adjacent backwater lakes.

Appendix I (Hillside Sediment Control) of the Definite Project Report, Stage II begins to address the sediment problem. A July 14, 2000, report written by R.W. Windhorn, which is included in Appendix I, indicates that that the overall yield of sediment coming from Mozier Creek watershed system is estimated at 15,000 tons per year. Of these 15,000 tons, 11,400 tons per year is suspended sediment from streambank erosion and 3,600 tons per year is bedload. Total streambank erosion within the watershed includes an estimated 1,160 tons from Wildcat Hollow, 830 tons from Stearns Hollow, 2,100 tons from Belleview Hollow, 415 tons from Infidel Hollow, 2,000 tons from West Panther Creek, 580 tons from Crooked Creek, and 4,300 tons from Fox Creek.

Sedimentation is considered by many as the most severe problem affecting fish and wildlife resources in the Mississippi River. Sediment deposition occurs due to overbank flooding and inputs from surrounding uplands. Aquatic vegetation production is inhibited by soft substrates and high turbidity. This aquatic vegetation forms the basis of the substrate needed for aquatic macroinvertebrate production and along with macroinvertebrates provides an important food base for many species of migratory birds and riverine fish. The aquatic vegetation also provides important spawning and brood rearing habitat for fish.

The degraded state of the project area provides a significant opportunity to rehabilitate and enhance forest, wetland, and aquatic habitats for the benefit of migratory birds, fish and other wildlife resources. The primary problems to be addressed by this project include the loss of bottomland hardwood forest, loss of wetland diversity, lack of water regulation and supply, lack of aquatic habitat diversity, and lost connectivity and drainage due to sedimentation in Sny Creek.

GOALS AND OBJECTIVES

The overall mission of this project is to restore as much of the historic ecological functions and values that the current conditions and constraints of the project area will allow. Specific goals of the project are: restoration of fundamental ecological processes; restoration of communities/habitat types to appropriate location based on geomorphology, hydrology, and soils; and, restoration of key resources for endemic fish and wildlife species. To achieve these goals a planning team of biologists from the Corps (St. Louis District), IDNR, NRCS, and Service developed the objectives for the project. The objectives include the following:

- Restore river/floodplain connectivity where appropriate;
- Keep sediment input/output balanced in the floodplain ecosystem;
- Restore and maintain a natural hydrological regime in floodplain wetlands and waters;
- Restore historic water movement and flow throughout the system;
- Restore and maintain water quality in all surface waters;
- Restore and maintain off-channel and backwater flooded habitats for riverine and floodplain fishes, waterbirds, amphibians and reptiles;
- Restore distribution and composition of historic floodplain vegetation communities where possible;
- Reduce detrimental sediment loading and accumulation in floodplain wetlands and streams;
- Provide high energy foods and habitats for migratory waterbirds, especially ducks;
- Provide over-wintering, spawning and rearing habitat for native fishes;
- Provide food and habitat for neotropical migrant songbirds;
- Provide floodplain habitat for breeding and resident waterbirds, reptiles, and mammals.

Although the Rip Rap Landing HREP is a component of the Upper Mississippi River System Environmental Management Program (EMP), the project also fits well into the higher order goals established for the Upper Mississippi River System Navigation and Ecosystem Sustainability Program (NESP). These goals, provided to the Corps by the Environmental Science Panel, are as follows (Lubinski and Barko 2003).

First Tier Goal (Sustainability Goal):

"The balance of economic, environmental, and social conditions so as to meet the current and future needs of the Upper Mississippi River System without compromising the ability of future generations to meet their needs."

Second Tier Goals:

1. Maintain viable populations of native species in situ.
2. Represent all native ecosystems types across their natural range of variation.
3. Restore and maintain evolutionary and ecological processes (e.g., disturbance regimes, hydrologic regime, nutrient cycles, etc.).

4. Integrate human uses and occupancy within these constraints.

In addition to the development of higher order goals for the Upper Mississippi River System, the Science Panel worked initially to condense over 2,600 ecosystem objectives into 81 objectives (Lubinski and Barko 2003). These 81 objectives have been further refined, deleted, and combined into more practical and quantifiable objectives by the Science Panel Goals and Objectives Team (Barko et al. 2006).

Since 2006, the Science Panel has further worked to develop system-wide Goals and Objectives for the UMRS. In Galat et al. (2007), the Science Panel proposed the following ecosystem-wide goal:

> "to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System to achieve the vision of the Navigation and Ecosystem Sustainability Program."

Further, the science panel proposed the five system-wide objectives framed within essential ecosystem characteristics discussed in Galat et al. (2007). They include management for:

1. a more natural hydrologic regime (hydrology and hydraulics)
2. processes that shape a diverse and dynamic river channel (geomorphology)
3. processes that input, transport, assimilate, and output materials within UMR basin river-floodplains: water quality, sediments, and nutrients (biogeochemistry)
4. a diverse and dynamic pattern of habitats to support native biota (habitat)
5. viable populations of native species and diverse plant and animal communities (biota)

The Rip Rap Landing HREP fits well into the higher order ecosystem-wide goals and objectives developed by the Science Panel and further the project will meet the following specific objectives identified in Barko et al. (2006):

- Objective 1.5: Reduce, maintain, or increase sediment loadings to the rivers
- Objective 1.9: Maintain water clarity sufficient to support submersed aquatic vegetation, aquatic invertebrates and fish species appropriate to location
- Objective 2.2: Modify the channels and floodplains of tributary rivers
- Objective 2.12: Modify contiguous backwater areas
- Objective 4.3: Modify the extent, patch size and successional variety of plant communities
- Objective 4.5: Modify the extent, abundance, and diversity of emergent aquatic plants
- Objective 4.7: Modify backwaters to provide suitable habitat for fishes
- Objective 4.8: Modify channels to provide suitable habitat for fishes
- Objective 5.1: Maintain viable populations of native species throughout their range in the UMRS at levels of abundance in keeping with their biotic potential
- Objective 5.2: Maintain the diversity and extent of native communities throughout their range in the UMRS

PROPOSED PROJECT FEATURES

To achieve the project objectives, a number of project plans/features were evaluated within each of the landscape/administrative zones: Zone 1 (Sny Levee and Drainage District); Zone 2 (State Natural Area); Zone 3 (Roadside and Waverly Lake Wetland Management Area); Zone 4 (Rust Land Company – WRP Easement); and, Zone 5 (General Plan Lands – Dog Island). The recommended plan (alternative 8) consists of the following:

- Enhancing water level management in Zone 1 by drilling a well, installing a pump, closing the existing levee district ditch with a water control structure, and dredging a channel to Goose Pasture Lake;
- Converting croplands in Zones 1, 2, and 3 to bottomland forests;
- Converting croplands in Zone 4 to wet meadow and bottomland forests;
- Improving water distribution and control to Zone 3 by upgrading the riverside pump, pump ditch, and water control structures;
- Improving water distribution and control to Zone 4 by upgrading the riverside pump, pump ditch, water control structures, installing a south spillway, and installing river ridge scour swale controls;
- Enhancing opportunities for growth of submerged aquatic vegetation in Roadside Lake in Zone 3 by using a portable pump and installing a fish friendly water control structure;
- Allowing fish access to Zones 4 and 5 by dredging Sny Creek;
- Allowing fish access to Roadside Lake by creating a cut from Sny Creek into the lake.

METHODOLOGY TO EVALUATE ALTERNATIVES

The Rip Rap Landing HREP was analyzed using the Wildlife Habitat Appraisal Guide (WHAG) and the Aquatic Habitat Appraisal Guide (AHAG). The target species for the WHAG included the mallard and northern parula. The target species for the AHAG included the smallmouth buffalo and bluegill. Existing conditions, future without project conditions and future with project conditions were examined. This analysis was conducted with team members representing the Corps, IDNR, Service and HDR, Inc., the contractor assisting with preparation of the Definite Project Report with Integrated Environmental Assessment.

The evaluation models utilized produced a rating of habitat quality for each respective habitat type. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing and future habitat conditions compared to optimum habitat which is 1.0. This value, when multiplied by the available habitat within the project area, will provide a measure of available habitat quality and quantity known as habitat units (HUs). Average annual habitat units (AAHUs) for each species are typically calculated to reflect expected habitat conditions over a 50-year project life.

