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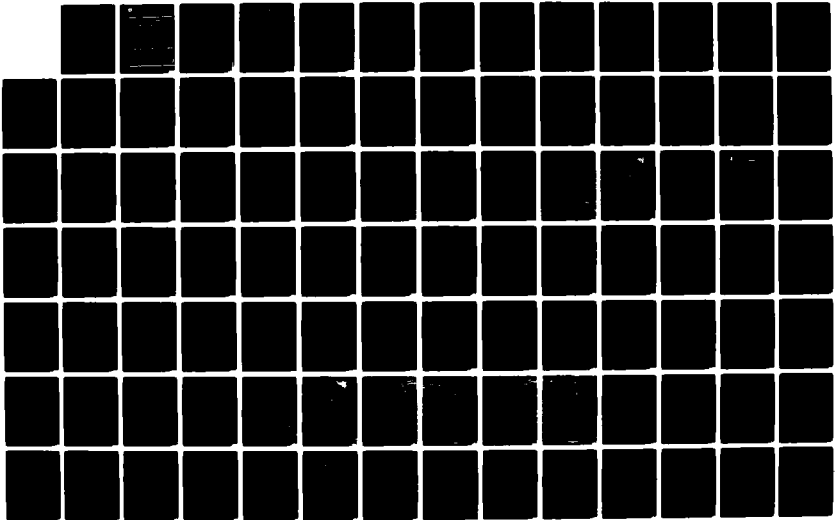
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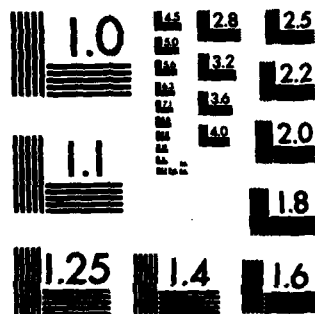
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US Army Corps
of Engineers
St. Paul District

**DRAFT PROGRAMMATIC
ENVIRONMENTAL IMPACT STATEMENT**

**LAKE DARLING
FLOOD CONTROL PROJECT
SOURIS RIVER, NORTH DAKOTA**

AND

**DRAFT FEATURE
ENVIRONMENTAL IMPACT STATEMENT
VELVA FLOOD CONTROL**

VELVA, NORTH DAKOTA

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In 1970, the authorization is now complete. The authorization was authorized in 1970. The 1982 legislation prohibits the Corps from doing other work unless directed by Congress. Most of the flood control features currently under evaluation were also features of the Burlington Dam project. The dam itself and the Des Lacs tunnel diversion structure are not part of the proposed project.

[Faint, mostly illegible text follows in several paragraphs, appearing to be a continuation of the report or a list of details.]

The proposed lake... [Faint text describing project details, including mentions of 'Des Lacs tunnel diversion structure' and 'Burlington Dam project'.]

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DRAFT
PROGRAMMATIC
ENVIRONMENTAL IMPACT STATEMENT
LAKE DARLING FLOOD CONTROL PROJECT
SOURIS RIVER, RENVILLE, WARD, MCHENRY, AND
BOTTINEAU COUNTIES, NORTH DAKOTA



St. Paul District, Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

OCTOBER 1982

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DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

**Lake Darling Flood Control Project,
Souris River, Renville, Ward, McHenry and
Bottineau Counties, North Dakota**

The responsible lead agency is the U.S. Army Engineer District, St. Paul, Minnesota. The responsible cooperating agencies are the U.S. Fish and Wildlife Service and the Environmental Protection Agency.

Abstract: The proposed Lake Darling flood control project, authorized by the 1982 Energy and Water Development Act, consists of an approximate 4-foot raise of Lake Darling and associated upstream and downstream flood control measures, including Velva, North Dakota. This programmatic EIS covers all project features. In addition, a site-specific EIS for the Velva portion of the project is included at the end of this programmatic EIS. The St. Paul District has been investigating flood control alternatives for the Souris River since 1963. A channel modification project in Minot was authorized in 1970 and construction is now complete. Construction of a large dam (Burlington Dam) on the Souris River was authorized in 1970 to provide an additional level of flood protection for Souris Valley residents. A draft EIS for the Burlington Dam project was completed in October 1977 and a draft supplement was completed in January 1980. Neither of these documents were filed with EPA in final form. The 1982 legislation prohibits the Corps from doing further work to implement the Burlington Dam project unless directed to do so by Congress. Most of the flood control features currently under evaluation were also features of the Burlington Dam project. The dam itself and the Des Lacs tunnel diversion structure are not part of the proposed project. The proposed 4-foot raise of the Lake Darling flood pool will increase the level of protection at Minot from a 16-year to approximately a 25-year combined Souris and Des Lacs Rivers flood, and a 35-year flood originating on the Souris River. The various downstream flood control features would prevent damages from the proposed 5,000 cubic feet per second releases from Lake Darling.

If you would like further information concerning this statement, please contact:

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1.00 SUMMARY

Major Conclusions and Findings

1.01 The Lake Darling Flood Control project was specifically authorized by the 1982 Energy and Water Development Appropriations Act (Public Law 97-88). Therefore, separate National Economic Development (NED) and Environmental Quality (EQ) plans will not be developed, although selection of the recommended features of the Lake Darling project will involve the identification and development of the best combination of NED and EQ benefits.

1.02 A tiered approach for Environmental Impact Statement reporting, as discussed in paragraphs 1.13 and 1.14, will be used for this project. This will enable construction on the Velva features to proceed as the first phase of the Lake Darling project. Other project features will be formulated and reevaluated to a sufficient degree so that impacts can be discussed in a later site-specific EIS or EIS's.

Areas of Controversy

1.03 The most significant area of controversy is fee title acquisition of private properties necessary for project features, which is opposed by both upstream and downstream residents. Other measures such as floodproofing, levee protection, or no action are locally preferred to fee title acquisition.

1.04 Another concern of many residents is the belief that wetland drainage in the basin has contributed to Souris River flood problems and that a moratorium or stricter control of drainage should be instituted as part of a total watershed management program. There is also a belief that the raise of Lake Darling would induce additional authorized and unauthorized wetland drainage in the Souris basin. At this time there is no evidence to indicate that the potential for downstream flooding acts as a constraint on wetland drainage projects. Economic incentive and technical feasibility influence decisions to drain and develop wetlands; moral consideration of downstream effects seems to have only a minor influence on such decisions.

1.05 The operating plan for release of stored floodwaters from Lake Darling has been an area of controversy. Upstream residents and the Fish and Wildlife Service would prefer a rapid rate of drawdown so that normal operations can be resumed as quickly as possible. Most downstream landowners would prefer reducing release rates early enough to allow bottomlands to be planted that season. The recommended operating plan developed and coordinated for the Burlington Dam project appears to be feasible for the Lake Darling project as well. This plan would release 5,000 ft³/s until May 15, when the discharge would be reduced to the inflow rate of 500 ft³/s to allow downstream farming during flood years. The other operating plan being considered would release 5,000 ft³/s until the operating pool level in Lake Darling is reached.

Unresolved Issues

1.06 The local share of costs for the project has not been definitely determined. Current local costs are based on the non-Federal interests furnishing lands and rights-of-way at the local protection features of the project, as opposed to paying 35 percent of the entire project costs under the Administration's new cost-sharing policy. Congress and the Department of the Army must resolve this issue.

1.07 The type and extent of fish and wildlife habitat, recreation, or cultural resources mitigation or compensation measures will be determined and coordinated with the public concurrently with preparation and coordination of the site-specific Lake Darling EIS. Acquisition of breakout points around the Upper Souris Refuge is desired by the Fish and Wildlife Service so that refuge facilities can be relocated out of the flood pool.

1.08 Compensation to Canada for altered return flows and flowage easements for affected property owners will be determined and negotiated prior to project implementation.

1.09 An acceptable disposition of the Grano recreation area, which will be affected by the project, will be determined later in the study. This area was financed by a Federal grant under the Land and Water Conservation Fund Act (LAWCON).

1.10 Structural features designed to prevent the undesirable introduction of carp into the North Dakota reach of the Souris River were recommended for the Burlington Dam project. A thorough analysis of conditions expected from the Lake Darling-Souris River project will be performed to determine if the project could allow carp introduction into the Souris loop. If the results warrant it, carp control structures would be recommended as project features.

1.11 Perhaps the most important unresolved issue which will remain over the long term is the need for permanent flood protection for the Souris Valley. The Lake Darling-Souris River project provides interim protection from Souris River floods. Under the terms of the 17 June 1981 Memorandum of Understanding, signed by the initial supporters of the 4-foot Lake Darling raise, alternative approaches to permanent protection will be cooperatively investigated and recommended, if feasible.

Relationship to Environmental Protection Statutes and Other Environmental Requirements

1.12 The proposed project has been reviewed for compliance with applicable environmental laws and regulations for the current stage of planning. Table 1 describes the relationship of the proposed plan to the applicable environmental requirements at this time. (See the Velva EIS for a discussion of the Velva features' relationship to environmental requirements.)

Content and Scope of the EIS

1.13 Council on Environmental Quality (CEQ) regulations on the implementation of the National Environmental Policy Act (NEPA) of 1969 (40 CFR 1500-1508) identify a process called "tiering" and define it as "...the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared..." (40 CFR 1508.28).

1.14 This is the first of at least two separate EIS's to be prepared for the Lake Darling-Souris River project. This programmatic EIS will present sufficient information regarding the general impacts of the project as a whole so that a reasoned judgment can be made on the merits of the action at the present stage of planning. In association with and immediately following this programmatic EIS, a Velva site-specific EIS provides a detailed presentation of the impacts of proposed flood control measures at Velva, North Dakota. The site-specific Lake Darling EIS will be prepared in 1983 and will contain a detailed analysis of the impacts of the remaining features of the project. Section 7.00 of this programmatic EIS discusses currently identified data gaps and studies which will be done to address these issues in greater detail.

2.00 NEED FOR AND OBJECTIVES OF ACTION

Study Authority

2.01 The project for flood damage reduction on the Souris River, North Dakota, recommended by the Chief of Engineers in House Document No. 321, 91st Congress, 2d session, provided for two major structural measures: channel modification through Minot, North Dakota, and upstream reservoir development. The channel modification feature was approved by Senate and House Public Works Committee resolutions adopted 25 June and 14 July 1970, respectively. The reservoir feature was authorized later by the Flood Control Act approved 31 December 1970 (Public Law 91-611). The now-completed Minot channel modification was authorized separately to provide limited flood protection for the city at the earliest possible date. The reservoir feature (the proposed Burlington Dam project) has been deferred by the 1982 Energy and Water Development Act passed by Congress in December 1981. Congress directed the Corps of Engineers to take no further action to construct the Burlington Dam until expressly directed to do so. The Energy and Water Development Act specifically authorized a raise of Lake Darling by approximately 4 feet and implementation of upstream and downstream flood control measures. Most of these measures (including the Velva features) were also part of the Burlington Dam study and are interpreted to be included in the 1982 authorization.

Public Concerns

2.02 The major concern expressed by Souris Valley residents is the need for flood damage reduction and protection of public health and safety from the Souris River and its tributaries. Although Minot is afforded protection from 16-year floods on the Souris River as a result of the channel modification project, residents consider this level of protection insufficient. Not only are urban areas such as Minot, Velva, and Sawyer subject to flood damages, but rural residents in the Souris Valley suffer both damage to structures and crop delays caused by flooding.

2.03 Concern has also been expressed about Federal land acquisition for this flood control project, with attendant loss of local tax bases and farm production, and the forced relocation of residents. During the Burlington Dam study,

many Souris Valley rural residents felt they would bear a disproportionate share of the burden of impacts, while urban areas benefited most from the project. This eventually led to a polarization between Souris Valley residents who were for or against implementation of the Burlington project. The Lake Darling project has more widespread support, although certain features are still controversial.

2.04 Other public concerns include the preservation of cultural and historic resources, development and preservation of recreational areas, loss of fish and wildlife habitat caused by development and wetland drainage, water quality of the Souris River, prevention of carp introduction into the Souris loop, and maintenance of an adequate water supply, especially for irrigation needs.

Planning Objectives

2.05 In addition to the objectives of national economic development, environmental quality, regional development, and social well being, the following specific objectives have been identified for the Lake Darling-Souris River project:

- Reduce flood damages in Minot, Velva, Sawyer, other urban areas, and rural lands and developments along the Souris River.
- Minimize displacement necessary for project implementation.
- Minimize adverse project impacts on local transportation systems.
- Minimize project-induced losses to tax bases and farm production.
- Minimize adverse impacts on recreational resources throughout the Souris Valley caused by the project.
- Preserve the quality of existing fish and wildlife habitat within and outside wildlife refuge boundaries.
- Minimize adverse impacts on cemeteries and other cultural and historical resources.
- Minimize project effects on Souris River water quality.

3.00 ALTERNATIVES

No Action

3.01 The no action alternative would involve no action on the part of the Corps of Engineers. This is not a feasible alternative, however, because the Lake Darling project has been specifically authorized by Congress for implementation. The no action alternative would include continuation of floodplain regulation and flood insurance; the existing channel modifications at Minot; the existing flood forecasting and emergency protection (evacuation and flood fighting); and rehabilitation of Lake Darling Dam to meet current engineering standards (with no increase in flood storage capacity, however). Flooding would continue at the present degree, or would worsen as wetland drainage and development in the Souris and Des Lacs River basins continues. Minot is presently afforded protection from approximately a 16-year flood from combined Souris and Des Lacs River floods.

General

3.02 The proposed flood control plan provides for a raise of Lake Darling Dam by approximately 4 feet and flood control measures upstream and downstream of the dam (see Plate 1). Other features which are considered to be part of the directive from Congress include road and railroad relocations; flood control measures at Velve, Sawyer, and six subdivision areas between Burlington and Minot; flood proofing of residences and/or acquisition of flowage easements downstream of the dam; modification of U.S. Fish and Wildlife structures in the Upper Souris National Wildlife Refuge and possibly in the J. Clark Salyer Refuge; mitigation measures; compensation to Canada for altered return flows; and protection measures for flooding from the Gassman Coulee.

3.03 The operating plan is expected to be the same as that defined for the Burlington Dam project, which provided for releases up to 5,000 ft³/s until the 15th of May, then cutting back to 500 ft³/s until the current conservation pool level of 1596 is reached. The design pool level will be at elevation 1605, approximately 4 feet higher than the existing pool. Another potential operating plan consists of release of 5,000 ft³/s until the conservation pool level of 1596 is reached.

3.04 The occasional storage of water at higher stages would require an interest in real estate, such as flowage easements, within the design pool. This includes approximately 600 acres of privately-owned lands upstream of the Upper Souris Refuge and breakout points along the east and west boundary of the refuge. Renville County Park will be evaluated for possible levee protection, flood proofing, or acquisition.

3.05 For a maximum reservoir pool of elevation 1605, the crest of the raised dam would be at elevation 1610. The spillway would be located on the left abutment. The low-level outlet would also be located near the left abutment and would have provisions for multi-level release. A public bridge would be provided across the spillway, and the approach roads would be raised to elevation 1610.

3.06 The following roads cross the reservoir and may be affected by short-term flood storage at the flood pool elevation of 1605:

	<u>Bridge Deck Elevation</u>	<u>Minimum Approach Elevation</u>
State Highway 5	1609.0	1604.8
State Highway 28	1605.5	1605.5
Renville County Road 9	1608.0	1605.0
Grano Crossing	1604.4	1602.4

3.07 The need to raise any of these crossings will be evaluated after the reservoir operating plan is better defined. Protection of the structures to minimize damage from reservoir storage is considered necessary even if the crossings are not raised. Also, the Soo Line Railroad crossing at Greene is at elevation 1604 and may require raising.

3.08 The McKinney Cemetery is situated between elevation 1600 and 1610 and would therefore be partially affected by the design pool level. A levee around the riverward edge of the cemetery may be an acceptable means of protecting this area in lieu of relocation.

3.09 Renville County Memorial Park is located in a loop of the Souris River about 2 miles north of State Highway 5 and, except for some county-owned property, is privately owned. There are about 170 separate ownerships in the park, including 80 cottages (a few of which are permanent residences) and county-owned recreation buildings. The park has an average elevation of about 1600, and would therefore be subject to flooding. The four basic options being investigated for this area are:

1. Fee title acquisition.
2. Acquisition of flowage easements on the land and floodproofing of the buildings.
3. Acquisition of flowage easements, removal of the structures, and allowing limited use during the nonflood season.
4. Construction of a channel cutoff and protection with a levee.

Levee protection is currently viewed as the most favorable alternative.

3.10 One set of farm buildings, the Eckert ranch, is below elevation 1605. A plan to divert drainage around the farmstead and to protect it with a levee is currently viewed as an acceptable alternative to acquisition of the buildings.

Downstream Measures for Reservoir Operation

3.11 The authorization for the project provides for the implementation of downstream measures, including upgrading existing temporary levees and providing interior drainage facilities for residential areas at Velva, Sawyer, and at six subdivisions between Burlington and Minot. In addition to the leveed areas, there have been 117 rural residences identified that have flood problems at a 5,000 ft³/s release rate. Without protection, these structures would remain subject to flooding from reservoir controlled releases and local inflow. Accordingly, the proposed plan provides for a combination of measures including levees encircling individual residences; flood proofing; raising of residences and access roads; installing holding tanks to temporarily handle sanitary wastes; and flood proofing wells. Where levees and flood proofing would not be feasible, residences would be relocated to adjacent high ground. The plan would not include protection of farm buildings, silos, or any other improvements outside the place of residence.

Refuge Structures

3.12 The U.S. Fish and Wildlife Service has indicated that improvements in the Upper Souris Refuge to provide for more intense management would be an acceptable mitigation measure in lieu of land acquisition. Also, because the existing refuge structures may be affected by reservoir operation, dams 41, 87, and 96 and several low-level levees and maintenance roads are slated for various degrees of upgrading. Modification to the dams would include embankments, spillways, and outlet works.

3.13 Because they would be affected by the higher water stages, the embankments for Ponds A, B, and C, and service roads located below elevation 1605 above Lake Darling Dam would be modified. Provisions would be made for supplying water to Pond A since the removal of the existing outlet structure would eliminate the present source of water.

3.14 The recreation area immediately downstream of the Lake Darling spillway would have to be relocated because of the proposed location of the new outlet and spillway. The new site will be determined in the feature design memorandum.

3.15 The effect of project operation on the dam embankments in the J. Clark Salyer Refuge will be evaluated and, if adversely affected, they would all be modified and stabilized as necessary to prevent erosion. The spillways and outlet structures would be replaced with larger structures capable of passing a discharge of 5,000 ft³/s plus local inflow from below Lake Darling Dam. The gates on all refuge dams would be equipped with heaters to facilitate winter operation. Also, the low-flow outlet on dam 357 would be modified to prevent upstream movement of carp during summer and fall releases from the reservoir.

3.16 Headwater impoundments and restoration of wetlands for flood storage have been considered in past flood control studies on the Souris River; however, these alternatives have been shown to lack economic justification and present difficulties in implementation. They will, however, be addressed in further detail in the site-specific EIS for the project.

4.00 AFFECTED ENVIRONMENT

Environmental Conditions

4.01 The Souris (also called Mouse) River headwaters are in the Canadian Province of Saskatchewan. The river crosses the international border near Sherwood, North Dakota, and makes a 358-mile loop through Renville, Ward, McHenry, and Bottineau Counties before entering the Province of Manitoba near Westhope. The Souris River basin is an area of approximately 24,800 square miles, of which 15,480 are in Canada and 9,320 are in the United States (almost entirely in North Dakota).

4.02 The existing conditions in the Souris River Valley upstream of Verendrye are that of a small stream in an oversized valley. The valley floor is an average of 3/4-mile wide and lies 100 to 200 feet below the ground-moraine plain. The valley walls are fairly steep-sided. Downstream of Verendrye, the river valley is in the glacial Lake Souris area and is 1/2 to 3 miles wide and relatively flat. Two U.S. Fish and Wildlife Service (FWS) National Wildlife Refuges, Upper Souris and J. Clark Salyer, impound extensive reaches of the upper and lower Souris loop, respectively. The FWS-owned Lake Darling Dam is located in the Upper Souris National Wildlife Refuge and forms the major impoundment on the Souris River. The primary function of Lake Darling is to supply water to downstream impoundments of both refuges, but it has also been operated to provide some flood storage during spring runoff on the Souris River.

4.03 Agriculture is the primary business in the Souris basin, and there are many small farming communities in the area. Minot is located near the midpoint of the Souris loop and is the region's major center for commerce, manufacturing, and services. Land use trends, including floodplain development and both legal and illegal wetland drainage, have apparently contributed to the flooding problems in the area. Wetland drainage reduces flood storage capacity in the basin, and increases runoff into the river and its tributaries.

4.05 The Souris River floodplain forest comprises about 2 percent of North Dakota's forests. This constitutes a significant resource in a State which ranks 50th in the country in total forest acreage.

4.06 The two national wildlife refuges on the Souris River, along with other wetlands in the basin, contribute an important percentage of the State's total annual waterfowl production. The diversity of habitat along the Souris River also supports numerous other wildlife species.

4.07 The U.S. Fish and Wildlife Service indicated in a Biological Opinion dated 4 January 1980 that the proposed Burlington Dam project would have no adverse effects on threatened or endangered species. The proposed Lake Darling-Souris River project represents a much scaled-down version of the Burlington Dam project and therefore should also have no adverse impacts on threatened or endangered species.

4.08 Population in the Souris basin is unevenly distributed among the seven counties:

	<u>1980 population</u>
Bottineau County	9,338
Burke County	3,822
McHenry County	7,858
(includes City of Velva 1,101)	
Mountrail County	7,679
Pierce County	6,166
Renville County	3,608
Ward County	58,392
(includes City of Minot 32,843)	

Each county's population declined between 1970 and 1980, with an overall regional decrease of 3.5 percent. Although united as the Souris Basin Planning Council (North Dakota Region II), these counties do not yet function in a unified way for water resource management. Each county maintains separate water management districts and independent taxing and regulating authorities.

Significant Resources

4.09 Water Quality - The waters of the Souris River are marginal with respect to both quality and dependability of supply. Flows are generally very low during fall and winter, with frequent periods of no flow lasting from days to months at a time. Non-point source pollution is a major factor in the water quality of the streams in the Souris basin. The North Dakota State Health Department has noted that the quality of surface waters has not improved comparatively with the rapid advances that have been made by municipalities, industries, and other point sources in providing adequate treatment of their wastes.

4.10 The State of North Dakota has classified the Souris River as a IA stream. The quality of waters in this class is suitable for the propagation of resident fish species and for boating, swimming, and other water recreation. Treatment for municipal use may require softening, and the treated water must meet bacteriological, physical, and chemical requirements of the State Health Department. The quality of class IA water also permits its use for irrigation, stock watering, and wildlife use without injurious effects.

4.11 North Dakota has classified Lake Darling as a 2C cool water fishery, capable of supporting growth and propagation of non-salmonoid fishes and associated aquatic life. The C-class characteristic (present degree of eutrophication) applies to a lake which is presently somewhat degraded and is progressing toward further degradation.

4.12 Aquatic Resources - Fish species found in Lake Darling and in the Souris and Des Lacs Rivers are generally characteristic of those found in warm-to-cool waters in the Midwest. Twenty-four fish species are known to inhabit the area, with northern pike, fathead minnow, white sucker, black and brown bullhead, yellow perch, and walleye considered very common. Carp are found in the Assiniboine River, and occasionally in the Souris River as far upstream as Melita, Manitoba (River Mile 124), where they have surmounted five of six lowhead dams. Carp are not present in the United States portion of the Souris River, however, making it unique. The absence of carp in J. Clark Salyer NWR is thought to be due to low flow and low dissolved oxygen, which make winter survival difficult.

