US Army Corps
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St. Paul District

Upper Mississippi River System Environmental Management Program

Definite Project Report/ Environmental Assessment (SP-22)

POOL SLOUGH WETLAND COMPLEX

HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Pool 9
Upper Mississippi River
Houston County, Minnesota and Allamakee County, Iowa

July 2003

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT (SP-22)

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POOL 9, UPPER MISSISSIPPI RIVER
HOUSTON COUNTY, MINNESOTA AND ALLAMAKEE COUNTY, IOWA

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INTRODUCTION

AUTHORITY

The authority for this report is provided by 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. Section 1103 is summarized as follows:

Section 1103. UPPER MISSISSIPPI RIVER PLAN

(a)(1) This section may be cited as the Upper Mississippi River Management Act of 1986.

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

(e)(1) The Secretary, in consultation with the Secretary of the Interior and the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, is authorized to undertake, as identified in the Master Plan -

(A) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement....

A design memorandum (or implementation document) did not exist at the time of the enactment of Section 1103. Therefore, the North Central Division, U.S. Army Corps of Engineers, completed a "General Plan" for implementation of the Upper Mississippi River System Environmental Management Program (UMRS-EMP) in January 1986. The U.S. Fish and Wildlife Service (USFWS), Region 3, and the five affected States (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) participated through the Upper Mississippi River Basin Association. During the initial years of the program, programmatic updates of the General Plan for budget planning and policy development were accomplished through Annual Addendums.

Coordination with the States and the USFWS during the preparation of the General Plan and Annual Addendums led to an examination of the Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Master Plan, completed by the Upper Mississippi River Basin Commission in 1981, was the basis of the recommendations enacted into law in Section 1103. The Master Plan report and the General Plan identified examples of potential habitat rehabilitation and enhancement techniques. Consideration of the Federal interest and Federal policies has resulted in the conclusions below:

Project Eligibility Criteria -

a. (First Annual Addendum). The Master Plan report...and the authorizing legislation do not pose explicit constraints on the kinds of projects to be implemented under the UMRS-EMP. For habitat projects, the main eligibility criterion should be that a direct relationship should exist between the project and the central problem as defined by the Master Plan; i.e., the sedimentation of backwaters and side channels of the Upper Mississippi River System (UMRS). Other criteria include geographic proximity to the river (for erosion control), other agency missions, and whether the condition is the result of deferred maintenance....

b. (Second Annual Addendum).

(1) Projects within Corps of Engineers implementation authorities include:

- backwater dredging
- dike and levee construction
- island construction
- bank stabilization
- side channel openings/closures
- wing and closing dam modifications
- aeration and water control systems
- waterfowl nesting cover (as a complement to one of the other project types)
- limited acquisition of wildlife lands

(2) A number of innovative structural and nonstructural solutions that address human-induced impacts, particularly those related to navigation traffic and operation and maintenance of the navigation system, could result in significant long-term protection of UMRS habitat. Therefore, proposed projects that include such measures will not be categorically excluded from consideration, but the policy and technical feasibility of each of these measures will be investigated on a case-by-case basis and the measures will be recommended only after consideration of system-wide effects.

PROJECT IMPLEMENTATION PROCESS

The major steps in project implementation include:

1. Fact sheet preparation
2. Project selection
3. Budgeting
4. Funding
5. Planning
6. General design
7. Public review
8. Project approval
9. Plans and specifications
10. Construction
11. Project monitoring

The Pool Slough project is at the end of public review (step 7).

PROJECT SELECTION PROCESS

Projects are nominated for inclusion in the District's habitat program by the respective State natural resource agency and the U.S. Fish and Wildlife Service (USFWS) based on agency management objectives. In September 1986, the States and USFWS agreed to utilize the expertise of the Fish and Wildlife Work Group (FWWG) of the River Resources Forum (RRF) to assist the District in the project selection process. The FWWG consists of field level biologists responsible for managing the river for their respective agency. The FWWG was directed to consider critical habitat needs along the Mississippi River and prioritize nominated projects on a biological basis.

In phase one, the individual projects proposed by the various Federal and State agencies were ranked by the FWWG within each pool according to the prioritized resource problems that the individual projects addressed and other ranking factors. The resource problems identified and prioritized in a pool included (in order of importance): backwater sedimentation; water quality; shoreline erosion; lack of important habitat; lack of habitat protection; and lack of public land base. The other ranking factors included anticipated fishery benefits, wildlife benefits, habitat diversity, ease of implementation, potential for innovative or experimental construction techniques, project longevity, maintenance, and socioeconomic benefits. The second phase of the evaluation involved the development of a prioritized list of the top 20 projects from the entire river system within the St. Paul District. The prioritized list was based on the following factors: numerical ranking from phase one; the desire to implement and evaluate a variety of habitat rehabilitation and enhancement techniques; the application of the LTRM component to habitat project development; and the evaluation of existing habitat projects and those under construction. This biological ranking was forwarded to the RRF for consideration of the broader policy perspectives and river management objectives of the

agencies involved. The RRF submitted the coordinated ranking to the District and each agency officially notified the District of its views on the ranking. The District then formulated and submitted a program consistent with the overall program guidance as described in the UMRS-EMP General Plan, Annual Addenda, and additional guidance provided by the former North Central Division, Corps of Engineers. New habitat project proposals continue to be submitted to the FWWG for ranking and the prioritized list is updated annually to guide the project selection process for each budget cycle.

Biologists closely acquainted with the river consequently have screened projects. Resource needs and deficiencies have been considered on a pool-by-pool basis to ensure that regional needs are being met and that the best expertise available is being used to optimize the habitat benefits created at the most suitable locations. Through this process, the Pool Slough project was recommended and supported as capable of providing significant habitat benefits.

The Pool Slough project was submitted in December 1986 by the Iowa Department of Natural Resources (DNR) to the FWWG for ranking with all the other originally proposed habitat projects. The ranking relative to the other habitat projects was low because Pool Slough is primarily a single-purpose project and does not address sedimentation or water quality, two important factors in the FWWG scoring process. In 1989, the USFWS requested to co-sponsor the project with the Iowa Department of Natural Resources (IDNR) by including the USFWS lands immediately to the north of the proposed project area. This did not change the ranking, but added quantitatively to the potential habitat value of the project. The FWWG then recommended that the project be added to the list of highest priority projects, but listed it separate from the priority ranking. The RRF felt that it would be in the best interest of the Environmental Management Program to construct some projects that are traditional, proven habitat manipulation techniques, even though they may not rank high in the normal prioritization process. Therefore, the RRF endorsed the potential projects list for fiscal year 1993 to include Pool Slough as second in priority. Based on the RRF priority list, public interest, the value of the resources, the opportunity for habitat enhancement, agency priorities, and program funding constraints, the St. Paul District placed the Pool Slough project on the habitat project schedule for funding in fiscal year 1993. However, funds to begin general design were not made available until fiscal year 1994. Other habitat projects on the priority listing for fiscal year 1993 that received funding for general design included Pool 8 Islands-Phase II, East Channel, Rice Lake, and Spring Lake Islands. Planning and design of the Spring Lake project is underway. Construction of the Pool 8 Islands project was completed in 1999, the Rice Lake project was completed in 1998, and the East Channel project was completed in 1997.

PARTICIPANTS AND COORDINATION

Direct participants in the planning process for the Pool Slough project included the Upper Mississippi River Wildlife and Fish Refuge (McGregor District) and Region 3 Office of the U.S. Fish and Wildlife Service (USFWS), the Iowa, Minnesota, and Wisconsin Departments of Natural Resources (IDNR, MDNR, and WDNR), and the St. Paul District, U.S. Army Corps of Engineers (COE). The USFWS was a cooperating agency throughout the process as required by regulations developed by the Council on Environmental Quality for the implementation of the National Environmental Policy Act (40 CFR 1500-1508). The following study team members visited the site on 4 April 1994 or 14 March 1995 or have attended follow-up meetings to discuss problems, objectives, and site characteristics for preparation of this report.

Team Member	Expertise	Agency
Don Powell	Project Management	COE
Randy Devendorf	Wildlife Biologist	COE
Michelle Schneider	Hydraulic Engineer	COE
Jon Hendrickson	" "	COE
Chris Behling	Geotechnical Engineer	COE
Joel Face	" "	COE
Jeff Stanek	General Engineer	COE
Terry Williams	" "	COE
Tony Fares	Structural Engineer	COE
Gary Smith	Cost Engineer	COE
Keith Beseke (ret.)	EMP Coordinator	USFWS
John Lyons (ret.)	McGregor District Mgr	USFWS
Doug Mullen (ret.)	" "	USFWS
John Lindell	" "	USFWS
Clyde Male	" "	USFWS
Ken Dulik	" "	USFWS
Gary Ackerman (ret.)	Fisheries Biologist	IDNR
Mike Griffin	Miss River Biologist	IDNR
Bob Kurtt	Wildlife Biologist	IDNR
Scott Gritters	Fisheries Biologist	IDNR
Dan Dieterman	Fisheries Biologist	MDNR
Mike Davis	EMP Coordinator	MDNR
Jeff Janvrin	EMP Coordinator	WDNR
John Wetzel	Fisheries Biologist	WDNR
Ron Benjamin	Fisheries Biologist	WDNR

Correspondence was exchanged between the agencies to coordinate the project at various stages of development. Several meetings were held with the USFWS and State team members during the planning phase to further develop the alternatives and the habitat model for evaluating the alternatives. Public input and coordination has officially taken place on several occasions. Local officials in the city of New Albin were briefed about the proposed project on July 11, 1995. A public meeting was held at New Albin, IA, on August 6 1996. About 40 people attended the meeting to hear about the study status and the proposed alternative, and to provide input to the study. Another public meeting to hear comments on the draft of this report

was held at New Albin on December 2, 1999, attended by 39 people. Additional information about the public meetings and comments received are included in attachment 5. Twenty people attended a public meeting held by the Iowa DNR on August 19, 2002, at New Albin to discuss the project, changes to the project, and the closed area for hunting. About 15 people were briefed about the project during an Audubon Society field trip to the site on August 26, 2002.

A preliminary draft of this report was sent to the USFWS and the Iowa, Minnesota, and Wisconsin DNR's for review and comment. The draft Definite Project Report/Environmental Assessment or notice of availability was distributed to the public as listed in attachment 11. The comments that were received and the results of meetings with the agencies and the public were used to select and develop the final recommended plan. This report includes the environmental assessment, Finding of No Significant Impact (attachment 2), and Section 404(b)(1) Evaluation (attachment 3).

PROJECT LOCATION AND PURPOSE

The Pool Slough project area is located on the west side of the Mississippi River at the Iowa-Minnesota border in pool 9, near New Albin, Iowa (see Plate 1). Part of the site lies in Minnesota within the Upper Mississippi River Wildlife and Fish Refuge (McGregor District). The remainder of the site lies in Iowa on lands owned by the IDNR. Plate 2 shows the general study area.

The overall purposes or goals of this project are to preserve, restore and enhance migratory bird habitat in the area of pool 9 on the Upper Mississippi River. As described later in this report, this is consistent with the designated goals of the Refuge and the IDNR.

EXISTING CONDITIONS

PHYSICAL SETTING

Pool 9 was created in 1938 when the Corps of Engineers constructed lock and dam 9 to provide for the 9-foot (2.75-meter) channel project on the Upper Mississippi River system. Pool 9 is 50.4 kilometers (31.3 miles) long, extending from river mile 647.9 to 679.2. The target pool elevation for pool 9 is 189.0 meters (620.0 feet) above mean sea level. At target pool elevation the surface area is 11,790 hectares (29,125 acres). The pool has the largest federally managed surface area of any pool in the Upper Mississippi River System. The average long-term discharge at Lock & Dam 9 is approximately 850 cubic meters per second (30,000 cubic feet per second). The Corps of Engineers administers about 2,680 hectares (6,620 acres) in pool 9, most of which is aquatic.

Wisconsin is located on the left descending riverbank and Minnesota and Iowa are on the right bank. The river valley in the area of Pool Slough is over 5 kilometers (3 miles) wide. The well-defined main Mississippi River channel is adjacent to and parallels the Wisconsin shoreline. The remainder of the project area is backwater bottoms comprised of an irregularly braided slough system dividing lowland marshes and floodplain forests and swamps.

The Pool Slough study area includes about 144 hectares (356 acres) located on the extreme western side of the river valley in Minnesota and Iowa (see Plate 2). The area is bounded on the west by the Iowa city of New Albin, a wastewater treatment pond, and the Iowa & Minnesota Rail Link and State Highway No. 26 embankments. Wooded areas, with relatively straight tree lines, border the northern and northeastern limits of the area. The easterly side is comprised of a series of sloughs (Pool Slough), bottomland forest, and a delta formation on Winnebago Creek. The southern boundary is formed by Army Road, a gravel road maintained by Allamakee County that leads to the New Albin boat landing, about 2.7 kilometers (1.7 miles) from the area. The U.S. Fish and Wildlife Service maintain the boat landing. Historically, a large portion of the area north of Winnebago Creek was farmed, but no farming has been done since shortly after the USFWS acquired the land in 1989. A spoil dike along the north side of Winnebago Creek keeps some of the flows from moving to the north. The spoil dike was formed when Winnebago Creek was excavated in 1960 to divert the flow more directly toward the Mississippi River. The remainder of the area is usually flooded during spring runoff. Potholes, sloughs, and ditches collect water during the summer months. The city of New Albin on the west is located on a natural terrace about 3.5 meters (11 feet) higher than the project area. The residential and commercial areas are above the 100-year flood elevation. A majority of the farmland around New Albin is located below the 20-percent frequency flood elevation, but because flooding usually occurs only in early spring, it does not have a great effect on productivity.

WATER RESOURCES

Hydrology - Water surface elevations in the study area are primarily influenced by Mississippi River, Winnebago Creek, Minnesota Slough, and Pool Slough discharges. Numerous small channels and sloughs convey water into and through the area. A detailed discussion of existing conditions is included in attachment 8.

Mississippi River - The main channel of the Mississippi River is located along the Wisconsin shoreline, about 5 kilometers (3 miles) east of the Pool Slough area. The annual hydrograph of Mississippi River discharges is characterized by spring peak flows following ice breakup, snowmelt, and spring rains. Spring runoff usually begins near the end of March and extends through April into May. The spring peak flow most typically occurs around mid-April. The highest recorded flow (April 1965) was 7,530 cubic meters (265,900 cubic feet) per second at lock and dam 8 and 7,800 cubic meters (275,500 cubic feet) per second at lock and dam 9. Normal summer flows range from 560 to 850 cubic meters (20,000 to 30,000 cubic feet) per second. River discharges typically increase from fall rains in September and October. Winter discharge is relatively steady at about 560 cubic meters (20,000 cubic feet) per second. Side channels on the Mississippi River (especially Minnesota Slough) carry floodwaters into the project area. The primary source of floodwaters is spring snowmelt combined with the increased precipitation that usually occurs during these months. The normal pool 9 elevation is 189.0 meters (620.0 feet) for flows up to 990 cubic meters (35,000 cubic feet) per second. A 50-year flood occurrence on the Mississippi River at New Albin would produce a water level elevation of about 193.4 meters (634.5 feet).

Winnebago Creek - Winnebago Creek enters the project area from the west, approximately 0.8 kilometers (½ mile) north of New Albin in Houston County, Minnesota. The creek drains the higher river valley bluff area of approximately 156 square kilometers (60 square miles). The watershed consists of upland farmlands, forested bluffs, steep river valleys, and floodplain. Both spring snowmelt and summer rainfall can cause flooding from the creek. The land where the creek flows through the project area is relatively flat. In 1960, the channel in the project area was straightened by excavating a 12-meter-wide (40 feet), 800-meter-long (1,300 feet) diversion channel from State Highway 26 to a small slough that drained to Minnesota Slough. Normally, flows would travel 2.5 kilometers (1.5 miles) east through the project area to Minnesota Slough and eventually to the Mississippi River. However, in 1978, heavy rainfall washed silt and debris from upland areas in the watershed, filling the diversion channel and flooding cropland and pasture. Flow from the creek has continued to flood agricultural land and keeps water levels high. In addition, beaver activity and continued formation of the delta on the east side of the project area has resulted in breakout flows within the project area. Until 2000, most of Winnebago Creek flow broke out to the south and into Pool and Wood Sloughs (see Plate 3). Flow then traveled east along Army Road to Minnesota Slough at a more southern location and finally to the Mississippi River. A discharge-frequency curve developed for Winnebago Creek in 1983 indicates that a 50-year flood occurrence would produce a flow of about 225 cubic meters (8,000 cubic feet) per second (see attachment 8). Gages were installed in 1994 in the creek at the railroad bridge and just downstream of the breakout flow location. Water levels at the railroad bridge varied from 192.94 to 192.76 meters (633.0 to 632.4 feet) from September 1994 through September 1996. In 2000, a major flood event on Winnebago Creek

breached the spoil pile levee on the north side of the creek, allowing significant flow to the north and eventually to Minnesota Slough.

Pool Slough - Pool Slough enters the project area from the south as it receives drainage from the terraced area within the higher bluffs. The drainage area of Pool Slough is about 14 square kilometers (5.5 square miles). Two 42-inch corrugated metal pipes under Army Road allow flow to pass to the north into the project area. Flow from the slough then meets the breakout flows from Winnebago Creek and is short-circuited to the east along a county ditch adjacent to Army Road as described above. A gage was installed in 1994 in Pool Slough on the north side of Army Road. The water surface elevation varied from 190.85 to 190.53 meters (626.2 to 625.1 feet) from September 1994 through August 1996 and is normally about 2.1 meters (6.9 feet) lower than Winnebago Creek elevations. Most of the drop in water surface elevation appears to take place in the mid-portion of the study area.

GEOLOGY AND SOILS

Geology - The Mississippi River lies in a broad, bedrock gorge or trench that probably existed in some form as long as 180 million years ago. The primary geologic event that created the valley existing today occurred approximately 10,000 years ago, near the end of the Pleistocene glaciation. During this glacial period the Mississippi gorge was filled with glacial outwash sand and gravel deposits. After deposition of the outwash sediments, large volumes of meltwater from the southward outflow of glacial Lake Agassiz eroded the sands and gravels, simultaneously scouring and deepening the bedrock valley. As meltwaters diminished, the deeply eroded gorge filled with up to 60 meters (200 feet) of river sands, gravels, clays, and silts. The large supply of sediment from the Mississippi headwaters and it's tributary streams, coupled with a diminished water supply at the end of glacial melting, led to the development of a braided stream environment. River conditions were characterized by numerous channels, swampy depressions, natural levees, islands, and shallow lakes. The bluffs are steep on both sides and highly dissected, with a maximum relief of 152 to 183 meters (500 to 600 feet). Steep-sided tributary valleys may widen abruptly as they debouch into the river to form "coves" or elevated deltaic areas filled with alluvial materials, mostly sand and silt. The valleys of such tributaries as the Upper Iowa River and Winnebago Creek display prominent, complex terrace systems up to more than 30 meters (100 feet) high. Lesser tributaries have terraces in proportion to size.

Prior to the impoundment of pool 9, the broad floodplain of the river was characterized by a stream system consisting of multiple channels, swampy depressions, sloughs, natural levees, islands, and shallow lakes. The completion of Lock and Dam 9 in 1937 flooded the area and obscured the braided stream characteristics. Lake-type sediments now form a relatively thin, stratified, veneer of organics, silts, sands, and clays over most of the present river bottom. The

river gradient is quite low, averaging less than 30 millimeters per kilometer (0.1 feet per mile) during typical flow conditions. Side channels, meanders, and sloughs that typify low gradient conditions are conspicuous at the project location. The depth of sedimentation is generally greater in the slow moving backwater areas than in the main channel portions of pool 9.

Soils - The principal parent material of soils of pool 9 and associated uplands is loess over bedrock or over clay loam till. The principal soil associations of the pool 9 area are the Fayette and Fayette-Dubuque-Stonyland. The uplands surrounding pool 9 are mantled with loess: a wind-blown silt deposit several tens of feet thick. The silt was eroded from glacial drift during the later part of the Pleistocene Ice Age. Stream banks plainly show the varying thickness of the different materials and in many places the lack of continuity of the sand and gravel layers above low water level. The loess is easily eroded and thus streams erode large amounts each year. Sand and gravel strips border most sloughs, but some of the larger, more elevated areas between the sloughs are covered with heavy silty loam that is underlain with sand or gravel.

The major soil type of islands and upland peninsular in pool 9 is Dorchester silt loam with 0 to 1 percent slope. This soil is light colored, lacks a B horizon, and is built up on black buried soil with layers of sand in some areas. The bottomland soils are flooded nearly every year during spring thaw or after heavy rains prior to the growing season. Soils developed under forest cover belong to the soil group referred to as the Gray-Brown Podzolics. These soils generally occur on gently rolling to steep topography along major streams.

Soils within the project area range from alluvial or slow water fluvial sediments in the wetlands to sands in areas adjacent to the steeper uplands. The most common soil unit at the immediate project site is the New Albin silt-loam ((U.S.D.A. classification), consisting of low plasticity clay (CL), or silt (ML) interbedded with silty sands (SP-SM or SM). Test pits north of Army Road revealed semi-pervious soils (SM or SP-SM) present to at least a depth of 1.5 meters (5 feet) below the ground surface. The locations and logs of the test pits are shown in attachment 9.

Sediment Transport and Substrate Type - Sediment is transported by water as suspended load or as bedload. The suspended load consists of fine particles, such as clay, silt, and fine sand, held in suspension by the turbulence of flowing water or by colloidal suspension. Bedload consists of coarser particles that roll, slide, or bounce along the streambed. Generally, erosion of uplands is the primary source of fine materials, while channel erosion contributes coarser particles. Upland erosion is the major source of sediment to the UMR. The substrate in the project area is highly variable. No detailed sediment analysis has been done in Pool Slough and Winnebago Creek channel. However, it is estimated that Winnebago Creek carries approximately 2,830 cubic meters (3,700 cubic yards) of sediment from the watershed each year. Streambank erosion along the upper reaches

of the creek is the main contributor to the sediment load. Upland farming contributes to the sediment load, but this is minor because upland farmers have implemented soil erosion control practices. However, clearing of land, especially forested areas, has left debris in the watershed coulees. This debris, if carried into the project area could affect flows significantly. A more detailed discussion of sediment transport is included in attachment 8.

Observation of the Winnebago Creek sediment indicates mostly sands, but can contain considerable amounts of silt and clay. Fine-grained suspended sediments are carried deeper into the backwater areas than bedload sediments. These fine-grained sediments settle out in the backwaters as flow velocities decrease.

Sediment transport in Pool Slough consists of primarily fine-grained suspended sediments because flow is normally quite slow in the slough during the summer months. The drainage area is only about 1,400 hectares (3,500 acres). The slough is well defined only in the flatter area of the floodplain and flow is intermittent in the higher elevations. Much of the slough may be fed by groundwater and artesian flows. Aquatic vegetation in the slough also reduces flow velocities.

Sediment Quality - Sediment quality is generally good in pool 9. Metals concentrations are low and most of the backwater metals concentrations are within expected ranges for backwater sediments on the Upper Mississippi River. There has been no data collected to date on the sediment quality of Winnebago Creek or Pool Slough. It is expected that much of the fluvial sediments would contain relatively high levels of nutrients because of the agricultural nature of the watershed.

NATURAL RESOURCES

Habitat Types and Distribution - Habitat in the project area is a mix of bottomland hardwoods, old fields, slough/creek, wet meadow and palustrine wetland. Bottomland hardwoods are located immediately adjacent to the primary project area, extending from the eastern limits of the area to the Mississippi River. Within the project area, wet meadow comprises approximately 72 hectares (178 acres). About 13 hectares (32 acres) of old field are located at the northern portion of the project area on the USFWS parcel north of Winnebago Creek. The eastern portion of the project area is comprised of 5 hectares (12 acres) of bottomland hardwoods and 32 hectares (80 acres) of shrub/scrub wetlands. About 10 hectares (25 acres) of slough/creek habitat and 12 hectares (29 acres) of intermittent and semi-permanent wetlands comprise the remaining habitat in the project area.

Vegetation - Vegetation in pool 9 is an overlapping of eastern and western species. Several high "sand prairie" areas are scattered along the river valley forests, offering habitat conditions normally found much farther west. The climate moderation also allows more southern plant species to extend their ranges up the river valley.

Vegetation in the project area is typical for the floodplain in this reach of the river. Floodplain forest borders the eastern limits of the project area and extends to the Mississippi River. Dominant tree species that are present include Silver maple, cottonwood, American elm, river birch and green ash. Mixed stands of black willow and sandbar willow are present along some of the slough areas and, especially, in the Winnebago Creek delta area. Common shrub species that are present in some areas include buttonbush, red osier dogwood, panicled dogwood, staghorn sumac, and honeysuckle. The herbaceous layer in these wooded areas, when present, is often dominated by poison ivy, wood nettle and, in drier areas, reed canary grass.

The project area is primarily open in nature with little wooded vegetation. The vegetation that is present is representative of an area that is characterized primarily as a mix of old field and pasture which is seasonally flooded. The drier areas are comprised of a mix of perennial grasses with prairie cordgrass being a dominant species. Reed canary grass, sedges and bulrushes are the predominant species in the wetter soils and emergent aquatics, primarily cattails, are present in the depressional areas and along the slough.

Habitat Conditions - In general, the existing habitat conditions in the Pool Slough area would be considered good. Habitat types in and adjacent to the project area range from cropland to seasonally flooded wetlands to bottomland hardwoods to running sloughs. This diversity of habitat types allows the area to support a diverse wildlife population. The running sloughs and permanent wetlands provide good habitat for wetland dependent species. The habitat quality is decreased to some degree by the dominance of reed canary grass in a large portion of the area. The area south of Winnebago Creek floods on an annual basis and provides good fish spawning habitat. The area also provides good resting and feeding habitat for waterfowl and a variety of wading birds, primarily in the spring. However, the quality of the migration habitat is dependent on the water conditions in any given year. While the area is usually flooded in the spring, it is often not at desired depths and is only present for a few weeks. The area is usually not flooded in the fall and, therefore, provides limited migration habitat during this time of the year.

Fish and Wildlife - Pool 9 has a variety of high quality terrestrial and aquatic habitats. These habitats support a diverse and productive fishery and provide important waterfowl nesting, feeding, and resting areas. The most prevalent aquatic habitats include main channel, main channel border, secondary channel, sloughs, river lakes, and tailwater. The numerous backwater areas interspersed with forested islands in pool 9 provide good habitat for a variety of wildlife species. The pool contains a rich mixture of vertebrate animals from the northern and southern United States, as well as an overlapping of eastern and western species.

Pool 9 provides habitat to a wide variety of mammals. White-tailed deer is the most popular and abundant big game animal. Many small carnivores such as fox, raccoon, mink, and weasel are found within the pools, while larger carnivores such as bobcat and coyote are infrequent. Otters are present but their numbers are not abundant. Many smaller mammals, including beaver, muskrat, shrews, moles, bats, rabbits, squirrels, and numerous varieties of mice are relatively common. The mix of floodplain forest adjacent to the eastern limits of the project and old field/wetland/slough in the project area result in the presence of a wide variety of wildlife. Mammals common to the area include white-tailed deer, coyotes, beaver, muskrat, mink, raccoon, striped skunk, weasels, red and gray fox, cottontail rabbit, gray and fox squirrel and a variety of moles, mice and shrews.

Numerous species of birds are present in the project area. The great variety of bird species that use pool 9 can be attributed to its location within the Mississippi flyway. Areas such as Lansing Big Lake, Reno Bottoms, and Mozeman's Slough provide critical resting and foraging opportunities for these migratory waterfowl. Although pool 9 is not of great importance as nesting areas for waterfowl (other than wood ducks), it is an important resting area for waterfowl during spring and fall migration. In the fall and spring, ring-necked ducks, canvasbacks, and scaup use the deeper areas of the backwater, while mallards, American widgeon, blue-winged teal, gadwalls, and wood duck use the shallower areas. Because of the reduced island landmass, less of the backwater is protected from wave action. In general, use of the pool by waterfowl has declined in the past 15 years. While waterfowl populations have declined, the decline in use of pool 9 has seemed to mirror the erosion of islands and the resulting reduction in protected backwater areas.

Pool 9 provides nesting and foraging habitat for many passerine bird species. Some of these species spend the entire year in the area, while others migrate into the area at various times of the year. Great egrets and blue herons are the most common wading birds to be found in the pool. Spotted sandpiper, killdeer, and black terns also nest within the pool. Other shorebirds and gulls that use the pool include sandpipers, herring gulls, and ring-billed gulls. Many varieties of raptors use the river valley as a flyway, and a number of these species, such as eagles, hawks, and owls, overwinter in these floodplain areas. Backwater areas and lakes provide important habitat for bald eagles and large migrations of waterfowl each year.

The mix of slough, wetland and open field in the Pool Slough area provides especially good habitat for wading birds, such as herons, egrets, rails and bitterns. The woodland, shrub and wetland mix results in many songbirds being present and the area is especially important to neotropical migrant species during the spring and fall. The area typically provides good migration habitat in the spring for waterfowl including mallards, gadwall, teal, wood ducks and Canada geese. Canada geese are also known to nest in the project area.

The continuum of aquatic habitats ranging from fast flowing main channel to lotic backwaters are present in pool 9, providing for great diversity and abundance of fish. There are 80 species of fish reported in pool 9. All are native except rainbow trout, brown trout, grass carp, carp, and goldfish. Most are warm-water species. Common game and panfish species include the walleye, sauger, northern pike, channel catfish, smallmouth and largemouth bass, white bass, bluegill, and white and black crappie. Common non-game fish include the freshwater drum, channel catfish, carp, redhorses, buffaloes, and a wide variety of minnows. The catfishes, buffaloes, and carp are the primary fish of commercial interest, while the typical sport fish include northern pike, largemouth bass, crappies and bluegill. Rearing, wintering and spawning habitat is provide by sloughs, secondary channels, and tailwaters. Fish most common to the Pool Slough area include largemouth bass, northern pike, bluegill, crappies, perch, carp, brown bullhead, freshwater drum and suckers. Much of the area south of Winnebago Creek provides fish spawning habitat due to its seasonally flooded nature.

The floodplain of pool 9 provides habitat for a wide variety of amphibians and reptiles. Common species typically found in marshes and aquatic areas of the pools include snapping turtle, map turtle, false map turtle, painted turtle, smooth softshell, spiny softshell, northern water snake, eastern garter snake, blue racer, bullsnake, eastern tiger salamander, American toad, gray treefrog, western chorus frog, green frog, and leopard frog.

Aquatic Invertebrates - There is a large assemblage of invertebrate species within pool 9. The varied invertebrate fauna is due to the wide variety of habitats. Lake-forms of invertebrates find suitable habitat in the lentic portions of the pool. Organisms that require running water find a wide range of water velocities in the tailwaters, main channel, along the wing dams, and in secondary channels. The rocks associated with wing dams and shoreline protection provide a suitable habitat for specialized invertebrates.

Over 50 mussel species native to the Upper Mississippi River system are known to occur in pools 1 through 10. Pool 9 supports various species of mussels, including threeridge, threehorn pimpleback, deertoe, fawnfoot, fragile papershell, pocketbook, giant floater, deertoe, pigtoe, fawnfoot, and fat mucket and the Federally-endangered Higgins' Eye Pearly Mussel (*Lampsilis higginsi*). A recent exotic introduction, the zebra mussel (*Dreissena polymorpha*), has been observed in the pool and its numbers have been steadily increasing since its first reported occurrence. The impacts of zebra mussels are still unclear, but it is generally thought to be deleterious. Fingernail clams (*Musculium transversum*) have thrived in areas of pool 9 that have adequate dissolved oxygen and silt bottoms. They are important food items for both waterfowl (especially diving ducks) and several species of fish.

The insect fauna in pool 9 is dominated by immature stages of mayflies, midges, and caddisflies, indicative of high dissolved oxygen

levels. Being efficient converters of detritus, aquatic insects are an important link in the food web, providing food for both fish and waterfowl.

Threatened and Endangered Species - Seven wildlife species in pool 9 have protective status from Federal or state agencies and are shown in table DPR-1. Three are birds, three are reptiles, and one is an amphibian. The bald eagle and the peregrine falcon are the wildlife species that are Federally protected under the Endangered Species Act. The bald eagle is Federally listed as threatened in Iowa, Wisconsin, and Minnesota. The other protected species are listed as threatened or endangered in one or more of the states bordering the river. Minnesota also lists five species of special concern.

In recent years, bald eagle numbers have increased dramatically. Eagles use the pools year-round. In addition, the pools are a part of an important migration corridor. There are 25 known bald eagle nesting locations within pool 9. Of these 25 sites, 19 are still considered active. These nests produced an average of 1 to 2 young a year per nest. The Reno Bottoms complex, located upstream of the Lansing Big Lake area, is one of the established breeding areas for the species. Also, a large amount of bald eagle use within the pool is during winter. Winter use is highest where the river is ice-free and adequate perch sites are available. In pool 9, one mammal species, the river otter (Lutra canadensis), is listed by the State of Iowa as threatened. The peregrine falcon (Falco peregrinus) may be occasionally sighted in the project area and the bald eagle (Haliaeetus leucocephalus) is known to nest in the vicinity. The State of Iowa listed threatened river otter, American bullfrog, King rail, mudpuppy, and red shouldered hawk, and the Minnesota listed threatened Blanding's turtle may also occur in the area.

Table DPR-1 - Protected Mammals, Birds, Insects, Reptiles and Amphibians in Pool 9 of the UMR

State Protected Species	Federal Status	Minnesota Status	Wisconsin Status	Iowa Status	Occurrences in Pool 9 by County
American Bullfrog	--	--	--	T	--
American Peregrine Falcon	E	T	E	E	Vernon, Houston
Bald Eagle	T	T	T	E	All
Eastern Massasauga Rattlesnake	--	--	E	E	Crawford
King Rail	--	--	--	E	Houston, Allamakee
Mudpuppy	--	--	--	E	Allamakee
Red Shouldered Hawk	--	--	T	E	Allamakee
River Otter	--	--	--	T	--

T = Threatened, E = Endangered, SC = Special Concern

Twenty-six aquatic species with protected status are present in pool 9 and are shown in table DPR-2. Twelve of these species are fish and fourteen are mussels. The Higgins' Eye Pearly Mussel is the only species with Federal protection under the Endangered Species Act. The rest of the species are listed as threatened or endangered by Minnesota, Wisconsin, and/or Iowa. However, the paddlefish has been identified by the USFWS as a potential candidate. The Higgins' Eye Pearly Mussel (Lampsilis higginsi) has been found in various areas throughout pool 9. Lansing Big Lake and the Reno Bottoms provide important habitat for the Higgins' Eye Pearly Mussel. Minnesota also lists the bland sandshell as a species of special concern. None of the species are known to be present in the project area.

Thirteen protected plant species are found in counties bordering the pool as shown in table DPR-3. One of the plant species is Federally protected. The northern monkshood is Federally listed as threatened. The others are designated for state protection by Iowa, Minnesota, and/or Wisconsin. Three species are listed as endangered in Minnesota and five are listed as threatened. Minnesota also lists one species of special concern. The threatened listed Illinois tick-trefoil has been observed in the State Forest west of Reno Village in Houston County, Minnesota. The endangered listed sweet-smelling Indian-plantain is found within the floodplain forest in the Upper Mississippi Fish and Wildlife Refuge in Houston County, Minnesota. Two of the species including the Federally listed northern monkshood are listed as threatened in Wisconsin. Two species are listed as endangered in the state of Wisconsin and two are listed as threatened. Iowa lists two species as threatened and two species as endangered. Many of the species listed, including the two Federally listed species, are not floodplain species and are not present at the site.

Table DPR-2 - Protected Fish and Mussels in Pool 9 of the UMR

State Protected Species	Federal Status	Minnesota Status	Wisconsin Status	Iowa Status	Occurrences in pool 9 by County
Black Buffalo	--	SC	T	--	Vernon, Crawford
Blue Sucker	--	SC	T	--	Vernon, Crawford
Bluntnose Darter	--	--	E	E	Allamakee,Vernon,Crawford,Houston
Chestnut Lamprey	--	--	--	T	Allamakee
Goldeye	--	--	E	--	Vernon, Crawford
Greater Redhorse	--	--	T	--	Vernon
Longear Sunfish	--	--	T	--	Crawford
Paddlefish	--	T	T	--	Crawford, Houston
Pallid Shiner	--	SC	E	--	Vernon, Crawford, Houston
Skipjack Herring	--	SC	E	--	Vernon, Crawford
Speckled Chub	--	--	T	--	Vernon, Crawford
Weed Shiner	--	--	--	E	Allamakee
Buckhorn Mussel	--	T	T	E	Crawford
Bullhead Mussel	--	E	--	--	?
Butterfly Mussel	--	T	E	--	Crawford
Ebonyshell Mussel	--	E	E	--	Crawford
Elephant Ear Mussel	--	E	E	--	Crawford
Higgins' Eye Pearly Mussel	E	E	E	E	Houston, Allamakee, Vernon, Crawford
Monkeyface Mussel	--	T	T	--	Vernon, Crawford, Houston
Ohio River Pigtoe Mussel	--	T	--	--	?
Purple Wartyback Mussel	--	T	E	T	Crawford
Rock Pocketbook Mussel	--	E	T	--	Vernon, Crawford, Houston
Salamander Mussel	--	T	T	--	Crawford
Spectacle Case Mussel	--	T	E	E	Crawford
Wartyback Mussel	--	E	T	--	Vernon, Crawford
Washboard Mussel	--	T	--	--	?

T = Threatened, E = Endangered, SC = Special Concern

Table DPR-3 - Protected Plants in Counties Bordering Pool 9 of the UMR

State Protected Species	Federal Status	Minnesota Status	Wisconsin Status	Iowa Status	Occurrences in pool 9 by County
Black Holly	--	--	--	E	Allamakee
Davis Sedge	--	T	--	--	Houston
Hairy Meadow Parsnip	--	--	E	--	Crawford
Illinois Tick-Trefoil	--	T	--	--	Houston
Marginal Shield-fern	--	T	--	--	Houston
Northern Monkshood	T	--	T	T	Vernon
Purple Cliff-Brake	--	SC	--	E	Houston
Purslane Species	--	E	--	--	Houston
Rock Clubmass	--	T	--	T	Houston
Sweet-Smelling Indian-Plantain	--	E	--	--	Houston
Upland Boneset	--	T	--	--	Houston
Wild Petunia	--	E	E	--	Crawford
Yellow Giant Hyssop	--	--	T	--	Crawford

T = Threatened, E = Endangered, SC = Special Concern

Water Quality - The project area generally has relatively good water quality. The dissolved oxygen levels remain high year-round, except in isolated sloughs and backwater lakes. Water temperature in the channels and sloughs correlate with air temperature. Maximum water temperature occurs in mid-summer, and remains close to zero degrees Centigrade during the winter. Water in the shallow areas attains a slightly higher temperature than the main channel, cools faster in the evening, and results in greater swings in diel temperature than occur in other flowing areas of the river. The water is warmer in the shallow areas due to suspended solids, the dark bottom, and smaller volume of water.

Phytoplankton in Winnebago Creek and Pool Slough follow a seasonal progression of species composition typical of north-temperate eutrophic water bodies, a strong spring diatom bloom giving way to blue-green algae blooms dominated by Aphanizomenon. Plant nutrient concentrations during the open water season normally exceed levels that allow nuisance blooms of algae to develop. Inorganic nitrogen and available phosphorus concentrations occasionally fall below limiting concentrations during intense algal blooms. Physical conditions of light penetration, mixing, filtering by aquatic plant beds, wind, flow path, and dilution have a great effect on phytoplankton concentrations.

CULTURAL RESOURCES

In accordance with the National Historic Preservation Act of 1966, as amended, the National Register of Historic Places has been consulted. As of 22 December 1999, there are no sites on or determined eligible for the Register in the project area. There are no previously identified historic or archaeological properties within the project area. However, the city of New Albin is built on the site of an Oneota Village and there are known burial mounds near the project area to the west. An historic aboriginal burial site is also located at higher elevations to the south of the project area.

RECREATION/AESTHETIC RESOURCES

Recreation activities in pool 9 include fishing, boating, picnicking, camping, swimming, canoeing, hunting, trapping, camping, birdwatching, island beach use, and sightseeing. The project area offers many opportunities for sightseeing, outdoor recreation, and nature study. Pool 9 is one of the most heavily fished pools in the Upper Mississippi River. Sport fishing is heavy and commercial fishing activity in the pool ranks second only to pool 4.

There is a large amount of Federal land in pool 9. Most of this land is managed for fish and wildlife as part of the Upper Mississippi River Wildlife and Fish Refuge and state management areas, parks, refuges, and recreation areas. Much of the project area is open to public hunting and trapping during state seasons. The Pool Slough Wildlife Management Area near New Albin, Iowa, provides opportunities for hunting of waterfowl and deer. Just below Pool Slough is the Blackhawk Point Wildlife Management Area, which is used for hunting of wildlife such as deer, grouse, turkey, and woodcock. Lansing State Wildlife Area, below the Iowa River, is home to deer, squirrel, grouse, turkey, and woodcock. West of Kains Lake is the Fish Farm Mounds Wildlife Area, which offers hunting and viewing of various wildlife species. The Chain of Lakes Natural Area features open water habitat where canvasbacks aggregate to feed on wild celery. The area serves as a rookery for herons and egrets. Eagle roosting and nesting sites are also present. Wisconsin-endangered reptiles, fish, and shorebirds are found there.

A number of high quality recreational beaches, public day-use (149 picnicking units) and camping recreation facilities (180 camping units), and private marina facilities (216 marina slips) are available to recreationists along the main channel of the river. The dredged material placement islands along the main channel throughout the pool are also popular with recreational boaters. Pool 9 provides 16 boat landings and over 400 adjacent parking areas that are scattered throughout the pool. Many residents in the region own boats that they trailer to the river. In the summer months, the public and private access facilities adequately serve the public. These boat access points also facilitate winter hunting, trapping, snowmobiling, and ice fishing. The New Albin boat landing, located at the end of Army Road,

is about 2 kilometers (1.3 miles) southeast of the project area. High water on the Mississippi River frequently inundates portions of Army Road, cutting off access to the landing.

Recreation, management, and natural areas in the pool 9 area are shown in table DPR-4.

Table DPR-4 - Pool 9 Recreation, Management, and Natural Areas

Area	State	County	Hectares/Acres	Type
Fish Farm Mounds	IA	Allamakee	576/233	L
Mt. Hosmer Park	IA	Allamakee	ND	L
Blackhawk Memorial Park	WI	Vernon	ND	F
Battle Island Park	WI	Vernon	ND	L
Sugar Creek Park	WI	Crawford	ND	L
Chain of Lakes Marsh Natural Area	WI	Crawford	ND	ND
Waiter Lake Floodplain Forest Natural Area	WI	Vernon	ND	S
Winneshiek Slough Natural Area	WI	Crawford	ND	S
Forester's Tern Colony Natural Area	WI	Crawford	ND	S
Pool Slough State Wildlife Mgmt. Area	IA	Allamakee	453/183	S
Blackhawk Point State Wildlife Mgmt. Area	IA	Allamakee	186/75	S
Fish Farm Mounds State Wildlife Mgmt Area	IA	Allamakee	449/182	S
Lansing State Wildlife Area	IA	Allamakee	1,921/777	S
Lansing Big Lake State Wildlife Mgmt. Area	IA	Allamakee	752/304	S
New Albin Wildlife Area	IA	Allamakee	200/81	ND
Lansing Wildlife Area	IA	Allamakee	ND	ND
McGregor State Wildlife Mgmt. Area	IA	Clayton	133/54	S

Type: Federal (F), State (S), Local (L) ND=No Data

SOCIOECONOMIC RESOURCES

Pool 9 has little industrialization along its banks and is the origin or destination of only a minor portion of the commodities that move through the pool. The project area is located in a rural area of northeastern Iowa and southeastern Minnesota. The floodplain lands in the river valley are largely in public ownership or have flowage easements on them because of the Mississippi River navigation project. The two commercial docks in pool 9 are used for coal traffic exclusively (Interstate Power Company is 19 kilometers (12 miles)

downstream of the project area at Lansing, Iowa, and the Dairyland Power Cooperative is 8 kilometers (5 miles) upstream of the project area at Genoa, Wisconsin). Agricultural products are not received or shipped from pool 9. Blackhawk Park is the largest public facility in pool 9. The park is located approximately 40 kilometers (25 miles) downstream from La Crosse, Wisconsin and about 6 kilometers (4 miles) southeast of the project area. Pool 9 is one of the most important pools for commercial fishing. Carp ranks first in commercial value. The annual catfish catch is also significant.

The city of New Albin, adjacent to the project area, has a population of about 600. Lansing, Iowa, just 16 kilometers (10 miles) to the south, has a population of about 1,200 and is the site of a bridge that allows crossing of the Mississippi River to Wisconsin. Larger cities to the north of the project area are La Crescent, Minnesota, a distance of about 34 kilometers (21 miles) with a population of 4,400, and La Crosse, Wisconsin, (a major urban center) about 38 kilometers (24 miles) away with a population of 62,000.

FUTURE WITHOUT PROJECT CONDITIONS

HISTORICALLY DOCUMENTED CHANGES IN HABITAT

The establishment of the 9-foot (2.75-meter) navigation channel project modified the pre-impoundment conditions in the project area slightly. Since the area is in the upper reach of pool 9, the river valley is still comprised of free flowing side channels and sloughs. However, operation of lock and dams 8 and 9 can produce rapid changes in water levels on a more frequent basis and for longer periods of time than would normally occur.

Modifications to the Winnebago Creek channel have straightened the channel through the project area. However, sediment from the watershed has formed a delta on the east side of the project area, causing flow to break out of the channel to the north and south and flow overland to Pool, and Wood Sloughs. A major flood event on Winnebago Creek in 2000 caused a breach in the spoil pile berm on the north side of the creek. These changes provide additional wetlands on the north and south sides of Winnebago Creek on a year-round basis.

FACTORS INFLUENCING HABITAT CHANGE

The factors affecting habitat quality in the project area are numerous, complex, and interrelated, but the dominant factors influencing habitat change are: flood events; flow conditions; location within the pool; location of tributaries; and delta formation. Sedimentation produces more uniform depths in the channels that leads to decreased plant species diversity. Gradual conversion from open water to marsh because of sedimentation also changes habitat conditions. Beaver activity in the delta area of Winnebago Creek has

also caused higher water levels.

The area north of Winnebago Creek had been in agricultural use, primarily a mix of row crops and pasture/hay land. When the USFWS acquired the land in 1993, agricultural use was discontinued and the area was slowly returning to more woody vegetation conditions. However, recent flow into the area has resulted in wetland conditions over a large part of the area.

ESTIMATED FUTURE HABITAT TYPES AND CONDITIONS

Habitat changes that could be expected to occur over the next 50 years are associated primarily with the successional process. Successional change would affect vegetation composition and the mix of habitat in the project area. The types of change that would be expected would generally reduce the value of the area for migratory waterfowl and shorebirds. It is possible that changes outside the project area could also affect geomorphology, hydrology, and sediment transport in the project area.

Hydrology - Lacking any unforeseen change in dam operation, the water level regime in the project area (pool 9) will remain the same. However, the feasibility of water level manipulation on a pool-wide basis beyond the current operating limits and constraints is being studied as a means to improve aquatic habitat. This could lead to short-term changes to the future hydrologic regime. It also appears that the water table has risen in recent years. The flow pattern through the project area will probably change as sedimentation and delta formation continue. Overland flow to the north and south from Winnebago Creek will create and enlarge channels leading to Minnesota and Pool Sloughs.

Sediment Transport - Suspended sediment will continue to be carried into the area by Winnebago Creek and by flood flows from the Mississippi River. A reduction in sediment input from upland erosion may occur as a result of improved soil conservation and land use practices, but this input will still be the primary source of fine sediments in Winnebago Creek.

Vegetation - In the absence of any management measures, it is anticipated that the vegetation composition and distribution south of Winnebago Creek would remain about the same. The conditions in the project area are adapted to the current hydrologic regime and are not expected to change appreciably. It is probable that the annual spring flooding will limit to some extent the encroachment of woody vegetation into the area.

A greater degree of vegetation change would be expected to occur to the north of Winnebago Creek. The area is slightly higher in elevation and is now flooded continuously. It is anticipated that much of the area would revert to wetland vegetation and the higher portions of the area would gradually revert to shrub/scrub vegetation

and then eventually to bottomland hardwoods, depending on how Winnebago Creek continues to flow through the area.

Habitat Types and Distribution - In the absence of management measures, habitat conditions south of Winnebago Creek would remain about the same, providing fairly good migration habitat for waterfowl and wading birds in the spring. To the north of Winnebago Creek, a large portion of what is currently old field would revert to a combination of wetland, brushland, and woodland. The overall value of the Pool Slough area as migration habitat for waterfowl and wading birds would decline slightly.

PROBLEM IDENTIFICATION

EXISTING HABITAT DEFICIENCIES

Habitat deficiencies are viewed in the context of the desired conditions or management goals of a particular area. What may be viewed as a deficiency for one species may be considered excellent habitat for another species. Management goals for the UMRWFR vary by management area or pool. One goal of state and federal resource managers is to establish, improve, and maintain migration habitat along the Mississippi River, especially for waterfowl. These goals are discussed in more detail in the FISH AND WILDLIFE MANAGEMENT GOALS section of this report.

Existing habitat conditions in the project area could be considered as fair to good when evaluated as waterfowl migration habitat. The area is usually flooded in the spring, providing important spring migration habitat not only for waterfowl, but also for several species of wading birds. However, inconsistent water conditions in the fall limit the value of the area as fall migration habitat for waterfowl. The capability to manage water levels would provide more consistent and productive habitat conditions.

ESTIMATED FUTURE HABITAT DEFICIENCIES

Overall, waterfowl and wading bird migration habitat conditions in the Pool Slough area would decline slightly. While conditions to the south of Winnebago Creek would remain about the same, it is difficult to estimate how conditions to the north of Winnebago Creek would change due to the recent changes in flow conditions. Annual spring flooding of the area south of Winnebago Creek would continue to result in fair to good migration habitat for waterfowl and wading birds, but the extent and duration of flooding would vary from year to year. The value of the immediate area as migration habitat in the fall would remain somewhat limited because of the drier conditions that usually prevail in the fall, and disturbance in the area due primarily to hunting.

PROJECT OBJECTIVES

FISH AND WILDLIFE MANAGEMENT GOALS

The USFWS, MDNR, IDNR, and COE have direct management responsibilities in the project area. The following describes the resource management goals of each agency that are applicable to the project area.

U.S. Fish and Wildlife Service - Fish and wildlife management goals for the area are defined in the Upper Mississippi River Wildlife and Fish Refuge Master Plan (USFWS 1988). The Master Plan specifically recommended that action be taken to upgrade existing wildlife and fish habitat through selected development and/or management options. The management goals listed in the Master Plan that most directly apply to the study area include:

* Restore species that are in critical condition and achieve the national population or distribution objectives.
* Maintain or improve habitat of migrating waterfowl using the Upper Mississippi River (UMR).
* Maintain or increase the populations and distribution of colonial nesting birds.
* Increase production of historically nesting waterfowl.
* Contribute to the achievement of the national population and distribution objectives identified in the North American Waterfowl Management Plan and flyway management plans.
* Maintain and enhance, in cooperation with the States, the habitat of fish and other aquatic life on the UMR.
* Maintain or increase the species diversity and abundance of wildlife.
* Maintain and enhance habitat used by threatened and endangered species.
* Carry out endangered species recovery plans.
* Maintain furbearer populations at levels compatible with fisheries and waterfowl management and other management objectives to provide a resource for recreation.
* Provide outdoor recreation opportunities.

The management goal specific to the project area for the USFWS is to develop migratory bird management units where water levels can be controlled on a consistent basis.

Minnesota and Iowa Departments of Natural Resources - The Minnesota and Iowa Departments of Natural Resources manage the fisheries in the project area in cooperation with the USFWS. State DNR conservation officers regulate hunting, fishing, and recreational boating on their respective portions of the Mississippi River. They also manage water quality and regulate activities that affect waters of their state. State DNR management goals for the project area include:

* Improve water quality.
* Improve and/or maintain fish and wildlife habitat conditions.
* Improve opportunity for all recreational uses of fish and wildlife (fishing, hunting, trapping, etc).
* Maintain access for recreational boating.
* Avoid increases in flood stages.

The IDNR has a specific goal to manage the project area for wetland birds and migratory birds. The objective is to systematically address food and life requirements in the area.

Corps of Engineers - The St. Paul District, Corps of Engineers (COE) has responsibility for operation and maintenance of the 9-foot (2.75-meter) navigation channel project in pool 9. The COE also has management responsibilities for project lands and the Environmental Management Program. COE management goals for the project area include:

* Manage resource capabilities wisely in relation to multiple-purpose resource demand.
* Minimize user conflicts and optimize public safety and access.
* Maximize COE management actions for the greatest economic, social, or environmental benefit to the public.
* Conserve and enhance river-related natural resources.
* Improve fish and wildlife habitat and water quality conditions.

SPECIFIC PROJECT OBJECTIVES

Current guidance on project evaluation indicates the prime focus should be on measurable chemical and physical parameters, with limited monitoring of biological features (i.e., vegetation studies only). Therefore, the stated project objectives were narrowly defined to reflect the aspects of the project that could be designed for future monitoring and evaluation. Meeting these objectives will also produce positive effects in other aspects and outside the project area. The above management objectives, together with additional input from state and Federal agency natural resource managers and the public, were used to guide the development of specific project objectives. This project forms only one part of a much larger cooperative natural resource management effort on the river. The ultimate goal of the project is to preserve, restore, and enhance migratory bird and fish habitat on the Upper Mississippi River Wildlife and Fish Refuge and in the backwaters. For purposes of design and future evaluation, specific

project objectives were developed. Specific goals are required for an engineered solution to the habitat problems at a specific site. The overall habitat improvement objectives for the future 50-year period follow. These objectives were developed prior to the recent change in flow conditions north of Winnebago Creek.

The goal of improving migration habitat for waterfowl and wading birds was identified for the project area. Establishing waterfowl migration habitat with dependable water levels along the Mississippi River corridor is a high priority goal of the IDNR. The following objectives would support the goal of improving migration habitat for waterfowl and wading birds:

1) Provide consistent spring and fall migration habitat on 140 hectares (346 acres) within the project area.

Although a large portion of the Pool Slough area is flooded each spring, providing fair to good migration habitat, the extent and duration of flooding varies from year to year. Conditions in any given year are dependent on the timing, extent, and duration of flooding. The area is usually not flooded in the fall. When the area is flooded, only 30 to 50 percent is flooded to a depth in the range of 0.1 to 0.45 meters (4 to 18 inches), the preferred feeding depths for dabbling ducks. Likewise, the extent of shallow water areas conducive to the production of invertebrates (an important food for waterfowl and shorebirds in the spring), is dependent on the hydrologic conditions in any given year. These conditions limit the overall value of the area as migration habitat for waterfowl and wading birds. The capability to provide and maintain optimum water depths in the area during key migration periods of the year and to encourage invertebrate growth over a large portion of the project area would greatly improve migration habitat conditions.

2) Limit the expansion of woody vegetation and maintain the existing amount of open habitat in the project area.

The area south of Winnebago Creek is flooded on an annual basis and it is expected that woody encroachment into this area will be limited, although some expansion of willow stands may occur. The area north of Winnebago Creek, which is also flooded frequently, is expected to gradually succeed to a more wooded condition in areas of higher elevation. The ability to annually flood and maintain water levels would effectively prevent the encroachment of woody vegetation into the project area.

Based on design factors that affect project area habitats and future project performance assessment, the specific project objectives for the study area are summarized in table DPR-5.

Table DPR-5 - Project Objectives and Enhancement Features

Project Objective	Potential Enhancement Feature	Unit of Measure	ENHANCEMENT POTENTIAL		
			Existing	Future w/o Project (2048)	Future With Project
Provide consistent migration habitat	Dikes, water supply	hectares (acres)	16 (40)	15 (38)	140 (346)
Limit expansion of woody vegetation	Dikes, water supply	hectares (acres)	37 (91)	43 (106)	37 (91)

PLANNING OPPORTUNITIES

Planning opportunities are physical conditions, plans by others, and available resources that could be integrated into or used in the formulation of alternatives to address the management objectives in the project area. Physical characteristics of the project area are considered during the development of alternative plans to address the objectives. Whenever possible, existing physical conditions and materials at the site should be used to conserve non-renewable resources.

PLANNING CONSTRAINTS

A plan to maintain or improve habitat in the project area must be compatible with a number of constraints.

HYDROLOGIC

1. Structures must be designed with consideration of the hydrologic regime and water regulation of pool 9. Any structures should be designed to withstand forces of water currents, wave action, and water levels associated with conditions up to a 50-year recurrence interval flood event.

2. Structures should not induce measurable increased water level elevations during a flood event. The areas where this applies are upstream of the railroad bridge on Winnebago Creek and upstream of Army Road on Pool Slough.

3. Structures should not increase surface or ground water elevations that would adversely affect private lands adjacent to the project area; especially the areas south of Army Road and west of Highway 26, and the City of New Albin.

4. The discharge from the existing treatment pond cannot be adversely affected and must be maintained.

ENGINEERING

1. Construction access and material handling should be possible for normal construction equipment.

2. Project features should be designed for a minimum 50-year life and must withstand periodic flooding.

3. When possible, construction materials should be obtained from on-site for maximum resource efficiency and cost effectiveness.

4. Effluent discharge from the existing wastewater treatment pond must be maintained.

5. Water depths in a controlled area should have depths ranging from 0.1 to 0.6 meters (0.5 to 2 feet) over 80% of the area.

6. Operation and maintenance requirements must be minimized. Gravity flow structures are preferred.

ECOLOGICAL

1. The project should not adversely affect Federal- or State-listed threatened or endangered species that may occur in the area.

2. Efforts to improve migratory bird habitat should not adversely impact on Upper Mississippi River Wildlife and Fish Refuge objectives of higher priority.

RECREATION

1. The existing Army Road and recreational access to the New Albin boat landing must be maintained.

2. Increased hunting in the area due to increased migratory bird use of the area must not create a nuisance or safety hazard.

LEGAL

1. A plan must comply with all Federal laws and regulations and all applicable state laws and regulations.

2. Project features must be constructed on lands owned by the Federal Government or provided by a local sponsor. At a minimum, long-term easements must be acquired by a local sponsor for construction on private property.

ECONOMIC

1. The cost of project features must be reasonable when compared to the habitat improvements estimated.

2. A recommended plan has to fit into the overall EMP funding allocations.

3. A local sponsor has to have the capability to assume the non-Federal share of the project cost.

CULTURAL RESOURCES

1. A cultural resource literature search and/or investigation would have to be made of any upland site proposed for disturbance.

2. Any known important cultural resource sites would have to be avoided or, if disturbed, appropriate mitigation measures would have to be provided.

INSTITUTIONAL

1. The portion of the project located within the Upper Mississippi River Wildlife and Fish Refuge must be compatible with the primary purposes of the Refuge and be consistent with the Refuge's management goals and objectives, as well as the laws and regulations governing Refuge management.

2. Public ownership of lands or long term easements are necessary for project implementation.

3. Applicable permits for construction will be needed from the USFWS, MDNR, and IDNR.

4. A non-Federal sponsor is necessary for any project features constructed on non-Federal lands.

PLAN FORMULATION

The principal purpose of plan formulation is to develop a plan that provides the best use, or combination of uses, of water and land resources to address the project objectives. The plan formulation process must also consider the identified planning opportunities and constraints.