The WHAG model includes limiting factors in each matrix. Absence of critical life requisites for a particular species makes the habitat unsuitable and results in an HSI value of zero regardless of other habitat characteristic scores. The AHAG model did not include limiting factors.

EXISTING, FUTURE WITHOUT, AND FUTURE WITH CONDITIONS

A number of general and site specific assumptions were made about what the project area and vicinity would be like 50 years in the future with and without the project and can be found in Appendix B of this report. One major assumption not addressed in Appendix D is the control of hillside born sediment that is impacting the Sny Creek Channel and adjacent backwater lakes and sloughs. The predicted future with habitat conditions for these areas assumes that hillside sediment control measures will be included as part of the project. Without the hillside sediment control measures the HSI scores will be reduced and the available AAHUs will significantly decrease due to the continued impact of hillside born sediment deposition within these areas. Hillside sediment control measures are vital to the success of the Rip Rap Landing HREP and if they are not included in the project plans the WHAG and AHAG analyses will require reevaluation.

Terrestrial Species

Zone 1

The overall habitat suitability score for the target terrestrial species, the mallard, improved with the project over the existing condition and was greater than the future without project within each of the different habitat types in Zone 1 (Table 1). The overall habitat suitability for the mallard improved with the project due to the conversion of cropland to forested habitat, improved ability to manage water conditions in the fall-winter, increased availability of water 4-18 inches in depth, increased coverage of important food plants, and improved access to nonforested wetlands with predictable water levels. Without the project the inability to manage fall-winter water conditions resulted in a limiting factor value and an HSI score of zero for the mallard within each of the different habitat types.

The overall habitat suitability scores for the other species analyzed varied across the different habitat types. In the bottomland hardwood areas the habitat suitability for the green-backed heron, wood duck, and beaver improved with the project due to improved access to nonforest wetlands with predictable water levels. Habitat suitability for the northern parula and prothonotary warbler also improved due to changes within the forest stand that benefited each of the species. In the nonforested wetland areas the habitat suitability for the Canada goose improved with the project similar to the mallard and habitat quality for the muskrat, green-backed heron, and coot improved due to the ability to manage the water regime and manage for water in the 4-18 inch range by August. Habitat suitability for the lesser yellowlegs remained the same with or without the project while habitat quality for the least bittern and king rail declined slightly with the project because of the water regime management. In the cropland areas the habitat suitability for the green-backed heron and beaver improved with the project due

to the conversion of cropland to forested wetland habitat and improved access to nonforest wetlands with predictable water levels. Habitat suitability for the northern parula and prothonotary warbler also improved with the conversion of cropland to forested habitat.

Zone 2

The overall habitat suitability score for the target terrestrial species, the northern parula, varied across the different habitat types in Zone 2 (Table 1). In the bottomland hardwood areas the habitat suitability for the northern parula remained the same with the project because the forested habitat would be left in its current condition. In the cropland areas the habitat suitability with the project improved due to the conversion of cropland to forested habitat and the increased availability of forested habitat adjacent to permanent water. Without the project the lack of forested habitat in the cropland areas resulted in a limiting factor value and the HSI score of zero for the northern parula.

The overall habitat suitability scores for the other species analyzed remained the same or improved with the project. In the bottomland hardwood areas the habitat suitability for the green-backed heron, wood duck, beaver, northern parula, and prothonotary warbler remained the same because the forested habitat would be left in its current condition. In the cropland areas habitat suitability for the green-backed heron, wood duck, beaver, and prothonotary warbler improved with the project due to the conversion of cropland to forested wetland habitat and the increased availability of forested habitat adjacent to permanent water.

Zone 3

The overall habitat suitability scores for the two target terrestrial species, the mallard and northern parula, improved with the project over the existing condition and were greater than the future without project within each of the habitat types in Zone 3 (Table 1). In the bottomland hardwood areas the habitat suitability for the mallard improved due to increased coverage of important food plants including acorn producing trees. In the nonforested wetland areas of Waverly Lake the habitat suitability for the mallard improved due to increased coverage of important food plants. In the nonforested wetland areas of Roadside Lake the habitat suitability for the mallard improved due to the improved ability to manage water conditions in the fall-winter, increased coverage of important food plants, and increased plant diversity. Without the project the inability to manage fall-winter water conditions in Roadside Lake resulted in a limiting factor value and the HSI score of zero for the mallard. In the cropland areas the habitat suitability for the northern parula improved due to the conversion of cropland to forested habitat. Without the project the lack of forested habitat in the cropland areas resulted in a limiting factor value and the HSI score of zero for the northern parula.

The overall habitat suitability scores for the other species analyzed varied across the different habitat types. In the bottomland hardwood areas the habitat suitability for the wood duck, northern parula, and prothonotary warbler improved with the project while the habitat suitability for the green-backed heron and beaver declined slightly. Habitat suitability for the wood duck,

northern parula, and prothonotary warbler improved due to beneficial changes within the forest stand as it matures over the life of the project. In the nonforested areas of Waverly Lake habitat suitability for the Canada goose, least bittern, lesser yellowlegs, king rail and American coot improved with the project while habitat suitability for the muskrat and green-backed heron declined slightly. Habitat suitability for the Canada goose improved similar to the mallard, habitat suitability for the lesser yellowlegs and king rail improved with the project due to improved ability to manage the water regime, and habitat suitability for the least bittern and American coot improved with the project due to the increased abundance of emergent vegetation and improved ability to manage the water regime. In the nonforested areas of Roadside Lake habitat suitability for the Canada goose, least bittern, and American coot improved with the project while habitat suitability for the lesser yellowlegs and green-backed heron remained unchanged and habitat suitability for the muskrat declined. Habitat suitability for the Canada goose improved similar to the mallard and habitat suitability for the least bittern and American coot improved with the project primarily due to the increased abundance of emergent vegetation. In the cropland areas habitat suitability for the green-backed heron, beaver, and prothonotary warbler improved due to the conversion of cropland to forested habitat.

Zone 4

The overall habitat suitability scores for the two target terrestrial species, the mallard and northern parula, improved with the project over the existing condition and were greater than the future without project within each of the habitat types in Zone 4 (Table 1). In the nonforested wetland areas the habitat suitability for the mallard improved due to improved ability to manage water conditions in the fall-winter, increased availability of water 4-18 inches in depth, and increased coverage of important food plants. Without the project the inability to manage fall-winter water conditions resulted in a limiting factor value and the HSI score of zero for the mallard. In the cropland areas the habitat suitability for the northern parula improved due to the conversion of cropland to forested habitat and the increased availability of forested habitat adjacent to permanent water. Without the project the lack of forested habitat in the cropland areas resulted in a limiting factor value and the HSI score of zero for the northern parula.

The overall habitat suitability scores for the other species analyzed varied across the different habitat types. In the nonforested wetland areas the habitat suitability for the Canada goose, least bittern, king rail, and American coot improved with the project while habitat suitability for the lesser yellowlegs and green-backed heron remained unchanged and habitat suitability for the muskrat declined. Habitat suitability for the Canada goose improved similar to the mallard, habitat suitability for the king rail improved with the project due to increased coverage of sedge canopy and improved ability to manage the water regime, and habitat suitability for the least bittern and American coot improved primarily due to the increased abundance of emergent vegetation. In the cropland areas habitat suitability for the green-backed heron, beaver, and prothonotary warbler improved due to the conversion of cropland to forested wetland habitat and the increased availability of forested habitat adjacent to permanent water.

Zone 5

Habitat suitability and acreages in Zone 5 have not been verified in the field due to the inability to access the area to complete a habitat evaluation. Until this evaluation is completed the overall impact of the proposed project on terrestrial species cannot be determined.

Aquatic Species

Habitat suitability for both aquatic species in Roadside Lake and Sny Creek improved with the project over existing conditions, while without the project the habitat suitability declined (Table 3). The major change associated with the project is that the dredging of Sny Creek and the added connection between Sny Creek and Roadside Lake would allow improved access for spawning and rearing to areas that for the most part are inaccessible under the current conditions. Without the project the impact of sediment deposition within Roadside Lake and Sny Creek would lead to reduced depth, poorer water temperatures, and reduced dissolved oxygen levels.