4.13 Lake Darling currently maintains an excellent walleye and northern pike fishery as a result of natural reproduction, downstream movement of fish from Canadian impoundments, and stocking efforts. The major factors which limit the Lake Darling sport fishery are eutrophication and related algal blooms, siltation, occasional winterkills, and reservoir drawdown for flood control.

4.14 Fish species which inhabit the downstream reaches of the Souris River are similar to those in Lake Darling. Spawning habitat for walleyes in the downstream area is limited to areas below lowhead dams and isolated gravel-rubble-riprap deposits, while northern pike use the Upper Souris NWR marsh units and the J. Clark Salyer NWR. Salyer has extremely good northern pike spawning conditions, but winterkill in the shallow impoundments has limited fishery management efforts in these areas. In its 1978 Permanent Stream Evaluation, the FWS gave the entire Souris River the highest fishery resource rating.

4.15 Wildlife Resources - The two Souris River National Wildlife Refuges contain the most valuable wildlife habitat along the river and are important environmental concerns related to the proposed project. The primary purposes of the Upper Souris NWR are production of huntable waterfowl, provision of other necessities in the life cycle of waterfowl, and water supply to J. Clark Salyer NWR (through assured releases from Lake Darling). The refuge also provides habitat for upland and big game, furbearers, and nongame species; winter cover for deer from the surrounding area; public use of refuge related resources, some haying and grazing, and prevention of waterfowl depredations on private lands. There is also a significant amount of big game hunting on the refuge. J. Clark Salyer NWR, which is larger than the Upper Souris NWR, has similar purposes and uses, except for the water supply function. Both of these refuges serve as vitally important, dependable waterfowl habitat reserves during drought years.

4.16 Vegetation - In terms of acreage, the floodplain forest is the smallest ecological community in the Souris loop, but because this type of vegetation is scarce in North Dakota, it is an important community. The forests in the Souris River between the Saskatchewan border and the upstream boundary of the J. Clark Salyer National Wildlife Refuge represent about 2 percent of the State's total forests. The predominant plant species found in the floodplain forest are elm, green ash, box elder, bur oak, willow, cottonwood, hawthorn, chokecherry, dogwood, wolfberry, and wild rose.

4.17 Wetlands - The three general categories of wetlands of concern in the Souris basin are riverine wetlands, natural and impounded floodplain wetlands, and prairie potholes.

4.18 About 300,000 acres of wetlands in the Souris basin in North Dakota are considered important to waterfowl. The type and quality of the individual wetlands vary considerably. Easements are held on more than 200,000 acres and about 43,000 acres are managed exclusively or primarily for fish and wildlife use. (Water Resources Management Plan, 1981, Souris-Red-Rainy Region, Upper Mississippi River Basin Commission.) The Souris-Red-Rainy Region Basin Commission has estimated that less than half of the original wetland acreage in the basin remains. As the remaining wetlands continue to be drained, waterfowl and other wildlife habitat is reduced. Wetlands owned and managed for wildlife purposes will become increasingly important as the focus of available waterfowl habitat in the basin.

4.19 Grasslands - Untilled grassland in the floodplain and on valley slopes is usually heavily pastured. Inside refuge boundaries, grassland is maintained for wildlife, with some farming and cattle grazing permitted when compatible. Private and Federal holdings of grasslands total about 15 percent of the land area in the Souris floodplain and roughly 20 percent of the United States portion of the basin (Lunan et al., 1973).

4.20 Agricultural Lands - Agricultural land in the Souris River floodplain is used primarily for small grain (predominantly wheat) and alfalfa farming and grazing. Most agricultural use occurs on formerly native grasslands because the soil types are conducive to dry-land agriculture. It is estimated that at least 40,000 acres of agricultural land downstream of Lake Darling would be affected by the 5,000 ft³/s discharge rate of the proposed operating plans. About 1,250 acres upstream of the Lake Darling Dam would be affected by a 35-year flood.

4.21 The Council on Environmental Quality (CEQ) Memorandum on Analysis of Impacts on Prime and Unique Farmlands issued 30 August 1976 directs Federal agencies to determine if their actions would adversely affect prime and unique farmlands, either directly or indirectly, and if so, to seek alternatives with less adverse impacts or to develop mitigative measures that would reduce the loss of value of these valuable agricultural lands. Coordination with the Soil Conservation Service has indicated that prime farmlands would be affected by the proposed flood control project. The potential impacts will be defined in detail in the site-specific Lake Darling EIS.

4.22 Renville County Memorial Park - Renville County Park, located above Lake Darling Dam, is a recreational area and meeting place which has been in use since 1911. Formerly called Mouse River Park, it continues to be a focal point for political, religious, social, and recreational activities within the Upper Souris River basin. In addition, these activities over the years have given the area a significance to the local history. The park has picnic tables, sanitary facilities, a baseball diamond, campsites, playground equipment, picnic shelters and four group-use buildings for activities such as roller-skating and dancing. Popular recreation activities include swimming, fishing, boating, picnicking, and camping. The social, recreational, and historical impacts of the Lake Darling raise will be further evaluated in the site-specific EIS.

Cultural Resources

4.23 In compliance with Section 106 of the National Historic Preservation Act, as amended, the National Register of Historic Places has been consulted. As of 29 June 1982, only one property which is currently listed on the Register, McKinney Cemetery (listed in 1978), will be affected by the raise of Lake Darling or the downstream levee and channel work. This site will be discussed in a separate section.

4.24 Archeological and historical surveys of the project area were conducted in 1978 by the University of North Dakota. The historic survey was conducted in an area from the Canadian border south to the Des Lacs-Souris confluence. The archeological survey was conducted in the same area but was much less intensive upstream of Lake Darling. Currently, additional studies are being done to survey the downstream levee and channel work and those areas above Lake Darling which were not covered in the 1978 survey. Also included in this ongoing work is the initiation of a testing program to determine if known sites and those discovered during the present survey are eligible for the National Register of Historic Places. The results of these investigations and the detailed impact assessment will be presented in the site-specific EIS to be prepared later.

4.25 McKinney Cemetery - The McKinney Cemetery was established in the 1880's, and includes the gravesites of many of the area's pioneers. Although the cemetery was associated with the former townsite of McKinney, it is still being used by the local residents. This property has been placed on the National Register of Historic Places because of its age and significance to local history. The social and historical impacts of alternatives to protect, raise, or relocate a portion or all of the cemetery will be discussed in greater detail in the site-specific EIS for Lake Darling. Section 106 coordination (Public Law 89-665) has been initiated with the State Historic Preservation Officer.

Recreation Resources

4.26 National Wildlife Refuge Recreation Areas - A detailed list of recreation facilities within the Upper Souris and J. Clark Salyer Refuges is not available at this time. However, existing Lake Darling or Souris River access sites are being inventoried, including boat ramps and other structures (picnic tables, parking lots, water supply and sanitary facilities) that may be affected by the project.

4.27 One site that would require relocation is a refuge-operated recreation area located immediately downstream of the existing Lake Darling spillway. This day-use site consists of a picnic area (22 tables) and support facilities.

4.28 Boat landings to be studied further include refuge landings numbers 1-3. Landing 1, located on the west shore of Lake Darling about 150 yards north of the dam, services the needs of both lake and shore fisherman. Refuge records indicate that this site receives about 10 percent of total refuge area use. Similar use levels are recorded for landings 2 and 3, also located on the west shore about 1/2 mile above landing 1.

4.29 Thirty percent of the refuge's annual recreation use has been recorded at Baker Bridge, a 7-acre site located 15 miles north of Minot on Ward County Road 15. This area is used mainly for bank fishing and picnicking. St. Marys Bridge, also known as Silver Bridge, is located about 17 miles north of Minot and accounts for about 10 percent of this type of refuge use.

4.30 Grano Park (Crossing) - Grano Park is located at elevation 1603 on the east shore of Lake Darling. Facilities at this 45-acre site consist of a parking lot, boat ramp, picnic tables, vault toilet, and camping pads. The Renville County Park Board operates and maintains the site, which accounts for approximately 15 percent of total refuge area recreation use. Because construction funds for the park were provided by the Land and Water Conservation Fund, any mitigation plan must be coordinated through the Secretary of the Interior. Previous Corps studies have shown that this site is heavily used by fishermen for access to one of the two areas in Lake Darling open for boat fishing.

4.31 Minot Recreation Areas - The City of Minot Park Board has reported flooding problems at the Souris Valley Golf Course since 1969, and has recorded high costs for restoration of the course after floods during recent years. Much of the cost has been for removal of silt deposits. Bank erosion has also been a problem.

4.32 The Park Board, in recent correspondence with the Corps, has expressed concern over project impacts on an open-space area known as "Bison Plant." This currently unused park is located on the Souris River in the Bell School area. This site and the golf course will both be included in future project studies.

4.33 The Upper Souris Refuge has been identified by the Department of Interior in its ecological theme analysis of the Great Plains Natural Region as having outstanding natural features potentially suitable for receiving a natural landmark designation. These features include stable communities of deciduous lowland forests and native grasses and seasonal concentrations of native animals, especially waterfowl. Further coordination with the Denver Field Office of the National Park Service is required to assess project impacts and possible required mitigation measures associated with the natural landmark program (P.L. 74-292).

Aesthetic Values

4.34 The areas of highest aesthetic value in the project area are the Upper Souris National Wildlife Refuge, the J. Clark Salyer National Wildlife Refuge, and the Souris River Valley, between Burlington and the Upper Souris Refuge, and between the northern limit of the Upper Souris Refuge and the Saskatchewan border. Aesthetic features include a diversity of habitat types and topographic characteristics. The unique natural characteristics of the Upper Souris Refuge contribute to recognition of the aesthetic value of this area. The woodland acreage of the Refuge is also an important component of North Dakota's scarce forest resources. Project area aesthetic resources and beautification plans will be addressed in greater detail in future study documents as required by Army regulations.

Social Resources

4.35 Section 122 (P.L. 91-611) Considerations - The following resources addressed by Section 122 of the River and Harbor Flood Control Act of 1970 (Public Law 91-611) would be significantly affected by the proposed project.

4.36 Institutional Arrangements - The basin's social, economic, and political life exists within a framework of legal and habitual arrangements between various organizations and individuals. Three aspects of these institutional arrangements are particularly important for this project: the financial capacity of the revenue system, the network of organizational relationships, and the existing plans for the region and its component areas.

a. Financial capacity is governed by the tax bases and legal limitations of different taxing authorities at the local levels. The State Water Commission's resources would require a specific legislative appropriation before it could provide substantial assistance on the project.

b. Organizational relations are currently not highly coordinated for water resource management, and one group's policies and actions often contradict another's. Recent North Dakota laws encourage appropriate changes, such as floodplain management and basin-wide water resource districts. A coalition (some of whose members are also members of affected political units) has laid the groundwork for a compromise among the different interests, who were earlier unable to reach a consensus on the Burlington Dam project.

c. Plans relevant to this project include those objectives and goals of the Souris Basin Planning Council, such Comprehensive Plans as exist in the region, zoning and land use ordinances, and State policies and plans.

4.37 Social Cohesion - Social cohesion exists in the Souris basin, as elsewhere, among people or groups when there are shared values, interests, and experiences; when neighborhood safety and stability are assured; and when social and political arrangements are perceived as equitable. Cohesion can be disrupted by a failure in these factors and by controversy over specific issues; the earlier conflict over the proposed Burlington Dam was an example of the region's normal cohesiveness being fragmented into opposing interest groups.

4.38 Transportation - Roads and railroads are important links for the cities and farms scattered over the region. Although usually well-maintained, the roads often lack satisfactory alternate routes, particularly in the case of the infrequent bridges over rivers and lakes.

Future Without-Project

4.39 Institutional Arrangements

a. Financial capacity at the State and local levels may become increasingly limited if national and regional economic trends continue. This may be offset by energy resource development in the State and by world agricultural demand.

b. Organizational relations are unlikely to change significantly without outside influence.

c. Plans in the region will gradually include more participation in the Federal flood insurance program and more conscious land use guidance. Water resource management will probably continue to be fragmented.

4.40 Social Cohesion - Although there will occasionally be sources of conflict in the region, including anxiety and anger over continued flooding, there is no reason to predict a long-term change in the level of social cohesion.

4.41 Transportation - The road network will probably remain much the same, with possible maintenance problems if the local tax base becomes less secure.

5.00 ENVIRONMENTAL EFFECTS

Significant Impacts

5.01 Further detailed studies will be required to provide a better definition of project impacts on the significant resources discussed in the preceding section. The following paragraphs therefore provide only a general overview of potential impacts identified in previous studies of Souris River flood control. Studies that will be done during the next phase of planning are discussed in paragraph 7.00 of this document.

5.02 Water Quality - The raise of Lake Darling, modification of refuge impoundments, and levee and channel modifications would all result in the temporary degradation of water quality. The most apparent impacts would likely be short-term localized increases in turbidity and lowered levels of dissolved oxygen. Lake Darling would be subjected to storage up to about elevation 1600 for the 25-year flood and 1605 for the 35-year flood, an increase in depth of about 1 foot and 4 feet, respectively, over existing conditions. Except for any drawdown in anticipation of floods, floods up to the 25-year level should have little effect on Lake Darling, although sedimentation would probably be increased slightly due to erosion between the drawdown and storage elevations.

5.03 Holding Lake Darling at elevation 1598 for prolonged periods of time, coupled with periodic inundation at higher elevations, would increase erosion and sedimentation in the reservoir. Although the sedimentation increase is not expected to be large, it could result in increased nutrient loading from ions adsorbed on the sediments, which could aggravate the already eutrophic conditions.

5.04 The reservoir would continue to dilute dissolved salts, settle out suspended solids, and act as a nutrient "sink," reducing nutrient loads downstream. Although the erosive effects of existing peak flood flows would be reduced, long-term release rates at higher than normal flows would exert steady erosive forces at higher bank elevations than under existing conditions. Higher flows should decrease water temperatures and increase the level of dissolved oxygen. In general, no significant improvement or degradation of water quality by the proposed project is expected.

5.05 Aquatic Resources - Short-term impacts to the aquatic ecosystem in the Souris Valley would result from project construction activities, including dam construction, modification of refuge impoundments, proposed Velve levee and cutoff construction, and levee construction at other project sites. These impacts would result from direct physical disruption and, more importantly, from increases in suspended sediments which would bury aquatic invertebrates, irritate exposed membranes of fish and invertebrates (possibly to the extent that secondary bacterial infections could occur), and reduce light penetration. All of these effects could reduce aquatic production for several years.

5.06 Drawdown of Lake Darling for flood control could increase the likelihood of fish winterkill. The lake has had winterkill problems after drawdowns in the past when ice and snow cover were heavy. If drawdowns occur the first winter after a flood storage event, the increased levels of sediments, nutrients, and littoral vegetation decomposition could further aggravate the dissolved oxygen situation in the reservoir.

5.07 Northern pike and yellow perch spawning habitat in the lake may be improved by a raise in elevation of the reservoir for flood storage. However, this would be contingent on factors such as timing and duration of storage and rate of drawdown.

5.08 During years of extended releases following flood storage, higher than normal flows in the Souris River would have both positive and negative effects on the aquatic ecosystem. The erosive effects of existing peak flood flows would be reduced; however, higher summer and possibly fall releases (depending on the operating plan and the severity of the flood) could exert a constant erosive force on the riverbanks at higher than normal elevations. The river could become more turbid and carry a higher silt load, which could cover or scour spawning sites and reduce the quality of aquatic habitat. On the other hand, higher flows could improve fish habitat quality over that which is currently limited by normal low summer flows.

5.09 An analysis will be conducted to determine if carp, presently confined to the lower Souris River downstream of Wawanesa Dam, would be able to migrate up through the Souris Loop as a result of the project. This is a prominent concern because of the adverse impact carp have on waterfowl habitat. The proposed plan includes provision for carp control measures if the results of the analysis indicate they are needed.

5.10 Wildlife Resources - The most significant impacts on wildlife resources would result from prolonged discharge flows for flood storage evacuation from Lake Darling. This would hinder current marsh management practices downstream from the dam, especially in the J. Clark Salyer Refuge. The flexibility to raise or lower pool levels to achieve various refuge management objectives is critical to the success of waterfowl production and other wildlife management goals. Because flows greater than 250 ft³/s restrict the drawdown capability (see exhibit 1 - Fish and Wildlife Service planning aid letter) in the Salyer Refuge, an operating plan consisting of 500 ft³/s discharge over the summer would be more detrimental to marsh management than the operating plan consisting of 5,000 ft³/s discharge until the Lake Darling conservation pool level is reached. Although this release rate would render pool level management impossible for a few weeks longer than under normal conditions, the refuge dams could become operable in June, salvaging part of the season's management capability.

5.11 Water level fluctuation in the Lake Darling flood pool would cause changes in shoreline emergent vegetation, floodplain forest, grassland, and agricultural land. The most significant impacts would occur to the marshes and bottomland forests at the north end of the lake. There would be displacements of animal populations during flood storage, and the quality of habitat for certain species could be seriously reduced. The degree of these impacts would be dependent on several factors, especially the choice of operating plan, and is still under study.

5.12 Downstream impacts to wildlife would result mainly from extended releases of higher than normal flows. Riparian habitat could be inundated for several weeks or for the entire summer and into fall, depending on the operating plan selected and the severity of the flood. Prolonged inundation could kill certain plant species, altering the composition of the biotic community. In addition, inundated habitat would be unavailable to many wildlife species at a time when it would normally be providing important life requisites such as breeding, nesting, and feeding cover.

5.13 Direct effects of project construction include loss of habitat from clearing, inundation, increased sedimentation, and disturbance of wildlife populations.

5.14 Vegetation - Water level fluctuations in the headwaters of the Lake Darling flood pool could affect the floodplain forest biotic community. The severity of impact would depend on the operating plan, the severity and timing of the flood, the degree of drawdown prior to the flood, the character of the underlying soils, the species composition and phenology of the vegetation, the frequency of flood storage from year to year, and topography.

5.15 Downstream impacts would result from extended discharges during draw-down of the Lake Darling flood pool. Some floodplain forest habitat could be inundated for several weeks or for the entire summer and into fall, depending on the operating plan. Although tolerance of inundation varies widely with different plant species, a change in species composition could take place over the years.

5.16 Trees and other vegetation would have to be removed from several downstream sites of local flood protection features for levee upgrading and channel cutoff construction. The impact of vegetation removal at Velva is discussed in Section 6.00 of the Velva EIS. The acreage and cover type of vegetation will be determined as more site-specific information becomes available.

5.17 Wetlands - Approximately 1,600 acres of wetlands above Lake Darling Dam to the Saskatchewan border would be subjected to increased flood storage. About 2,200 acres of marsh impoundments are located on the Upper Souris NWR, and over 1,600 acres below Lake Darling. The fringe of emergent vegetation around Lake Darling could be damaged by fluctuating water levels, increased depth and duration of flooding, and increased ice damage. A more precise quantification of wetland acreage in the lower Souris which would be affected by project impacts will be determined for the site-specific EIS. Project impacts on refuge marsh management are discussed in paragraph 5.10.

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5.18 Grasslands - Floodwater storage for even a few days during the growing season would be sufficient to kill the grassland sod. This would be especially true of upland grassland types (both native and introduced species), as opposed to grass or graminoid types, which are more adapted to wet conditions. About 2,000 acres of grasslands between Lake Darling Dam and the Saskatchewan border would be affected by a 35-year flood with the project in place. Duration of inundation would depend on the reservoir operating plan, which would also determine impacts on grasslands downstream.

5.19 Agricultural Lands - Cropland inundated for one growing season could be expected to be reestablished in a monocultural crop in 1 to 3 years, depending on the crop. Production would be lost the year inundation occurred. Production losses for the following years would probably depend on the crop and would range from light to heavy. About 1,250 acres of agricultural land upstream of the Lake Darling Dam would be inundated for varying lengths of time by the storage for a 35-year flood. The rate of flood pool recession to the normal operating pool level would depend on the operating plan chosen.

5.20 If the plan of operation consisting of 5,000 ft³/s discharge until flood pool recession is chosen for the Lake Darling Dam, at least 40,000 acres of agricultural lands downstream would be flooded about two weeks longer for a 35-year flood than under existing conditions. Because of North Dakota's short growing season, this could mean the loss of crop production on that land for the season. Cutting the discharge rate back to 500 ft³/s on May 15th would probably allow most of the downstream acreage to be cropped that season. However, about 1,800 acres (predominantly hayland) near Towner would be inundated during the summer by the 500 ft³/s discharge (for the 35-year flood).

5.21 An undetermined amount of prime farmland soil types would be inundated for varying lengths of time between the elevations of the conservation pool and the flood pool (1598 and 1605, respectively) during flood storage in Lake Darling. Stages and velocities of flood waters on prime farmland in the floodplain downstream would be reduced for floods exceeding the 25-year probability of occurrence, but farmland would be subject to extended periods of inundation from 500 to 5,000 ft³/s flows released from Lake Darling. Although the relationship between the location of project features and prime farmland soil types has not yet been determined, some prime farmland could be lost during construction of these features. Quantification of these potential impacts will be better defined in the site-specific Lake Darling EIS.

5.22 Renville County Memorial Park - Renville County Park is potentially eligible for the National Register of Historic Places. Acquisition or flood-proofing would have an adverse impact upon this resource, while protection of the park by levee construction would have a beneficial effect. Most of the 70-acre site lies approximately at elevation 1600 and would therefore be subject to flooding by the proposed raise in Lake Darling pool elevation. Levee protection is currently viewed as the most favorable alternative for flood protection because it would protect both the privately-owned and county recreation structures on the site. Archeological surveys are currently underway to determine impacts on this resource.

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5.23 McKinney Cemetery - Relocation of the McKinney Cemetery would have an adverse effect upon this National Register site. A raise in place of the cemetery is also likely to have adverse impacts upon the site. The State Historic Preservation Office has preliminarily indicated that construction of a levee would be the most favorable alternative.

Cultural Resources

5.24 Under the no action plan, archeological and historical sites upstream and adjacent to Lake Darling will continue to be inundated. A pool raise to 1605 and discharge of 5,000 ft³/s to normal pool level would inundate a larger number of cultural resources for a longer period of time. Marginal sites could be affected by erosion and wave action.

5.24 An operating plan which would discharge 5,000 ft³/s until 15 May and then greatly reduce discharge during summer months would increase the number of sites presently inundated. Inundation of some sites could extend from spring to fall. Marginal sites could be greatly affected by erosion and wave action.

5.25 Downstream historic structures would be the most likely cultural resources to be affected by acquisition, relocation, or floodproofing. Small ring levees around these structures could affect archeological sites. Overall impacts may be a trade-off between archeological and historic resources. Cultural resources investigations for this feature will not be undertaken until the summer of 1983.

5.26 A Gassman Coulee flood warning system could have beneficial effects upon National Register properties within Minot. Acquisition of the Eckert Ranch would adversely effect the Parker Log House, which is potentially eligible for the National Register.

5.27 Construction of levees at Sawyer and six subdivisions between Burlington and Minot could affect archeological and historic resources. A cultural resources survey of these proposed levees will be completed in the fall of 1982.

5.28 Three archeological sites could be adversely affected by the work to be done at Fish and Wildlife Dam No. 41 and at Pools A and B below Lake Darling Dam. One archeological site could be affected by the raise of the Soo Line Railroad bridge, while an additional site could be affected by the Highway 28 bridge raise. Presently unknown resources could be affected by work at the Highway 5 and County Road 9 bridges.