ALTERNATIVES CONSIDERED

No Action - The no action alternative is defined as no implementation of a project to modify habitat conditions in the project area.

Dikes - The project area would be divided into management cells in order to control water levels. The size and location of the management cells would depend on topography, existing waterways, water supply, drainage capabilities, and operational desires and flexibility. Several different layouts were considered. It should be noted that the alternatives considered were formulated prior to a major flood event on Winnebago Creek that significantly changed existing conditions.

Control Structures - Control of water levels in each management cell and in the overall project area would require structures to provide the ability to control water flow and levels. Control structures can be either active or passive. Active structures use gates or stoplogs, sometimes associated with pumps, to provide operational flexibility in controlling flows. Passive structures include features such as weirs or other fixed structures, where the flow is controlled by stream or pond stages. They typically are relatively low cost and require little or no operation and maintenance.

Pumps - In order to obtain maximum operability and flexibility, pumps can be used to control water levels. When pumps are used, stream or pond stages and topography are normally not critical to the management of the project. However, operation and maintenance costs would be expected to be higher than a gravity flow system and fuel or power resources are consumed.

Artesian Wells - Artesian wells are located in the area. They could be used to fill diked areas or supplement another water supply if the flow is adequate. Artesian wells are low cost and require little operation and maintenance. Nutrient levels in artesian water would likely be low compared to surface water sources.

Borrow Sources - If dikes are constructed, sources for dike fill must be found. On-site sources are preferred, since they could be incorporated into the project design and be economical. However, the material at the site needs to be suitable for building a stable dike and available in sufficient quantity. Off-site sources would increase

the project construction cost, which would impact on the economic feasibility of a project.

Ditches - In order to supply water to moist soil units, ditches could be excavated instead of using pipelines or pumps to convey water. Some type of structure may be necessary to control or divert flow into the ditches.

Pipelines - Pipelines from various water sources (surface or well) could be used to supply water to the project area or provide for drainage of moist soil units. The cost of materials and maintenance could be higher than the use of ditches.

Pothole Excavation - Excavating or blasting potholes in the project area could create additional wetland habitat.

Fish Ponds - In order to enhance fisheries, ponds could be constructed to permit the rearing of desired fish species. A dependable water supply would be necessary to assure success. A special outlet structure would be required so that fish could be discharged into the receiving waters or transferred out of the facility and transported to the desired receiving waters. This would be considered in the Iowa portion of the project only.

ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Much of the discussion between the project proponents and designers centered on achieving the desired project objectives with the lowest first costs and minimal operation and maintenance requirements. Alternatives eliminated include the following:

Pumps - In the area north of Winnebago Creek, existing ground elevations and water levels would permit operation solely with the use of gravity flow from Winnebago Creek, thereby reducing construction and operation and maintenance costs significantly compared to the use of pumps. However, conveying water via gravity flow to the area south of Winnebago Creek could be difficult from an engineering standpoint, may be costly because of the topography of the area, and could be difficult to maintain. Therefore, the use of pumps was eliminated only in the area north of Winnebago Creek.

Artesian wells - The sole use of artesian wells for filling ponds is not feasible because a cursory evaluation indicated that flows would not be sufficient to fill the ponds in the relatively short period of time desired. However, they could naturally supplement other methods of water supply.

Pipelines - Pipelines will only be considered when it is not possible to use open ditches for the conveyance of water.

Fish ponds - Ponds devoted solely to the spawning and rearing of fish were not considered because fisheries is not a project objective.

ALTERNATIVES CONSIDERED FURTHER

No action - The no action alternative would involve no construction of habitat restoration and/or enhancement features within the project area. With this alternative, increased management possibilities would be limited. Normally, habitat conditions desired for migratory waterfowl would be achieved only in the spring with no optimization of timing or duration possible. This plan would be selected only if no feasible action alternative could be found.

Dikes and control structures - Construction of dikes to divide the project area into manageable cells or ponds is considered a basic requirement to address the project objectives. The proposed number and size of ponding areas was coordinated with river resource managers on the project team. Consideration of existing topography, flow conditions, and borrow sites would determine the location of the dikes for optimal efficiency. On-site borrow would be the desired source of dike fill. However, the structural adequacy of the material may be questionable. Therefore, the use of off-site material will also be evaluated. Ditches and pumps would be evaluated to convey water to the ponds. Control structures would be used to control flows into and out of the ponds. The types of structures considered would include concrete, sheet pile, fiberglass, corrugated metal, stoplog, gated, and drop. The location of the structure, its function, cost, durability, and operation and maintenance would determine the type of structure used.

Potholes - Creating potholes will be evaluated as a means of providing areas with more permanent ponding of water in some portions of the project area.

ALTERNATIVE EVALUATION

Several alternative features were evaluated to address the project objectives. Value engineering techniques were used to formulate a conceptual plan for management cells as shown on Plate 4. This plan was then used as a basis to develop a more detailed alternative plan for the area as shown on Plate 5. The following discussion describes the evaluation that was done for each alternative feature and analyzes the benefits that are possible. In terms of their benefits to waterfowl and wading birds, the pools in the area north of Winnebago Creek are independent of the pools south of Winnebago Creek. Habitat evaluation procedures (HEP) were used to evaluate the potential habitat benefits derived at each area. A detailed discussion of the habitat benefits is presented in the HEP discussion in attachment 4. A summary of the costs and habitat gains for each alternative feature is shown in table DPR-6. An incremental analysis was conducted for the pool alternatives in order to identify the most cost-effective approach to addressing management goals for each area. The incremental analysis is presented later in this report.

NOTE: This alternative evaluation was completed prior to a major flood event on Winnebago Creek in 2000 that significantly changed the flow and habitat conditions that existed in the area. The following description of the habitat analyses that were conducted remains mostly unchanged from the draft of this report.

No Action - Habitat management and water levels in the area would continue with limited management capability and marginal habitat conditions, depending on natural water levels and weather. Willow encroachment in the area would continue and management for waterfowl would be difficult because of the lack of water level management capability, especially during the fall migration. None of the project objectives would be met if this plan was selected, although limited management efforts such as controlled burning or minor berming may address the problems to a small degree.

Dikes and control structures - Dikes were considered in two separable areas; the area north of Winnebago Creek (upper unit) and the area south of Winnebago Creek (middle and lower units).

1) **North of Winnebago Creek** (upper unit)

This area is owned by the USFWS and located in Minnesota. It was formerly cultivated, so it has little woody vegetation other than the current encroachment of willows at some locations and isolated trees. It was decided early in the study to evaluate the potential for moist soil units only in the formerly farmed area that has been cleared of woody vegetation (not in areas that are forested or are naturally open water) and to maximize the diked area. It is desirable to fill and drain the area by gravity so that pumping is not necessary. The need for pumping would add not only to the initial construction cost, but would also increase the operation and maintenance costs.

The topography in the upper unit is high near the creek where a spoil bank from a previous channel modification is in place. The land slopes down from the creek toward the northeast. The normal water level in the creek is higher than the ground elevations in the area, making it possible to supply water to the area via gravity. Therefore, it appeared that construction of pools or units for moist soil management would be physically feasible. The initial conceptual plan diked almost the entire non-wooded area to create the maximum sized pools D1 and D2 as shown on Plate 4. Areas that are continually wet and or have ground elevations that are not conducive to moist soil management were not included in the diked area. The optimum water depth of a moist soil unit for dabbling ducks is 0.1 to 0.6 meters (4 to 24 inches). In order to achieve this water depth, two pools (D1 and D2) would be created by constructing an interior cross-dike generally along an appropriate ground elevation contour. The size of pool D1 would be 9.8 hectares (24 acres) and pool D2 would be 12.7 hectares (31 acres). The typical late summer/fall water level elevation of Winnebago Creek is 192.8 meters (632.6 feet). Based on the water level and bathymetric conditions, the design ponding elevation for pool D1 was set at 192.33 meters (631.0 feet). The dike

top elevation along Winnebago Creek would be 193.55 meters (635.0 feet). The interior dike elevation would be 192.63 meters (632.0 feet). This would provide a freeboard (difference between the design pool elevation and the top of dike elevation) of 0.3 meter (1 foot). The bottom of the pool would be graded to provide a varying design water depth of 0.2 to 0.6 meter (8 to 24 inches). The top width of the dikes would be 3.0 meters (10 feet) with 1 vertical on 4 horizontal side slopes. A 0.15-meter (5-inch) thick gravel surface would be placed on portions of the dike alignment for vehicle access to the control structures. The design ponding elevation for pool D2 was set at 191.7 meters (629.0 feet) with the remainder of the pool D2 dike top elevation at 192.0 meters (630.0 feet); providing a freeboard of 0.3 meter (1 foot). Approximately 20,000 cubic meters (26,000 cubic yards) of material would be needed to build the dikes and level the pool bottom.

The source of dike fill was evaluated based on the structural suitability of on-site material and cost. The sources and the initial unit cost estimates included: 1) material adjacent to the dikes at $3.90/cubic meter ($3.00/cubic yard); 2) material from within the project limits at $4.90/cubic meter ($3.75/cubic yard); and 3) material from off-site at $9.50/cubic meter ($7.25/cubic yard). It was decided that material in the vicinity of the project construction (within the project limits) would be suitable if 0.2 meter (8 inches) of the existing ground surface was stripped to remove vegetation and roots from the dike fill. This stripped material would be stockpiled and used later for topsoil on the dikes and to level the pool bottom. The water table is typically about 2 meters (6.5 feet) or less below the existing ground surface.

A flow control structure would be placed in the dike along Winnebago Creek to supply water to pools D1 and D2. Water level control structures would be placed in the cross-dike between pools D1 and D2 and in the lower D2 dike to control water levels in the pools. Several types of control structures were evaluated: concrete; corrugated metal; fiberglass; and sheetpile. The concrete and corrugated metal structures both use wooden stoplogs to control water levels. The stoplog weirs would be 1.2 meters (4 feet) wide. The fiberglass structure that was considered is a patented product that uses a polyethylene sliding gate and a sliding control weir mounted in a watertight track to control water levels. All the structures would use a 0.6-meter (24-inch) pipe or opening to allow for filling of the pools to the design elevation in less than two weeks. The comparative evaluation of the structures concluded that the concrete structure would be the most costly to build (about $21,000) and would require about the same maintenance as the corrugated metal structure. The corrugated metal structure, at a cost of about $15,000, would be a reliable structure that could withstand periodic flooding and should not need replacing during the 50-year life of the project. The fiberglass structure may be about half the cost to install, but the reliability and operability are not known. For the purpose of project evaluation, the corrugated metal control structure was initially selected. This structure is shown on Plate 6. Later in the project

development another alternative was suggested by the USFWS. It would be a structure similar to one designed by the Corp's Rock Island District that uses only an open chute with stoplogs. The chute could be constructed with concrete or sheetpile. This structure is shown on Plate 8. The cost is estimated to be higher than the corrugated metal structure, but maintenance would be much simpler and longevity would be greater. At this location, clogging by debris would be a major problem if a pipe were used in a structure. The open channel design would significantly reduce this problem and make debris removal much easier. The USFWS and Iowa DNR have indicated their preference for this type of structure. The preliminary comparative cost estimate for the structure was $30,000. Further design effort would likely reduce the cost by using lighter, cheaper material for the sheetpile and possibly reduce the quantity of sheetpile used.

A preliminary cost estimate and habitat analysis was made of this alternative plan. The estimated construction cost of $618,000 was higher than desired because of the significant amount of filling required at the northern end of pool D2, both in the pond bottom and the dike. Additional fill from area E would have to be used to supplement the material available from within the pool D area. In order to reduce fill requirements, it was decided to move the alignment of the pool D2 northern dike further south to higher existing ground elevations. The modified alignment is shown on Plate 7. This reduced the pool D2 size to 8.74 hectares (21.6 acres) and the required fill amount from about 20,000 cubic meters (26,200 cubic yards) to 15,000 cubic meters (19,600 cubic yards). No material would be needed from outside the area. The modified alignment resulted in a construction cost estimate of $473,000.

2) **South of Winnebago Creek** (middle and lower units)

The area between Winnebago Creek and the Minnesota/Iowa border (middle unit) is owned by the USFWS. The area between the Minnesota/Iowa border and Army Road (lower unit) is owned by the IDNR. The City of New Albin has constructed an effluent treatment pond on the west side of the lower unit in the project area. The pond provides secondary treatment for discharges from the sewage treatment plant. The treatment pond effluent discharges into a ditch in the lower unit and then flows into Pool Slough. The project area is frequently flooded in the spring, so it has little woody vegetation other than isolated trees and willow growth primarily in the middle unit. However, in recent years the willow growth and flow from Winnebago Creek in the middle unit have significantly expanded.

The USFWS has no desire to develop moist soil units on their property in the middle unit because the ground elevations are higher and would require pumping in order to attain the appropriate water level. The need for pumping would result in significant operation and maintenance costs. However, an alternative was formulated and a habitat analysis was done to evaluate the development of potholes in the area for migratory waterfowl. The potholes would require no operation or maintenance. The middle unit is 13 hectares (32 acres)

in size and was designated as area E (shown on Plate 5). The proposed development would involve the excavation of up to 12 potholes, about 37 meters (120 feet) in diameter and 0.1 hectares (0.25 acre) in size. The depth of each pothole would vary from 0.5 to 1.2 meter (1.5 to 4 feet). A sketch of a typical pothole is shown on Plate 10. The excavated material would be side-cast or dozed to the side. The excavated areas could also be made donut-shaped. Approximately 11,000 cubic meters (14,400 cubic yards) of material would be excavated. At a unit cost of $2.40 per cubic meter, the total preliminary estimate of the cost to develop potholes in Area E would be $26,400.

Further south on IDNR lands (the lower unit), the existing ground elevations are lower than Winnebago Creek water levels, making it possible to supply water to the lower unit via gravity. Therefore, construction of pools or cells for moist soil management appeared to be physically feasible. Diking could be done in the area bounded by: the City of New Albin and the treatment pond and discharge pipe on the west; the Minnesota/Iowa border on the north; Pool Slough and the wooded area on the east; and Army Road on the south. The diked area would be supplied with water via a ditch from Winnebago Creek. Plate 4 shows the conceptual plan that was initially developed for the entire area. Pool development in the area is constrained by existing Pool Slough water levels and the treatment pond effluent discharge line. The effluent discharge line runs in a southerly direction for a distance of about 230 meters (750 feet) from the treatment pond to an outlet into a ditch connected to Pool Slough, about 300 meters (1,000 feet) away. Typical daily discharge from this line is about 190,000 liters (50,000 gallons), so it is necessary to make provisions for the discharge to maintain the treatment pond operation.

Initial alternative formulation proposed four management pools (A, B, C1, C2) in the area (see Plate 4). The pool A area is about 16 hectares (40 acres) in size and normally has standing water year-round. It is productive for waterfowl under existing conditions. Therefore, it is desired to maintain the existing water level elevation in the pool A area or raise it slightly during drought conditions. Dikes would not be needed around pool A. The effluent discharge from the treatment pond and the existing ditch would be maintained by constructing dikes on both sides of the existing ditch. Pool B would be 19.8 hectares (49 acres) in size and would be bounded by the existing effluent ditch on the north, Pool Slough on the east, Army Road on the south, and the pool A area on the west. Pool C would be located on the north side of the effluent ditch and extend to the Minnesota/Iowa border. Because of the existing topography differences within pool C, it was divided into two pools (C1 and C2) by placing an intermediate dike generally on an elevation contour line. This would provide the desired range of depths in the pools. Pool C1 would be 6.5 hectares (16 acres) in size and pool C2 would be 4.0 hectares (10 acres). The total area water level control in the lower unit would be 46.5 hectares (115 acres). Stoplog culvert structures in the dikes would control the water supply to the pools. Water would be supplied to pool C1 via a ditch from Winnebago Creek and distributed to the other pools via control structures. Supplying water to pool B would

require crossing the existing ditch using a drop inlet structure. The proposed drop inlet structure was later eliminated because of potential problems with siltation, debris, and maintenance. Instead, a culvert would be placed in the existing ditch and a pipeline would cross over top of it to supply water from pool C1 to pool B.

As the alternative development process continued, the IDNR indicated that discharge of the treatment pond effluent directly into a moist soil pool would be acceptable from a water quality standpoint. Therefore, it was not necessary to maintain the existing ditch alignment to Pool Slough for the treatment pond effluent. The IDNR suggested that this could eliminate the double dike between pools B and C2 and reduce the number of control structures. The IDNR also suggested that pool B be divided with an intermediate dike and the remainder of pool B be combined with pool C2. Water from pool A and the treatment pond effluent would be routed through pool B to outlet into Pool Slough. Pool B would be reduced 7.0 hectares (17.3 acres) and pool C2 would be increase to 19.3 hectares (47.7 acres). Pool C1 would be 5.7 hectares (14.2 acres) in size. The total area of the pools would be 48.2 hectares (119 acres).

Further hydraulic evaluation of the IDNR proposal indicated that drainage of water from pool A through pool B to Pool Slough may not be possible because of existing water level and hydraulic head conditions. To address this problem, it was decided either to construct a dike and ditch along the north side of Army Road or to install a control structure in Army Road to release flows into a ditch on the south side of Army Road to carry flows from pool A to Pool Slough. Although water level information had not been collected in the area south of Army Road, field investigations indicated that water levels would likely be about the same as water levels immediately to the north of Army Road. Therefore, the alternative to discharge water from pool A (and the treatment pond effluent) to the area south of Army Road was selected. Because borrow material was needed for dike and pond bottom fill, pools B and C2 were combined, resulting in one large pool (pool B) that would be 26.5 hectares (64 acres) in size. The total area of the pools would be 48.4 hectares (120 acres). This plan is shown on Plate 5.

The source of dike fill would be material from within the pools and from ditch excavation adjacent the dikes. Prior to use of the on-site material for dike fill, 0.2 meter (8 inches) of the existing ground surface would be stripped. This material would be stockpiled and used later for topsoil on the dikes and to level the pool bottom. The water table in this area is typically about 1 meter (3.3 feet) or less below the existing ground surface.

Stoplog control structures would be placed at the following locations: the upstream end of the ditch at Winnebago Creek; the inlet from the ditch to pool C; the two inlets from pool C to pools A and B; the outlet from pool B to Pool Slough; and the outlet at Army Road from pool A. The structures would be the same as those described for pools D1 and D2 above. The total estimated construction cost of

the lower unit would be $977,000.

However, as the plan formulation and design process continued, it was learned from more recent aerial photos that the site conditions in the area south of Winnebago Creek had changed significantly from when the study was initiated. Most of the flow from Winnebago Creek now moves through the middle unit and much of the lower unit. Small channels are being formed throughout the area between Winnebago Creek and the existing effluent ditch, contributing to delta formation. These flow conditions result in a fairly large portion of the area being flooded on a year-round basis. This affected the constructability and feasibility of implementing pools C1 and C2, as well as the proposed water supply ditch from Winnebago Creek to the lower unit pools. Maintenance of the cells would be require a high level of effort because the containment dikes would be built in an area that has become the flowage route and delta formation for Winnebago Creek. Water forces from the creek would be continually working to erode the dikes. Carrying water by gravity in a ditch to the lower unit would also be difficult. The ditch would cutoff normal flow patterns and delta formation. The water gradient would be above the existing ground elevation in the lower reach of the ditch. Provisions would also be needed to pass water from west of the ditch to the east. Frequent clearing of vegetation and debris in the ditch would be required and access to the ditch would be difficult during the time the ditch would be used. Considering all these factors, it was decided to abandon the proposal to build pools C1 and C2 and the use of gravity flow to fill the lower unit cells. This simplified the project considerably because only pool B remained viable and no special provisions would be necessary to handle effluent from the treatment pond or to maintain existing conditions in pool A.

Pool B would be 19.5 hectares (48 acres) in size and would be bounded by Army Road on the south, pool A on the west, the effluent ditch on the north, and Pool Slough on the east. After coordination with the IDNR, the dike alignment was shifted to create a larger area of 23.0 hectares (57 acres) with more accessibility to Pool Slough. The initial plan called for obtaining approximately 15,600 cubic meters (20,400 cubic yards) of material to build the dikes and raise Army Road from within the pool. Based on the topographic conditions, the design ponding elevation for pool B was set at 191.40 meters (628.0 feet). The dike top elevation would be 191.70 meters (629.0 feet). This would provide a freeboard elevation of 0.3 meter (1 foot). The bottom of the pool would be graded to provide a varying design water depth of 0.2 to 0.6 meter (8 to 24 inches). Additional fill necessary to achieve the bottom topography would be obtained from the area on the south side of Army Road. The top width of the dikes would be 3.05 meters (10 feet) with 0.10 meter (4 inches) of topsoil placed on the 1 vertical on 4 horizontal side slopes. A 0.15-meter (5-inch) thick gravel surface would be placed on portions of the dike alignment for vehicle access to the control structures. Only one outlet structure would be required with discharge directly into Pool Slough.

Pool B would be filled in the spring by opening the outlet structure and allowing water to back into the cell from Pool Slough. During high water events, water would also fill the cell by overtopping the dikes. If desired, the higher water level could be held for a longer period of time than normal by placing stop logs in the outlet structure. In the fall, pool B would be filled by pumping water into the cell from Pool Slough. The pumping rate required to fill the cell in 10 days is about 9,100 lpm (2,000 gpm). Several different types of pumps were considered including: electric submersible; hydraulic submersible; tractor-powered centrifugal; trailer-mounted diesel centrifugal; and diesel self-priming suction. After considering the advantages and disadvantages of each type of pump (including pump and operational costs), the trailer-mounted diesel centrifugal pump was selected. A large fuel tank would be provided to reduce the amount of time necessary to attend the pump. The total cost of constructing pool B would be $431,000.

HABITAT ANALYSIS

The U.S. Fish and Wildlife Service's 1980 version of Habitat Evaluation Procedures (HEP) model was used to separately quantify the potential habitat project affects and benefits for the area north of Winnebago Creek (pools D1 and D2) and the area south of Winnebago Creek (pool B and area E). These separate analyses were done not only because of the natural separation imposed by Winnebago Creek, but also for institutional reasons since the USFWS owns the lands north of the State boundary line and the IDNR owns the lands to the south where dikes would be constructed. A model to evaluate dabbling duck migratory habitat was developed and habitat suitability index (HSI) calculations were made for existing conditions, future without project, and future with project for each area. A period of analysis of 50 years was used. The HSI rates habitat quality on a scale of 0 to 1 (1 being optimum). The HSI is multiplied by the number of acres of available habitat to obtain Habitat Units (HU). One HU is defined as one acre (acre is the traditional unit of measure used by the model) of optimum habitat. The number of acres of habitat affected was determined by the area bounded by the proposed dikes. Habitat benefits associated with water availability would be realized the first year of operation and benefits associated with vegetation composition would be realized within five years. The habitat value for existing conditions in each area was computed in terms of average annual habitat units (AAHU). The number of habitat units gained with a proposed project over the period of analysis was calculated to quantify the benefits. Detailed information on the assumptions and results of the HEP analyses is included in attachment 4.

A summary of the average annual habitat units gained and associated costs for each area evaluated is shown in table DPR-6.

Table DPR-6 - Cost and Habitat Analyses

Project Area	Total Hectares (acres)	Average Annual Cost*	AAHU Gain	Cost/AAHU
Pool B & Area E	61.1 (151)	$36,178	39	$928
Pool E & Area E w/potholes	61.1 (151)	$1,783	6	$297
Pools D1 & D2	22.3 (55)	$47,073	32	$1,471
Pools D1 & D2 modified	18.6 (46)	$34,195	25	$1,368

* Based on a 6-7/8% interest rate, 50-year life, and O&M costs.

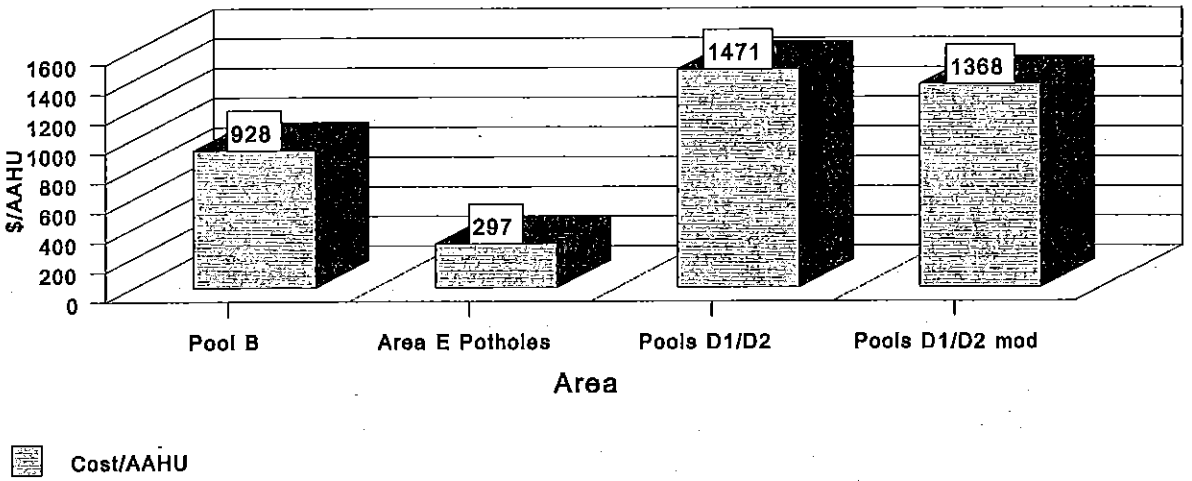
The costs shown above were used for the preliminary evaluation and for the comparison of alternatives during the formulation of the project. These costs may differ from the more detailed costs shown for the selected plan later in this report.

INCREMENTAL ANALYSIS

In terms of benefits to migratory birds, the proposed areas are independent features. An incremental analysis was conducted to compare the costs of pool B only with the addition of management area E (potholes), and to ensure the modification to pool D2 was justified. The individual pools within each area (B and D1/D2) were considered necessary to meet the overall objectives for each area. The engineering analyses indicated that the intermediate dike between pools D1 and D2 (constructed on the elevation contour) was the most effective means to construct the pools and provided the necessary operational flexibility for moist soil management. Therefore, only the comparisons of the project areas shown below were analyzed.

The incremental analysis shows that decreasing the size of pool D2 also decreased the cost per AAHU, making the smaller size justified. Construction of moist soil management features in the lower area (pool B) has a lower cost per AAHU and would be cost effective. The construction of potholes in area E has the lowest cost per AAHU, thereby making it a cost effective feature. Figure 1 is a graphical representation of the cost per AAHU for each alternative. The cost per AAHU for each of the diked areas is considered reasonable based on the type of benefits generated and the importance of the resource benefited. The costs per AAHU are comparable to other EMP habitat projects that have been constructed to improve waterfowl migration habitat on the Upper Mississippi River. The modified pools D1/D2 is preferred because of the lower initial construction cost. Pool B is justified by the lower cost per AAHU. The area E alternative (potholes) is also desirable because of the low cost per AAHU. Material from area E could also be used to level the bottoms in pools B, D1, and D2, thereby generating other ancillary benefits.

Figure 1 - Incremental Analysis



SELECTED PLAN OF ACTION

Plan Description - The initial plan that best satisfied the immediate agency and public goals, habitat improvement objectives, and planning opportunities and constraints included the following features:

a) dikes in the area south of Winnebago Creek between the existing effluent ditch and Army Road (pool B) for moist soil management;

b) dikes in the area north of Winnebago Creek (pools D1/D2) for moist soil management;

c) sheetpile inlet structure on the north side of Winnebago Creek to supply water to pools D1 and D2;

d) sheetpile outlet structures with stoplogs for water level control in the pools;

e) trailer-mounted diesel submersible pump to supply water from Pool Slough to pool B; and

f) pothole excavation in area E.

This plan is shown on Plate 7, the control structure design on Plate 8, and the trailer-mounted pump on Plate 9.

However, a major flood event on Winnebago Creek in 2000 caused significant changes in flow conditions (and associated habitat conditions) in the area, both north and south of the creek. A breach in the spoil pile berm to the north of Winnebago Creek allowed continuous flow into the area, resulting in fairly good habitat conditions for migratory bird use. Therefore, the USFWS has decided not to pursue development of moist soil units in the area, so pools D1 and D2 are no longer included in the selected plan.

Flow conditions to the south of Winnebago Creek also changed as a result of the flood event, making it wetter on a continuous basis and, subsequently, less desirable for pothole development in the area. The USFWS has no desire to pursue pothole excavation because of the existing wet conditions and delta development in the area, so pothole excavation is no longer included in the selected plan.

The selected plan is shown on Plate 11 and reflects the decision to pursue construction of a moist soil unit only in the lower unit south of Winnebago Creek.

Area south of Winnebago Creek (lower and middle units)-

Lower unit - This area is located about 800 meters (1/2 mile) from Winnebago Creek and is affected very little by flood events on the creek or delta formation by the creek. In order to achieve optimum water depths of 0.1 to 0.6 meters (4 to 24 inches) for moist soil unit operation, dikes would be constructed and Army Road raised to create management pool B as shown on Plate 11. Pool B would be an area 20.9 hectares (52 acres) in size that would be maintained in the fall at an elevation of 191.4 meters (628.0 feet) by pumping water into the unit from Pool Slough. In the spring, normal high water would be allowed to flood the area naturally, either by opening the control structure or by overtopping of the dikes. The pool B dike would be constructed to 191.7 meters (629.0 feet) and Army Road would be raised to the same elevation to serve as the southern dike. This dike elevation would provide a freeboard of 0.3 meter (1 foot) at the design ponding elevation of 191.40 meters (628.0 feet). The top width of the dikes would be 3.05 meters (10 feet) with 1 vertical on 4 horizontal side slopes. A 0.15-meter (5-inch) thick gravel surface would be placed on a portion of the dike alignment for vehicle access from Army Road to the control structure and pumping area. Army Road would also have gravel surfacing. The remainder of the dike would be seeded.

In order to achieve optimum water depths of 0.1 to 0.6 meters (4 to 24 inches) for moist soil operation, it was initially proposed to grade the bottom of pool B to provide for water depths varying from 0.2 to 0.6 meter (8 to 24 inches) at the design ponding elevation. However, technical review of the project during the draft report phase raised concerns about seepage of water from the pool because of existing soil conditions. More detailed soil investigations were made at the site. These investigations found that a relatively impervious layer existed at the ground surface, with more pervious silty sand below this surface layer. Grading of the pool bottom and stripping of the area under the proposed dike could remove this layer, causing a problem of a high seepage rate from the pool. Frequent pumping would be required to keep the water level at the desired elevation (assuming that the pool could even be filled to the design elevation with the water resources available). This would increase the need for personnel at the site, raise fuel costs, and result in rapidly fluctuating water levels. The Iowa DNR indicated that the optimum water depths of 0.1 to 0.6 meters (4 to 24 inches) in the pool were not absolute. They are confident that pool B could be operated at a

greater range of depths and still produce similar habitat results. It was also decided from an engineering standpoint that it would not be necessary to strip material from the dike footprint. The dikes are low-height and the existing ground conditions would not pose a stability problem. Therefore, no grading or stripping in the pool B area is proposed, so the impervious layer would remain and seepage would not be a concern. Material to build the dikes and raise Army Road would be obtained from the area owned by the Iowa DNR south of Army Road. Excavation of the borrow area would be accomplished in a manner that provides additional habitat benefits (more permanent water and diversity in the area). This would provide a larger area of improved habitat for migratory waterfowl. These additional habitat benefits were not included in the habitat analysis. Approximately 9,000 cubic meters (11,700 cubic yards) of material would be needed to build the dikes and raise Army Road. It is anticipated that topsoil may not need to be placed on the dikes because of the expected soil characteristics of the dike fill. However, if necessary, topsoil for the dikes would be obtained by using material stripped from the borrow area on the south side of Army Road.

The control structure would consist of two parallel sheetpile walls driven through the cross-section of the dike, 0.6 meters (24 inches) apart, using stoplogs to control the water level in the pool. A heavy duty steel grating on top of the opening through the dike would allow vehicles to drive across the structure. The invert elevation of the structure is shown on Plate 8. The Iowa DNR has suggested a simpler, lower cost structure made of fiberglass that is commercially available. This will be investigated during preparation of plans and specifications. Some minor ditching from the outlet structure to Pool Slough would be necessary to convey water directly to and from Pool Slough.

An area near the intersection of Army Road and the easterly dike would be prepared so that a trailer-mounted diesel centrifugal pump could be backed down a ramp into Pool Slough in order to fill pool B with water from Pool Slough. The pump would be a submersible pump with a 15-cm (6-inch) discharge pipe, similar to the pump shown on Plate 9. The pump would be capable of pumping 9,100 lpm (2,000 gpm) in order to fill the pool in two weeks or less. The existing treatment pond discharge, effluent ditch, and flow from Winnebago Creek would not be impacted by the construction or operation of pool B.

Middle unit - The selected plan proposes no action for this area as explained above.

Area north of Winnebago Creek (upper unit)- The selected plan proposes no action for this area as explained above.

Sources of Fill Material - The source of dike fill (and possibly topsoil) for pool B would be the area located on the south side of Army Road, owned by the Iowa DNR. Prior to use of the material for dike fill, 0.2 meter (8 inches) of the existing ground surface could

be stripped, stockpiled, and used for topsoil on the dikes. Riprap for the pre-formed scour hole and erosion protection at the control structure and fill and aggregate for raising Army Road would come from established quarries in the area.

Construction Methods - The dike material for pool B would be excavated from the area on the south side of Army Road with dozers and backhoe, hauled by dump truck, dumped on the dike alignment, and spread and compacted with dozers and rollers.

The control structure location would be excavated and dewatered using normal construction techniques. Steel sheet pile would be installed using the bucket on an hydraulic excavator to push the pile into place. Placement of rock at the control structure would likely be done using a crane or hydraulic excavator.

Project Support - The participants in the planning process (agencies and the public) provided written and verbal suggestions that were considered fully during plan development and selection. Their written comments and letters of support are included in attachment 5.

Project Accomplishments - The proposed project has been designed to address the project objectives shown in table DPR-5.

Real Estate Requirements - Pool B and the proposed borrow area south of Army Road would be located entirely on lands owned by the Iowa DNR. Appropriate agreements would be made between the Corps and the Iowa DNR for the construction and operation and maintenance of the project. No acquisition of lands would be necessary for any portion of the proposed project. The raising of Army Road would require close coordination with the USFWS and Allamakee County.

ENVIRONMENTAL ASSESSMENT

An environmental assessment has been conducted for the proposed action and a discussion of the impacts follows. As specified in Section 122 of the 1970 Rivers and Harbors Act, the categories of impacts in the impact assessment matrix (table DPR-7) were reviewed and considered in arriving at the final determination. In accordance with Corps of Engineers regulations (33 CFR 323.4(a)(2)), a Section 404(b)(1) evaluation was prepared (attachment 3). Water quality certification under section 401 of the Clean Water Act was received from the Iowa DNR on April 12, 2001. Any other applicable construction permits would be applied for during the preparation of plans and specifications. The Finding of No Significant Impact (attachment 2) was signed following the public review period. No significant impacts were identified by the public review.

RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS

The proposed action would comply with all applicable Federal environmental laws, executive orders, and policies, and State and local laws and policies including the Clean Air Act, as amended; the Clean Water Act of 1977, as amended; the Endangered Species Act of 1973, as amended; the Land and Water Conservation Fund Act of 1969, as amended, the National Environmental Policy Act of 1969, as amended, the Fish and Wildlife Conservation Act of 1958, as amended, the National Wildlife Refuge System Administration Act; Executive Order 11988 - Floodplain Management; and Executive Order 11990 - Protection of Wetlands. The proposed action would not result in the conversion of existing farmland use to non-agricultural uses. Therefore, the Farmland Protection Policy Act of 1981 does not apply to this project.

Table DPR-7 - IMPACT ASSESSMENT MATRIX

NAME OF PARAMETER	<—— INCREASING BENEFICIAL IMPACT			MAGNITUDE OF PROBABLE IMPACT NO APPRECIABLE EFFECT	INCREASING ——> ADVERSE IMPACT		
	SIGNIFICANT	SUBSTANTIAL	MINOR		MINOR	SUBSTANTIAL	SIGNIFICANT
A. SOCIAL EFFECTS							
1. Noise Levels					X		
2. Aesthetic Values				X			
3. Recreational Opportunities					X		
4. Transportation				X			
5. Public Health and Safety				X			
6. Community Cohesion (Sense of Unity)				X			
7. Community Growth & Development				X			
8. Business and Home Relocations				X			
9. Existing/Potential Land Use				X			
10. Controversy				X			
B. ECONOMIC EFFECTS							
1. Property Values				X			
2. Tax Revenues				X			
3. Public Facilities and Services				X			
4. Regional Growth				X			
5. Employment				X			
6. Business Activity				X			
7. Farmland/Food Supply				X			
8. Commercial Navigation				X			
9. Flooding Effects				X			
10. Energy Needs and Resources				X			
C. NATURAL RESOURCE EFFECTS							
1. Air Quality					X		
2. Terrestrial Habitat				X			
3. Wetlands		X					
4. Aquatic Habitat				X			
5. Habitat Diversity and Interspersion		X					
6. Biological Productivity		X					
7. Surface Water Quality					X		
8. Water Supply				X			
9. Groundwater				X			
10. Soils				X			
11. Threatened or Endangered Species				X			
D. CULTURAL EFFECTS							
1. Historic Architectural Values				X			
2. Pre-Hist & Historic Archeological Values				X			

NATURAL RESOURCES

Habitat - The proposed moist soil unit development would improve migratory bird habitat on approximately 21 hectares (52 acres) in the Pool Slough area. While the primary species benefited would be dabbling ducks (such as mallards, gadwalls, and teal), habitat conditions for wading birds (such as herons, egrets, rails, bitterns, and a variety of shorebirds) would also be improved. Habitat quality for fish in the Pool Slough area would decline slightly because the width of access to get to the spawning habitat would be reduced.

In order to quantify habitat benefits for the proposed actions, the U.S. Fish and Wildlife Service's Habitat Evaluation Procedure (HEP) was used. The HEP methodology utilizes a Habitat Suitability Index (HSI) to rate habitat quality on a scale of 0 to 1 (1 being optimum). The HSI is multiplied by the number of acres of available habitat to obtain Habitat Units (HU's). One HU is defined as one acre of optimum habitat. By comparing existing HU's to HU's expected to be gained with the proposed action, the benefits can be quantified. A detailed discussion of the habitat evaluation procedures conducted for this project is presented in attachment 4.

Waterfowl - The construction of moist soil unit features in the Pool Slough area would substantially improve waterfowl migration habitat by ensuring that water is present during key migration periods. Water management capabilities would also allow managers to control vegetation composition and distribution in the management cells. The Iowa DNR has indicated that it would implement a relatively intensive management approach for pool B by planting desired species such as millet in the summer and then flooding in the fall. Spring water levels could be extended by using the control structure to maintain shallow water conditions for invertebrate growth, thereby increasing the value of the spring migration habitat. The HEP model developed for this evaluation indicates that the migration habitat value would increase by about 93 percent in the pool B area.

Fish - The area of pond B is usually flooded in the spring and provides spawning habitat for a variety of fish species. The construction of dikes would reduce the value of the area as spawning habitat because the area would be less accessible during the more frequent flood events. The only access point would be through the control structure. Access to spawning areas during the larger flood events would not be affected because the dikes would be overtopped. However, some fish could be trapped within the management cell as floodwaters recede. The control structure would be located near the low spot of the pool to minimize this occurrence.

Other Wildlife - Additional wildlife benefits not quantified by the habitat model would accrue with project construction. The management cells would provide improved habitat for wading birds such as herons, egrets, rails, and bitterns by providing extended periods of water at suitable depths during the spring, early summer, and fall. A wide range of ground elevations would occur within the management cell, so

portions could be managed as mudflat areas for shorebirds. Habitat quality would also improve for amphibian and reptile species associated with seasonally flooded wetlands.

WETLANDS

Approximately 1-1/2 hectares (3 acres) of seasonally flooded wetland would be affected by the placement of fill material for the dikes. However, the proposed facility would allow more effective management of water levels in the 21-hectare (52-acre) pool. The gain in wetland function and values that would result from management activities would greatly exceed any losses that would occur with construction.

WATER QUALITY

The proposed action could result in short-term decreases in water quality because of localized increases in turbidity during construction. Runoff from the construction site would be controlled by the use of best management practices. No long-term impact on water quality is expected.

ENDANGERED SPECIES

No State listed or federally listed threatened or endangered species would be adversely affected by the proposed action. The activities would not affect the suitability of existing nesting sites for the bald eagle. Critical habitat for the Minnesota listed Blanding's turtle, or the Iowa listed river otter and American bullfrog, would not be affected by the proposed construction activities. The USFWS supports this determination of no significant impacts (see attachment 5).

AIR QUALITY

The proposed action would have minor negative effects on air quality. Exhaust emissions from construction equipment could degrade air quality slightly in the vicinity of New Albin, Iowa, for short periods. The overall effect of short-term air quality degradation on people, vegetation, and wildlife would be negligible.

CULTURAL RESOURCES

Land areas that would be affected by the proposed construction include no historical or archaeological sites listed or eligible to be listed in the National Register. The project has been coordinated with the Iowa State Historic Preservation Office and the Minnesota State Historic Preservation Office. Both have concurred that the proposed action would have no effects on significant cultural

resources (see attachment 5).

SOCIOECONOMIC FACTORS

The proposed action would have minimal or no impacts on the following socioeconomic categories: transportation, public health and safety, aesthetics, community cohesion, community growth and development, business or home relocations, land use, property values, tax revenues, regional growth, employment, business activity, food supply, navigation, flooding effects, or energy resources. During construction activities, intermittent closures of Army Road may be necessary.

NOISE

The immediate vicinity around the project area may be temporarily disrupted by construction activities. These effects would be temporary, and adverse impacts to the public would be short-term and insignificant. When pumping is required to fill pool B, the diesel engine on the pump would make a constant low noise that should not interfere with human or fish and wildlife activities. The pump would be located about 1 kilometer (1/2 mile) from the nearest residence.

RECREATION

The proposed project area is currently open to hunting, although use in the immediate area is limited due to the lack of open water during the fall. Human disturbance can be an important factor in determining the quality of waterfowl migration habitat. After project completion, access to the area during the fall would be limited to established roadways (Army Road), and the area would be closed to hunting. This would have a minor adverse effect on recreation opportunities. However, adjacent areas would remain open to hunting and should benefit from the project.

PROJECT REQUIREMENTS

OPERATION AND MAINTENANCE

After construction of the project, annual operation and maintenance (O&M) of the project would be the responsibility of the Iowa DNR. Generally, the O&M requirements would include project inspections and reports; repair of dike erosion and/or breaches; repairing displaced riprap at the control structure; gravel resurfacing of the dike; vegetation management; setting and removing stoplogs and pump; debris and/or sediment removal from the control structure; pump and accessory replacement; and monitoring of water levels. An O&M manual detailing the specific requirements of the project would be prepared by the COE

following completion of construction. Development of the manual would be coordinated with the Iowa DNR. Over the 50-year project life at a 7.125% interest rate, the estimated average annual O&M cost is shown in table DPR-8.

Table DPR-8 - Estimated Average Annual O&M Costs

Item	Average annual cost
Annual events	
Inspection & report (8 hr @ $50/hr)	$ 400
Set/remove stoplogs 4 times (1 hr @ $50/hr)	200
Debris removal 2 times (5 hr @ $50/hr)	250
Monitor water levels (10 hr/yr @ $50/hr)	500
Set/remove pump 2 times (2 hr @ $200/hr)	800
Service pump (8 hr @ $50/hr)	400
Fuel consumption (5 gal/hr for 14 days)	1,680
At 5-yr intervals	
Dike erosion repair (1% of fill @ $15/CM)	230
Topsoil replace (1% of topsoil @ $25/CM)	80
Gravel surfacing (1% of gravel @ $45/CM)	60
Replace discharge hose (30m @ $5/m)	30
At Year 10	
Repair/overhaul pump (30% of equipment cost)	220
At Year 20	
Replace pump (100% of equipment cost)	370
At Year 25	
Replace tank and hoses (100% of equipment cost)	120
At Year 30	
Repair/overhaul pump (30% of equipment cost)	60
At Year 40	
Replace pump (100% of equipment cost)	90
TOTAL ANNUAL O&M COST FOR THE SELECTED PLAN	$5,490

COST ESTIMATE

A cost estimate for the project is shown in table DPR-9. This cost estimate may differ from the preliminary estimates used earlier in the plan formulation and evaluation process for this project. More detailed design and analyses were used to develop this estimate. Extensions are rounded to the nearest $100 and column totals to the nearest $1,000. A more detailed estimate is shown in attachment 10.

The reasons for the contingencies shown are because of unknowns associated with unit pricing, quantities, and unanticipated work.

Planning and general design allocations (sunk costs) have totaled $330,000. Based on the total project cost estimate of $323,000, annualized first costs would amount to $23,780 at a 7 1/8% discount rate and a 50-year economic life. With the addition of annual operation and maintenance costs ($5,490), the total average annual costs are estimated to be $29,270. Performance evaluation costs are

shown in table DPR-11.

Table DPR-9 - Cost Estimate for the Selected Plan

FEATURE	QUANTITY	UNIT PRICE$	AMOUNT $	CONTINGENCY AMOUNT$	(%)	TOTAL AMOUNT$
Clearing	1.5 HA	400.00	600	200	30	800
Aggregate	755 M3	37.75	28,500	8,600	30	37,100
Topsoil	1,760 M3	13.60	23,900	7,200	30	31,100
Dike & road fill	8,975 M3	9.15	82,100	24,600	30	106,700
Control structure	1 EA	36,560.00	36,600	9,100	25	45,700
Pump facility	1 EA	37,270.00	37,300	6,300	17	43,600
SUBTOTAL DIRECT CONSTRUCTION COSTS			209,000	56,000	-	265,000
ENGINEERING AND DESIGN (17%)			36,000	5,000	15	41,000
SUPERVISION & INSPECTION (7%)			15,000	2,000	15	17,000
TOTAL PROJECT COST						**$ 323,000**

PERFORMANCE EVALUATION

The principal types, purposes, and responsibilities of project monitoring and performance evaluation are shown in table DPR-10.

Pre- and post-construction plans to monitor the performance of the project were designed to directly measure the degree of attainment of project objectives. For each objective, an appropriate monitoring parameter was chosen. The parameter to be measured for each objective is shown in table DPR-11. Monitoring activities would be closely coordinated with any similar efforts by the Upper Midwest Environmental Sciences Center and the Iowa DNR. The activities could be modified in the future based on field observations. Some limited biological monitoring (waterfowl and wading bird response) would likely be done by Iowa DNR personnel as part of their normal management activities for the pond. However, biological monitoring is not included as part of the formal performance evaluation activities proposed for the project and is not included in the cost estimate.

Water levels - Water level gages would be installed on the control structure so that water surface elevations could be monitored during the operation of the moist soil unit.

Vegetation surveys - The standard general qualitative/semi-qualitative surveys would be conducted. This type of survey method involves a combination of aerial photo interpretation and ground truthing. Semi-qualitative information on species presence and relative abundance would be gathered during these surveys. The limits of woody vegetation would also be determined from these surveys.

Table DPR-10 - UMRS-EMP Monitoring and Performance Evaluation Matrix

Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
Sedimentation Problem Analysis	Sedimentation Research Strategy /1	USFWS	USGS (UMESC)	LTRM	Lead into pre-project monitoring; define desired conditions for plan form.
Pre-project Monitoring	Identify and define problems at specific sites	Sponsor	Sponsor	Sponsor	Should attempt to begin defining baseline
Baseline Monitoring	Establish baseline for performance evaluation and inventory basic habitat conditions for project planning	Corps of Engineers	Field stations or sponsors thru Coop Agreements or Corps /2	HREP	Over several years to reconcile perturbations. Project should be in "Active" portion of spreadsheet
Data Collection for Design	1. Identify project objectives 2. Design of project 3. Develop performance evaluation plan	Corps of Engineers	Corps of Engineers	HREP	
Performance Evaluation Monitoring	Determine success of projects	Corps of Engineers	Field stations or sponsors thru Coop Agreements, sponsor thru O&M, /3 or Corps /2	HREP	After construction
Analysis of Biological Responses to Projects	1. Species abundance monitoring and internal UMRS cause-effect relationships. Reevaluate design criteria assumptions	Corps of Engineers	Corps/USGS (UMESC)/Others	HREP	Biological Response Study tasks beyond scope of Performance Evaluation, Problem Analysis, and Trend Analysis
	2. System-wide applicability of Level 1 results	USFWS	USGS(UMESC) /Others	LTRM	Problem Analysis and Trend Analysis studies of habitat projects

1/ Refers to Sedimentation Research Strategy 1.2.1, Final Draft LRTM Operating Plan.
2/ Choice depends on logistics. When done by States under a Coop Agreement, the role of the UMESC will be to: (1) advise and assist in assuring QA/QC consistency; (2) review & comment on reasonableness of cost est; and (3) be the financial manager. If a private firm or state is funded by contract, coordination with the UMESC is required to assure QA/QC consistency.
3/ Some limited reporting of information for some projects (e.g., waterfowl management areas) could be furnished by on-site personnel as part of O&M.

Table DPR-11 - Pre- and Post-Construction Measurements

Goal	Project Objective	Enhancement Feature	Unit of Measure	Measurement Plan	Monitoring Interval	Projected Cost per Effort
Improve waterfowl and wading bird habitat conditions	Provide consistent migration habitat	Dikes, water supply	meters hectares	Water levels Aerial photos to map vegetation	Each year of operation Pre- & 1, 3, and 5 years post	Included in pond mgmt. $1,500
	Limit expansion of woody vegetation	Dikes, water supply	hectares	Aerial photos to map limits of woody vegetation	Pre- & 1, 3, and 5 years post	$200

Average annual monitoring cost over the 50-year project life = $136

PROJECT IMPLEMENTATION

DIVISION OF PLAN RESPONSIBILITIES

The responsibilities for implementing any selected plan fall to the Corps of Engineers as the lead Federal agency. The general design and construction costs of any proposed project features that are located on lands of the National Wildlife Refuge System and "managed as a national wildlife refuge" within the meaning of Section 906(e) of the 1986 Water Resources Development Act (WRDA) would be 100-percent Federal. Pool B is located in Iowa on lands owned and managed by the Iowa DNR. The general design and construction costs of project features in this area would be shared 65-percent Federal and 35-percent non-Federal in accordance with Section 509 of the WRDA 1999. The non-Federal sponsor would be the Iowa DNR. All costs for operation and maintenance of the project would be the responsibility of the Iowa DNR. A draft project cooperation agreement is included as attachment 7.

COST APPORTIONMENT

Construction - The proposed project is located on lands owned and managed by the Iowa DNR. Therefore, in accordance with Section 509 of the WRDA 1999, the construction costs would be shared 65-percent Federal and 35-percent non-Federal. The non-Federal sponsor would be the Iowa DNR.

Total project costs will be computed in accordance with the following formula:

$$\text{Total project costs} = \frac{A}{A + B} \times C + D, \text{ where}$$

A = Government estimate of direct construction cost for Project features south of the Iowa/Minnesota boundary as presented in draft DPR dated October 1999 ($429,000)
B = Government estimate of direct construction cost for project features north of the Iowa/Minnesota boundary as presented in draft DPR dated October 1999 ($473,000)
C = All planning, engineering, and design costs from October 31, 1996, through May 30, 2001 ($175,000), associated with the entire Pool Slough Wetland Complex habitat project (includes moist soil units originally proposed on U.S. Fish and Wildlife Service lands)
D = All engineering, design, construction, and inspection costs incurred after May 30, 2001 (current estimate $352,000)

Operation and Maintenance - After construction of the project, annual management operations would be conducted by the Iowa DNR. The Project Cooperation Agreement will include the requirement for the Iowa DNR to assume 100-percent of the operation and maintenance costs for the project. Specific operation and maintenance features would be defined in a project O&M manual which would be prepared by the COE and coordinated with the Iowa DNR after the completion of construction.

Rehabilitation - Rehabilitation of the project cannot be accurately estimated. The COE will be responsible for 75 percent of the cost of rehabilitation work that is mutually agreed upon and determined necessary for the project or functional portion. The non-Federal sponsor is responsible for the remaining 25 percent of rehabilitation cost, in accordance with Section 906(e) of the WRDA 1986.

STEPS PRIOR TO PROJECT CONSTRUCTION

After approval of this final report, the preparation of plans and specifications for a construction contract would begin. This work would include: locating limits of the borrow area and final design of the dikes and control structure. The Project Cooperation Agreement will need to be signed by both parties. The current schedule is to prepare plans and specifications, advertise for a construction contract by the competitive bid process, and award a construction contract in 2003. Construction would be completed by the end of 2004.

APPROVAL

I have weighed the accomplishments to be obtained from construction of this habitat improvement project against its cost and have considered the alternatives, impacts, and scope of the proposed project. In my judgment, the proposed project is a justified expenditure of Federal funds.

The current total estimated project construction cost for the selected plan of action is $323,000 (not including sunk planning and general design costs). The project would be cost shared 65 percent Federal and 35 percent non-Federal, with the Iowa DNR as the non-Federal sponsor. The current estimated non-Federal cost is $142,000 (includes 35-percent of applicable planning, design, supervision, and inspection costs incurred after October 31, 1996). The current total estimated Federal cost (including sunk planning and general design costs) of the selected plan is $264,000.

The Mississippi Valley Division has delegated construction approval authority to the St. Paul District for projects that have construction costs less than $1,000,000. Therefore, I approve the proposed Pool Slough Wetland Complex project to include the construction of low-level dikes, a water level control structure, and a pump facility. I further approve the preparation of plans and specifications to begin immediately so that award of a construction contract can be accomplished in 2003.