Habitat suitability and acreages in the Dog Island location have not been analyzed due to the inability to access the area to complete a habitat evaluation. Until this evaluation is completed the overall impact of the proposed project on aquatic species cannot be determined. However, it is anticipated that dredging the Dog Island Sloughs will be beneficial to aquatic species by providing much needed off-channel habitat.

Summary

The WHAG and AHAG analysis indicates that the preferred alternative results in a net increase of 503.69* AAHUs for the target terrestrial species and 89.61* AAHUs for the target aquatic species over the future without project. Overall, the preferred alternative results in a net yield of 1944.74* AAHUs for all terrestrial species evaluated (Table 2) and a net yield of 89.61* AAHUs for the aquatic species (Table 4) over the future without project condition. The combination of aquatic and terrestrial features in the preferred alternative will yield a net increase of 2034.35* AAHUs for all evaluation species over the future without project condition. To reemphasize, these AAHUs were developed assuming hillside sediment control measures were a part of the proposed project plans. If these measures are not included in the project, the future with project AAHUs and net AAHUs will require reevaluation.

*AAHUs from Zone 5 are not included in these results.

CONCLUSIONS AND RECOMMENDATIONS

According to the Incremental Cost Analysis (ICA), the preferred alternative (alternative 8) ranks 8 out of 14 in cost per AAHU output compared to the other best buy plans. In addition to the 14 alternative best buy plans, the Service recommended two additional alternatives, alternatives 8a and 8b, be carried forward for further evaluation. In addition to the features included in the preferred alternative, alternative 8a includes the dredging of Dog Island Sloughs and alternative

8b includes the dredging of Dog Island Sloughs and water control structures within Dog Island Sloughs. The Service recommended that alternatives 8a and 8b be carried forward until a site investigation of Dog Island occurred to determine the current condition of the sloughs and to verify the incremental cost per output ($/AAHU). This investigation has not been completed due to the inability to access the Dog Island area; therefore, the Service at this point in time continues to recommend that Alternatives 8a and 8b be carried forward for further investigation, in addition to Alternative 8.

One of the major problems that is not addressed by the current preferred alternative is the detrimental sediment loading and accumulation of hillside born sediment within the Sny Creek channel. This sediment deposition results in the inability to properly drain the wetland areas and results in the loss of connectivity between the Upper Mississippi River, Sny Creek and adjacent backwater lakes and sloughs. Hillside sediment control measures are critical to the success of the Rip Rap Landing HREP. Without the control measures, the success of many of the features included in the preferred alternative will be reduced or eliminated over the life of the project and the overall mission of the project will not be accomplished. The Service strongly recommends that hillside sediment control measures be incorporated into the project plan and some acceptable assurances are given that they will be constructed. Appendix I (Hillside Sediment Control) of the Definite Project Report, Stage II begins to address this key issue and a potential path forward. According to Appendix I, NRCS is in the process of conducting a study of the upland areas of Sny Creek and formulating an erosion control and sediment reduction plan. Once this plan is complete the Service recommends that it be incorporated in the project plans for the Rip Rap Landing HREP. Precedence for incorporating hillside control measures into HREP projects includes the Batchtown HREP and the Swan Lake HREP.

With the inclusion of hillside sediment control measures, the proposed project will be beneficial to the Mississippi River and biota dependent upon the river and its floodplain by improving habitat quality in this portion of river. The project will rehabilitate and enhance the quality and diversity of wetland habitat, enhance forest quality, reconnect channels to the floodplain, and improve aquatic diversity in backwater habitats. Migratory birds and other terrestrial organisms will have access to improved habitat for resting, feeding, nesting, and escape cover. Large river fish and other aquatic organisms will gain improved access to important habitats for several life stages, such as spawning, rearing and over-wintering. These areas will also provide an important feeding area for aquatic organisms and serve as a production area for small fish and invertebrates that other terrestrial organisms feed upon. The proposed Rip Rap Landing HREP will be beneficial to a variety of fish and wildlife resources. The Service fully supports the proposed Rip Rap Landing HREP with the inclusion of hillside sediment control measures.

THREATENED AND ENDANGERED SPECIES

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the Fish and Wildlife Service (Service) information concerning any species, listed or proposed to be listed, which may be present in the area of the

proposed action. Therefore, we are furnishing you the following list of species that have ranges that include the concerned area:

Classification	Common Name (Scientific Name)	Habitat
Endangered	Indiana bat (*Myotis sodalis*)	Caves, mines; small stream corridors with well developed riparian woods; upland and bottomland forest
Threatened	Decurrent false aster (*Boltonia decurrens*)	Disturbed alluvial soils
Threatened	Eastern prairie fringed orchid (*Platanthera leucophaea*)	Mesic to wet prairies
Candidate	Spectaclecase mussel (*Cumberlandia monodonta*)	Mississippi River

There is no designated critical habitat in the project area at this time. A biological assessment or evaluation should be prepared for this proposed action. The purpose of the assessment is to identify listed or proposed species likely to be adversely affected by the action and to assist in making a decision as to whether formal consultation should be initiated.

Although the bald eagle has been removed from the threatened and endangered species list, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA). The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. A final report will be prepared after project plans have been revised to incorporate hillside sediment control measures and further review of the planning documents has occurred. If you have questions, please contact Matt Mangan of my staff at (618) 997-3344, ext. 345.

Sincerely,

/s/ Matthew T. Mangan

For Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Atwood, Postlewait, Schanzle)
HDR, Inc (Miller, Roads)
USFWS (Clevenstine, Mabery)

Attachments: Table 1
Table 2
Table 3
Table 4
Appendix A – Literature Cited
Appendix B – Assumptions

Table 1: Habitat Suitability Index (HSI) scores for Existing, Future Without (Year 50) and Future With (Year 50) for terrestrial species, Rip Rap Landing HREP. Only the species highlighted in gray were used to calculate project benefits.

Habitat Type	Species	Existing	Future With	Future Without	Net
Zone 1 - Bottomland Hardwoods	**Mallard**	**0.00**	**0.81**	**0.00**	**0.81**
	Green-backed Heron	0.53	0.60	0.53	0.07
	Wood Duck	0.48	0.58	0.48	0.10
	Beaver	0.45	0.51	0.45	0.06
	Northern Parula	0.42	0.50	0.42	0.08
	Prothonotary Warbler	0.44	0.53	0.44	0.09
Zone 1 - Nonforested Wetlands	**Mallard**	**0.00**	**0.85**	**0.00**	**0.85**
	Canada Goose	0.00	0.61	0.00	0.61
	Least Bittern	0.71	0.61	0.69	-0.08
	Lesser Yellowlegs	0.68	0.68	0.68	0.00
	Muskrat	0.15	0.62	0.15	0.47
	King Rail	0.56	0.49	0.56	-0.07
	Green-backed Heron	0.71	0.85	0.76	0.09
	American Coot	0.63	0.78	0.68	0.10
Zone 1 – Cropland Conversion	**Mallard**	**0.00**	**0.86**	**0.00**	**0.86**
	Green-backed Heron	0.00	0.34	0.00	0.34
	Beaver	0.15	0.33	0.00	0.33
	Northern Parula	0.00	0.35	0.00	0.35
	Prothonotary Warbler	0.00	0.09	0.00	0.09
Zone 2 - Bottomland Hardwoods	Green-backed Heron	0.44	0.44	0.44	0.00
	Wood Duck	0.48	0.49	0.49	0.00
	Beaver	0.40	0.40	0.40	0.00
	Northern Parula	**0.50**	**0.50**	**0.50**	**0.00**
	Prothonotary Warbler	0.68	0.71	0.71	0.00
Zone 2 – Cropland Conversion	Green-backed Heron	0.00	0.54	0.00	0.54
	Wood Duck	0.00	0.10	0.00	0.10
	Beaver	0.14	0.48	0.00	0.48
	Northern Parula	**0.00**	**0.45**	**0.00**	**0.45**
	Prothonotary Warbler	0.00	0.11	0.00	0.11
Zone 3 - Bottomland Hardwoods (Roadside Lake)	**Mallard**	**0.13**	**0.29**	**0.27**	**0.02**
	Green-backed Heron	0.64	0.63	0.63	0.00
	Wood Duck	0.50	0.64	0.55	0.09
	Beaver	0.68	0.63	0.59	0.04
	Northern Parula	0.42	0.45	0.45	0.00
	Prothonotary Warbler	0.47	0.64	0.64	0.00
Zone 3 - Bottomland Hardwoods (Waverly Lake)	**Mallard**	**0.13**	**0.29**	**0.27**	**0.02**
	Green-backed Heron	0.64	0.63	0.63	0.00
	Wood Duck	0.50	0.64	0.55	0.09
	Beaver	0.68	0.63	0.59	0.04
	Northern Parula	0.42	0.45	0.45	0.00
	Prothonotary Warbler	0.47	0.64	0.64	0.00