Recreational Resources

5.29 National Wildlife Refuge Recreation Areas - After inventories of recreation areas in the Upper Souris and J. Clark Salyer Refuges have been completed, a detailed mitigation analysis for project impacts on these resources will be done. It does appear at this time that the day-use recreation site located immediately downstream of the existing Lake Darling spillway would have to be relocated because of construction for the proposed new spillway and outlet structures. The new site for this recreation area will be determined in the Feature Design Memorandum.

5.30 Grano Park - Proposed increases in the Lake Darling pool elevation would cause periodic flooding in the Grano recreation area. Temporary inundation should not physically affect the parking lot and boat ramp at the park, but further study is necessary to determine the full extent of any temporary flooding or drawdown impacts on these facilities. Permanent picnic tables and a wood frame picnic shelter may also be affected, along with park sanitary facilities. The toilets were not designed to withstand flooding, although the vault design could be modified to provide sealing or emptying during flood events. An existing water supply well could be temporarily contaminated, although it should be structurally capable of withstanding temporary inundation.

5.31 General adverse impacts on the park would depend upon length of inundation and are expected to include minor damage to existing vegetation, erosion of grass and gravel areas, including camp pads, and an increase in maintenance costs after each inundation.

5.32 Minot Recreation Areas - Further study will be necessary to identify project impacts on both the Souris Valley Golf Course and proposed Bison Plant recreation area. The Minot Park Board has indicated that the proposed Lake Darling release of 5,000 ft³/s would inundate the entire course and would generate extensive clean-up costs.

5.33 As noted earlier, raising Lake Darling Dam could have adverse impacts on the existing outstanding natural features within the Upper Souris Refuge which have led to its possible National Landmark designation. The degree of impact would depend on frequency, elevation, and duration of inundation. Tolerance to inundation varies widely among plant species. For example, some species, especially certain deciduous trees, can be destroyed by a single, relatively short period of flooding, whereas other species can survive annual, long-term inundations. Destruction of plants would also adversely affect various animal species if the plant species involved were important to the animal's habitat requirements.

Aesthetic Values

5.34 Increased flood storage could subject elevations of the Lake Darling shoreline between the conservation pool and the flood pool to inundation and subsequent recession of floodwaters. This could produce areas of dead vegetation and mudflats.

5.35 Although the effects of peak flooding would be reduced downstream of the dam, extended releases of between 500 and 5,000 ft³/s for varying lengths of time could kill some inundated vegetation and subject some areas to long-term erosive forces. The effect on aesthetics of this area would be adverse until recovery takes place.

Social Resources

5.36 In compliance with Section 122 of the River and Harbor Act of 1970 (P.L. 91-611), the following social factors were considered and were determined to be not significantly affected by any of the components of the various plans studied at the present level of detail: population mobility and density; housing; noise; aesthetic values; education opportunities; public facilities; public services; local/regional activity; real income distribution; employment/labor force; business/industrial activity; agricultural activity; and national defense. These factors will be evaluated further for the following EIS. The effects of the alternatives on floodplain development were also studied in compliance with E.O. 11988 and are discussed in other sections of this report.

5.37 Potential exists for significant impacts to the following social factors: transportation; local government finance; community cohesion; displacement of people; desirable community growth; health; land use; institutional relationships; man-made resources; natural resources; and air and water quality.

5.38 Institutional Arrangements

a. Financial capacity will be strained for whatever government levels participate in local costs of the project.

b. Organizational relations will change considerably when a joint project sponsor is created out of the various affected units. It is currently unknown what shape the new organization will take.

c. The project is being formulated to provide a good match with existing local plans and policies, and it will itself stimulate new zoning and land-use plans which should be consistent with the national interest.

5.39 Social Cohesion - Although the present project is the result of local political compromises, it has not yet been tested by a larger public opinion. The effect on social cohesion is therefore uncertain. Specific areas of concern include McKinney Cemetery, Renville County Park, perceptions of equity between upstream and downstream interests, and acquisition of homes or property.

5.40 Transportation - Several roads crossing Lake Darling may have to be raised, causing as yet undetermined disruption to traffic. Local roads will bear heavy loads during several construction seasons, causing a temporary deterioration of road conditions. The roads will be restored by the Federal contractors.

Other Impacts

5.41 Economic mineral deposits affected would be the sand, gravel, boulders, and clay used for the construction of the proposed structures. The project would not, however, significantly diminish the regional supply of these materials. The project would have no effect on the production and future development of lignite, oil, gas, or salt. The raise of Lake Darling would not inundate large land areas around the lake. Because this area is a national wildlife refuge, minerals exploitation is not a significant objective.

5.42 Executive Order 11988 Floodplain Management - Floodplain development would not be induced because the project provides less than 100-year protection and requires that floodplain management be undertaken.

5.43 Executive Order 11990, Protection of Wetlands - The Souris River basin contains many important wetlands (as discussed in paragraphs 4.17, 4.18, and 5.17). Because wetland drainage is one of the most prominent public issues, wetlands protection is one of the planning objectives, and evaluation of potential project impacts on wetlands is an important aspect of this flood control study.

5.44 Various features of the proposed project would affect wetlands. The 4-foot raise of the Lake Darling flood pool would affect wetlands adjacent to the lake, particularly in the tailwater areas. The extended releases of 500-5,000 ft³/s for varying lengths of time to achieve flood pool drawdown would inundate many downstream wetlands and severely hamper the drawdown capability of the marshes in both refuges downstream of the dam. Management objectives might not be achievable and the resulting effect on waterfowl (and other wildlife) production in the refuges could be significant.

5.45 Measures included in the plan to help minimize adverse effects on wetlands are upgrading of structures in the Upper Souris Refuge and possibly in J. Clark Salyer, depending on the chosen plan of operation. The proposed plan is considered to be responsive to the planning objectives and would not result in unacceptable impacts on wetlands and the environment as a whole.

6.00 PUBLIC INVOLVEMENT

6.01 A Notice of Intent to Prepare a Draft Environmental Impact Statement for a Proposed Flood Control Project, Lake Darling, Souris River, North Dakota, appeared in the Federal Register on 28 April 1982. This notice invited participation in the scoping process by anyone who was interested.

6.02 On 14 June 1982, a proposed scope was mailed to interested agencies, organizations, and individuals who had indicated an interest in the Burlington Dam project. As required by CEQ regulations (40 CFR 1501.7), the scoping process must be used during preparation of an EIS "for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." A primary purpose of scoping is to make the EIS a more concise, meaningful document that concentrates on the significant issues.

6.03 A final scope was distributed to the public on 5 August 1982. It incorporated the views expressed by Federal, State, and local agencies, organizations, and interested citizens in response to the proposed scope. The St. Paul District has begun coordination with Federal, State, and local agencies and interested citizens to obtain their input into the study process. Informal project information meetings were held with the responsible local governing bodies in Minot and Velva during 1982.

Required Coordination

6.04 This draft EIS, together with the draft Velva site-specific EIS, will be coordinated with all public agencies, organizations, and interested individuals for review and comment. Comments received will be responded to and will be used in preparation of the final EIS's. Routine coordination with appropriate agencies will continue throughout the study process. A draft and final site-specific Lake Darling EIS will be prepared and coordinated with the public in Fiscal Years 1983 and 1984.

6.05 Because the proposed plan involves placement of fill material in waters of the U.S., a Section 404(b)(1) evaluation of the effects of the fill placement will be prepared for inclusion in the site-specific Lake Darling EIS and submitted to Congress under the provisions of Section 404(r) of the Clean Water Act, Public Law 92-500, as amended. A Section 404(b)(1) evaluation of the effects of fill placement for the Velva flood control feature is included in the attached Velva site-specific EIS and will be coordinated in the same manner.

6.06 A planning aid letter submitted by the U.S. Fish and Wildlife Service under the provisions of the Fish and Wildlife Coordination Act is included as Exhibit 1 of this EIS. A Coordination Act Report will be included in the site-specific Lake Darling EIS. The Coordination Act Report on the Velva feature is included in the Velva site-specific EIS. Coordination with the Fish and Wildlife Service on endangered species is described in paragraph 4.07.

6.07 The project has been coordinated with the National Park Service and with the State Historic Preservation Officer. The results of all cultural resource investigations will be coordinated with the State Archeologist, the State Historic Preservation Office, the National Park Service, and the Advisory Council on Historic Preservation. The comments of the Advisory Council will be requested in accordance with 36 CFR 800 for all significant cultural resources that may be affected by the proposed project.

EIS Distribution

6.08 The individuals and groups listed in Exhibit 4 of the Velva feature EIS received either a copy of this document or a notice of its availability.

Public Views and Responses

6.09 The authorization for the Lake Darling flood control project resulted from a compromise agreement between the proponents and opponents of the Burlington Dam project. There is general acknowledgement throughout the Souris Valley that flood damage reduction is needed by valley residents as soon as possible and that permanent protection is preferred for the long term. Public opinion also holds that flood protection measures should be acceptable to both those benefitted and those adversely affected by the construction of those measures. The formulation of the Lake Darling project has been sensitive to all the public concerns and is an effort to satisfy as many of those concerns as possible within technical, economic, social, and environmental limitations.

7.00 SUPPLEMENTARY ENVIRONMENTAL DOCUMENTATION

7.01 The tiering concept has been chosen to satisfy the NEPA requirements for the Lake Darling flood control project (see paragraphs 1.02, 1.13 and 1.14). Because only general environmental impacts have been discussed in this programmatic EIS, the information must be supplemented in a site-specific Lake Darling Souris River EIS so that a more detailed analysis of impacts can be made. The purpose of this section is to identify the studies and coordination with other agencies that will be done prior to preparation of the site-specific EIS.

Fish and Wildlife Resources

7.02 A detailed analysis of conditions expected from proposed project operation will be conducted to determine if the project would increase the likelihood of carp migration up the Souris River loop. If study results indicate that it would, carp control measures will be added to project design.

7.03 Potential project impacts on aquatic habitats both within and downstream of Lake Darling Dam will be studied in detail. Of particular concern are effects of construction and operation on existing fisheries resources. Using available hydrological information, we will also evaluate project effects on water level management and associated habitat management objectives on the J. Clark Salyer Refuge.

7.04 Impacts on terrestrial habitats of the lower Souris River from construction and operation of the overall project and individual features will be specifically determined.

7.05 The location and extent of breakout points along the Upper Souris Refuge boundary, relocations of refuge facilities, and the type of land to be acquired will be addressed.

7.06 Determining construction related impacts will require site-specific location and cover typing of all areas to be affected. This includes borrow sites, excess material disposal sites, work staging areas, site limits of the dam and spillway, roads, and other related facilities. Impacts of required channel modification will also be assessed.

7.07 An analysis of proposed operating plans and hydrographs for a range of floods will be refined to determine area and degree of habitat impacts from inundation.

Water Quality

7.08 Additional water quality evaluations are currently underway to define probable water quality impacts both within and downstream of the reservoir.

Prime Farmlands

7.09 Impacts on prime farmlands will be quantified and assessed.

Cultural Resources

7.10 Intensive surveys of all project features, except downstream flood protection of rural residences, will be completed during the 1982 field season. A survey of downstream residences will be undertaken in the summer of 1983. Future work will focus on intensive testing and documentation of archeological and historic resources for evaluation against the criteria for inclusion on the National Register of Historic Places.

7.11 Coordination will be maintained with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. It is anticipated that a Cultural Resources Feature Design Memorandum will be prepared for Lake Darling which will outline a mitigation plan for significant resources and will include an executed Memorandum of Agreement in accordance with the Advisory Council's Regulations (36 CFR Part 800).

Social Resources

7.12 Detailed studies of social resources will include an evaluation of impacts on transportation, acquisition and floodproofing of residences, institutional changes, and construction-related impacts on housing, education, and labor.

7.13 The issues of wetland drainage and floodplain management will be examined further in relation to the social conditions in the study area. The current social significance of McKinney Cemetery will also be investigated further.

Recreational Resources

7.14 An intensive inventory of Souris River Valley recreational resources and a subsequent evaluation of potential project impacts on those resources will be conducted.

Mitigation/Compensation

7.15 After detailed determinations of project impacts on fish and wildlife resources, cultural and historical sites, and recreation areas, mitigation/compensation features for these resources must be developed, coordinated with the public, and recommended for inclusion as specific project features.

LIST OF PREPARERS

The following people were primarily responsible for preparing this Draft Environmental Impact Statement:

<u>Name</u>	<u>Discipline/Expertise</u>	<u>Experience</u>	<u>Role in Preparing EIS</u>
Ms. Jeannie Wagner	Biology/Wildlife	3 years EIS studies, St. Paul District	Effects on water quality, fish and wildlife resources, vegetation, prime farmlands; primary preparation of EIS.
Mr. Jim Holleran	Outdoor Recreation Planner	8 years resource planning St. Paul District	Effects on recreation, aesthetics, and related resources.
Ms. Suzanne Gaines	Sociologist	3 years EIS studies, St. Paul District	Effects on social resources, institutional relationships
Mr. David Berwick	Archeology/Cultural Resources Management	3 years cultural resources management & EIS studies, St. Paul District; 2 years cultural resources management, Memphis District	Effects on historical, architectural and archeological resources.
Mr. Robbin Blackman	Biology/Fisheries	11 years EIS studies, Corps of Engineers	EIS Coordinator
Mr. David Loss	Engineering/Civil, Water Resources	11 years, project management, St. Paul District, Corps of Engineers	Study Manager

Table 1. Relationships of the proposed plan to environmental requirements

Federal Statutes	Proposed Plan	No Action
Archaeological and Historic Preservation Act, as amended, 16 U.S.C. 469, et seq.	Full	N/A
Clean Air Act, as amended, 42 U.S.C. 7401, et seq.	Full	Full
Clean Water Act, as amended (Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq.	Full	Full
Coastal Zone Management Act, as amended, 16 U.S.C. 1451, et seq.	N/A	N/A
Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, et seq.	Full	Full
Estuary Protection Act, 16 U.S.C. 1221, et seq.	N/A	N/A
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq.	Full	Full
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq.	Full	Full
Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601-4601-11, et seq.	Full	Full
Marine Protection, Research and Sanctuaries Act, 22 U.S.C. 1401, et seq.	N/A	N/A
National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, et seq.	Full	Full
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470a, et seq.	Full	N/A
Rivers and Harbors Act, 33 U.S.C. 401 et seq.	N/A	N/A
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	N/A	N/A
Wild and Scenic Rivers Act; as amended, 16 U.S.C. 1001, et seq.	Full	Full
Executive Orders, Memoranda		
Floodplain Management (EO 11988)	Full	Full
Protection of Wetlands (EO 11990)	Full	Full
Environmental Effects Abroad of Major Federal Actions (EO 12114)	Full	N/A
Analysis of Impacts on Prime and Unique Farmlands, CEQ Memorandum 30 August 1976	Full	Full
State and Local Policies	Full	Full
Land Use Plans	Full	Full
Required Federal Entitlements		
U.S. Fish and Wildlife Service Special Use Permit	N/A	N/A
Water Pollution Control Act Section 404(b)(1) Permit	Full	Full

NOTES: The compliance categories used in this table were assigned based on the following definitions.

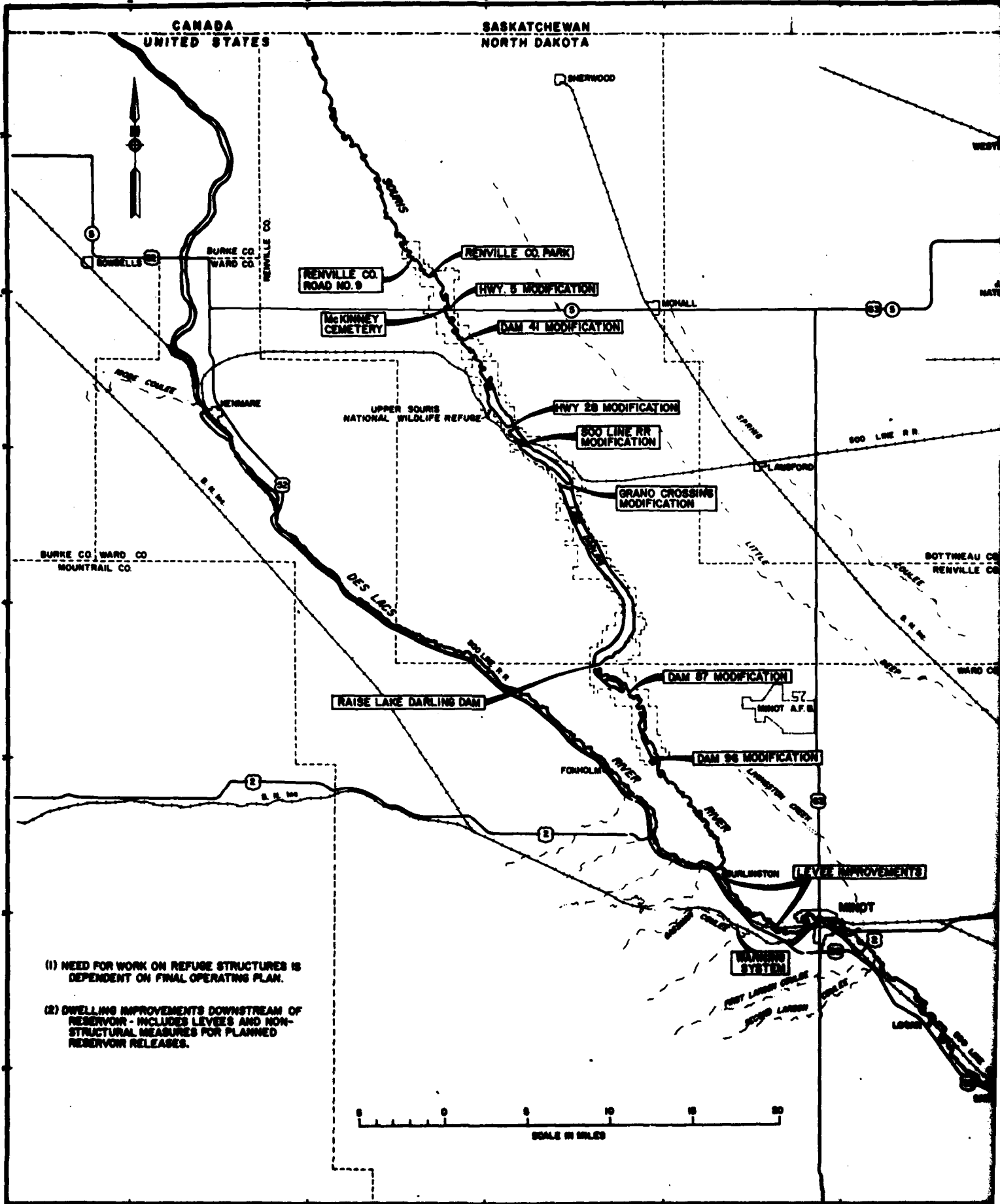
- a. Full compliance - All requirements of the statute, E.O., or other policy and related regulations have been met for the current stage of planning.
- b. Partial compliance - Some requirements of the statute, E.O., or other policy and related regulations remain to be met for the current stage of planning.
- c. Noncompliance - Violation of a requirement of the statute, E.O., or other environmental requirement.
- d. Not applicable (N/A) - Statute, E.O., or other policy not applicable for the current stage of planning.

Table 2 - Comparative Impacts of Alternatives and Features.

Plan features and alternatives	Significant Resources					
	Water Quality	Aquatic Resources	Wildlife Resources	Recreation	Benvenue Co. Park	Historic Resources
Best Condition	Souris River is a Class IA or -umb. Lake Darling is a Class II lake; eutrophic.	Souris River is carp-free in North Dakota; has a diversity of other fish species. Lake Darling - good quality northern pike and walleye fishery.	Upper Souris and J. Clark Salyer National Wildlife Refuges are significant waterfowl production areas; river valley contains diverse wildlife habitat.	There are about 7,920 acres of Souris River floodplain forest and 300,000 acres of wetlands in Souris basin; 12% of Souris' floodplain is grassland; there are about 41,250 acres of agricultural land in affected floodplain.	5 permanent county buildings; 70 summer homes, about 1 permanent residence; 70-acre site at 1000 and 4th & 6th streets county owned & operated park.	A National Register of Historic Places property.
No Action (Without-Project)	Souris River will continue to suffer from both point and non-point source pollution problems. Lake Darling will continue trend toward eutrophy.	Aquatic habitats would continue to suffer from chronic water pollution problems; winter-killed may occur in Lake Darling and J. Clark Salyer Refuge.	Losses of wetland habitat due to drainage will likely continue in the basin.	Continued drainage of wetlands in the basin; agricultural acreage will increase.	Existing impacts would continue.	Existing impacts would continue.
Pool raise to 1605; Operation Plan: 5000 ft ³ /s discharge to normal pool level	Some increase in sedimentation in Lake Darling. Extended discharges could increase riverbank erosion downstream. No significant changes in overall water quality are foreseen.	Short-term sedimentation impacts during construction; Lake Darling drawdowns could increase chance of winter kills. Extended discharges could have both beneficial and adverse effects on aquatic habitat downstream.	Extended discharges would delay marsh level management in refuges and adversely affect downstream riparian habitats; water level fluctuations in Lake Darling could adversely affect shore line habitat.	Water level fluctuations in Lake Darling could adversely affect floodplain forests, wetlands, grasslands, and agricultural lands. Extended drawdowns would have both beneficial and adverse effects on downstream vegetation; 40,000 acres downstream of Lake could be flooded 2 weeks longer than present conditions.	Scrape and erosion would increase impacts on historic structures over existing conditions; flood damages to one facility; loss of one use days.	Scrape and erosion would increase impacts on HHP properties over existing conditions.
Pool raise to 1605; Operation Plan: 5000 ft ³ /s discharge to 5/15; 500 ft ³ /s to normal pool or 9/2 then 700 ft ³ /s to recession	See above.	See above.	Similar to above; effects on marsh level management could be worse.	See above.	Scrape and erosion would greatly increase impacts on historic structures over existing conditions and other operating plans.	Scrape and erosion would greatly increase impacts on historic structures over existing conditions and other operating plans.
Benvenue Co. Park Acquisition/Relocation	Possible minor improvement if relocation is out of floodplain.	Possible minor improvement if relocation is out of floodplain.	Minor improvement depending on relocation site.	If structures were removed site could revert to natural state; loss of vegetation at relocation site.	See Cultural and Recreational Resources and Serial Schedule.	No effect.
Floodproofing	Some improvement from sewage system upgrading.	Minor improvement from sewage system upgrading.	No effect.	No effect.	No effect.	No effect.
Levee and channel cutoff	No effect.	No effect.	Minor losses of habitat.	Some clearing during construction.	No effect.	No effect.
McKinney Cemetery Relocation	No effect.	No effect.	Minor long-term increase in suitable habitat.	Site could revert to natural state; loss of vegetation at relocation site.	No effect.	See Cultural Resources and Serial Schedule.
Raise in place	Negligible	Negligible	Negligible	Negligible	No effect.	No effect.
Levee protection	Possible short-term increase in turbidity during construction.	Possible short-term increase in turbidity during construction.	Minor loss of habitat.	Minor clearing for levee construction.	No effect.	No effect.
Downstream Rural Protection Acquisition/Relocation	Possible minor improvement in some cases.	Possible minor improvement in some cases.	Negligible	Negligible	No effect.	No effect.
Floodproofing	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Levees, dikes	Possible short-term increase in turbidity during construction.	Possible short-term adverse effects during construction.	Negligible	Negligible	No effect.	No effect.
Levees at Sages and Six Subdivisions	Short-term increase in turbidity during construction. Some adverse effects due to loss of riparian cover.	Short-term adverse effects during construction; some decline in habitat quality possible.	Decreases in habitat quantity and quality due to clearing.	Some clearing of floodplain forests; some losses of other vegetation types.	No effect.	No effect.
Unify Upper Souris Refuge Structures	Short-term construction impacts.	Disruption of habitats in individual subunits and downstream during construction.	Disruption of habitat during construction; long-term benefits to refuge management objectives.	Disruption of managed marshes during construction; adverse impacts on other vegetation during construction.	No effect.	No effect.
Reber Ranch Acquisition/Relocation	Long-term minor improvement possible.	Long-term minor improvement possible.	Effect would depend on relocation site.	Some losses of vegetation at relocation site.	No effect.	No effect.
Levees/dikes	Possible short-term increase in turbidity during construction.	Possible short-term adverse effects during construction.	Minor losses of habitat.	Minor losses from clearing.	No effect.	No effect.
Gasman Gulch No Action	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Flood Warning System	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Road and Rail Bridges	Short-term construction impacts.	Short-term construction impacts.	Short-term disruption of habitat during construction.	Minor vegetation removal during construction.	No effect.	No effect.