Robert L. Ball
Colonel, Corps of Engineers
District Engineer

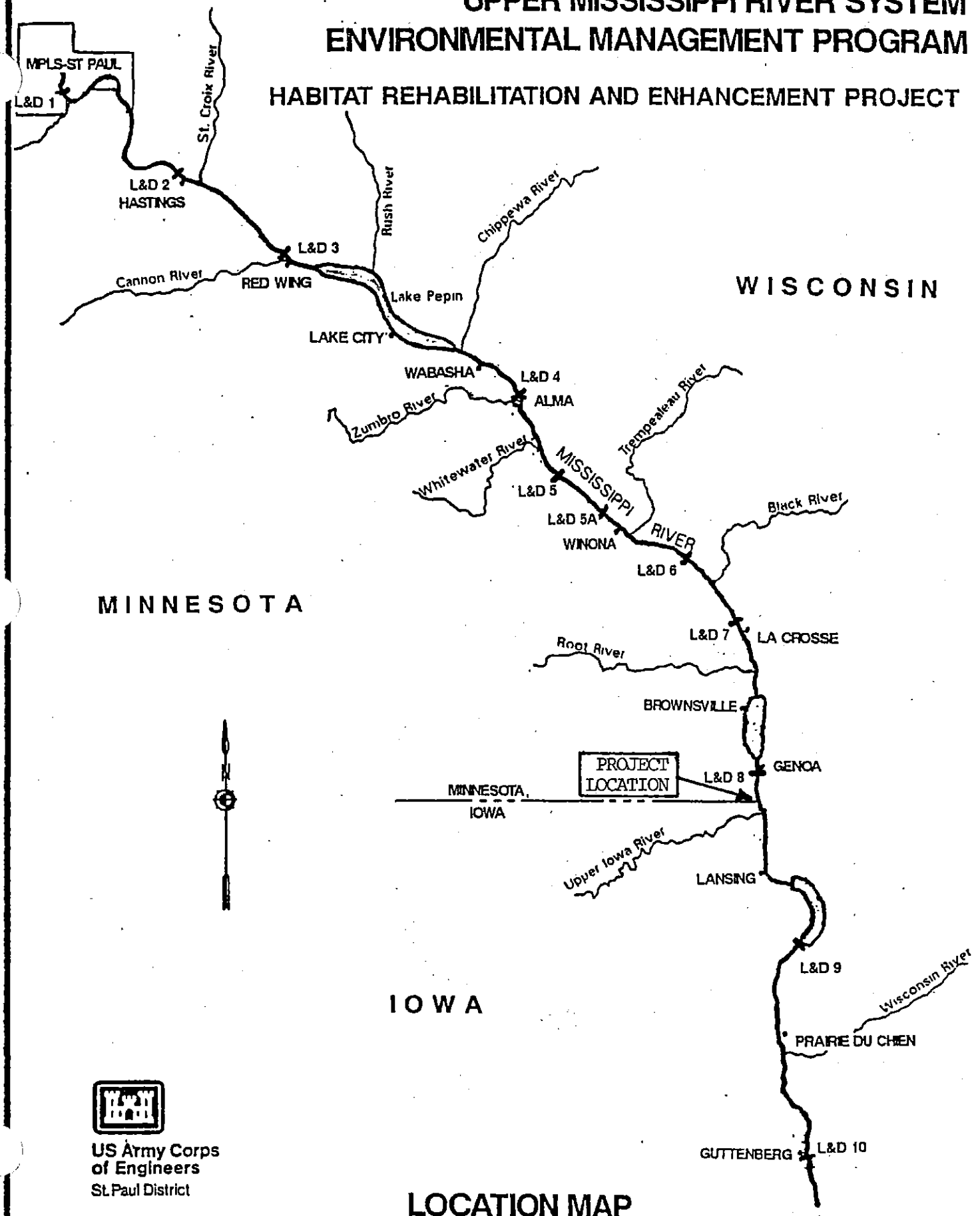
Attachments
1. Plates (11)
2. Finding Of No Significant Impact
3. Section 404(b)(1) Evaluation
4. Habitat Analysis
5. Coordination
6. Draft PCA
7. Hydraulics Appendix
8. Geotechnical Appendix
9. Detailed Cost Estimate
10. Distribution List

Attachment 1

Plates

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

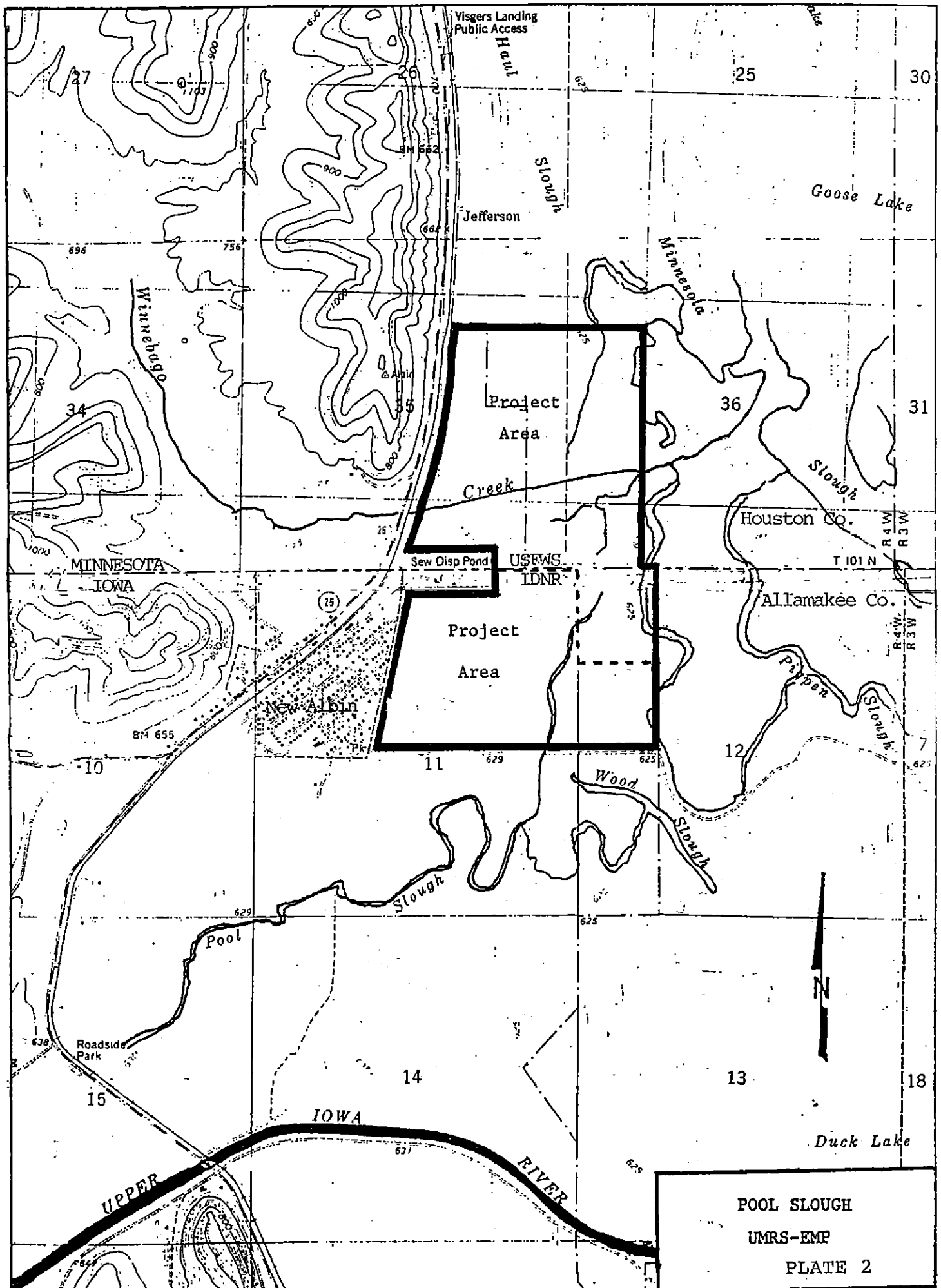
HABITAT REHABILITATION AND ENHANCEMENT PROJECT



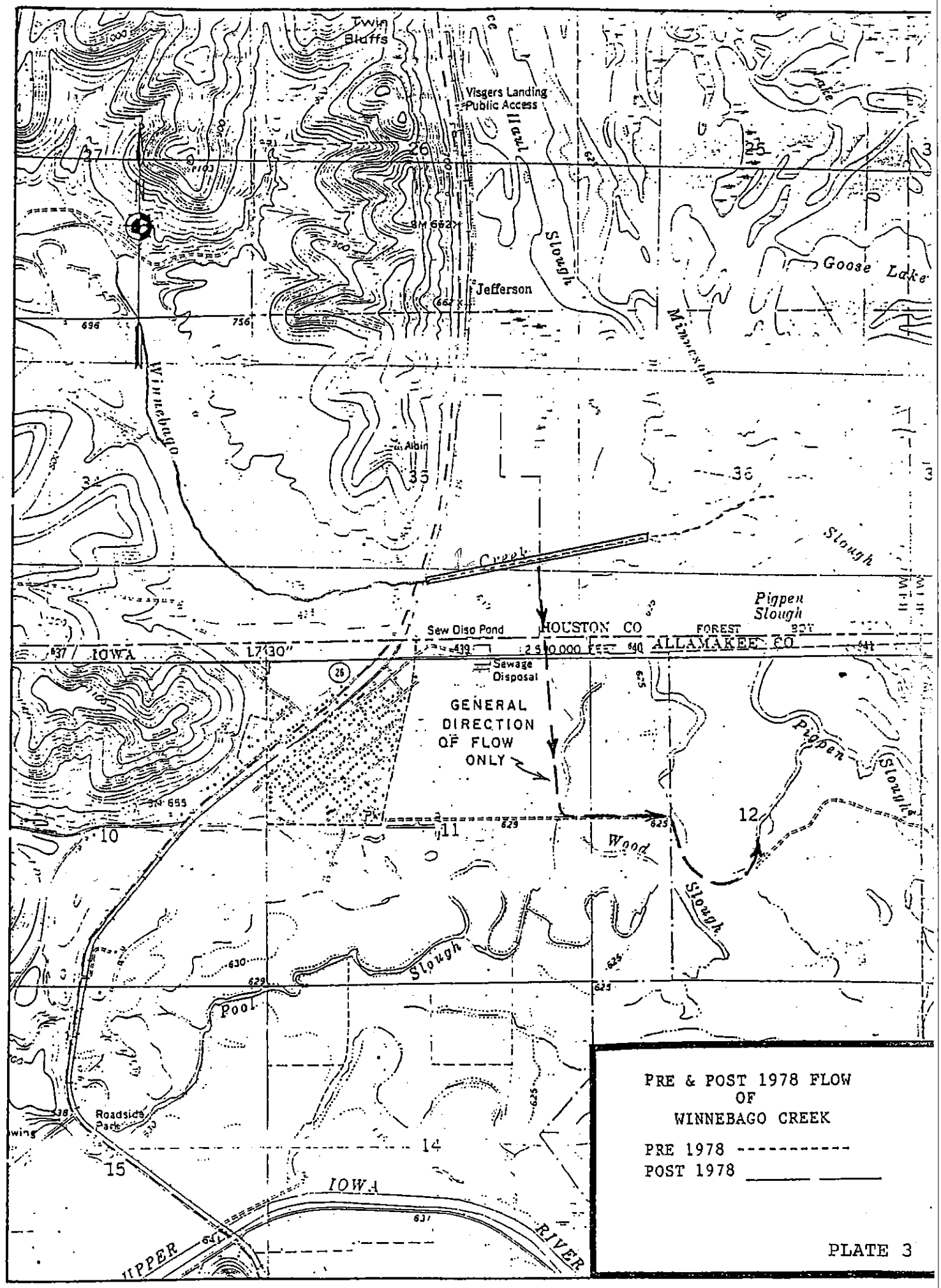
US Army Corps of Engineers
St. Paul District

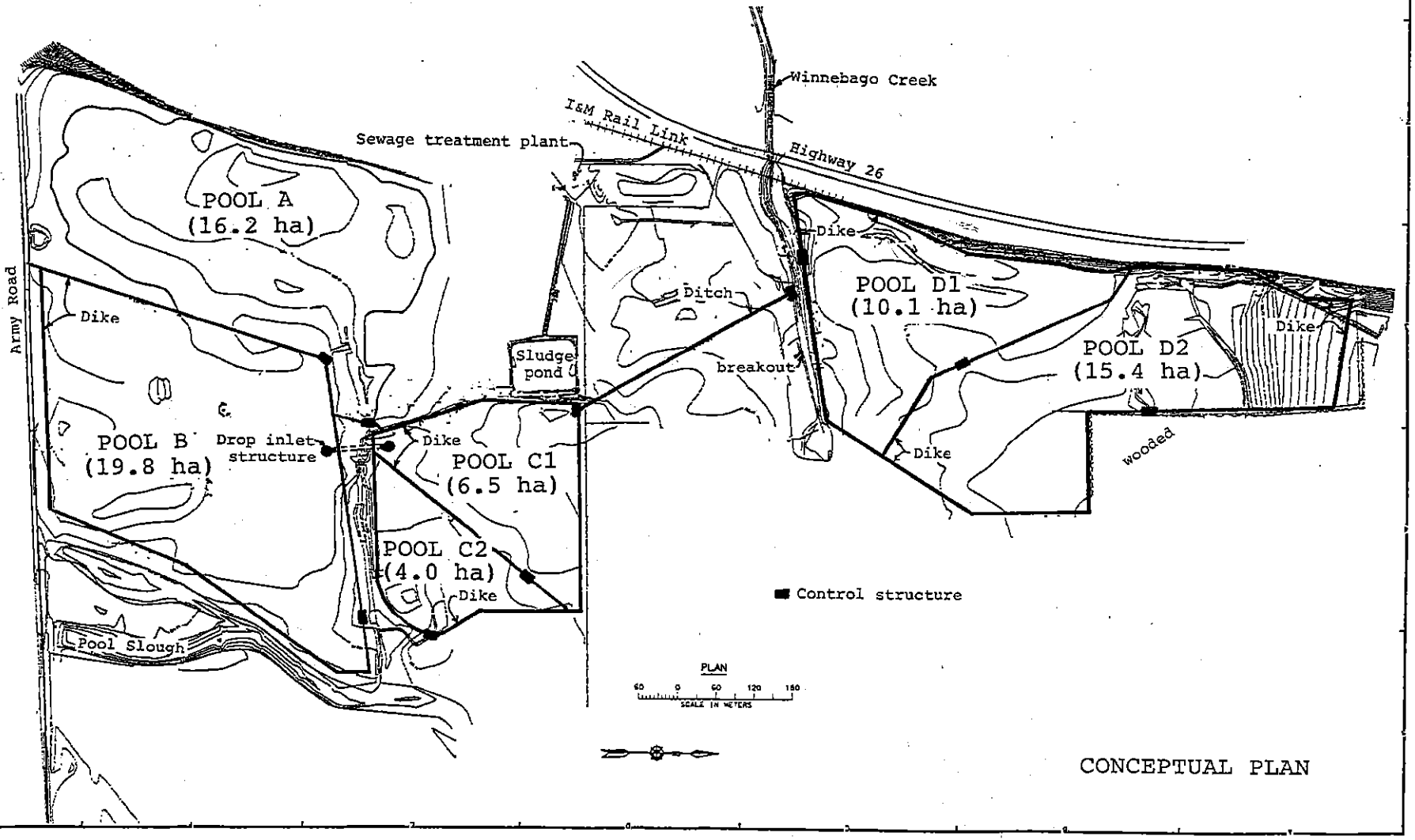
LOCATION MAP

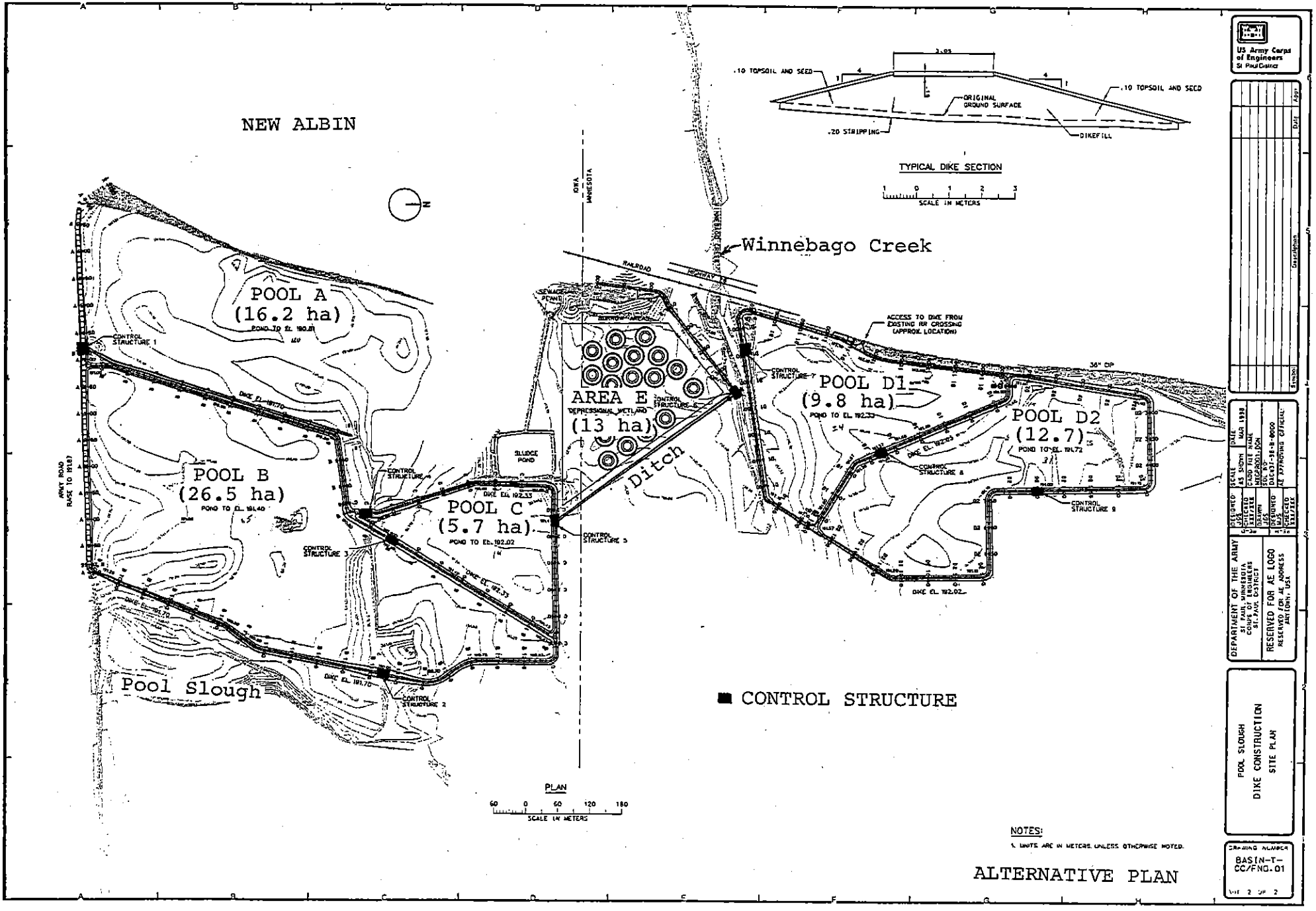
PLATE 1

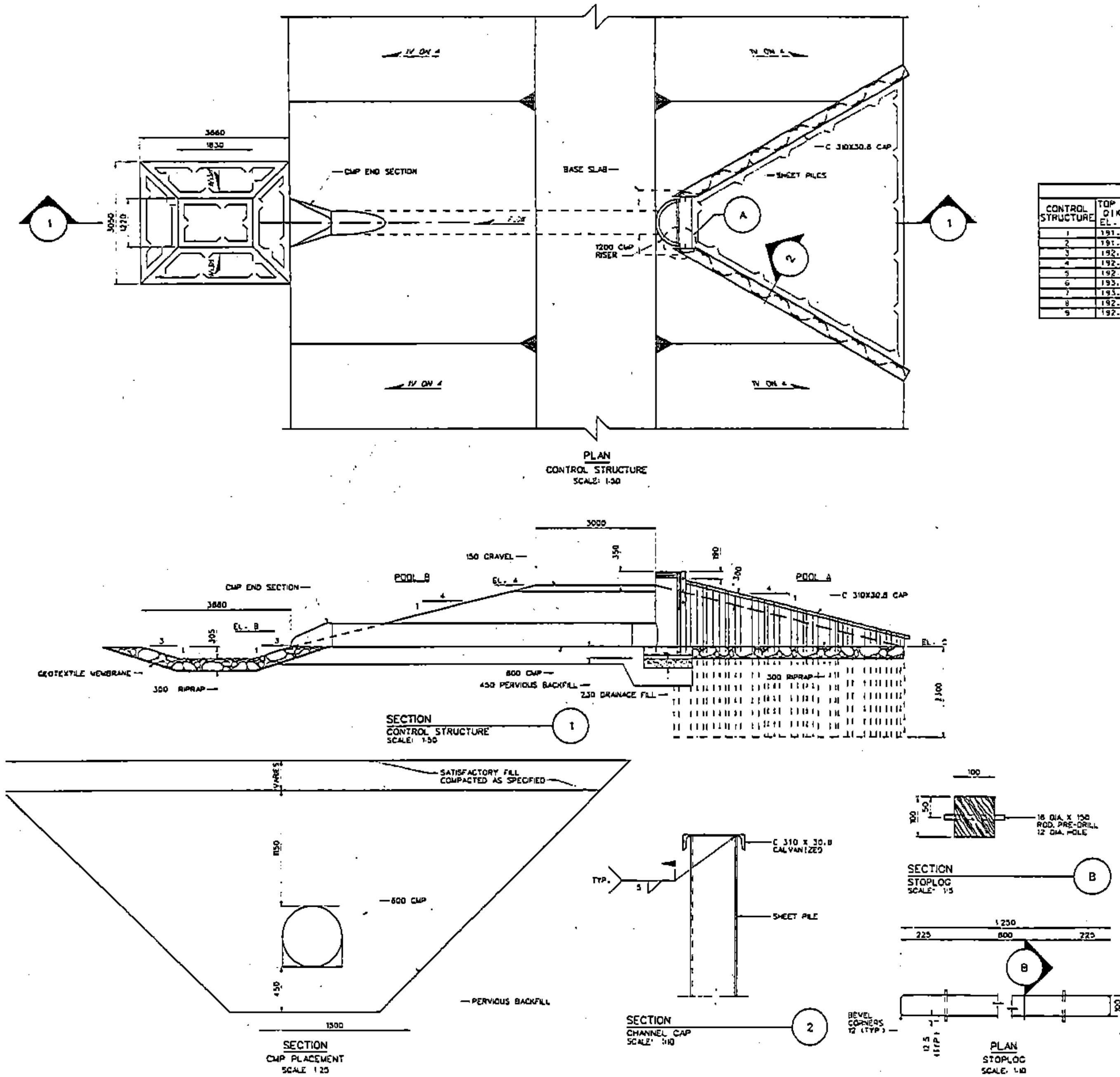


POOL SLOUGH
UMRS-EMP
PLATE 2


Twin Bluffs
Visgers Landing Public Access
Canal
Slough
Goose Lake
Jefferson
Minnesota
Winnebago
Albin
Creek
Slough
Pigpen Slough
Sew Diso Pond
HOUSTON CO
FOREST
ALLAMAKEE CO
IOWA
Sewage Disposal
GENERAL DIRECTION OF FLOW ONLY
Pigpen (Slough)
Wood Slough
Slough
Pool
Roadside Park
IOWA
UPPER
RIVER
PRE & POST 1978 FLOW
OF
WINNEBAGO CREEK
PRE 1978 ----------
POST 1978 _____ _____
PLATE 3


NEW ALBIN
Winnebago Creek
I&M Rail Link
Highway 26
Sewage treatment plant
POOL A
(16.2 ha)
Army Road
Dike
Ditch
POOL D1
(10.1 ha)
Dike
Sludge pond
breakout
POOL D2
(15.4 ha)
Dike
POOL B
(19.8 ha)
Drop inlet structure
Dike
POOL C1
(6.5 ha)
Dike
wooded
POOL C2
(4.0 ha)
Dike
Control structure
Pool Slough
PLAN
60 0 60 120 180
SCALE IN METERS
CONCEPTUAL PLAN


NEW ALBIN
Winnebago Creek
POOL A
(16.2 ha)
POOL B
(26.5 ha)
POOL C
(5.7 ha)
AREA E
(13 ha)
POOL D1
(9.8 ha)
POOL D2
(12.7)
Ditch
Pool Slough
SLUDGE POND
CONTROL STRUCTURE 1
CONTROL STRUCTURE 2
CONTROL STRUCTURE 3
CONTROL STRUCTURE 4
CONTROL STRUCTURE 5
CONTROL STRUCTURE 6
CONTROL STRUCTURE 7
CONTROL STRUCTURE 8
CONTROL STRUCTURE 9
ACCESS TO DIKE FROM EXISTING RR CROSSING (APPROX. LOCATION)
36" CIP
IOWA
MINNESOTA
RAILROAD
HIGHWAY
.10 TOPSOIL AND SEED
.20 STRIPPING
ORIGINAL GROUND SURFACE
DIKE FILL
TYPICAL DIKE SECTION
SCALE IN METERS
PLAN
SCALE IN METERS
CONTROL STRUCTURE
NOTES:
1. UNITS ARE IN METERS UNLESS OTHERWISE NOTED.
ALTERNATIVE PLAN
US Army Corps of Engineers
St Paul District
DEPARTMENT OF THE ARMY
ST. PAUL, MINNESOTA
CORPS OF ENGINEERS
ST. PAUL DISTRICT
RESERVED FOR AE LOGO
RESERVED FOR AE ADDRESS
ANYTOWN, USA
DESIGNED
DRAWN
CHECKED
SUBMITTED
DATE
SCALE AS SHOWN
CADD FILE NAME
DRAWING NUMBER
BASIN-T-CC/ENG.01
POOL SLOUGH
DIKE CONSTRUCTION
SITE PLAN



PLAN
CONTROL STRUCTURE
SCALE: 1:50

SECTION
CONTROL STRUCTURE
SCALE: 1:50

SECTION
CMP PLACEMENT
SCALE 1:25

SECTION
CHANNEL CAP
SCALE: 1:10

SECTION
STOPLOG
SCALE: 1:5

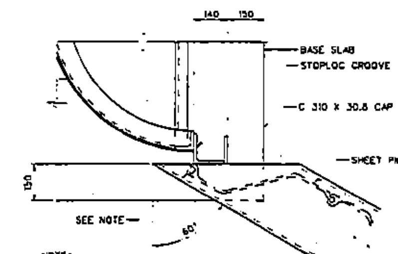
PLAN
STOPLOG
SCALE: 1:10

NOTES:

1. ALL UNITS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN METERS.
3. ELEVATIONS REFER TO MEAN SEA LEVEL (N.G.V.D. 1929 ADJ.)
4. ALL BOLTS FOR METAL CONSTRUCTION AND ANCHORS SHALL BE ASTM A325M, GALVANIZED AS SPECIFIED.
5. ALL CMP JOINT CONNECTIONS SHALL USE HUGGER BANDS AND RUBBER O-RING GASKETS AS SPECIFIED.
6. SHEET PILE SHALL BE OF THICKNESS AND SECTION MODULUS SPECIFIED.
7. PROVIDE 2 STOPLOG LIFTING HOOKS.
8. PLACE CMP BACKFILL TO A MINIMUM OF 300 ABOVE TOP OF PIPE. COMPACT BACKFILL WITH HAND EQUIPMENT TO SPECIFIED COMPACTION.
9. HAND PLACE AND HAND TAMP UNDER CMP HAUNCHES.

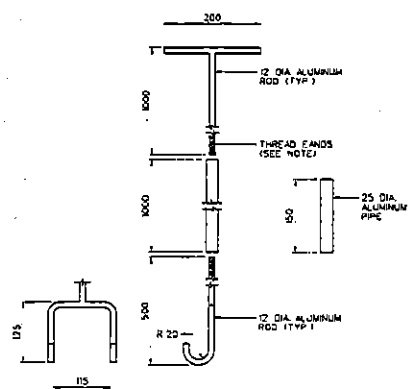
HEADWALL SCHEDULE

CONTROL STRUCTURE	TOP OF DIKE EL. A	PIPE INVERT EL. B	PIPE INVERT EL. C	FROM	TO	PIPE LENGTH (mm)
1	191.87	190.20	190.20	POOL A	DITCH SOUTH OF ARMY ROAD	9 730
2	191.70	190.00	190.00	POOL B	OUT	9 850
3	192.33	190.90	190.90	POOL C	POOL B	8 770
4	192.33	190.60	190.60	POOL C	POOL A	9 970
5	192.33	191.41	191.41	DITCH	POOL C	6 730
6	193.00	192.16	192.16	WINNEBAGO CREEK	DITCH	6 410
7	193.55	192.87	192.18	WINNEBAGO CREEK	POOL D1	9 770
8	192.63	191.26	191.57	POOL D1	POOL D2	8 530
9	192.02	191.00	191.00	POOL D2	OUT	7 130



NOTE:
PLACE SHEET PILE TO REST AGAINST STOPLOG GROOVE. MAINTAIN CONTACT BETWEEN SHEET PILE AND STOPLOG GROOVE OVER LENGTH OF STOPLOG GROOVE

DETAIL
INTERSECTION LAYOUT
SCALE: 1:10



DETAIL
STOPLOG LIFTING HOOK
SCALE: 1:5

STANDARD METRIC SCALES

US Army Corps of Engineers
St. Paul District

DEPARTMENT OF THE ARMY
ST PAUL, MINNESOTA
CORPS OF ENGINEERS
ST PAUL DISTRICT

DATE: 05-05-91
CADD FILE NAME: SLOUGH1U.DGN
SOL NO: DACW37-90-B-0000
AE APPROVING OFFICIAL

POOL SLOUGH
DIKE & HEADWALLS
STOPLOG CLOSURE STRUCTURE & HEADWALL SCHEDULE

DRAWING NUMBER
BASIN-T-CC/FND.01

S-13 OF 4

CONTROL STRUCTURE

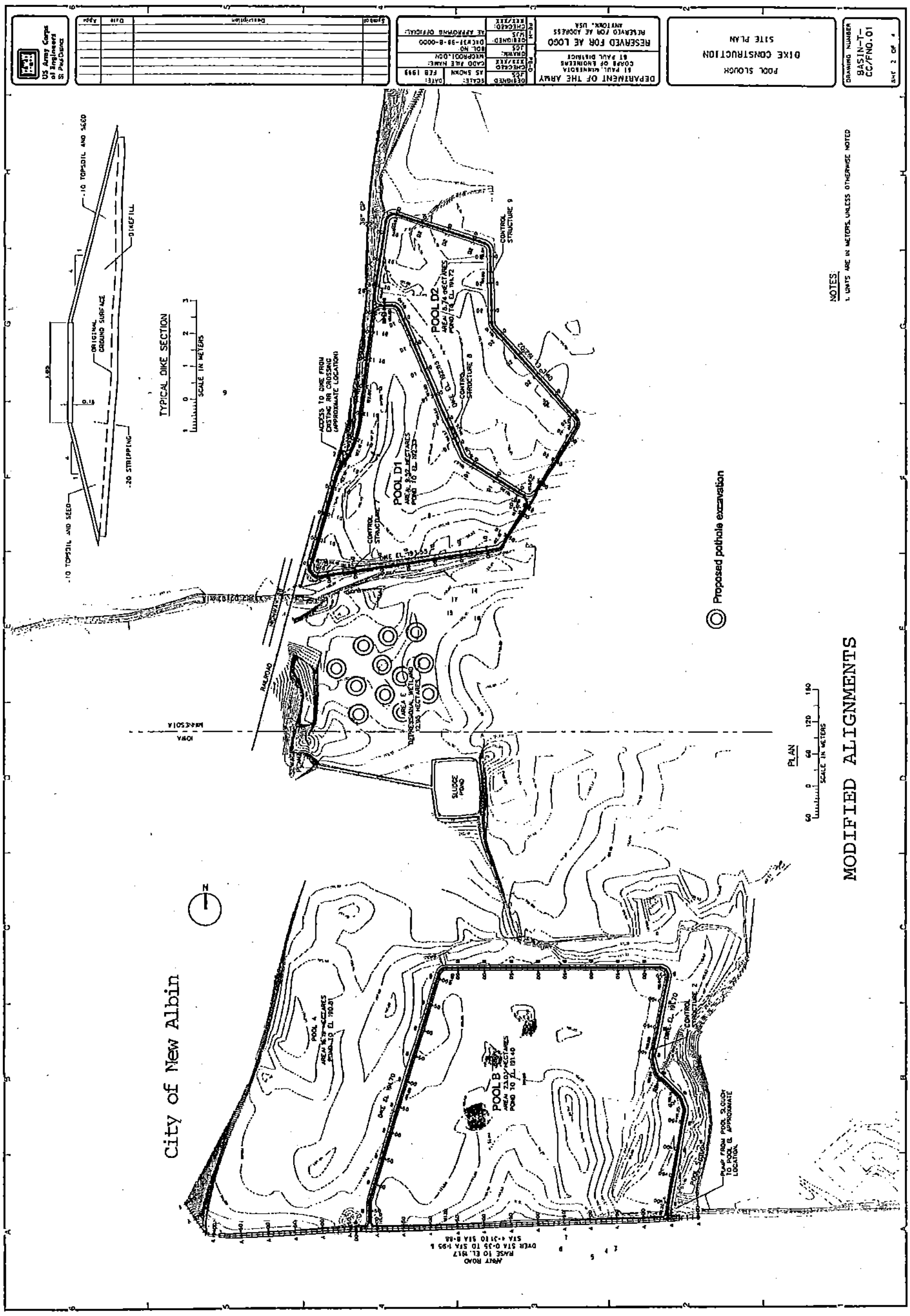
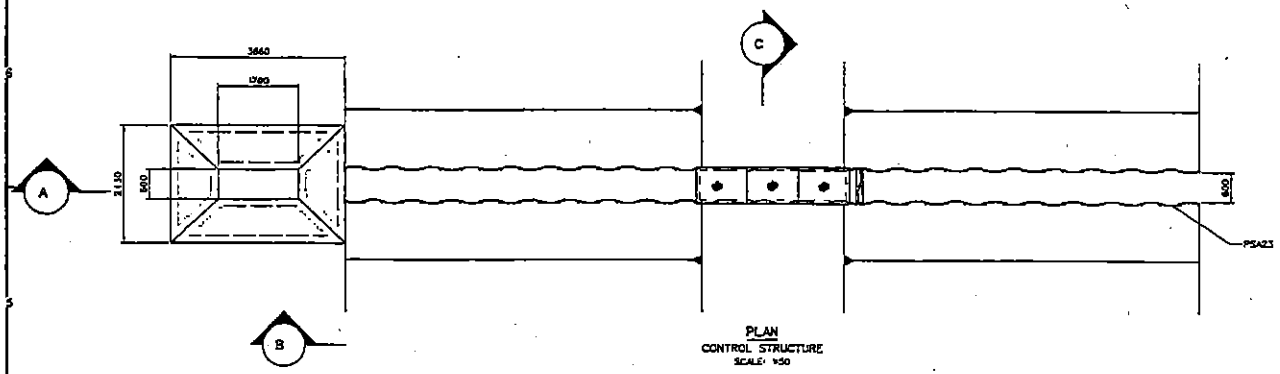

US Army Corps of Engineers St Paul District
DEPARTMENT OF THE ARMY
RESERVED FOR AE LOGO
POOL SLOUGH
DIKE CONSTRUCTION
SITE PLAN
TYPICAL DIKE SECTION
SCALE IN METERS
POOL D1
POOL D2
CONTROL STRUCTURE 9
CONTROL STRUCTURE 8
RAILROAD
IOWA
MINNESOTA
SLUDGE POND
Proposed pothole excavation
PLAN
SCALE IN METERS
MODIFIED ALIGNMENTS
NOTES:
1. UNITS ARE IN METERS UNLESS OTHERWISE NOTED
City of New Albin
POOL 4
POOL B
CONTROL STRUCTURE 2
ARMY ROAD

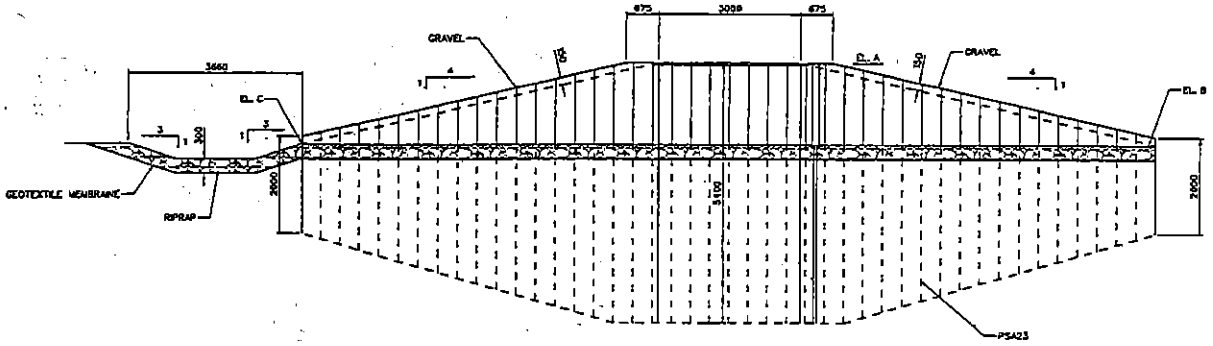
PLATE 7



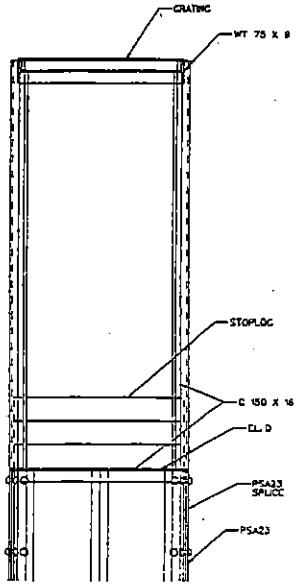
PLAN
CONTROL STRUCTURE
SCALE: 1:50

NOTES:

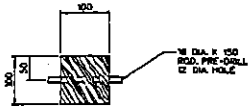
1. ALL UNITS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN METERS.
3. ELEVATIONS REFER TO MEAN SEA LEVEL (M.S.L.V.D. 1929 ADJ.)
4. SHEET PILE SHALL BE OF THICKNESS AND SECTION MODULUS SPECIFIED.
5. PROVIDE 2 STOPLOG LIFTING HOOKS.



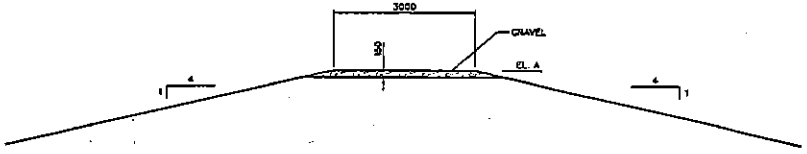
SECTION
SHEETPILE
SCALE: 1:50
A



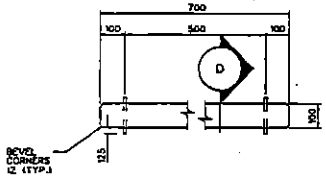
SECTION
STOPLOG
SCALE: 1:10
C



SECTION
STOPLOG
SCALE: 1:5
D



SECTION
DIKE
SCALE: 1:50
B



PLAN
STOPLOG
SCALE: 1:10

SHEETPILE CONTROL STRUCTURE

US Army Corps of Engineers
St. Paul District

No.	Description	Date	Appr

DEPARTMENT OF THE ARMY
ST. PAUL, MINNESOTA
CORPS OF ENGINEERS
ST. PAUL DISTRICT

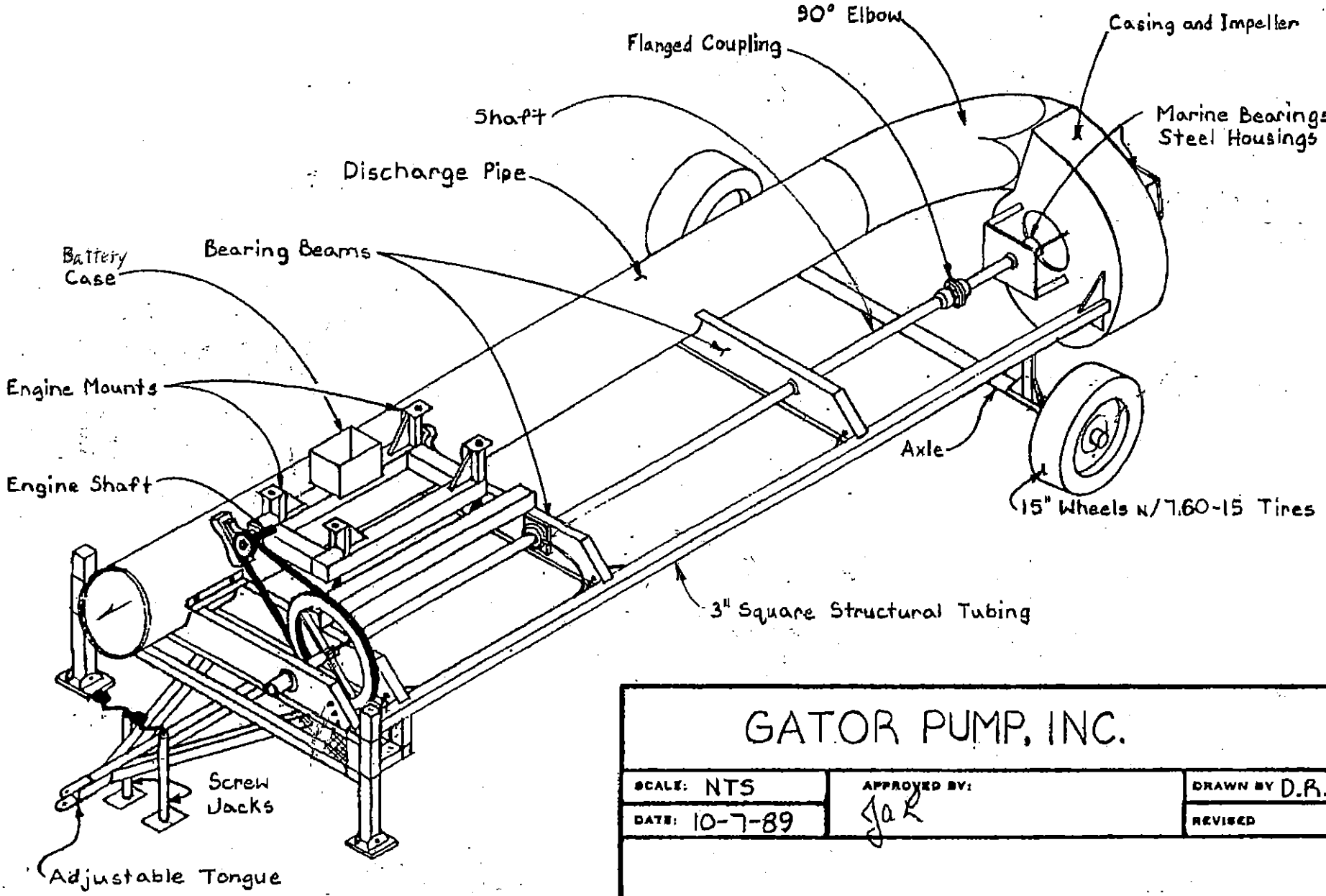
DESIGNED: TSF
DRAWN: TSF
TRACED: TSF
CHECKED: TSF
SCALE: AS SHOWN
CADD FILE NAME: TEMPLATES.DGN
DATE: 04-02-98
CONTRACT NO. DACW37-98-B-0000
RECOMMENDED: TSF
APPROVED: TSF
DATE: TSF

POOL SLOUGH
OFFICIAL DRAWING CLAS..
MAIN FEATURE SHOWN ON DRAWING
SUPPLEMENTAL INFORMATION

DRAWING NUMBER
BASIN-T-CC/ENG.01

SHT 999 OF 4

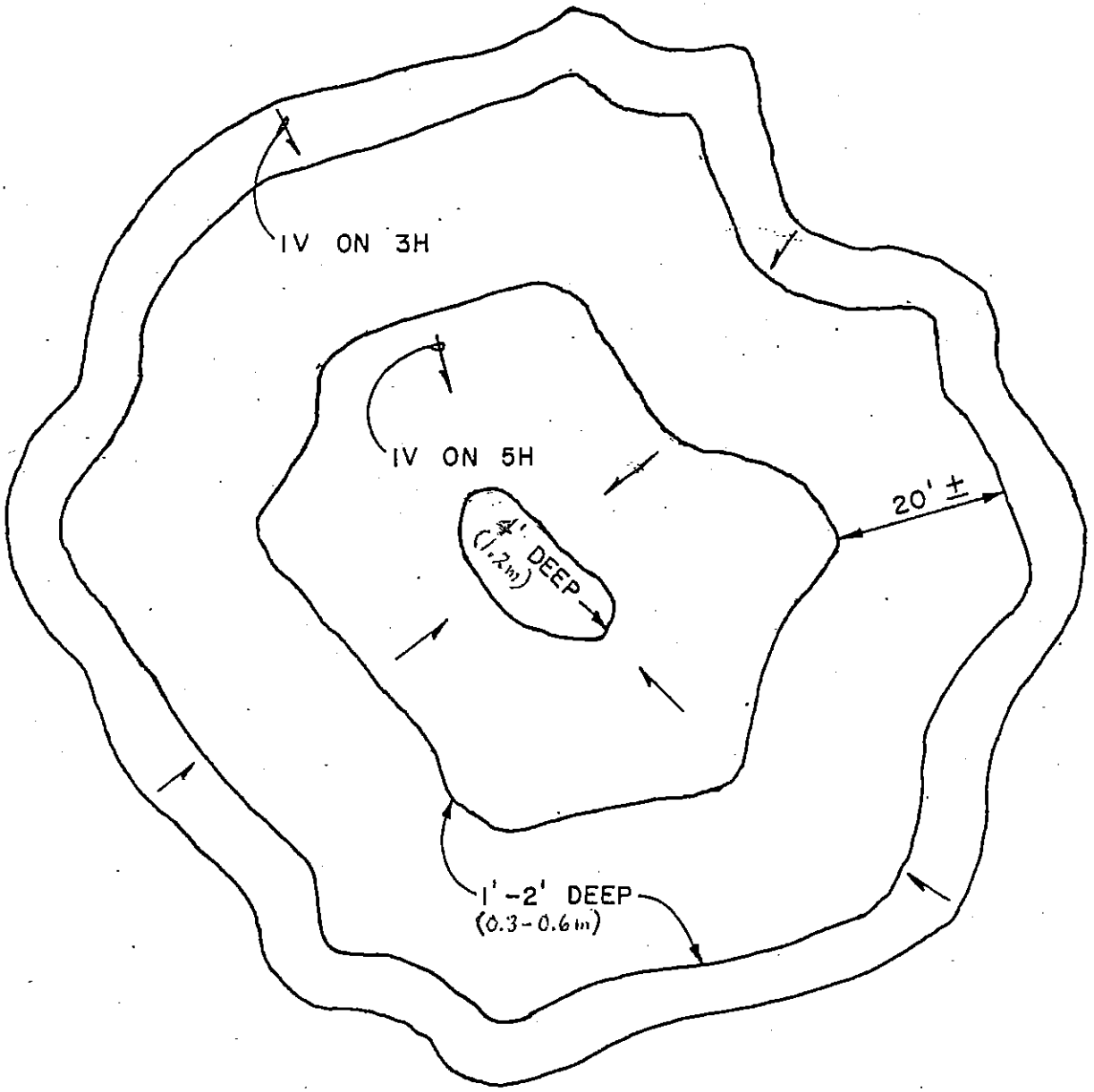
PLATE 8



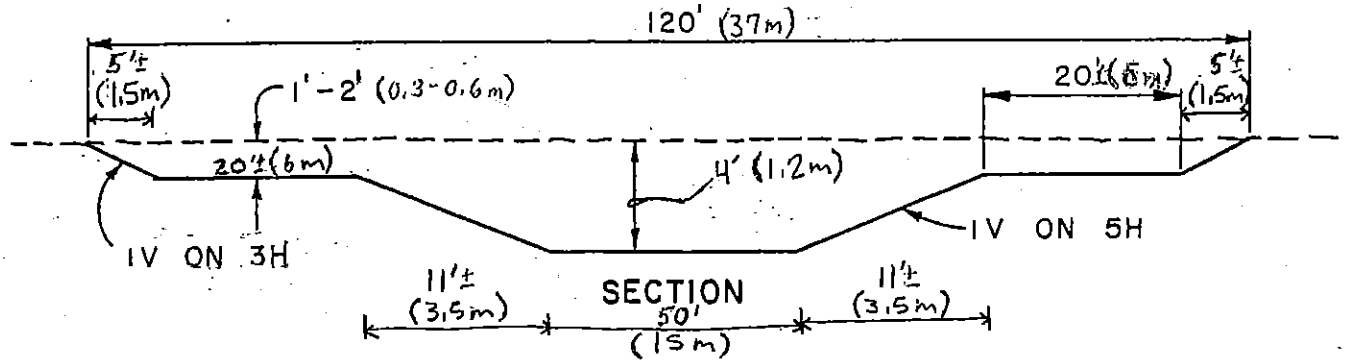
GATOR PUMP, INC.

SCALE: NTS	APPROVED BY: JaR	DRAWN BY D.R.B.
DATE: 10-7-89		REVISED
PUMP FOR POOL B		DRAWING NUMBER

PLATE 9



PLAN



TYPICAL POTHOLE EXCAVATION

AREA E

(Not included in selected plan)

PLATE 10

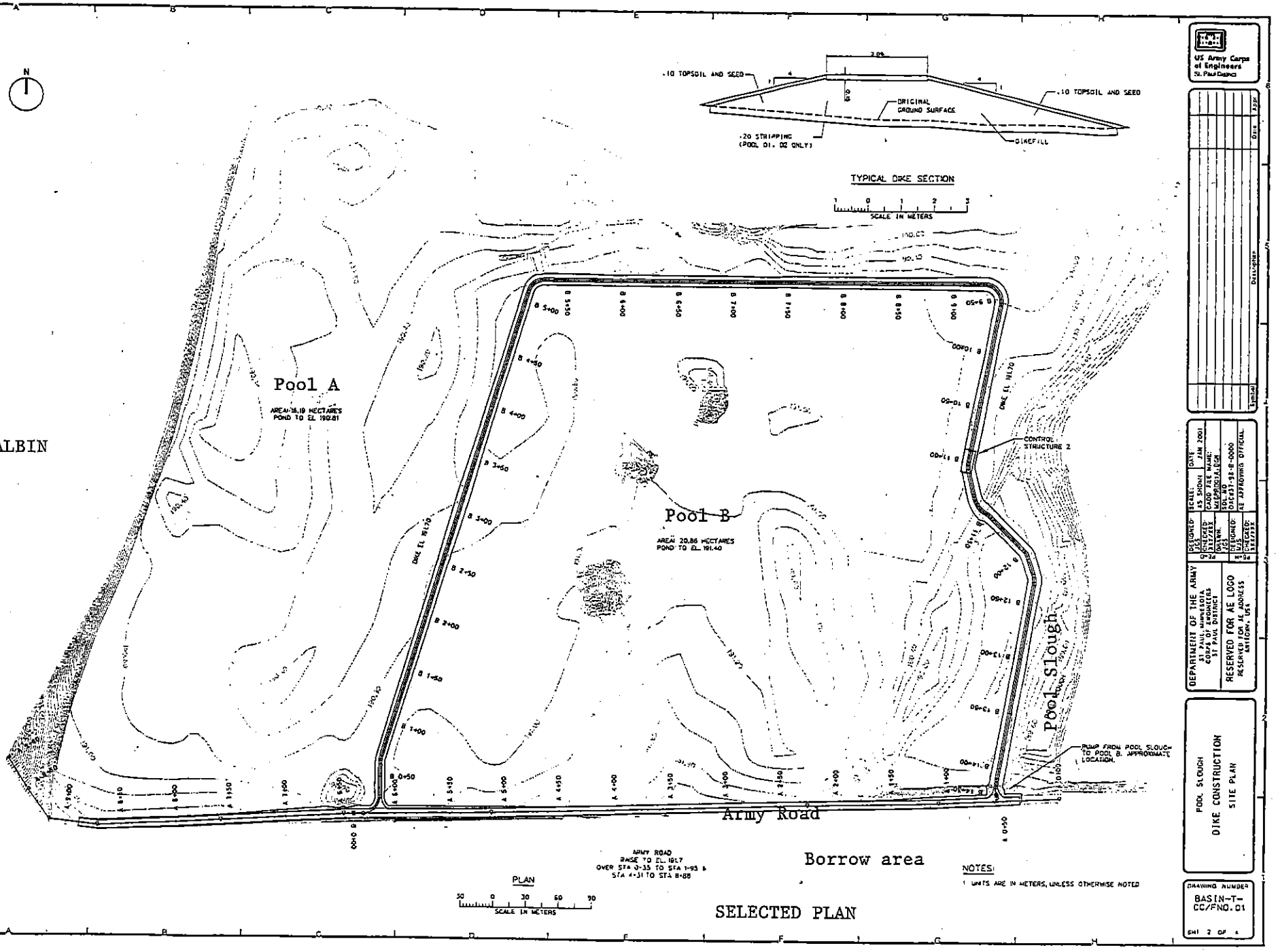

N
.10 TOPSOIL AND SEED
.20 STRIPPING (POOL 01, 02 ONLY)
ORIGINAL GROUND SURFACE
DIKEFILL
.10 TOPSOIL AND SEED
TYPICAL DIKE SECTION
SCALE IN METERS
NEW ALBIN
Pool A
AREA 16.19 HECTARES
POND TO EL. 190.81
Pool B
AREA 20.86 HECTARES
POND TO EL. 191.40
DIKE EL 191.70
CONTROL STRUCTURE 2
Pool Slough
PUMP FROM POOL SLOUGH TO POOL B. APPROXIMATE LOCATION.
Army Road
Borrow area
ARMY ROAD
RAISE TO EL. 191.7
OVER STA 0-35 TO STA 1+95 &
STA 4+31 TO STA 8+88
PLAN
SCALE IN METERS
NOTES:
1. UNITS ARE IN METERS, UNLESS OTHERWISE NOTED
SELECTED PLAN
US Army Corps of Engineers
St. Paul District
DEPARTMENT OF THE ARMY
ST PAUL, MINNESOTA
CORPS OF ENGINEERS
ST PAUL DISTRICT
RESERVED FOR AE LOGO
RESERVED FOR AE ADDRESS
Anytown, USA
DESIGNED
DRAWN
CHECKED
SCALE: AS SHOWN
DATE: JAN 2001
CADD FILE NAME: MCPOOL01.DGN
CONTRACT NO. DACW37-91-B-0060
AS APPROVED OFFICIAL
POOL SLOUGH
DIKE CONSTRUCTION
SITE PLAN
DRAWING NUMBER
BASIN-T-CC/FND.01
SHT 2 OF 4

PLATE 11

Attachment 2

Finding of No Significant Impact

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
190 FIFTH STREET EAST
ST. PAUL, MN 55101-1638

REPLY TO
ATTENTION OF

Project Management Branch
Planning, Programs, & Project Management Division

FINDING OF NO SIGNIFICANT IMPACT

In accordance with the National Environmental Policy Act of 1969, the St. Paul District, Corps of Engineers has assessed the impacts of the following project.

POOL SLOUGH WETLAND COMPLEX
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 9, UPPER MISSISSIPPI RIVER
ALLAMAKEE COUNTY, IOWA

The intent of the proposed project is to improve waterfowl migration habitat along the Upper Mississippi River near New Albin, Iowa. The proposed project involves the construction of dikes and a control structure to create a moist soil management unit. The area would be managed by the Iowa Department of Natural Resources to provide migration habitat for waterfowl during the spring and fall.

This Finding of No Significant Impact is based on the following factors: the proposed project would have beneficial impacts on wildlife resources; the project would have no impacts on the economic and cultural environments; the project would have minor impacts on the social environment and fishery resources; and continued coordination will be maintained with appropriate State and Federal agencies.

The environmental review process indicates that the proposed action does not constitute a major Federal action significantly affecting the quality of the environment. Therefore, an environmental impact statement will not be prepared.

24 JUL 03
Date

Robert L. Ball
Colonel, Corps of Engineers
District Engineer

Attachment 3

Section 404(b)(1) Evaluation

SECTION 404(b)(1) EVALUATION
POOL SLOUGH WETLAND COMPLEX
POOL 9, UPPER MISSISSIPPI RIVER
ALLAMAKEE COUNTY, IOWA

I. PROJECT DESCRIPTION

A. Location and Background - The project area is located on the Minnesota and Iowa border (See plates 1, 2, and 7 of the main report).

The Corps of Engineers is proposing to construct dikes on the State of Iowa Wildlife Management Area lands. The overall purpose of the project is to preserve, restore, and enhance wildlife habitat on these lands by providing improved water management capabilities. Features of the project include dikes, water level control structure, and a trailer-mounted pumping facility.

B. General Description - The proposed action involves the construction of approximately 1,400 meters (4,600 feet)of dikes to create a moist soil impoundment. The dikes would average about 1.2 meters (4 feet) high, with a 3.05 meter (10 foot) top width and 1 vertical on 4 horizontal side slopes. The dikes would be constructed of material obtained from a borrow site on the south side of Army Road, and seeded. A 0.15-meter (5-inch) thick gravel surface would be placed on portions of the dike for vehicle access to the control structures. Soils in the area are primarily silty sand or silty loam. Construction of the dikes would create a 21-hectare (52-acre) management cell in which the water levels could be manipulated to control the type and extent of aquatic vegetation for migratory waterfowl.

C. Authority and Purpose - This project would be constructed under authority of Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The purpose of the dikes is to increase water management capabilities to improve habitat conditions for migratory waterfowl and other wildlife. The dikes would allow ponding of up to 0.6 meter (2 feet) of water and would allow resource managers to control water levels to enhance waterfowl food production, to provide feeding habitat for migrating waterfowl, and to control encroachment of woody vegetation in the area.

D. General Description of Dredged and Fill Material

1. General Characteristics of the Material - The dike would be constructed primarily from random fill material obtained from a borrow site on the south side of Army Road. Soils in the area are silty sand and silty loam.

2. Quantity of Material - The estimated quantities of various fill materials are as follows: dike fill – 9,000 cubic meters (11,700 cubic yards); topsoil - 1,760 cubic

meters (2,300 cubic yards); aggregate fill - 755 cubic meters (1,000 cubic yards); rockfill - 80 cubic meters (100 cubic yards);

3. Source of the Material - The dike fill would be obtained from a borrow area on the south side of Army Road. Rockfill and aggregate would come from approved quarries in the vicinity.

E. Description of the Proposed Discharge Site

1. Location - The proposed fill would be located on the Pool Slough Wildlife Management Area in Iowa.

2. Size - The proposed activity would occur in a 23-hectare (57-acre) portion of the project area.

3. Type of Site - The proposed discharge site is a seasonally flooded wetland site.

4. Types of Habitat - The habitat at the site is primarily a seasonally flooded wetland with some scattered areas of permanent and semi-permanent wetland, and old field. A mix of bottomland forest, shrub/scrub wetland and slough habitat bound the area on the east.

5. Timing and Duration - The proposed discharge is expected to take place during the construction seasons of 2003 through 2004.

F. Description of Disposal Method - The dikes would be built by using materials excavated and trucked from the borrow site adjacent to the project area on the south side of Army Road. Final shaping of the dikes would be done with a dozer and/or other mechanical means.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations - The construction of the dikes would cover approximately 2 hectares (5 acres). The area is dry during normal pool levels. Soils in the proposed fill area are primarily silty sand or silty loam.

B. Water Circulation, Fluctuation, and Salinity Determinations

1. Water

a. Salinity - Not applicable.

b. Water Chemistry - The proposed discharge activities would have no impact on water chemistry.

c. Clarity - There would be no appreciable effects on water clarity. During dike construction there could be short-term localized reductions in water clarity due to increases in turbidity.

d. Color - The proposed discharge activities would have no impact on water color.

e. Odor - The proposed discharge activities would have no impact on water odor.

f. Taste - The proposed discharge activities would have no impact on water taste.

g. Dissolved Gas Levels - The proposed discharge activities would have no impact on dissolved gas levels.

h. Nutrients - The proposed discharge activities would have no impact on nutrient levels.

i. Eutrophication - The proposed discharge activities would have no impact on eutrophication.

j. Temperature - The proposed discharge activities would have no impact on water temperature.

2. Current Patterns and Circulation

a. Current Patterns and Flow - The proposed action would have some impacts on current patterns or flows across the area that are associated with the more frequent flood events. The dikes would prevent flows associated with up to the 5-year flood events from flowing freely across portions of the project area. Flow at these flood events would enter the area only if the control structures were open, which is likely to be the mode of operation. Pumping from Pool Slough to fill the management cell in the fall would have no appreciable effect on the flow or current patterns in Pool Slough.

b. Velocity - The proposed discharge activities would have no impact on water velocity.

c. Stratification - The proposed discharge activities would have no impact on stratification.

d. Hydrologic Regime - The proposed discharge activities would have no impact on the hydrologic regime.

3. Normal Water Level Fluctuations - The proposed discharge activities would affect water level fluctuations since the purpose of the project is to provide the capability to manage water levels in the project area. The dikes would provide the ability to pond water to a depth of 0.6 meter (2 feet) in the management cell at various times of the year.

4. Salinity Gradients - Not applicable.

5. Actions Taken to Minimize Impacts – To avoid changing any existing flow patterns, dikes would not be located in the current Pool Slough flowage area. Minimal disturbance of the project site would take place because no grading of the existing site would be performed. No other special actions would be taken to minimize impacts because only the minimum quantity of fill needed to construct the dikes would be used.

C. Suspended Particulate/Turbidity Determinations - Dike construction would likely result in some temporary localized increases in turbidity. Levels of turbidity would return to normal after construction.

D. Contaminant Determination - The fill would be material obtained from a borrow area adjacent to the project area and rockfill would be used at the control structure and pump site. Neither material would introduce contaminants into the aquatic system. The proposed activities would have no appreciable effects on the location or levels of contaminants in the aquatic system.

E. Aquatic Ecosystem and Organisms Determinations

1. Effects on Plankton - The proposed actions would have no effect on plankton.

2. Effects on Benthos - The proposed action would have no effect on benthos.

3. Effects on Fish and Wildlife - The proposed activity would result in the direct conversion of 2 hectares (5 acres) of seasonally flooded wetland habitat to dike. This loss would have a negligible effect on the aquatic ecosystem. Overall, the project should have a substantial beneficial effect on the wildlife resources in the project area by providing the capability for improved water management, thereby increasing the quality of habitat for wildlife. The construction of the dikes would reduce the value of the area as fish spawning habitat. About one-third of the 61 hectare (152 acre) area would be less accessible during the more frequent flood events since the only access points would be through the control structure. While access to spawning areas during the less frequent flood events would not be affected, some fish could be trapped within the management cells as the floodwaters recede.

4. Effects on Aquatic Food Web - The proposed action would have no appreciable effect on the aquatic food web.

5. Effects on Special Aquatic Sites

a. Sanctuaries and Refuges - The project area is a State Wildlife Management Area (WMA). The proposed action would allow for more effective water level management on the WMA to improve waterfowl and shorebird habitat.

b. Wetlands, Mudflats and Vegetated Shallows - The majority of the area is considered a seasonally flooded wetland. The proposed activity would result in the direct conversion of 2 hectares (5 acres) of seasonally flooded wetland habitat to dike. The proposed dike alignment is required in order to meet project objectives. Overall, the change in the flooding patterns on about 23 hectares (57 acres) would be considered beneficial.

6. Threatened and Endangered Species - The proposed activity would have no appreciable effect on State or Federally listed threatened or endangered species. The proposed activities would not affect the suitability of the existing nesting sites for either bald eagles or ospreys in the vicinity. There is no suitable habitat for Higgin's eye pearly mussel in the area. Critical habitat for the State listed wood turtle, Blanding's turtle, river otter, Red-shouldered hawk, king rail, or American bullfrog would not be affected by the proposed construction activities.

7. Actions Taken to Minimize Impacts - Best management practices would be used during construction to minimize runoff from the site during construction. No other special actions would be taken to minimize impacts.

F. Proposed Disposal Site Determination

1. Mixing Zone Determination - Not applicable. The material would not be dispersed.

2. Determination of Compliance with Applicable Water Quality Standards - The proposed fill activity is expected to comply with applicable state water quality standards. Water quality certification has been obtained from Iowa. Best management practices would be used to minimize the erosion and runoff from the site during construction.