Table 1: Continued

Habitat Type	Species	Existing	Future With	Future Without	Net
Zone 3 - Nonforested Wetlands (Roadside Lake)	**Mallard**	**0.00**	**0.31**	**0.00**	**0.31**
	Canada Goose	0.00	0.32	0.00	0.32
	Least Bittern	0.00	0.71	0.00	0.71
	Lesser Yellowlegs	0.65	0.65	0.62	0.03
	Muskrat	0.64	0.28	0.64	-0.36
	Green-backed Heron	0.77	0.77	0.79	-0.02
	American Coot	0.60	0.69	0.58	0.11
Zone 3 - Nonforested Wetlands (Waverly Lake)	**Mallard**	**0.15**	**0.31**	**0.13**	**0.18**
	Canada Goose	0.14	0.29	0.13	0.16
	Least Bittern	0.63	0.81	0.61	0.20
	Lesser Yellowlegs	0.64	0.68	0.61	0.07
	Muskrat	0.55	0.53	0.41	0.12
	King Rail	0.64	0.76	0.57	0.19
	Green-backed Heron	0.87	0.73	0.86	-0.13
	American Coot	0.61	0.65	0.60	0.05
Zone 3 – Cropland Conversion	Green-backed Heron	0.00	0.34	0.00	0.34
	Beaver	0.15	0.33	0.00	0.33
	Northern Parula	**0.00**	**0.35**	**0.00**	**0.35**
	Prothonotary Warbler	0.00	0.37	0.00	0.37
Zone 4 - Nonforested Wetlands	**Mallard**	**0.00**	**0.35**	**0.00**	**0.35**
	Canada Goose	0.00	0.35	0.00	0.35
	Least Bittern	0.00	0.80	0.00	0.80
	Lesser Yellowlegs	0.65	0.65	0.62	0.03
	Muskrat	0.40	0.26	0.40	-0.14
	King Rail	0.00	0.73	0.00	0.73
	Green-backed Heron	0.73	0.73	0.75	-0.02
	American Coot	0.54	0.65	0.51	0.14
Zone 4 – Cropland Conversion	Green-backed Heron	0.00	0.54	0.00	0.54
	Beaver	0.14	0.48	0.00	0.48
	Northern Parula	**0.00**	**0.45**	**0.00**	**0.45**
	Prothonotary Warbler	0.00	0.44	0.00	0.44
Zone 5 - Bottomland Hardwoods	Green-backed Heron				
	Wood Duck				
	Beaver				
	Northern Parula				
	Prothonotary Warbler				

Table 2: Average Annual Habitat Units for Future With Project (Year 50) and Future Without Project (Year 50) for terrestrial species, Rip Rap Landing HREP. Only the species highlighted in gray were used to calculate project benefits.

Habitat Type	Species	Future With	Future Without	Net
Zone 1 - Bottomland Hardwoods	**Mallard**	**72.27**	**0.00**	**72.27**
	Green-backed Heron	54.02	49.29	4.73
	Wood Duck	50.80	44.81	5.99
	Beaver	46.24	39.87	6.37
	Northern Parula	43.13	43.05	0.08
	Prothonotary Warbler	43.58	42.53	1.05
	Sum	**310.04**	**219.55**	**90.49**
Zone 1 - Nonforested Wetlands	**Mallard**	**35.42**	**0.00**	**35.42**
	Canada Goose	25.69	0.00	25.69
	Least Bittern	26.29	29.08	-2.79
	Lesser Yellowlegs	28.86	28.86	0.00
	Muskrat	26.40	6.28	20.12
	King Rail	20.13	23.86	-3.73
	Green-backed Heron	35.05	32.20	2.85
	American Coot	32.69	27.92	4.77
	Sum	**230.53**	**148.20**	**82.33**
Zone 1 – Cropland Conversion	**Mallard**	**51.16**	**0.00**	**51.16**
	Green-backed Heron	19.15	0.00	19.15
	Beaver	20.23	0.00	20.23
	Northern Parula	14.18	0.00	14.18
	Prothonotary Warbler	4.49	0.00	4.49
	Sum	**109.21**	**0.00**	**109.21**
Zone 2 - Bottomland Hardwoods	Green-backed Heron	125.67	125.67	0.00
	Wood Duck	138.82	134.48	4.34
	Beaver	114.12	114.12	0.00
	Northern Parula	**144.45**	**144.45**	**0.00**
	Prothonotary Warbler	198.62	192.12	6.50
	Sum	**721.68**	**710.84**	**10.84**
Zone 2 – Cropland Conversion	Green-backed Heron	20.55	0.00	20.55
	Wood Duck	3.45	0.00	3.45
	Beaver	18.70	0.00	18.70
	Northern Parula	**11.90**	**0.00**	**11.90**
	Prothonotary Warbler	3.18	0.00	3.18
	Sum	**57.78**	**0.00**	**57.78**
Zone 3 - Bottomland Hardwoods (Roadside Lake)	**Mallard**	**12.89**	**10.67**	**2.22**
	Green-backed Heron	29.95	29.95	0.00
	Wood Duck	26.91	24.08	2.83
	Beaver	31.38	30.57	0.81
	Northern Parula	20.41	20.41	0.00
	Prothonotary Warbler	24.60	24.60	0.00
	Sum	**146.14**	**140.28**	**5.86**

Table 2: Continued

Habitat Type	Species	Future With	Future Without	Net
Zone 3 - Bottomland Hardwoods (Waverly Lake)	**Mallard**	**63.24**	**52.35**	**10.89**
	Green-backed Heron	146.95	146.95	0.00
	Wood Duck	132.04	118.13	13.91
	Beaver	153.94	149.98	3.96
	Northern Parula	100.12	100.14	-0.02
	Prothonotary Warbler	120.69	120.69	0.00
	Sum	**716.98**	**688.24**	**28.74**
Zone 3 - Nonforested Wetlands (Roadside Lake)	**Mallard**	**37.81**	**0.00**	**37.81**
	Canada Goose	38.57	0.00	38.57
	Least Bittern	74.43	0.00	74.43
	Lesser Yellowlegs	68.13	66.43	1.70
	Muskrat	29.44	66.87	-37.43
	Green-backed Heron	80.55	82.25	-1.70
	American Coot	72.35	61.34	11.01
	Sum	**401.28**	**276.89**	**124.39**
Zone 3 - Nonforested Wetlands (Waverly Lake)	**Mallard**	**93.29**	**37.50**	**55.79**
	Canada Goose	86.66	35.35	51.31
	Least Bittern	215.30	163.96	51.34
	Lesser Yellowlegs	180.67	164.07	16.60
	Muskrat	140.30	131.33	8.97
	King Rail	200.38	157.10	43.28
	Green-backed Heron	193.63	228.68	-35.05
	American Coot	172.22	160.09	12.13
	Sum	**1282.45**	**1078.08**	**204.37**
Zone 3 – Cropland Conversion	Green-backed Heron	11.11	0.00	11.11
	Beaver	11.74	0.00	11.74
	Northern Parula	**8.23**	**0.00**	**8.23**
	Prothonotary Warbler	10.61	0.00	10.61
	Sum	**41.69**	**0.00**	**41.69**
Zone 4 - Nonforested Wetlands	**Mallard**	**77.78**	**0.00**	**77.78**
	Canada Goose	77.42	0.00	77.42
	Least Bittern	151.83	0.00	151.83
	Lesser Yellowlegs	124.03	120.94	3.09
	Muskrat	49.91	76.10	-26.19
	King Rail	131.36	0.00	131.36
	Green-backed Heron	139.75	142.97	-3.22
	American Coot	124.39	99.78	24.61
	Sum	**876.47**	**439.79**	**436.68**
Zone 4 – Cropland Conversion	Green-backed Heron	242.15	0.00	242.15
	Beaver	220.34	0.00	220.34
	Northern Parula	**140.22**	**0.00**	**140.22**
	Prothonotary Warbler	149.65	0.00	149.65
	Sum	**752.36**	**0.00**	**752.36**

Table 2: Continued

Habitat Type	Species	Future With	Future Without	Net
Zone 5 - Bottomland Hardwoods	Green-backed Heron			
	Wood Duck			
	Beaver			
	Northern Parula			
	Prothonotary Warbler			
	Sum			
	Grand Total			

Table 3: Habitat Suitability Index (HSI) scores for Existing, Future Without Project (Year 50) and Future With Project (Year 50) for aquatic species, Ted Shanks HREP.