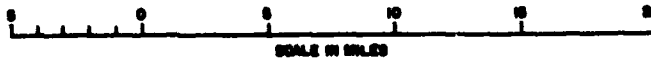
Table 2 - Comparative Impacts of Alternatives and Features (Continued)

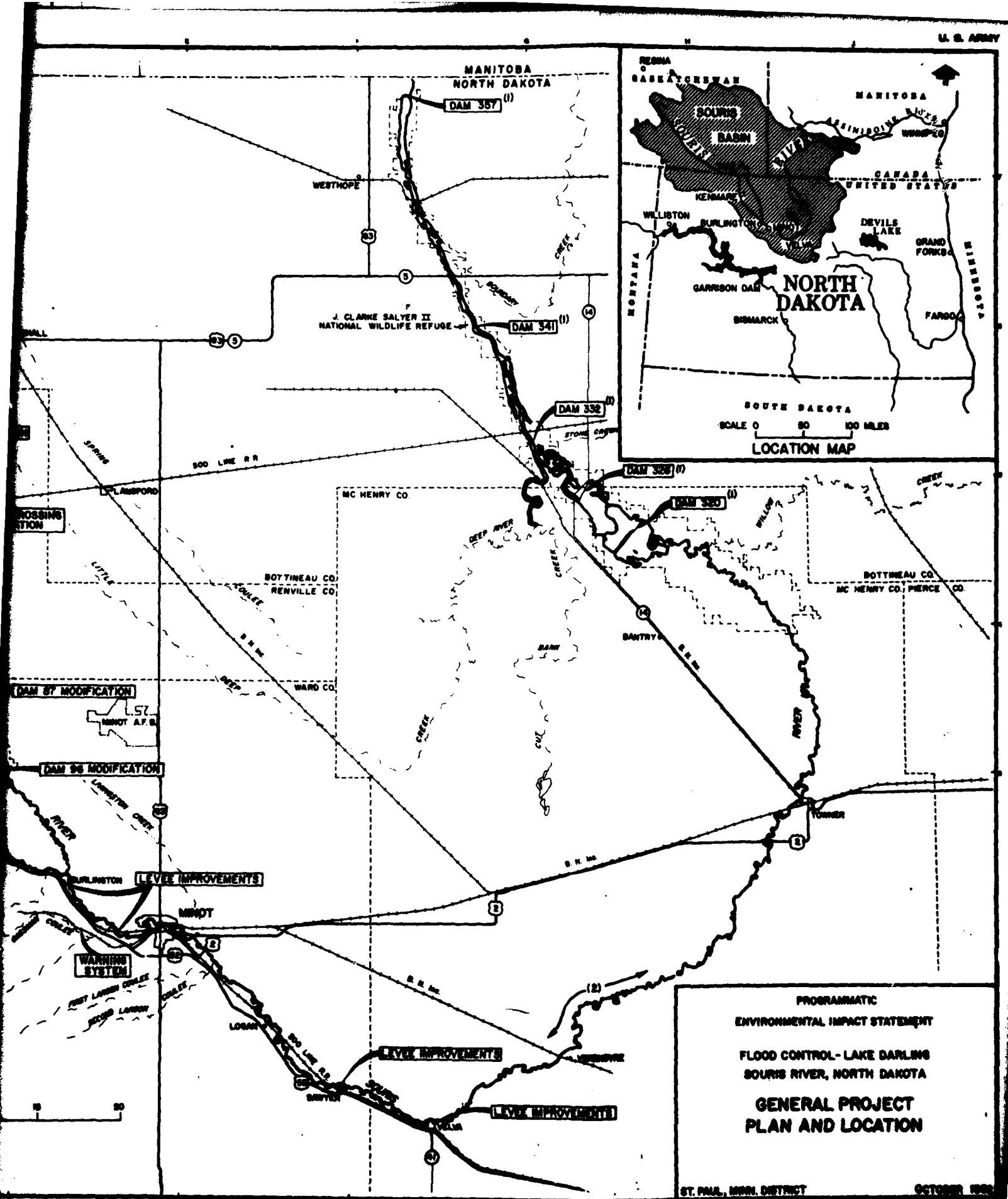
Plan Features and Alternatives	Significant Resources					
	Cultural Resources	Recreational Resources	Aesthetics	Institutional Arrangements	Social Conditions	Transportation
Base Condition	12 known archaeological sites, 8 historic sites (1 on National Register of Historic Places) above Lake Barling; 18 known archaeological sites, 6 historic sites adjacent to Lake Barling.	Boysce landings day-use areas, 3 county parks, several other recreation areas and informal use areas on bridge crossings within study area.	Swain River Valley contains a variety of landscape, vegetation, and wildlife, providing important scenic qualities in the basin.	Somehow constrained financial capacity; few formal associations between water resources/political organizations; some formal planning documents and mechanisms available.	History of conflict related to an earlier flood control proposal; a comprehensive plan has been developed by various groups and individuals.	Road network basically adequate and usually well maintained.
No Action (Without-Project)	Existing impacts would continue.	Existing impacts would continue.	May decline because of wetland drainage.	Gradually increasing financial capacity of local govt. levels; coordination unlikely to increase without greater State pressure; gradual increase in floodplain/land use management.	No predictable changes.	No change in network, but gradually increasing maintenance problems.
Pool Basin to 1695; Operation Plan: 5000 ft ³ /s discharge to normal pool level	Increase in number of sites impacted because of increased duration of inundation, and erosion potential.	Partial loss of run, use days - adverse damage to some recreation resources.	Fluctuating water levels in Lake Barling could kill or damage shoreline vegetation, causing denuded conditions; increased duration of flooding downstream could adversely affect aesthetics of riparian areas.	Strain on financial capacity; increasing organizational complexity and interdependence among governmental units; stimulus to more conscious planning and coordination.	Uncertain acceptability of project details (see below).	No effect
Pool Basin to 1695; Operation Plan: 5000 ft ³ /s discharge to normal pool or 9/1 then 700 ft ³ /s to recreation	See above.	Loss of early season recreation and major adverse impact on spring fishing access; partial damage of recreation resources.	See above.	Same	Uncertain acceptability of project details (see below).	No effect
Swainville Co. Park Acquisition/Relocation	Adverse impact on historic structures from removal.	Adverse impact on regional recreational resources.	Relocation site would not likely be as attractive as present site.	Same	Uncertain acceptability of alternatives for Swainville County Park.	No effect
Floodproofing	Adverse impact on historic structures from floodproofing.	Loss of recreational use days during construction for ramping and other day-use activities.	Floodproofed structures could be less attractive.	Same		No effect
Levee and Channel Cutoff	Beneficial impact on historic structures.	Would provide protection for recreational resources and aesthetics existing use levels.	Losses of riparian vegetation would result in less attractive surroundings.	Same		No effect
Hullman Cemetery Relocation	Adverse impact on HEMP property.	No effect	Effect would depend on relocation site.	Same	Uncertain acceptability of alternatives for Hullman Cemetery protection.	No effect
Raise in Flood	Minimal impact on HEMP property.	No effect	Short-term adverse effect.	Same		No effect
Levee Protection	Minimal impact on HEMP property.	No effect	Possible adverse effect.	Same		No effect
Downstream Rural Protection Acquisition/Relocation	May remove some potentially historic structures.	No effect	Effect would depend on individual case.	Same	Uncertain acceptability of alternatives for downstream rural flood protection.	Some disruptions to traffic during construction.
Floodproofing	May alter some potentially historic structures.	No effect	Floodproofed structures could be less attractive.	Same		
Levees, Dikes	May adversely affect unknown archaeological resources.	No effect	Possible adverse effect.	Same		
Levees at Sawyer and Six Subdivisions	May have adverse effect on historical and archaeological properties.	No effect	Losses of riparian vegetation would result in less aesthetically pleasing surroundings.	Same	Uncertain acceptability of lower alternatives.	Some disruptions to traffic during construction.
Stilly Upper Swain Refuge Structures	Modification of Run 41 could affect 3 sites; work on Ponds A or B could impact 1 site not eligible for HEMP.	Minor impact on refuge recreation sites; limited impact on run, use days.	Negligible	Same	No effect	No effect
Robert Beach Acquisition/Relocation	Will have adverse effect on historical properties.	No effect	Effect would depend on relocation site.	Same	No effect	No effect
Levees/Dikes	Will have beneficial effect on historical properties.	No effect	Possible adverse effect	Same	No effect	No effect
Thomas Swain No Action	Existing impacts on HEMP properties in Swain would continue.	No effect	No effect	Same	No effect	No effect
Flood Warning System	May have beneficial effect on HEMP properties in Swain.	No effect	No effect	Same	No effect	No effect
Road and Rail Bridges	See Low Bid notes and Sup. 26 notes could impact known sites; Sup. 3 and City, R. 9 possible impact.	Minor adverse impact on existing run, use.	Effect would depend on individual perceptions.	Same	No effect	Some disruptions to traffic during construction; disruptions to be repaired on completion of work.



(1) NEED FOR WORK ON REFUGE STRUCTURES IS DEPENDENT ON FINAL OPERATING PLAN.

(2) DWELLING IMPROVEMENTS DOWNSTREAM OF RESERVOIR - INCLUDES LEVEES AND NON-STRUCTURAL MEASURES FOR PLANNED RESERVOIR RELEASES.





PROGRAMMATIC
 ENVIRONMENTAL IMPACT STATEMENT
 FLOOD CONTROL- LAKE DARLING
 SOURIS RIVER, NORTH DAKOTA
 GENERAL PROJECT
 PLAN AND LOCATION

2

2

REFERENCES

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
AREA OFFICE—NORTH DAKOTA
1500 CAPITOL AVENUE

BISMARCK, NORTH DAKOTA 58501

AUG 24 1982

Colonel Edward G. Rapp, District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Re: Lake Darling Flood Control Project

Dear Colonel Rapp:

This letter provides planning aid information for Items 1 through 5 of the Scope of Work for U.S. Fish and Wildlife Service, FY 1982. Our purpose is to assist you in preparing the phase II general design memorandum supplement and programmatic draft environmental impact statement in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. 661 et seq.).

The following numbered items correspond to the same numbers in the Scope of Work:

1. A generalized description of current fish and wildlife conditions for the Souris Valley is presented. The United States portion of the Souris Basin, 9,320 square miles, includes all or portions of Renville, Bottineau, Rolette, Pierce, McHenry, Ward, Mountrail, Burke and Divide Counties. The principal features of concern to this study are the main stem of the Souris River and its immediate adjacent habitats. They include the cover types of riverine wetland, natural and impounded flood-plain (palustrine) wetland, bottomland hardwood, grassland and cultivated land.

Two major National Wildlife Refuges (NWR) were established during the extreme drouth of the 1930's on the main stem of the Souris River. The Lower Souris Refuge (now J. Clark Salyer Refuge), about 59,000 acres, was a marsh restoration project of areas drained for agricultural production. A series of five dams was erected to create pools along the 50 miles of river included within the refuge boundary. The Upper Souris Refuge of 32,000 acres encompasses nearly 30 miles of the valley. The Lake Darling impoundment covered about 20 miles of the river. Its primary purpose was to furnish a regulated supply of water to smaller marsh impoundments downstream and to the lower Souris marshes 50 miles to the east. The lake was designed to hold a 2-year supply of water in case of extended drouth. Both of these refuges have developed into major migration areas for migratory waterfowl and also important producers of ducks and Canada geese. A large diversity of wildlife species utilize the upland and lowland habitats of both refuges. An important sport fishery for walleye, yellow perch and northern pike developed in the large impoundment.

Detailed information on species and numbers of wildlife, and the human uses thereof is available. Much of the information was assembled during the Burlington project study and will not be reiterated here. The condition of these resources has been affected in recent years by both natural changes and man-induced changes. The former include an absence of extended severe drouth periods such as occurred in the 1930's, the notable shift westward to the valley of snow goose migrations, and a reduction in use by white-fronted geese. Beneficial man-induced changes have principally involved maintenance stocking and introductions of fish and wildlife species. Included are maintenance of Lake Darling's fish populations through stocking of hatchery fish, introductions of smallmouth bass, wood ducks, turkeys, ruffed grouse and Canada geese, and stocking of ring-necked pheasants. Refuge land management changes include vegetation management, additional marsh and island construction, and manipulation of water levels.

Land-use changes on private lands, by contrast, have been largely detrimental to the habitats upon which the fish and wildlife resources depend. Recently large scale wetland drainage has occurred in the river basin. Documentation of much of the drainage was done in 1976 by refuge personnel. Channelization of the tributary Boundary Creek also occurred, with its attendant wetland drainage. Similar drainage and channelization has taken place upstream in the Canadian portion of the Basin.

Fifty percent of the flows during the 1979 flood on the Souris were attributed to wetland drainage which had occurred in the North Dakota portion of the watershed (Malcolm, 1979). The drainage has had a severe negative impact upon water quality in the Souris, in addition to its large contribution to flooding and the tremendous loss of waterfowl and other wildlife habitat occasioned by the destruction of the wetlands. The drainage and channelization have added high silt loads from accelerated erosion, and nutrients and agricultural chemicals to the river and the marshes. Sewage releases have contributed to waterfowl disease losses from botulism at Salyer Refuge and fish kills in the river downstream from Minot. Feedlot runoff and flood control drawdowns have added to water quality problems at Lake Darling, including a partial winterkill of fish in 1978.

Anticipated future without project conditions in the watershed area include a continuation of the conversion of wetlands, grasslands and woodlands to cultivated areas. We have not estimated the future rates of such conversions for either the Canadian or U.S portion of the watershed. For the immediate area of project impact, the habitat types are primarily in public ownership and will, therefore, remain essentially the same in quantity. The quality of marsh and aquatic habitat will continue to decline. An important exception will be the expected alleviation of sewage discharges, with the construction of new treatment facilities. Large scale development of irrigation in the Basin, if it occurs, will exacerbate the water quality problem by collecting and discharging return flows to the watercourse and by installation of extensive drainage systems.

The preservation of remaining wetlands has been identified as the primary Important Resource Problem for the state. Objectives for this effort include many activities designed to counter existing economic and social pressures which foster drainage. Examples include the Small Wetlands Acquisition Program, new private and public preservation and restoration programs, and possible tax incentives.

Management plans for the two National Wildlife Refuges are designed to meet identified objectives for fish and wildlife population maintenance and production, and various human uses of these populations and habitats. Nonconflicting recreational and economic uses are accommodated where possible. Emphasis of habitat management programs is directed toward meeting the requirements of nesting and migrating waterfowl, primarily by improvement of existing terrestrial and aquatic areas. Marsh manipulations include alternate cycles of drying and flooding, excavating areas, and vegetation management through water level fluctuations, mechanical methods, burning, grazing and haying. Nesting area improvements are accomplished by island construction, erecting nesting structures and maintenance of herbaceous dense nesting cover on upland areas. Periodic burning, mowing, grazing, haying, cultivation and seeding are the tools used. Small acreages are cropped as a phase of rejuvenating grasslands, or to provide green browse and grain to alleviate waterfowl depredations in the area and provide wildlife food.

2. The expected general impacts of the project as a whole on fish and wildlife resources include direct and indirect, terrestrial and aquatic. Direct effects of the dam, levee and channel work include loss of woody and herbaceous cover from clearing and inundation, increased sedimentation during construction, and altered flow regimes during flood years. Riparian areas subject to reduced flood frequencies as a result of the project will have reduced productivity and possible induced conversion to alternate uses. The mere fact of flood control measures being installed may serve to stimulate additional wetland drainage in the watershed, particularly if no legal constraints are imposed.

The additional storage space available in Lake Darling, when used during spring runoff, can be expected to enhance reproduction of northern pike and yellow perch. Increased water volume in the lake will not materially change conditions for fish survival unless the permanent (management) pool is held at a higher level than at present. The winter season is critical for oxygen demand. In the long term, more sediments and nutrients will be trapped in the reservoir.

Floodpool inundation of terrestrial and marsh habitat will result in vegetational changes. The frequency and length of inundation will determine the rapidity of the changes and the ultimate species composition or lack of cover. Increased bank erosion on the reservoir will likely occur.

The cormorant-heron rookery at the Grano crossing may be affected with accelerated loss of nest trees from more frequent inundation.

Release rates from Lake Darling will be prolonged at a higher rate during flood events than the current condition. One effect of this would be reduced management flexibility of the Salyer marshes. Flows in excess of about 250 cfs restrict the drawdown capability. If the Lake Darling permanent pool level is increased, the water supply for downstream marshes would be augmented during extended drouth periods. Instream water quality would also benefit from this.

The significance of the various impacts will be determined during detailed planning. It is presently believed that aquatic impacts (river and lake) are relatively minor in scope and some may be off-setting. The impact to management of downstream marshes and increased flooding above the dam are susceptible to amelioration by implementation of appropriate measures on the refuges.

3. Determining the area and extent of flooding impact will require analysis of operation plans and hydrographs for a range of flood events. Cover types to be inundated were previously mapped at 10-foot contour intervals. These data could be refined if more detailed topography is made available. Interpolation between the contours will be done in the absence of such maps. If required, an abbreviated habitat evaluation for a very few of the major species may be conducted.

Determining impacts from construction of the dam and spillway will require site-specific location and cover types of all areas to be disturbed by construction. This includes borrow sites, excess material disposal sites, work staging areas, site limits of the dam and spillway, roads and any other related facilities. It should be identified if channel work is required immediately downstream of the new facilities.

The location and extent of breakout points along Upper Souris Refuge boundary, relocations of boundary and internal fences, roads and other facilities, and the type of land interests to be acquired will need to be determined.

Information needs for facilities at downstream housing areas other than Velva, at crossings to be upgraded, and at the Renville County Park will be the same as described above for the dam and spillway.

To determine effects on water management of the Salyer marshes, hydrological information sufficient to compare the with and without project conditions on timing and quantity of flows will be required.

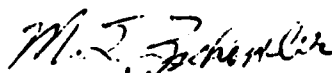
4. The proposed project basically increases the storage capacity of the largest upstream refuge impoundment by about 32 percent. This could complement the objective of water supply for downstream marshes if the normal operating level is increased. However, prolonged high flows for flood storage evacuation will hinder marsh level management, especially drawdown capability.

The fishery reproduction for northern pike and perch in Lake Darling may be improved. Winter fish survival will be enhanced only if more storage occurs at that season. Refuge objectives at Upper Souris for the identified species and groups of wildlife species should not be greatly affected. No irreversible loss of opportunity has been identified. Two potentially unmanageable conflicts are: (1) if acquisition of breakout points around Upper Souris Refuge is by a method which does not permit relocation of refuge facilities or allow necessary management; and (2) if the project operations restrict marsh management activities below Lake Darling on either or both refuges without any corrective action being taken.

5. Project plans received include a generalized discussion in the fact sheet, a preliminary conceptual design, hydrographs and discharge/frequency curves, and two preliminary levee and diversion plans. Completion of this item for suggested modifications will best be accomplished with ongoing coordination. We request the opportunity to review and comment on all planned physical developments, acquisition, siting decisions and operating plans. Some potential modifications include upgrading and possibly increasing storage, discharge capacities and winter discharge capability of Upper Souris and/or J. Clark Salyer structures. Development of one or more additional marsh units on Upper Souris below Lake Darling would benefit the project area fish and wildlife resources. Improvement of nesting areas for waterfowl and colonial nesting birds may be considered. An increase in the Upper Souris management pool level should be evaluated.

We trust this information will be helpful. Any questions or additional requests should be directed to Stan Zschomler (FTS:783-4481) or Vic Hall (FTS: 783-4492).

Sincerely,



M. S. Zschomler
Field Supervisor-Environment

PREFACE

This report contains two environmental documents: a programmatic environmental impact statement (EIS) and a feature EIS. The programmatic EIS covers the general impacts and concerns associated with the entire Lake Darling project, while the feature EIS covers the specific impacts and concerns associated with project features at Velva, North Dakota. A third document covering the specific impacts of project features at Lake Darling and some downstream areas will be prepared in 1983 and will complete the environmental assessment of the Lake Darling project.

DRAFT
FEATURE ENVIRONMENTAL IMPACT STATEMENT

Velva Flood Control
Lake Darling Flood Control Project
McHenry County, North Dakota

Department of the Army
St. Paul District, Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

OCTOBER 1982

DRAFT
FEATURE ENVIRONMENTAL IMPACT STATEMENT

Velva Flood Control
Lake Darling Flood Control Project
McHenry County, North Dakota

The responsible lead agency is the U.S. Army Engineer District, St. Paul.
The responsible cooperating agency is the U.S. Fish and Wildlife Service.

Abstract: Velva is located on the Souris River in central North Dakota. Flood damage reduction plans for Velva are being studied as part of the Lake Darling flood control project. Six levee alignments were given detailed consideration. All of these alignments were designed to provide 100-year protection when combined with project features at Lake Darling. The recommended levee alignment was chosen because it maximizes net economic benefits and is the least environmentally damaging if proposed zoning restrictions are adopted. Features of the recommended alignment include: construction of a levee around the city of Velva; construction of a 1,600-foot cutoff channel near Velva Park; modification of 4,300 linear feet of river channel, and riprapping 6,500 feet of channel. Impacts associated with this alignment include: removal of 15 acres of floodplain vegetation; alteration of 14.5 acres of river channel habitat; filling or excavating 4 acres of oxbow wetlands; inducing floodplain development in a 30-acre area; and relocation of one residence and the rodeo arena in Velva Park.

SEND YOUR COMMENTS ON THIS EIS TO THE DISTRICT ENGINEER BY 27 December 1982.

If you would like further information on this project please contact:

Mr. Robbin Blackman
U.S. Army Engineer District, St. Paul
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101
Commercial telephone: (612) 725-7746
FTS telephone: 725-7746

NOTE: Information presented in the Lake Darling Programmatic EIS is incorporated by reference in this EIS.

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1.00 SUMMARY

Major Conclusions and Findings

1.01 Six levee alignments were given detailed consideration. After economic, environmental, and engineering review, alignment ACFGHIKM (see plate 2) was recommended as the plan which best fulfills the planning objectives. The recommended plan is designed for protection from flood flows of 14,700 ft³/s. At this level of protection, the recommended plan maximizes net benefits and is the National Economic Development (NED) plan.

1.02 Alignment ACDEFGHIKM (see plate 2) was designated as the least environmentally damaging plan. This alignment is the same as the recommended alignment except that it does not have as much potential for inducing floodplain development.

1.03 Several modifications to the recommended plan designed to reduce adverse environmental effects are being studied for inclusion during development of plans and specifications for construction. These modifications include zoning cropland areas inside the proposed levee for green space, agriculture, or other floodplain-compatible uses; augmentation of flow through wetlands; planting vegetation where possible; and channel excavation techniques which minimize adverse fishery effects. If these modifications are implemented, the NED/recommended plan would also become the least environmentally damaging plan.