3. Potential Effects on Human Use Characteristics - The area is currently open to hunting during the waterfowl season. Human disturbance is an important factor in contributing to the value of migration habitat for waterfowl. Since a primary objective of the project is to improve waterfowl migration habitat, the area would be closed to hunting.

G. Determination of Cumulative Effects on the Aquatic Ecosystem - No cumulative effects would occur on the aquatic ecosystem.

H. Determination of Secondary Effects on the Aquatic Ecosystem - No significant negative affects would result from the proposed project.

III. FINDINGS OF COMPLIANCE

The proposed discharge of fill material would comply with the Section 404(b)(1) guidelines of the Clean Water Act. No significant adaptations to the Section 404(b)(1) guidelines were made for this evaluation. No alternatives were identified that would accomplish the purposes of the proposed project that would not involve the deposition of fill. Other alternatives considered were different dike designs and alignments and sources of fill. They were not selected because they were either not effective in meeting the project objectives or were higher in cost.

The proposed discharge of dredged material would comply with all State of Iowa water quality standards, Section 307 of the Clean Water Act, and the Endangered Species Act of 1973, as amended. The proposed action would have no adverse impacts on human health or welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, wildlife, and special aquatic sites. The life stages of aquatic organisms and other wildlife would not be adversely affected. No significant adverse effects on aquatic ecosystem diversity, productivity, and stability, or on recreational, aesthetic, and economic values would occur.

On the basis of this evaluation, I specify that the proposed action complies with the requirements of the guidelines for discharge of fill material.

24 JUL 03
Date

Robert L. Ball
Colonel, Corps of Engineers
District Engineer

Attachment 4

Habitat Analysis

Note

This appendix was prepared for the project when it included development of pools on lands managed as a national wildlife refuge by the U.S. Fish and Wildlife Service. The final selected plan recommends construction of only one pool (pool B).

HABITAT EVALUATION PROCEDURE USED FOR THE POOL SLOUGH WETLAND COMPLEX HABITAT EVALUATION AND ENHANCEMENT PROJECT

Habitat evaluation procedures (HEP) were used to evaluate the potential benefits of the proposed habitat improvement features for the Pool Slough project area. Active participants included biologists from the St. Paul District, the U.S. Fish and Wildlife Service and the Iowa Department of Natural Resources.

METHODS

METHODOLOGY

The U.S. Fish and Wildlife Service's 1980 version of Habitat Evaluation Procedures (HEP-80) was used to quantify the potential project effects and benefits. The HEP methodology utilizes a Habitat Suitability Index (HSI) to rate habitat quality on a scale of 0 to 1 (1 being optimum). The HSI is multiplied by the number of acres of available habitat to obtain Habitat Units (HU's). One HU is defined as one acre of optimum habitat. By comparing existing HU's to HU's expected to be gained with the proposed action, the benefits can be quantified.

EVALUATION SPECIES SELECTION

The establishment of secure, dependable waterfowl migration habitat along the Mississippi River is a key management objective of the Iowa DNR. One of the management components of the Upper Mississippi River Wildlife and Fish Refuge is to maintain and improve migratory habitat for waterfowl. The highest projected use in the project area is as migration habitat, especially by geese and dabbling ducks. State and Federal resource managers identified that the key management objective for the project area is to improve its value as migration habitat, especially for waterfowl, and dabbling ducks were selected as the indicator species.

There were no available models for evaluating migratory habitat for waterfowl along the Upper Mississippi River. Therefore, a model to evaluate dabbling duck migratory habitat along the Upper Mississippi River was developed for this evaluation (enclosure 1).

DATA REQUIREMENTS

The model requires information regarding vegetation species composition and distribution, water conditions during migration

periods and the predictability of water availability. Land use and vegetation composition were obtained from aerial photographs and on-site visits. Water conditions in the project area during the spring and fall were determined by comparing the discharge, frequency, and stage-duration information at Pool Slough to the existing topography, on-site visits and aerial photography.

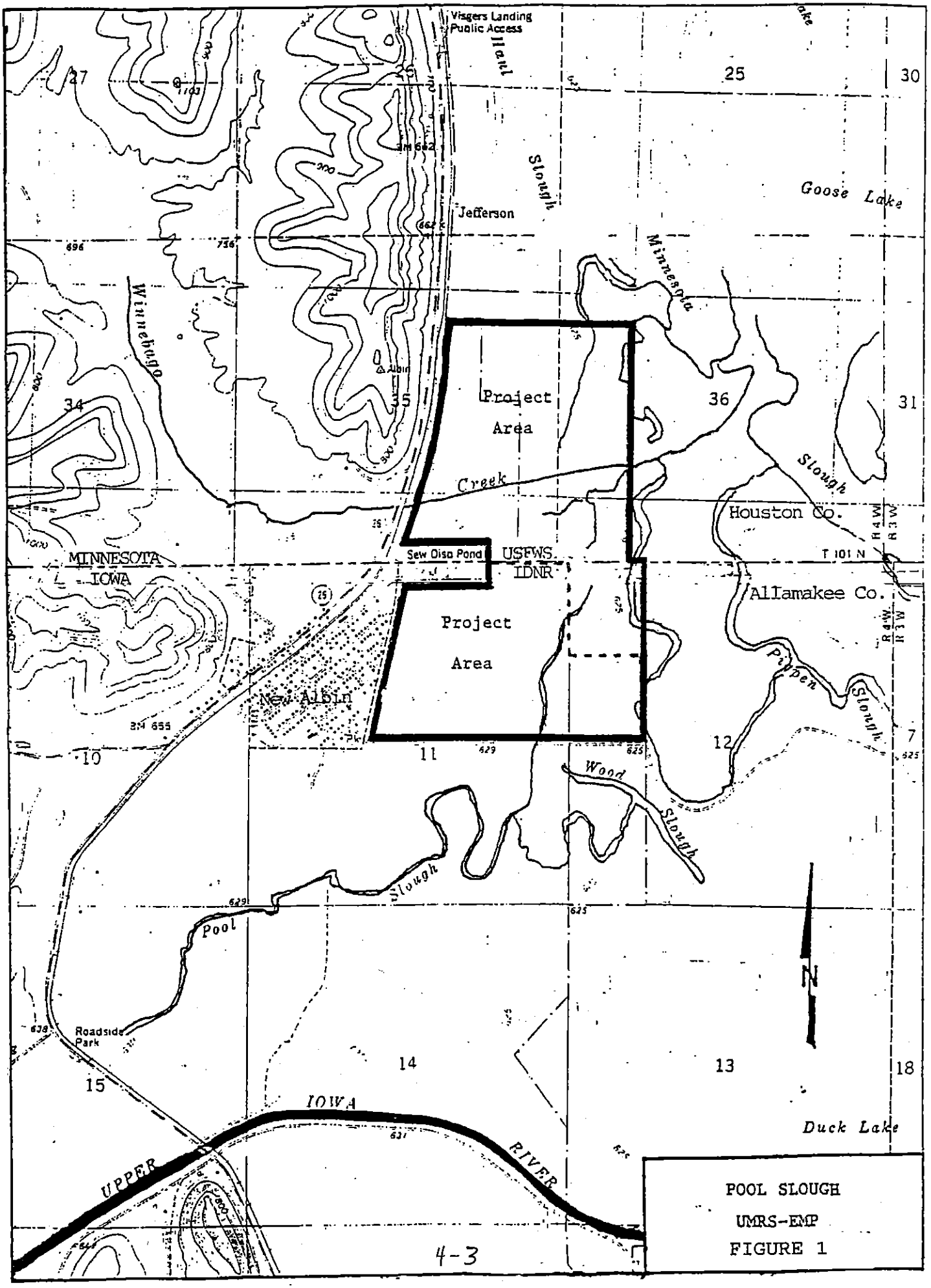
EVALUATION AREA AND PLAN COMPONENTS

The core study area of the Pool Slough project area is a 144 hectare area comprised of 53 ha of U.S. Fish and Wildlife Service property in Minnesota and 91 ha owned by the Iowa Department of Natural Resources (Figure 1). The area is generally bounded by a gravel road (Army Road) on the south, the city of New Albin, Iowa, the Soo Line Railroad and Highway 26 embankments on the west, wooded areas with relatively straight tree lines along the north and northeast, and a series of sloughs (Pool Slough) and bottomland hardwoods on the east. Preliminary evaluations considered conditions in this entire area. As the study progressed, design considerations reduced the project area to an 83 ha area (Figure 2). This was based primarily on topographic conditions at the site that would be conducive to economic dike construction. Generally the dikes are layed out along existing contours and avoid the need for extensive clearing of wooded vegetation or the construction of very high dikes.

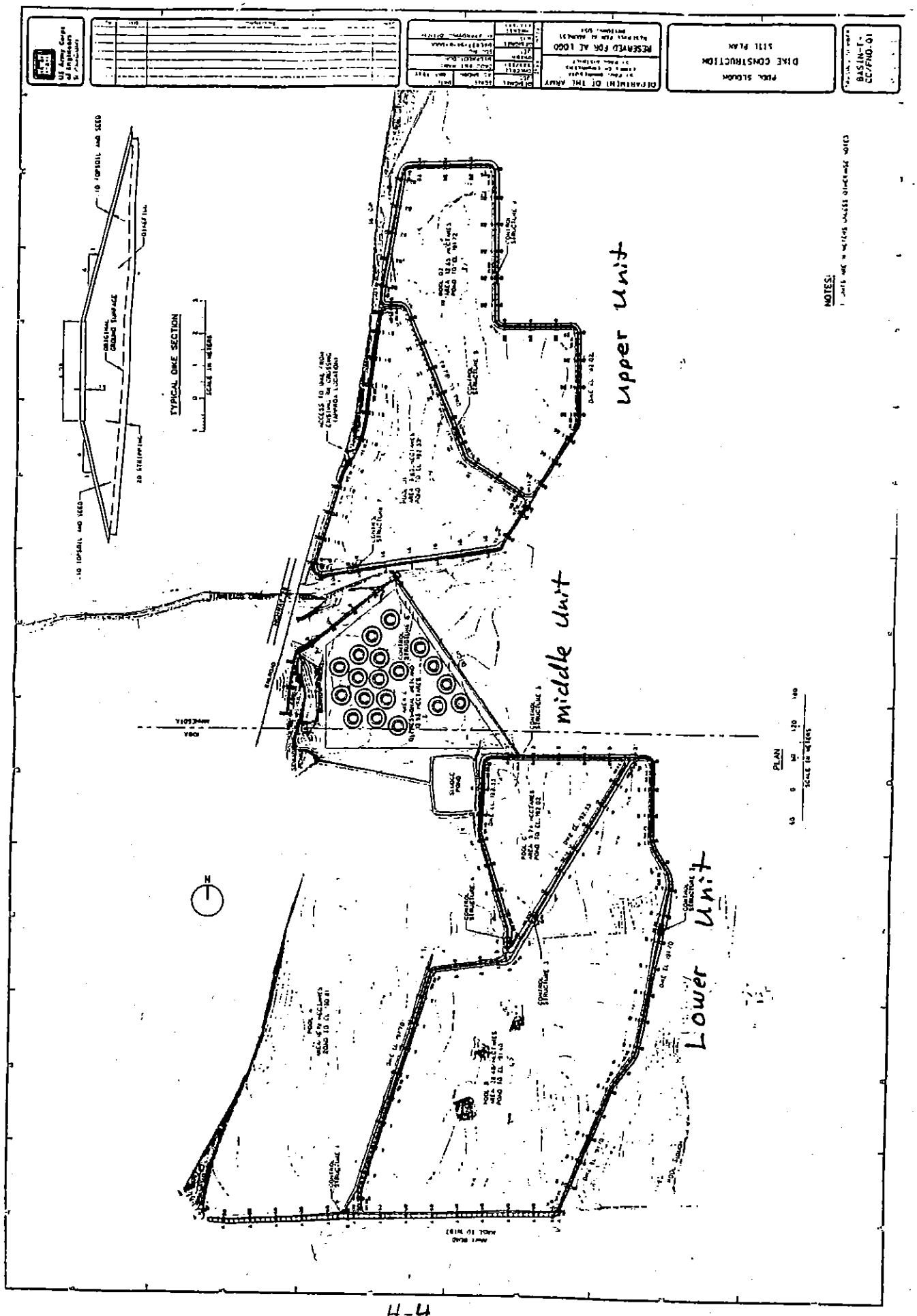
Initially, the primary study area was divided into three distinct evaluation areas, the Upper Unit (north of Winnebago Creek), which is generally higher, the Middle Unit and the Lower Unit (both south of Winnebago Creek) which are generally flooded on a more frequent basis. The Upper Unit is 22 ha (55 ac), the Middle Unit is 13 ha (32 ac) the Lower Unit is 48 ha (119 ac).

Several management cells for the moist soil units were developed in the design process and identified as management cells A through D. Design considerations for management cells A through D were that each cell should have a depth of about .5 to 2 feet across at least 80% of the management cell once it was flooded, and should be filled and drained with gravity flow from Winnebago Creek. In order to allow Winnebago Creek to follow natural breakout points during high flows, development of moist soil units in the Middle Unit was not considered. Initial designs provided water supply to cells A through C via a ditch across this area. Measures to improve habitat conditions in the Middle Unit were confined to the excavation of potholes to provide more permanent water in this area.

Additional design criteria included a restriction that the discharge from the New Albin sewage treatment ponds, which currently flow down an existing ditch, not be affected.



POOL SLOUGH
UMRS-EMP
FIGURE 1


Upper Unit
Middle Unit
Lower Unit
TYPICAL DIKE SECTION
PLAN
NOTES:
DIKE CONSTRUCTION
SITE PLAN
RESERVED FOR AE 1000
DEPARTMENT OF THE ARMY
BASIN-T-CC/PND-01

4-4

FIGURE 2

As design studies proceeded it was discovered that site conditions south of Winnebago Creek were considerably different than was assumed when the study was first initiated. Winnebago Creek spreads out considerably more than was originally assumed. As a result, a fairly large portion of the area to the south is flooded on a year round basis. This affected the constructability of Management Cell C. It also became apparent that maintenance of the water supply ditch could be a continual problem. Also given the topography of the area, it became increasingly clear that it would be difficult provide an effective system over the entire area based only on gravity flow.

As design considerations changed from managing water levels over the majority of the area in the lower unit to managing water levels on a portion of the area, the evaluation areas were redefined to combine the middle and lower units as one evaluation unit (figure 3). This approach more accurately quantifies the potential benefits of the proposed measures on the overall migration habitat value of the area to the south of Winnebago Creek.

The features proposed for the Lower Unit include a 23 ha (58ac) moist soil unit that would be filled by pumping water from Pool Slough, and the excavation of potholes.

HABITAT SUITABILITY INDEX CALCULATIONS

Model matrixes and Habitat Suitability Index (HSI) calculations are presented in enclosure 2. HSI's were calculated for the existing conditions and for the future with project conditions in each management unit. Habitat unit calculations were rounded to the nearest HU. The assumptions and data sources used to the variable values are listed in the evaluation sheet under the comments column. Other general assumptions used in completing this evaluation were:

1. Up to 10 percent of the flow from Winnebago Creek can be diverted at anytime to fill the management cells in the Upper Unit. This would have no appreciable effect on Pool Slough water levels or current patterns.

2. Habitat benefits associated with water availability and water levels would realized with the first year of operation. Benefits associated with vegetation composition would be realized within 5 years.

3. The period of analysis for this project is 50 years.

EXISTING CONDITIONS

Depending on the water conditions in any given year, the Pool

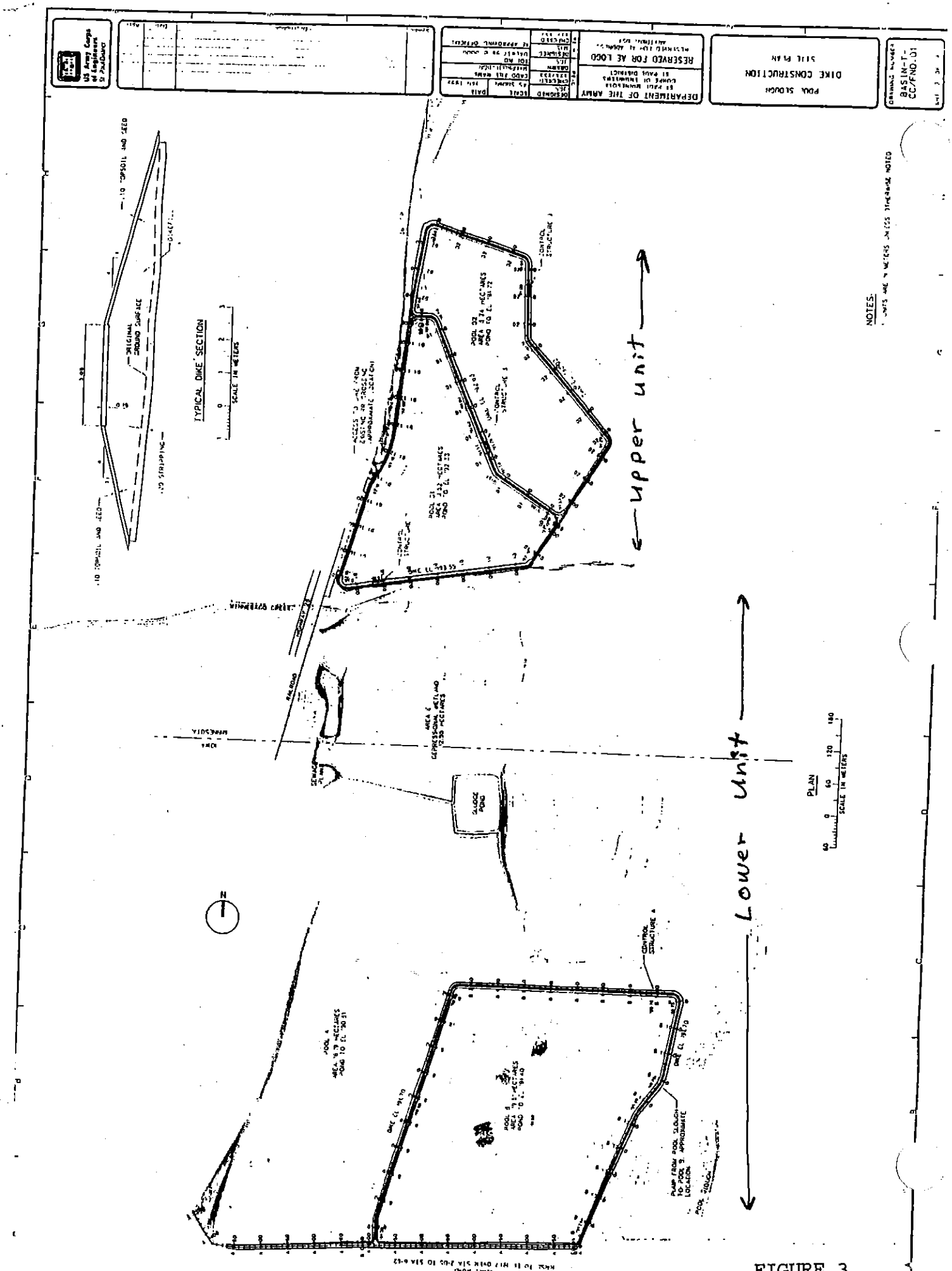

Upper unit
Lower Unit
TYPICAL DIKE SECTION
SCALE IN METERS
PLAN
SCALE IN METERS
NOTES:
SLUDGE POND
CONTROL STRUCTURE
ORIGINAL GROUND SURFACE
DEPARTMENT OF THE ARMY
RESERVED FOR AE LOOD
POOL SLOUGH
DIKE CONSTRUCTION
SITE PLAN
BASIN-T-CC/FND.01

FIGURE 3

Slough area may provide fair to good migration habitat for waterfowl in the spring. While up to 86 % the area south of Winnebago Creek is usually flooded in the spring, the water is uncontrolled when present, and is often only available for a few weeks. While the sloughs and potholes provide some habitat in the fall, the area is open to hunting and the majority of the area is usually not flooded during this critical time of year. The area south of Winnebago Creek provides somewhat better migration habitat than the area above Winnebago Creek because a greater portion of the area floods in the spring and about 34% (51 acres) of the Lower Unit usually has some water present in the fall. Because of the limited area flooded in the spring and the usual lack of water in the fall, the Upper Unit provides minimal migration habitat with an HSI of .1. The Lower Unit provides better spring and fall migration habitat with an HSI of .3.

FUTURE WITHOUT PROJECT CONDITIONS

If no actions are taken, it is expected that habitat conditions in the project area south of Winnebago Creek will remain about the same. The conditions in the project area are adapted to the current hydrologic regime and are not expected to change appreciably. It is probable that the annual spring flooding will limit the encroachment of woody vegetation into much of the area. The northwest corner of the unit, located between the treatment ponds and Winnebago Creek, will likely become dominated with willows as this area is higher and subject to less frequent flooding.

The habitat conditions in the Upper Unit may exhibit a greater degree of change. This area is slightly higher in elevation and is only flooded one out of every three years. In the absence of any management measures, it is likely that woody vegetation would encroach on the area. It is estimated that woody vegetation could comprise up to 35% of the area over the evaluation period. The area would still provide minimal waterfowl migration habitat with an HSI of .1.

FUTURE WITH PROJECT CONDITIONS

Data indicates that the major component limiting migration habitat quality in the Pool Slough area is water availability and predictability. Vegetation composition and distribution, although not optimum, is fairly good and 30-50% of the area is of preferred water depth for dabblers when the area is flooded in the spring. Providing the capability to manage water availability at desired water depths during critical time periods would improve the HSI in the areas to be diked on the Upper Unit to .71. Construction of a moist soil unit (MSU) on the Lower Unit would increase the area where water would predictably be

available each spring and fall from 20 ha (51 ac) to 43 ha (109 ac), which is about 72% of the Lower Unit. This would improve the HSI of the area to .56.

The construction of potholes in and by themselves were not considered to be a preferred approach to increasing the migration habitat value in the area. While the construction of such features would increase the amount of permanent water in the area, there would be no control of water levels and little opportunity to control vegetation composition in these areas. However, the USFWS did identify that the construction of up to 3 acres of potholes in the Lower Unit could increase the overall habitat value in the area by increasing the diversity of wetland types in the area. Due to the limited extent of this feature, pothole development was only considered as a project increment after the construction of the MSU.

Construction of potholes in the northwest corner of the lower unit would limit the growth of persistent woody vegetation in this portion of the evaluation area. As there is no component in the migration model that addresses wetland diversity, the multiplier component was increased slightly (from .8 to .85)) to address this potential benefit. The HSI value would increase from .56 with the construction of the MSU to .60 with the construction of the MSU and potholes.

HABITAT UNIT CALCULATIONS

Habitat unit calculations for the various features are presented in enclosure 1 and are summarized in table 1.

During the design process, the opportunity to substantially decrease the construction cost in the Upper Unit was identified. Field surveys identified that the topography dropped off more sharply than originally assumed on the northern edge of the unit. As a result, the required dikes were substantially higher in this reach than in other areas. A portion of the dike alignment was shifted south, decreasing the size of the proposed management unit from 22 ha to 18 ha. This decreased the construction cost by over $200,000. Habitat units were calculated for this reduced area and are included in table 1 (Upper Unit-Modified).

TABLE 1. SUMMARY OF HABITAT UNIT CALCULATIONS - POOL SLOUGH EMP

FEATURE	EVALUATION SPECIES	ACRES	FUTURE WITHOUT CONDITIONS					FUTURE WITH CONDITIONS					AAHU GAIN
			TY0	TY1	TY5	TY50	AAHU*	TY0	TY1	TY5	TY50	AAHU	
UPPER UNIT	DABBLING DUCK	55	0.1	0.1	0.1	0.1	6	0.1	0.65	0.7	0.7	38	32
UPPER UNIT MODIFIED	DABBLING DUCK	46	0.1	0.1	0.1	0.1	5	0.1	0.65	0.7	0.7	30	25
LOWER UNIT	DABBLING DUCK	151	0.3	0.3	0.3	0.29	45	0.3	0.5	0.56	0.56	84	39
LOWER UNIT + POTHOLES	DABBLING DUCK	151	0.3	0.5	0.56	0.56	84	0.3	0.52	0.6	0.6	90	6

INCREMENTAL ANALYSIS

The incremental analysis only addresses the comparative costs between the larger diked evaluation units and pothole development. The sub-areas within the Upper Unit(i.e D1&D2) were considered necessary to meet the overall management objectives of that MSU and were not evaluated separately. It was recognized from the outset that without the construction of a sub-area within the Upper Unit MSU, extensive grading and much taller dikes would be required to meet the design criteria. Therefore, intermediate dikes constructed on contours were identified as the most effective means to achieve these goals.

As noted earlier, initial designs had several management cells in the Lower Unit with all the water coming from Winnebago Creek via gravity flow. Detailed studies revealed that site conditions presented numerous constructability, operation and maintenance problems. Several design iterations produced constructable designs but with high cost and without solving many operation or maintenance concerns. These designs were dropped from further consideration and are not presented in detail here.

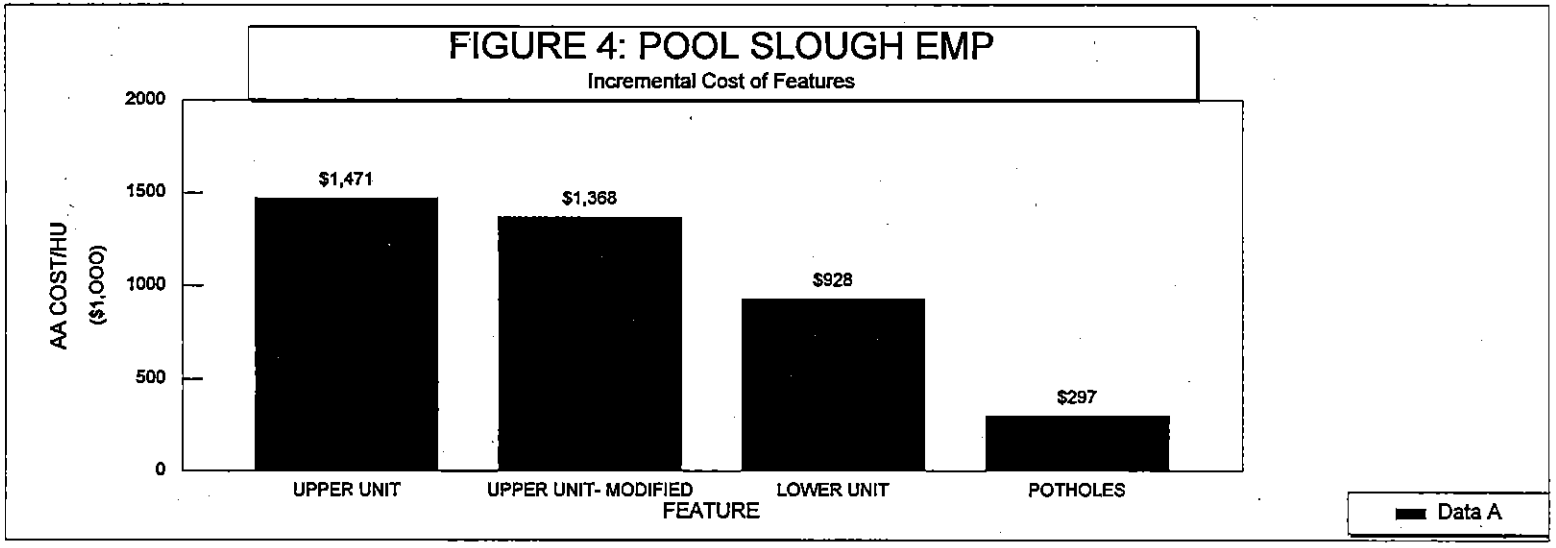
Table 2 is a summary of the costs associated with each feature and are displayed in figure 4. The analysis indicates that decreasing the size of the moist soil unit in the Upper Unit by 6 hectares decreased the cost/habitat unit from $1471/HU to $1,368/HU. Selection of the modified Upper Unit design is recommended based on the substantial reduction in cost compared to the relatively small area omitted from the moist soil unit development.

Construction of moist soil unit feature in the Lower Unit is substantially less at $928/HU. The analysis also indicates that constructing potholes in the northwest corner of the Lower Unit is the most cost effective measure at $297/HU.

The cost per habitat unit for the Upper and Lower Unit moist soil unit features are considered justified based on the reasonableness of the costs, the types of benefits being generated and the importance of the resource being benefitted. The establishment of secure, reliable waterfowl migration habitat on the Upper Mississippi River is a primary goal of the resource agencies. The moist soil units would contribute to the goals of the North American Waterfowl Management Plan. The enhancement of waterfowl habitat, especially along migration corridors such as the Mississippi River is of key importance in maintaining viable waterfowl populations. The cost of $1,368 for the Upper Unit and $928 for the Lower Unit are comparable to the cost of other EMP projects that have improvement of waterfowl migration habitat as

Table 2: Pool Slough - Cost per Habitat Unit of proposed features

FEATURE	AAHU	FIRST COST	AA FIRST COST	ANNUAL O&M	AA COST	AA COST/HU
UPPER UNIT	32	$618,000	$44,073	$3,000	$47,073	$1,471
UPPER UNIT- MODIFIED	25	$448,000	$31,555	$2,640	$34,195	$1,368
LOWER UNIT	39	$431,000	$30,738	$5,440	$36,178	$928
POTHOLES	6	$25,000	$1,783	$0	$1,783	$297



a component.

The excavation of potholes would be the most cost effective feature to implement at $297/HU. Although this feature offers little additional management capabilities it does provide additional diversity to habitat types in the area. It is recommended that this feature be implemented as part of the project.

ENCLOSURE 1

DABBLING DUCK MIGRATION MODEL

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DABBLING DUCK MIGRATION HABITAT MODEL DOCUMENTATION FOR THE POOL SLOUGH HABITAT REHABILITATION AND ENHANCEMENT PROJECT NEW ALBIN, IOWA

GENERAL

Seasonal migration habitat is important for waterfowl. Fall migration habitats provide key resources to meet the physiological demands of migration, allowing waterfowl to arrive on wintering grounds in good shape. Spring migration habitat can be important in ensuring that individuals arrive on their breeding grounds in top condition, which can contribute to a successful nesting effort (Reid, et al., 1989). Krapu and Reinecke (1992) noted that mallards, ring-necked ducks, canvasbacks and lesser scalp breeding in the midcontinent region of North America imported most of the fat required from the production of their initial clutches. Large fat reserves were developed on the wintering grounds or on spring staging areas. Secure spring migration habitat allows individuals to arrive on breeding grounds with these fat reserves intact.

Numerous habitat models are available for dabbling ducks. Most are geared towards evaluating either breeding or wintering habitat. There are no Fish and Wildlife Service (FWS) HEP models that solely address migration habitat quality for waterfowl. Some models used for other methodologies such as the Missouri's Wildlife Habitat Appraisal Guide (WHAG) address components of migration habitat but involve an overall evaluation of migration/wintering habitat. (Missouri Department of Conservation and U.S.D.A. Soil Conservation Service, 1990).

For this study it was determined that in lieu of designing a new model for evaluating migration habitat for dabbling ducks, the existing model that has been developed for the WHAG model would be modified. This model has been used extensively and is considered to be a valid model for evaluating fall migration and wintering habitat.

The format adopted for the modified model follows the procedures developed for the WHAG approach. This approach is somewhat similar to the approach of habitat model development outlined by the U.S. Fish and Wildlife Service (1981) in that a suitability index (SI) relationship for each of the parameters must first be developed. It differs from the FWS approach in that the relationships for each parameter are presented on a discrete scale and the SI ranges from 0 to 10. Some parameters may be identified as having greater importance by identifying them as critical factors or by weighting. The final Habitat Suitability Index (HSI) is calculated by dividing the sum of the suitability indices by the possible maximum score that could be obtained.

Good migration habitat for dabbling ducks is dependent on water, food

and a minimal amount of disturbance (Bookhout et al., 1989, Reid et al, 1989, Ringelman, 1991,). WHAG model components which addressed fall migration habitat components for the mallard were extracted from the model. These components addressed; Habitat composition within a 2 mile wide circle of the evaluation area, fall water conditions (addressing water availability and water depth), plant species composition and distribution, and land use practices.

Disturbance conditions during the fall were added as an evaluation component for fall migration. Spring water conditions (again addressing water availability and depth) were added to incorporate spring migration conditions as part of the overall evaluation for migration habitat.

MODEL DESCRIPTION

The following section provides a discussion of what variables were used from the existing WHAG model and what variables were added. The overall model is presented at the end of this discussion.

The specific components extracted from the WHAG model, and reasoning for its inclusion in the modified model, are listed below. In some cases the components were incorporated into the model as presented. In other cases the parameters were modified, and the reasoning for those modifications is presented.

Percent Bottomland Hardwoods and Non-forested wetlands in a 2-mile wide circle: This component addresses habitat availability within and around the evaluation area. If greater than 75 percent of the land use surrounding the evaluation area is comprised of bottomland hardwood and non-forested wetland, conditions are considered optimum and a suitability index of 10 is assigned this variable. A suitability index of 1 is assigned to this variable if less than 10 percent of the surrounding area is comprised of these cover types. This variable was adapted from the WHAG model with no modification.

Distance to Bottomland Hardwoods and Water Predictability: Some species of dabbling ducks will feed in wooded areas during migration. Small acorns are a preferred food for mallards and wood ducks for example. The proximity of flooded woodlands can add to the quality of a marsh during migration. Areas less than 1/2 mile away with water present are considered optimum and assigned a suitability index of 10. Areas greater than 1 mile away, or less than 1 mile but with no water present, are considered of minimal value and assigned a suitability index of 1. This variable was adapted from the WHAG model with no modifications.

Tree Species Composition: The tree species present determine the habitat quality of the bottomland hardwoods. The presence of mast producing trees (such as oaks) is an indicator of high habitat quality. If greater than 50 percent of the species present are pin oak (or species that produce small acorns), a suitability index of 10 is

assigned this variable. If greater than 50 percent of species present are species such as elm, walnut, willow, cottonwood sycamore, maple or ash, a suitability index of 1 is assigned. This variable was adapted from the WHAG model with no modifications.

Fall Water Conditions: This variable addresses water availability in the evaluation area during fall migration. If water is present annually, conditions are considered optimum and a suitability index of 10 is assigned. Conditions are considered minimal if water conditions are unpredictable or dry during the fall and the variable is assigned a value of 1. This component was modified in the migration model. Water control is a key evaluation factor for fall water conditions in the WHAG model. If no control is present, the WHAG model considers this a limiting factor and the HSI is rated as .1. While the ability to control the water on a site is an important consideration, this approach underestimates the value of areas that provide good migration habitat in the absence of water control. For this model, water control was omitted from the fall water conditions variable and added as a separate evaluation component.

Water Depths in the Fall: This variable addresses the percent of the area that would offer optimum water depths for foraging (4-18 inches) for dabbling ducks. The suitability index ranges from 10, if greater than 90 percent of the area is at optimum depths, to 1 if less than 10 percent of the area offers optimum water depths. This variable was adapted from the WHAG with no modifications.

Important food Plant Coverage: This variable addresses the percent of the area that contains preferred food plants for dabbling ducks. Some important waterfowl food plants identified in the model include bides, chufa, coontail, cutgrass, duckweeds, pondweeds, foxtail, pigweeds, ragweeds, sedges, smartweeds, spikerushes, wigeon grass, Japanese millet, wild millet, agricultural crops and acorns. If greater than 75 percent of area is comprised of important food species an index value of 10 is assigned. If important food plants cover less than 10 percent of the area, conditions are considered minimal and a suitability index of 1 is assigned. The WHAG model weighted the value of this parameter with multipliers. This approach underestimates the value that adjacent land use may have in determining fall migration habitat quality, or the value the area may have for spring habitat. An area may serve primarily as a loafing area in the fall, or provide an area for invertebrate growth in the spring. This variable was adapted from the WHAG model but without the multipliers.

Plant Diversity: This variable addresses the quality of the food plants that are present. High quality habitat provides a diverse assemblage of preferred food plants as opposed to a monotypic stand of one species. Not only does this provide an overall higher quality diet, this ensures that as conditions vary from year to year, some preferred species are likely to be present. Conditions are considered optimum if greater than 7 preferred plant species are present and is assigned a suitability index of 5. If less than 4 species are present, conditions are considered minimal and assigned an index value of 1.

This variable was adapted from the WHAG model with no modifications.

Persistent Emergent or Woody Vegetation: This component addresses habitat use. Suitability of an area as migration habitat decreases with an increase in persistent emergent or woody vegetation. Coverage of the area with less than 15 percent of persistent emergent or woody vegetation is considered optimum and assigned an index value of 5. This variable was adapted from the WHAG model with no modifications.

Percent Open Water: This variable addresses the overall quality of migration habitat as it relates to the interspersion of open water and vegetation. Wetlands with large monotypic stands of vegetation (such as cattails) are less valuable as migration habitat than wetlands with an interspersed mix of vegetation and open water. Optimum areas have a 50/50 mix of open water and vegetation and are assigned a suitability index of 5. Areas with less than 10 percent or more than 90 percent open water are considered to have minimal value and are assigned a value of 1. Varying amounts of open water above and below the optimum 50/50 mix are assigned intermediate values. This variable was adapted from the WHAG model with no modifications

Distance to Cropland, Cropland Practices and Water Conditions: Agricultural grains can provide high levels of metabolizable energy during migration. The presence of croplands and the field practices used can be a factor in evaluating the quality of an area as migration habitat. This component was adapted from the WHAG but modified. While the distance to cropland parameters listed in the WHAG model are reasonable, it requires that the cropland be unharvested or partially unharvested and flooded to receive a high value. Depending on the type of crop (corn for example), an unharvested field may be of minimal value. The availability of waste grain is a function the amount of crop residues after harvest, which is determined by the efficiency of harvest practices and tillage practices. This variable was modified to consider distance to cropland and whether or not crop residues are disturbed. Areas less than 1/4 mile away with residues undisturbed are assumed to be optimum and assigned a suitability index of 10. Areas greater than 1 mile away or less than a mile but with residues disced or plowed are considered to be of minimal value and assigned a value of 1. Fields of intermediate distances and varying amounts of crop residues are assigned intermediate values.

The following parameters were added to the model:

Spring Water Conditions: This parameter addresses water availability in the evaluation area in the spring. The same range of index values that is used for fall water conditions is applied to spring conditions.

Water Depth in the Spring: This parameter was added to address the percent of the area that would offer optimum water depths for foraging (4 - 18 inches) for dabbling ducks during the spring (April - May). Shallow water depths in the spring also provide conditions suitable for invertebrate growth, an important food for migrating waterfowl in

the spring (Reid et al, 1989, Fredrickson and Reid, 1988, Eldridge, 1990). The same range of index values that is used for fall water depths is applied to spring conditions.

Water Control: The ability to control the water on the site is an important evaluation factor because water control provides the ability to maintain water conditions during critical periods. It also allows for management of vegetation composition and distribution by manipulating time and depth of inundation. This parameter was assigned a suitability index of 10 if there is the capability to fully manipulate water levels, a suitability index of 5 if there is a capability to partially manipulate water levels and a suitability index of 1 if there is no water control available.

Disturbance in the Fall: Susceptibility of an area to human disturbance will lower the value of an area as migration habitat. Disturbance in migration areas limit feeding opportunities and force the birds to expend energy in avoidance activity (Reid et al, 1989, Pederson et al, 1989, Kadlec and Smith, 1989). In some cases, the influence of disturbances from bird watchers or researchers may have as great an impact on specific birds as more obvious disturbances such as hunting (Reid et al, 1989). Weather, vegetation cover, water regime and wetland size often lessen the disturbance factor by these types of activities. Hunting can lead to prevention of access to some forage areas, reduction in foraging time and changes in feeding patterns. It is assumed that an area with uncontrolled access will provide minimal value or provide only short-term migration habitat and is assigned a suitability index of 1. Areas closed to all human activity or entry is considered optimum and is assigned a value of 10. Areas closed to hunting but subject to other forms of human disturbance are assigned intermediate values.

Multipliers: The presence of water is a key factor in evaluating the value of an area for migration habitat. An area may provide good migration habitat in only spring or fall. The potential of an area to provide good migration habitat in both the spring and fall is determined by the season that has the least favorable water conditions. For this reason, spring and fall water conditions were weighted in their value by using a multiplier. This multiplier is applied to the Habitat Suitability Index that is predicted by the model. If both variables have a multiplier other than 1, the lowest value is applied to the HSI. For either spring or fall water conditions, if water is present annually, and predictable, the multiplier is 1. If water presence is unpredictable the multiplier is .25. Intermediate values are assigned depending on the frequency of inundation.

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE=____	
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE=____	
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE=____	
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE=____	
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE=____	
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 Inches in the Spring				
a) > 90%		10	ENTER VALUE=____	
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE=____	
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 Inches in fall				
a) >90%		10	ENTER VALUE=____	
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10	ENTER VALUE=	
b) Ability to partially manipulate water levels	5		
c) No water control available	1		
10) Percent Open Water			
a) < 10%	1	ENTER VALUE=	
b) 10 - 25 %	2		
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER VALUE=	
b) 4 -7 preferred species present	3		
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER VALUE=	
b) 50 -75%	8		
c) 25 - 50%	6		
d) 10 - 25%	4		
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5	ENTER VALUE=	
b) 15 - 25%	4		
c) 25 - 50%	2		
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10	ENTER VALUE=	
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5		
d) Open to hunting, access unrestricted	1		

TOTAL= 0
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0
MULTIPLIER ____ (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)

REVISED HSI = 0

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ENCLOSURE 2

HSI CALCULATIONS

EXISTING CONDITIONS (DRAFT)

POOL SLOUGH - UPPER UNIT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Approximatley 60% - Based on Aerial Photos
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Bottomland hardwoods are adjacent to the site with running sloughs or side channels present
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Dominant species are: elm, ash, maple, river birch cottonwood, willow
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Cropland is adjacent - < 40% of surrounding cropland has resldues undisturbed
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 3	Water is present on a portion of the evaluation area in Spring 1 out of 3 years (based on stage duration information at Pool Slough)
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 Inches in the Spring				
a) > 90%		10	ENTER VALUE= 4	It is esitmated that 30% of the evaluation area is within the desired depths when flooded in the spring
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 1	Usually not flooded in the fall (based on stage duration information at Pool Slough)
b) Present most years	(.75)	7		
c) Present occaslonally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 Inches in fall				
a) >90%		10	ENTER VALUE= 1	Usually not flooded in the fall
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		
b) Ability to partially manipulate water levels	5	ENTER	No water control present
c) No water control available	1	VALUE= 1	
10) Percent Open Water			
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 2	Primarily open water conditions when water is present
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	Ragweed, beggar tick, smarweeds and perennial grasses
b) 4 -7 preferred species present	3	VALUE= 3	Area dominated by prairie cordgrass
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER	Important flood plants widely scatterd, but make up about
b) 50 -75%	8	VALUE= 6	50 % of the area
c) 25 - 50%	6		
d) 10 - 25%	4		Based on field observations
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		Wood vegetation currently confined to the borders of
b) 15 - 25%	4	ENTER	the evaluation unit
c) 25 - 50%	2	VALUE= 5	
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10		
b) Closed to hunting, human activity during migration is minimal or access restricted	8		Area is open to hunting and easily accessable
c) Closed to hunting but considerable human activity during migration	5	ENTER	
d) Open to hunting, access unrestricted	1	VALUE= 1	

TOTAL= 49
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.39
MULTIPLIER 0.25 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.1

FUTURE WITHOUT PROJECT CONDITIONS (DRAFT)

POOL SLOUGH - UPPER UNIT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Same as Existing Conditions
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Same as Existing Conditions
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Same as Existing Conditions
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Same as Existing Conditions
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 3	Same as Existing Conditions
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 Inches in the Spring				
a) > 90%		10	ENTER VALUE= 4	Same as Existing Conditions
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 1	Same as Existing Conditions
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 Inches in fall				
a) >90%		10	ENTER VALUE= 1	Same as Existing Conditions
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		Same as Existing Conditions
b) Ability to partially manipulate water levels	5	ENTER	
c) No water control available	1	VALUE= 1	
10) Percent Open Water			
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 2	Same as Existing Conditions
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	
b) 4 -7 preferred species present	3	VALUE= 3	Same as Existing Conditions
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER	
b) 50 -75%	8	VALUE= 6	Same as Existing Conditions
c) 25 - 50%	6		
d) 10 - 25%	4		
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		Area is not flooded as frequently as the lower unit, therefore woody vegetation encroachment may occur without intensive management. Estimated that up to 35% of the area may be covered with soody vegetation over the evaluation period.
b) 15 - 25%	4	ENTER	
c) 25 - 50%	2	VALUE= 2	
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10		
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5	ENTER VALUE= 1	Same as Existing Conditions
d) Open to hunting, access unrestricted	1		

TOTAL= 46
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.37
MULTIPLIER 0.25 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.09

FUTURE WITH PROJECT CONDITIONS

POOL SLOUGH - UPPER UNIT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Same as Existing Conditions
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Same as Existing Conditions
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Same as Existing Conditions
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Same as Existing Conditions
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 9	Except in years of extensive flooding conditions, project will allow for control of water conditions (A multiplier of .9 is assigned for this value since it is slightly less than optimum)
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 inches in the Spring				
a) > 90%		10	ENTER VALUE= 8	Area would be designed to provide optimum depths over 75-90% if the area when flooded
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 10	Area could be flooded annually
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 inches in fall				
a) >90%		10	ENTER VALUE= 8	Area would be designed to provide optimum depths over 75-90% if the area when flooded
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		Project would provide capabilites to fully control water levels
b) Ability to partially manipulate water levels	5	ENTER	
c) No water control available	1	VALUE= 10	
10) Percent Open Water			
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 5	Management capabilites would provide ability to manage for optimum conditions
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	Water management would for management to increase species diversity
b) 4 -7 preferred species present	3	VALUE= 5	
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			Water management capabilities would allow for managing area to increase coverage of important food plants
a) >75%	10	ENTER	
b) 50 -75%	8	VALUE= 8	
c) 25 - 50%	6		Area would be managed to allow natural vegetation to become established
d) 10 - 25%	4		
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		Water management capability would provide ability to control woody vegetation encroachment
b) 15 - 25%	4	ENTER	
c) 25 - 50%	2	VALUE= 5	
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10		
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5	ENTER	Area would be closed to hunting Some human disturbance may occur
d) Open to hunting, access unrestricted	1	VALUE= 8	

TOTAL= 98
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.78
MULTIPLIER 0.9 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.71

EXISTING CONDITIONS (DRAFT)

POOL SLOUGH - LOWER UNIT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Approximatley 60% - Based on Aerial Photos
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Bottomland hardwoods are adjacent to the site with running sloughs or side channels present
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Dominant species are: elm, ash, maple, river birch cottonwood, willow
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Cropland is adjacent - < 40% of surrounding cropland has residues undisturbed
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 8	Water is present in the Spring most years over approximately 86% of the area (Based on stage duration information at Pool Slough)
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		About 33% of area annually has water in spring regardless of flooding conditions (based on aerial photos/site inspections)
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 Inches in the Spring				
a) > 90%		10	ENTER VALUE= 4	Approximately 50% of the area flooded is at optimum depths
b) 75 - 90%		8		
c) 50 - 75%		6		Therefore-approximately 45% of the evaluation area is within the desired depths when flooded in the spring
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 6	Area is flooded in the fall about 1 out of 8 years (based on stage duration information at Pool Slough)
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		About 33% of the area has water present in the fall
d) Unpredictable or dry	(.25)	1		(use a multiplier value of .6)
8) Water Depth 4-18 Inches in fall				
a) >90%		10	ENTER VALUE= 4	About 25% of the evaluation area is at desired depths in the fall
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		No water control present
b) Ability to partially manipulate water levels	5	ENTER	
c) No water control available	1	VALUE= 1	
10) Percent Open Water			Primarily open water conditions in the spring
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 2	Less than 25% of the evaluation area is open water in fall
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	Ragweed, beggar tick, smarweeds and perennial grasses
b) 4 -7 preferred species present	3	VALUE= 3	Area dominated by prairie cordgrass
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER	
b) 50 -75%	8	VALUE= 6	Important flood plants widely scatterd, but make up about 50 % of the area
c) 25 - 50%	6		
d) 10 - 25%	4		
e) <10%	1		Based on field observations
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		Wood vegetation currently confined to the borders of the evaluation unit - less than 15% of the area
b) 15 - 25%	4	ENTER	
c) 25 - 50%	2	VALUE= 5	
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10		Area is open to hunting and easily accessable
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5	ENTER	
d) Open to hunting, access unrestricted	1	VALUE= 1	

TOTAL= 62
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.5
MULTIPLIER 0.6 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.3

FUTURE WITHOUT PROJECT CONDITIONS (DRAFT)

POOL SLOUGH - LOWER UNIT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Same as Existing Conditions
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Same as Existing Conditions
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Same as Existing Conditions
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Same as Existing Conditions
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 8	Same as Existing Conditions
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 Inches in the Spring				
a) > 90%		10	ENTER VALUE= 6	Same as Existing Conditions
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 4	Same as Existing Conditions
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 Inches in fall				
a) >90%		10	ENTER VALUE= 4	Same as Existing Conditions
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		Same as Existing Conditions
b) Ability to partially manipulate water levels	5	ENTER	
c) No water control available	1	VALUE= 1	
10) Percent Open Water			
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 2	Same as Existing Conditions
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	
b) 4 -7 preferred species present	3	VALUE= 3	Same as Existing Conditions
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER	
b) 50 -75%	8	VALUE= 6	Same as Existing Conditions
c) 25 - 50%	6		
d) 10 - 25%	4		
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		Woody vegetation is confined to the borders of the evaluation unit - Northwest corner of the area near Winnebago Creek likely to become more dominated by willows. Persistent woody vegetation greater than 15% over the entire evaluation area.
b) 15 - 25%	4	ENTER	
c) 25 - 50%	2	VALUE= 4	
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10		
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5	ENTER VALUE= 1	Same as Existing Conditions
d) Open to hunting, access unrestricted	1		

TOTAL= 61
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.49
MULTIPLIER 0.6 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.29

FUTURE WITH PROJECT CONDITIONS

POOL SLOUGH - LOWER UNIT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Same as Existing Conditions
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Same as Existing Conditions
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Same as Existing Conditions
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Same as Existing Conditions
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 9	Same as existing conditions. However, with MSU 72% of area (109 ac) likely to have water present annually. 58 acres (38%) could be flooded annually regardless of conditions in any given year. (Assign a Multiplier of .8)
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 inches in the Spring				
a) > 90%		10	ENTER VALUE= 6	Over 50% of the area at optimum depths when flooded About 40% of the area with optimum depths in years without flooding
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 8	Same as existing conditions. However, with MSU 72% of area (109 acres) likley to have water present in the fall. 58 acres (38%) could be flooded annually regardless of conditions in any given year. (Assign a Multiplier of .8)
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 inches in fall				
a) >90%		10	ENTER VALUE= 5	At least 80% of the MSU (46 ac) and 50% of other flooded areas (25 ac) at optimum depths. Therefore- about 40% of the evaluation area (60 ac) at optimum depths
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		Project would provide capabilites to fully control water levels on 38% of the evaluation area
b) Ability to partially manipulate water levels	5	ENTER	
c) No water control available	1	VALUE= 8	
10) Percent Open Water			
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 4	Management capabilites would provide ability to manage 38% of the area for optimum conditions
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	Water management would allow for management to increase species diversity
b) 4 -7 preferred species present	3	VALUE= 5	
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER	Water management capabilities would allow for managing area to increase coverage of important food plants
b) 50 -75%	8	VALUE= 8	
c) 25 - 50%	6		
d) 10 - 25%	4		
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		
b) 15 - 25%	4	ENTER	Same as Future Without Project Conditions
c) 25 - 50%	2	VALUE= 4	
d) < 5% or > 50%	1		
14) Disturbance in the Fall			
a) Closed to hunting and no other human activity occurs	10		
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5	ENTER VALUE= 8	Area would be closed to hunting Some human disturbance may occur
d) Open to hunting, access unrestricted	1		

TOTAL= 87
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.7
MULTIPLIER 0.8 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.56

FUTURE WITH PROJECT CONDITIONS

POOL SLOUGH - LOWER UNIT POTHOLE DEVELOPMENT

DABBLING DUCK MIGRATION HABITAT MODEL
UPPER MISSISSIPPI RIVER

VARIABLE			VALUE	COMMENTS
1) % Bottomland hardwood and Non Forested Wetland in a 2 mile circle				
a) >75%		10	ENTER VALUE= 8	Same as Existing Conditions
b) 50-75%		8		
c) 25-50%		6		
d) 10-25%		4		
e) <10%		1		
2) Distance to bottomland hardwoods and water availability				
a) < 1/2 mile, water predictable		10	ENTER VALUE= 8	Same as Existing Conditions
b) 1/2 - 1 mile, water predictable		8		
c) < 1/2 mile, water predictable 1 of 3 years		6		
d) 1/2 - 1 mile, water predictable 1 of 3 years		4		
e) > 1 mile or < 1 mile and water unpredictable		1		
3) Woodland Tree Species				
a) > 50% pin oak (or other small acorns)		10	ENTER VALUE= 1	Same as Existing Conditions
b) 25 - 50% pin oak (or other small acorns)		8		
c) < 25% pin oak or < 25 % are elm, walnut, willow, cottonwood, sycamore, maple, ash.		6		
d) 24 - 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		4		
e) > 50% are elm, walnut, willow, cottonwood, sycamore, maple, ash.		1		
4) Distance to Cropland and Cropland Practices				
a) <1/4 mile, with residues undisturbed		10	ENTER VALUE= 5	Same as Existing Conditions
b) 1/4 - 1/2 mile, with residues undisturbed		8		
c) 1/2 - 1 mile, with residues undisturbed		6		
d) <1/4 mile with some residues remaining		5		
e) 1/4-1/2 mile with some residues remaining		4		
f) 1/2-1 mile with some residues remaining		2		
d) >1 mile to any cropland; or <1 mile, with residues disced or plowed.		1		
5) Spring Water Conditions				
a) Present annually, predictable	(1)	10	ENTER VALUE= 9	Same as Lower Unit With Project Conditions. Pothole development would increase the area with water present annually to 112 acres. Therefore, Multiplier increased by .05. (Assign a Multiplier of .85)
b) Present most years	(.75)	8		
c) Present 1 out of 3 years	(.5)	4		
d) Unpredictable	(.25)	1		
6) Water Depth 4 - 18 Inches in the Spring				
a) > 90%		10	ENTER VALUE= 6	Same as Lower Unit With Project Conditions
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		
7) Fall water Conditions				
a) Present annually	(1)	10	ENTER VALUE= 8	Same as Lower Unit With Project Conditions. Pothole development would increase the area with water present annually to 112 acres. Therefore, Multiplier increased by .05. (Assign a Multiplier of .85)
b) Present most years	(.75)	7		
c) Present occasionally	(.5)	4		
d) Unpredictable or dry	(.25)	1		
8) Water Depth 4-18 Inches in fall				
a) >90%		10	ENTER VALUE= 5	Same as Lower Unit With Project Conditions
b) 75 - 90%		8		
c) 50 - 75%		6		
d) 25 - 50%		4		
e) < 25%		1		

VARIABLE		VALUE	COMMENTS
9) Water Control Capabilities			
a) Ability to fully manipulate water levels	10		
b) Ability to partially manipulate water levels	5	ENTER	
c) No water control available	1	VALUE= 8	Same as Lower Unit With Project Condition
10) Percent Open Water			
a) < 10%	1	ENTER	
b) 10 - 25 %	2	VALUE= 4	Same as Lower Unit With Project Conditions
c) 25 - 40%	3		
d) 40 - 60%	5		
e) 60 -75%	3		
f) 75 - 90%	2		
g) > 90%	1		
11) Plant Diversity			
a) > 7 preferred species present	5	ENTER	
b) 4 -7 preferred species present	3	VALUE= 5	Same as Lower Unit With Project Conditions
c) < 4 preferred species present	1		
12) Important food plant coverage (% of the area containing important food plants)			
a) >75%	10	ENTER	
b) 50 -75%	8	VALUE= 8	Same as Lower Unit With Project Conditions
c) 25 - 50%	6		
d) 10 - 25%	4		
e) <10%	1		
13) Persistent Emergent and Woody Vegetation Coverage			
a) 5 - 15%	5		Pothole development would limit the encroachment of woody vegetation in this portion of the lower unit evaluation area.
b) 15 - 25%	4	ENTER	
c) 25 - 50%	2	VALUE= 5	
d) < 5% or > 50%	1		
14) Disturbance In the Fall			
a) Closed to hunting and no other human activity occurs	10		
b) Closed to hunting, human activity during migration is minimal or access restricted	8		
c) Closed to hunting but considerable human activity during migration	5	ENTER VALUE= 8	Area would be closed to hunting Some human disturbance may occur
d) Open to hunting, access unrestricted	1		

TOTAL= 88
MAXIMUM POSSIBLE TOTAL = 125

HSI = 0.7
MULTIPLIER 0.85 (Multiply HSI by appropriate value to calculate revised HSI: Use lowest value if two multiplier values apply)
REVISED HSI = 0.6

ENCLOSURE 3

HABITAT UNIT CALCULATIONS

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: PA 1 (without project) UPPER UNIT
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 5.50

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	55.00	0.10	5.50
1	55.00	0.10	5.50
5	55.00	0.10	5.50
50	55.00	0.10	5.50

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: PA 2 (with project) UPPER UNIT
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 38.03

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	55.00	0.10	5.50
1	55.00	0.65	35.75
5	55.00	0.70	38.50
50	55.00	0.70	38.50

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: MP 1 (without project) UPPER UNIT-MODIFIED
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 4.60

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	46.00	0.10	4.60
1	46.00	0.10	4.60
5	46.00	0.10	4.60
50	46.00	0.10	4.60

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: MP 2 (with project) UPPER UNIT-MODIFIED
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 29.42

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	46.00	0.10	4.60
1	46.00	0.10	4.60
5	46.00	0.65	29.90
50	46.00	0.70	32.20

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: PA 3 (without project) LOWER UNIT MSU
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 44.62

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	151.00	0.30	45.30
1	151.00	0.30	45.30
5	151.00	0.30	45.30
50	151.00	0.29	43.79

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: PA 4 (with project) LOWER UNIT MSU
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 83.71

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	151.00	0.30	45.30
1	151.00	0.50	75.50
5	151.00	0.56	84.56
50	151.00	0.56	84.56

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: MP 3 (without project) LU MSU + POTHOLES
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 83.71

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	151.00	0.30	45.30
1	151.00	0.50	75.50
5	151.00	0.56	84.56
50	151.00	0.56	84.56

Form C: Average Annual Habitat Units Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: MP 4 (with project) LU MSU + POTHOLES
Period of Analysis: 50
Evaluation Species: 1 DABBLER AAHU's: 89.54

Target Year	Area of Habitat	Habitat Suitability Index	Habitat Units
0	151.00	0.30	45.30
1	151.00	0.52	78.52
5	151.00	0.60	90.60
50	151.00	0.60	90.60

Form D: Net Change in AAHU's Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: PA 2 (with project) UPPER UNIT
Compared To: PA 1 (without project) UPPER UNIT
Period of analysis: 50

Evaluation Species ID#	Name	AAHU's With Action	AAHU's Without Action	Net Change
1	DABBLER	38.03	5.50	32.53

Form D: Net Change in AAHU's Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: MP 2 (with project) UPPER UNIT-MODIFIED
Compared To: MP 1 (without project) UPPER UNIT-MODIFIED
Period of analysis: 50

Evaluation Species ID#	Name	AAHU's With Action	AAHU's Without Action	Net Change
1	DABBLER	29.42	4.60	24.82

Form D: Net Change in AAHU's Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: PA 4 (with project) LOWER UNIT MSU
Compared To: PA 3 (without project) LOWER UNIT MSU
Period of analysis: 50

Evaluation Species ID#	Name	AAHU's With Action	AAHU's Without Action	Net Change
1	DABBLER	83.71	44.62	39.09

Form D: Net Change in AAHU's Date: 03/31/1999

Study Name: POOL SLOUGH MSU
Action: MP 4 (with project) LU MSU + POTHOLES
Compared To: MP 3 (without project) LU MSU + POTHOLES
Period of analysis: 50

Evaluation Species ID#	Name	AAHU's With Action	AAHU's Without Action	Net Change
1	DABBLER	89.54	83.71	5.83

Attachment 5

Coordination

Fields of Opportunities

STATE OF IOWA

IOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

May 12, 2003

Donald Powell
St. Paul District Corps of Engineers
Army Corps of Engineers Centre
190 Fifth Street East
St. Paul, MN 55101-1638

Mr. Powell

The Iowa Department of Natural Resources (IA DNR) has encumbered non-federal funds suitable for cost sharing the Pool Slough HREP. These funds where derived from contributions from Audubon, Ducks Unlimited, State Marine fuel taxes, revenues from license sales and credits for land value and work in kind. I understand our pecuniary liability will be reduced from the costs in the PCA by a current appraisal of our land on which project features will be constructed. I also understand Mike Griffin of my staff has requested cost saving measures that include replacement of the $45,700 water control structure with a $5,000 Wisconsin tube.