Location	Species	Existing	Future With	Future Without	Net
Roadside Lake	Smallmouth Buffalo	0.30	0.59	0.22	0.37
	Bluegill	0.34	0.48	0.22	0.26
Sny Creek	Smallmouth Buffalo	0.30	0.59	0.22	0.37
	Bluegill	0.34	0.48	0.22	0.26
Dog Island	Smallmouth Buffalo				
	Bluegill				

Table 4: Average Annual Habitat Units for Existing, Future Without Project (Year 50) and Future With Project (Year 50) for aquatic species, Rip Rap Landing HREP.

Location	Species	Future With	Future Without	Net
Roadside Lake	Smallmouth Buffalo	69.20	26.90	42.30
	Bluegill	66.50	27.60	38.90
	Sum	**135.70**	**54.50**	**81.20**
Sny Creek	Smallmouth Buffalo	7.16	2.79	4.37
	Bluegill	6.88	2.84	4.04
	Sum	**14.04**	**5.63**	**8.41**
Dog Island	Smallmouth Buffalo			
	Bluegill			
	Sum			
Total				

Appendix A:

LITERATURE CITED

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Appendix B:

General and site specific assumptions and habitat characteristic information used to determine WHAG and AHAG values and acreage. Taken from Appendix D of the Definite Project Report.

General

1) We assumed that target years of 0 (baseline condition), 1, 5, 25, and 50 (future without and future with project conditions) are sufficient to analyze HUs and characterize habitat changes over the estimated project life.

2) Two floods have breached the sand levee extension from the Sny Levee in the last 50 years: 1993, 2005. We assume two more floods will breach the levee over the project life, the next 50 years, resulting in some amount of sediment accumulation in and around Waverly Lake and upper Sny Creek.

3) The duration, elevation, and severity of Mississippi River floods have increased with floodplain development and changes in agriculture. Navigation pool formation has increased sedimentation within the pools and side channels. We expect that this will not change in the next 50 years but flood event impacts to the project area from overbank scouring are expected to be less severe as the natural levee along the river increases in elevation and riverfront forest becomes better established.

4) After the flood of 1993, tree mortality was severe in the old growth bottomland hardwood forested natural area in Zone 2. Most of the oaks and some pecans have died in the period after the flood, likely due to stress from the flood height, duration and a later flood event in 1995. The area has been resurveyed recently, and still retains enough of the old growth forest component to justify the natural area designation.

5) Scouring, overbank flows from the river as flood waters rise have damaged some of the structures installed to enhance wetlands as part of the WRP easement acquired by NRCS. They also have provided funding for establishment of approximately 190 acres of wet prairie in 2010. Without the project, the continued existence of the prairie after establishment is unknown. With or without the project, some of the prairie area established may revert to bottomland forest and/or wet meadow, depending upon the hydrology and management at some of the prairie sites.

6) Without the project, IDNR will continue to manage the project area as in the past except for the WRP lands in Zone 4 that have the NRCS easement in place, and thus have restrictions on the type of management actions that can occur.

7) Without the project, IDNR may not have or choose to provide funds for replacement of the pump and water control structures that currently enable the management of Waverly Lake. Therefore, we assume the pump and water control structures and the ability to manipulate water levels within the Waverly Lake management area will fail by year 25.

Without water management capability, moist soil and other wetland vegetation will be heavily degraded by year 25. Additionally, the lack of management may favor establishment of reed canary grass resulting in a monoculture that has little benefit for wildlife, especially migratory birds.

8) Without the project, the former cropland in Zone 4 will continue to be dominated by herbaceous vegetation, inhibiting the natural conversion of those acres to bottomland forest, except along the riverfront. Cropland in the other zones would continue to be farmed providing little benefit to migratory birds. With project, the conversion to bottomland forest in Zone 4 will be a management objective requiring the chemical or mechanical manipulation of the herbaceous vegetation to favor natural bottomland forest establishment. Other cropland acres in Zones 1, 2 and 3 would be converted to bottomland forest through the use of containerized trees, thus allowing the forest canopy to close in those areas over time.

9) Under with-project conditions water control and movement would be enhanced and operated at a higher level of effectiveness throughout the 50-year planning period.

10) We assumed that operation of Rip Rap Landing Fish and Wildlife Area would continue with the current management objectives and plans for at least the life of the HREP.

11) Without the project, fish use of the backwaters and Sny Creek will continue to be restricted in many years by the lack of access for spawning, rearing and overwintering.

Site Specific

Zone 1

This zone is within and protected by the Sny Drainage and Levee District levee, a fifty year levee that has only been breached once (1993) in the past 50 years. The water level in this zone is also influenced by pumping from the Sny Drainage and Levee District, resulting in a habitat situation than is somewhat drier than desired. The area in Zone 1 is comprised of wet marsh, cropland and regenerating and maturing bottomland forest. Without the project, the area is likely to be managed as at present, given the influence of dewatering as a result of Sny D&LD pumping. With or without project there are no fish habitat units generated for this zone, consequently there was no AHAG evaluation.

WHAG Evaluation – The four measures proposed for this zone will allow the area to be managed more intensively for waterfowl and other migratory birds. We evaluated the habitat benefits using the non-forested wetland matrix for the marsh/wetland acres (Goose Pasture Lake), and the bottomland hardwood matrix for the existing forest and the cropland proposed for conversion to bottomland forest. The addition of three measures to facilitate water level management greatly enhance the habitat benefits for migratory birds, consequently the mallard was used as the indicator species and is the management focus for the site. The water control structure in the Sny D&LD ditch will prevent the area from being drained by pumping except as is required for water management to maintain water levels in Goose Pasture Lake and facilitate

the growth of submersed aquatic vegetation and moist soil plants, emergent and herbaceous vegetation, and/or to dewater the bottomland forested areas as required in the annual cycle. The pump station will allow most of the zone to be flooded during the fall and winter as needed, facilitated by the channel to Goose Pasture Lake to maintain water levels during the summer, if required. The cropland acres will be planted to bottomland hardwood species such as pin oak, overcup oak, swamp white oak, pecan, green ash, hawthorn and persimmon using containerized trees, bare root stock and transplanted stock from within the zone. Over time the reforested area canopy will close benefitting Prothontary warblers which prefer to nest near or over water and the northern parula which prefers unbroken tracts of bottomland forest.

Zone 2

The zone is outside the Sny D&LD and subject to flooding from the Mississippi River. It is also designated as a State Natural Area due to the presence of high quality bottomland forest that is within the zone. The high quality forest was severely impacted by the flood of 1993 causing mortality of some of the trees, likely due to stress. A more recent assessment of the area has been conducted and determined that it remains of high enough quality to retain the natural area designation. The only measures proposed for the zone include reforestation of the existing cropland. A measure was originally proposed to establish a riverside levee at elevation 450 msl, but the construction cost could not be justified by the benefits and the levee feature was dropped from consideration. No fisheries benefits are generated within the zone, consequently no AHAG evaluation was conducted.