1.04 The recommended plan is in compliance with Executive Order (EO) 11990 because there is no practical alternative which has less impact on wetlands. Without modifications, the recommended plan is not in compliance with EO 11988. However, if cropland inside the levee is zoned to prevent uses which are not compatible with floodplain uses, the recommended plan would comply. Impacts on prime and unique farmland have been assessed as required by the 1976 Council on Environmental Quality memorandum. A 404(b)(1) evaluation has also been prepared and is attached to this EIS for submission to Congress under Section 404(r) of the Clean Water Act of 1977.

Areas of Controversy

1.05 Public concern has been expressed over the project's effects on the rodeo arena and the softball field in Velva Park. Under current plans, the softball field could still be used; however, the rodeo arena would have to be removed. It is felt that adequate rodeo facilities can be constructed in a nearby area to replace those that would be eliminated.

1.06 Public concern has also been expressed over the project's effect on upstream and downstream flooding. The project would raise upstream flood stages, but the raise would be less than 1 foot for a 100-year flood, which is within the amount allowed by Federal floodplain zoning laws. The proposed project should have no observable effects on downstream flood stages.

Unresolved Issues

1.07 At the current stage of study, the recommended plan is not in compliance with EO 11988; however, the city is currently considering zoning restrictions which would make the project comply. Because this matter is still under study, final determinations of compliance will be presented in the final EIS.

Relationship to Environmental Protection Statutes and Other Environmental Requirements

1.08 Table 1 describes the relationship between applicable environmental regulations and all alternatives given detailed consideration.

2.00 SCOPE OF THE EIS AND OTHER STUDY DOCUMENTS

2.01 Flood control at Velva, North Dakota, is being studied as part of the basin-wide Lake Darling flood control project. The environmental documents for the Lake Darling project are being prepared in three stages, using the tiering concept given in the 1978 Council on Environmental Quality regulations (40 CFR 1502.20). These documents will include:

a. A programmatic environmental impact statement (EIS) which covers general effects of the entire flood damage reduction program for the United States portion of the basin.

b. A feature EIS covering specific effects of the project features at Lake Darling and some of the upstream and downstream areas.

c. This feature EIS on the specific effects of flood damage reduction proposals at Velva.

2.02 The programmatic EIS is being prepared and distributed in conjunction with this EIS. To avoid repetition, portions of the programmatic EIS are referenced in this document.

2.03 A general design memorandum for the entire Lake Darling project will be completed in June 1983. A design memorandum presenting the engineering specifics of the Velva features will be completed in November 1982.

3.00 NEED FOR AND OBJECTIVES OF ACTION

Study Authority

3.01 Flood protection at Velva was first studied as part of flood damage reduction studies for the entire Souris River basin. The basin study identified upgrading existing temporary levees at Velva in conjunction with other basin-wide features as the flood reduction plan for the city. Flood protection for Velva was also studied separately under Section 205 of the 1948 Flood Control Act, as amended, although that study did not progress beyond preliminary stages. Current study authorization came in the Fiscal Year 1982 Energy and Water Development Appropriations Act (see exhibit 1). Velva is being studied under this authority as part of the downstream flood protection measures. (See section 2.01 of the programmatic EIS for further information.)

Public Concerns

Reduction of flood damages at Velva is a major concern of most city residents and the city council. Average annual flood damages at Velva are estimated at \$430,000. The Souris River basin has recently experienced a series of severe floods, which have prompted basin-wide studies of the causes and possible solutions. (See section 2.00 of the Programmatic EIS.) Recent increases in flood damages in the basin and at Velva have been attributed to many factors, including changes in upstream land use (wetland drainage, etc.), the effects

of upstream flood reduction projects, and recent increases in precipitation. These potential causes of flooding problems were considered in developing appropriate solutions. Additional concerns have been directed at the specific impacts of flood control projects. These included preserving prime farmland, wetlands and areas of floodplain forest; and preserving recreation, social, and cultural resources in the study area.

Planning Objectives

3.03 The following are the general planning objectives that were employed during plan formulation.

- a. Reduce damages in the city of Velva, North Dakota, from floods on the Souris River during the 1986-2086 period of analysis.
- b. Preserve prime and unique farmland around Velva, North Dakota, for agricultural purposes during the 1986-2086 period of analysis.
- c. Preserve floodplain values, including fish and wildlife, social, and cultural values, in order to maintain ecosystem stability and aesthetic quality during the 1986-2086 period of analysis.
- d. Preserve for Velva residents the recreational opportunities offered in the Velva Park area during the 1986-2086 period of analysis.

4.00 ALTERNATIVES

4.01 Flood damage reduction measures at Velva have been studied separately under Section 205 of the 1948 Flood Control Act and as a feature in basin-wide studies such as the Burlington Dam study and the current study. The Section 205 study was very preliminary (reconnaissance stage) and proposed the following alternative solutions: floodplain evacuation, combinations of flood proofing and floodplain regulation, and construction of levees. Basin-wide studies have always considered only levee alternatives for flood damage reduction at Velva, with the exception of a preliminary analysis of diversion channel construction.

4.02 Plans developed in all of the above studies were considered in formulating alternatives for the current flood protection study at Velva. However, ER 200-2-2 requires that the alternatives discussion in an EIS be limited to those plans studied at a stage 2⁽¹⁾ level of detail. Since levee alternatives are the only ones which have been given this level of analysis, they are the only plans presented in this section.

4.03 Fifteen alternative levee alignments were developed and studied at the required level of detail. They are presented in three sections: alignments eliminated from detailed study, without-project conditions, and alignments given detailed consideration.

(1) Stage 2 refers to the second stage of the three stages in preparation of a General Design Memorandum. At this point, the costs, benefits, design, and environmental impacts of each alternative are fairly well known.

Alignments Eliminated From Detailed Study

4.04 Of the 15 levee alignments studied, 9 were not given detailed consideration. These 9 alignments represent the possible combinations between 3 different upstream alternatives and 3 different downstream alternatives. They are shown on plate 2, and are summarized as follows (letters represent points on plate 2):

BDEGHIKM
BDEGHIJLM
BDEGHJLM

ACDEGHIKM
ACDEGHIJLM
ACDEGHJLM

BDEFGHIKM
BDEFGHIJLM
BDEFGHJLM

4.05 These alternatives were eliminated because of the adverse economic and environmental impacts associated with reach BD and reach EG. Any alternative which includes construction of a levee from point B to point D would require raising both highway 52 and the railroad. The cost of these raises would be very high, making alternatives containing alignment BD impractical when compared to cheaper alignments such as AC.

4.06 Alignment EG was first studied during the Burlington Dam study (design level—8,000 ft³/s) and was found to be more costly than other alignments (e.g., alignment FG). Increasing the design level to the current level of 14,700 ft³/s would require a substantial increase in the amount of channel excavation, thereby causing significant adverse environmental impacts (home relocations, loss of additional parkland, and loss of fish and wildlife habitat). Increases in the amount of channel excavation would also result in substantial cost increases, which would increase the cost difference between alignments EG and FG. These combined factors resulted in the elimination of alternatives containing levees along alignment EG.

Without-Project Conditions

4.07 Definition of future conditions in the project area is based on an examination of community growth patterns in the region, regional demand for housing and agricultural land, sewage treatment needs, clearing rates, and wetland drainage rates. One major factor affecting future flooding at Velva is the proposed 4-foot raise and change in operating plan for Lake Darling. Because flood protection at Velva is an integral part of the Lake Darling flood control project, without-conditions are defined as without the total project (Velva features and the features at Lake Darling). The following is a description of the without-project conditions of the important resources in the Velva area.

4.08 Flooding - Flooding problems at Velva could worsen in the future if wetland drainage continues, and if upstream communities build levees or channelize the river for flood protection.

4.09 Aquatic ecosystem - The aquatic ecosystem is expected to deteriorate slowly in the future as a result of increased water demand, poorer water quality, and clearing of vegetation in the floodplain.

4.10 Water Quality - The water quality of the Souris River is also expected to deteriorate in the future. More intensive use of the river water and more intensive agriculture (including irrigation and use of stronger fertilizers) would be primary contributors to this deterioration.

4.11 Terrestrial Ecosystem - The clearing of natural vegetation is expected to continue, although the rate should decrease as easily-cleared lands become harder to find.

4.12 Development in the Floodplain - Development in the floodplain is expected to be minimal because Velva currently has ordinances restricting such development. The cost of complying with the ordinance (i.e., providing flood protection for new development) is the major factor in deterring floodplain development (see Executive Order 11988 analysis, exhibit 2).

4.13 Prime Farmland - Prime farmlands are expected to remain undeveloped for the same reasons the floodplain would not be developed. Future clearing of vegetation may actually increase the amount of prime farmland in production.

4.14 Social Setting - Velva will continue to function as a secondary agricultural service center, a bedroom community to Minot, and a retirement center for the region's farm population. Population and housing needs will be heavily dependent on regional economic conditions. Community cohesion will remain high, reflecting the area's cultural homogeneity and interdependence.

4.15 Cultural Resources - No significant archeological resources are presently known to exist in the vicinity of Velva. Any buildings or structures in Velva which may have historical or architectural significance would continue to deteriorate if flooding continues. However, protection from flooding may cause a tendency to replace older structures with newer ones. Replacement of historic structures may be discouraged if the community knows about and takes advantage of Federal tax incentives for rehabilitation of historic structures.

Alignments Given Detailed Consideration

4.16 Six levee alignments were given detailed consideration. These alignments represent the possible combinations between 2 upstream alternatives and 3 downstream alternatives. They are shown on plate 2, and are summarized as follows (letters represent points on plate 2):

ACFGHIKM
ACFGHIJLM
ACFGHJLM

ACDEFGHIKM
ACDEFGHIJLM
ACDEFGHJLM

4.17 All alternatives studied in detail were designed to provide 100-year protection in conjunction with project features at Lake Darling. The discharge at this level of protection is 14,700 ft³/s, approximately the level which maximizes net economic benefits, and is felt to be appropriate protection for Velva. Some features are common to all of the alignments which were given detailed consideration. These features include: construction of a high-flow

cutoff channel through Velva Park; 4,300 feet of channel modification; excavation of 1,600 feet of an oxbow lake; and riprapping 6,500 feet of channel.

4.18 The operating plan for the cutoff channel is the same for all alignments. Most flows in excess of 170 ft³/s would follow the cutoff channel, while most flows under 170 ft³/s would follow the existing channel. During floods, all flows would follow the cutoff channel, and the existing river channel around Velva Park would be used for ponding and removing water from inside the levee. The cutoff operating plan and its effect on discharge are explained in greater detail on page 34.

4.19 Differences among the six alignments studied in detail are essentially the differences among the upstream alternatives and the differences among the downstream alternatives. On the upstream end, those levees which follow alignment ACF bisect an agricultural field, whereas those which follow alignment ACDEF go around the field. Alignment ACF would be less expensive to construct than alignment ACDEF.

4.20 On the downstream end, three alternative alignments address the feasibility of protecting downstream structures. These structures are enclosed within the area KIJL, and are also within the city limits of Velva. The majority of the structures are storage for equipment or grain; however, the Soil Conservation Service offices and one residence are also located in this area. Alignments HJLM and HIJLM both protect the structures in the area, while alignment HIKM does not. Alignment HIJLM is the most expensive of these three; HIKM is the least expensive.

4.21 Table 2 presents the cost and implementation responsibilities of each of the alignments given detailed consideration.

4.22 Recommended Alignment - The recommended levee alignment is ACFGHIKM. It calls for construction of a high-flow cutoff channel through Velva Park, 4,300 feet of channel modification, excavation of 1,600 feet of an oxbow lake, riprapping 6,500 feet of channel, and construction of a levee around the town. Alignment ACFGHIKM was chosen because it is the least costly alternative and comes very close to maximizing net economic benefits. Major features and impacts of the recommended alignment are shown in plate 3.

4.23 Least Environmentally Damaging Plan - The least environmentally damaging plan (Alignment ACDEFGHIKM) is essentially the same as the recommended plan; however, the upstream portion of the levee (portion ACDEF) follows the border of an agricultural field and therefore has no potential for inducing development of that agricultural land. The least environmentally damaging plan was not recommended because it was more costly than alignment ACFGHIKM, required more real estate, and could adversely affect drainage and snow accumulation on the Soo Line Railroad tracks between points C and D.

4.24 Modifications to the Recommended Plan - Several modifications designed to reduce the impacts of the recommended plan have been proposed. The following is a brief description and analysis of these modifications.

a. Zone cropland areas for green space: Inclusion of zoning restrictions in the local cooperative agreement for cropland areas inside the proposed levee are being explored as a means to protect floodplain values and/or their value as cropland. This modification is necessary to assure project compliance with Executive Order 11988.

b. Augmentation of flow through wetlands: It may be possible to create a small amount of flow through the oxbow lake containing the cutoff channel. Increasing flows through this wetland area would improve its water quality and increase fish and wildlife habitat value. The feasibility of this modification would be studied during preparation of plans and specifications for construction.

c. Vegetation plantings to replace lost wildlife habitat: A vegetation planting scheme will be developed to replace as much of the lost vegetation as possible. The north bank of the river is one area which would be revegetated. The exact amount of land, its location, and the species composition of the plantings will be determined during development of plans and specifications for construction.

d. Modification of the river channel: A few large rocks could be randomly placed along the channel bottom between points G and H (plate 2) to increase its value for fish. Feasibility of this modification would be studied during development of plans and specifications for construction.

e. Fish and Wildlife Service recommendations: The Fish and Wildlife Coordination Act Report (exhibit 3) includes eight recommendations to prevent, mitigate, and/or compensate for adverse effects on fish and wildlife resources. The essence of five of these recommendations has already been discussed. The remaining recommendations will be adopted during development of plans and specifications for construction. They are: avoidance of construction activities in the water course during March, April, and May; locating borrow areas outside of high-value habitat areas; and minimizing tree removal and using approved sites and methods for disposal of removed vegetation. (See exhibit 3 for specific responses to Fish and Wildlife recommendations.)

Comparative Impacts of Alternatives

4.25 Table 3 compares the effects of all alternative levee alignments which were given detailed consideration.

5.00 AFFECTED ENVIRONMENT

5.01 The following description of the environmental resources focuses on the city of Velva. A more detailed description of resources found in the Souris River basin can be found in section 4.00 of the programmatic EIS.

Environmental Conditions

5.02 The city of Velva is located in central North Dakota, 22 miles southeast of Minot (plate 1). It is situated in the Souris River Valley, which is approximately 3/4-mile wide and is bordered by hills approximately 80 feet high. The city occupies the entire valley bottom in the project area with the exception of the river channel, which runs along the north edge of town between residences and the north side of the valley (see plate 2).

5.03 Velva is a small city (1980 population of 1,101) which has remained viable despite a 17 percent population decline in the past two decades. It is the largest city in McHenry County and serves as a bedroom community to Minot. Besides those employed in Minot, many residents work in the electric plant, sunflower processing plant, and basic care facility, which have diversified Velva's economic role from its original function as agricultural service center to the area. The city has successfully worked to receive Federal and regional planning and financial assistance for development projects, which have maintained its position as a good place to live. Its sheltered location makes it especially attractive to farmers wishing to retire from the windy plains around it; the basic care facility, senior citizen center, and apartments recently built for seniors capitalize on this natural advantage.

5.04 Recreation facilities in the city include a 20-acre natural area, a city park, and a community swimming pool. Sporting facilities in Velva Park include a rodeo arena, softball and baseball diamond, all-weather track, and a football field.

5.05 Land in the Velva area can be classified as urban land, cropland, and floodplain forest vegetation. The urban land (city of Velva) is mostly surrounded by very productive cropland which, according to general soil maps for the county, is listed as prime farmland by the Soil Conservation Service. Floodplain forest vegetation borders most of the city on the northern side. This vegetation provides good habitat for many wildlife species and is especially valuable because North Dakota has very little forested land.

5.06 The Souris River in the project area is rated in the highest-valued fishery resource category. It is a low gradient/low velocity river with a mud/rock bottom, and supports a fishery of walleye, northern pike, white sucker, longnose dace, bigmouth shiners, fathead minnows, and other species.

5.07 Recent (August 1982) cultural surveys of Velva and the recommended levee area located 26 historic structures, one archeological site, and one prehistoric isolated find.

5.08 Two types of flooding occur at Velva: high-flow spring runoff on the Souris River, and flash floods from adjacent bluff runoff. Existing protection consists of temporary levees around the town and a permanent project on the Bonnes Coulee immediately upstream of Velva. The temporary levees are eroding and unstable and do not provide adequate flood protection. Average annual damages resulting from flooding are estimated at \$430,000.

Significant Resources

5.09 Significant resources related to the proposed project at Velva have been identified on the basis of public interest, laws, standards, and/or technical criteria. These significant resources are briefly described in the following paragraphs.

5.10 Aquatic Ecosystem - The Souris River in the project area supports a productive aquatic ecosystem, and is given the highest-valued fishery resource rating in the 1978 permanent stream evaluation (USFWS, 1978). Physical diversity is a key factor in maintaining a productive ecosystem, and the Souris River in the project area is physically diverse. This is evident in the substrates found in the river (locally variable from mud to rock), in the fish feeding and resting areas created by streamside vegetation, the presence of oxbows and meanders which create a variety of flow conditions, and a variability in flow conditions during the year, from spring floods to summer and winter low flows. The aquatic ecosystem at Velva was sampled in 1975 (FWS) and was found to contain walleye, northern pike, white sucker, longnose dace, fathead minnows and bigmouth shiners.

5.11 Terrestrial Ecosystem - As previously stated, the predominant land types in the project area are urban land, cropland, and floodplain land. Urban land and cropland provide marginal habitat for most wildlife species; however, the floodplain land, with its diverse vegetation, provides excellent wildlife habitat. Floodplain vegetation in the project area is generally restricted to areas immediately adjacent to the Souris River. Predominant vegetation in these areas includes American elm, burr oak, cottonwood, and green ash, with an understory of grape, sorrel, meadow rue, poison ivy, rose, cocklebur, and chokecherry and black currant in some of the upland areas. Evidence of wildlife noted during field visits included whitetail deer and raccoon tracks, and sightings of muskrat, marmot, waterfowl, and numerous passerine species. Other wildlife species which are probably common include cottontail rabbit, skunk, beaver, mink, squirrel, numerous small mammals, wood duck, and raptors.

5.12 State or Federally Listed Endangered or Threatened Species - The North Dakota Natural Heritage Program reviews secondary sources (literature, museum and herbaria records) to develop and maintain location data and descriptions of all significant resources in the State. As of 18 August 1982, they had no listing of any rare, unique, threatened, or endangered species in the vicinity of Velva.

5.13 The U.S. Fish and Wildlife Service is the agency responsible for determining which Federally-listed endangered or threatened species might be found in an area. They currently list the bald eagle (threatened) and the peregrine falcon (endangered) as two species which may migrate through the Velva area (see exhibit 3: Fish and Wildlife Coordination Act Report).

5.14 Water Quality - Water quality problems in the Souris River basin stem primarily from sewage treatment discharges and agricultural runoff which add nutrients to the river and result in excessive algae growth, low oxygen levels in the water, and fish kills during summer or winter low flow periods. This problem is most evident at J. Clark Salyer National Wildlife Refuge (102 river miles downstream of Velva) where winter fish kills result from nutrient-rich water. The cause has been attributed to inadequate sewage treatment at Minot (54 river miles upstream of Velva) (USFWS, 1975) and to wetland drainage near the refuge (Malcolm, 1979).

5.15 The water of the Souris River at Velva was found to be moderately nitrogen enriched (FWS, 1975), probably because of upstream agricultural runoff. Other water quality parameters were within State standards.

5.16 Velva Natural Area - The Velva natural area is a 31-acre area of floodplain forest immediately downstream of the city. It has a short nature trail around its perimeter, and provides excellent opportunity for environmental education. This land was donated to the city as either parkland or natural area, and to date the city has chosen to treat it as a natural area. Federal funds (Land and Water Conservation Fund) were used to develop the nature trail through this area.

5.17 Velva Park Recreation Resources - The facilities at Velva Park include a rodeo arena, softball diamond, baseball diamond, all-weather track, football field, bleachers, fences, lights, buildings, picnic grounds, playground equipment, etc. Federal funds (Economic Development Administration) amounting to \$179,000 were used in construction of these facilities. Velva Park is flooded an average of once every 25 years.

5.18 Prime and Unique Farmland - The Council on Environmental Quality defines prime and unique farmlands in the following manner:

"Prime farmlands are those whose value derives from their general advantages as cropland due to soil and water conditions. Unique farmlands are those whose value derives from their particular advantages for growing specialty crops." (CEQ, 1976)

General soil maps for McHenry County (N.D. Pub. Serv. Comm., n.d.) show Velva loam as the soil type which surrounds Velva. This soil type is classified by the Soil Conservation Service as prime farmland. Although detailed soil maps are not available to confirm this classification, the soil surrounding Velva is assumed to be prime farmland for the purposes of this study.

5.19 Floodplain Resources - Executive Order (EO) 11988 states that floodplain areas have natural, social, and economic values which should be preserved. It also states that all Federal actions should avoid adverse impacts on floodplains as long as a practical alternative exists. The city of Velva lies almost entirely within the 100-year floodplain of the Souris River. Specific values associated with the floodplain at Velva include provision of fish and wildlife habitat, recreation opportunities, and a corridor large enough to convey flood waters downstream.

5.20 Wetland Resources - Wetlands are protected by EO 11990 in much the same way EO 11988 protects floodplain resources. Wetlands in the project area are of the type usually associated with a slow moving, low gradient, highly meandered river (oxbow wetlands, riverine wetland). Wetlands provide very valuable wildlife habitat, and have important functions in ground-water recharge, water purification, flood water retention, and fish spawning.

5.21 Transportation - Velva is linked with the rest of its region by US 52 (21 miles to Minot), Highway 41 (12 miles to US 2, which connects Minot, Devils Lake, and Grand Forks), and various county roads. The Soo Line Railroad still serves the city, and its tracks parallel US 52. There is no airport. City streets are well laid out and maintained. The city park is accessed either by the Second Avenue bridge or by the park road which connects with Highway 41 north of the Souris River, skirting the city limits.

5.22 Social Cohesion - Cultural homogeneity and interdependence are high in this small rural city. Although individual attitudes and interests may differ on a particular issue, a fairly high sense of social cohesion is the normal community condition.

5.23 Institutional Arrangements - Velva is incorporated, with a mayor-city council form of government. Although lacking a Comprehensive Plan, the city issues building permits in compliance with Federal flood insurance requirements, has a community development organization, and has worked with other levels of government to achieve specific economic, social, and recreational development goals.

5.24 Cultural Resources - In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the National Register of Historic Places has been consulted. As of 29 June 1982, no properties listed on or determined eligible for the National Register were found in the Velva area.

5.25 During August 1982, a cultural resources survey was conducted in the vicinity of the proposed levee and channel work. The survey also included the Bonnes Coulee Diversion and a channel cutoff to the east of Velva near the city's water treatment ponds.

5.26 The survey located 26 structures and features, 1 archeological site, and 1 prehistoric isolated find. The historic sites consisted primarily of residences and associated outbuildings located along the proposed levee and channel work areas. The archeological site consisted of a single small flake of Knife River flint, a small piece of bone, and a piece of fire-cracked rock. The isolated find was also a small flake of Knife River flint.

5.27 The draft cultural resources report will be coordinated with the State Historic Preservation Officer and the National Park Service. Comments received from these agencies will be presented in the Final EIS.