The Iowa DNR is committed to doing Work in kind of Placing the rock aggregate on the Army Road and to the pump facility listed at $37,100 and $6600, respectfully in the cost estimate.

I look forward to the completion of this HREP and the habitat benefits it will provide to the Mississippi River.

Sincerely;

Richard A. Bishop
Wildlife Bureau Chief

WALLACE STATE OFFICE BUILDING / 502 EAST 9th STREET / DES MOINES, IOWA 50319
515-281-5918 TDD 515-242-5967 FAX 515-281-6794 www.state.ia.us/dnr

Public Meeting
August 19, 2002
New Albin Community Center
7 P.M.
Pool Slough Closed Area

A Public meeting on a new "closed area" and "waterfowl refuge" near New Albin IA will be hosted by the Iowa Department of Natural Resources and the United States Fish and Wildlife Service (Service) at the New Albin Community Center August 19th, 2002 at 7:00 pm.

The Service and Iowa DNR propose this action on adjacent federal and state-owned lands in the New Albin, IA area. Service managed lands are part of the Upper Mississippi River National Wildlife and Fish Refuge. Adjacent Iowa DNR lands are managed as part of the Pool Slough Wildlife Management Area. The Minnesota Department of Natural Resources is a cooperating agency because a portion of the area is located in Minnesota.

Service lands would be designated a "closed area" and would be closed to all migratory bird hunting. The area would also be closed to all hunting and trapping during the state duck hunting seasons. Hunting other than for migratory birds would be permitted beginning the day after the close of the state duck season, until season closure or March 15, whichever occurs first.

Iowa DNR owned lands would be designated a "waterfowl refuge" and closed to all trespass from September 15 to December 25 or complete freeze up of the area. The area would then be open to hunting and trapping.

The proposed "closed area" and "waterfowl refuge" boundaries would be; **Southern boundary** would be as posted along the Army Road from the town of New Albin to Minnesota Slough. **Eastern boundary** would be along Minnesota Slough and Ice Haul Slough, north into Minnesota to the North boundary line. **North boundary** would begin at the posted corner on Ice Haul Slough, west to the boundary of a privately owned parcel then along the east and south boundary of the privately owned parcel to the railroad right of way. **West boundary** would follow the rail road right of way to the city limits of New Albin then along the New Albin city limits to Army Road. A map of the proposed area will be available at the public meeting.

This action is proposed to become effective in 2003, implemented in conjunction with a new Habitat Rehabilitation and Enhancement Project that will be built on Iowa DNR lands within the proposed waterfowl refuge. The project will enable managers to grow high quality food for migratory birds. An area protected from human disturbance is proposed so that waterfowl and other birds may receive optimum benefit from this project. Quality food and resting areas are important factors in successful completion of bird migration. This project would provide an important staging area for many waterfowl and other birds in the area.

Fields of Opportunities

STATE OF IOWA

TOM J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

April 12, 2001

Corps of Engineers – St. Paul District
Mr. Don Powell
ATTN: CEMVP-PM-A
190 Fifth Street
St. Paul, MN 55101-1638

Dear Mr. Powell:

After reviewing your request for State 401 Water Quality Certification, the Department has issued the enclosed Certification. Please read the attached conditions carefully before beginning work on the project.

If you have any questions or comments about the certification or any conditions contained therein, please contact me at the address shown below or call (515) 281-6615.

Sincerely,

Christine M. Schwake

Christine M. Schwake
Environmental Specialist

WALLACE STATE OFFICE BUILDING / DES MOINES, IOWA 50319
515-281-5918 TDD 515-242-5967 FAX 515-281-6794 WWW.STATE.IA.US/DNR

IOWA DEPARTMENT OF NATURAL RESOURCES

SECTION 401 WATER QUALITY CERTIFICATION

Certification issued to: Effective: April 12, 2001

Corps of Engineers – St. Paul District
ATTN: Mr. Don Powell CEMVP-PM-A
190 Fifth Street
St. Paul, MN 55101-1638

Project certified: US Army Corps of Engineers, Joint Public Notice No. CEMVP-PM-A
State 401 Water Quality Certification, Application Log No.: 01-N-005-03-08

The goal of the Pool Slough habitat project is to improve migration habitat for waterfowl and wading birds. The proposed plan involves building low-height dikes and structures to control water levels in the area north of Army Road and just to the east and northeast of New Albin. Water would be pumped from Pool Slough to fill pool B and gravity flow from Winnebago Creek would be used to fill pools D1 and D2. The management pools would ensure that water is present for waterfowl during key migration periods. Excavation of potholes in the area north of the existing water treatment plant is also being proposed to provide more permanent water and increase the diversity of wetland types in the area. The project is located in S11, T100N, R4W, Allamakee County, Iowa.

Water quality use designation:

The impacted wetlands are designated as General Use Water and are protected at all places at all times for livestock and wildlife water, aquatic life, non-contact recreation, crop irrigation, and industrial, domestic, agricultural, and other incidental water withdrawal uses.

This State 401 Water Quality Certification has been issued by the Iowa Department of Natural Resources (Department) pursuant to Section 401 of the Clean Water Act. State Certification is required by the Army Corps of Engineers before a Section 404 permit can be issued. Section 401 Certification represents the Department's concurrence that the project certified is consistent with the Water Quality Standards of the state of Iowa as set forth in Chapter 61, Iowa Administrative Code.

Subject to the attached conditions, incorporated by reference herein, the Department has determined that there is reasonable assurance the proposed activities will be conducted in a manner that will not violate water quality standards of the state of Iowa.

By: Christine M. Schwake Date Executed: April 12, 2001

GENERAL CONDITIONS

1. Permittee is responsible for securing and for compliance with such other permits or approvals as may be required by this Department, federal, or local governmental agencies for the project activities described.

2. Clearing of vegetation, including trees located in or immediately adjacent to waters of the state, shall be limited to that which is absolutely necessary for construction of the project. All vegetative clearing material shall be removed to an upland, non-wetland disposal site.

3. All construction debris shall be disposed of on land in such a manner that it cannot enter a waterway or wetland.

4. Construction equipment, activities, and materials shall be kept out of the water to the maximum extent possible.

5. Equipment for handling and conveying materials during construction shall be operated to prevent dumping or spilling the material into waterbodies, streams or wetlands except as approved herein.

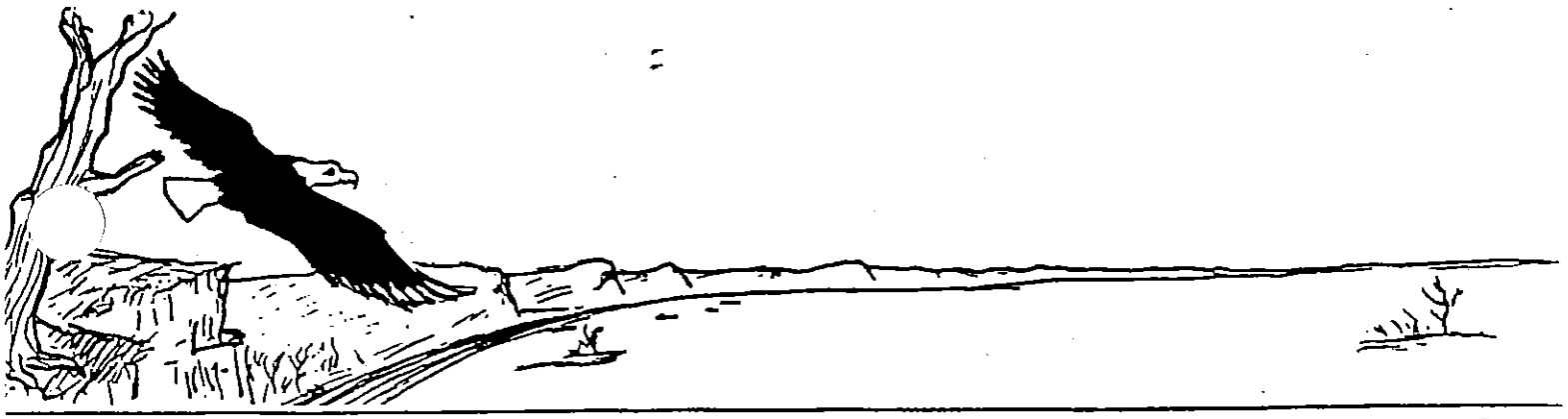
6. Care shall be taken to prevent any petroleum products, chemicals, or other deleterious materials from entering waterbodies, streams or wetlands.

7. Construction activities shall be conducted during low to normal flows and the applicant shall employ controls to reduce the erosiveness of land adjacent to surface waters and wetlands, including establishment and maintenance of the erosion controls during and after construction and revegetation of all disturbed areas upon project completion.

8. All disturbed areas not covered by riprap shall be seeded with native grasses consistent with those included in the NRCS Critical Areas Seeding Mixture, excluding Reeds Canary Grass, during an optimal seeding period. If excavation and construction are completed outside an optimal seeding period, temporary erosion control protection shall be implemented immediately upon completion of excavation and construction and shall be maintained until such time as seeding can be completed during an optimal period. The applicant shall monitor revegetated areas continuously to assure success of revegetation.

9. If rye is initially planted to stabilize the soil then native warm season grasses shall be planted during the following growing season.

10. Riprap shall consist of native field stone, quarry run rock or clean broken concrete. If broken concrete is used all reinforcement material shall be completely removed from it; if removal is not possible, said reinforcement material shall be cut flush with the flat surface of the concrete. It shall be the applicant's responsibility to maintain the riprap such that any reinforcement material that becomes exposed in the future is removed. The concrete pieces shall be appropriately graded and no piece shall be larger than 3 feet across the longest flat surface. No asphalt or petroleum based material shall be used as or included in riprap material.



FRED LESHER 509 WINONA ST. LA CROSSE, WI 54603 608-783-1149

March 22, 2001
Fred Lesher
509 Winona St.
LaCrosse, WI
54603

Mr Powell: I understand that you are responsible for comment on a project to create a low-level impoundment or other dike structure to attempt to stabilize delta changes by Winnebago Creek as it reaches the Mississippi River.

I made comment on this project at a hearing on the project held in New Albin some months ago. My concern then and now is that populations of resident breeding birds such as Sandhill Cranes, Least Bitterns, Virginia Rails, Sora Rails, Marsh Wrens, Sedge Wrens, and Yellow-headed Blackbirds not be negatively impacted by any project. Has anyone studied these resident breeding birds in the proposed project area? Is there any base-line data with which to compare pre-project status with post-project status of these species? I can provide my own sightings and avian teritorial behavior of Least Bitterns and Marsh Wrens in the project area last spring. Though these species are not endangered, I believe it is always the goal of projects not to unnecessarily disrupt species. And I

can guarantee you that these species are especially observable by the public at this site. Strangely, for all the square miles of wetland habitat along the Mississippi, there is not a lot of such habitat like that at Pool Slough accessible to the public, especially in Iowa.

Also, I have photos of Bullfrogs taken in the project area last summer. Has anyone done a study of reptiles and amhibians in the project area? Bullfrogs are negatively affected by lots of human engineering. My personal observation is that these animals are declining in numbers. What is their status in Iowa?

I am sure that the goal of this project is to provide habitat for nesting and migrant waterfowl. While I do not necessarily oppose that goal, I do not believe that it should be the overriding goal. Other considerations are equally important from both public and environmental points of view.

Thank you.

Fred Lesher, Phone 608-783-1149
509 Winona St. LaCrosse, WI 54603

Fred Lesher

March 22, 2001

Dear Mr. Powell:

The "Mailer Daemon" kicked the enclosed e-mail back to me as not deliverable. Rather than toss it and write the letter by hand, I have salvaged it as you see. I know this may seem amateurish, but it has saved time and effort.

The area referred to is Pool Sargh north of Army Dr. east of New Albin in Allamakee County, Iowa. The project proposed is by the Iowa Department of Natural Resources, and I believe the area is an Iowa Wildlife [redacted] Area.

I am an active bird-watcher and upper Mississippi River watcher and caretaker.

Thank you for reading.

Fred Lesher

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Upper Mississippi River National Wildlife and Fish Refuge
51 E. Fourth Street - Room 101
Winona, Minnesota 55987

IN REPLY REFER TO:

December 15, 2000

Mr. Don Powell
St. Paul District
Army COE Centre
CENCS-EPD-P
190 Fifth Street East
St. Paul, Minnesota 55101-1638

Dear Mr. Powell:

This letter is a follow up to your recent telephone conversations with Keith Beseke of my staff regarding continued Fish and Wildlife Service participation in the Pool Slough Habitat Rehabilitation and Enhancement Project (HREP) in Mississippi River navigation pool 9.

As you are aware, high rainfall and resulting high water flows within the Winnebago Creek watershed this summer caused significant changes in Winnebago Creek channel at the location of proposed Pool Slough EMP impoundments D1, D2 and area E. During this event, Winnebago Creek breached the old spoil berm that previously defined the creek channel immediately east of the I&M Rail Link railroad bridge. We estimate that up to fifty percent of Winnebago Creek volume now flows northeast, across the area on which impoundments D1 and D2 are proposed. After exiting the old spoil berm breach, the water flow northeast occupies what appears to be an old creek channel, and also sheet flows across what had been a grassy meadow and wooded area. During recent site visits, estimated water depth were generally six to eighteen inches across much of the sheet flow area. We observed that emergent and submergent plant species typical of shallow permanently flooded wetlands have occupied the area since inundation. The resulting wetland was consistently utilized by waterfowl and other water birds during the summer and fall.

Because of the recent changes in flow pattern of Winnebago Creek, the Service has determined that we no longer support construction of Pool Slough HREP components proposed on Service owned lands. This was a difficult decision. We are aware of the considerable agency work and public involvement invested in the project to date. We also recognize and appreciate the strong support this project receives from the Iowa Department of Natural Resources. We have come to this decision for two primary reasons.

1. It is our observation that Winnebago Creek has a history of "exceptional flow events" that tend to cause dramatic changes within its flood plain delta. This has been a concern throughout the planning process. The high water flow event of this summer was a reminder that such flood

plain deltas are extremely dynamic. This of particular concern because the southern most containment dike and inlet structure of pool D1 are proposed along one of the most dynamic segments of Winnebago Creek. While the dynamism of stream flows may be addressed by appropriate engineering (i.e. larger structures, more rock riprap, location adjustment), we believe the specific circumstances of the Pool Slough (Pool D) area suggest that there is an unacceptable chance that proposed facilities or project function would be adversely affected by recurring high flow events.

2. The flood event of this summer resulted a significant increase in wetland habitat. Much of the newly "created" wetland habitat is within the proposed Pool D area. We believe it would be ecologically and economically inappropriate to convert naturally occurring wetland habitat to a managed wetland situation as proposed in this project. It may be practicable to enhance or further increase the area of wetland habitats in the vicinity of proposed Pool D, however, these actions would likely be small.

We recognize that the recent changes in Winnebago Creek channel alignment and resulting wetlands are likely to be transient. The time frame during which the newly established features existence is uncertain. We are certain that the Winnebago Creek alignment and associated habitat features will continue to change within its delta. These changes will continue to provide wetland habitat values. We also understand that the naturally occurring habitats may not be the same as those anticipated from completion of the proposed project. However, we believe these habitats will continue significantly benefit a broad spectrum of fish and wildlife resources.

We continue to support those portions of the Pool Slough HREP proposed on lands owned by the State of Iowa, Department of Natural Resources.

Thank you for your excellent work on this project. If you have questions regarding these comments, please contact Keith Beseke (507) 452-4232 at this office.

Sincerely,

James R. Fisher

James Fisher
Complex Manager

cc: McGregor District
FWS, Ecological Services
Minnesota DNR
Iowa DNR
Wisconsin DNR

STATE OF IOWA

THOMAS L. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
PAUL W. JOHNSON, DIRECTOR

Don Powell
St Paul District
USACE
190 5th Street East
St Paul MN 55101-1638

Mike Griffin
Iowa DNR
206 Rose St.
Bellevue IA 52031

Sept 29 2000

Don;

It has come to the attention of the Iowa DNR that the Winnebago Creek, which flows through the proposed HREP Pool Slough, has changed its course. A 100-year flood event happened in June of 2000 and the creek is now broken out to the North and South of its former course. We believe this will not adversely affect the project but you should revise the current 404 documents to include this new course in the current conditions section.

We understand the DPR for this project will be finalized shortly. The 404 reviews will be a better document if we include the real current conditions. I hope this will not delay the project but will make it easier for the public to understand what the proposed project is meant to do.

Thank you for your consideration of the above request.

Mike Griffin
Iowa DNR
Mississippi River Wildlife Biologist
206 Rose St.
Bellevue IA 52031

TEAMING WITH WILDLIFE

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO

December 22, 1999

ER 99/1000

Colonel Kenneth S. Kasprisin
District Engineer
St. Paul District, U.S. Army Corps of Engineers
Army Corps of Engineers Centre
190 Fifth Street East
St. Paul, Minnesota 55101-1638

Dear Colonel Kasprisin:

The Department of the Interior (Department) has reviewed the draft Definite Project Report with integrated Environmental Assessment for the Pool Slough Wetland Complex Habitat Rehabilitation and Enhancement Project, Pool 9 of the Upper Mississippi River, Houston County, Minnesota, and Allamakee County, Iowa. The U.S. Fish and Wildlife Service has been involved as a cooperating agency at all stages of planning for this proposed project. The subject document for the proposed project adequately addresses the environmental concerns of the Department, and we have no other comments on the document.

We appreciate the opportunity to review the document and provide comments.

Sincerely,

Michael T. Chezik

Michael T. Chezik
Regional Environmental Officer

State Historical Society of Wisconsin
816 State Street ♦ Madison, Wisconsin 53706-1482 ♦ 608/264-6400 ♦ Fax: 264-6504

Division of Historic Preservation
608/264-6500

December 22, 1999

Mr. Charles E. Crist
U.S. Army Corps of Engineers
Army Corps of Engineers Centre
190 Fifth Street East
St. Paul, MN 55101-1638

IN REPLY PLEASE REFER TO
SHSW COMPLIANCE CASE #99-1359/GT

RE: Pool Slough Wetland Complex Habitat Rehabilitation & Enhancement

Dear Mr. Crist:

We have reviewed the above-referenced project as required for compliance with Section 106 of the National Historic Preservation Act and 36 CFR Part 800: Protection of Historic Properties, the regulations of the Advisory Council on Historic Preservation governing the Section 106 review process.

There are no archeological or architectural properties listed in the National Register of Historic Places located within the area of potential effect of the proposed undertaking. Furthermore, we are not aware of any properties that may be eligible for the National Register in this area.

We remind you that 36 CFR 800.4 includes the requirement that you seek information, as appropriate to the undertaking, from parties likely to have knowledge of or concerns with historic properties in the project area - such as Indian tribes, local governments, and public and private organizations.

Please note that the regulations governing the implementation of the Section 106 review process have been changed effective June 17, 1999. A copy of the new regulations and explanative materials regarding the Section 106 review process can be found on the Advisory Council on Historic Preservation's web site at www.achp.gov. We urge you to review them to better understand how the process has been revised and streamlined.

If there are any questions concerning this matter, or if project plans should change, please contact Dan Duchrow at (608) 264-6505.

Sincerely,

Chip Harry L. Brown III, J.D.
Compliance Coordinator

CHLB/DJD/djd

Minnesota Department of Natural Resources

(612) 345-3331

Section of Ecological Services
1801 S. Oak St.
Lake City, MN 55041
December 8, 1999

FAX (612) 345-3975

District Engineer
St. Paul District, Corps of Engineers, ATTN: CEMVP-PM-A
190 Fifth Street East
St. Paul, MN 55101-1638

Comments on the Pool Slough HREP Draft Definite Project Report:

In general, we feel that the area encompassing the proposed project is already significant and important habitat due to its hydrologic and physical diversity and dynamics. It is in transition from former agricultural use to wildlife and fish habitat. With the help of Winnebago Creek's developing distributary network, and an ambitious beaver population, the area promises to become the kind of self-sustaining/self-renewing floodplain area we seek to have established elsewhere along the Mississippi River valley. Others feel that the area presents an opportunity to construct and manage a reliable feeding and resting area for migrating waterfowl and improve hunting in the vicinity by attracting and holding ducks and geese during the waterfowl season.

Pool Slough HREP's significance in addressing the habitat problems that have resulted from managing the river for commercial navigation and its floodplain for agriculture is questioned by many within our agency. We have gone on record supporting the removal of dikes and levees that isolate portions of the floodplain from the river and have vigorously supported the concept of restoring floodplain connectivity. This project will do the opposite.

Pool Slough HREP was proposed by the Iowa DNR and the USFWS, planning began many years ago, and we anticipate that future HREP proposals will have a different approach. We do recognize that the proposed project is likely to attract large numbers of waterfowl to feed in the managed areas, is supported by our Area Wildlife Manager, and also meets the goals of the other agencies involved.

Our Sections of Fisheries and Ecological Services would prefer that additional dugout ponds be constructed in lieu of diked areas, and that the old Winnebago Creek levees be removed to allow it to find new channels through the area. We suggest dugouts similar to those constructed by USFWS refuge mangers in the floodplain of the old Zumbro River channels two years ago. These ponds have developed lush wetland plant stands, provide good habitat for a variety of wildlife, are accessible to

fish during floods, require little or no Operation or Maintenance, and because they resemble river channel oxbows, provide high quality natural aesthetics. All design changes that will reduce or eliminate the isolation of floodplain areas are encouraged.

Sincerely,

Mike Davis, HREP Coordinator,
Minnesota Department of Natural Resources

cc: Nick Gulden
Tim Schlagenhaft
Scot Johnson
Steve Johnson
Mike Griffin, IA DNR
Keith Beseke, USFWS
Jeff Janvrin, WI DNR

PUBLIC MEETING
for the
POOL SLOUGH WETLAND COMPLEX
HABITAT REHABILITATION AND ENHANCEMENT PROJECT

A **public meeting** to discuss proposed habitat improvements in the area of Pool Slough and Winnebago Creek is scheduled for **Thursday, December 2, 1999, at 7:00 pm at the Town House in New Albin, Iowa**. This will be an opportunity to learn about the proposed construction of moist soil management pools near New Albin as part of the Environmental Management Program. You will be able to hear what has been accomplished since the last public meeting in 1996, ask questions, and provide your input to representatives from the U.S. Corps of Engineers, U.S. Fish and Wildlife Service, and the Iowa and Minnesota Departments of Natural Resources.

The goal of the **Pool Slough habitat project** is to improve migration habitat for waterfowl and wading birds. The agencies mentioned above, as well as the Wisconsin Department of Natural Resources, have been involved in the planning and development of a plan to address the specific project objectives for the Pool Slough area. The proposed plan involves building low-height dikes and structures to control water levels in the area north of Army Road and just to the east and northeast of New Albin (see map on other side). Water would be pumped from Pool Slough to fill pool B and gravity flow from Winnebago Creek would be used to fill pools D1 and D2. The management pools would ensure that water is present for waterfowl during key migration periods. Excavation of potholes in the area north of the existing water treatment plant is also being proposed to provide more permanent water and increase the diversity of wetland types in the area. If approved, most of the construction activity would occur in 2001.

We encourage you to attend the meeting on December 2nd and tell others who might be interested in providing input or hearing about proposed plans affecting the Pool Slough and Winnebago Creek area. If you are unable to attend the meeting, feel free to send your comments to the St. Paul District, Corps of Engineers, ATTN: CEMVP-PM-A, 190 Fifth Street East, St. Paul, Minnesota 55101-1638. You can also contact Mr. Don Powell directly at (651) 290-5402 or email at donald.l.powell@usace.army.mil.

11/18/99

POOL SLOUGH HABITAT PROJECT
ENVIRONMENTAL MANAGEMENT PROGRAM

Summary of Questions/Answers and Concerns
at a Public Meeting in New Albin, Iowa, on December 2, 1999

Total Attendance = 53 (39 public and 14 from government agencies).

Agencies Represented: U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Iowa DNR, Minnesota DNR, and Wisconsin DNR.

The Closed Area: Representatives from the Iowa DNR and U.S. Fish and Wildlife Service discussed the goals of this project and the need for an area closed to hunting. These agencies expect this project to provide favorable habitat for migrating waterfowl. To ensure the health of the populations of these birds, this area must provide sustainable food and be secure. This will improve their chances of making it south in a healthy condition.

At this time, no specific plans for the closed area were offered. However, the DNR expects to secure most of the area north of Army Road. Proposals for the size of the closed area range from 700 to 1500 acres. These agencies expect to manage the area for the fall migrating season, which begins in early September and ends in December. During this season no trespassing would be allowed. However, outside of this season restrictions would be lifted.

Questions and Concerns of the Public

Q: Concerned about the impact of this project on non-game, nesting, and shore birds and other wildlife.
A: Overall, this project should diversify the vegetation and species of birds in this area. The major impacts will depend on the grading of the project area and how it is managed. Currently, the plan is to draw water off the project area during the growing season and flood it in the fall to sustain vegetation that will attract the migrating birds. There should be no adverse impact on shore birds. The birds that will be adversely affected are those that like the grasses currently occupying the project area. However, the impact should be minimal due to the existence of many grassy areas outside of the project boundaries.

Q: What will be the impact of this project on the use of Army Road?
A: At this time, the Iowa DNR has no plans to curtail traffic on Army road. There may be some future projects to improve visibility and add some pull-offs, but those are not within the scope of this immediate project.

Q: What will be the impact of this project on the water treatment facility?
A: This project should have no impact on the water treatment facility.

Q: What about the impact of this project on mosquito breeding?
A: Although there will be some permanent water areas within the project, there should not be a significant difference from the existing conditions.

Q: What is the impact of this project on Winnebago Creek?
A: This project will not change the location or flow pattern of Winnebago Creek.

RECORD OF ATTENDANCE

Meeting - Pool Slough Habitat Project at New Albin, Iowa

Date - December 2, 1999

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Ed Sylvud	2944 Winnebago Rd New Albin, IA 52160	
Gary Schaller	RR#1 Box 44 Brownsville Mn. 55919	
Larry Donahue	Box 189 New Albin, Ia. 52160	Larry Donahue Const.
Linus Ott	294 Enemy St New Albin Ia	
Gary Grob	69 White Oak Ct. Winona, Mn. 55987	
Tom Wiebke	126 Portland Fitzen, Minn. 55931	
Ed Staheli	2368 Hwy 26 Lansing, IA. 52151	
Bud Maust	Box 369 New Albin Ia	City Council
Chris McLymans	Box 396 New Albin Ia.	
Leo Whalen	RR#1 New Albin, Ia.	
Hank Becker	255 1st St. SE New Albin Iowa	
Terry Haindfield	P.O. Box 122 Highlandville, IA 52149	IDNR
Betty Zarwell	P.O. Box 299 Lansing, IA 52151	

RECORD OF ATTENDANCE

Meeting - Pool Slough Habitat Project at New Albin, Iowa

Date - December 2, 1999

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
MIKE ZEIMET	PO BOX 323 NEW ALBIN IA	SELF
Doug Darling	P.O Box 163 New Albin Iowa 52160	Self
Tom Darling	P.O. Box 163 New Albin, Iowa 52160	SELF
Dan Darling	P.O Box 163 NEW ALBIN IA. 52160	SELF
Ric ZARWELL	P.C. Box 299 Lansing, IA 52151	
GLEN WENDEL	LANSING Iowa	SELF
DOUG MULLEN	1762 GREAT RIVER RD LANSING, IOWA 52151	SELF
DAVE/SCRK	BOX 458 ELKADER IOWA 52043	
Lloyd K. Colsch	2774 Hx 26 NEW ALBIN IA 52160	
Lora Friest	3045 N. Old Mill. Decorah	Upper Iowa River Watershed Project
Duane Bahnell	new albin 2748 Hwy 26	
Dave Herman	1137 Pool Hill Dr new Albin, Iowa	Self
Gary Thomas	416 1st St NE New Albin	City & self

RECORD OF ATTENDANCE

Meeting - Pool Slough Habitat Project at New Albin, Iowa

Date - December 2, 1999

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Scott Kurk	RR1 Box 217H Caledonia, Mn 55921	Self
Dave Wild	New Albin Box 60	"
Greg Dougherty	~~Box~~ 381 Railroad Av NW New Albin	"
Fred Leisher	509 Winona St LaCrosse	Coulee Region Audubon Society
Jim Eha	New Albin	self
Randy Devendorf	St Paul	Corps of Engrs.
Kari Layman	St Paul	Corps of Engrs.
Keith Beseke	Winona	US Fish + Wildlife Service
John Lindell	McGregor	US Fish + Wildlife Service
Jim Fisher	Winona	US Fish + Wildlife Service
Mike Griffin	Bellevue	Iowa DNR
Bob Kurft	Decorah	Iowa DNR
Scott Gritters	Guttenberg	Iowa DNR

RECORD OF ATTENDANCE

Meeting - Pool Slough Habitat Project at New Albin, Iowa

Date - December 2, 1999

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Nick Gulden	411 Exchange Bldg. Winona, MN 55987	MNDNR
Art Roseland	Manchester	Iowa DNR
Jeff Janvrin	La Crosse	Wisconsin DNR
Ray Marinan		Self
Don Powell	St Paul	Corps of Engrs.

The area has now been researched and examined by a St. Paul District archaeologist with the following conclusions. The area is sensitive archaeologically due to the proximity of a Woodland mound site and an Oneota village site on the New Albino terrace overlooking the project area. The immediate project area is all on the floodplain proper, and is mostly low and marshy, with standing water over large portions. The landscape history of the area includes the channelization of Winnebago Creek sometime after 1940 and the filling in of a slough that came into Winnebago Creek from the north. An area of higher ground just north of the mouth of Winnebago Creek that can be seen on the 1894 Mississippi River Commission map was apparently leveled at about this time also.

Almost the whole of the project area shows as marsh on the 1894 map. While most of the area appears marshy at present, the ground is slightly higher at the north and south ends. Apparently the area was drained and cropped at times in the past; a 1989 aerial photo shows a field with a drainage ditch between Winnebago Creek and the sewage plant.

The low, wet position of the project area, in conjunction with the considerable landscape modification of the last century, makes it very unlikely that substantial intact archaeological deposits exist in the project area. Six backhoe trenches were placed to examine the soils: two in the north end, two in the central part, and two at the south end of the project area (see map of locations in Attachment 9). The tests show deep alluvial or slow water fluvial sediments typical of a slow moving backwater area. The river gradient is low in this area, making for a great depth of sedimentation. No buried soil horizons that may have been suitable for former occupation were observed.

The known landscape history of the project area and the deep alluvial/fluvial soils indicate that the area has probably never been suitable for habitation, and thus the potential for archaeological remains is very low, although it was undoubtedly used by the prehistoric (as by the historic) inhabitants of the neighboring New Albin terrace. The St. Paul District's investigations in compliance with Section 106 of the National Historic Preservation Act have resulted in a determination that no historic properties will be affected by the present project. These findings are being coordinated with the State Historic Preservation Offices of Minnesota and Iowa.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Upper Mississippi River National Wildlife and Fish Refuge
51 E. Fourth Street - Room 101
Winona, Minnesota 55987

IN REPLY REFER TO:

September 9, 1998

Mr. Don Powell
St. Paul District, Corps of Engineers
NCS-PE-M
190 Fifth Street East
St. Paul, Minnesota 55101

Dear Mr. Powell:

This provides U.S. Fish and Wildlife Service (Service) comments on the draft Definite Project Report and Environmental Documentation (SP-22) for the Pool Slough Wetland Complex Habitat Rehabilitation and Enhancement Project. This project will benefit the biological resources of the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) and adjacent state lands.

A portion of this project is being built on federal lands managed as part of the Refuge, therefore, a Refuge compatibility determination and Refuge approval is required before this part of the project can be constructed. Enclosed is a signed compatibility determination for the alternative discussed in this draft report. Approval of the project will be formally provided by the Regional Director after completion of the final project report.

The final draft definite project report must include a copy of the draft Memorandum of Agreement for the operation, maintenance, and rehabilitation. The Service will cover operation and maintenance costs as discussed in this report for the portion of the project on the Refuge. The Regional Director's letter on the final draft definite project report will include the certification of support for operation and maintenance.

The Service's first choice for dike fill material is the South-West corner of Pond D1. The goal is to flatten out the bottom of Pool D1 to improve "moist soil" management.

The Service would like to have the South dike moved back away from erosion areas formed by Winnebago Creek. Winnebago Creek has also broken out across Area E. This will have to be investigated further during plans and specifications phase of the project.

As illustrated by your survey data Area E is the "highest" area on our project site, not the lowest as discussed in your habitat evaluation (HEP). Therefore, adjustments in your analysis are needed. The Service would like to see about three or five depressional wetlands built.

The Service would like stoplog structures similar to the one we have in the Spring Lake EMP Project, Pool 13 (the Service will provide general design). We feel this can be built at approximately the same cost, besides being much easier to maintain.

The Service needs an upgrade of the existing railroad crossing to access the site.

Endangered Species Act

Based on information contained in the Preliminary Draft Definite Project Report and the nature of the proposed project, its location, and the habitat requirements of the federally threatened bald eagle (*Haliaeetus leucocephalus*), endangered peregrine falcon (*Falco peregrinus*), and Higgins' eye pearly mussel (*Lampsilis higginsi*), we concur with your determination that the proposed project is not likely to adversely affect federally listed threatened or endangered species. Should this project be modified or new information indicated that listed species may be affected, consultation with the Service's Twin Cities Field Office should be reinitiated.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327), the Endangered Species Act of 1973, (16 U.S.C. 1531-1543), as amended, and the U.S. Fish and Wildlife Service's Mitigation Policy.

This report illustrates the cooperation evident between the Corps and the Service. The cooperative efforts on this project and the Environmental Management Program as a whole ensure that progress in this area will continue on the Upper Mississippi River System.

Sincerely,

Keith L. Beilke

James R. Fisher
Acting Complex Manager

Enclosures

cc: TCFO (Wege)
La Crosse FRO
MN DNR
WI DNR
IA DNR
McGregor District
RO -- SS

Upper Mississippi River National
Wildlife and Fish Refuge
Established 1924
Compatibility Determination
Pool Slough Wetland Complex
Rehabilitation and Enhancement Project

Establishment Authority:

Public Law No. 268, 68th Congress, The Upper Mississippi River Wild Life and Fish Refuge Act.

Purposes for Which the Refuge was Established:

"... (a) as a refuge and breeding place for migratory birds... (b)...as a refuge and breeding place for other wild birds, game animals, fur-bearing animals, and for the conservation of wild flowers and aquatic plants, and (c)...as a refuge and breeding place for fish and other aquatic animal life."

43 Stat. 650, dated June 7, 1924.

"... shall be administered by him (Secretary of the Interior) directly or in accordance with cooperative agreements...and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife resources thereof, and its habitat thereon,... "16 U.S.C. 664 (Fish and Wildlife Coordination Act)

"... suitable for--(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. 460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors..." 16 U.S.C. 460k-2 [Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended]

"... particular value in carrying out the natural migratory bird management program." 16 U.S.C. 667b (An act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes)

Description of Proposed Use:

The proposal is a Habitat Rehabilitation and Enhancement project authorized by the Water Resource Development Act of 1986 (Pub. L. 99-662). The proposed project includes the construction of small moist soil units and wetland potholes to provide habitat diversity for migratory birds.

More details of the project, including maps and engineering drawings, are contained in the draft report entitled, "Upper Mississippi River System Environmental Management Program Definite Project Report With Integrated Environmental Assessment (SP-22) Pool Slough Wetland Complex, Habitat Rehabilitation and Enhancement, Upper Mississippi River, Iowa, and Minnesota," prepared by the St. Paul District, Corps of Engineers.

Anticipated Impacts on Refuge Purposes:

As a result of the project fish and wildlife populations should increase which will be a direct benefit toward maintaining and accomplishing refuge purposes. A summary of impacts to the natural resources of the Refuge are as follows:

NATURAL RESOURCES

Habitat - The proposed moist soil unit development would improve migratory bird habitat on approximately 18 hectares in the Pool Slough area. While the primary species benefitted would be dabbling ducks (such are as mallards, gadwalls, and teal), habitat conditions for wading birds (such are as herons, egrets, rails, bitterns, and a variety of shorebirds) would also be improved.

Waterfowl - The construction of moist soil unit features in the Pool Slough area would substantially improve waterfowl migration habitat by ensuring that water is present during key migration periods. Water management capabilities would also allow managers to control vegetation composition and distribution in the management cells. In pool D, the management strategy would be to provide conditions suitable for the establishment of desired wetland vegetation species and to limit the encroachment of woody vegetation. Spring water levels would be managed to extend and maintain shallow water conditions to encourage invertebrate growth, thereby increasing the value of the spring migration habitat. The HEP model developed for this evaluation indicates that the migration habitat value would increase by about 90 percent.

Other Wildlife - Wildlife benefits not quantified by the habitat model would accrue with project construction. The management cells would provide improved habitat for wading birds such are as herons, egrets, rails, and bitterns by providing extended periods of water at suitable depths during the spring, early summer, and fall. Some of the management cells could be managed to create mudflat areas for shorebirds by having them only partially filled. Habitat quality would also improve for amphibian and reptile species associated with seasonally flooded wetlands.

Justification:

The proposed project works toward the accomplishment of the stated objectives of the refuge by improving habitat conditions over approximately 20 hectares in the Pool Slough area. This action is compatible with the purposes for which the Refuge was established.

Determination

The proposed use is _X_ is not ___ compatible with the purposes for which the Refuge was established.

Determined by: _____ Date: Aug. 18, 1998
Refuge Manager

Concurred by: _____ Date: Aug 18, 1998
Complex Manager Acting

Reviewed by: _____ Date: 8.27.98
Refuge Program Supervisor-2

STATE OF IOWA
TERRY E. BRANSTAD, GOVERNOR
DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

Don Powell
St. Paul District,
Corps of Engineers
190 fifth Street East
St. Paul Minnesota 55101-1638

Mike Griffin
IA DNR
206 Rose St.
Bellevue IA 52031

8/10/98

Mr. Don Powell;

This letter contains our comments on the Pool Slough HREP (Draft) DPR dated June 1998.

The Iowa DNR continues to support the Project, as described in the draft DPR. When completed, the Pool Slough HREP will help insure the quality and continuity of migrational habitat for migratory birds in the Pool 9 area. More importantly and from a system perspective, the project will provide one of the key links in a chain of riverine migrational habitat units on the Upper Mississippi River System. Located on the floodplain periphery, the enhanced water management potential will duplicate riverine habitat and hydrology that has been lost with dam operations and floodplain development. The project will insure river moist soil and wet meadow habitat conditions and make them accessible during migratory periods.

As explained in our letter of 7/20/98, we suggest that costs can be reduced while maintaining all habitat features and values of the project. The Iowa DNR suggests cost savings measures including:

1) Eliminate placing aggregate on the dike tops.

2) Not grading pool bottoms to a uniform elevation. It is not necessary.

3) Dispose of strippings in the most economical way possible, ideas include; grade on dike tops, fill borrow areas, grade on-site, mound up and leave some as 'nesting islands', place and grade on low area of cell, etc.. Disposal may vary by site.

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4) Topsoiling of dikes is probably not necessary. Most material encountered is likely to be suitable for construction and seeding on the low, wide earth berms.

5) Borrow location for dike/berm construction should be based on economics and potential for improving biological benefits. Generally, borrow should be obtained in the most economical way. Avoid any deep borrow immediately adjacent the berms to avoid muskrat use of the berms. Even 10-20 feet of 'shoulder' or natural elevation between the berm and borrow area will prevent problems. Linear borrow parallel to the berms might be used to facilitate drainage of the cells and avoid fish entrapment. Before final design, DNR personnel would like to meet with COE project personnel to review topographic data, borrow volumes, and to suggest borrow alternatives that will improve the biological benefits.

6) More cost effective, minimal maintenance water control structure designs have been identified. These new designs should reduce costs, while increasing the practicality of the structure.

Design of the Iowa DNR portion of the project should facilitate fish movement and avoid entrapment. Ditches or ponds (borrow, etc.) within cells should outlet to structures. We anticipate leaving structures open through much of the year to avoid entrapment and facilitate habitat utilization by fish.

Thank you for the opportunity to comment.

Mike Griffin
IA DNR Mississippi River Wildlife Biologist

STATE OF IOWA
TERRY E. BRANSTAD, GOVERNOR
DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

Don Powell
St. Paul District,
Corps of Engineers
190 fifth Street East
St. Paul Minnesota 55101-1638

Mike Griffin
IA DNR
206 Rose St.
Bellevue IA 52031

7/20/98

Don;

I have read the preliminary cost estimate for the Pool Slough HREP. I have some suggestions for some cost savings on the area to the South of Winnabago Creek.

Aggregate;

The IA DNR needs no aggregate on the dike's between segments for this project. We will be using an ATV to adjust the gate settings and dike inspections. Therefore this item is not needed.

Stripping:

We have looked at the contour maps the Corps supplied and can see little advantage to stripping and grading the pool bottoms. We advise that this item be removed from the cost estimate.

Topsoil;

We would encourage the Corps to use the dike strippings for the topsoil used on the dikes. Please adjust your cost figures to incorporate this feature.

Dikefill;

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We suggest borrowing near (but not adjacent to) the dike locations. We propose building the dikes with nearby material and some borrow pits strategically placed for cost savings and biological benefits.

Backfill Overexcavation;

With the careful planning of strategic barrow areas and the use of strippings for topsoil we believe the cost for this item can be reduced. If there are excess strippings they can be incorporated in small nesting islands next to deep barrow areas.

Control Structures;

I understand that the control structures have changed and there is opportunity for some cost savings with the new design. I only want to state we would like control structures that are easy to operate, handy to clean out and have self storing stop log bays. The Structures should also be designed to allow fish passage when the logs have been removed.

Sincerely;

Mike Griffin
Mississippi River Wildlife Biologist

cc Szcodronski
Roseland
Kurtt
Gritters

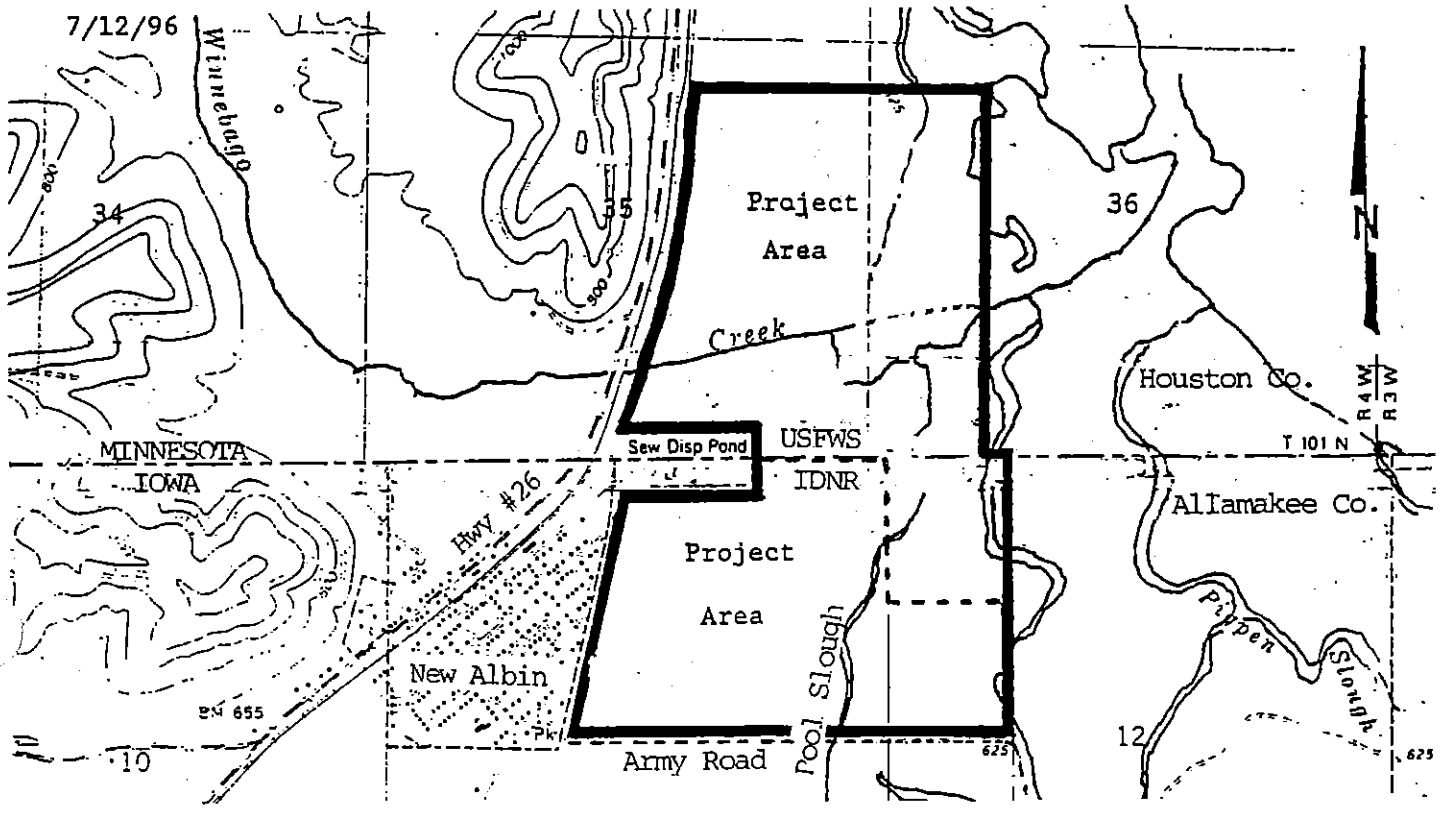
PUBLIC MEETING SCHEDULED
for the
POOL SLOUGH
HABITAT REHABILITATION AND ENHANCEMENT PROJECT

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM

A public meeting to discuss possible habitat improvements in the area of Pool Slough and Winnebago Creek is scheduled for Tuesday, August 6, 1996, at 7:00 pm at the Town House in New Albin, Iowa. This will be an opportunity to learn about the Environmental Management Program and be involved in the planning for the Pool Slough habitat rehabilitation and enhancement project. You will be able to hear what has been accomplished to date, ask questions, and provide your input to representatives from the Corps of Engineers, U.S. Fish and Wildlife Service, and the Iowa Department of Natural Resources.

The Pool Slough habitat project is part of the Environmental Management Program, a partnership program designed to protect the resources of the Upper Mississippi River and guide future river management. The goal of the Pool Slough project is to improve migration habitat for waterfowl and wading birds. The agencies mentioned above, as well as the Minnesota and Wisconsin Departments of Natural Resources, have been involved in the initial planning efforts and the development of a conceptual plan to address the specific project objectives for the Pool Slough area. The plan involves building dikes and structures to control water levels in the area.

We encourage you to attend the meeting at the Town House on August 6th and tell others who might be interested in providing input or hearing about possible plans affecting the Pool Slough and Winnebago Creek area. If you are unable to attend the meeting, feel free to ask for more information or send your comments to the District Engineer, St. Paul District, Corps of Engineers, 190 Fifth Street East, St. Paul, Minnesota 55101-1638, ATTN: PE-M/Powell. You are also invited to contact Mr. Don Powell directly at (612) 290-5402.



POOL SLOUGH HABITAT PROJECT
ENVIRONMENTAL MANAGEMENT PROGRAM

Summary of Questions/Answers and Concerns
at a Public Meeting in New Albin, Iowa, on August 6, 1996

Statement by Iowa DNR
The portion of the project on Iowa land will be operated as a moist soil unit and the immediate project site will probably be an area closed to hunting.

Statement by USFWS
The area on the north side of Winnebago Creek will be operated as a moist soil unit. The area on the south side of Winnebago Creek will be operated as a depressional wetland.

Question and Answer Period

Q: How much will the water be raised?
A: 2 feet within the ponds.

Q: So, you'll be backing the water upstream?
A: No, the dike will not be going parallel to the creek, not across it. The water level will only be raised within the ponds. Water will continue to flow down Winnebago Creek.

Q: Will the project increase upstream water levels in Winnebago Creek?
A: No.

Q: What effect will the project have on sedimentation in Winnebago Creek and its corresponding effect on groundwater levels?
A: It would have to noticeable effect. (Need to demonstrate in the report that the project will not appreciably affect groundwater levels on adjacent lands)

Q: What about the beavers?
A: The beavers will still try to dam it up. There isn't much we can do to stop that. It will be part of the project maintenance.

Q: What kind of food source will be provided?
A: Emergent aquatic plants will be produced from the native seed bank. Iowa will possibly plant some grains in the Iowa units.

Q: Will the area be closed to hunting?
A: Yes - the project area will be a established as a waterfowl refuge.

Q: Concerned that once established, the no hunting area will be expanded.
A: There are no plans at this time to expand it.

Q: Will the area be open to trapping?
A: That is at the discretion of the FWS or Iowa DNR, but it probably will be open to trapping.

Q: Why do you want more duck-days? The ducks & geese will eat my corn.
A: This should not be a major problem. Others in the audience felt that ducks and geese are not the primary animals that consume the corn.

Q: Why does the river keep sedimenting in?
A: Sediment introduced into the creek from the watershed and the streambed itself.

Q: Why does Winnebago Creek keep rising and ruining our fields?
A: Continual sedimentation over time.

Q: How are you going to keep sedimentation from ruining this project?
A: All of the EMP projects are designed for a 50-year life. We will be looking at sedimentation in the design.

Q: How are you going to keep the delta on Winnebago Creek from moving upstream, raising the water levels and ruining our land?
A: The project design will have to address this problem.

Q: Are there going to be pumps?
A: No, only gravity flow would be used.

Q: Hydraulically you're saying this will not raise the water table?
A: That's right.

Q: Concerned about potential effects on the Treatment Plant (expressed by Lenny Mellick, Public Works Supervisor). With the increase in waterfowl in the area, there could be a large increase in bird use on the Sludge Pond, which in turn could affect ability to effluent standards.
A: Will investigate ways to minimize effects. (Need to make sure any potential effects on the treatment plant are addressed, not only from an operation standpoint, but also to make sure that their maintenance costs are not increased)

Q: What about the potential effects of dikes on flood levels at the treatment lagoons?
A: This will be evaluated as part of floodplain impacts.

Q: Concerned about potential effect of the dikes on flood flow current patterns where the moist soil unit dikes tie into the treatment lagoon dikes and potential damage.
A: Design studies will evaluate effects on existing structure and additional protection (riprap) will be provided if necessary.

Q: You're starting with a 200 acre project here, what's going to keep you from continuing to buy another 200 acres here and there and buying our land?
A: We have no intention of buying any more land (the Iowa DNR specifically stated that their department is not considering the acquisition of other lands in the area).

Q: You're going to close off part of the refuge and we'll be able to hunt even less ducks, you'll just make the hunting worse.
A: The area that you're hunting now is good habitat. The area that this project would be constructed is good habitat in the spring but not in the fall. The project would not be built in the area you're hunting now, so you wouldn't loose any hunting area.

Q: You're going to spend $700,000 to bring ducks here and then we can't even shoot them.
A: You won't be able to shoot within the refuge. However, having a closed refuge will attract more ducks and these ducks will stay around longer. There would be more ducks to hunt and for a longer period of time.

Q: How much will it cost to shoot a duck?
A: The costs are based on habitat units and are calculated as cost per average annual habitat unit gain.

Q: How many ducks will stop in this 200 acres that we can hunt?
A: We don't really know. It will depend on the available food source and quality of the habitat

Q: How long will the ducks stay?
A: Probably not too much change from spring conditions. The effects in the fall would be dependent on conditions and the number of waterfowl that show up in a given year. There would likely be intense use by waterfowl for a 2-3 week period in the fall.

Q: I have gone down the river and past the islands and seen all of the dead timber. What's causing the timber to die?
A: It's gotten wetter than the timber can tolerate.

Q: Why has it gotten wetter?
A: It's hard to say. There are wetter weather cycles and also sedimentation could be a factor.

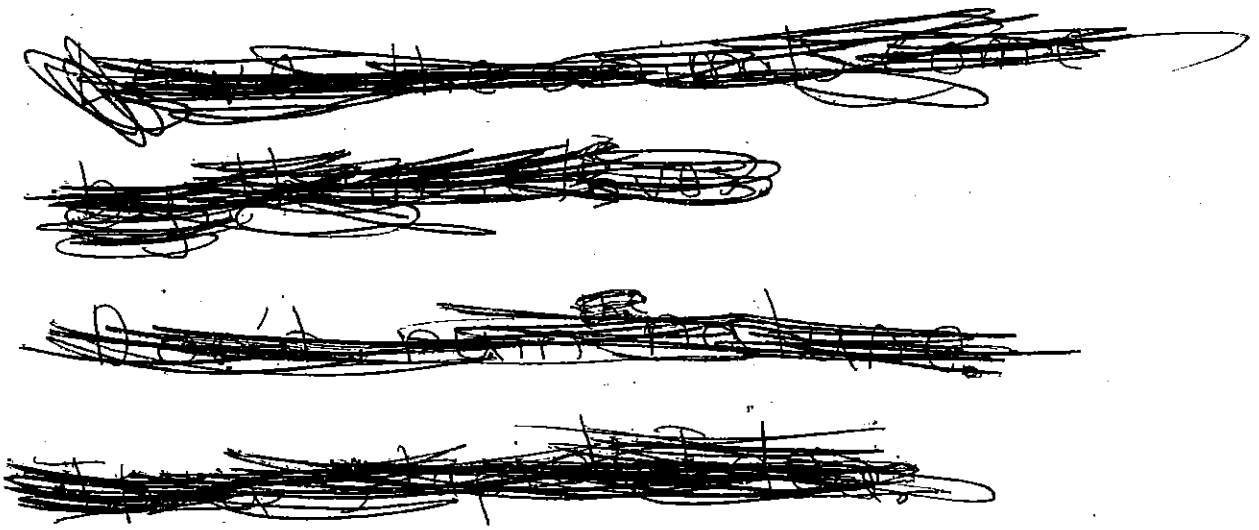
Q: Why can't you spend money on the boat landing and put rock at Millstone Landing?
A: The program we are working under does not currently address recreation facilities.

Q: Why can't you put 3 culverts in the dam at Reno?
A: There is a project at Reno that has been identified for the EMP, but it has not been selected for implementation under the current program and we don't have funding for it.

COMMENTS

Pool Slough Habitat Project 8/6/96

Name (optional) Abby Harmon



It's a pretty good thing to help animals. Make Some ponds, but not too many. I don't want to see you ruin the land. But try to find different Alternatives.

Please leave this sheet at the meeting or mail your comments to:

Mr. Don Powell, PE-M
U.S. Corps of Engineers
190 Fifth Street East
St. Paul, MN 55101-1638

COMMENTS

Pool Slough Habitat Project **8/6/96**

Name (optional) Ronald Chamberlin

I am in favor of this project. We are in great need of restoring habitat for waterfowl in this area.

With the river silting in and the pool levels rising and falling rapidly, feeding areas for waterfowl has decreased greatly in my opinion.

Waterfowl hunting in this area is no longer even close to hunting in the Dakotas, and I feel this is due to feeding area reductions along the Mississippi River.

The Reno Bottoms Ducks Unlimited Chapter located in Caledonia, Minnesota, is having their annual Banquet September 17th, & could possibly assist you in your efforts relative to this project.

Please leave this sheet at the meeting or mail your comments to:

Mr. Don Powell, PE-M
U.S. Corps of Engineers
190 Fifth Street East
St. Paul, MN 55101-1638

RECORD OF ATTENDANCE

Meeting – Pool Slough Habitat Project at New Albin, Iowa Date – August 6, 1996

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Thomas Wiebke	126 Portland Eitzen, MN. 55931	
Leo Whalen	RR#1 New Albin, Ia. 52160	
Ken Schaller	R.R. #1 Box 41A. Brownsville, Mn.	
Send WLHTF report DAVID P. NELSON	P.O. Box 306 CALEDONIA, MN 55921	RENE BOTTENS DUCKS UNLIMITED
Leonard Vederenbeet	Box 13 New Albin Ia 52160	
Paul Schauer	MN/DOT PO Box 6177 Rochester MN 55904	MN/DOT
Barry Fruechte	1658 Sunrise Ct New Albin, IA 52160-7501	
Dave Stuth	Box 83 New Albin Ia	
Craig + Holly Dougherty	New Albin 2971 Fox Farm Rd.	
Gary Thomas	P.O. Box 133 New Albin, Ia.	City Council
Tracy Dibert	1903 Highway 26 New Albin Ia 52160-7500	
Robin Harmon	2930 cemetary Rd. New Albin, Ia.	City Council

RECORD OF ATTENDANCE

Meeting – Pool Slough Habitat Project at New Albin, Iowa Date – August 6, 1996

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Ed Sinerud	2494 Winnebago Rd New Albin, IA 52160-7551	
Earl Mitchell	Box 275 New Albin Ia 52160	
Lennie Mellick	Box - 219 New Albin IA 52160	City of New Albin
Aj J Wiemerslage	Box 59 52160 NEW ALBIN Iowa	
Larry L. Rice	Box 98 New Albin, Ia.	
Tom Darling	Box 163 New Albin, Ia	
Larry Donaldson	P.O. Box 189 - 550 Main New Albin, Ia.	Corps. Company
Iris Sires	" " "	
Cleon Sires	Box 27 New albin Ia.	
MIKE ZEIMET	POBOX 323 NEW ALBIN IA 52160	SELF
Ray Whalen	Box 213 New albin, Ia 52160	
Dave Mach	1019 N. 4th St. MANCHESTER	IA DNR

RECORD OF ATTENDANCE

Meeting – Pool Slough Habitat Project at New Albin, Iowa Date – August 6, 1996

This information will be used for the purpose of knowing who attended this meeting. Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Duane Bakewell	New Albin	
Earl Hammell	" "	
JEFF JANVRIN	LA CROSSE	WDNR
Ed Staheli	2368 HWY 26 Lansing Ia	
Dick Eisler	RR1 BOX 101 Caledonia, MN. 55921	D.V.
Gerald Hammell	New Albin	
Eleanor Hammell	1857 Cemetery R.D. New Albin, Ia 52160	
Larry Harmon	2930 Cemetery Rd New Albin IA 52160	
Richard Mauss	Box 107 New Albin, Iowa 52160	
Ken Dulik	USFWS - McGregor D. SX.	
Gene Harman	1137 Bob Hill Dr New Albin, Iowa 52160	
Alex Galema	Box 272 New Albin IA 52160	

RECORD OF ATTENDANCE

Meeting – Pool Slough Habitat Project at New Albin, Iowa Date – August 6, 1996

This information will be used for the purpose of knowing who attended this meeting.
Please include your address if you wish to be on the project mailing list. Thank you.