WHAG Evaluation – We evaluated benefits in the zone using the bottomland hardwood forest matrix for the existing forest and the cropland proposed for conversion to bottomland forest. We used the non-forested wetland matrix to evaluate the slough that runs through the zone and connects with Zones 3 and 4. The slough is impacted by measures proposed for zone 3 since it is an integral part of water movement to Waverly Lake and associated wetlands. The impact results from pumping water through the slough, thus providing a water source for an area that likely goes nearly dry in late summer and fall. Although the habitat benefits from pumping accrue in Zone 2, the habitat units are added to the water control feature within Zone 3 since that is the structure responsible for maintaining the higher water level. The water control structure is located in the pump ditch that traverses the south edge of the zone. The mallard was used as the indicator species. The northern parula was the indicator species chosen for the forested portion of the zone because that species benefited most from the continued aging of the existing forest and the conversion of cropland to bottomland forest. Conversion of the cropland to bottomland forest generated sufficient habitat units over the life of the project to make it a viable measure, though the aging of the existing forest did not generate enough habitat units with the addition of a levee to 450 to justify the construction cost. The cropland acres will be reforested with a variety of bottomland species, utilizing containerized and bare root stock. Some of the zone may be allowed to reforest naturally. The forest canopy will ultimately close over the life of the project making Zone 2 nearly a solid block of bottomland forest. The forested riverfront natural levee is accreting and will result in fewer scouring overbank flows in the future.

Zone 3
This zone encompasses both the Waverly Lake and Roadside Lake Wetland Management Areas. The zone includes nonforested wetlands, bottomland forest and cropland, along with a portion of Sny Creek.

WHAG Evaluation – We chose to evaluate measures in the zone using the bottomland hardwood and nonforested wetlands spreadsheets. The mallard was used as the indicator species for the nonforested wetlands, while the northern parula was used for the forested and cropland conversion areas. Two measures were proposed for Roadside Lake, a fish-friendly water control structure to provide control of the water level in the lake and a portable pump to allow drawdowns of the lake to solidify bottom material every five to seven years and facilitate the growth of submersed aquatic vegetation. Based upon the habitat units generated these two measures were justified. The conversion of cropland to bottomland hardwoods was also justified and the cropland areas will be planted to hardwood species similar to Zone 1, with containerized or bare root stock. Waverly Lake and the associated wetlands are currently managed for waterfowl, but the existing pump and ditch are inadequate to fill the wetland areas in some years. We assumed this system would fail without the project. The with project condition would replace the pump, increase the size of the pump ditch and provide new water control structures all with sufficient capacity to provide water to Zones 3 and 4. Based upon the amount of water needed in each zone, the project features costs were split 43 percent to Waverly Lake and associated wetlands, and 57 percent to wetlands in Zone 4. These measures were justified based upon habitat units generated for the mallard.

AHAG Evaluation – The AHAG matrix was used to evaluate fish benefits in Sny Creek from Waverly Lake downstream to the entrance to Roadside Lake. Two species were used representing different guilds, smallmouth buffalo a common river species frequents backwaters and bluegill a backwater species common in Mississippi River bottomland lakes and sloughs. Habitat units for these species were summed for justification of proposed project benefits. Without project conditions will have little benefit for spawning, rearing or overwintering of fish due to the lack of access from the river caused by shallow water. We assumed that no fisheries benefits would accrue without a deeper water connection to the river. Dredging upper Sny Creek down to Roadside Lake could not be justified based upon the small number of habitat units generated compared to the high cost, there simply wasn't enough acres affected. Roadside Lake was also evaluated along with the remainder of Sny Creek, downsteam to the confluence with the Mississippi River. The dredge cut to the lake from Sny Creek, coupled with dredging down to the river confluence at Dog Island was justified because it provided a year round river connection for spawning, rearing and overwintering within Sny Creek and allowing fish access to Roadside Lake. The Sny Creek dredging to Dog Island is actually in Zone 4, while the dredging along Dog Island is in Zone 5. We assumed placement of dredge material along Sny Creek to strengthen the Sny levee extension down to Dog Island. Thalweg disposal of the dredge material was assumed for the dredging along Dog Island.

Zone 4
Zone 4 encompasses all of the Rust Land Company property, on which NRCS holds a WRP easement and has developed some of the wetlands. Mississippi River overbank, scouring flows have damaged some of the wetland structures, especially the one located at the lower end of the slough that traverses Zones 2 and 4. Included in the NRCS management plan for the property is the establishment of approximately 190 acres of prairie in conjunction with the wetlands and below approximate elevation 440. The balance of the zone would be reforested. Without project, management capabilities in the zone are limited because of a lack of water during much of the year. The area previously cropped is covered by herbaceous vegetation and very little bottomland forest regeneration is occurring. Areas adjacent to the existing wetlands are being invaded by willow and soft maple with little habitat benefit to migratory birds.

AHAG Evaluation – The portion of Sny Creek that is in Zone 4 was discussed with measures in Zone 3. No other fisheries benefits will be generated by the measures in proposed for the zone.

WHAG Evaluation – With project, wetlands in the zone were evaluated using the nonforested wetland matrix and included the area proposed for the establishment of prairie and wet prairie. The remaining forested area and the remaining cropland proposed for reforestation was evaluated using the bottomland hardwood matrix. The mallard was used the indicator species for the wetlands and wet meadow and the northern parula for the bottomland forest and the cropland area proposed for reforestation. The riverside levee was not justified based upon the construction cost and the small amount of habitat units generated by that feature. The slough that begins in Zone 2, is utilized as part of the water conveyance for Zone 3, and traverses nearly all of Zone 4 down almost to Dog Island, and its associated wetlands provides another opportunity for managed wetlands. The pump ditch from the riverside pump station crosses the slough north of and adjacent to the Rip Rap Landing road. Water control structures at the road will enable the entire slough and wetlands in Zone 4 to be managed for moist soil plants and wet meadow. Fifty-seven percent of the cost of construction of the pump station and pump ditch are allocated to the zone based upon the amount of water required. The other measures; the water control structure at the road and the slough closing levee and water control structure and the closing of two scour swales along the river all are justified based upon the habitat units generated for the mallard and Northern parula. Conversion of the remaining cropland to bottomland forest is justified based upon habitat units generated for the Northern parula. Chemical or mechanical manipulation of the herbaceous vegetation on the cropland will be required to facilitate regeneration of bottomland forest on most of the area. Bottomland forest is becoming established along the riverfront and will be supplemented with transplanted trees from Zone 1 to further enhance the natural riverfront levee. Over time, fewer scouring river events will occur in the zone and the bottomland forest canopy will close providing a large unbroken tract of bottomland forest favored by the Northern parula.

Zone 5
This zone encompasses all of Dog Island and is general plan lands owned by the Corps of Engineers and managed by IDNR. The entire zone is forested except for internal sloughs and the side of the island bounded by Sny Creek. Without project the bottomland forest will continue to

age, the sloughs will become shallower due to siltation and the lack of water depth in Sny Creek will inhibit use of the upstream lake and wetlands by fish.

AHAG Evaluation – The portion of Sny Creek adjacent to Dog Island proposed for dredging was evaluated as part of the fisheries benefits including Sny Creek in Zone 4, and Roadside Lake and the dredge cut into the lake in Zone 3. The proposed measures were justified based upon the aquatic habitat benefits generated by the smallmouth buffalo and bluegill.

WHAG Bottomland Hardwood Evaluation – The bottomland forest on the island was evaluated using the bottomland forest matrix, and showed an increase in habitat benefits as the forest aged over the life of the project. However, no additional benefits accrued because no project measures are proposed for the forested area of the island.

WHAG Nonforested Wetland Evaluation – Sloughs and rudimentary side channels traverse Dog Island in several locations. Without the project these areas are expected to disappear over the next 50 years due primarily to siltation from frequent river flooding. With project measures proposed for these sloughs and side channels would deepen them and provide rock structures that would scour and maintain connects to the river. However these measures generated few habitat units for fish or wildlife and were dropped from consideration because of the high cost per AAHU.

APPENDIX O

IDNR – CERP PERMIT

Illinois Department of Natural Resources
COMPREHENSIVE ENVIRONMENTAL REVIEW PROCESS

Project Code: 1009484 Project Title: Riprap Emp pump ditch

Site Name: Miss. River FWA Area Proposed Start Date: _____

Contact Person: Kim Postlewait Phone Number: 618-376-3303

County: Calhoun T: T.8S. R: R.3 W Sec: 31

USGS Quad Maps: ANNADA Quad #: N 39 15 - W 90 45 / 7.5

Project Description: The project is to expand the existing pump ditch to allow it to carry more water with the installation of a larger pump. The bottom width of the ditch will increase from 5' to 17' and the water surface will increase from 9' width to 22' (see attached drawings)

Funding Source: IDNR Capital _____ Heavy Equipment _____ Force Account _____

Other State, Local, or Private Agency _____

Federal _____ Federal program (e.g. P-R) EMP

Approval by Site Superintendent: (for all NON CAPITAL projects, e.g. Heavy equipment, force accounts, leases, R.O.W., etc.)