5.28 Section 122, 1970 Rivers and Harbors Act - Section 122 of the 1970 Rivers and Harbors Act lists 32 categories which should be addressed when assessing the effects of a proposed project. These categories include social, economic, and natural resource considerations such as community cohesion, transportation, employment, terrestrial habitat, and biological productivity. All 32 categories were considered in this study and are addressed in this impact statement where appropriate.

6.00 ENVIRONMENTAL EFFECTS

6.01 This section discusses the environmental effects of each alignment which was studied in detail on the significant resources presented in the preceding section. For additional information, see the compliance and comparative impacts tables (tables 1 and 3) and plate 3.

6.02 Aquatic Ecosystem - Project-induced changes in the channel configuration would be the same for all alternatives: 350 linear feet of existing stream channel would be lost through fill or straightening operations; a 2,200-foot cutoff channel would be created which, when added to the 4,300 feet of channel modifications, produces approximately 6,500 feet of modified, partially riprapped channel; 4,400 linear feet of channel would be restricted to maximum flows of $170 \text{ ft}^3/\text{s}$. The following resultant changes in the aquatic ecosystem would be expected to occur:

a. A significant reduction in the cover, shade, and organic input from streamside vegetation would result from the clearing operations.

b. The dominant aquatic species in the new channel would change to those more tolerant of higher current velocities and coarser substrates.

c. Increases in substrate diversity and corresponding increases in some populations of bottom-dwelling organisms would be caused by placement of the riprap.

d. High current velocities (greater than 3 feet per second) through culverts in and out of the old river loop around Velva Park would probably eliminate fish movement during most of the year. Fish would not be able to move upstream when river discharge is below $500 \text{ ft}^3/\text{s}$. During an average year, $500 \text{ ft}^3/\text{s}$ is exceeded only 10 percent of the time, allowing fish to move upstream through Velva Park only 5 weeks out of the year. Fish movement is usually important during spawning periods for maintenance of existing fish populations. However, restricting movement in the Velva Park area is not expected to significantly affect area fish population because: (1) fish habitat in the area is fairly uniform; consequently, fish migration for spawning is not critical for maintaining existing populations (Ken Samber, N.D. Game & Fish Dept., Oct. 1982); (2) spawning usually occurs during spring floods when discharge is above $500 \text{ ft}^3/\text{s}$.

6.03 Terrestrial Ecosystem - Impacts on the terrestrial ecosystem would result from vegetation removal during channel and levee construction. Under alternative alignments ACFGHJLM and ACDEFGHJLM, vegetation losses would be about 17 acres, while under the other alternative alignments, 15 acres of vegetation would be lost. The vegetation to be removed is spread out along $1\frac{1}{2}$ miles of river channel, and is made up of elongate patches less than 100 feet in width. The species composition is typical of the area (see paragraph 5.11). No single patch is over 2 acres in size, and most are concentrated along the river as it flows along the north edge of town. The proposed project would not require removal of all floodplain vegetation in the area; however, on a localized scale, a substantial portion would be removed. Some minor adverse impacts on wildlife populations would result, but are not expected to be significant because the vegetation to be removed is not concentrated in one area and most of the existing habitat is already influenced

by human activity. Project features would displace some animals, thereby creating greater competition for available habitat. However, the surrounding habitat should absorb any displaced wildlife with only minor decreases in overall populations. In addition, some of the lost vegetation would be replaced through plantings done in conjunction with the project.

6.04 Threatened or Endangered Species - The bald eagle and peregrine falcon may use the area for feeding and resting during migration. They may stay in the area for anywhere from a few minutes to a few days, and would require a source of food (small mammals, birds, fish) and trees or cliffs for roosting. The proposed project would eliminate some trees (roosting areas) and the 15-17 acres of vegetation. As explained earlier, vegetation losses would cause very minor decreases in area wildlife populations (food sources). These impacts would affect the feeding and resting habitat for migrating bald eagles and peregrine falcons in the local area; however, since these species would use the area for only a short time and since the habitat losses are minor and very localized, the proposed project would have no significant impact on these species. This evaluation constitutes the biological assessment of the project's effects on endangered/threatened species, and will be coordinated with the Fish and Wildlife Service as required under section 7(c) of the Endangered Species Act, as amended (see paragraph 7.06).

6.05 Water Quality - Channel excavation and placement of fill material is a part of all the alternatives and would cause temporary increases in turbidity levels of the Souris River immediately downstream of the project area. The effects of channel modification at Minot were evident 23 river miles downstream (FWS, 1975); however, the sediments at Minot were much more nutrient-rich than those at Velva and the Minot channel project was much larger in scale. Suspended material from construction at Velva should settle out within the first few miles, thereby having only minor short-term impacts.

6.06 Velva Natural Area - All levee alignments would require removal of some vegetation in the Velva natural area. Alignments ACDEFGHJLM and ACFGHJLM would require clearing a 60-foot by 1,400-foot path (approximately 1.9 acres) through the middle of the area for levee construction. All other alignments (including the recommended alignment) would require clearing a 60-foot by 450-foot path (approximately 0.5 acres) along the eastern edge of the area.

6.07 Velva Park Recreation Resources - All alternative alignments would protect Velva Park from flooding; however, they would also occupy the present site of the rodeo arena, which would probably be relocated at local expense.

6.08 Prime and Unique Farmland - The various levee alignments would provide flood protection for three cropland areas: a 15.5-acre field immediately south of Velva Park; a 14.5-acre field enclosed by levees CDEFC; and a 20-acre portion of the area enclosed by levees HIJH. The specific acreage that would be protected by each alignment is shown in table 3.

6.09 Any cropland area protected from flooding could be developed for housing or other land uses. The housing situation in Velva is such that any protected areas would probably be developed (see exhibit 2: Executive Order 11988 analysis). Under the selected plan with its associated modifications, protected cropland would not be developed, and would maintain its agricultural potential either as cropland or as green space.

6.10 Floodplain Resources - Construction of levees around Velva would remove the entire city and some additional acreage from the floodplain. Because the urban land provides very little floodplain value, this should not significantly affect floodplain resources in the project area. Analysis of the pressure to develop in Velva indicates that any additional acreage removed from the floodplain would be developed and would result in lost floodplain values. The number of additional acres that would be protected by each alternative is given in table 3.

6.11 The recommended plan would induce development on 30 acres of cropland and is therefore not in compliance with EO 11988. Zoning the 30-acre area to preclude its development is being explored as a means to bring the recommended plan into compliance. Further information on the relationship between project alternatives and floodplain resources is found in exhibit 2.

6.12 Wetland Resources - For the purposes of the following discussion, wetlands are defined as oxbow lakes formed from old river meanders which are cut off from main channel flows. Project effects on other wetland types (stream channels) are presented in paragraph 6.02, Aquatic Ecosystem.

6.13 All alternatives involve some fill and/or excavation activities in wetland areas. Every alternative requires excavation of the oxbow lake near Velva Park for construction of the high-flow cutoff channel. In the cutoff channel area, 4 acres of the existing wetland vegetation would be replaced with a riprapped channel, which would provide only a fraction of the wildlife habitat now available.

6.14 All alternatives also require placement of a plug in a wetland area at the downstream end of the channel work to deflect the major portion of the flood flows down the main river channel. Culverts would be placed through the plug to allow some flow in and out of this oxbow, thereby maintaining the wetland values.

6.15 Alternatives ACFGHJLM and ACDEFGHJLM would isolate an additional 7 wetland acres around the Velva natural area from the replenishing characteristics of flood flows. This area could no longer be used by fish and would undergo accelerated degradation of its wetland values.

6.16 The impacts of the proposed project on all wetland areas as they relate to the requirements of EO 11990 are presented in exhibit 2: Executive Order 11990 analysis.

6.17 Transportation - Any of the alignments given detailed consideration would affect Velva's transportation system as follows: (1) FAS 371 (Truax Avenue) would be raised by about 3 feet near the SCS building at the east end of town. This would require a few weeks of traffic disruption (detours or slowing) at this point. (2) The park road would dead-end near the baseball field, no longer providing access to and from Highway 41. Park traffic would have to use the Second Avenue bridge and some combination of residential and commercial streets. (3) The two homes at the north end of Third Street West would be isolated when Glenwood Avenue, the only access to that block, is eliminated by the new levee. The city would probably wish to extend Third Street one block north by filling in the low-lying area north of Fifth Avenue. (4) Construction vehicles would use various city and township roads during the two years of construction activities. Some congestion and road surface deterioration would be expected during this time. Road conditions would be restored by the government contractor when work is completed. (5) Upon project completion, Velva's transportation system will be protected against flooding for the 1 percent frequency event, allowing safe movement within the city, and maintaining Velva's links with important regional facilities, such as hospitals.

6.18 Social Cohesion - A normally well-integrated and cohesive social group can be disrupted by issues such as those involving economic interests or emotional ties. Although there are no known severe threats to Velva's social cohesion, the following potentially disruptive issues should be noted.

6.19 Perceptions of Equity - Government actions are frequently perceived as having effects which benefit one group at a cost to another group. The recommended plan for Velva provides flood protection for most of the city's property and citizens, yet there are several sources of possible conflict about equity issues.

a. Flooding upstream of Velva could be increased; however, the increase will be less than 1 foot for the 100-year flood. Rural families may be concerned that protection for the city would adversely affect their property.

b. To save considerable project costs, a developed area at the downstream end of Railway Avenue will have a slightly lower degree of flood protection than the rest of the city. The property owners of this area may feel it is unfair that they are not "worth" the incremental cost of protection.

c. Some properties will have to be acquired, by purchase or condemnation, for the recommended plan. One home will be removed, and 30 acres of agricultural land will probably be acquired. Although the city must comply with Public Law 91-646 (the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970), which helps offset the financial burden of displacement, there are emotional ties to homes and farmland which cannot always be compensated for. Some owners may resent this as an unfair sacrifice for the community's good.

d. Although it is possible that Velva may receive financial assistance from the North Dakota State Water Commission, the method in which the balance of local costs are allocated to Velva taxpayers may cause dissatisfaction.

6.20 Opposition - The equity factors discussed above might become sources of opposition. In addition, three other areas of opposition may exist. (a) Some residents feel the selected plan is too environmentally destructive, especially in the upstream end near the park. (b) Residents regard the park as a particularly important social resource of historic and current value. Concerns have been expressed over removal of the rodeo arena and softball area, and over perceived disruption to the traditional patterns of activity in the park. (c) Some Velva residents may feel that their existing emergency levee provides adequate protection against present conditions. To these people, building a costly flood protection project might be seen as unnecessary, except for the Lake Darling raise.

6.21 Protection against flooding should improve Velva's economic and social viability as a secure and attractive community, thus strengthening the basis for social cohesion in the long run.

6.22 Institutional Arrangements - Changes in the legal and organizational relations in Velva would occur as a result of the project. Details of these changes cannot be known at this stage, but their general nature is discussed in terms of (a) the match of the project to local plans, (b) financial capability, and (c) organizational relations.

a. Match with Plans - The city of Velva has no formal planning process and no Comprehensive Plan. However, this project is in accord with many of the goals and objectives developed by the Souris Basin Planning Council, of which Velva is a member. Flood control has been a long-time goal of Velva city representatives, and the project as formulated seems to meet most local officials' expectations. However, some citizens would prefer that the city park be left intact, and there probably will be some conflict over whether land use changes should be permitted in the land presently in agricultural or recreational use.

b. Financial Capability - It is presently unknown whether Velva itself will be one of the primary members of the joint board being created to sponsor all parts of Lake Darling-related measures, or whether it will be represented by its county on the joint board. In either case, it will be faced with a large financial obligation. In the past, Velva has made effective use of Federal grants and assistance for community development. However, its own financial base is inadequate for the local cost-sharing received, using either the "traditional" or "innovative" administrative arrangements. The city is considering applying for assistance from the State Water Commission, which would probably turn to the State legislature for an appropriation as a separate line item. However, there would probably still be some amount to be financed by bond or tax levy. These questions may not be resolved by the local political process before the final EIS; therefore, the ultimate impact upon the community's financial capacity cannot be predicted.

c. Organizational Relations - The requirements for local sponsorship of the project will impose several changes on the existing organizational structure in the region. Although no substantial legal changes need be made, zoning ordinances for floodplain management must be passed and enforced by several government units, and regulation of drainage must be enforced.

6.23 The creation of a joint board to act as the single Lake Darling project sponsor would increase the existing organizational complexity considerably. This board may serve as the base for a Souris Basin Joint Water Resource District. Formation of such drainage system-based districts is encouraged by recent North Dakota legislation, and could promote wiser water and land use planning. However, if this joint board is created only for purposes of this project, and is not fully representative of all basin interests, it will add to the number of overlapping organizations and possibly forestall creation of a truly basin-wide water resource district.

6.24 Although details about the joint board have not been decided, there will probably be some mechanism which allocates costs to different political units benefitting from the project. Velva, as one of the early beneficiaries, would have to establish a legal and practical method of sharing responsibilities and costs for its portion of the project. These changes in organizational relations are neither necessarily good nor bad, but they can complicate the area's normal patterns of political power and accountability.

6.25 Cultural Resources - The results of the cultural resources survey and a check of the National Register of Historic Places indicate that no significant cultural resources would be affected by construction of levees along the recommended alignment. Further survey work would be required to fully assess the impacts of other alternative alignments.

6.26 At the current stage of study, the project only partially complies with the Archaeological and Historic Preservation Act, and the National Historic Preservation Act of 1966. Full compliance for the recommended alignment will be achieved when the results of the cultural resources survey are coordinated with the State Historic Preservation Officer and the National Park Service. Other alignments would require further survey work for full compliance.

6.27 Section 122, 1970 Rivers and Harbors Act - Section 122 of the 1970 Rivers and Harbors Act specifies these additional categories of impacts, which were considered but found to be not significant for this project: noise, displacement of people, aesthetic values, desirable community growth, public facilities and services, employment and labor force, public health and safety, regional growth, business activity, commercial navigation, energy needs and resources, air quality, water supply, ground water, and soils.

7.00 PUBLIC INVOLVEMENT

7.01 The following summarizes the public involvement program used to collect public views and responses to project proposals at Velva. Much of this was accomplished in conjunction with the public involvement program at Lake Darling. Section 6.00 of the programmatic EIS contains an overview of the public involvement program.

Public Involvement Program

7.02 The Velva portion of the Lake Darling project was included in a Notice of Intent to Prepare an EIS published in the Federal Register on 28 April 1982. Comments on the Velva features and significant resources were also solicited in scoping letters sent to all agencies and individuals concerned with the Lake Darling project. A public meeting was held in Velva on 17 August 1982 to inform the public of specific project proposals for Velva. Throughout the study, close coordination was maintained with several State, Federal, and local groups and individuals.

7.03 Major issues raised through the public involvement program included: protection of the recreation facilities at Velva Park; project effects on upstream flooding problems, prime farmland, and fish and wildlife habitat; and local cost-sharing responsibilities.

Required Coordination

7.04 This draft EIS will be coordinated with appropriate agencies, groups, and individuals. If public interest is sufficient, a public meeting will be held to allow opportunity for additional comment. Comments received on the draft

EIS will be used in preparation of the final EIS. Coordination with appropriate agencies and groups will continue throughout the study process.

7.05 Further coordination is required with the city of Velva regarding zoning restrictions in the cropland areas provided flood protection by the recommended alternative. If proposed zoning restrictions are acceptable to the city, the project would be in compliance with EO 11988.

7.06 As required by Section 7(c) of the Endangered Species Act of 1973, as amended, the draft EIS contains a summary of the biological assessment of impacts on federally-listed or proposed threatened or endangered species which may be affected by the project. This document will be coordinated with the U.S. Fish and Wildlife Service in compliance with the Act.

7.07 The results of all cultural resource investigations will be coordinated with the State Historic Preservation Office and the National Park Service. The comments of the Advisory Council on Historic Preservation will be requested in accordance with 36 CFR 800 for any significant cultural resources that may be affected by the proposed project.

7.08 Because the proposed plan involves placement of fill material in waters of the United States, a Section 404(b)(1) Evaluation of the effects of the fill placement has been prepared and circulated with these draft documents in compliance with the Clean Water Act of 1977, as amended (Public Law 92-500). The final EIS, containing the Section 404(b)(1) Evaluation, will be submitted to Congress under Section 404(r) of the Clean Water Act.

EIS Distribution

7.09 Either a copy of this document or a notice of its availability was sent to the individuals and organizations listed on exhibit 4.

Public Views and Responses

7.10 During the public involvement program, many public views were expressed that had a major influence on the study and were considered in the decision-making process. Three primary concerns were the reduction of flood damages, minimization of social impacts, and minimization of fish and wildlife impacts. These concerns and others were considered in the analysis of alternative levee alignments and in identification of a recommended plan.

LIST OF PREPARERS

<u>Name</u>	<u>Expertise</u>	<u>Experience</u>	<u>Role in Preparation of EIS</u>
Mr. Dennis Anderson	Aquatic Biologist	4 years aquatic biologist, St. Paul District, Corps of Engineers. 3 years research assistant, St. Mary's College.	Prepared 404(b)(1) evaluation.
Mr. David Berwick	Archaeologist	3 years cultural resources management and EIS studies, St. Paul District, Corps of Engineers. 2 years cultural resources management, Memphis District, Corps of Engineers.	Reviewed and coordinated cultural resources survey. Evaluated impacts on cultural resources.
Mr. Robbin Blackman	Supervisory Biologist	12 years EIS studies, Corps of Engineers.	EIS coordinator.
Mr. James Diedrick	Regional Economist	3 years regional economics, St. Paul District, Corps of Engineers.	Economics evaluation.
Mr. Gary Erickson	Civil Engineer	5 years consulting engineering firm; 17 years Corps of Engineers.	Project engineer.
Ms. Suzanne Gaines	Sociologist	3 years sociologist, St. Paul District, Corps of Engineers; 1 year research assistant, Arizona State Univ., Sociology Department and Survey Research Laboratory; 3 years teaching assistant, University of Minnesota, Sociology Department.	Prepared social impact evaluations and Executive Order 11988 evaluation.
Mr. Vic Hall	Wildlife Biologist	13 years wildlife biologist, U.S. Fish and Wildlife Service; 13 years wildlife/land manager, U.S. Fish and Wildlife Service.	Prepared Fish and Wildlife Coordination Act Report; evaluation of impacts on fish and wildlife.
Mr. James Holleran	Outdoor Recreation Planner	8 years resource planning, St. Paul District, Corps of Engineers.	Evaluation of impacts on recreation resources.

LIST OF PREPARERS (Continued)

<u>Name</u>	<u>Expertise</u>	<u>Experience</u>	<u>Role in Preparation of EIS</u>
Mr. John Kittelson	Biologist	3 years biologist, St. Paul District, Corps of Engineers	EIS coordinator and primary author; evaluation of biological impacts.
Mr. Dave Loss	Civil Engineer	11 years project management, St. Paul District, Corps of Engineers.	Project manager.

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- Council on Environmental Quality, 1976. Analysis of Impacts on Prime and Unique Farmland in Environmental Impact Statements. Memorandum for Heads of Agencies, Washington, D.C.
- Fish and Wildlife Service, 1975. Limnological Survey of the Souris River and its Major Tributaries in North Dakota. Bismarck Area Office, Bismarck, N.D.
- Fish and Wildlife Service, 1978. Stream Evaluation Map, North Dakota. Office of Biological Services, Denver, CO.
- Malcolm, Jon M., 1979. The Relationship of Wetland Drainage to Flooding and Water Quality Problems and its Impacts on the J. Clark Salyer NWR. Fish and Wildlife Service, Upham, N.D.
- N.D. Public Service Commission, n.d. Energy Conversion Facility and Transmission Facility Siting Inventory Report, Bismarck, N.D.

Table 1. Relationships of Plans to Environmental Requirements.

	No Action	Levee ACDFGHJKM	Levee ACDFGHJLM	Levee ACDFGHIJM	Levee ACDFGHJLM	Levee ACDFGHJLM	Levee ACDFGHJLM	Levee (1) ACDFGHJKM
<u>Federal Statutes</u>								
Archaeological and Historic Preservation Act, as amended, 16 U.S.C. 469, et seq. ⁽²⁾	N/A	Partial	Partial	Partial	Partial	Partial	Partial	Partial
Clean Air Act, as amended, 42 U.S.C. 7401, et seq.	Full	Full	Full	Full	Full	Full	Full	Full
Clean Water Act, as amended (Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq.	Full	Full	Full	Full	Full	Full	Full	Full
Coastal Zone Management Act, as amended, 16 U.S.C. 1451, et seq.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, et seq.	Full	Full	Full	Full	Full	Full	Full	Full
Estuary Protection Act, 16 U.S.C. 1221, et seq.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq.	Full	Full	Full	Full	Full	Full	Full	Full
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq.	Full	Full	Full	Full	Full	Full	Full	Full
Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601-4601-11, et seq.	Full	Full	Full	Full	Full	Full	Full	Full
Marine Protection, Research and Sanctuaries Act, 22 U.S.C. 1401, et seq.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, et seq.	Full	Full	Full	Full	Full	Full	Full	Full
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470a, et seq. ⁽²⁾	N/A	Partial	Partial	Partial	Partial	Partial	Partial	Partial
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wild and Scenic Rivers Act; as amended, 16 U.S.C. 1001, et seq.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<u>Executive Orders/Memoranda</u>								
Floodplain Management (EO 11988)	Full	Full	Full	Non ⁽³⁾	Non ⁽³⁾	Non ⁽³⁾	Non ⁽³⁾	Non ⁽³⁾
Protection of Wetlands (EO 11990)	Full	Full	Full	Full	Full	Full	Full	Full
Environmental Effects Abroad of Major Federal Actions (EO 12114)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Analysis of Impacts on Prime and Unique Farmlands, CEQ Memorandum 30 August 1976	Full	Full	Full	Full	Full	Full	Full	Full
State and Local Policies	Partial	Full	Full	Full	Full	Full	Full	Full
Land Use Plans (None in city of Valva)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTES: The compliance categories used in this table were assigned based on the following definitions.

- a. Full compliance - All requirements of the statute, E.O., or other policy and related regulations have been met for the current stage of planning.
- b. Partial compliance - Some requirements of the statute, E.O., or other policy and related regulations remain to be met for the current stage of planning.
- c. Noncompliance - Violation of a requirement of the statute, E.O., or other environmental requirement.
- d. Not applicable (N/A) - Statute, E.O., or other policy not applicable for the current stage of planning.

(1) Levee ACDFGHJKM is the tentatively recommended plan. Letters used to describe levee alignments correspond to points on plate 2.

(2) See paragraph 6.25.

(3) See paragraph 6.10 and Exhibit 2.

C

Table 2: Cost and Implementation Responsibilities of Alignments Given Detailed Consideration.

	<u>Total Cost</u> ⁽¹⁾	<u>Federal Share</u> ⁽¹⁾	<u>Local Share</u> ⁽¹⁾
Alignment ACDEFGHIKM	\$5,185,000	\$4,900,000	\$285,000
Alignment ACDEFGHIJLM	\$5,365,000	\$5,065,000	\$300,000
Alignment ACDEFGHJLM	\$5,240,000	\$4,950,000	\$290,000
Alignment ACFGHIJLM	\$5,180,000	\$4,890,000	\$290,000
Alignment ACFGHJLM	\$5,054,000	\$4,774,000	\$280,000
Alignment ACFGHIKM	\$5,000,000	\$4,725,000	\$275,000

(1) If proposed innovative cost sharing policies apply to this project, the Federal Government would pay 65 percent of total costs and the local sponsor would pay the remaining 35 percent.