NAME (please print)	ADDRESS (optional)	REPRESENTING
Bill Collins	202 1st St NE Waukon, IA 52172	IA DNR
Bud MAUST	Box 369 New Albin IA 52160	City Council
TERRY HAINDFIELD	~~Box~~ IOWA DNR Box 122 HIGHLANDVILLE, IA 52149	IA DNR

6/28/96

Don Powell
U.S. Army Corps of Engineers
St. Paul District
Technical Management Section
St. Paul MN

Michael K. Griffin
Mississippi River Wildlife Biologist
IADNR
206 Rose St.
Bellevue IA 52031

Don;

These are our comments on the Pool Slough PAR dated 5/24/96.

1. There is a typo on the conceptual drawing attached to the PAR. The Easterly dike in Pool B is identified as being 639.5 high, all other dikes are at 629.5.

2. The IA DNR is still very concerned with the elevation of Winnibago Creek. We want to make sure that the elevation of the water supply, for a gravity feed system, is not dependent on a transient features which will not be there in fifty years. i.e. a beaver dam. How much can the elevation of Winnibago Creek drop and still provide the needed head to make the project work?

3. The IA DNR would like to see the design of a box culvert instead of the drop structure shown on the conceptual drawing. We would also like to see the Army road be used as the dike for the southern part of the project. We suggest that the dikes be constructed on the contours where possible. We also suggest there might be some areas South of Army road that could be used for barrow areas for dike construction.

I appreciate the opportunity to comment on this HREP. I am also including a copy of people in the New Albin area who are interested in the project. Please include them on your mailing list for the up coming public meeting.

Sincerely;

Mike Griffin

cc. Szcodronski
Kurtt
Roseland

STATE OF MINNESOTA
OFFICE MEMORANDUM

DEPARTMENT: NR - WILDLIFE

PHONE : 507 453-2950
FAX : 507 453-2951

DATE : 6/7/96

TO : Mike Davis

FROM : Nick Gulden Nick

SUBJECT : Pool Slough Draft PAR

I have reviewed the above document and concur with the basic plan.

I would suggest several minor changes/additions as follows:

P.10, 3.4.2 - Add coyotes to the list of mammals.

P.10, 3.4.3 - With reference to river otter, bullfrog and Blanding's turtle, the otter and bullfrog are found in the Reno Bottoms. I don't believe there are any records for the Blanding's turtle. I'd suggest that the County Biological Survey people be contacted since they have just completed Houston County. There may be some plants of concern within the project site also.

P.11, 3.6 - Include trapping in the last sentence.

I assume you are coordinating our response to this review. If not, please advise and I will contact Don Powell directly.

cc File

STATE OF MINNESOTA
OFFICE MEMORANDUM

DEPARTMENT OF NATURAL RESOURCES

DATE: June 24, 1996

TO: Don Powell

FROM: Mike Davis, HREP Coordinator

PHONE: (612) 345-3331

SUBJECT: Pool Slough PAR

GENERAL

Comments on the Pool Slough HREP have been received from our Fisheries and Wildlife sections and our Division of Waters.

This project is not a high priority for our agency because we feel that the area (as described on PAR-7, 3.2.1.2) is already significant and important habitat due to its hydrologic and physical diversity and dynamics. It is in transition from former agricultural use to wildlife and fish habitat. With the help of Winnebago Creek's developing distributary network, and an ambitious beaver population, the area promises to become the kind of self-sustaining/self-renewing floodplain area we seek to have established elsewhere along the Mississippi River valley.

Although we acknowledge that this project is proposed as an exception (PAR-5, 2.2) to other HREP proposals, we continue to prefer projects that enhance natural river and floodplain processes that have been restricted or eliminated by managing the river for commercial navigation and other impairing uses.

Our Fisheries staff do not feel that spawning habitat for fish is a limiting factor in Pool 9. Although eliminating spawning areas is of concern, we do not believe it is necessary to provide an intensively managed pond for fish spawning as a feature of the project.

We do recognize that the proposed project will attract large numbers of waterfowl to feed in the managed areas, and therefore meets the goals of other agencies.

SPECIFIC

PAR-8, 3.3.1 - The river prior to L&D construction was of a *wooded island or anastomosing channel* type, not braided.

PAR-12, 3.7 - Southeastern MN, not west central WI.

PAR-13, 4.4.2 - Dredging of Winnebago creek would prevent the formation of distributary channels, a process we would like to encourage, not limit.

PAR-14, 4.4.3 - I have noticed that bottomland hardwoods are dying and decreasing in extent in the area, probably due to the rising water levels you have mentioned. As this trend progresses, the shallow former woodlands are likely to become marshy, excellent waterfowl habitat. Willows are also invading old field areas as they become wet. These are the kind of successional dynamics that we want to see occurring in the river valley.

PAR-17, 7.1.1.2 - MN does not have a three millimeter flood elevation increase limit, who does?

PAR-19, 8.2.2 - Diking the area would eliminate the developing distributary network of Winnebago Creek, a process we would like to encourage because of it is a long-term, self sustaining process that maintains a dynamic, productive array of habitat types for all floodplain plant and animal species.

PAR-21, 8.2.9 - Our section of fisheries is not interested in pursuing this project feature in Minnesota waters.

cc: Nick Gulden - comments attached
Tim Schlagenhaft
Scot Johnson
Steve Johnson
Mike Griffin, IA DNR
Keith Beseke, USFWS

Pool Slough meeting
3/12/96

NAME	ADDRESS
✓ Mike Griffin	206 Rose St Bellevue Ia
✓ Bob Kurtt	903 Commerce - Decorah
✓ Greg Dougherty	2971 Fox Farm Rd New Albin
✓ Jim Eube	355 S 2nd New Albin
✓ Alex Galeucia	Box 272 New Albin
✓ Ed Staheli	2368 Hwy 26 Lansing, Ia
✓ Bob Henkel JR.	Lansing, IA.
✓ Al Wiengrecke	New Albin
Bill Cowles	Waukon
✓ Ed Ludwig	Lansing
✓ Chris McLennan	New Albin
✓ Ray Whalen	New albin
✓ Cyril W. Kenney	NEW ALBIN
✓ Les Colsch	" "
✓ Herman Zeinstra	" "

US Army Corps of Engineers Saint Paul District	PROJECT TITLE: Pool Slough	COMPUTED BY:	DATE: 7/11/95	SHEET:
	SUBJECT TITLE: New Albin, IA	CHECKED BY:	DATE:	CONTRACT NO.:

Briefing meeting for city officials

Ron Weymiller

Gilmin Meyer

Richard Mauss

Gary Thomas

Robin Harmon 319 544 4430 / 4272 W

Ricetto TV

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 6, 1993

APR 05 1993
U.S. Corps of Engineers
St. Paul District
Regulatory Branch

Colonel Richard Craig
St. Paul Corps of Engineers
1421 U.S. Post Office and Custom House
St. Paul, MN 55101-1479

Dear Colonel Craig:

I understand that the Pool Slough project is nearing preliminary design under the EMP Habitat Rehabilitation and Protection program. The project boundary originally included both federal and state land. However, I asked that the portion of the project on state land be deferred until the issue of funding operation and maintenance was resolved. That issue has since been resolved, so I request that the portion of the project on state land be reinstated and included in design and engineering along with the federal land components. I understand that the Iowa DNR will be responsible for paying 25% of construction costs and 100% of operation and maintenance costs on features of the project on state land.

Art Roseland and Bob Kurtt, Iowa DNR Wildlife Biologists, have developed a conceptual plan for developments on state land within the Pool Slough area. Please have your planning and engineering staff work directly with Art and Bob during preliminary design.

We look forward to working with your agency and the U.S. Fish and Wildlife Service on the Pool Slough EMP project.

Sincerely,

LARRY J. WILSON
DIRECTOR
IOWA DEPARTMENT OF NATURAL RESOURCES

5-51

WALLACE STATE OFFICE BUILDING / DES MOINES, IOWA 50319 / 515-281-5145 / TDD 515-242-5967 / FAX 515-281-8895

MINNESOTA HISTORICAL SOCIETY

May 12, 1994

Mr. Robert F. Post
Corps of Engineers, Engineering & Planning
190 East Fifth Street
St. Paul, Minnesota 55101

Dear Mr. Post:

Re: Environmental Management Program on Mississippi River near New Albin, Allamakee County, Iowa extending into Houston County (S35, 36, T101, R4), Minnesota
SHPO Number: 94-2392

Thank you for consulting with our office during the early planning stages for the above referenced project.

There are no previously identified historic or archaeological properties within the project boundaries, but there are recorded burial areas just to the west. We would recommend a geomorphological study to assess the archaeological potential of the project area.

We look forward to working with you further on this effort.

Sincerely,

Britta L. Bloomberg
Deputy State Historic Preservation Officer

BLB:dmb

345 KELLOGG BOULEVARD WEST / SAINT PAUL, MINNESOTA 55102-1906 / TELEPHONE: 612-296-6126

State Historical Society of Iowa

The Historical Division of the Department of Cultural Affairs

April 28, 1994

In reply refer to
R & C#: 940403097

Mr. Robert F. Post
Chief, Engineering and Planning Division
Department of the Army
St. Paul District, Corps of Engineers
190 Fifth Street East
St. Paul, Minnesota 55101-1638

RE: COE - ALLAMAKEE COUNTY, IOWA - ENVIRONMENTAL MANAGEMENT PROGRAM (EMP) - PROPOSED POOL SLOUGH NEAR NEW ALBIN

Dear Mr. Post:

We have received your request for information concerning known and potential cultural resources in the above referenced project area.

No previous cultural resource surveys have been undertaken in that area, however, three known sites are in the immediate vicinity of the project (map enclosed). The community of New Albin is built on the site of an Oneota Village (13AM66). Site 13AM68 consists of burial mounds. Somewhat to the south of your project area, but in the same topography, is an historic aboriginal burial site.

As the project location is in the vicinity of several previously recorded archeological sites and there is potential for sites to be found in your project area, we recommend an archeological survey be conducted prior to land disturbance activities. The purpose of the survey would be to locate any presently unidentified archeological or historical sites which may be impacted by the proposed undertaking.

Should you have any questions or if the office can be of further assistance to you, please contact the Review and Compliance program at 515-281-4137.

Sincerely

Laurine Rogers

Laurine Rogers
Archeologist, Review and Compliance Program
State Historic Preservation Office

☐ 402 Iowa Avenue
Iowa City, Iowa 52240
(319) 335-3916

☐ Capitol Complex
Des Moines, Iowa 50319
(515) 281-5111

☐ Montauk
Box 372
Clermont, Iowa 52135
(319) 423-7173

5-53

Rivette to TV

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCE
LARRY J. WILSON, DIRECT

April 6, 1993

APR 05 1993
U.S. Corps of Engineers
St. Paul District
Regulatory Branch

Colonel Richard Craig
St. Paul Corps of Engineers
1421 U.S. Post Office and Custom House
St. Paul, MN 55101-1479

Dear Colonel Craig:

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Art Roseland and Bob Kurtt, Iowa DNR Wildlife Biologists, have developed a conceptual plan for developments on state land within the Pool Slough area. Please have your planning and engineering staff work directly with Art and Bob during preliminary design.

We look forward to working with your agency and the U.S. Fish and Wildlife Service on the Pool Slough EMP project.

Sincerely,

LARRY J. WILSON
DIRECTOR
IOWA DEPARTMENT OF NATURAL RESOURCES

5-54

WALLACE STATE OFFICE BUILDING / DES MOINES, IOWA 50319 / 515-281-5145 / TDD 515-242-5967 / FAX 515-281-8895

[NOT REQUIRED]

Attachment 6

DRAFT
Memorandum of Agreement
for
Operation and Maintenance

[NOT REQUIRED]

DRAFT

MEMORANDUM OF AGREEMENT

BETWEEN

THE UNITED STATES FISH AND WILDLIFE SERVICE

AND

THE DEPARTMENT OF THE ARMY

FOR

ENHANCING FISH AND WILDLIFE RESOURCES

OF THE

UPPER MISSISSIPPI RIVER SYSTEM

AT THE

POOL SLOUGH WETLAND COMPLEX

MINNESOTA AND IOWA

I. PURPOSE

The purpose of this memorandum of agreement (MOA) is to establish the relationships, arrangements, and general procedures under which the U.S. Fish and Wildlife Service (USFWS) and the Department of the Army (DOA) will operate in constructing, operating, maintaining, repairing, and rehabilitating the Pool Slough Wetland Complex separable element of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP).

II. BACKGROUND

Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, authorizes construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. A part of the project area is managed by the USFWS and is on land managed as a national wildlife refuge. Under conditions of Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, all construction costs of those fish and wildlife features of the Pool Slough project that are located on USFWS lands are 100 percent Federal, and pursuant to Section 107(b) of the

Water Resources Development Act of 1992, Public Law 102-580, all costs of operation and maintenance for those features of the Pool Slough project that are located on USFWS lands are 100 percent Federal.

III. GENERAL SCOPE

The project to be accomplished pursuant to this MOA shall consist of rehabilitating and improving migratory waterfowl and wading bird habitat on the Upper Mississippi River National Wildlife and Fish Refuge by constructing low level dikes and control structures to create 2 moist soil management units for the production of food for migratory waterfowl. This would involve moving about 36,000 cubic meters (47,000 cubic yards) of material to create the waterfowl management units at the Pool Slough project site near New Albin, Iowa in pool 9 of the Upper Mississippi River. The entire Pool Slough project includes construction of additional management units on lands to the south owned by the State of Iowa. The project would improve migratory bird habitat by providing the capability to manage water levels in the units.

IV. RESPONSIBILITIES

A. DOA is responsible for:

1. Construction: Construction of the project which currently consists of creating about 18 hectares (45 acres) of moist soil management units with earth fill dikes and associated control structures. About 17,000 cubic meters (22,000 cubic yards) of fill for the dikes and about 7,000 cubic meters (10,000 cubic yards) of fill to level the pool bottoms would be used. All fill material to accomplish the work would be obtained from within the project area.

2. Major Rehabilitation: The Federal share of any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements identified in the Definite Project Report and that is needed as a result of specific storm or flood events.

3. Construction Management: Subject to and using funds appropriated by the Congress of the United States, and in accordance with Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, DOA will construct the Pool Slough project as described in the Definite Project Report/Environmental Assessment, Pool Slough Wetland Complex, Habitat Rehabilitation and Enhancement Project, dated June 2003, applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The USFWS will be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed. If DOA encounters potential delays related to construction of the project, DOA will promptly notify USFWS of such delays.

4. Maintenance of Records. The DOA will keep books, records, documents, and other evidence pertaining to costs and expenses incurred in connection with construction of the project to the extent and in such detail as will properly reflect total costs. The DOA shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the project and resolution of all relevant claims arising therefrom, and shall make available at its offices, at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the USFWS.

B. USFWS is responsible for operation, maintenance, and repair: Upon completion of construction as determined by the District Engineer, St. Paul, the USFWS shall accept the project and shall operate, maintain, and repair the project as defined in the Definite Project Report/Environmental Assessment entitled "Pool Slough Wetland Complex, Habitat Rehabilitation and Enhancement Project," dated June 2003, in accordance with Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580.

V. MODIFICATION AND TERMINATION

This MOA may be modified or terminated at any time by mutual agreement of the parties. Any such modification or termination must be in writing. Unless otherwise modified or terminated, this MOA shall remain in effect for a

period of no more than 50 years after initiation of construction of the project.

VI. REPRESENTATIVES

The following individuals or their designated representatives shall have authority to act under this MOA for their respective parties.

USFWS: Regional Director
U.S. Fish and Wildlife Service
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, Minnesota 55111-4056

DOA: District Engineer
U.S. Corps of Engineers, St. Paul District
Sibley Square
190 Fifth Street East
St. Paul, Minnesota 55101-1638

VII. EFFECTIVE DATE OF MOA

This MOA shall become effective when signed by the appropriate representatives of both parties.

THE DEPARTMENT OF THE ARMY

BY: _____
(signature)
Robert L. Ball
Colonel
Corps of Engineers
District Engineer

DATE: _____

THE U.S. FISH AND WILDLIFE SERVICE

BY: _____
(signature)
Robyn Thorson
Regional Director
U.S. Fish and Wildlife Service

DATE: _____

Attachment 7

Draft

Project Cooperation Agreement

DRAFT - July 2003

PROJECT COOPERATION AGREEMENT BETWEEN THE DEPARTMENT OF THE ARMY AND THE STATE OF IOWA FOR CONSTRUCTION OF THE POOL SLOUGH WETLAND COMPLEX HABITAT REHABILITATION AND ENHANCEMENT PROJECT AT POOL 9, MISSISSIPPI RIVER, ALLAMAKEE COUNTY, IOWA

THIS AGREEMENT is entered into this _____ day of _____, 200__, by and between the DEPARTMENT OF THE ARMY (hereinafter the "Government"), represented by the Assistant Secretary of the Army (Civil Works), and the STATE OF IOWA, (hereinafter the "Local Sponsor"), represented by the Director, Iowa Department of Natural Resources.

WITNESSETH, THAT:

WHEREAS, construction of the Pool Slough Wetland Complex Habitat Rehabilitation and Enhancement Project at Pool 9, Mississippi River, Allamakee County, Iowa was approved under the terms of the Upper Mississippi River System Environmental Management Program, as authorized by Section 1103(e) of the Water Resources Development Act of 1986, Public Law 99-662, as amended;

WHEREAS, the Government and the Local Sponsor desire to enter into a Project Cooperation Agreement for construction of the Pool Slough Wetland Complex Habitat Rehabilitation and Enhancement Project at Pool 9, Upper Mississippi River, Allamakee County, Iowa (hereinafter the "Project", as defined in Article I.A. of this Agreement);

WHEREAS, Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, as amended, specifies the cost sharing requirements applicable to construction of the Project;

WHEREAS, Section 906(e) provides that the first costs for enhancement of fish and wildlife resources shall be a Federal cost when certain specified circumstances are present;

WHEREAS, Section 509(e) of the Water Resources Development Act of 1999, Public Law 106-53, further provides that when such specified circumstances are not present, 35 percent of the first cost of enhancement of fish and wildlife resources shall be provided by the Non-Federal Interest;

WHEREAS, the Government and the Local Sponsor agree that the specified circumstances referred to in Subsection 906(e) of Public Law 99-662 are not present;

WHEREAS, Section 1103(e)(7)(a) of the Water Resources Development Act of 1986, Public Law 99-662, as amended, specifies the operation and maintenance responsibilities for the Project;

WHEREAS, Section 221 of the Flood Control Act of 1970, Public Law 91-611, as amended, provides that the Secretary of the Army shall not commence construction of any water resources project, or separable element thereof, until each Local Sponsor 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 costs for the habitat rehabilitation and enhancement component of the Upper Mississippi River System Environmental Management Program;

WHEREAS, the Local Sponsor does not qualify for a reduction of the maximum Non-Federal cost share pursuant to the guidelines that implement Section 103(m) of the Water Resources Development Act of 1986, Public Law 99-662, as amended;

WHEREAS, the Local Sponsor desires to perform certain work (hereinafter the "work-in-kind", as defined in Article I.M. of this Agreement) which is a part of the Project;

WHEREAS, the Government and the Local Sponsor have the full authority and capability to perform as hereinafter set forth and intend to cooperate in cost sharing and financing of the construction of the Project in accordance with the terms of this Agreement.

NOW, THEREFORE, the Government and the Local Sponsor agree as follows:

ARTICLE I - DEFINITIONS AND GENERAL PROVISIONS

For purposes of this Agreement:

A. The term "Project" shall mean that portion of habitat rehabilitation and enhancement in the vicinity of Pool Slough near New Albin, Iowa, located on lands owned by the Iowa Department of Natural Resources and are outside the Upper Mississippi River National Wildlife and Fish Refuge. Features included are low-level dikes, a water control structure, and a pumping facility to create a moist soil unit for optimal control of water levels for the production of food for migratory waterfowl. These features are generally described in the Upper Mississippi River System Environmental Management Program Definite Project Report/Environmental Assessment (DPR), dated June 2003, and approved by the Commander, St. Paul District on 24 July 2003. The Project includes the work-in-kind described in Article I.M. of this Agreement.

B. The term "total project costs" shall mean all costs incurred by the Local Sponsor and the Government in accordance with the terms of this Agreement directly related to construction of the Project. Subject to the provisions of this Agreement, the term shall include, but is not necessarily limited to: continuing planning and engineering costs incurred after October 1, 1985; advanced engineering and design costs; preconstruction engineering and design costs; engineering and design costs during construction; the costs of investigations to identify the existence and extent of hazardous substances in accordance with Article XV.A. of this Agreement; costs of historic preservation activities in accordance with Article XVIII.A. of this Agreement; actual construction costs, including the costs of alteration, lowering, raising, or replacement and attendant removal of existing railroad bridges and approaches thereto; the credit amount for the work-in-kind performed by the Local Sponsor in accordance with Article II.D.4 of this Agreement; supervision and administration costs; costs of participation in the Project Coordination Team in accordance with Article V of this Agreement; costs of contract dispute settlements or awards; the value of lands, easements, rights-of-way, relocations, and suitable borrow and dredged or excavated material disposal areas for which the Government affords credit in accordance with Article IV of this Agreement; and costs of audit in accordance with Article X of this Agreement. The term does not include any costs for operation, maintenance, repair, replacement, or rehabilitation; any costs due to betterments; or any costs of dispute resolution under Article VII of this Agreement.

C. The term "financial obligation for construction" shall mean a financial obligation of the Government or a financial obligation of the Local Sponsor for work-in-kind, other than an obligation pertaining to the provision of lands, easements, rights-of-way, relocations, and borrow and dredged or excavated material disposal areas, that results or would result in a cost that is or would be included in total project costs.

D. The term "non-Federal proportionate share" shall mean the ratio of the Local Sponsor's total cash contribution required in accordance with Article II.D.2. of this Agreement to total financial obligations for construction, as projected by the Government.

E. The term "period of construction" shall mean the time from the date the Government first notifies the Local Sponsor in writing, in accordance with Article VI.B. of this Agreement, of the scheduled date for issuance of the solicitation for the first construction contract to the date that the U.S. Army Engineer for the St. Paul District (hereinafter the "District Engineer") notifies the Local Sponsor in writing of the Government's determination that construction of the Project is complete.

F. The term "highway" shall mean any public highway, roadway, street, or way, including any bridge thereof.

G. The term "relocation" shall mean providing a functionally equivalent facility to the owner of an existing utility, cemetery, highway or other public facility, or railroad (excluding existing railroad bridges and approaches thereto) when such action is authorized in accordance with applicable legal principles of just compensation or as otherwise provided in the authorizing legislation for the Project or any report referenced therein. Providing a functionally equivalent

facility may take the form of alteration, lowering, raising, or replacement and attendant removal of the affected facility or part thereof.

H. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

I. The term "functional portion of the Project" shall mean a portion of the Project that is suitable for tender to the Local Sponsor to operate and maintain in advance of completion of the entire Project. For a portion of the Project to be suitable for tender, the District Engineer must notify the Local Sponsor in writing of the Government's determination that the portion of the Project is complete and can function independently and for a useful purpose, although the balance of the Project is not complete.

J. The term "betterment" shall mean a change in the design and construction of an element of the Project resulting from the application of standards that the Government determines exceed those that the Government would otherwise apply for accomplishing the design and construction of that element.

K. The terms "repair" and "replace" shall refer to predictable, discrete actions necessary for continued operation and maintenance of the Project.

L. The term "rehabilitation" of the project shall mean remedial work to restore the project to a fully functional operational condition, and that exceeds the annual operation and maintenance requirements identified in the DPR.

M. The term "work-in-kind" shall mean placing stabilized aggregate on the dike from Army Road to the water level control structure and supplying the control structure, as approved by the District Engineer in the Definite Project Report/Environmental Assessment dated 24 July 2003. The work-in-kind includes construction of the authorized improvements as well as planning, engineering, design, supervision and administration, and other activities associated with construction, but does not include the construction of betterments or the provision of lands, easements, rights-of-way, relocations, or suitable borrow and dredged or excavated material disposal areas associated with the work-in-kind.

ARTICLE II - OBLIGATIONS OF THE GOVERNMENT AND THE LOCAL 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 Local Sponsor, shall expeditiously construct the Project (including alteration, lowering, raising, or replacement and attendant removal of existing railroad bridges and approaches thereto), applying those procedures usually applied to Federal projects, pursuant to Federal laws, regulations, and policies.

1. The Government shall afford the Local 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. The Government shall not issue the solicitation for the first construction contract until the Local Sponsor has confirmed in writing its willingness to proceed with the Project. To the extent possible, the Government shall afford the Local Sponsor the opportunity to review and comment on all contract modifications, including change orders, prior to the issuance to the contractor of a Notice to Proceed. In any instance where providing the Local Sponsor with notification of a contract modification or change order is not possible prior to issuance of the Notice to Proceed, the Government shall provide such notification in writing at the earliest date possible. To the extent possible, the Government also shall afford the Local 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 Local Sponsor, but the contents of solicitations, award of contracts, execution of contract modifications, issuance of change orders, resolution of contract claims, and performance of all work on the Project (whether the work is performed under contract or by Government personnel), shall be exclusively within the control of the Government.

2. Throughout the period of construction, the District Engineer shall furnish the Local Sponsor with a copy of the Government's Written Notice of Acceptance of Completed Work for each contract for the Project.

3. Notwithstanding paragraph A.1. of this Article, if, upon the award of any contract for construction of the Project, cumulative financial obligations for construction would exceed $300,000, the Government and the Local Sponsor agree to defer award of that contract and all subsequent contracts for construction of the Project until such time as the Government and the Local Sponsor agree to proceed with further contract awards for the Project, but in no event shall the award of contracts be deferred for more than three years. Notwithstanding this general provision for deferral of contract awards, the Government, after consultation with the Local Sponsor, may award a contract or contracts after the Assistant Secretary of the Army (Civil Works) makes a written determination that the award of such contract or contracts must proceed in order to comply with law or to protect life or property from imminent and substantial harm.

B. The Local Sponsor may request the Government to accomplish betterments. Such requests shall be in writing and shall describe the betterments requested to be accomplished. If the Government in its sole discretion elects to accomplish the requested betterments or any portion thereof, it shall so notify the Local 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 Local Sponsor shall be solely responsible for all costs due to the requested betterments and shall pay all such costs in accordance with Article VI.C. of this Agreement.

C. When the District Engineer determines that the entire Project is complete or that a portion of the Project has become a functional portion of the Project, the District Engineer shall so notify the Local Sponsor in writing and furnish the Local Sponsor with an Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual (hereinafter the "OMRR&R Manual") and with copies of all of the Government's Written Notices of Acceptance of

Completed Work for all contracts for the Project or the functional portion of the Project that have not been provided previously. Upon such notification, the Local Sponsor shall operate, maintain, repair, replace, and rehabilitate the entire Project or the functional portion of the Project in accordance with Article VIII of this Agreement.

D. The Local Sponsor shall contribute 35 percent of total project costs in accordance with the provisions of this paragraph.

1. In accordance with Article III of this Agreement, the Local Sponsor shall provide all lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas that the Government determines the Local Sponsor must provide for the construction, operation, and maintenance of the Project, and shall perform or ensure performance of all relocations that the Government determines to be necessary for the construction, operation, and maintenance of the Project.

2. If the Government projects that the value of the Local Sponsor's contributions under paragraph D.1. of this Article and Articles V, X, and XV.A. of this Agreement will be less than 35 percent of total project costs, the Local Sponsor shall provide an additional cash contribution, in accordance with Article VI.B. of this Agreement, in the amount necessary to make the Local Sponsor's total contribution equal to 35 percent of total project costs.

3. If the Government determines that the value of the Local Sponsor's contributions provided under paragraphs D.1. and D.2. of this Article and Articles V, X, and XV.A. of this Agreement has exceeded 35 percent of total project costs, the Government, subject to the availability of funds, shall reimburse the Local Sponsor for any such value in excess of 35 percent of total project costs. After such a determination, the Government, in its sole discretion, may provide any remaining Project lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas and perform any remaining Project relocations on behalf of the Local Sponsor.

4. The Government has determined that the work-in-kind is compatible with the Project and has approved a credit in the estimated amount of $36,000 for construction of such work by the Local Sponsor. The affording of such credit shall be subject to an on-site inspection by the Government to verify that the work was accomplished in a satisfactory manner and is suitable for inclusion in the Project. The actual amount of credit shall be subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of costs. To afford such credit, the Government shall apply the credit amount toward any additional cash contribution required under paragraph D.2. of this Article. The Local Sponsor shall not receive credit for any amount in excess of such additional cash contribution, nor shall the Local Sponsor be entitled to any reimbursement for any excess credit amount. In no event shall the Local Sponsor perform work-in-kind that would result in either the credit afforded under this paragraph exceeding 80 percent of the Local Sponsor's share of total project costs or the credit afforded under this paragraph, plus the value of lands, easements, rights-of-way, relocations, and suitable borrow and dredged or excavated material disposal areas for which the Government affords credit in accordance with Article IV of this Agreement, exceeding 35 percent of total project costs. Crediting of work-in-kind is subject to satisfactory compliance

with applicable federal labor laws covering non-Federal construction, including, but not limited to the Davis-Bacon Act (40 USC 276a et seq), the Contract Work Hours and Safety Standards Act (40 USC 327 et seq) and the Copeland Anti-Kickback Act (40 USC 276c). Crediting of work-in-kind may be withheld, in whole or in part, as a result of the Local Sponsor's failure to comply with its obligations under these laws.

E. The Local Sponsor may request the Government to provide lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas or perform relocations on behalf of the Local Sponsor. Such requests shall be in writing and shall describe the services requested to be performed. If in its sole discretion the Government elects to perform the requested services or any portion thereof, it shall so notify the Local 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 Local Sponsor shall be solely responsible for all costs of the requested services and shall pay all such costs in accordance with Article VI.C. of this Agreement. Notwithstanding the provision of lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas or performance of relocations by the Government, the Local Sponsor shall be responsible, as between the Government and the Local Sponsor, for the costs of cleanup and response in accordance with Article XV.C. of this Agreement.

F. The Government shall perform a final accounting in accordance with Article VI.D. of this Agreement to determine the contributions provided by the Local Sponsor in accordance with paragraphs B., D., and E. of this Article and Articles V, X, and XV.A. of this Agreement and to determine whether the Local Sponsor has met its obligations under paragraphs B., D., and E. of this Article.

G. The Local Sponsor shall not use Federal funds to meet the Local Sponsor's share of total project costs under this Agreement unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

ARTICLE III - LANDS, RELOCATIONS, DISPOSAL AREAS, AND PUBLIC LAW 91-646 COMPLIANCE

A. The Government, after consultation with the Local Sponsor, shall determine the lands, easements, and rights-of-way required for the construction, operation, and maintenance of the Project, including those required for relocations, borrow materials, and dredged or excavated material disposal. The Government in a timely manner shall provide the Local Sponsor with general written descriptions, including maps as appropriate, of the lands, easements, and rights-of-way that the Government determines the Local Sponsor must provide, in detail sufficient to enable the Local Sponsor to fulfill its obligations under this paragraph, and shall provide the Local Sponsor with a written notice to proceed with acquisition of such lands, easements, and rights-of-way. Prior to the end of the period of construction, the Local Sponsor shall acquire all lands, easements, and rights-of-way set forth in such descriptions. Furthermore, prior to issuance of the solicitation for each construction contract, the Local Sponsor shall provide the Government with authorization for entry to all lands, easements, and rights-of-way the

Government determines the Local Sponsor must provide for that contract. For so long as the Project remains authorized, the Local Sponsor shall ensure that lands, easements, and rights-of-way that the Government determines to be required for the operation and maintenance of the Project and that were provided by the Local Sponsor are retained in public ownership for uses compatible with the authorized purposes of the Project.

B. The Government, after consultation with the Local Sponsor, shall determine the improvements required on lands, easements, and rights-of-way to enable the proper disposal of dredged or excavated material associated with the construction, operation, and maintenance of the Project. Such improvements may include, but are not necessarily limited to, retaining dikes, wasteweirs, bulkheads, embankments, monitoring features, stilling basins, and de-watering pumps and pipes. The Government in a timely manner shall provide the Local Sponsor with general written descriptions of such improvements in detail sufficient to enable the Local Sponsor to fulfill its obligations under this paragraph, and shall provide the Local Sponsor with a written notice to proceed with construction of such improvements. Prior to the end of the period of construction, the Local Sponsor shall provide all improvements set forth in such descriptions. Furthermore, prior to issuance of the solicitation for each Government construction contract, the Local Sponsor shall prepare plans and specifications for all improvements the Government determines to be required for the proper 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.

C. The Government, after consultation with the Local Sponsor, shall determine the relocations necessary for the construction, operation, and maintenance of the Project, including those necessary to enable the removal of borrow materials and the proper disposal of dredged or excavated material. The Government in a timely manner shall provide the Local Sponsor with general written descriptions, including maps as appropriate, of such relocations in detail sufficient to enable the Local Sponsor to fulfill its obligations under this paragraph, and shall provide the Local Sponsor with a written notice to proceed with such relocations. Prior to the end of the period of construction, the Local Sponsor shall perform or ensure the performance of all relocations as set forth in such descriptions. Furthermore, prior to issuance of the solicitation for each Government construction contract, the Local 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 contract.

D. The Local 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 paragraphs A., B., or C. of this Article. Upon receipt of such documents the Government, in accordance with Article IV of this Agreement and in a timely manner, shall determine the value of such contribution, include such value in total project costs, and afford credit for such value toward the Local Sponsor's share of total project costs.

E. The Local 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 by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 C.F.R. Part 24, in

acquiring lands, easements, and rights-of-way required for the construction, operation, and maintenance of the Project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and shall inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - CREDIT FOR VALUE OF LANDS, RELOCATIONS, AND DISPOSAL AREAS

A. The Local Sponsor shall receive credit toward its share of total project costs for the value of the lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas that the Local Sponsor must provide pursuant to Article III of this Agreement, and for the value of the relocations that the Local Sponsor must perform or for which it must ensure performance pursuant to Article III of this Agreement. However, the Local Sponsor shall not receive credit for the value of any lands, easements, rights-of-way, relocations, or borrow and dredged or excavated material disposal areas that have been provided previously as an item of cooperation for another Federal project. The Local Sponsor also shall not receive credit for the value of lands, easements, rights-of-way, relocations, or borrow and dredged or excavated material disposal areas to the extent that such items are provided using Federal funds unless the Federal granting agency verifies in writing that such credit is expressly authorized by statute.

B. For the sole purpose of affording credit in accordance with this Agreement, the value of lands, easements, and rights-of-way, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, 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 Local Sponsor on the effective date of this Agreement shall be the fair market value of such real property interests as of the date the Local Sponsor provides the Government with authorization for entry thereto. The fair market value of lands, easements, or rights-of-way acquired by the Local 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 B.3. of this Article, the fair market value of lands, easements, or rights-of-way shall be determined in accordance with paragraph B.2.a. of this Article, unless thereafter a different amount is determined to represent fair market value in accordance with paragraph B.2.b. of this Article.

a. The Local Sponsor shall obtain, for each real property interest, an appraisal that is prepared by a qualified appraiser who is acceptable to the Local Sponsor and the Government. 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 Local Sponsor's appraisal, if such appraisal is approved by the Government. In the event the Government does not approve the Local Sponsor's appraisal, the Local Sponsor may

obtain a second appraisal, and the fair market value shall be the amount set forth in the Local Sponsor's second appraisal, if such appraisal is approved by the Government. In the event the Government does not approve the Local Sponsor's second appraisal, or the Local Sponsor chooses not to obtain a second appraisal, 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 Local Sponsor. In the event the Local Sponsor does not approve the Government's appraisal, the Government, after consultation with the Local Sponsor, shall consider the Government's and the Local 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 Local Sponsor for the real property interest exceeds the amount determined pursuant to paragraph B.2.a. of this Article, the Government, at the request of the Local Sponsor, shall consider all factors relevant to determining fair market value and, in its sole discretion, after consultation with the Local Sponsor, may approve in writing an amount greater than the amount determined pursuant to paragraph B.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 Local Sponsor, but no less than the amount determined pursuant to paragraph B.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 Local Sponsor shall, prior to instituting such proceedings, 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 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 Local 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 Local 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 Local Sponsor agree as to an appropriate amount, then the Local 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 Local Sponsor cannot agree as to an appropriate amount, then the Local 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 sub-paragraph B.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 the 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 Local 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 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, and mapping costs, as well as the actual amounts expended for payment of any Public Law 91-646 relocation assistance benefits provided in accordance with Article III.E. of this Agreement.

C. After consultation with the Local 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 Iowa 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, but 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 costs.

4. Crediting for relocations performed within the Project boundaries is subject to satisfactory compliance with applicable Federal labor laws covering Non-Federal construction, including, but not limited to the Davis-Bacon Act (40 USC 276a et. seq.), the Contract Work Hours and Safety Standards Act (40 USC 327 et. seq.) and the Copeland Anti-Kickback Act (40 USC 276c). Crediting may be withheld, in whole or in part, as a result of the Local Sponsor's failure to comply with its obligations under these laws.

D. The value of the improvements made to lands, easements, and rights-of-way for the proper 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 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.

ARTICLE V - PROJECT COORDINATION TEAM

A. To provide for consistent and effective communication, the Local 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 construction. The Government's Project Manager and a counterpart named by the Local Sponsor shall co-chair the Project Coordination Team.

B. The Government's Project Manager and the Local Sponsor's counterpart shall keep the Project Coordination Team informed of the progress of 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 construction, the Project Coordination Team shall generally oversee the Project, including issues related to design; plans and specifications; scheduling; real property and relocation requirements; real property acquisition; contract awards and modifications; contract costs; the application of and compliance with the Davis-Bacon Act, Contract Work Hours and Safety Standards Act and the Copeland Anti-Kickback Act for relocations and construction portion of the non-Federal work-in-kind; 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, replacement, and rehabilitation of the Project; and other related matters. This oversight shall be consistent with a project management plan developed by the Government after consultation with the Local Sponsor.

D. The Project Coordination Team may make recommendations that it deems warranted to the District Engineer on matters 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 construction of the Project, has the discretion to accept, reject, or modify the Project Coordination Team's recommendations.

E. The costs of participation in the Project Coordination Team shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE VI - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties and current projections of total project costs and costs due to betterments. By January 31 of each year and at least quarterly thereafter, the Government shall provide the Local Sponsor with a report setting forth all contributions provided to date and the current projections of total project costs, of total costs due to betterments, of the components of total project costs, of each party's share of total project costs, of the Local Sponsor's total cash contributions required in accordance with Articles II.B., II.D., and II.E. of this Agreement, of the non-Federal proportionate share, and of the funds the Government projects to be required from the Local Sponsor for the upcoming fiscal year. On the effective date of this Agreement, total project costs are projected to be $435,230 and the Local Sponsor's cash contribution required under Article II.D. of this Agreement is projected to be $152,330. Such amounts are estimates subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Local Sponsor.

B. The Local Sponsor shall provide the cash contribution required under Article II.D.2. of this Agreement in accordance with the provisions of this paragraph.

1. Not less than 30 calendar days prior to the scheduled date for issuance of the solicitation for the first construction contract, the Government shall notify the Local Sponsor in writing of such scheduled date and the funds the Government, after consideration of any credit afforded pursuant to Article II.D.4. of this Agreement, determines to be required from the Local Sponsor to meet the non-Federal proportionate share of projected financial obligations for construction through the first fiscal year of construction, including the non-Federal proportionate share of financial obligations for construction incurred prior to the period of construction. Not later than such scheduled date, the Local Sponsor shall provide the Government with the full amount of the required funds by delivering a check payable to "FAO, USAED, St. Paul" to the District Engineer or verifying to the satisfaction of the Government that the Local Sponsor has deposited the required funds in an escrow or other account acceptable to the Government, with interest accruing to the Local Sponsor or presenting the Government with an irrevocable letter of credit acceptable to the Government for the required funds or providing an Electronic Funds Transfer in accordance with procedures established by the Government.

2. For the second and subsequent fiscal years of construction, the Government shall notify the Local Sponsor in writing, no later than 60 calendar days prior to the beginning of that fiscal year, of the funds the Government, after consideration of any credit afforded pursuant to Article II.D.4. of this Agreement, determines to be required from the Local Sponsor to meet the non-Federal proportionate share of projected financial obligations for construction for that fiscal year. No later than 30 calendar days prior to the beginning of the fiscal year, the Local Sponsor shall make the full amount of the required funds for that fiscal year available to the Government through any of the payment mechanisms specified in Article VI.V.1. of this Agreement.

3. The Government shall draw from the funds provided by the Local Sponsor such sums as the Government, after consideration of any credit afforded pursuant to Article

II.D.4. of this Agreement, deems necessary to cover: (a) the non-Federal proportionate share of financial obligations for construction incurred prior to the period of construction; and (b) the non-Federal proportionate share of financial obligations for construction as they are incurred during the period of construction.

4. If at any time during the period of construction the Government determines that additional funds will be needed from the Local Sponsor to cover the non-Federal proportionate share of projected financial obligations for construction for the current fiscal year, the Government shall notify the Local Sponsor in writing of the additional funds required, and provide an explanation of why additional funds are required, and the Local Sponsor, no later than 60 calendar days from receipt of such notice, shall make the additional required funds available through any of the payment mechanisms specified in Article VI.B.1. of this Agreement.

C. In advance of the Government incurring any financial obligation associated with additional work under Article II.B. or II.E. of this Agreement, the Local Sponsor shall provide the Government with the full amount of the funds required to pay for such additional work through any of the payment mechanisms specified in Article VI.B.1. of this Agreement. The Government shall draw from the funds provided by the Local Sponsor such sums as the Government deems necessary to cover the Government's financial obligations for such additional work as they are incurred. In the event the Government determines that the Local Sponsor must provide additional funds to meet its cash contribution, the Government shall notify the Local Sponsor in writing of the additional funds required and provide an explanation of why funds are required. Within 30 calendar days thereafter, the Local Sponsor shall provide the Government with the full amount of the additional required funds through any of the payment mechanisms specified in Article VI.B.1. of this Agreement.

D. Upon completion of the Project or termination of this Agreement, and upon resolution of all relevant claims and appeals, the Government shall conduct a final accounting and furnish the Local Sponsor with the results of the final accounting. The final accounting shall determine total project costs, each party's contribution provided thereto, and each party's required share thereof. The final accounting also shall determine costs due to betterments and the Local Sponsor's cash contribution provided pursuant to Article II.B. of this Agreement.

1. In the event the final accounting shows that the total contribution provided by the Local Sponsor is less than its required share of total project costs plus costs due to any betterments provided in accordance with Article II.B. of this Agreement, the Local Sponsor shall, no later than 90 calendar days after receipt of written notice, make a cash payment to the Government of whatever sum is required to meet the Local Sponsor's required share of total project costs plus costs due to any betterments provided in accordance with Article II.B. of this Agreement by delivering a check payable to "FAO, USAED, St. Paul" to the District Engineer or providing an Electronic Funds Transfer in accordance with procedures established by the Government.

2. In the event the final accounting shows that the total contribution provided by the Local Sponsor exceeds its required share of total project costs plus costs due to any betterments provided in accordance with Article II.B. of this Agreement, the Government shall, subject to the availability of funds, refund the excess to the Local Sponsor no later than 90

calendar days after the final accounting is complete. In the event existing funds are not available to refund the excess to the Local 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. The parties shall each pay 50 percent 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, REPLACEMENT, AND REHABILITATION (OMRR&R)

A. Upon notification in accordance with Article II.C. of this Agreement and in a manner compatible with the Project's authorized purposes and in accordance with specific directions prescribed by the Government in the OMRR&R Manual and any subsequent amendments thereto, the Local Sponsor as required by Section 1103(e)(7)(A) of the Water Resources Development Act of 1986, as amended, shall operate, maintain, repair, and replace the entire Project or functional portion of the Project for so long as the Project remains authorized. If any future rehabilitation of the Project is mutually agreed upon by the Local Sponsor and the Government, the cost of such rehabilitation, in accordance with Section 1103(e) and Section 906(e) of the Water Resources Development Act of 1986, as amended, and shall be cost shared as follows: 65 percent Government; and, 35 percent Local Sponsor.

B. The Local Sponsor hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Local Sponsor owns or controls for access to the Project for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project. If an inspection shows that the Local 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 Local Sponsor. If, after 30 calendar days from receipt of notice, the Local 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 Local Sponsor owns or controls for access to the Project for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Government shall operate to relieve the Local Sponsor of responsibility to meet the Local 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 - INDEMNIFICATION

The Local Sponsor shall hold and save the Government free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project and any Project-related 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 Local Sponsor shall develop procedures for keeping books, records, documents, and 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 Non-Federal Governments at 32 C.F.R. Section 33.20. The Government and the Local Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures and for a minimum of three years after the period of construction and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Local Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. Pursuant to 32 C.F.R. Section 33.26, the Local Sponsor is responsible for complying with the Single Audit Act of 1984, 31 U.S.C. Sections 7501-7507, as implemented by Office of Management and Budget (OMB) Circular No. A-128 and Department of Defense Directive 7600.10. Upon request of the Local Sponsor and to the extent permitted under applicable Federal laws and regulations, the Government shall provide to the Local Sponsor and independent auditors any information necessary to enable an audit of the Local 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-128, and such costs as are allocated to the Project shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

C. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Local Sponsor is required to conduct under the Single Audit Act. 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 cost 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 Local Sponsor and the Government agree to 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, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army". The Local Sponsor is also required to comply with all applicable Federal labor standards requirements including, but not limited to the Davis-Bacon Act (40 USC 276a et seq), the Contract Work Hours and Safety Standards Act (40 USC 327 et seq) and the Copeland Anti-Kickback Act (40 USC 276c).

ARTICLE XII - RELATIONSHIP OF PARTIES

A. In the exercise of their respective rights and obligations under this Agreement, the Government and the Local 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 such other party may have to seek relief or redress against such contractor either pursuant to any cause of action that such other party may have or for violation of any law.

ARTICLE XIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE XIV - TERMINATION OR SUSPENSION

A. If at any time the Local Sponsor fails to fulfill its obligations under Article II.B., II.D., II.E., VI, or XVIII.C. of this Agreement, the Assistant Secretary of the Army (Civil Works) shall terminate this Agreement or suspend future performance under this Agreement unless he determines in writing 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. If the Government fails to receive annual appropriations in amounts sufficient to meet Project expenditures for the then-current or upcoming fiscal year, the Government shall so notify the Local Sponsor in writing, and 60 calendar days thereafter either party may elect without penalty to terminate this Agreement or to suspend future performance under this Agreement. In

the event that either party elects to suspend future performance under this Agreement pursuant to this paragraph, such suspension shall remain in effect until such time as the Government receives sufficient appropriations or until either the Government or the Local Sponsor elects to terminate this Agreement.

C. In the event that either party elects to terminate this Agreement pursuant to this Article or Article XV of this Agreement, both parties shall conclude their activities relating to the Project and proceed to a final accounting in accordance with Article VI.D. of this Agreement.

D. Any termination of this Agreement or suspension of future performance under this Agreement in accordance with this Article or Article XV of this Agreement shall not relieve the parties of liability for any obligation previously incurred. Any delinquent payment 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 XV - HAZARDOUS SUBSTANCES

A. After execution of this Agreement and upon direction by the District Engineer, the Local Sponsor shall perform, or cause to be performed, any investigations for hazardous substances that the Government or the Local 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 (hereinafter "CERCLA"), 42 U.S.C. Sections 9601-9675, 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 the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project. However, for lands that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigations unless the District Engineer provides the Local Sponsor with prior specific written direction, in which case the Local Sponsor shall perform such investigations in accordance with such written direction. All actual costs incurred by the Local Sponsor for such investigations for hazardous substances shall be included in total project costs and cost 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 costs.

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 the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project, the Local Sponsor and the Government shall provide prompt written notice to each other, and the Local Sponsor shall not proceed with the acquisition of the real property interests until both parties agree that the Local Sponsor should proceed.

C. The Government and the Local Sponsor shall determine whether to initiate construction of the Project, or, if already in construction, whether to continue with work on 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 the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project. Should the Government and the Local Sponsor determine to initiate or continue with construction after considering any liability that may arise under CERCLA, the Local Sponsor shall be responsible, as between the Government and the Local Sponsor, for the costs of clean-up and response, to include 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 Local Sponsor fails to provide any funds necessary to pay for clean up and response costs or to otherwise discharge the Local Sponsor's responsibilities under this paragraph upon direction by the Government, the Government may, in its sole discretion, either terminate this Agreement for the convenience of the Government, suspend future performance under this Agreement, or continue work on the Project.

D. The Local 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 clean up 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 Local Sponsor, the Local Sponsor shall be considered the operator of the Project for purposes of CERCLA liability. To the maximum extent practicable, the Local Sponsor shall operate, maintain, repair, replace, and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA.

ARTICLE XVI - 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 either delivered personally or by telegram or mailed by first-class, registered, or certified mail, as follows:

If to the Local Sponsor:

Director
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, Iowa 50319-0034

If to the Government:

District Engineer
U.S. Army Engineer District, St. Paul
190 Fifth Street East
St. Paul, Minnesota 55101-1638

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 XVII - 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 XVIII - HISTORIC PRESERVATION

A. The costs of identification, survey and evaluation of historic properties shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

B. As specified in Section 7(a) of Public Law 93-291 (16 U.S.C. Section 469c(a)), the costs of mitigation and 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 for the Project.

C. The Government shall not incur costs for mitigation and data recovery that exceed the statutory one percent limit specified in paragraph B. of this Article unless and until the Assistant Secretary of the Army (Civil Works) has waived that limit in accordance with Section 208(3) of Public Law 96-515 (16 U.S.C. Section 469c-2(3)). Any costs of mitigation and data recovery that exceed the one percent limit shall be included in total project costs and cost-shared in accordance with the provisions of 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 Legislature of the State of Iowa.

B. The Local Sponsor intends to satisfy its obligations under this Agreement. The Local Sponsor shall include in its budget request or otherwise propose, for each fiscal period, appropriations sufficient to cover the Local Sponsor's obligations under this Agreement for each year, and will use all reasonable and lawful means to secure the appropriations for that year sufficient to make the payments necessary to fulfill its obligations hereunder. The Local Sponsor reasonably believes that funds in amounts sufficient to discharge these obligations can and will lawfully be appropriated and made available for this purpose. In the event the budget or other means of appropriations does not provide funds in sufficient amounts to discharge these obligations, the Local Sponsor shall use its best efforts to satisfy any requirements for payments under this Agreement from any other source of funds legally available for this purpose. Further, if the Local Sponsor is unable to satisfy its obligations hereunder, 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 Principal Assistant Secretary of the Army (Civil Works).

THE DEPARTMENT OF THE ARMY

BY: _____

DOMINIC IZZO
Principal Deputy Assistant Secretary of the Army (Civil Works)

DATE: _____

THE IOWA DEPARTMENT OF NATURAL RESOURCES

BY: _____

JEFFERY R. VONK
Director, Iowa Department of Natural Resources

DATE: _____

CERTIFICATE OF AUTHORITY

I, _____, do hereby certify that I am the principal legal officer of the Iowa Department of Natural Resources, that the Iowa 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 Iowa Department of Natural Resources in connection with the Pool Slough Wetland Complex Habitat Rehabilitation and Enhancement Project at pool 9, Mississippi River, Allamakee County, Iowa, and to pay damages in accordance with the terms of this Agreement, if necessary, in the event of the failure to perform, as required by Section 221 of Public Law 91-611 (42 U.S.C. Section 1962d-5b), and that the persons who have executed this Agreement on behalf of the Iowa Department of Natural Resources have acted within their statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this _____ day of _____, 200__.

_____

Typed Name
Title in full

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 Section 1352, Title 31, U.S. Code. 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.

_____

Typed Name
Title in full

DATE: _____

(STATE OF IOWA)
(COUNTY OF POLK)

On this ____ day of_____, 200__, before me, a Notary Public in and for said County, personally appeared _____, who stated that he is the duly appointed and Director of the Iowa Department of Natural Resources, that he was authorized to execute the foregoing Agreement on behalf of the Iowa Department of Natural Resources, and that he executed the foregoing Agreement as his voluntary act and deed, and as the voluntary act and deed of the Iowa Department of Natural Resources.

_____
Notary Public
in and for the State of Iowa

CERTIFICATION OF LEGAL REVIEW

The draft Project Cooperation Agreement for construction of the Pool Slough Wetland Complex Habitat Rehabilitation and Enhancement Project, Allamakee County, Iowa, has been fully reviewed by the Office of Counsel, St. Paul District, U.S. Army Corps of Engineers.

EDWIN C. BANKSTON
District Counsel

Attachment 8

Hydraulics Appendix

Note

This appendix was prepared for the project when it included development of pools on lands managed as a national wildlife refuge by the U.S. Fish and Wildlife Service. The final selected plan recommends construction of only one pool (pool B).

HYDRAULICS APPENDIX

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PLATES

GENERAL

The Pool Slough project area is located on the Minnesota-Iowa border in Houston County, Minnesota and Allamakee County, Iowa in Pool 9 of the Upper Mississippi River from about River Mile 673.4 to River Mile 674.7 (See Plate 1). The area is separated from the main channel of the Mississippi River on the east by a series of sloughs, bottomland forest, and a delta formation on Winnebago Creek. The project area is bordered on the west by the city of New Albin, Iowa, a wastewater treatment pond, and the Soo Line Railroad and State Highway 26 embankments. The city of New Albin, Iowa is located above the 100 year floodplain on a natural terrace about 3.5 m (11 ft) higher than the project area. The northern and northeastern limits of the area are bordered by woods. The project area is bordered on the South by Army Road, a gravel road maintained by Allamakee County that leads to the New Albin boat landing. Part of the site lies in Minnesota within the Upper Mississippi River Wildlife and Fish Refuge (McGregor District). The remainder of the site lies in Iowa on lands owned by the Iowa Department of Natural Resources (IDNR). A close-up of the area in its existing condition is shown on Plate 2.

The main objective is to be able to manage the Pool Slough project area for the enhancement of migratory waterfowl. This objective will be accomplished by dividing the approximately 120 ha (300 ac) area into management pools through the use of dikes. The management pools within Minnesota will be filled using gravity control structures and water from Winnebago Creek. The management pool within Iowa will be filled using water pumped from Pool Slough. All management pools will be drained using gravity control structures. These features are shown on Plate 3. The project will be managed by the U.S. Fish and Wildlife Service (FWS) and the Iowa Department of Natural Resources (IDNR). This will be accomplished by operating the control structures to obtain the desired water surface elevation.

EXISTING PHYSICAL CONDITIONS

MISSISSIPPI RIVER HYDROLOGY

All of the Mississippi River hydrology data provided here was obtained from the St. Paul District Water Control Center.

Discharge-frequency information at Lock and Dam 8 and the corresponding elevation at Lock and Dam 8, Lansing, Iowa gage, and the interpolated elevation at the project area is shown in Table 1 below.

TABLE 1. DISCHARGE-FREQUENCY-ELEVATION AT POOL SLOUGH

Lock & Dam 8 Discharge		Frequency	Flood	Elevation at Dam 8 TW		Elevation at Pool Slough		Elevation at Lansing, IA	
(cms)	(cfs)			(m)	(ft)	(m)	(ft)	(m)	(ft)
3,030.0	107,000	20%	5 yr	192.06	630.10	191.51	628.32	190.49	624.95
2,973.4	105,000	25%	4 yr	192.03	630.00	191.48	628.20	190.44	624.80
2,916.7	103,000	33%	3 yr	192.00	629.90	191.45	628.12	190.43	624.75
2,661.9	94,000	50%	2 yr	191.83	629.35	191.28	627.55	190.24	624.15
2,180.5	77,000	67%	1.5 yr	191.51	628.30	190.95	626.46	189.89	623.00
1,840.7	65,000	80%	1.25 yr	191.22	627.35	190.65	625.50	189.59	622.00
1,302.6	46,000	95%	1.05 yr	190.61	625.35	190.04	623.50	188.98	620.00

Mississippi River stage-duration information at the project area on a monthly basis from March to November is shown in Table 2 on the next page. The stages at the project area were interpolated from the stage of Lock and Dam 8 tailwater and the gage at Lansing, Iowa. The range of elevations shown, are the lowest approximate elevations within one of the pools to the highest dike elevation. This data was compiled to show how often water would naturally be present within the pool areas and the likelihood of the dikes being overtopped following construction of the project.

Water surface elevations taken from the gage on Pool Slough were compared to Mississippi River discharge on the same dates. This comparison is shown in the rating curve on Figure 1. It appears that Pool Slough maintains an average water surface elevation of 190.66 m (625.5 ft) even though discharge on the Mississippi River varies greatly. The only times Mississippi River stages and discharge appear to have an effect on Pool Slough water surface levels is during high flows such as Spring flooding.