Kim Postlewait SAS II May 12, 2010

Site Superintendent Signature Date

CERP Staff Only:
REVIEWS PERFORMED

	Approved	Approved with Restrictions	Comments
Threatened & Endangered Species			
Natural Areas/Nature Preserves	X		
Wetlands	X		
Cultural Resources	X		
Other _____	N/A		

Rich Lewis 2-25-11

Kenneth L. Litchfield, Manager
CERP (217)785-5500

Date

APPENDIX P

PUMP SIZE ANALYSIS

Zone 3 Roadside Lake and Waverly Lake Wetland Management Areas Pumping Analysis

The initial project scope suggested that the existing pump station located within Zone 2 and feeding the Waverly Lake unit within Zone 3 be increased in size from its current 11,000 gpm capacity to 15,000 gpm. In addition, a new pump station, 20,000 gpm in size would be developed in Zone 4 to provide water to re-supply the wetlands during dry periods. The design parameter normally utilized by IDNR is that they would like the capability of flooding any specific migratory wildlife unit within a 10 day, 24 hour per day operation. This gives IDNR the maximum flexibility to delay flooding the wetlands until after vegetation has matured but insures flooding the area before the first migratory wildlife flights.

An analysis of historical pumping records at RRL indicates that increasing the water supply to Waverly Lake from 11,000 gpm to 15,000 gpm would have little benefit. Because of the variables associated with reviewing historical pumping records at RRL, pumping success was deemed valid if increasing the pump size provided 90% or more of calculated capacity for any given year. As the second to last column in Table 4.2 indicates, increasing the pump size from 11,000 to 15,000 gpm would have allowed the site to reach the desired capacity with a 10-day, 24 hour per day pumping period in 4 of the 10 years of record instead of the 3 years of success the existing 11,000 gpm pump provided. If the pumping capacity is increased to 35,000 gpm the last column indicates, the 10-day, 24 hour per day pumping success rate is increased to approximately 7 out of the 10 years (Table R1).

In addition to increasing the number of years the desired filling rate can be achieved within the Waverly Lake from three years to seven years by going from an 11,000 to 35,000 gpm pump, the cost savings of increasing the existing pump station capacity versus developing a second pump station is substantial.

Table R1 - Historical Pumping Analysis

YEAR	START DATE	ENDING DATE	TOTAL HRS.	GPM	TOTAL GAL.	TOTAL ACRE FT. PUMPED	Required Pump Capacity to Fill the Area in 10 Days, in GPM	Years in Which a 15,000 GPM Pump Would Supply Demand	Years in Which a 35,000 GPM Pump Would Supply Demand
1999	RIP RAP	2/29/1904	2,601	11,000	1,716,660,000	5,268	119,220	No	No
2000	9/26/2000	11/29/2000	505	11,000	333,300,000	1,023	23,147	No	Yes
2001	10/9/2001	12/5/2001	248	11,000	163,680,000	502	11,367	Yes	Yes
2002	9/25/2002	12/11/2002	352	11,000	232,320,000	713	16,134	Yes	Yes
2003			553	11,000	364,980,000	1,120	25,347	No	Yes
2004	10/18/2004	11/5/2004	78	11,000	51,480,000	158	3,575	Yes	Yes
2005	8/24/2005	11/24/2005	880	11,000	580,800,000	1,782	40,336	No	No
2006	8/22/2006	11/29/2006	810	11,000	534,600,000	1,641	37,127	No	Yes
2007	NO PUMPING		0	11,000	0	0	0		
2008	10/23/2008	12/9/2008	173	11,000	114,180,000	350	7,930	Yes	Yes

In the early stages of the analysis, it was determined that it was much more cost effective and functional to utilize the current pump structure and place a new 35,000 gpm pump on the existing pump structure than to build a totally new pump station for Zone 4 and increase the existing pump station capacity that fed Zone 3. This modification was accomplished by verifying with the pump supplier that a 35,000 gpm pump would indeed fit on the existing sheet pile structure. The analysis then reviewed whether the pump supply channel located within Zone 2 that fed the wetland units within Zone 3 could be increased in size for the new flow capacity desired in Zone 3 and whether this flow could be partially or totally diverted to feed the wetlands within Zone 4. As indicated on the Plates 5-7, the channel can be increased in size to accommodate 35,000 gpm instead of 11,000 gpm and this flow can be diverted into Zone 4 as desired or required by manipulation of gates. This eliminated the need for developing a new major pump station to service Zone 4 and significantly reduced the cost of the project.

Increasing the existing channel capacity east of the Sny Sand Levee is also proposed. This channel is the main water supply for the Waverly Lake wetlands and had to be increased to accommodate the new flow capacity of up to 35,000 gpm. Several years ago additional moist soil units were created west of Waverly Lake and they were fed using water from the main supply channel. This was done by erecting a water control structure across the pump channel and "backing" water up and through water control structures into the north and south moist soil units. This structure would need to be expanded. Because the main pump channel would be widened, the water control structures to feed the north moist soil units will have to be moved and replaced.

The cost of expanding the existing pump station from 11,000 gpm to 35,000 gpm and widening the pump channel from the pump station to the Sny sand levee was divided between Zones 3 and 4 based upon a percentage using the original concept of 15,000 gpm for Zone 3 and 20,000 gpm for Zone 4. Having the ability to divert up to 35,000 gpm to either Zone would increase the management flexibility of the site and allow them to "move" water based upon the wetland conditions in either Zone.

As part of the pump and channel analysis required in expanding the pump capacity, the pump supply pipe increased in size. In order to maintain existing water elevation, thus protecting the pump station and boat access road, it would be necessary to reduce the amount of earthen cover over the pump supply pipe. While this might be an issue only if heavy equipment were to utilize the existing access road going along the river into Zone 2, it was determined that a concrete entrance slab should be placed along the roadway where it crossed the pump water supply pipe.

The increased water supply from the pump station would terminate in a backwater slough just to the west of the Sny Sand Levee extension. At this location, water can then either be directed under the Sny Sand levee though a water control structure or it could be directed under the pump station and boat access road south to fill Zone 4. Water within this slough could also be directed north into the backwater slough areas in Zone 2. The slough would be used as a water conveyance for Zones 2, 3 and 4.

The analysis for the pump determined that the minimum size needed to maintain water level management capabilities and have similar controls over the newly acquired tract was 35,000 gpm. Smaller pump sizes would not allow the two areas to be managed at the same time. Two

pumps would be able to accomplish the goals, but the cost for installing the infrastructure for a new additional pump to supplement the existing one would be greater than putting a new larger pump on the existing infrastructure. Larger pump sizes were not evaluated because it would not have any greater benefits than the 35,000 gpm pump, but a larger cost. Larger pumps would only affect the time required to fill the area and not affect the benefits. In addition, the PDT looked at wells, using the river through structures through the natural levee, and supplementing an existing pump with a smaller gpm pump. In this case, initial investigations and cost estimates showed that the larger pump was the most feasible and cost effective. Thus it was the only water supply feature carried forward for more detailed analysis.

APPENDIX Q

PERFORMANCE MONITORING AND ADAPTIVE MANAGEMENT PLAN

APPENDIX Q

RIP RAP LANDING MONITORING AND ADAPTIVE MANAGEMENT PLAN

INTRODUCTION

The 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662) authorized implementation of Ecosystem Restoration projects to ensure the coordinated development and enhancement of the Upper Mississippi River system. WRDA 2007, section 2039 details requirements for monitoring and adaptive management for ecosystem restoration project performance.

This appendix outlines St. Louis District's plans for monitoring to assess performance indicators and designate targets and timelines for the Rip Rap Landing Habitat Rehabilitation and Enhancement Project's (RRL HREP) success in meeting project objectives.

GOALS and OBJECTIVES

The primary goal of the RRL HREP is to increase quantity and quality of aquatic, non-forested wetland, and forested wetland habitats in the project area. The goal will be achieved through the following objectives:

(1) Improve aquatic ecosystem resources;

(2) Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management;

(3) Reduce impacts of headwater flooding and river-borne sedimentation; and,

(4) Increase quantity and quality of bottomland hardwood forest.