C

Table 3. Comparative Impacts of Alternatives

Significant Resources	Plans	Base condition	Future without-PROJECT condition	Levee alignment (1)				
				ACRCHULIN	ADREPHULIN	ADREPHULIN	ADREPHULIN	ADREPHULIN
Economic considerations (A, B, C, D)		average annual damages = \$400	average annual damages = \$400	total costs = \$5,185 net benefits = 124 b/c ratio = 1.46	total costs = \$5,240 net benefits = 133 b/c ratio = 1.46	total costs = \$5,180 net benefits = 136 b/c ratio = 1.48	total costs = \$5,054 net benefits = 143 b/c ratio = 1.51	total costs = \$5,000 net benefits = 144 b/c ratio = 1.52
	Aquatic ecosystem	Substrate: mud and rock floor; high spring flows are usually followed by low summer/winter flows. River at Valve given "highest valued fishery resource" rating. (wilderness class 1A)	Development pressure and trends in the basin indicate a slow deterioration of the aquatic ecosystem.	Substrate would change to large rock and velocities would increase in a 3,400-foot reach of river channel. Flows would be restricted to approximately 160 ft ³ /s maximum in a 4,400-foot reach. Riprap would provide better habitat for many bottom-dwelling aquatic insects, and consequently, better fish food. The increases in food value would be offset by decreases in the cover and reproductive values of the habitat. Project features around Valve Park would prohibit fish passage during some portions of the year.	15 acres of floodplain vegetation would be eliminated, causing a minor decrease in wildlife populations.	15 acres of floodplain vegetation would increase in a 3,400-foot reach of river channel. Flows would be restricted to approximately 160 ft ³ /s maximum in a 4,400-foot reach. Riprap would provide better habitat for many bottom-dwelling aquatic insects, and consequently, better fish food. The increases in food value would be offset by decreases in the cover and reproductive values of the habitat. Project features around Valve Park would prohibit fish passage during some portions of the year.	15 acres of floodplain vegetation would be eliminated, causing a minor decrease in wildlife populations.	17 acres of floodplain vegetation would be eliminated, causing a minor decrease in wildlife populations.
Terrestrial ecosystem	Wooded river corridor provides high valued habitat for many woodland/wetland species. Woodlands are surrounded by low value cropland & residential areas. Woodlands are especially valued in R.D. because they are uncommon.	Some clearing of vegetation will not significantly affect the future condition of the terrestrial ecosystem. Life populations.	No change is assumed.	No effect.	No effect.	No effect.	No effect.	No effect.
State or Federally listed endangered or threatened species	No State listed species have been recorded in the Valve area (3) in the U.S. Fish and Wildlife Service (like the wood thrush, peregrine falcon (through) as migrating through the area. (3)	Increased turbidity levels would occur during construction periods. No other significant effects are anticipated.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Water quality	USGS data show some sediment enrichment but otherwise good water quality. Impoundments on the river may have low dissolved oxygen.	A trend toward declining water quality resulting from more intensive agricultural practices may be offset by better sewage treatment measures. Therefore, no change is assumed.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Valve Natural Area	The Natural Area consists of 20 acres of floodplain forest surrounded by an oxbow lake. The land was donated to the city. Federal funds were used to construct a nature trail around the perimeter.	Because the area is not protected by law, it might be converted to other uses at some point in the future.	A 60-foot by 450-foot path for the levee would be cleared along the west edge of the area. Re-establishment of trees in this path would not be allowed.	A 60-foot x 1,400-foot path for the levee would be cleared through the middle of the area. Re-establishment of trees in this path would not be allowed.	A 60-foot by 450-foot path for the levee would be cleared along the west edge of the area. Re-establishment of trees in this path would not be allowed.	A 60-foot x 1,400-foot path for the levee would be cleared through the middle of the area. Re-establishment of trees in this path would not be allowed.	A 60-foot by 450-foot path for the levee would be cleared along the west edge of the area. Re-establishment of trees in this path would not be allowed.	A 60-foot by 450-foot path for the levee would be cleared along the west edge of the area. Re-establishment of trees in this path would not be allowed.
Valve Park Recreation Resources	Park facilities include restrooms, ball field, all-weather track, benches, buildings, fences, lights, etc.	Existing flooding problems are expected to ruin the all-weather track and damage other facilities.	Levee would alleviate existing flood problem. Construction of cutoff channel would require relocation of roads grounds.	No effect.	No effect.	No effect.	No effect.	No effect.
Prime and Wetland Farmland as defined in the CRQ	Soil throughout the project area in the Valve Loom, Valve Loom is listed by the RCR as prime farmland.	Lack of development pressure and floodplain regulation are expected to preserve existing prime farmland.	Flood protection would be provided to 15.5 acres of prime farmland (Valve Loom) and land (Valve Loom) and would probably result in this acreage being removed from crop production.	Flood protection would be provided to 35.5 acres of prime farmland (Valve Loom) and land (Valve Loom) and would probably result in this acreage being removed from crop production.	Flood protection would be provided to 30 acres of prime farmland (Valve Loom) and would probably result in this acreage being removed from crop production.	Flood protection would be provided to 30 acres of prime farmland (Valve Loom) and would probably result in this acreage being removed from crop production.	Flood protection would be provided to 30 acres of prime farmland (Valve Loom) and would probably result in this acreage being removed from crop production.	Flood protection would be provided to 30 acres of prime farmland (Valve Loom) and would probably result in this acreage being removed from crop production.

(1) Letter designations of alignments represent points on plate 2.
 (2) North Dakota Natural Heritage program 1992, personal communication.
 (3) See exhibit 3: Fish and Wildlife Coordination Act report.

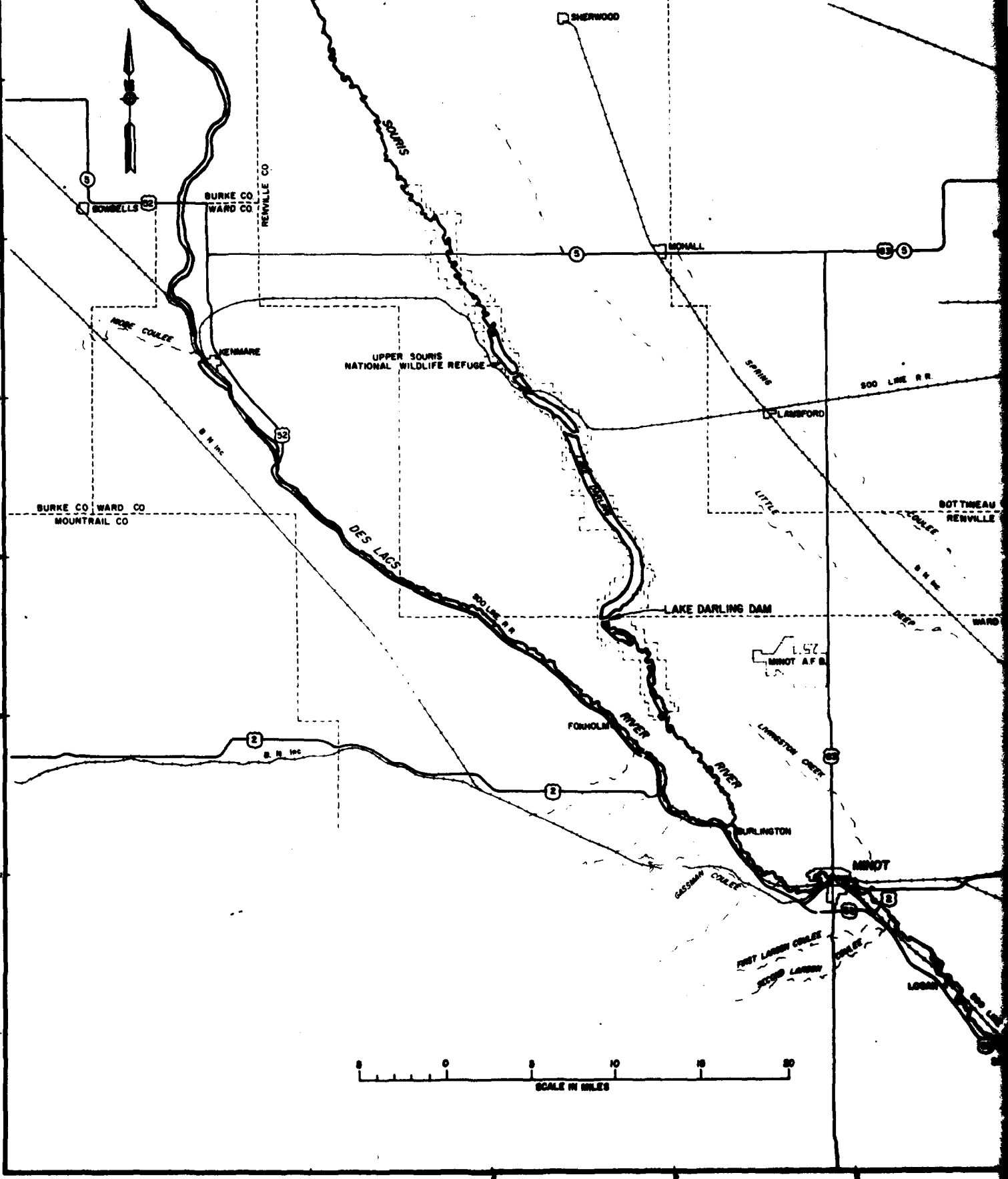
Table 3. Comparative Impacts of Alternatives (Continued)

Significance Resource	Baseline Condition	Future without-PROJECT Condition	Levee alignment (1) ACHERON	Levee alignment (1) ACHERON	Levee alignment (1) ACHERON	Levee alignment (1) ACHERON	Levee alignment (1) ACHERON
Floodplain Resources as specified in BD 11986	The entire project area is within the 100-year floodplain.	Lack of flood protection and floodplain regulation are expected to reduce existing floodplain resources.	61.5 acres of land (other than urban land) would be removed from the floodplain. 15.5 of these acres would probably be developed into non-floodplain uses.	61.5 acres of land (other than urban land) would be removed from the floodplain. 15.5 of these acres would probably be developed into non-floodplain uses.	82 acres of land (other than urban land) would be removed from the floodplain. 30 of these acres would probably be developed into non-floodplain uses.	96 acres of land (other than urban land) would be removed from the floodplain. 30 of these acres would probably be developed into non-floodplain uses.	56 acres of land (other than urban land) would be removed from the floodplain. 30 of these acres would probably be developed into non-floodplain uses.
Wetland Resources (other than the river channel)	Old wetlands (old river channel) are found throughout the project area.	Wetlands in the project area are not expected to change.	Channel excavation and levee construction would involve filling and/or excavating 4 acres of wetland.	Channel excavation and levee construction would involve filling and/or excavating 4 acres of wetland.	Channel excavation and levee construction would involve filling and/or excavating 4 acres of wetland.	Channel excavation and levee construction would involve filling and/or excavating 4 acres of wetland.	Channel excavation and levee construction would involve filling and/or excavating 4 acres of wetland.
Transportation (Boo Line Railroad, city roads)	Boo Line is serviced by the Boo Line Railroad and a well developed and maintained network of road transportation.	No significant changes foreseen.	Construction of a levee parallel to the railroad tracks between points C and D could cause excessive snow build-up on the tracks.	Construction of a levee parallel to the railroad tracks between points C and D could cause excessive snow build-up on the tracks.	Construction of a levee parallel to the railroad tracks between points C and D could cause excessive snow build-up on the tracks.	Construction of a levee parallel to the railroad tracks between points C and D could cause excessive snow build-up on the tracks.	Construction of a levee parallel to the railroad tracks between points C and D could cause excessive snow build-up on the tracks.
Social Cohesion	Fairly high cohesion; cultural homogeneity and interdependence.	No significant changes foreseen.	All levee alignments would affect transportation as follows: (1) temporary interruption of PAS 371 (Trunk Ave.); (2) closure of park road. Four-to-five. 41 traffic region would be protected during floods (up to 1 percent frequency).	All levee alignments would affect transportation as follows: (1) temporary interruption of PAS 371 (Trunk Ave.); (2) closure of park road. Four-to-five. 41 traffic region would be protected during floods (up to 1 percent frequency).	All levee alignments would affect transportation as follows: (1) temporary interruption of PAS 371 (Trunk Ave.); (2) closure of park road. Four-to-five. 41 traffic region would be protected during floods (up to 1 percent frequency).	All levee alignments would affect transportation as follows: (1) temporary interruption of PAS 371 (Trunk Ave.); (2) closure of park road. Four-to-five. 41 traffic region would be protected during floods (up to 1 percent frequency).	All levee alignments would affect transportation as follows: (1) temporary interruption of PAS 371 (Trunk Ave.); (2) closure of park road. Four-to-five. 41 traffic region would be protected during floods (up to 1 percent frequency).
Institutional Arrangements	The city works with other government agencies for development, but lacks a comprehensive development plan. Value of the flood plain with respect to agriculture is not known. It has a student town home.	No significant changes foreseen.	Threats to cohesion could arise from perceptions of inequities including: exclusion of east area of town from protection; acquisition of one residence and agricultural acres; and allocation of local costs. Additional threats to social cohesion could result from potential opposition over environmental costs, disruption of the city park, or perceptions of the necessity of flood protection. Social cohesion could be improved by a decreased flooding frequency.	Threats to cohesion could arise from perceptions of inequities including: exclusion of east area of town from protection; acquisition of one residence and agricultural acres; and allocation of local costs. Additional threats to social cohesion could result from potential opposition over environmental costs, disruption of the city park, or perceptions of the necessity of flood protection. Social cohesion could be improved by a decreased flooding frequency.	Threats to cohesion could arise from perceptions of inequities including: exclusion of east area of town from protection; acquisition of one residence and agricultural acres; and allocation of local costs. Additional threats to social cohesion could result from potential opposition over environmental costs, disruption of the city park, or perceptions of the necessity of flood protection. Social cohesion could be improved by a decreased flooding frequency.	Threats to cohesion could arise from perceptions of inequities including: exclusion of east area of town from protection; acquisition of one residence and agricultural acres; and allocation of local costs. Additional threats to social cohesion could result from potential opposition over environmental costs, disruption of the city park, or perceptions of the necessity of flood protection. Social cohesion could be improved by a decreased flooding frequency.	Threats to cohesion could arise from perceptions of inequities including: exclusion of east area of town from protection; acquisition of one residence and agricultural acres; and allocation of local costs. Additional threats to social cohesion could result from potential opposition over environmental costs, disruption of the city park, or perceptions of the necessity of flood protection. Social cohesion could be improved by a decreased flooding frequency.
Cultural Resources	26 historic structures, 1 archaeological site, and historic structures as a result of flooding. No isolated find are located within boundary of recommended plan. No National Register of Historic Places properties are located in vicinity of Valva.	Continued deterioration of historic structures as a result of flooding.	All alignments match with basin-wide plans. Financial capability of local sponsor is uncertain at this point. Organizational relations would probably become more complex as a result of the project.	All alignments match with basin-wide plans. Financial capability of local sponsor is uncertain at this point. Organizational relations would probably become more complex as a result of the project.	All alignments match with basin-wide plans. Financial capability of local sponsor is uncertain at this point. Organizational relations would probably become more complex as a result of the project.	All alignments match with basin-wide plans. Financial capability of local sponsor is uncertain at this point. Organizational relations would probably become more complex as a result of the project.	All alignments match with basin-wide plans. Financial capability of local sponsor is uncertain at this point. Organizational relations would probably become more complex as a result of the project.

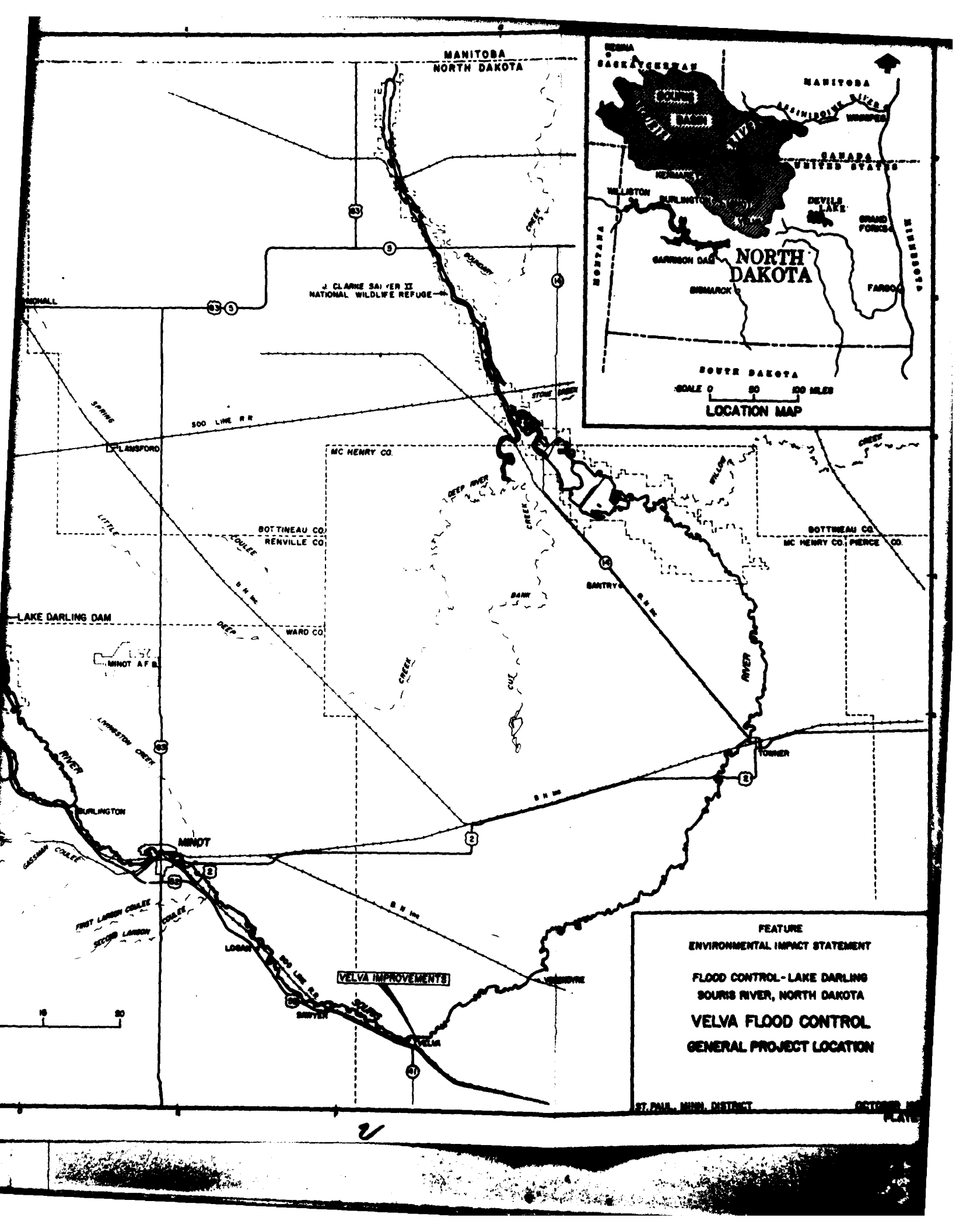
(1) Letter designations of alignments represent points on plate 2.
 (2) North Babson National Heritage program 1982, personal communication.
 (3) See exhibit 3: Fish and Wildlife Coordination Act report.

CANADA
UNITED STATES

BASKATCHEWAN
NORTH DAKOTA



SCALE IN MILES



MANITOBA
NORTH DAKOTA



J. CLARKE SAYER II
NATIONAL WILDLIFE REFUGE

SMALL

SPRING

SDD LINE R.R.

LANSFORD

MC HENRY CO.

BOTTINEAU CO.
RENVILLE CO.

LAKE DARLING DAM

MINOT AFB

WARD CO.

BOTTINEAU CO.
MC HENRY CO.; PIERCE CO.

LYNCHTON CREEK

MINOT

FIRST LANSON COULEE
SECOND LANSON COULEE

LODGE

VELVA IMPROVEMENTS

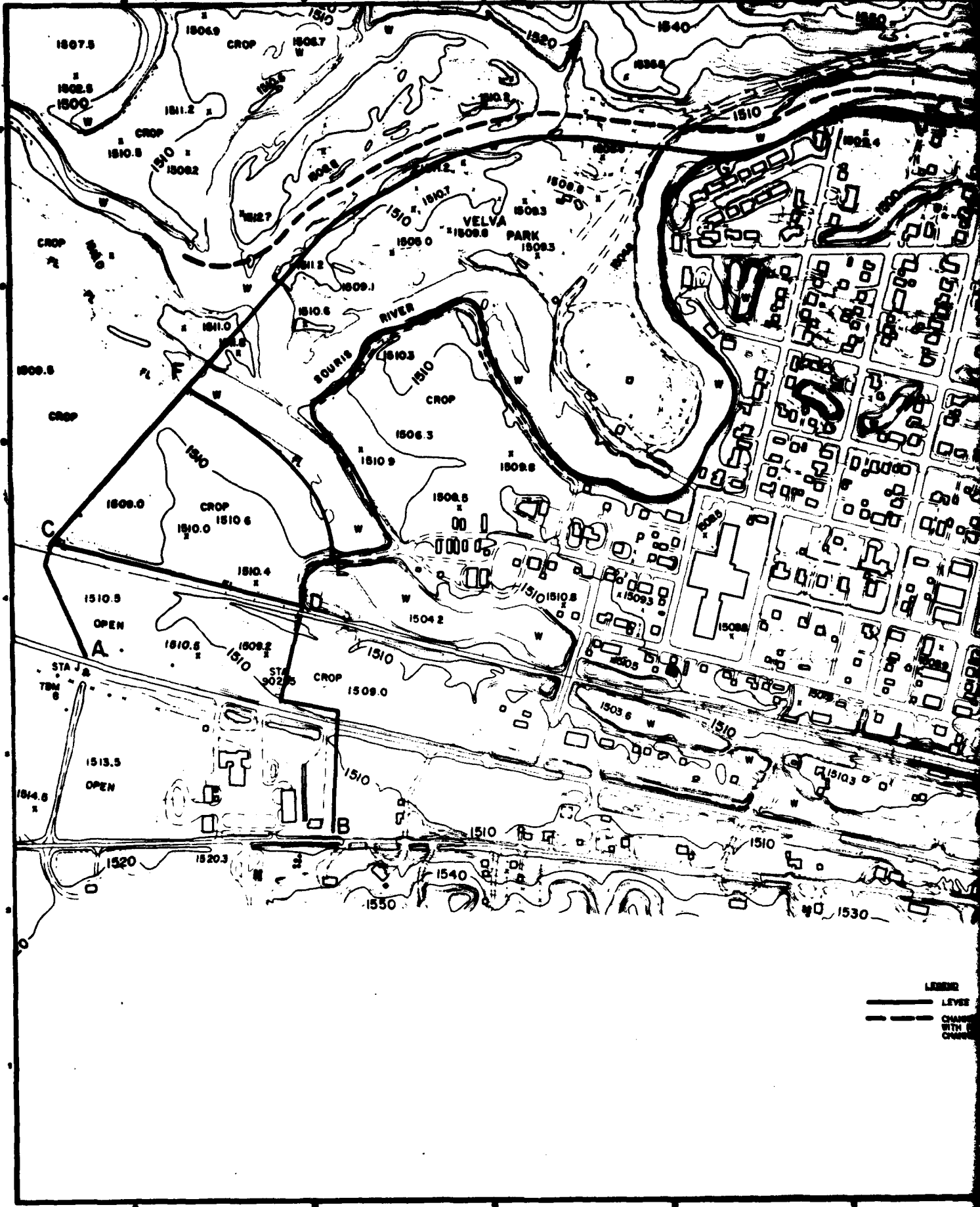
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FEATURE
ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL - LAKE DARLING
SOURIS RIVER, NORTH DAKOTA
VELVA FLOOD CONTROL
GENERAL PROJECT LOCATION