TABLE 2. MISSISSIPPI RIVER MONTHLY STAGE - DURATION AT POOL SLOUGH
(PERCENT OF TIME DIKE ELEVATION IS OVERTOPPED AT EACH POOL)

Elevation (m)	(ft)	Pool	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.
190.81	626.00		17.5	45.6	37.2	18.2	16.3	6.3	6.4	9.1	5.4
190.88	626.25		15.7	44.1	35.7	16.0	14.6	5.2	4.8	8.1	5.1
190.96	626.50		14.8	42.3	33.8	14.7	13.1	4.6	4.3	7.0	3.9
191.04	626.75		13.5	40.3	31.7	12.9	12.2	4.4	3.9	6.0	2.9
191.11	627.00		12.8	37.1	29.7	11.5	10.7	3.7	3.1	5.6	2.1
191.19	627.25		11.1	34.0	26.9	10.0	9.4	2.8	2.3	5.0	1.4
191.26	627.50		10.2	31.6	24.8	8.6	8.5	1.6	1.8	4.7	0.8
191.34	627.75		9.2	28.3	22.7	7.8	7.1	0.9	1.2	4.1	0.5
191.42	628.00		8.4	26.0	20.8	6.7	5.6	0.8	1.1	3.6	0.1
191.49	628.25		7.5	23.8	18.5	5.8	5.1	0.6	1.0	3.1	0.0
191.57	628.50		6.3	21.3	14.6	4.6	4.5	0.6	0.8	2.8	0.0
191.65	628.75		5.3	18.6	12.7	3.9	4.1	0.6	0.7	2.5	0.0
191.72	629.00	B	4.5	17.0	11.0	3.4	3.6	0.5	0.6	2.3	0.0
191.80	629.25		3.7	14.3	8.6	2.6	3.1	0.4	0.6	2.1	0.0
191.87	629.50		2.7	11.5	6.7	2.0	2.7	0.3	0.5	1.8	0.0
191.95	629.75		2.5	9.3	5.5	2.0	2.4	0.0	0.5	1.4	0.0
192.03	630.00	D2	2.3	7.2	4.5	1.8	2.1	0.0	0.5	1.1	0.0
192.10	630.25		2.0	5.5	3.6	1.4	1.9	0.0	0.5	1.0	0.0
192.18	630.50		1.8	3.9	2.9	0.8	1.8	0.0	0.5	0.8	0.0
192.25	630.75		1.6	2.7	2.2	0.8	1.8	0.0	0.5	0.8	0.0
192.33	631.00		1.3	2.3	1.2	0.8	1.6	0.0	0.5	0.7	0.0
192.41	631.25		1.1	1.6	1.0	0.8	1.3	0.0	0.5	0.7	0.0
192.48	631.50		0.8	1.3	1.0	0.7	1.0	0.0	0.5	0.6	0.0
192.56	631.75		0.4	1.0	0.9	0.7	0.8	0.0	0.5	0.5	0.0
192.64	632.00	D1	0.1	0.7	0.8	0.7	0.7	0.0	0.4	0.5	0.0

* Period of Record is 1972 to 1995

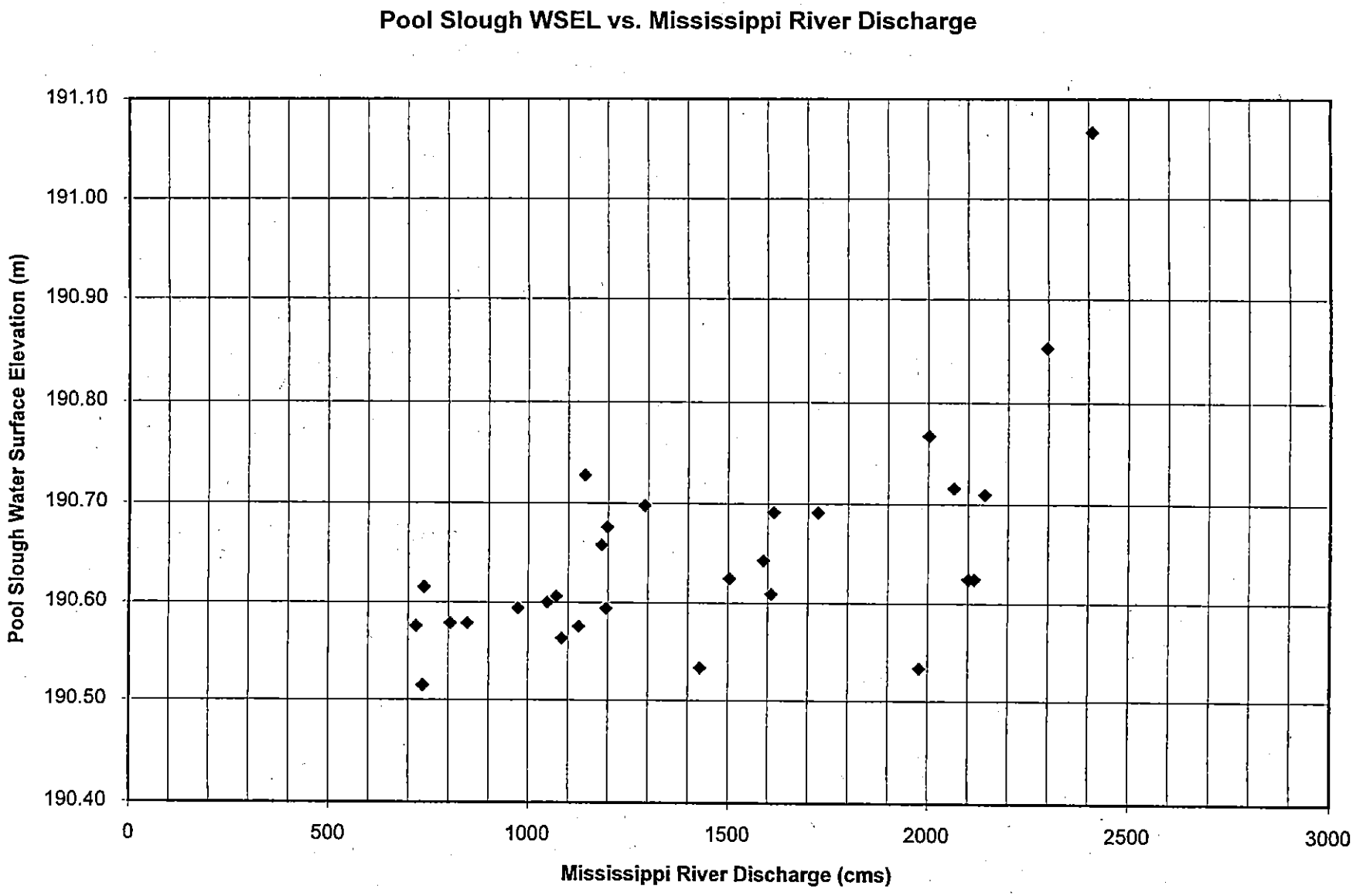

Pool Slough WSEL vs. Mississippi River Discharge
Pool Slough Water Surface Elevation (m)
191.10
191.00
190.90
190.80
190.70
190.60
190.50
190.40
0
500
1000
1500
2000
2500
3000
Mississippi River Discharge (cms)

FIGURE 1

WINNEBAGO CREEK AND POOL SLOUGH HYDROLOGY

Winnebago Creek flows east to the Mississippi River on a steep gradient, dropping from an elevation of 353.6 m (1160 ft) to 190.5 m (625 ft) in approximately 32.2 km (20 miles) from source to mouth. It drains a watershed of approximately 156 sq. km (60 sq. miles) consisting of upland farmlands, forested bluffs, steep river valleys and floodplain areas near the outlet. The channel alignment of Winnebago Creek upstream of the state highway 26 and railroad bridges has remained relatively stationary. However, downstream of the bridges, the channel has undergone significant changes. Prior to 1960, Winnebago Creek flowed north into Minnesota Slough after the railroad bridge. In 1960, the City of New Albin, Iowa constructed a diversion ditch that altered Winnebago Creek to flow straight east out to Minnesota Slough. The ditch functioned well until 1978 when a combined rainfall near the 100-year storm event fell on the watershed flooding and plugging the ditch. In the 1980's and early 1990's, the water flowed southeast of the project area, upstream of the plug, to Pool Slough. Today, Winnebago Creek meanders through Area E and flows through the ditch along the sewage treatment pond dike and discharge pipe and then through the sewage treatment pond effluent ditch to Pool Slough.

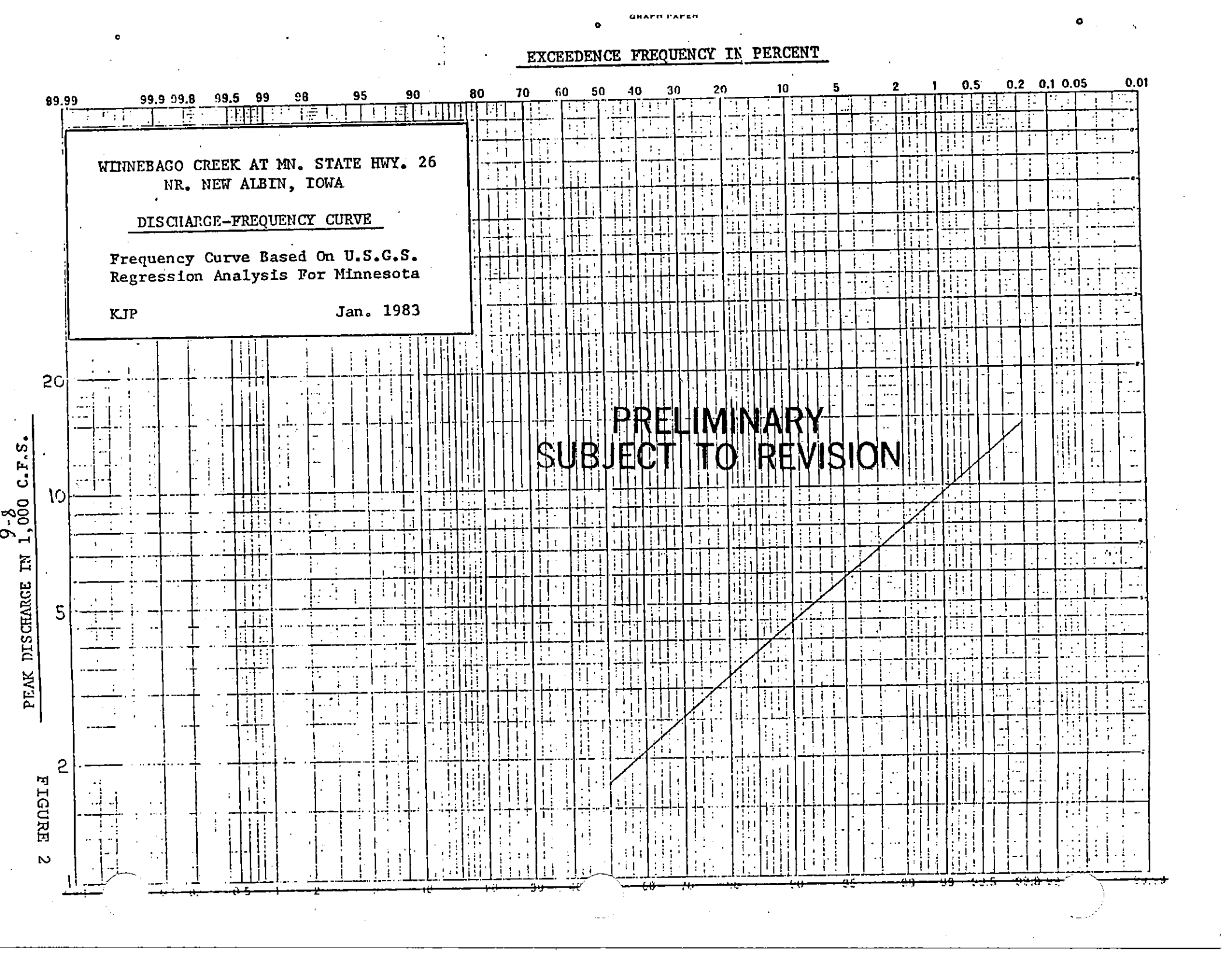
The channel alignment of Pool Slough south of Army Road has remained relatively stationary. The alignment of Pool Slough has changed slightly over time where it met the diversion ditch due to the plugging of the ditch with debris and sediment.

Three gages were established in the project area to monitor the stage of Winnebago Creek and Pool Slough. The gage locations are shown on Plate 2 and the data collected in Table 3. The gages were read from the fall of 1994 through fall of 1996, and the spring through fall of 1998. The water surface elevation of Winnebago Creek at gage 1 (downstream side of the railroad bridge) varied from 192.95 m (633.03 ft) to 192.76 m (632.43 ft). The water surface elevation of Pool Slough at gage 3 by Army road varies from 190.85 m (626.19 ft) to 190.52 m (625.08 ft), with an average water surface elevation of 190.66 m (625.52 ft). The average drop in water surface elevation from Winnebago Creek to Pool Slough is about 2.1 m (7.1 ft) with most of the drop occurring in the mid-portion of the project area.

In the Section 205 Flood Control Reconnaissance Report for the City of New Albin, Iowa (reference 7), an instantaneous peak discharge-frequency curve was developed for Winnebago Creek at state highway 26 (see Figure 2). This discharge-frequency curve is considered approximate because it was based on an approximate method developed by the U.S. Geological Survey for ungaged watersheds.

HYDRODYNAMIC CONDITIONS

The USGS has a discontinued partial record station on Winnebago Creek located at Houston County Highway 5 approximately 1.3 miles northwest of New Albin, Iowa. Nine discharge measurements were made at this gage, once each year, for 1969-71, 1976-77, 1980, 1983, 1985, and 1989.


EXCEEDENCE FREQUENCY IN PERCENT
99.99 99.9 99.8 99.5 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
WINNEBAGO CREEK AT MN. STATE HWY. 26
NR. NEW ALBIN, IOWA
DISCHARGE-FREQUENCY CURVE
Frequency Curve Based On U.S.G.S.
Regression Analysis For Minnesota
KJP
Jan. 1983
PRELIMINARY
SUBJECT TO REVISION
PEAK DISCHARGE IN 1,000 C.F.S.
20
10
5
2
1

9-8

FIGURE 2

Discharge was measured at gages 1 and 3, Winnebago Creek at the railroad bridge, and Pool Slough at Army Road respectively. Between the fall of 1994 and the spring of 1995, Winnebago Creek started breaking out towards Pool Slough just upstream of gage 2 because of a beaver dam. Although gage 2 was still useful for measuring stages, there was no measurable discharge after the beaver dam. By April 1998, Winnebago Creek flow meandered some more and started flowing southeast upstream of gage 2. The original location of gage 2 was on dry land, so it was relocated along the new breakout in the same general vicinity. Discharge measurements are shown in Table 3. A stage-discharge rating curve for Winnebago Creek at the railroad bridge is shown in Figure 3.

SEDIMENT TRANSPORT

DEPOSITION/EROSION

Based on local information, Winnebago Creek has been agrading over time. No past data was available for comparison of creek elevation or velocities. Sedimentation of Winnebago Creek was looked at during the Section 205 Flood Control Reconnaissance study (reference 7). A summary of their findings is below.

The creek carries approximately 2,830 m^3 (3,700 yd^3) of sediment from the watershed each year. Streambank erosion along the upper reaches of the creek is the main contributor to the sediment load. Upland farming does add to the sediment load, but this contribution is minor because erosion control practices have been implemented by upland farmers under Soil Conservation Service guidance. However, clearing of land, especially forested areas, has left debris in the watershed coulees.

Because there have been no major changes in the watershed since the Section 205 Flood Control Reconnaissance study it is assumed that the sediment load of Winnebago Creek remains unchanged.

Winnebago Creek has a very dynamic channel geometry. Channel geometry from discharge measurements at gage 1, railroad bridge, was plotted to show the bed movement in Figure 4.

TABLE 3. STAGE & DISCHARGE DATA ON SITE

	WINNEBAGO CREEK						POOL SLOUGH			
Date	Gage 1 Elevation (ft)	Gage 1 Elevation (m)	Discharge (cfs)	Discharge (cms)	Gage 2 Elevation (ft)	Gage 2 Elevation (m)	Gage 3 Elevation (ft)	Gage 3 Elevation (m)	Discharge (cfs)	Discharge (cms)
24-Sep-69			25.7	0.73						
21-May-70			27.5	0.78						
19-Aug-71			33.2	0.94						
24-Sep-76			30.8	0.87						
26-Aug-77			33.5	0.95						
07-May-80			28.4	0.80						
28-Sep-83			44.0	1.25						
22-Aug-85			42.6	1.21						
19-Sep-89			29.8	0.84						
08-Sep-94	632.91	192.90			632.81	192.87	625.41	190.62		
16-Sep-94	633.01	192.93			632.85	192.88	625.78	190.73		
26-Sep-94	633.03	192.94					625.91	190.77		
28-Sep-94	632.86	192.89			632.66	192.83	625.66	190.69		
30-Sep-94	632.83	192.88			632.71	192.84	625.66	190.69		
04-Oct-94							625.68	190.70		
08-Oct-94	632.82	192.87			632.66	192.83	625.61	190.68		
12-Oct-94	632.83	192.88			632.66	192.83	625.55	190.66		
25-Oct-94	632.78	192.86			632.56	192.79	625.50	190.64		
08-Nov-94							625.28	190.58		
22-Nov-94							625.38	190.61		
29-Nov-94	632.82	192.87			632.61	192.81	625.36	190.60		
02-Dec-94							625.34	190.59		
05-Dec-94	632.78	192.86			632.61	192.81	625.29	190.58		
14-Mar-95	632.72	192.84			632.54	192.79	625.14	190.53	50.00	1.42
04-Apr-95	632.64	192.82	56.0	1.59	632.54	192.79	626.19	190.85		
19-Apr-95	632.82	192.87			632.56	192.79	625.44	190.62		
26-Apr-95	632.77	192.86			632.54	192.79	626.89	191.07		
08-May-95	632.77	192.86			632.64	192.82	625.74	190.72		
12-May-95	632.67	192.83			632.54	192.79	625.14	190.53		
18-May-95	632.72	192.84			632.49	192.77	625.44	190.62		
24-May-95	632.67	192.83			632.39	192.74	625.72	190.71		
12-Jun-95	632.62	192.81			632.39	192.74	625.39	190.61		
21-Jun-95	632.72	192.84			632.54	192.79	625.44	190.62		
03-Jul-95	632.77	192.86			632.64	192.82	625.29	190.58		
11-Jul-95	632.82	192.87			632.74	192.85	625.24	190.56		
19-Jul-95	632.87	192.89	47.0	1.33	632.84	192.88	625.34	190.59	18.00	0.51
12-Sep-95	632.82	192.87	43.0	1.22	632.69	192.83				
19-Oct-95	632.82	192.87	45.0	1.27	632.67	192.83				
31-May-96	632.43	192.76								
06-Aug-96	632.63	192.82					625.28	190.58		
16-Aug-96	632.69	192.83	39.0	1.10			625.08	190.52	20.00	0.57
27-Aug-96	632.78	192.86								
25-Sep-96	632.73	192.85								

Discharges measured from 1969 - 1989 are from the U.S.G.S.
Gage 1 is located on Winnebago Creek at MN State Highway 26.
Gage 2 is located on Winnebago Creek at break in levee downstream of MN Hwy 26.
Gage 3 is located at Pool Slough in the ditch along the North side of Army Road.

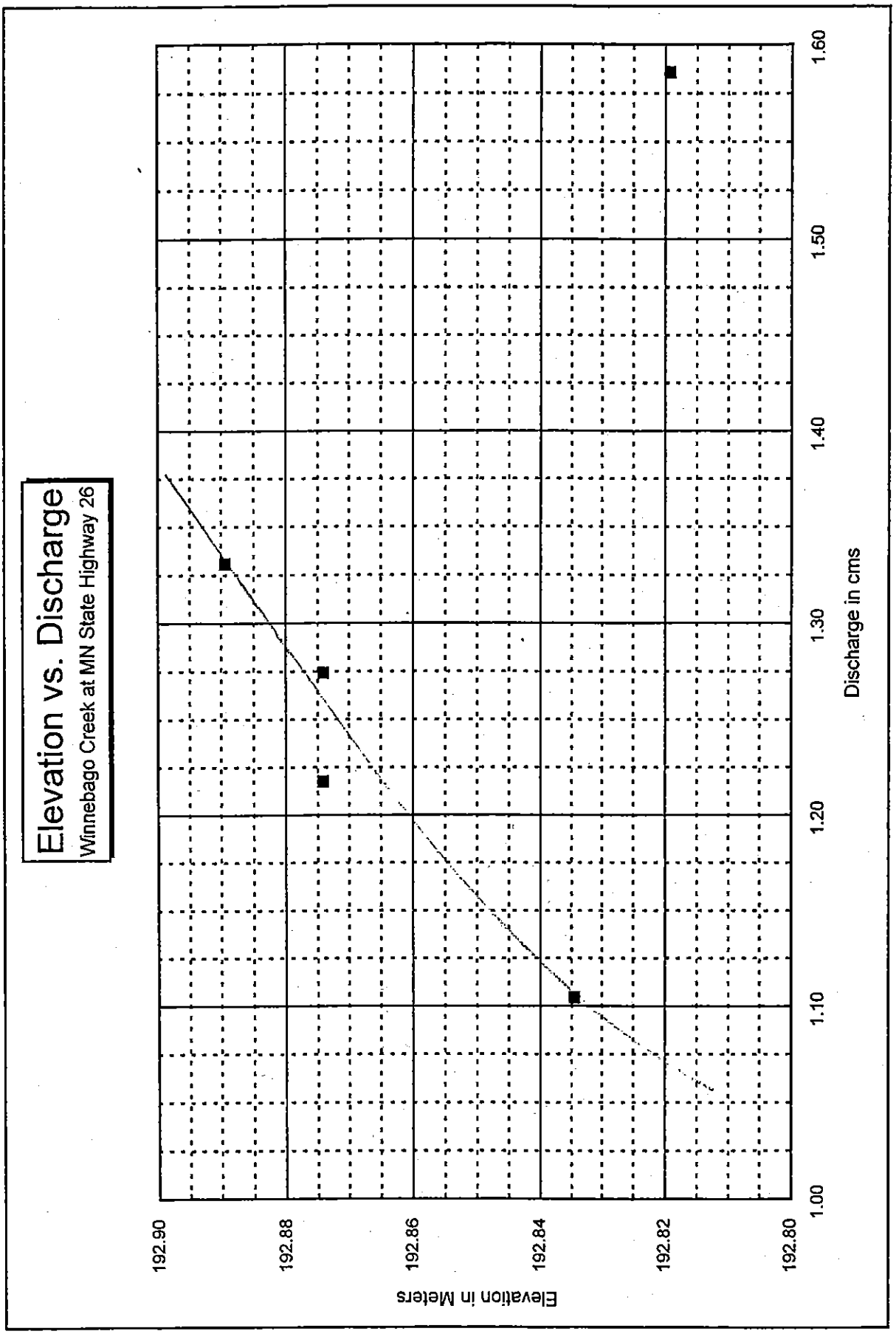

Elevation vs. Discharge
Winnebago Creek at MN State Highway 26
Elevation in Meters
192.90
192.88
192.86
192.84
192.82
192.80
1.00
1.10
1.20
1.30
1.40
1.50
1.60
Discharge in cms

FIGURE 3

Winnebago Creek Channel Geometry at Soo Line Railroad, Near New Albin, IA

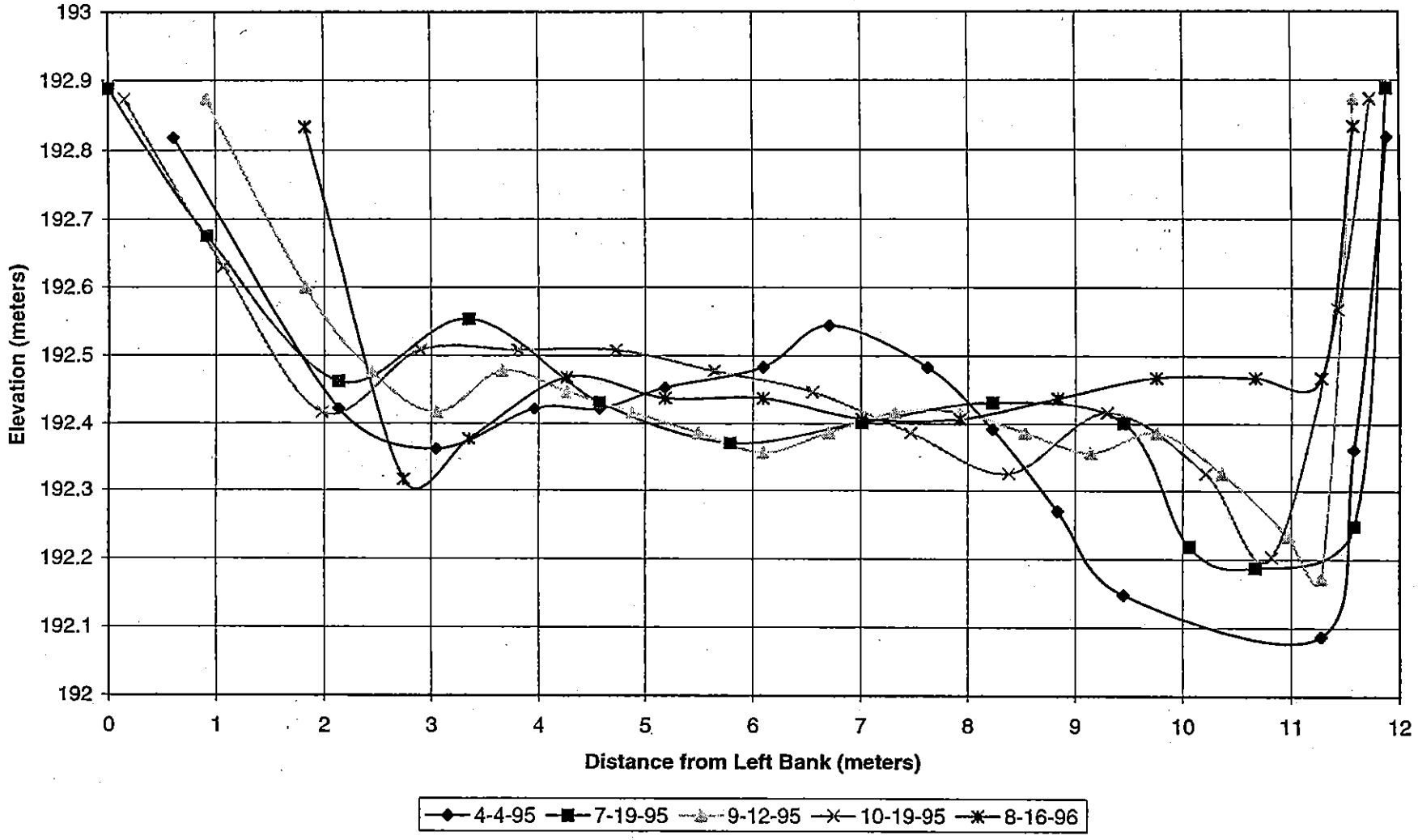


FIGURE 4

SEDIMENT TYPES

There are two main sediment types available in the watershed area. Streambank erosion is responsible for the majority of the coarse material, mostly sand. Although Winnebago Creek itself was not examined in the GREAT I study (reference 8), we can assume that it has similar coarse sediment characteristics to the Upper Iowa River which was examined, and found to be a moderate source of sand sediments. The GREAT I study identified critical areas of fine sediment erosion based on generalized soil maps and geological knowledge of the area. The area, including Winnebago Creek, was identified as a severe erosion hazard for silt and clay sediments. Strembank erosion is the source for both coarse and fine sediments.

Based on the data collected during this study, 1994-1996, the normal range of velocities in Winnebago Creek at the railroad bridge is about 0.35 m/s (1.1 ft/s) to 0.25 m/s (0.8 ft/s). This range of velocities indicates that it is a deposition reach, and sand will be carried as bed load. Channel velocities would be higher following a rainfall event, however the channel forming discharge would consist of velocities within the normal range given above.

HYDROLOGIC MASS BALANCE

The hydrologic mass balance analysis was performed for future conditions in Pool Slough. The purpose of this analysis was to determine if each pool complex could be filled within 2 weeks using a maximum inflow of 0.14 cms (5 cfs) from Winnebago Creek. An existing mass balance model developed using the Lotus 123-spread sheet computer program was modified for Pool Slough and used in the analysis. This model is based on continuity as applied to the pool, i.e.

$$Ig + Rv + Pv - Ev - dS - Og + G - SP = 0 \qquad (1)$$

where

Ig - gravity inflow through the inlet structure;

Rv - volume of runoff from watersheds draining into the pool as determined from measured precipitation using Soil Conservation Service (SCS) methods;

Pv - volume of direct precipitation onto the pool;

Ev - volume of evaporation from the open water areas, as estimated from pan evaporation measurements at Lock & Dam 6, Trempealeau, WI;

dS - change in storage of the pool;

Og - gravity outflow through the outlet structure;

G - groundwater exchange;

SP - seepage through the dikes

All the above can be determined, either by direct measurement or indirectly through calculation, from field measurements. Groundwater inflow was assumed to be equal to the seepage of water lost through the dikes since we had no data for the values.

4. Measured hydrologic data used in the mass balance analysis were daily precipitation, daily pan evaporation, Winnebago Creek and Pool Slough stage and discharge data, and total drainage area. Daily precipitation measured at Lock & Dam 8, Genoa, WI was used to estimate daily runoff using procedures given in the SCS Engineering Handbook (Reference 2). Precipitation for a given day and the 4 preceding days were added, and an antecedent moisture condition (AMC) was estimated using the following criteria:

5-day accumulated precip. < 1.4"	AMC=1	CN=51
1.4 < 5-day accumulated precip. < 2.1"	AMC=2	CN=70

5-day accumulated precip. > 2.1" AMC=3 CN=85.

The SCS curve number (CN) was estimated for each curve number using the criteria given in SCS TR-55 (Reference 3). The daily runoff was then calculated using the following relation:

$$r = \begin{cases} 0 & p \le Ia \\ \{p-0.2*[Ia]\}^2/\{p+0.8*[Ia]\} & p > Ia \end{cases} \quad (2)$$

where: r - daily runoff in inches;
p - daily precipitation in inches;
CN - SCS runoff curve number;
Ia - initial abstraction, given by Ia=0.2*[(1000/CN)-10].

Contributing drainage area in hectares was calculated by subtracting the water surface area from the total drainage area as determined by grid method. Runoff volume in hectare-meter per day was calculated using the relation:

$$Rv = r * \text{contributing drainage area} * \text{unit conversions} \quad (3)$$

Topographic surveys were used to develop a stage - volume relationship for each pool.

$$Pv = p * \text{water surface area} * \text{unit conversions} \quad (4)$$

Daily pan evaporation measured at Lock & Dam 6, Trempealeau, WI was used to calculate the evaporation volume Ev, in hectare-meter per day, using the relation:

$$Ev = 0.74 * Ep * \text{water surface area} * \text{unit conversions} \quad (5)$$

where Ep = pan evaporation in millimeters.

The gravity outflow Og consisted of sharp crested weir flow over the stoplogs on the outlet structure. The proposed control structures are very similar to structures designed by the Soil Conservation Service, now Natural Resource Conservation Service. They use an English weir coefficient of 3.1 for their structures, a new metric coefficient was computed to be 1.71. Weir flow in cubic meters per second was calculated using the relation:

$$Og = 1.71 * L * h^{3/2} \quad (6)$$

where: L = length of weir
h = height of water surface over the weir

The gravity inflow Ig consisted of sharp crested weir flow for all pools. The sharp crested weir

inflow was calculated as described above for gravity outflow.

Once these five volume quantities were known, the change in Storage dS was found using Equation (1), rearranged as

$$dS = Ig - Ev + Pv + Rv - Og$$

Stage-volume data for each pool after grading is shown in Table 4 on the next page. The period of record chosen for the study was 1 March through 30 November, 1988. This period was chosen as a worst case scenario, based on data availability. Table 5 shows the hydrologic mass balance.

TABLE 4. STAGE-VOLUME RELATIONSHIP BY POOL

Pool D1

Elevation (m)	Elevation (ft)	Volume (cm)	Volume (cy)
191.58	628.57	30	23
191.73	629.07	645	485
191.88	629.56	4,600	3,456
192.03	630.05	14,305	10,748
192.18	630.54	27,595	20,733
192.33	631.03	41845	31,439

Pool D2

Elevation (m)	Elevation (ft)	Volume (cm)	Volume (cy)
191.03	626.77	2,503	1,881
191.12	627.06	10,010	7,521
191.27	627.56	26,880	20,195
191.42	628.05	45,140	33,914
191.57	628.54	63,550	47,746
191.72	629.03	82,085	61,672

Pool C

Elevation (m)	Elevation (ft)	Volume (cm)	Volume (cy)
190.67	625.59	85	64
190.82	626.08	225	169
190.97	626.57	635	477
191.12	627.06	1,610	1,210
191.27	627.56	3,860	2,900
191.42	628.05	7,890	5,928
191.57	628.54	15,565	11,694
191.72	629.03	23,860	17,926
191.87	629.53	31,970	24,020
192.02	630.02	40,350	30,316

Pool B

Elevation (m)	Elevation (ft)	Volume (cm)	Volume (cy)
190.05	623.55	425	319
190.20	624.05	1,400	1,052
190.35	624.54	3,430	2,577
190.50	625.03	6,230	4,681
190.65	625.52	10,205	7,667
190.80	626.01	17,540	13,178
190.95	626.51	36,810	27,656
191.10	627.00	67,355	50,605
191.25	627.49	104,770	78,715
191.40	627.98	143,690	107,956

Pool A

Elevation (m)	Elevation (ft)	Volume (cm)	Volume (cy)
190.07	623.6	0	0
190.10	623.7	124	93
190.20	624.0	7,340	5,515
190.35	624.5	76,977	57,834
190.50	625.0	339,802	255,298
190.65	625.5	919,307	690,689
190.81	626.0	1,860,988	1,398,188

TABLE 5. HYDROLOGIC MASS BALANCE FOR POOLS B & C

3/1 THROUGH 11/30, 1988 - ONE SEASON OF HISTORIC DATA
START FALL FILLING ON 9/1/88

DATE	POOL C ELEV. m	POOL B ELEV. m	DAILY PRECIP mm	5-DAY TOTAL PRECIP mm	AMC	SCS C.N.	RUNOFF INTO POOL C ha*m/d	RUNOFF INTO POOL B ha*m/d	PAN EVAP mm	POOL C EVAP LOSS ha*m/d	POOL B EVAP LOSS ha*m/d	INTO POOL C CULVERT OPEN? 1-Y,0-N	INTO POOL C CULVERT FLOW cms	INTO POOL B WEIR 2 FLOW cms	OUT OF POOL B WEIR 3 FLOW cms	VOLUME CHANGE POOL C ha*m	NEW VOL POOL C ha*m	NEW POOL C ELEV. m	VOLUME CHANGE POOL B ha*m	NEW VOL POOL B ha*m	NEW POOL B ELEV. m	WINNE-BAGO CREEK ELEV. m
9/1	190.67	190.05	0.00	6.25	1	51	0.000	0.000	5.50	0.000	0.002	1	0.283	0.000	0.000	2.446	2.455	191.72	-0.002	0.041	190.00	192.87
2	191.72	190.00	0.00	5.75	1	51	0.000	0.000	2.00	0.008	0.000	1	0.283	0.000	0.000	2.438	4.806	192.14	0.000	0.000	190.00	192.87
3	192.14	190.00	0.00	0.50	1	51	0.000	0.000	5.00	0.021	0.000	1	0.283	0.087	0.000	1.676	6.383	192.32	0.749	0.749	190.53	192.87
4	192.32	190.53	0.00	0.50	1	51	0.000	0.000	1.00	0.004	0.001	1	0.283	0.343	0.000	-0.519	5.196	192.20	2.961	3.664	190.92	192.87
5	192.20	190.92	5.75	5.75	1	51	0.001	0.017	2.50	0.011	0.029	1	0.283	0.159	0.000	1.092	6.135	192.32	1.367	4.663	190.98	192.87
6	192.32	190.98	0.00	5.75	1	51	0.000	0.000	1.25	0.005	0.018	1	0.283	0.343	0.000	-0.520	5.195	192.20	2.944	7.236	191.10	192.87
7	192.20	191.10	0.00	5.75	1	51	0.000	0.000	1.25	0.005	0.022	1	0.283	0.159	0.000	1.065	6.108	192.32	1.362	8.098	191.13	192.87
8	192.32	191.13	0.00	5.75	1	51	0.000	0.000	5.50	0.023	0.100	1	0.283	0.343	0.000	-0.538	5.177	192.20	2.866	10.349	191.22	192.87
9	192.20	191.22	0.00	5.75	1	51	0.000	0.000	6.25	0.026	0.119	1	0.283	0.159	0.000	1.044	6.087	192.32	1.257	10.986	191.25	192.87
10	192.32	191.25	0.00	0.00	1	51	0.000	0.000	5.25	0.022	0.102	1	0.283	0.343	0.000	-0.537	5.178	192.20	2.860	13.337	191.34	192.87
11	192.20	191.34	0.00	0.00	1	51	0.000	0.000	2.50	0.011	0.049	1	0.283	0.159	0.000	1.060	6.103	192.32	1.330	14.142	191.37	192.87
12	192.32	191.37	0.00	0.00	1	51	0.000	0.000	4.75	0.020	0.093	1	0.283	0.343	0.000	-0.535	5.180	192.20	2.878	16.469	191.70	192.87
13	192.20	191.70	0.00	0.00	1	51	0.000	0.000	1.50	0.006	0.029	0	0.000	0.159	0.343	-1.383	3.660	191.93	-1.612	14.437	191.40	192.87

91-8

TABLE 5. HYDROLOGIC MASS BALANCE FOR POOL D

3/1 THROUGH 11/30, 1988 - ONE SEASON OF HISTORIC DATA
START FALL FILLING ON 9/1/88

DATE	POOL D1 EL.EV. m	POOL D2 ELEV. m	DAILY PRECIP mm	5-DAY TOTAL PRECIP mm	AMC	SCS C.N.	RUNOFF INTO POOL D1 ha*m/d	RUNOFF INTO POOL D2 ha*m/d	PAN EVAP mm	POOL D1 EVAP LOSS ha*m/d	POOL D2 EVAP LOSS ha*m/d	INTO POOL D1 CULVERT OPEN? 1-Y,0-N	INTO POOL D1 CULVERT FLOW cms	INTO POOL D2 WEIR 2 FLOW cms	OUT OF POOL D2 WEIR 3 FLOW cms	VOLUME CHANGE POOL D1 ha*m	NEW VOL POOL D1 ha*m	NEW POOL D1 ELEV. m	VOLUME CHANGE POOL D2 ha*m	NEW VOL POOL D2 ha*m	NEW POOL D2 EL.EV. m	WINNE-BAGO CREEK EL.EV. m
9/1	191.61	191.03	0.00	6.25	1	51	0.000	0.000	5.50	0.001	0.004	1	0.283	0.000	0.000	2.446	2.461	192.12	-0.004	0.246	191.00	192.87
2	192.12	191.00	0.00	5.75	1	51	0.000	0.000	2.00	0.013	0.000	1	0.283	0.000	0.000	2.433	4.894	192.39	0.000	0.246	191.00	192.87
3	192.39	191.00	0.00	0.50	1	51	0.000	0.000	5.00	0.035	0.000	1	0.283	0.031	0.000	2.140	7.034	192.60	0.271	0.518	191.06	192.87
4	192.60	191.06	0.00	0.50	1	51	0.000	0.000	1.00	0.007	0.002	1	0.283	0.300	0.000	-0.151	6.883	192.60	2.589	3.107	191.30	192.87
5	192.60	191.30	5.75	5.75	1	51	0.001	0.010	2.50	0.018	0.017	1	0.283	0.300	0.000	-0.107	6.775	192.57	2.584	5.691	191.51	192.87
6	192.57	191.51	0.00	5.75	1	51	0.000	0.000	1.25	0.009	0.011	1	0.283	0.251	0.000	0.266	7.042	192.60	2.160	7.851	191.69	192.87
7	192.60	191.69	0.00	5.75	1	51	0.000	0.000	1.25	0.009	0.011	1	0.283	0.300	0.000	-0.153	6.889	192.60	2.579	10.431	191.93	192.87
8	192.60	191.93	0.00	5.75	1	51	0.000	0.000	5.50	0.039	0.051	0	0.000	0.300	0.206	-2.630	4.259	192.33	0.766	11.197	192.02	192.87

DESIGN OF HYDRAULIC FEATURES

POOL DESIGN

All the water management pools were designed to pond 0.15 m (0.5 ft) to 0.6 m (2 ft) over 80 percent of the pool at the design ponding elevation. Grading was required within the pools to provide that range of depths. Dikes were located to optimize the existing topography of the area so that a minimum amount of grading within the pool and dike fill would be required. Pool D control structures were located so that the inlet was at the high point of the pool and the outlet at the low point of the pool to make filling and draining by gravity easy. Each pool within Pool D has a swale from the inlet to the outlet to convey low flow water and is graded to drain to the swale. In Pool B, the pool be filled by pumping water in from Pool Slough, the outlet is located at the low point of the pool. All dike elevations were designed a minimum of 0.3 m (1 ft) above the design ponding elevation. There are three water management pools, A, B, and D. Pool D is subdivided into 2 pools, forming an upper and lower pool, D1 and D2 respectively. The surface area of each pool, ponding elevation and minimum dike elevation are shown in Table 6 below.

TABLE 6. POOL SURFACE AREA, PONDING AND DIKE ELEVATIONS

	Surface Area, ha	Ponding Elevation, m	Min. Dike Elevation, m
Pool A	16.19 (40.0 ac)	190.8 (626.0 ft)	191.7 (629.0 ft)
Pool B	23.03 (56.9 ac)	191.4 (628.0 ft)	191.7 (629.0 ft)
Area C	5.60 (13.8 ac)	Not Applicable	Not Applicable
Pool D1	9.52 (23.5 ac)	192.3 (631.0 ft)	192.6 (632.0 ft)
Pool D2	12.27 (30.3 ac)	191.7 (629.0 ft)	192.0 (630.0 ft)
Pool D Total	21.79 (53.8 ac)	Not Applicable	Not Applicable
Area E	12.95 (32.0 ac)	Not Applicable	Not Applicable

POOL A

Pool A is located completely in Iowa, and is bordered on the south by Army Road, west by the City of New Albin, Iowa, on the east by the Pool B dike and on the north by forestland. Pool A is unique in that it is an existing wetland area with a spring. Pool A is not bordered by dikes except where it adjoins Pool B. Pool A is naturally lower than the rest of the area and therefore doesn't need dikes to contain the water. Water from Pool A outlets through the treatment plant effluent ditch.

POOL B

Pool B is located completely in Iowa and is bordered on the south by Army Road, west by Pool A, on the east by Pool Slough, and on the north by the treatment plant effluent ditch. Pool B is unique in that it is the only pool that will be filled by pumping water from Pool Slough and not by gravity. The original project plan was to fill Pool B by gravity with water from Winnebago Creek, using a ditch through Area E to Area (Pool) C and then another control structure into Pool B. However, when Winnebago Creek meandered to its current location, the ditch route through Area E was no longer possible.

AREA C

Area C is located on the south side of Winnebago Creek completely within Iowa. Area C is bordered on the north by the Minnesota-Iowa border and Area E, on the west by the New Albin, Iowa sewage treatment pond and dike, on the south by the treatment plant effluent ditch, and on the east by Pool Slough. Area C was originally planned to be Pool C filled by gravity with water from Winnebago Creek, using a ditch through Area E. However, when Winnebago Creek meandered to its current location, the ditch route through Area E was no longer possible.

POOL D

Pool D is located on the north side of Winnebago Creek completely within Minnesota. It will be subdivided into 2 pools, Pools D1 and D2. Pool D will be bordered on the west by the Soo Line railroad embankment. Pool D is bordered on the south by Winnebago Creek, this dike will be built higher at an elevation of 193.5 m (635.0 ft) to prevent overtopping from the higher Winnebago Creek. Water will flow from Pool D1 to Pool D2.

AREA E

Area E is located on the south side of Winnebago Creek completely within Iowa. Area E is bordered on the south by the New Albin, Iowa sewage treatment pond and dike, on the south by Area C, on the west by the Soo Line railroad embankment, and on the east by water flowing from Winnebago Creek to Pool Slough. Area E will be enhanced to be a depressional wetland.

DIKE DESIGN

Dikes were designed with a 3 m (10 ft) top width and 1V on 4H side slopes. Design criteria included dike widths that would allow driving a vehicle on top of the dikes and side slopes that would deter animals from burrowing through the dikes and still minimize the quantity of dike fill needed. The dike cross section is shown on Plate 4.

The dikes were also designed with 0.3 m (1 ft) of freeboard. The dikes will be occasionally overtopped during spring and summer flood events. To prevent dike erosion during flooding, the control structures will have flood operations. Emergency spillways are not being considered because the dikes would need to be a minimum of 0.6 m (2 ft) higher than they already are, 0.3 m (1 ft) of flow and 0.3 m (1 ft) of rock thickness. Horizontal riprap blankets are being added in front of the structures as a lower cost alternative.

CONTROL STRUCTURES.

In order to fill and drain the pools and for regular control of the water levels within the pools control structures were needed. Since the pools could be filled by gravity flow from Winnebago Creek, is was initially assumed that pumps were not needed. Control structures were chosen based on cost and ease of operation and maintenance. The control structures consisted of sheetpile wingwalls, 1/2 of a 1220 mm (4 ft) corrugated metal pipe (CMP) riser and a 610 mm (2 ft) CMP culvert through the dike (see Plate 5). Water levels were regulated by 100 mm (0.33 ft) stoplogs across the CMP riser. This control structure design was adapted from a standard SCS design. Stoplogs were chosen because they can self-regulate the pool level, cost less than gates, and don't plug up and cause maintenance problems as gates can. The maximum required culvert size was much less than the 610 mm (2 ft) CMP being used, however 610 mm (2 ft) CMP was chosen as the culvert size because of the increased ease of maintenance with the larger culvert. The flow through the culvert should be inlet control and partial pipe flow except during draining the pools if all the stoplogs are pulled at once. The design details of each control structure are given in Table 7 below. However, later in the design process, the control structure design was changed in favor of a simpler, more maintenance-free sheetpile structure as shown on Plate 8 of the main report. These structures provide a 610mm (2 ft) open channel through the dike with stoplogs to control flow or water levels.

TABLE 7. CONTROL STRUCTURE DETAILS

Top of Dike Elev.		Inlet Pipe Invert El.		Outlet Pipe Invert		Pipe Length	
(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)
Control Structure #1		From Pool A to ditch south of Army Road					
191.87	629.5	190.20	624.0	190.20	624.0	9.73	31.9
Control Structure #2		From PoolB and out					
191.70	629.0	190.00	623.4	190.00	623.4	9.85	32.3
Control Structure #3		From Pool C to Pool B					
192.33	631.0	190.90	626.3	190.90	626.3	8.77	28.8
Control Structure #4		From Pool C to Pool A					
192.33	631.0	190.60	625.4	190.60	625.4	9.97	32.7
Control Structure #5		From Ditch to Pool C					
192.33	631.0	191.41	628.0	191.41	628.0	6.73	22.1
Control Structure #6		From Winnebago Creek to Ditch					
193.00	633.2	192.16	630.5	192.16	630.5	6.41	21.0
Control Structure #7		From Winnebago Creek to Pool D1					
193.55	635.0	192.18	630.5	191.87	629.5	9.77	32.1
Control Structure #8		From Pool D1 into Pool D2					
192.63	632.0	191.57	628.5	191.26	627.5	8.53	28.0
Control Structure #9		From Pool D2 and out					
192.02	630.0	191.00	626.7	191.00	626.7	7.13	23.4

*All pipes are 610 mm (2 ft) diameter CMPs.

PREFORMED SCOUR HOLES.

Preformed, riprap scour holes are needed on the outlet side of each control structure to control erosion. The scour holes were sized based on the culvert size (similar to the sheetpile wall spacing of the current design). The riprap was sized based on culvert size and flowrate as recommended in Practical Guidance for Design of Lined Channel Expansions at Culvert Outlets (reference 4). The preformed scour hole is shown below in Figure 5. The riprap gradation is shown in Figure 6 on the next page.

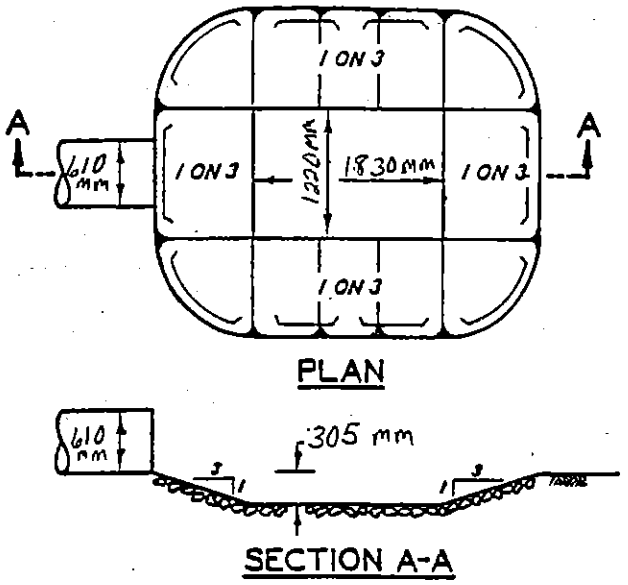


Figure 5 Preformed scour hole

HORIZONTAL RIPRAP BLANKET

A horizontal riprap blanket will be needed on the inlet side of each control structure to control erosion in front of the structure. The riprap will be the same size and thickness as that used on the preformed scour holes and will be placed from the base of the structure and extend to the edge of the sheetpile wingwalls. The riprap blanket will prevent the formation of a scour hole in front of the structure during flood operation.

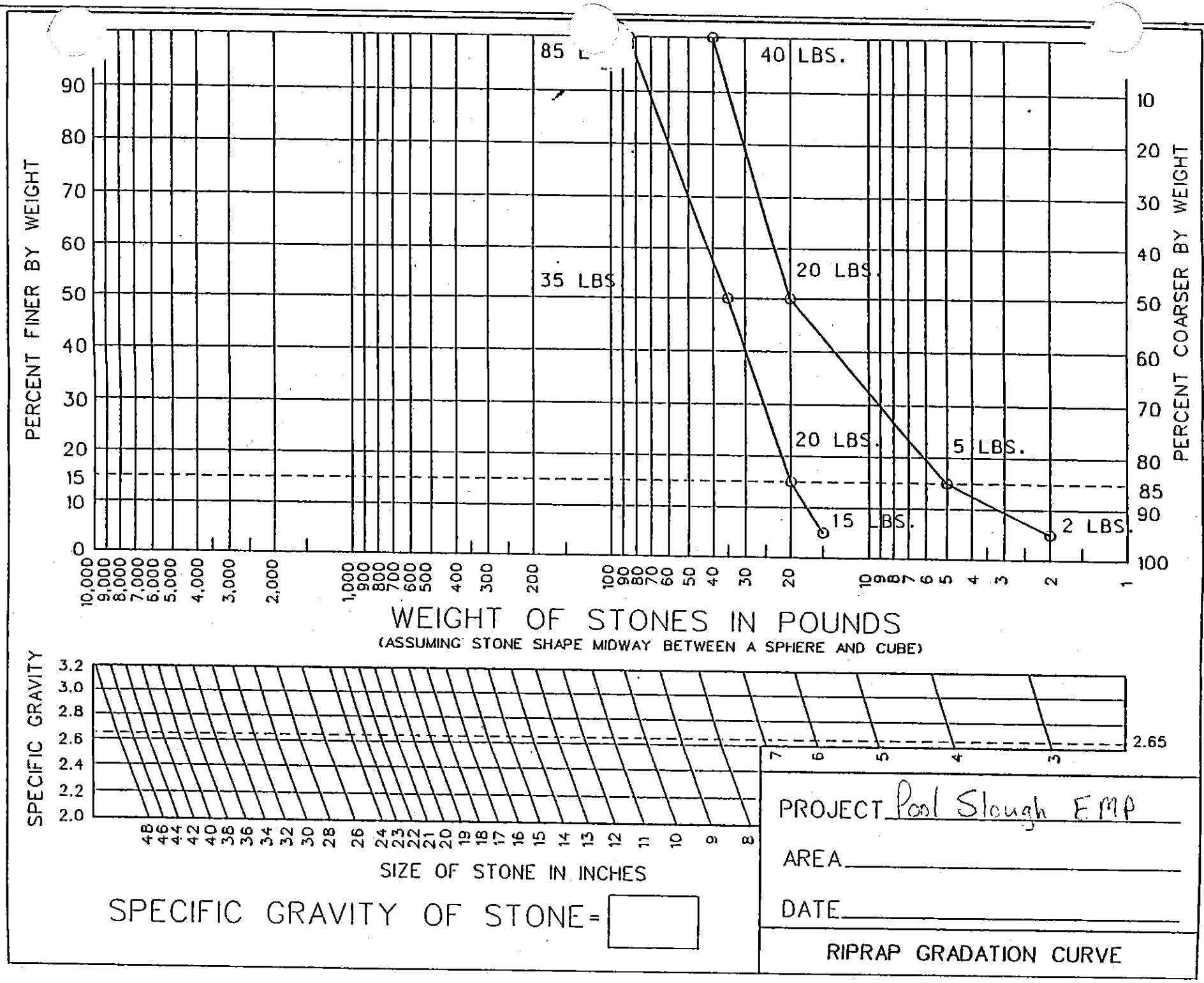


FIGURE 6

FIGURE 6

PLAN OF OPERATION

The primary management goal of the Pool Slough project is to manage the project area for the enhancement of migratory birds and aquatic wildlife. This will be done through the abilities to raise and draw down the water levels within each pool.

The typical cycle of operation for all pools is expected to be as follows. The pool will be filled to the design ponding elevation before spring migration. Once spring migration has ended, the pools will be drained in order to allow vegetation to grow. At the start of fall migration, the pools will be filled to their ponding elevation once again and the flooded vegetation will provide food for the migratory waterfowl. The pools will be filled with water from Winnebago Creek or Pool Slough. The operating curve for the control structures is shown on the next page in Figure 7.

PUMPING INTO POOL B

In the spring, water would be allowed to flow into Pool B through a control structure in the easterly dike of the pool. In the fall, water must be pumped from Pool Slough on the east to fill Pool B. The rate of filling would be controlled by the pump capacity of 9,100 lpm (2,000 gpm). The pool can be drained through the control structure.

POOL D1 & POOL D2

Water must go through the control structure on the north side of Winnebago Creek into Pool D1 to fill Pool D1. The discharge in Winnebago Creek is known to vary from 0.73 – 1.59 cms (25.7 – 56 cfs). Because of the low discharge, there is a concern about drawing too much water off the creek at once. It is recommended that no more than 0.28 cms (10 cfs) be drawn from Winnebago Creek at one time when filling Pools D1 and D2. This corresponds to a head on the stoplogs of 0.252 m (0.827 ft). Pool D2 can only be filled with water from Pool D1. There is no direct outlet from Pool D1 to Minnesota Slough. Pool D1 can only be drained through Pool D2.

OPERATION DURING FLOOD CONDITIONS

The control structures will be operated during flooding to prevent the erosion of the dikes caused by overtopping. Forecasts of conditions on the Mississippi River should be examined during the spring and summer especially during spring snowmelt and storm events within the Upper Mississippi River Watershed. The pools should be filled during spring snowmelt and remain filled until after the Mississippi River has receded. If the Mississippi River rises, to the water surface in the pools, the stoplogs on each control structure should be removed so that the water can flow into the pools through the outlet side of the control structures. The horizontal riprap blanket on the interior side of the pool should help minimize erosion. This procedure should keep the head differential across the dikes to a minimum.

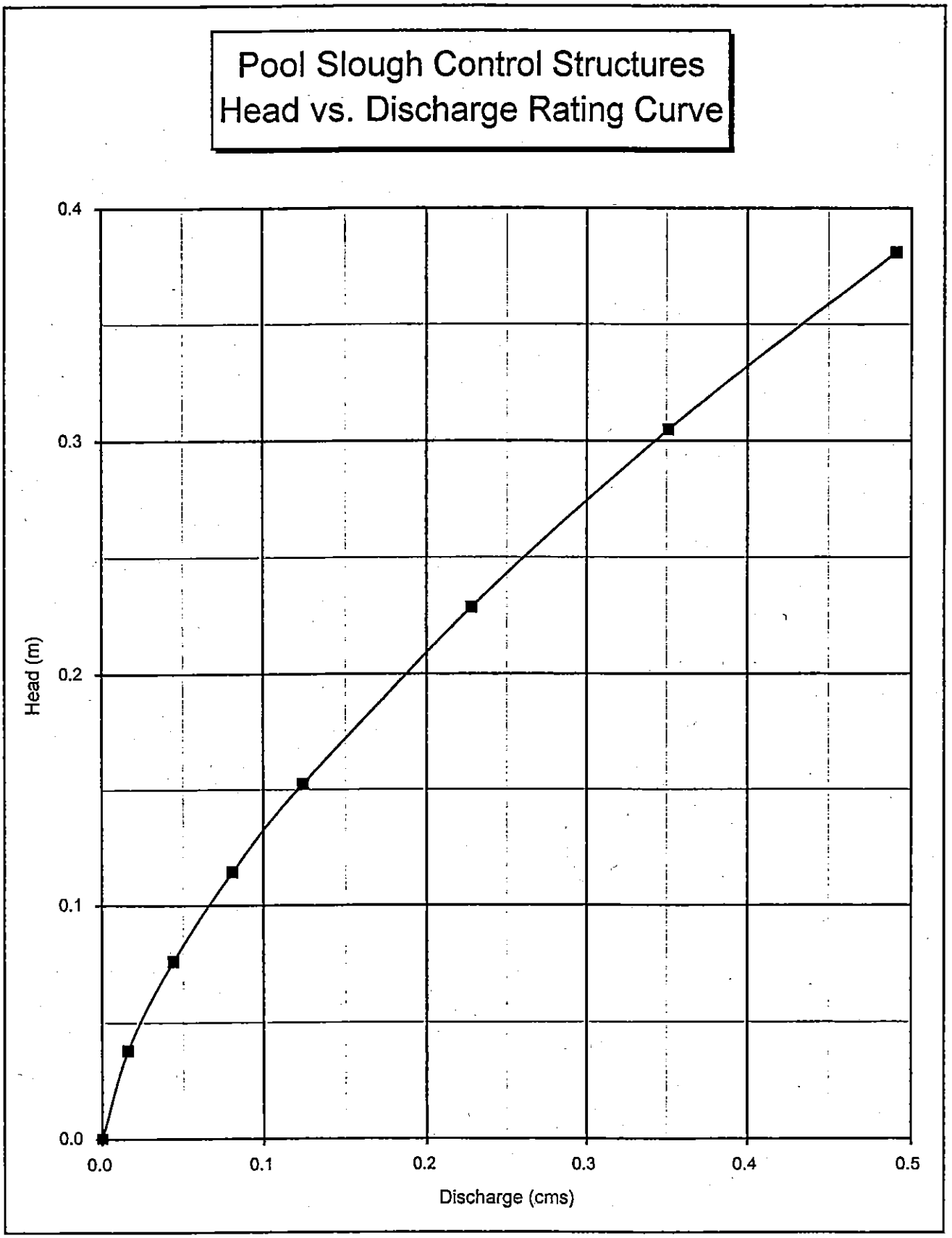

Pool Slough Control Structures
Head vs. Discharge Rating Curve
Head (m)
0.0
0.1
0.2
0.3
0.4
0.0
0.1
0.2
0.3
0.4
0.5
Discharge (cms)

FIGURE 7

PROPOSED PHYSICAL CONDITIONS

SEDIMENT TRANSPORT IN WINNEBAGO CREEK

Sediment transport is an exponential function of velocity. Therefore, a small decrease in velocity will cause an increase in sediment deposition. Velocities in Winnebago Creek are usually lower in the summer and fall. Velocities and sediment load are most likely higher in the spring because of the increase in discharge and upland erosion due to snowmelt and runoff. There is a concern about increasing sediment deposition in Winnebago Creek as a result of the project. Since sediment concentration is greatest near the creek bed, the water taken from Winnebago Creek to fill the pools will most likely leave most of the sediment within the creek since the water is being drawn off the top.