Implementation of these objectives would improve quality and quantity of wildlife and aquatic habitats and provide necessary resources for migratory species along with a variety of other native floodplain species.

PERFORMANCE INDICATORS

Performance indicators to the above objectives were developed with the best available knowledge. They were developed to be specific, measureable, attainable, realistic, and timely. Current performance indicators and the conceptual monitoring timeline for use in the RRL HREP are detailed bellowed (Tables Q.1 and Q.2).

Objective 1: Improve aquatic ecosystem resources

Performance Indicator 1A: Roadside Lake connected to Mississippi River via Sny Creek

Rationale: Currently, the Old Sny Creek channel lacks year-round connectivity to the Mississippi River, which in turn, isolates Roadside Lake, a floodplain lake, from the river. Project features are designed to improve depth within Sny Creek providing year-round aquatic connectivity between the Mississippi River and Roadside Lake. This year-round connectivity will provide aquatic species important spawning and rearing habitat.

Expected Outcome: With the improved depth within Sny Creek, Roadside Lake should have year-round connectivity. Results should be realized in the first year after construction completion.

Monitoring and Measurement: Upon completion of the excavation of Sny Creek, site staff will record the days Sny Creek provides connectivity between the Mississippi River and Roadside Lake. Biological response will be analyzed using a trend analysis.

Table Q.1. Project objectives, indicators, and time before the effects become apparent at RRL.

Project-Wide Goal	Site-Specific Objective	Performance Indicator	Monitoring Target	Time of Effect	Responsible Party[12]
Increase quantity and quality of aquatic, non-forested, and forested wetland habitats	Improve aquatic ecosystem resources	Roadside Lake connected to Sny Creek	365 days per year	Construction Completion	IDNR
	Increase native plant species diversity and reduce number of acres impacted by invasive plant species by improving water level management	Water delivery and drainage	Ability to drain or flood zones 3 and 4 in $\leq$ 10 days	Construction Completion	IDNR
		Percent cover of moist soil plants	Desirable plants comprise $\geq$ 50% of the cover estimate for the unit	4 year post construction	IDNR/ USACE
	Reduce impacts of headwater flooding and river-borne sedimentation	Site experiences only back flooding	4 out of 5 years	Construction completion	IDNR
	Increase quantity and quality of bottomland hardwood forest	Survival of planted trees	80% survival of trees	5 years post construction	IDNR/ USACE

[1]IDNR will submit reports of data collection at years 1 and 5-10 to the MVS LTRM manager.

[2]Individual agencies will be responsible for providing their share of funding for the monitoring.

Table Q.2. RRL Conceptual Monitoring Plan. Construction is set at Year 0.

INDICATOR	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Connectivity*		Construction	X	X	X	X	X	X	X	X	X	X
Water	X		X									
Moist Soil							X	X	X	X	X	X
Headwater*			X	X	X	X	X	X	X	X	X	X
Trees			X				X					X
Estimated Cost ($)	2000		2500				3000	2000	2000	2000	2000	5000
SUBTOAL	$20,500											
Contingency (25%)	$5,125											
TOTAL	$26,000											
Average Annual Cost	$700											

[1] No additional monitoring costs would be required since these observations are part of normal site management
[2]Per WRDA 2007 Section 2039, monitoring up to 10 years is cost shared at rate of 50% Federal and 50% non-Federal

<u>Objective 2:</u> Increase native plant species diversity and reduce number of acres impacted by invasive plants species by improving water level management

Performance Indicator 2A: Water delivery and drainage

Rationale: Currently, the water level management at RRL is operating at an inadequate water conveyance capacity. The existing system prevents optimum water drainage and delivery within the project area, limiting the ability to provide needed wetland habitat for a variety of migratory and resident wildlife. Additionally, with inadequate water conveyance, reed canary grass, an invasive plant species is becoming dominant within the project area. Project features are designed to improve water delivery and drainage.

Expected Outcome: With the improved water delivery and drainage capacity, Zones 3 and 4 should be able to reach target water levels within 10 days. Results should be realized in the first year after construction.

Monitoring and Measurement: Pre- and post-project construction de-watering times will be recorded by site staff to determine the change in water drainage and delivery efficiencies.

Performance Indicator 2B: Cover of moist soil plants

Rationale: Managing water levels to promote a diverse suite of moist soil plants provide migratory and resident wildlife with nutritional resources (e.g., seeds and tubers) that are needed to complete vital annual life stages. Project features are designed to improve water level manipulation which will directly improve the ability to manage for moist soil plants contingent

on the reduction of reed canary grass in the project area. The use of plant species composition is a tool commonly used to evaluate moist soil wetland habitat.

Expected Outcome: With enhanced water manipulations, moist soil management at RRL should improve. Desirable native moist soil plants should comprise ≥ 50% of the cover estimate for estimate for each non-forested wetland area. Results should be realized within 5 years after construction completion.

Monitoring and Measurement: Five (50 × 50 cm) plots will be randomly located within moist soil habitat in Zone 1, 3 and 4, with 15 plots total for the entire project area. Plots will be used to visually estimate percent cover (0-100%) of the 5 or 6 most common plant species at each sample site. This will provide an index of herbaceous plant composition for moist-soil management needs. If for example, percent cover of desirable plants dropped from 85% to 40% with increasing amounts of perennials dominating the site, then the management plan can be adapted to have a drawdown or some mechanical disturbance should be scheduled for the following growing season. Biological response will be analyzed using a trend analysis.

Objective 3: Reduce impacts of headwater flooding and river-borne sedimentation

Performance Indicator 3A: Site experiences only back flooding

Rationale: Currently, the project area experiences headwater flooding which scours and deposits river-borne sediments into the wetlands, reducing their quality. Project features are designed to reduce headwater flooding and in turn reduce river-borne sedimentation.

Expected Outcome: The known areas of scour will be filled thus reducing headwater flooding allowing the site to back flooding most of the time (target is at least 4 out of 5 years the site only experiences back flooding). Results should be realized after construction completion.

Monitoring and Measurement: Upon completion, each year site staff will record how many times, if any, the filled scour areas experience headwater flooding. Biological response will be analyzed using a trend analysis.

Objective 4: Increase quantity and quality of bottomland hardwood forest

Performance Indicator 4A: Survival of planted trees

Rationale: Bottomland hardwoods have been reduced within the project area due to historic clearing for agriculture and impacts of flood events. Project features to plant trees are former agricultural fields, which are on relatively higher ground reducing negative flood impacts, would increase the quantity and quality of bottomland hardwoods within RRL.

Expected Outcome: The amount of bottomland forest would increase by a total of 99 acres between Zones 1 and 3. Reforestation will be one of the last features completed since other project features need to be completed prior to planting. Once planted, results should be realized within 5 years. However, full realization of results is highly dependent upon flood events, deer browsing, and possible seedling competition with reed canary grass or other invasive species in the project area after construction. Adaptive management strategies (fencing, herbicide application, mowing) will be utilized if necessary.

Monitoring and Measurement: Four (1/5 acre) monitoring plots will be established randomly upon planting within each reforestation area (Zones 1 and 3). Success of planted trees will be

monitored 1 and 5-year post-planting to determine % survivorship (tree count). Biological response will be analyzed using a trend analysis.

ADAPTIVE MANAGEMENT

Because of USACE experience in designing, building, and implementing HREPs, the PDT feels that there is a low risk of project failure. Success of the project primarily relies on the ability to effectively manipulate water levels to mimic the historic hydrograph and produce the desired ecosystem benefits. Results from the monitoring will be used to determine project success and refine the development of the optimal hydrologic regime for the site if necessary. The PDT will use these results in the context of adaptive management to inform the operation of the pumping schedule.

EVALUATION AND REPORTING

In general, monitoring is documented in Project Evaluation Reports (PER) that are scheduled at 5 year and 10 year post-project completion. The 5 year PER serves as a progress report. It is used to evaluate project success and inform of any changes that may be necessary to ensure the project is successful. The PER at 10 years closes out the monitoring of the project. The PER is drafted by the District with input from the project sponsor and state partners. IDNR will submit reports of data collection at years 1 and 5-10 to the MVS LTRM manager for use in development of the PERs. Once finalized, the PERs will be made publically available on the District's HREP homepage.