Winnebago Creek downstream of the railroad bridge has a water surface profile of an M1 curve as can be seen by examining the difference in water surface elevations between gages 1 and 2 for the same discharge. The water surface at gage 2 is higher than would be expected because of the higher channel bottom and ponding caused by the beaver dams and other material plugging Winnebago Creek. An HEC-2 model was created for the reach of Winnebago Creek in the project area. A split flow analysis was performed to model the functioning of the control structures during filling. The result was a lower discharge, slightly lower water surface and higher velocities downstream of the control structures. This suggests that there will not be an increase in sediment deposition in this reach of Winnebago Creek; however, once the flow changes to overland flow east of the plug and south to Pool Slough, it will slow down and the sediment will deposit out. It is expected that more sediment deposition will occur during the fall filling of the pools than during the spring. However, the duration of filling the pools will be very short in comparison to the rest of the year when sediment transport will be unchanged by the project. During Spring and Summer storm events, the velocities within the creek will be many times the normal velocities and will most likely wash away temporary sediment deposits near Pools D1 and D2. Therefore, any sediment deposited as a result of operating the project is expected to have a negligible effect on the overall sediment transport regime. Also, we have shown that this currently is a deposition zone, so overall change in the sediment transport regime will be small. Some maintenance may be required at the structures.

Diverting flow from Winnebago Creek could also negatively impact downstream habitat. To minimize sediment transport and environmental impacts, it is recommended that only 0.28 cms (10 cfs) or less of the Winnebago Creek flow be diverted when filling Pools D1 and D2.

DEPOSITION/EROSION

Sediment deposition within the pools is not expected to be a significant problem since the water filling the pools will have a very low suspended sediment load because it will be drawn from the top of Winnebago Creek or pumped into the pool. Sediment deposition in the pools will be minimized by not operating the control structures during storm events when the water is more turbid. Sediment deposition for moderate flow events on the Mississippi River (up to the 5-year flood) will be decreased because the dikes will be keeping the floodwaters out of the pools.

REFERENCES

1. Problem Appraisal Report for Pool Slough Habitat Rehabilitation and Enhancement Project, U. S. Army Corps of Engineers, St. Paul District, September 1996.

2. National Engineering Handbook, Section 4, Hydrology (NEH-4), Soil Conservation Service, U. S. Department of Agriculture, June 1986.

3. Technical Release 55, Urban Hydrology for Small Watersheds, Engineering Division, Soil Conservation Service, U. S. Department of Agriculture, June 1986.

4. Technical Report H-74-9, Practical Guidance for Design of Lined Channel Expansions at Culvert Outlets, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, 1974.

5. Design of Small Dams, Bureau of Reclamation, U.S. Department of the Interior. 1977.

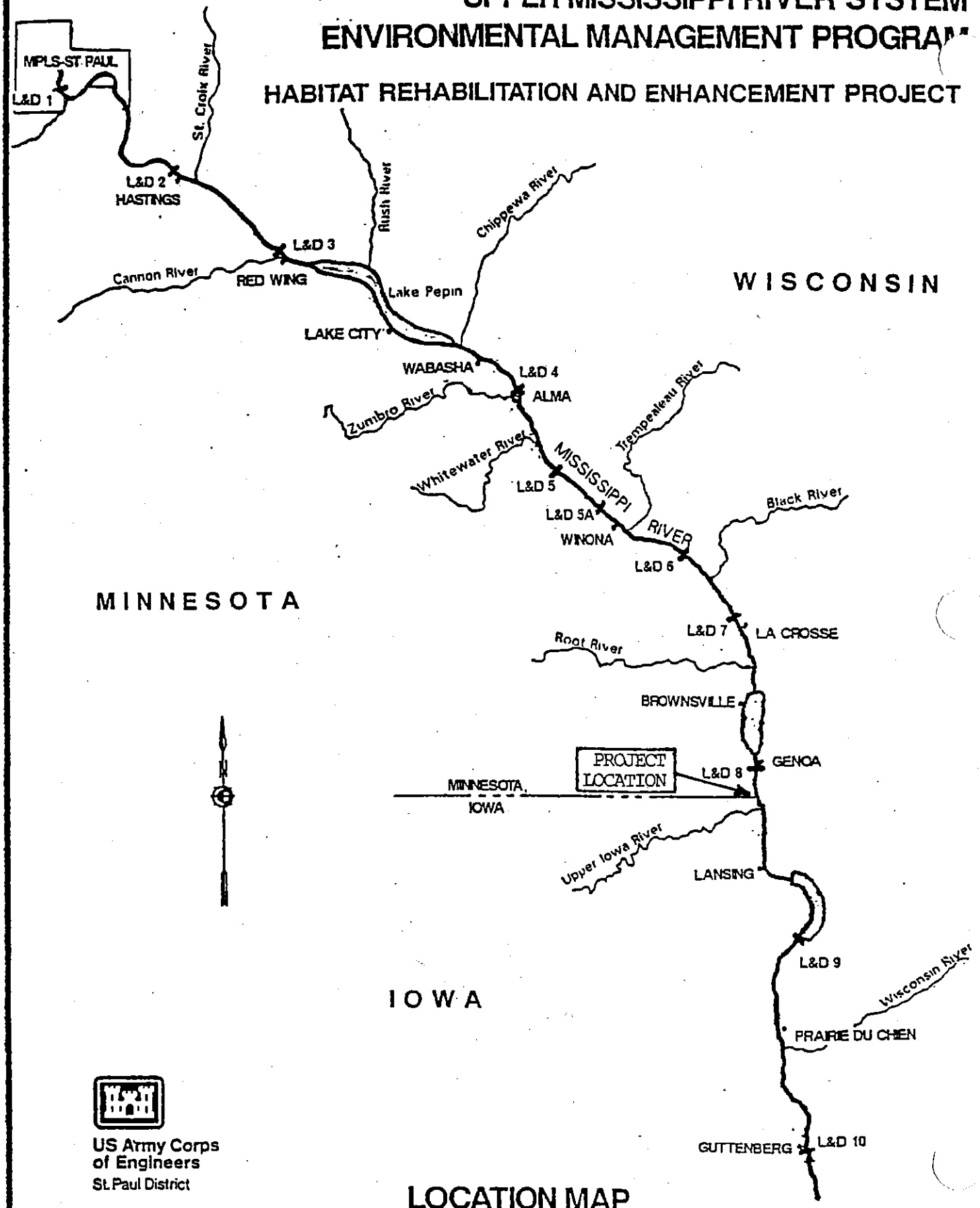
6. Engineers Handbook, Chapter XIII, Part 1, Drop Inlet Spillways, Soil Conservation Service, U. S. Department of Agriculture, 1964.

7. Section 205 Flood Control Reconnaissance Report, Winnebago Creek, New Albin, Iowa, U. S. Army Corps of Engineers, St. Paul District, June 1983.

8. Great I, Study of the Upper Mississippi River, Technical Appendix, Volume 4, September 1980.

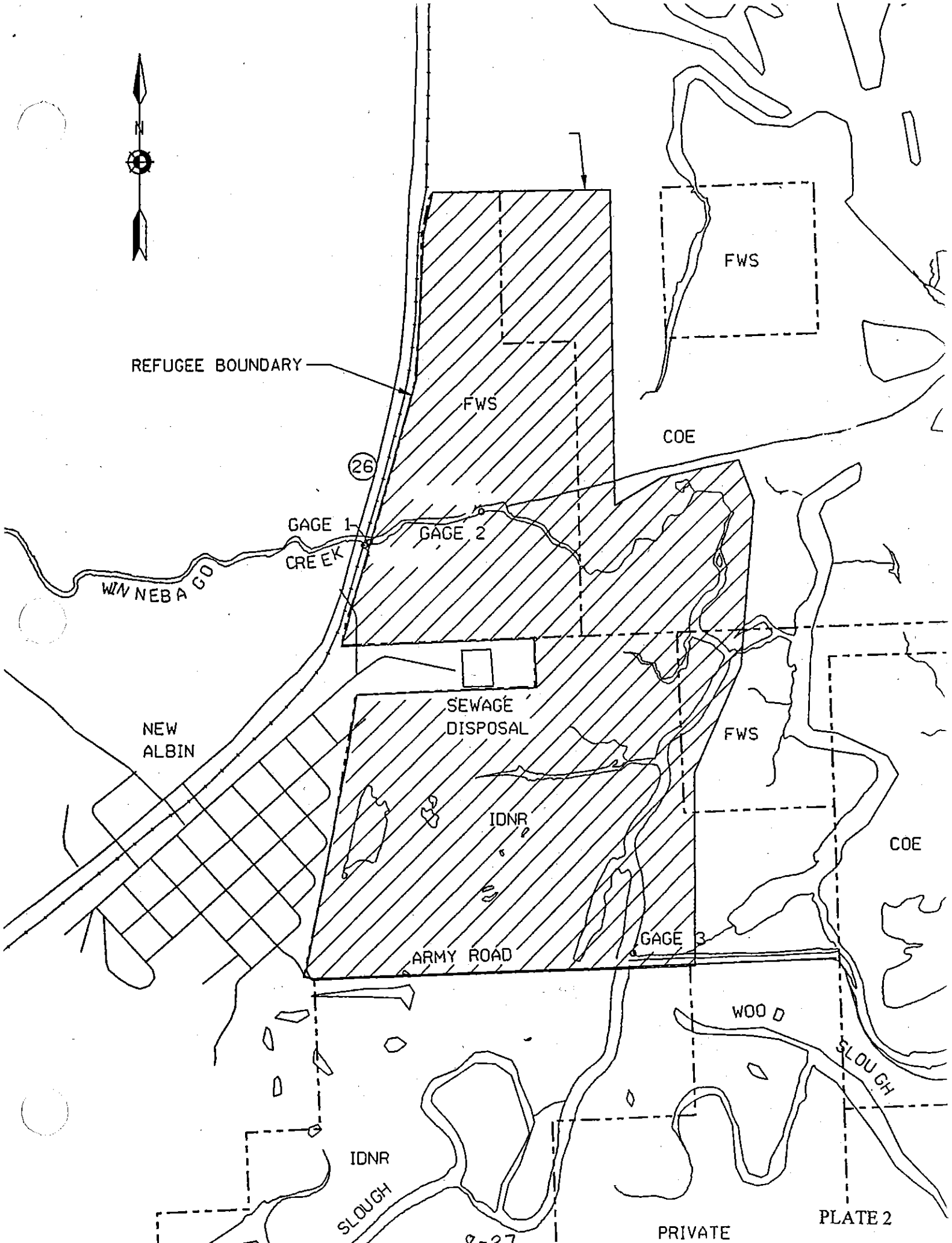
UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

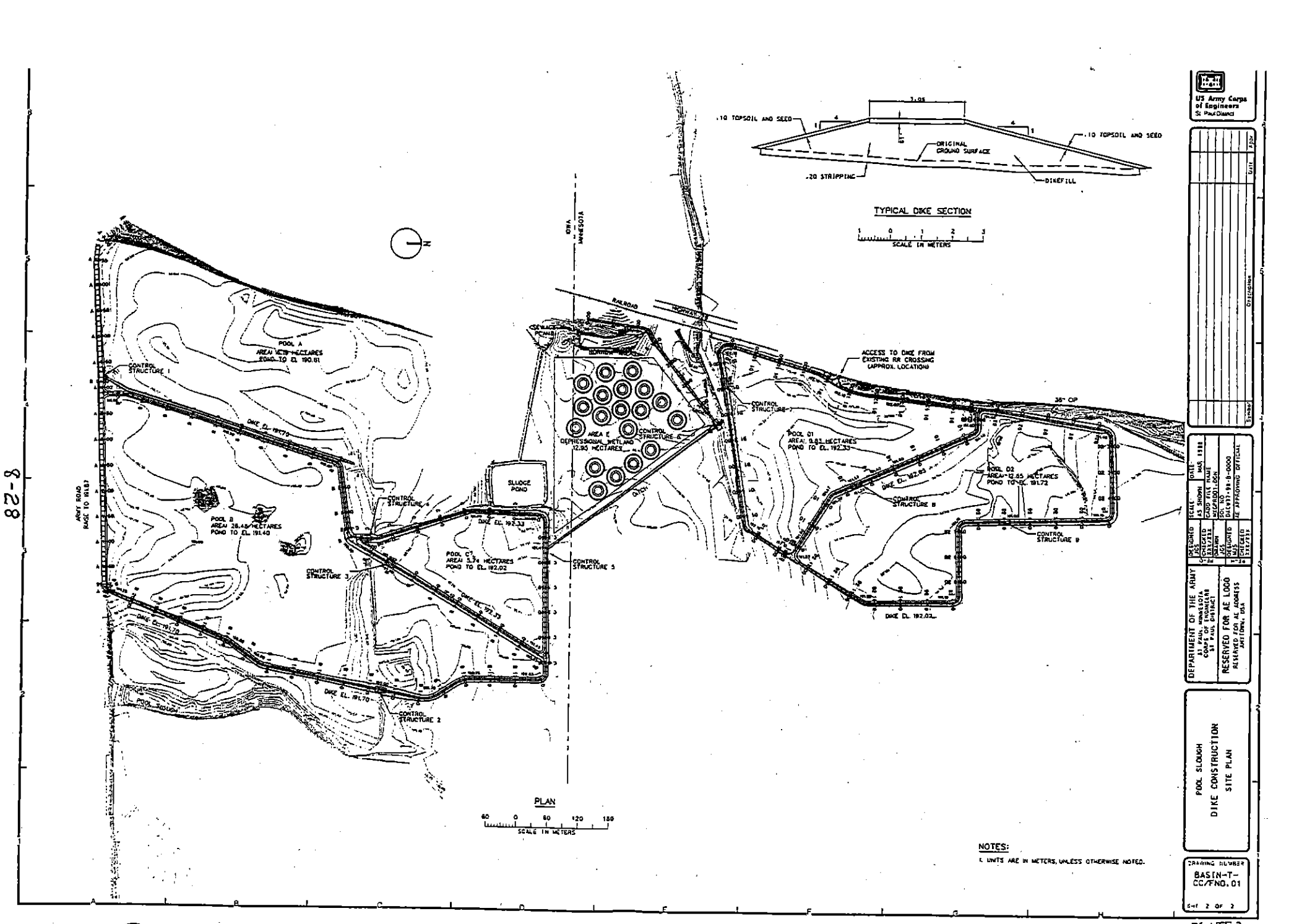
HABITAT REHABILITATION AND ENHANCEMENT PROJECT



US Army Corps of Engineers
St Paul District

LOCATION MAP

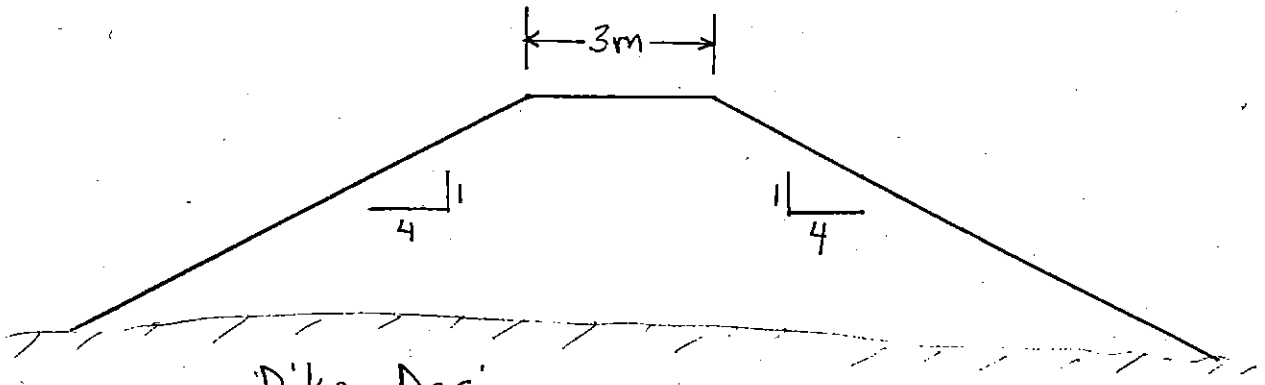

N
REFUGEE BOUNDARY
FWS
FWS
COE
26
GAGE 1
GAGE 2
CREEK
WINNEBAGO
SEWAGE
DISPOSAL
NEW
ALBIN
FWS
IDNR
COE
GAGE 3
ARMY ROAD
WOOD
SLOUGH
IDNR
SLOUGH
PRIVATE
PLATE 2


TYPICAL DIKE SECTION
SCALE IN METERS
.10 TOPSOIL AND SEED
ORIGINAL GROUND SURFACE
.20 STRIPPING
DIKEFILL
PLAN
SCALE IN METERS
POOL A
CONTROL STRUCTURE 1
DIKE EL. 191.79
POOL B
AREA 28.48 HECTARES
POND TO EL. 191.40
CONTROL STRUCTURE 3
DIKE EL. 191.79
CONTROL STRUCTURE 2
POOL SLOUGH
ARMY ROAD
BASE TO 191.87
SLUDGE POND
DIKE EL. 192.33
CONTROL STRUCTURE 4
POOL C
AREA 5.74 HECTARES
POND TO EL. 192.02
CONTROL STRUCTURE 5
AREA E
DEPRESSIONAL WETLAND
12.95 HECTARES
CONTROL STRUCTURE 6
RAILROAD
HIGHWAY 12
ACCESS TO DIKE FROM EXISTING RR CROSSING (APPROX. LOCATION)
CONTROL STRUCTURE 7
POOL D1
AREA 9.81 HECTARES
POND TO EL. 192.33
DIKE EL. 192.63
CONTROL STRUCTURE 8
POOL D2
AREA 12.65 HECTARES
POND TO EL. 191.72
CONTROL STRUCTURE 9
DIKE EL. 192.03
36" CP
NOTES:
1. UNITS ARE IN METERS, UNLESS OTHERWISE NOTED.
US Army Corps of Engineers
St. Paul District
DEPARTMENT OF THE ARMY
ST PAUL, MINNESOTA
CORPS OF ENGINEERS
ST. PAUL DISTRICT
RESERVED FOR AE LOGO
RESERVED FOR AE ADDRESS
ANYTOWN, USA
DESIGNED
DRAWN
CHECKED
SUBMITTED
APPROVED
DATE
MAR 1988
SCALE
AS SHOWN
CADD FILE NAME
MSCPBD01.DGN
DLW97-91-S-0000
RE APPROVING OFFICIAL
POOL SLOUGH
DIKE CONSTRUCTION
SITE PLAN
DRAWING NUMBER
BASIN-T-CC/FND.01
SHEET 2 OF 2

8-28

PLATE 3

US Army Corps of Engineers Saint Paul District	PROJECT TITLE: Pool Slough EMP	COMPUTED BY: MJS	DATE:	SHEET:
	SUBJECT TITLE: Dike and Ditch Designs	CHECKED BY:	DATE:	CONTRACT NO.:



Dike Design

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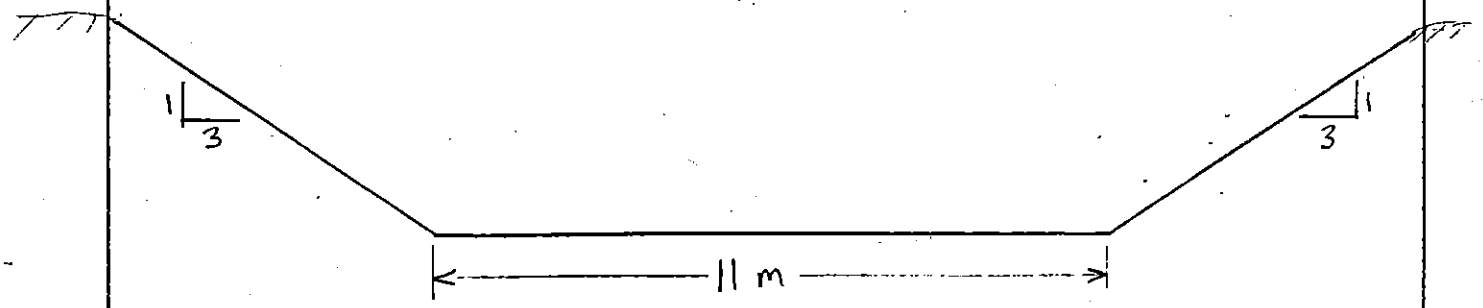
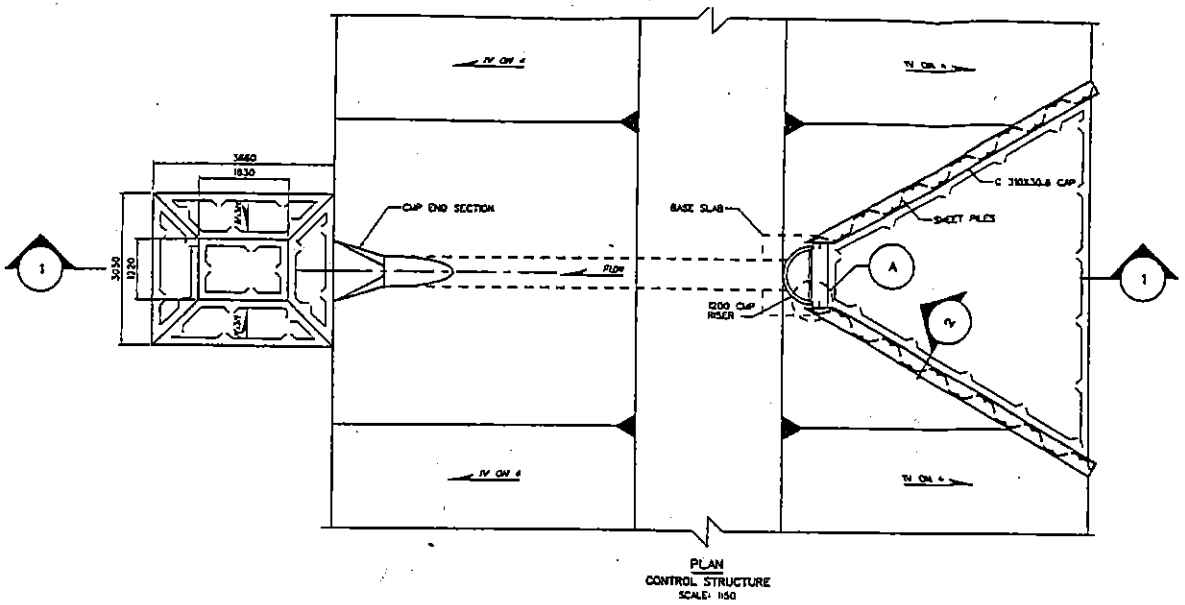
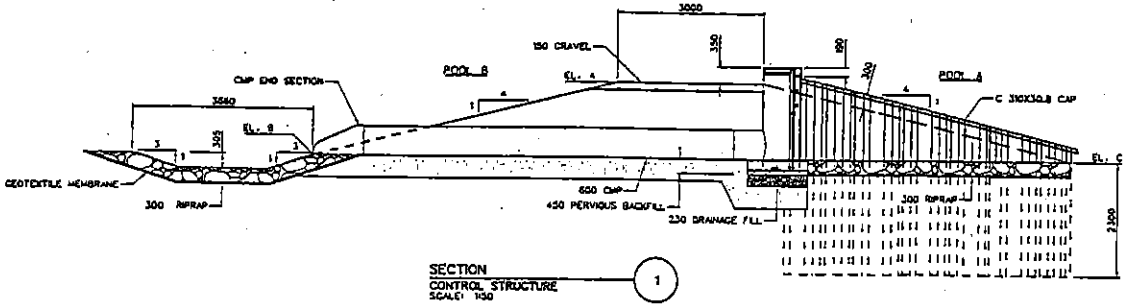


Ditch Design

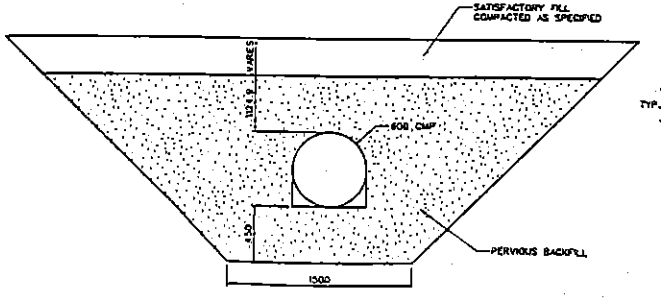
(not to scale)



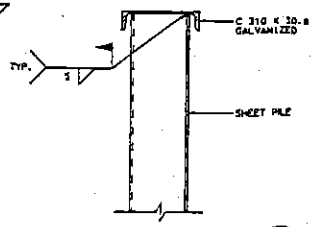
PLAN
CONTROL STRUCTURE
SCALE: 1:50



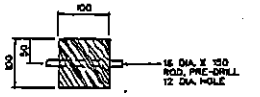
SECTION
CONTROL STRUCTURE
SCALE: 1:50 (1)



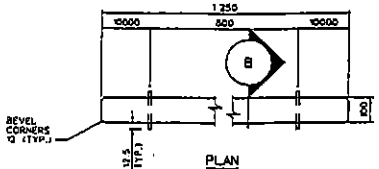
SECTION
CMP PLACEMENT
SCALE: 1:20



SECTION
CHANNEL CAP
SCALE: 1:10 (2)



SECTION
STOPLOG
SCALE: 1:5 (B)



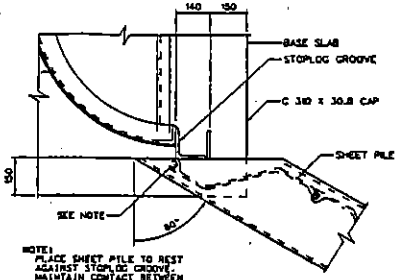
PLAN
STOPLOG
SCALE: 1:10

NOTES:

1. ALL UNITS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN METERS.
3. ELEVATIONS REFER TO MEAN SEA LEVEL (M.S.L.V.D. 1929 ADJ.)
4. ALL BOLTS FOR METAL CONSTRUCTION AND ANCHORS SHALL BE ASTM A325M. GALVANIZED AS SPECIFIED.
5. ALL CMP JOINT CONNECTIONS SHALL USE MUCGER BANDS AND RUBBER O-RING GASKETS AS SPECIFIED.
6. SHEET PILE SHALL BE OF THICKNESS AND SECTION MODULUS SPECIFIED.
7. PROVIDE 2 STOPLOG LIFTING HOOKS.
8. PLACE CMP BACKFILL TO A MINIMUM OF 300 ABOVE TOP OF PIPE. COMPACT BACKFILL WITH HAND EQUIPMENT TO SPECIFIED COMPACTION.
9. HAND PLACE AND HAND TAMP UNDER CMP HAUNCHES.

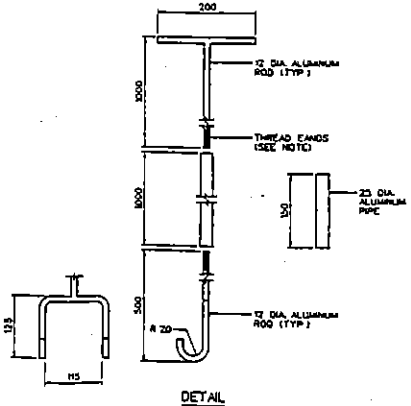
HEADWALL SCHEDULE

CONTROL STRUCTURE	TOP OF DIKE EL. A	PIPE INVERT EL. B	PIPE INVERT EL. C	FROM	TO	PIPE LENGTH (mm)
1	191.67	190.20	190.20	POOL A	DITCH SOUTH OF ARMY ROAD	9 730
2	191.70	190.00	190.00	POOL B	OUT	9 650
3	192.33	190.90	190.90	POOL C	POOL B	8 770
4	192.33	190.60	190.60	POOL C	POOL A	9 970
5	192.35	191.41	191.41	DITCH	POOL C	6 730
6	193.00	192.16	192.16	WINNEBAGO CREEK	DITCH	6 410
7	193.38	192.67	192.18	WINNEBAGO CREEK	POOL 01	9 770
8	192.63	191.26	191.57	POOL 01	POOL 02	8 530
9	192.02	191.00	191.00	POOL 02	OUT	7 130



NOTE:
PLACE SHEET PILE TO REST AGAINST STOPLOG GROOVE. MAINTAIN CONTACT BETWEEN SHEET PILE AND STOPLOG GROOVE OVER LENGTH OF STOPLOG GROOVE

DETAIL
INTERSECTION LAYOUT
SCALE: 1:10 (A)



DETAIL
STOPLOG LIFTING HOOK
SCALE: 1:5

STANDARD METRIC SCALES

SCALE	mm	0	m
1:2.5	125		0-.125
1:5	250		0-.25
1:10	500		0-.5
1:20	1000		1
1:50	2500		2.5
1:100	5000		5

US Army Corps of Engineers
St. Paul District

DEPARTMENT OF THE ARMY
ST. PAUL, MINNESOTA
CORPS OF ENGINEERS
ST. PAUL DISTRICT

DESIGNED (ELECTRONIC) — DATE: 84-03-28
CORRECTED — CARD FILE NAME: SLOUGH14.DGN
DRAWN — DGN: 37-00-B-0000
TRACED — DESIGNED — APPROVED — DATE
CHECKED — CHIEF, ENGINEERING DIVISION

POOL SLOUGH
DIKE & HEADWALLS
STOPLOG CLOSURE STRUCTURE & HEADWALL SCHEDULE

DRAWING NUMBER
BASIN-T-CC/FNO.01

PLATE 5

8-30

Attachment 9

Geotechnical Appendix

Note

This appendix was prepared for the project when it included development of pools on lands managed as a national wildlife refuge by the U.S. Fish and Wildlife Service. The final selected plan recommends construction of only one pool (pool B).

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GEOTECHNICAL APPENDIX

PROJECT DESCRIPTION

1. The selected plan for the Pool Slough EMP Project consists of three moist soil units (MSU) and creation potholes. Water diverted from Winnebago Creek would serve as the water source to fill two of the moist soil units and pumping from Pool Slough will be used to fill the other MSU. Stoplog structures will be used to control water levels.

GEOLOGY

2. The Mississippi River lies in a broad, bedrock gorge or trench that probably existed in some form as long as 180 million years ago. The primary geologic event that created the valley we see today occurred approximately 10,000 years ago, near the end of the Pleistocene Glaciation. During this glacial period the Mississippi gorge was filled with glacial outwash sand and gravel deposits. After deposition of the outwash sediments, large volumes of meltwater from the southward outflow of glacial Lake Agassiz eroded the sands and gravels while simultaneously scouring and deepening the bedrock valley. As the meltwaters diminished, the deeply eroded gorge filled with up to 60 meters of river sands, gravels, clays, and silts. The large supply of sediment from the Mississippi headwaters and its tributary streams, coupled with a diminished water supply at the end of glacial melting, led to the development of a braided stream environment. River conditions were characterized by numerous channels, swampy depressions, natural levees, islands, and shallow lakes.

3. Completion of Lock & Dam #9 (in 1937) flooded the area and obscured the braided stream characteristics. Lake-type sediments now form a relatively thin, stratified, veneer of organics, silts, sands, and clays over most of the present river bottom. The river gradient is quite low, averaging less than 2 inches per mile during typical flow conditions. Side channels, meanders, and sloughs that typify low gradient conditions are conspicuous at the project location. The depth of sedimentation is generally greater in the slow moving backwater areas, than in the main channel portions of Pool #9.

SUBSURFACE EXPLORATION

4. To date, six test pits (95-1TP through 95-6TP) have been excavated within the project limits by backhoe. Additionally, 15 hand-augers have been completed in the area. The locations for all these are shown on Plate 1, while Plates 2 through 6 contain summary logs of the test pits and hand augers. Test pit locations were initially chosen to identify suitable borrow source(s), provide general soil stratigraphy, and establish groundwater levels. Groundwater levels were

estimated from the highest elevation at which seepage exited the excavated face of the test pit. Two test pits were excavated at each of three potential borrow sites identified in the early planning stages.

5. Soils within the project area range from alluvial or slow water fluvial sediments in the wetlands to sands to boulder size particles in areas adjacent to the steeper uplands. Test pit 95-1TP, located furthest upland, indicated the presence of limestone and sandstone cobbles and boulders. The most common soil unit within the Minnesota portion of the project site is the New Albin silt-loam (USDA classification), consisting of low plasticity clay (CL), or silt (ML) interbedded with silty sands (SP-SM or SM). The soil classifications from the *Soil Survey of Houston County, Minnesota* correlate well with 95-1TP through 95-4TP soil stratigraphy. North of Army Road, test pits revealed semi-pervious soils (SM or SP-SM) present to at least a depth of 1.5 meters below ground surface. Subsequently, the hand augers completed in the area of pool B showed a thin (0.2 to 0.5 meter) layer of clay described below.

GEOTECHNICAL DESIGN CONSIDERATIONS

SLOPE STABILITY

6. No formal slope stability computations were completed for the proposed design. The low height of the moist soil unit dikes (generally between 1 to 1.5 meters), relatively flat side slopes (1V on 4H), and compaction of the dike fill should prevent development of any slope failures.

SETTLEMENT

7. Because of the low height of the moist soil unit dikes, consolidation settlements should be negligible. The presence of sand seams in the remaining alluvial deposits within the project limits would speed the consolidation process. Two areas where consolidation settlement could be a concern are the NE corners of pool D and pool B where the levee height approaches 2 meters. During final design, the alignment of the MSU dikes will be changed slightly, resulting in lower height dikes.

8. Settlement at the control structures should not present a problem because the sheet-pile will be placed to a depth below any compressible soils.

SEEPAGE

9. The maximum design depth of ponded water in a MSU is 0.6 meter. The head differential across a MSU dike should not exceed 0.6 meters during operation. This would result in small hydraulic gradients that would not cause uplift problems or lead to internal erosion. The pool B MSU is designed to pond water and to be filled by pumping. Water losses can occur because of seepage through or under containment dikes and evaporation of surface water. Ponded water lost to seepage will need to be replenished through pumping in pool B. A finite-element analysis was completed, using the following stratigraphy:

Soil Classification	Percent Fines	k Value Assumed	Thickness (m)
CL/CH	70	2.0×10^{-4} m/day**	0.5
SP-SM	10	4.8 m/day*	0.5
SP	0-5	86.4 m/day*	50

* From *Introductory Soil Mechanics and Foundations* by Sowers and Sowere p. 93 Table 3.1
** From gradations done on test pit samples with the Hazen equation used to compute k

This stratigraphy was taken from the hand augers that were advanced. The model assumed that no soil would be removed for borrow and that the CL/CH layer is consistent throughout the pond bottom. The model showed that pumping to maintain the pond would be required again 25 days after filling. Seepage through and under the dikes surrounding pools D1 and D2 will not cause problems because Winnebago Creek will be a continuous source of water to replenish any water lost by seepage.

BORROW SOURCES

10. The test pits all indicated foundation soils (CL, CL-ML, ML, and SM) suitable for dike fill construction. However, topsoil thickness varies due to past agricultural activities, groundwater levels change seasonally, and soil types differ spatially over the project limits. Test pits 95-1TP and 95-2TP indicated 1 meter and 0.5 meter of topsoil respectively, which probably reflects the recent farming in the proposed pool D MSU. The *Soil Survey of Houston County, Minnesota* indicates the seasonal high water table varies from 0.3 to1.0 meter below the ground surface between March and July. These factors complicate defining quantities of suitable dike fill present on-site.

11. Pool B would be built with borrow from a commercial sand pit. A number of off-site sand suppliers are available in the New Albin area. The seepage analysis showed that even with the dike constructed out of clean sand, seepage is not increased very much because of the low driving head across the dikes. In addition, much less pervious topsoil would be placed on the dike slopes.

12. Four hand-augers were taken on the south side of Army Road to evaluate the soils for use as borrow material. Augers 1999-7A through 1999-10A are shown on Plate 6. The soil in all holes would be difficult to use for borrow in a saturated condition and because of the high ground water table, there is very little unsaturated material. Also shown on Plate 6 hand-augers 2000-11A through 2000-21A that were taken in pool B, pool D1, and pool D2 to get a better understanding of the seepage these ponds would have.

CONSTRUCTION CONSIDERATIONS

13. Because of seepage concerns, the alignment of the dike for pool B will not be stripped. The vegetation along the dike alignment would be cleared. Suitable fill would then be placed to construct the embankment. Topsoil and seed would then be applied. The top of the MSU dikes would require an aggregate surface course where vehicle access to the control structures is necessary. The fine-grained foundation soils and high groundwater table in the spring could result in borrow material too wet for immediate placement and foundation soils too soft to support heavy construction equipment. The wet spring conditions and potential for flooding makes construction during this time of year difficult.

14. Excavation from the designated borrow sources and hauling to place fill would require construction of haul roads or a working platform to support heavy construction equipment. This type of construction (end dumping) would minimize regrading of the MSU pools and allow natural drainage patterns to be utilized. If side casting construction of the MSU dikes was used, then the bottom of the pools would require substantial regrading to establish proper drainage. This would cause the water in the pond to be directly connected to the underlying clean sand layer causing the pond to drain faster requiring more frequent pumping to fill it back up.

PLANS AND SPECIFICATIONS

15. Additional hand augers were advanced around the MSU dike alignment in the pool B area and in pool D to determine soil stratigraphy. These areas are further out in the floodplain and potentially have higher groundwater levels, which could present additional construction concerns. Additional subsurface exploration locations should be selected at control structure locations when possible. Exploration should not begin until the final dike alignments and structure locations are decided.

16. The Army Road embankment will be used instead of constructing 380 meters of MSU dike just north of Army Road. Those reaches of MSU dike that will serve as access roads to the control structures will have 0.15 meter of gravel placed on them. Turnarounds along the MSU dikes are required because the top of the MSU dikes would receive aggregate surface course only along the shortest route to the control structures, not around the entire dike.

Attachment 10

Detailed Cost Estimate

Attachment 10

DETAILED COST ESTIMATE

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Attachment 10

DETAILED COST ESTIMATE

10.1 GENERAL

1. This attachment contains the detailed project cost estimate prepared for the construction of the Pool Slough Wetland Complex project on the Mississippi River in Pool 9 near New Albin, Iowa. The estimate has been prepared using the MCACES computer program. Results are presented on a spread sheet showing costs and contingencies. This write-up is prepared to explain cost relationships and development of the contingencies. Guidance for preparation of this appendix was obtained from ER 1110-2-1150, Engineering and Design for Civil Works Projects, ER 1110-2-1302, Civil Works Cost Engineering, and EI 01D010, Construction Cost Estimates. The estimate is in the Civil Works Breakdown Structure format as directed by ER 1110-2-1302.

10.2 PRICE LEVEL

1. Estimated costs are based on June 2002 price levels. Indirect costs, including field office overhead, home office overhead, profit, and bond, have been added to the costs to obtain the unit prices. These costs are considered fair and reasonable to a prudent and capable contractor. Estimated prices on the Total Project Cost Summary Sheet are rounded to the nearest $1,000.00.

10.3 PROJECT DESCRIPTION

1. The purpose of the project is to provide habitat for waterfowl by managing the water level in a pond.

2. The pond is enclosed by dikes and the water levels within the dikes are managed by the operation of a control structure constructed within the dike section. The control structure is constructed of steel sheet pile walls with stoplogs for control of the water level or flow rate. There is also a 2300 gallon per minute portable pump which is used for filling the pond. The pump is driven by a diesel engine. The pump and engine are trailer mounted. The pump unit will be backed into the water and hooked up to a 1000 gallon fuel tank when pumping is required.

10.4 CONSTRUCTION METHODS

1. The material for the construction of the dikes, except for the aggregate on the surface of the dikes, comes from a borrow area south of Army Road, adjacent to the project area. Most areas will be dry at the time of construction. Dikefill will be excavated with dozers, loaded into trucks with loaders and hauled to the dike areas. Dozers and rollers will be used to spread and compact the dikefill material.

2. The control structure will be constructed using normal construction techniques. The steel sheet pile will be placed using a vibratory hammer. As an alternative, the contractor may choose to install the steel sheet pile by pushing it into place using the bucket on the hydraulic excavator.

10.5 COST RELATIONSHIPS

1. Construction Costs. It is assumed that a general contractor will accomplish all of the features of work. Costs for mobilization and demobilization are included in the estimate as a percentage of the construction cost and distributed to all other items. All costs, except for the material purchase costs, are based on specific crews and durations or production rates for each item of work.

10.6 CONTINGENCIES

1. Generally, contingencies are based on:

   a. 5% to 20% for unit pricing,

   b. 5% to 20% for unanticipated work,

   c. 5% to 10% for quantities.

2. Feature 06, Fish and Wildlife Facilities.

   a. Earthwork. Contingencies for all earthwork are 30%.

      1) Unit Pricing. Uncertainty in unit pricing for the earthwork items is relatively low because unit prices were developed using work analysis. Crews have been developed and production rates have been determined for these crews. A contingency for unit pricing for all earthwork items is assumed to be 10%.

      2) Unanticipated Work. Uncertainty in unanticipated work is relatively low. A contingency of 5% has been assumed for uncertainty in unanticipated items of work since the project features have been well defined, the site has been inspected, and coordination among the agencies involved in this project has resulted in general agreement as to what the project features should be.

      3) Quantities. A contingency of 15% has been assumed for uncertainty in quantities. Uncertainty in quantities is due to unknown changes in topography. The topographic data is from 1995 and there has been a major flood in the area since that time which may have changed the topography.

   b. Control Structures. Total contingencies for the control structures are assumed to be 25%. The largest uncertainty is the number of structures that could be added as the design progresses. Contingencies are based on 5% for uncertainties in unit pricing, 5% for uncertainties in unanticipated items of work, and 15% for uncertainties in quantities.

3. Feature 30, Planning, Engineering and Design. Estimated costs and contingencies are provided by the Project Manager and are based on a percentage of the total estimated construction costs with contingencies. This percentage is determined from experience on other projects similar to this project. Contingencies are added to cover uncertainties due to the preliminary level of design accomplished up to this time.

4. Feature 31, Construction Management. Estimated costs and contingencies are provided by the Project Manager and are based on a percentage of the total

estimated construction costs with contingencies. This percentage is determined from experience on other projects similar to this project. Contingencies are added to cover uncertainties due to the preliminary level of design accomplished up to this time.

10.7 ATTACHMENTS

1. The first attachment is the Total Project Cost Summary. This shows the fully funded project cost estimate. It is prepared in accordance with Project Management guidelines and includes costs for construction, engineering and design, and construction management along with the appropriate contingencies. All costs are indexed to the end of the fiscal year and then to the mid point of construction. For this project, there are no real estate costs since the project will be constructed on federal or state owned property.

2. The second attachment is the backup to the Total Project Cost Summary. This show detailed unit costs and detailed contingencies. The unit costs have been determined by preparing a detailed estimated using the MCACES cost engineering software.

3. The third attachment is the Estimated Average Annual Operation and Maintenance Costs.

TOTAL PROJECT COST SUMMARIES

PROJECT: POOL SLOUGH DPR
LOCATION: POOL 9, MISSISSIPPI RIVER
DATE PREPARED: 24 MAY 2000
DATE REVISED: 2 JULY 2002

PREPARED BY: GARY SMITH, CEMVP-ED-D

REVIEWED AND APPROVED BY:JAMES B. MOSNER, CHIEF, COST ENGINEERING

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	OMB INFLATION TO XX/XX %	AMOUNT	MID POINT OF FEATURE	OMB (%) INFLATION (+/-)	INFLATED COST AMOUNT ($)	INFLATED CONTG. AMT. ($)	FULLY FUNDED COST
06—	FISH AND WILDLIFE FACILITIES	209,000	56,000	27%	265,000							
	TOTAL CONSTRUCTION COSTS =====>	209,000	56,000	27%	265,000							
01—	LANDS AND DAMAGES											
30—	PLANNING, ENGINEERING AND DESIGN	45,000	7,000	16%	52,000							
31—	CONSTRUCTION MANAGEMENT	19,000	3,000	16%	22,000							
	TOTAL PROJECT COSTS ======>	273,000	66,000		339,000							

NOTES:
1. UNIT PRICES ARE AT JUNE 2002 PRICE LEVELS UNLESS NOTED OTHERWISE.

ACCOUNT CODE 06.--.--.--	ITEM FISH AND WILDLIFE FACILITIES	SUBTOTAL W/O CONT	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	PERCENT	REASON
06.03.--.--.--	WILDLIFE FACILITIES AND SANCTUARY								
06.03.73.--.--	HABITAT AND FEEDING FACILITIES								
06.03.73.02.--	SITE WORK								
06.03.73.02.05	MOIST SOIL UNITS								
06.03.73.02.05	Lower Area	209,086.80							
06.03.73.02.05	Clearing and Grubbing		HEC	1.50	400.00	600.00	180.00	30.0%	1,2,4,5
06.03.73.02.05	Aggregate	28,501.25							
06.03.73.02.05	Pool B		CM3	150.00	37.75	5,662.50	1,698.75	30.0%	1,3,4,5,6
06.03.73.02.05	Army Road		CM3	605.00	37.75	22,838.75	6,851.63	30.0%	1,3,4,5,6
06.03.73.02.05	Topsoil	23,936.00							
06.03.73.02.05	Dikes								
06.03.73.02.05	Pool B, Army Road		BM3	1,760.00	13.60	23,936.00	7,180.80	30.0%	1,2,4,5
06.03.73.02.05	Dikefill	81,941.75							
06.03.73.02.05	Pool B, Army Road								
06.03.73.02.05	Obtain Borrow Material		BM3	8,975.00	6.00	53,850.00	16,155.00	30.0%	1,2,4,5
06.03.73.02.05	Spread and compact		BM3	8,975.00	3.13	28,091.75	8,427.53	30.0%	1,2,4,5
06.03.73.02.05	Control Structures (1 Structure)	36,627.80							
06.03.73.02.05	Misc Metal Items		JB	1.00	1,789.00	1,789.00	447.25	25.0%	1,2,4,5,6
06.03.73.02.05	Grating, Heavy Duty		M2	2.32	250.00	580.00	145.00	25.0%	1,2,4,5,6
06.03.73.02.05	Steel Sheet Pile - PS28		M2	129.00	187.00	24,123.00	6,030.75	25.0%	1,2,4,5,6
06.03.73.02.05	Sheet Pile Cap		M	31.70	174.00	5,515.80	1,378.95	25.0%	1,2,4,5,6
06.03.73.02.05	Dewatering		JB	1.00	2,545.00	2,545.00	636.25	25.0%	2
06.03.73.02.05	Erosion Protection		JB	1.00	2,075.00	2,075.00	518.75	25.0%	1,2,3,4,5,6
06.03.73.02.05	Pump Facility	37,480.00							
06.03.73.02.05	Grading/Sitework		JB	1.00	3,475.00	3,475.00	868.75	25.0%	2
06.03.73.02.05	Aggregate Surface		M3	20.00	37.75	755.00	188.75	25.0%	1,3,4,5,6
06.03.73.02.05	Cable Concrete		JB	1.00	3,740.00	3,740.00	935.00	25.0%	1,4,5,6
06.03.73.02.05	Anchor		JB	1.00	510.00	510.00	127.50	25.0%	1,4,5,6
06.03.73.02.05	Pump		JB	1.00	20,000.00	20,000.00	2,000.00	10.0%	4,6
06.03.73.02.05	Fuel Tank, Hose, Supports		JB	1.00	9,000.00	9,000.00	2,250.00	25.0%	4,6
	SUBTOTAL CONSTRUCTION COSTS					209,086.80			
	SUBTOTAL CONTINGENCIES			26.8%			56,020.65		
	TOTAL 06. FISH AND WILDLIFE FACILITIES						265,107.45		

NOTES:
1. UNIT PRICES ARE AT MAY 2000 PRICE LEVELS UNLESS NOTED OTHERWISE.

REASONS FOR CONTINGENCIES

1. QUANTITIES
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICE
5. PRODUCTION/DURATION
6. MATERIALS

ACCOUNT CODE	ITEM	UNIT	NTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	PERCENT	REASON
08.--.--.--.--	FISH AND WILDLIFE FACILITIES							
30.-.-.-	PLANNING, ENGINEERING AND DESIGN	LS	1	45,068.27	45,068.27	6,760.24	15.0%	2
		17%						
	SUBTOTAL CONSTRUCTION COSTS				45,068.27			
	SUBTOTAL CONTINGENCIES		15.0%			6,760.24		
	TOTAL 30. PLANNING, ENGINEERING AND DESIGN					51,828.51		

REASONS FOR CONTINGENCIES

1. NOT APPLICABLE
2. UNKNOWNS DUE TO MANHOURS REQUIRED.

NOTES:
1. UNIT PRICES ARE AT MAY 2000 PRICE LEVELS UNLESS NOTED OTHERWISE.

1. UNCERTAINTIES DUE TO MANHOURS REQUIRED

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	PERCENT	REASON
ESTIMATED AV FISH AND WILDLIFE FACILITIES								
31.----	CONSTRUCTION MANAGEMENT (S&I)	LS	1	18557.52	18,558	2,784	15.0%	1
Item Description	Pool B		7%					
Inspection and Report								
Erosin Repair								
	SUBTOTAL CONSTRUCTION COSTS				18,557.52			
	SUBTOTAL CONTINGENCIES		15.0%			2,783.63		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					21,341.15		
REASONS FOR CONTINGENCIES								

NOTES:
1. UNIT PRICES ARE AT MAY 2000 PRICE LEVELS UNLESS NOTED OTHERWISE.

ESTIMATED AVERAGE ANNUAL OPERATION AND MAINTENANCE COSTS						
Period 50 YRS				Lower Area Pool B		
Interest Rate 7.125%						
Item Description	Units	Unit Price	Quantity	Amount		Notes
Annual Events						
Inspection and Report	HR	50.00	8.00	400.00		
Set/Remove Stoplogs						
4 Times Per Year						
1 HR Per Structure						
1 Structure	HR	50.00	4.00	200.00		
Debris Removal						
2 Times Per Year						
5 HR Per Structure						
1 Structure	HR	50.00	5.00	250.00		
Set and Remove Pumps	HR	200.00	4.00	800.00		
Monitor Water Levels	HR	50.00	10.00	500.00		
Service Pumps and Motors	HR	50.00	8.00	400.00		
Fuel Consumption						
5 Gal/HR, 14 Days, 24 Hrs per day	GAL	1.00	1,680.00	1,680.00		1
Average Annual Cost of Annual Events					4,230.00	
Events at 5 Year Intervals						
Erosion Repair						
1.00% of Dikefill Quantity	M3	15.00	89.75	1,346.25		
1.00% of Aggregate Surface	M3	45.00	7.55	339.75		
1.00% of Topsoil	M3	25.00	17.60	440.00		
Replace Discharge Hose	M	5.00	30.00	150.00		
Total Cost @ 5 Years				2,276.00		
Average Annual Cost of Events At Year 5					394.79	
Events at Year 10						
Repair/Overhaul Pumping Equipment						
30.00% of Equipment Cost	JB	6,000	1.00	6,000.00		
Present Value				3,014.69		
Average Annual Cost of Events At Year 10					221.90	
Events at Year 20						
Replace Pumps						
100.00% of Equipment Cost	JB	20,000	1.00	20,000.00		
Present Value				5,049.09		
Average Annual Cost of Events At Year 20					371.65	
Events at Year 25						
Replace Tanks and Hoses						
100.00% of Equipment Cost	JB	9,000	1.00	9,000.00		
Present Value				1,610.54		
Average Annual Cost of Events At Year 25					118.55	
Events at Year 30						
Repair/Overhaul Pumping Equipment						
30.00% of Equipment Cost	JB	6,000	1.00	6,000.00		
Present Value				761.07		
Average Annual Cost of Events At Year 30					56.02	
Events at Year 40						
Replace Pumps						
100.00% of Equipment Cost	JB	20,000	1.00	20,000.00		
Present Value				1,274.67		
Average Annual Cost of Events At Year 40					93.82	
Total Estimated Average Annual Cost					5,490.00	

NOTES
1 Assume 1 week of steady running and 1 week of intermittent running.
2 Unit prices are at June 2002 price levels unless noted otherwise.

Attachment 11

Distribution List

The Draft Definite Project Report/Environmental Assessment and/or Public Notice was sent to the following agencies and interests:

Congressional

Sen. Paul Wellstone (St. Paul)* Sen. Tom Harkin (Des Moines)* Sen. Rod Grams (Anoka)*
Sen. Herb Kohl (Madison)* Sen. Charles Grassley (Davenport)* Rep. Gil Gutknecht (Rochester)*
Rep. Jim Nussle (Wash DC)* Rep. Ron Kind (La Crosse)*

Federal

U.S. Fish and Wildlife Service (Bloomington- Lewis*; Winona- Fisher*, Beseke; Fort Snelling- Hartwig*, Dobrovolny; McGregor- Male)
Corps of Engineers (MVS- Hawickhorst*, Cotner; MVD- Arnold; MVR- Kowalcyk, Skalak; MVP-Fountain City-Peterson; LaCrescent- Urich; L&D 8*, L&D 9*; St. Paul- Cin*, Devendorf, Face, D.Foley*, Hendrickson*, Johannessen, Powell, Schneider, Smith, Williams; Onalaska- Baker*; Winona- Gulan*)
Department of Transportation (Chicago)* Environmental Protection Agency (Chicago)
U.S. Coast Guard (St. Louis)* U.S. Geological Survey (Moundsview; Madison; La Crosse)*
National Park Service (Omaha) Soil Conservation Service (Madison, St. Paul)*
Advisory Council on Hist Pres (Wash DC) Office of Environmental Compliance-DOE (Wash DC)*
Office of Environ. Project Review-DOI (Wash DC)

State of Minnesota

Department of Natural Resources (Lake City- Davis; St. Paul- Johnson; Winona- Gulden*)
Pollution Control Agency Department of Administration*
Department of Transportation (Rochester, St Paul)* State Historic Preservation Officer
Department of Energy, Economics, and Development* State Archeologist
State Planning Agency* Water and Soil Resources Board*

State of Wisconsin

Department of Natural Resources (La Crosse- Janvrin; Eau Claire- Bourget)
Department of Transportation (La Crosse)* State Historic Preservation Officer (Madison)*
State Archeologist (Madison)*

State of Iowa

Department of Natural Resources (Bellevue- Griffin; Des Moines- Szcodronski; Guttenberg- Gritter; Manchester- Roseland)
State Archaeologist (Iowa City)* Department of Transportation (Ames)*
State Historic Preservation Officer (Des Moines)* Department of Administration (Des Moines)*

Local

Allamakee Co Engineer*	Brownsville Post Office*	Crawford Co Engineer*	Desoto Post Office*
Ferryville Post Office*	Galesville Public Library	Genoa Post Office*	Guttenberg Post Office*
Guttenberg Public Library	LaCrescent City Clerk*	La Crosse Post Office*	La Crosse Public Library
Lansing City Clerk*	Lansing Post Office*	Lansing Public Library	Marquette Clerk*
Marquette Post Office*	McGregor Clerk*	McGregor Post Office*	McGregor Public Library

Other Interests

Allamekee Jrnl/Lansing Mir*	Badger State Sportsmen (LaX)*	Bass Masters (La Crosse)*
Big River (Winona)*	Courier Press (Prairie du Chien)*	Ducks Unlimited (Caledonia, La Crosse)*
Galesville Republican*	Guttenberg Press*	Houston County News*
I&M Rail Link (Davenport)	Izaak Walton Lg (Mpls, StevePt)*	KAGE,KWNO,KQAL Radio (Winona)*
KNEI Radio (Waukon)*	La Crosse Co Ext Office(LaCrosse)*	La Crosse Tribune*
Mn/Wi Bound Area Cm (Hudson)	Miss R Reg Plan Comm(La Crosse)*	National Audubon Society (St.Paul)*
Nature Conserv(Madison,Mpls)*	North Iowa Times*	Peoples State Bank
River Res Alliance (St Paul)	St. Mary's College (Winona)*	Sierra Club (Madison, Mpls)*
U of Wisc Extension Office*	Univ of Wisc (La Crosse)	Upper Miss R Basin As (St.Paul)*
Up Miss Riv Cons Com(Rock Isl)	Vernon Co Broadcaster*	Vernon Co Cons Alliance(Stoddard)*
Waukon Newspapers*	Winona Daily News*	Winona State University*
WKBT,WLAX,WXOW TV(La Crosse)*	WKTY,WLSU,WLXR Rad(La Crosse)	*WPRE Radio (Prairie du Chien)*

*Public Notice Only

Individuals*

Blaine- Anne Powell
Brownsville- Rick Denstad; Ken Schaller
Caledonia- David D. Nelson; Ronald Chamberlin
Desoto- Delmer Backhaus; Gerald Sindy
Eastman- Peter Biermenapp; Allen Christensen; DuWayne Jonsrud
Eau Claire- Jack Mettler
Eitzen- Thomas Wiebke
Elm Grove- Jim Kexel
Ferryville- Truman Anderson; Fritz Bechtel; W.A. Dean; John Diehl; Don Hempy; Stuart Johnston; Larry Knutson; William McCormick; George Olson; Paul Sampson; James Volk
Gays Mills- Ron Leys; Leonard Olson; Minnie Olson; Thomas Olson
Genoa- Raymond Klafke; Raymond McKelatti; John Wilber
Hokah- Arnold Idecker
Holmen- Joni Jackson; Jerry Pryor; Virgil Roberts
Houston- Phil Moen
La Crosse- Joe Bronk; William Buckner; Lynne Bulman; Claude Deck; Frank Hodge; Fred Lesher; Art Lotz; Harry Meinking; Neil Pomeroy; John Russell; Scott Schellhaass; Bill Steinmetz; Kathy Tabbert; Marty Venneman; Blair Voter; Dean Young
La Crescent- Jerry Kathar; Don Krohn
Lansing- Bill Burke; Bob Henkel, Jr.; Ed Staheli; Donald Weymiller
Lynxville- Nathan Burgin; Ron Coleman; Bob Hagensick; Stan Hagensick; Lawrence Henkel; Mark Withey
McGregor- Carl Lund
New Albin- Duane Bakewell; Henry Becker; Robert Bulman; Les Colsch; Tom Darling; Tracy Dibert; Larry Donahue; Greg & Holly Dougherty; Jim Erbe; Barry Fruechte; Alex Galema; Earl Hammell; Gerald & Eleanor Hammell; Larry & Robin Harmon; Leonard Heiderscheit; Gene Herman; Richard Mauss; Bud Maust; Chris MnLimans; Lennie Mellick; Gilman Meyer; Earl Mitchell; Ray Mulholland; Larry Rice; Iris Sires; Ed Smerud; Elmer Staggermeier; David Steel; Gary Thomas; Donald Vonderohe; Ron Weymiller; Leo Whalen; Craig Wiemerslage; Al Wuennecke; Mike Zeimet; Thomas Zeimet
Onalaska- Robert Baldsizzi; Carl Behringer; Russ Brinkman; Mike Dvorack; Harlan Edmunds; Willis Fernholz; David Fonger; Fred Funk (DPR); Glen Gran; Ed Gray; Wm Hawkins; Bill Heinz; Tom Laufenverg; Charles Lukwitz; Timothy Maier; Leif Marking; Jim Noel; Ronald Page; Merlin Pandler; Gene Pankonien; Leonard Pralle; Patrick Smith; Sue Stranc; Chuck Vogel; Darrel Washa; Al Wernecke; David Wilson
Prairie du Chien- Allen Ackerson, Donald Higgin, William Howe (DPR); David Miller; Carl Noel; Glen Palmer; Paul Porvaznik; Bob Ziel
Stoddard- Calvin Barstow; Paul Gettelman; Tom Gianoli; Kevin Gobel; George Goodsell; Clarence Haydysch; Richard Jensen; Norm Krause; Eugene Loeffler; Pat Middleton; David Peterson; Gary Raabel; Daryl Steinke; Jim Willenberg; Bob Woodhouse; Rudy Wopat

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