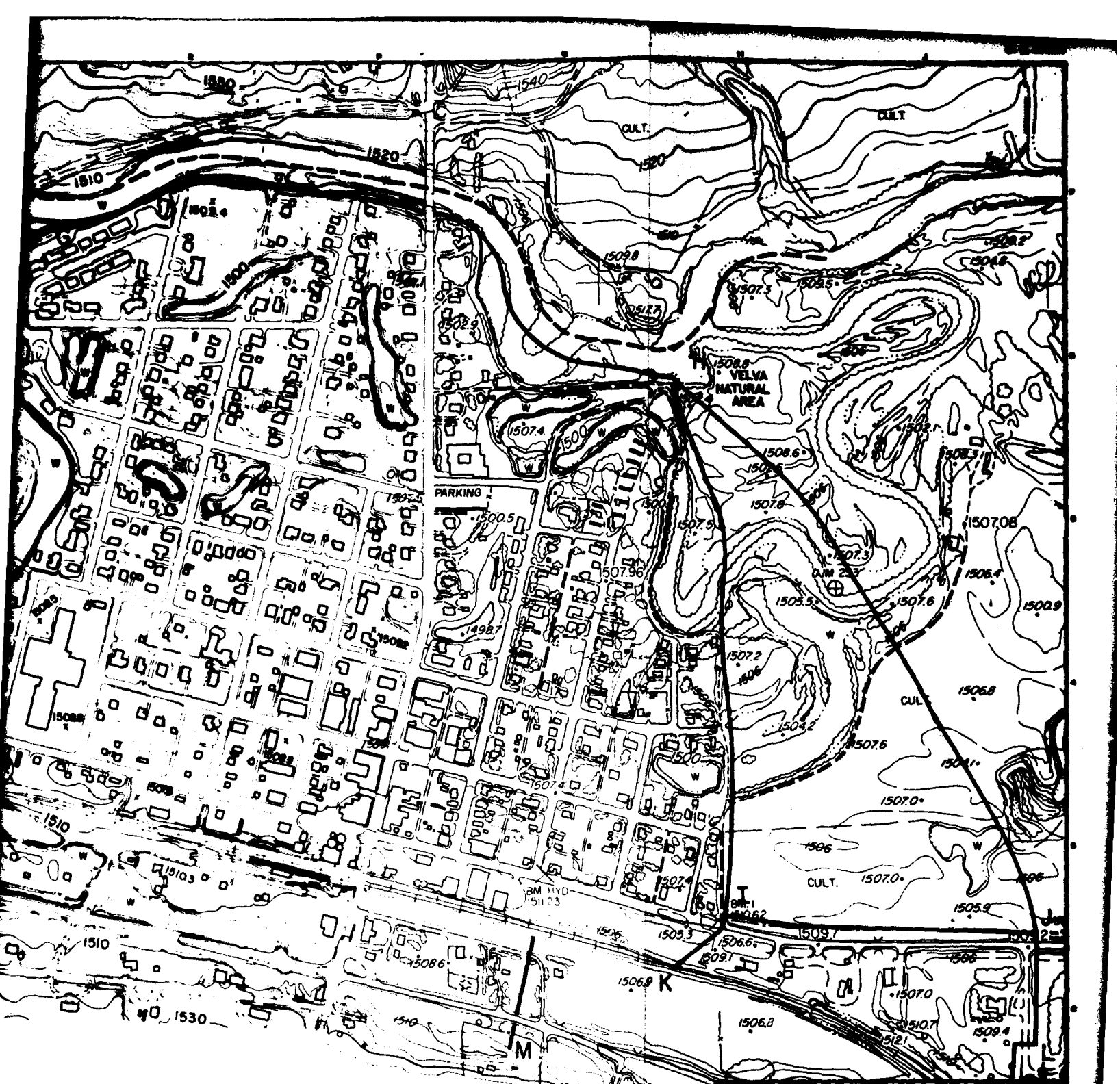
ST. PAUL, MINN. DISTRICT

OCTOBER 1964

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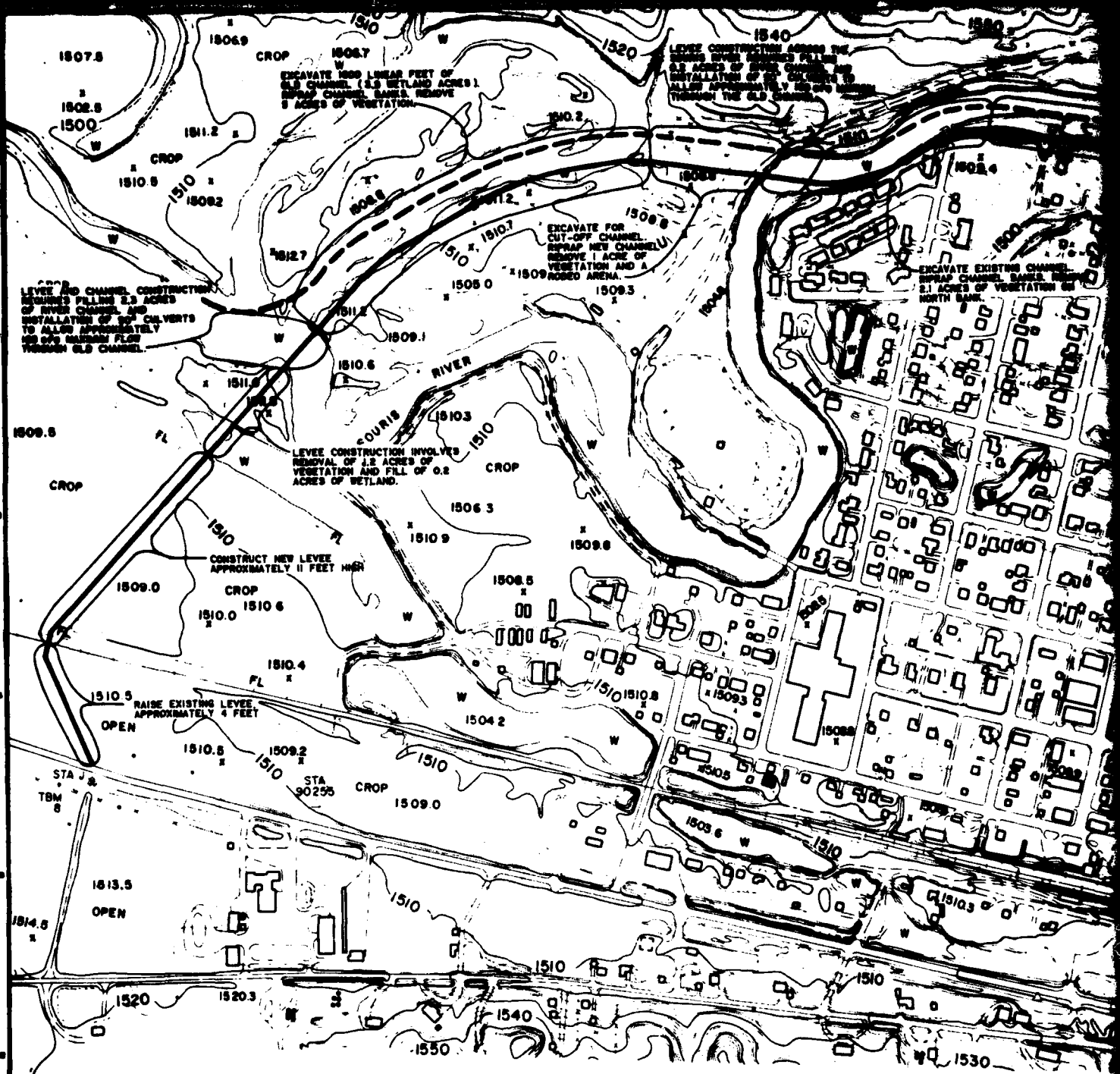


LEGEND
——— LEVEL
- - - - CHANGE WITH CHANGE



LEGEND
 ——— LEVEE
 - - - - CHANNEL MODIFICATION WITH RIPRAP ON BOTH CHANNEL BANKS.

FEATURE ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL - LAKE DARLING SOURCE RIVER, NORTH DAKOTA
VELVA FLOOD CONTROL
ALTERNATIVE LEVEE ALIGNMENTS



LEGEND

———— LEVEE

--- CHANNEL MODIFICATION WITH RIPRAP ON BOTH CHANNEL BANKS.

- PROJECT TOTALS:**
- CONSTRUCT 10,150 FEET OF LEVEE.
 - MODIFY AND RIPRAP 4,300 LINEAR FEET OF EXISTING RIVER CHANNEL.
 - CONSTRUCT A 2,800 FOOT CUT-OFF CHANNEL AROUND VELVA PARK.
 - REMOVE 14.4 ACRES OF VEGETATION.
 - FILL 4 ACRES OF WETLAND (OTHER THAN STREAM CHANNEL WETLAND).
 - RELOCATE A RODED ARENA AND ONE RESIDENCE.
 - ELIMINATE HIGH FLOWS FROM 4,400 FEET OF RIVER CHANNEL.
 - ALTER 80 ACRES OF EXISTING RIVER CHANNEL HABITAT.

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PRELIMINARY
SECTION 404(b)(1) EVALUATION
for Fill Activities Associated With
the Flood Control Project on the Souris
River at Velva, North Dakota

I. Project Description

A. Location: The proposed fill activity would take place along the Souris River in the immediate vicinity of Velva, North Dakota.

B. General Description: The proposed action would involve: (1) placement of clay-silt-sand fill material along the bank of the Souris River and other areas immediately surrounding the City of Velva, North Dakota, for the construction of 10,130 feet of levee; (2) placement of rock 12 to 24 inches deep along 4,300 linear feet of existing Souris River channel; (3) placement of clay-silt-sand fill and rock riprap along a proposed high water cutoff channel around Velva Park; (4) installations of culverts, to allow a maximum flow of 160 cubic feet per second in the main channel of the Souris River that will be blocked by the levee construction; (5) placement of a clay-silt-sand plug, rock riprap, and a culvert across the mouth of an old oxbow channel near the downstream end of Velva.

C. Authority and Purpose: Federal authority for the project is contained in the fiscal year 1982 Energy and Water Development Appropriations Act. The purpose of the project is to provide flood protection for the city of Velva, North Dakota.

D. General Description of Dredged or Fill Material

(1) General Characteristics of Material: Field stones with a probable average diameter of 6 inches would be used for the riprap. The other fill material would be collected from within the basin and would most likely consist of two types: recent alluvium (clay, silt, fine to medium sand), and morained deposits (impervious stoney clay till with thin seams, lenses, and channels of sand gravel).

(2) Quantity of Fill Material: Fill material would consist of approximately 43,400 cubic yards of rock riprap and 156,500 cubic yards of a combination of excavated dry bank material, borrow pit material, and material from the existing levee.

(3) Source of Material: The field stones for the riprap would be obtained from stockpile sites near the project area. The clay-silt-sand material would be obtained from excavation of selected dry bank areas; from part of the high water cutoff channel and straightening of the existing channel; from removal of the existing emergency levee; and from an approved borrow pit located near the project area.

E. Description of Proposed Discharge Site

(1) Location: The fill activity would take place along a straightened section of the Souris River immediately adjacent to Velva; along a proposed high water cutoff channel; across the existing channel upstream of Velva; across the mouth of an old oxbow channel immediately downstream of Velva; and at other areas immediately up and downstream of Velva. Map 1 shows the areas where fill activities will occur.

(2) Size: The proposed action would cover and destroy approximately 16 acres of stream bottom aquatic habitat and 4 acres of wetlands.

(3) Type of Site: The fill activity would take place in a riverine setting at an unconfined site.

(4) Types of Habitat: Approximately 20 acres of wetlands would be affected. Because the overall proposed plan requires much excavation and dredging of the existing channel and of the proposed high water cutoff channel, most of the fill area would be recently exposed clay-silt-sand bottom, essentially devoid of life. However, some of the fill material along the Souris channel would be placed on undisturbed stream bottom with a substrate of mud and occasionally, rock. Much of the existing bank areas are steep and subject to extreme erosion.

(5) Timing and Duration: If the project is approved and funds are available, construction would begin in November 1984 and be completed by November 1986.

F. Description of Disposal Method: The rock, borrow pit material, and material from the existing levee would be moved and placed by trucks, front-end loaders, tractors, and other mechanical means.

II. Factual Determinations

A. Physical Substrate Determinations

(1) Substrate Elevation and Slope: The fill material would not change the existing gradient (approximately 0.5 feet per mile) of the Souris River. Existing steep channel banks would be flattened to a slope of 1 foot vertical for every 2.5 feet horizontal.

(2) Sediment Type: The Fish and Wildlife Service (1975) indicates that the general surficial sediments in the area consist of mud and sand with occasional rocks. The material from the borrow pits, the excavated material, and the material from the existing levee are probably similar in nature and would not cause a significant change in substrate type in areas where only this material is used. However, most of the bank areas would be riprapped with rock and this would be a significant change from their clay-silt-sand substrate.

(3) Dredged/Fill Material Movement: Because of the presence of fine material (silts and clays) in the fill, it is anticipated that some movement would occur along the main channel of the Souris River during construction, especially in the areas where the channel is being straightened. However, no construction would be done during periods of high discharge and the sand- and gravel-sized particles and a majority of the silts and clays would therefore not move from the fill areas. Riprapping with rocks in high energy areas would be done shortly after the silt-clay-sand fill has been placed and would greatly reduce the potential for movement of the fill material. The riprap would also prevent long-term movement of the fill material.

B. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

(a) Salinity: Not applicable.

(b) Water Chemistry: The placement of clean fill material should not have any significant impacts on the Souris River's water chemistry.

(c) Clarity: Some minor, short-term decreases in clarity in the Souris River would be expected during the fill activities because of the presence of silts and clays in the borrow material and in the existing emergency levee. However, once the riprap is in place, there should be a slight improvement in water clarity because the erosion which is presently occurring will be reduced.

(d) Color: The proposed fill activity should have no impact on water color.

(e) Odor: The proposed fill activity should have no impact on water odor.

(f) Taste: The proposed fill activity should have no appreciable impact on water taste.

(g) Dissolved Gas Levels: The proposed fill activity should have very minimal impact on dissolved gas levels. Aerobic sediments with only small amounts of organic material would be used as fill; therefore, no impact on dissolved oxygen levels is expected.

(h) Nutrients: The proposed fill activity should have no significant impact on nutrient levels in the water.

(i) Eutrophication: The proposed fill activities should have no impact on the level or rate of eutrophication of the water.

(2) Current Patterns and Circulation

(a) Current Patterns and Flow: The purpose of the proposed project is to change current patterns and flow conditions in the area to provide flood protection for the city of Velva.

(b) Current Velocity - The proposed project would affect current velocity in the three areas summarized below. All other areas would experience only minor changes in current velocity.

(1) Current velocity would increase in the straightened channel area (reach B on Map 1) during flood conditions. Under existing conditions, flood flows are allowed to spread over the entire floodplain. The proposed project would restrict these flows to the river channel, thereby forcing more water through a confined area and increasing current velocity.

(2) The existing river channel around Velva Park would be cut off by the levee, but would be supplied with water through culverts. The water supply rate to this area compared with the total discharge rate for the Souris River is shown in Figure 1. Discharge on the river is greater than 120 ft³/s for about 25 percent of the year; the proposed project would lower discharge and velocities in this area for about 3 months during the year. In addition, the culverts would have to be closed because of high discharges sometime between April and June in 4 of every 5 years. At this time, a flow of only 15 ft³/s would be occurring in the area. (This flow would result from seepage, runoff, and a 6,800-gallon pumping station located near the downstream culvert.) The culverts could be closed from only a couple of days to as many as 50 days. It is expected that for 1 year in 5, they would have to be closed for 15 days or longer. Current velocities in this area would be substantially reduced (cross-sectional current velocities of approximately 0.05 foot per second) when the culverts are closed.

(3) Project features in the Velva Park area would affect discharge/velocity relationships such that fish movement would be affected in the following way: for Souris River discharges between 500 ft³/s and 1,700 ft³/s, fish would be able to use the existing river channel around Velva Park for upstream movement. For discharges above 1,700 ft³/s, fish movement could occur through the high flow cutoff channel north of the park. For discharges under 500 ft³/s, fish would not be able to move through the Velva Park area because current velocities in the culverts would be above 3 ft/sec, and the rock wier in the high-flow cutoff channel would prevent fish passage.

(c) Stratification: The proposed fill activities would have no significant impact on stratification.

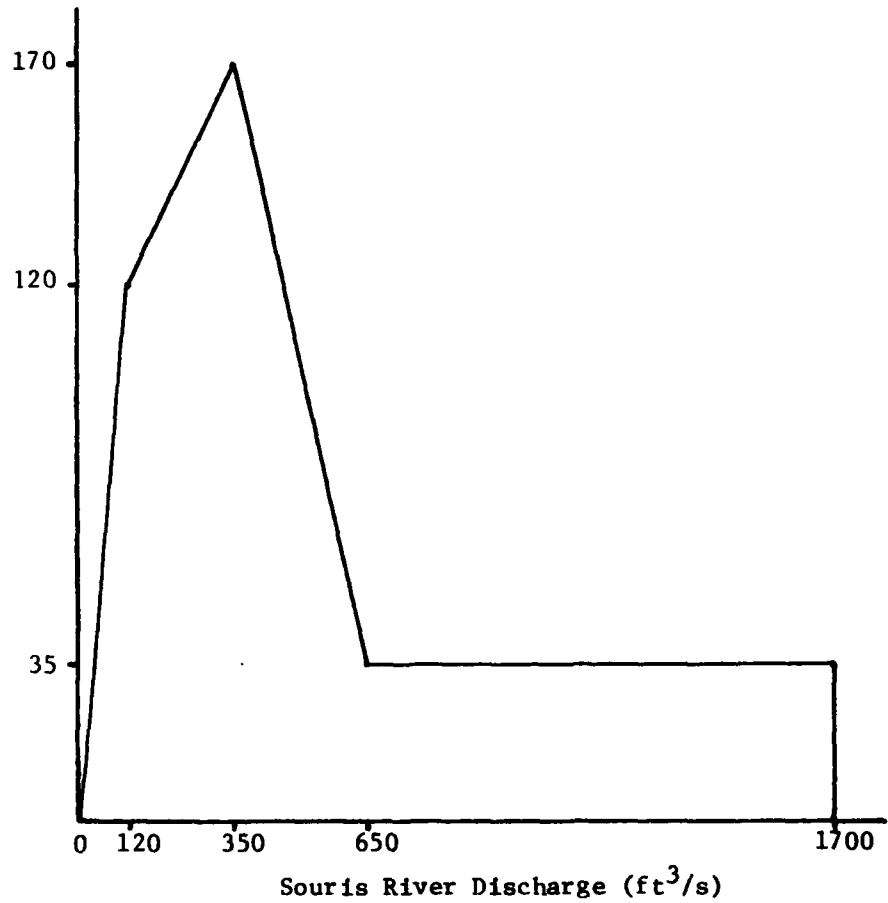
(d) Hydrologic Regime: The proposed fill activities would have no significant impact on the hydrologic regime.

(3) Normal Water-Level Fluctuations: Because of the constriction of flood waters caused by the levee system, upstream river stages would increase. Maximum increases are expected to be less than 1 foot for the 100-year flood. The fill activity will have negligible effect on downstream river stages.

(4) Salinity Gradient: Not applicable.

(5) Actions Taken to Minimize Impact: Culverts would be added to the proposed cutoff section of main channel and, except for during peak flows, 170 ft³/s of flow, or the entire river's flow (whichever is less), would be maintained to reduce impacts in this area. Mechanical means of placing the fill material would decrease the impact on water quality and fill material movement. In addition, placement of the rock riprap on the levee shortly after construction would reduce long-term impacts on water quality and on fill movement from the site.

Figure 1: Discharge rates in culverts around Velva Park compared to discharge rates in the Souris River.*



*Discharge rates are only approximate, and represent the best estimates available at time of publication. The graph is intended to show the anticipated relationship more than the absolute numeric values.

C

C. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Fill Site: Elevated levels of turbidity and suspended particulates would occur from construction activities such as excavation and dredging, and the fill activities would add to this problem. Some of the silts and clays in the borrow material and the existing emergency levee would mix with river water during placement, and some erosion may occur prior to stabilization with rock riprap. This would cause elevation in both turbidity and suspended particulate levels, but the increases are expected to be relatively minor and short-term.

(2) Effects on Chemical and Physical Properties of Water Column: Because of the clean nature of the fill material, there should be a negligible effect on the chemical properties of the water column. However, there may be a slight decrease in light penetration as a result of the increases in turbidity and suspended solids.

D. Contaminant Determinations: The fill material would be clean borrow material, existing levee material, dry excavated bank material, and rock, and would not introduce contaminants into the aquatic system. Neither the material nor its placement should cause relocation or increases of contaminants in the aquatic system. This material is excluded from further testing as provided by 40 CFR 230.60.

E. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton: Increases in turbidity and suspended solids near the fill activities would have a localized suppressing effect on phytoplankton and zooplankton productivity. However, these local effects are not considered significant when compared to the productivity of the Souris River as a whole. The plankton populations should recover quickly once the fill and other construction activities have ceased, especially since the predominant algae present are pollution-tolerant species.

(2) Effects on Benthos: Much of the fill activity would occur above the normal low flow and would have little effect on the benthic populations in the area. In addition, much of the area would be dredged or excavated prior to fill placement, and would therefore already be devoid of benthic life. However, approximately 11 acres of undisturbed aquatic area below normal low flow would be covered with fill material, burying and destroying all benthic life present. After project completion the rock substrate would probably provide habitat which is more stable and environmentally preferable to existing conditions.

In addition to the direct burial of benthic organisms discussed above, the benthic fauna in areas immediately downstream would be subject to stress imposed by increased turbidity and suspended particulates. Sight- and filter-feeders

would suffer decreased foraging abilities while the fill activity is going on. Because of the clean nature of the fill material, no toxic effects are expected on benthic organisms located on the periphery of the fill areas or in other areas downstream. The reduced flow in the channel which will be cut off by the levee should not have a significant adverse impact on the benthos. Even the reduced flow would support current-loving benthos. However, the occasional closure of the culverts during times of high discharge would affect benthos. Closures of less than 15 days would probably have minimal impact on existing current-dependent benthic species, such as filter-feeders. Closures of more than 15 days would greatly reduce the numbers or eliminate most of the current-dependent species present. This would probably happen only about once every 5 years, and considering the rapid colonization of disturbed areas that normally occurs in a riverine habitat, these impacts would be minor.

(3) Effects on Fish: High current velocities (greater than 3 ft/sec) resulting from project features around Velva Park would restrict fish movement whenever river discharge is below 500 ft³/s. In an average year, fish would be unable to move upstream past Velva Park for all but 5 weeks out of the year. The effect of movement restrictions is expected to be negligible for 2 reasons: (1) spawning (the most crucial time for allowing fish movement) occurs during spring floods when flows are usually above 500 ft³/s, and would not restrict fish movement; (2) area fish habitat in the area is fairly uniform, indicating that migration for spawning is not critical for maintaining existing populations.

Some fish may be trapped in the old river channel around Velva Park when the culverts are closed during high flows, but the number should not have significant effect on the river's fish population.

Fish utilization of the project area during project construction would be reduced as a result of increased turbidity/suspended particulate levels and other construction disruptions. Fish utilization should return to normal after construction is completed.

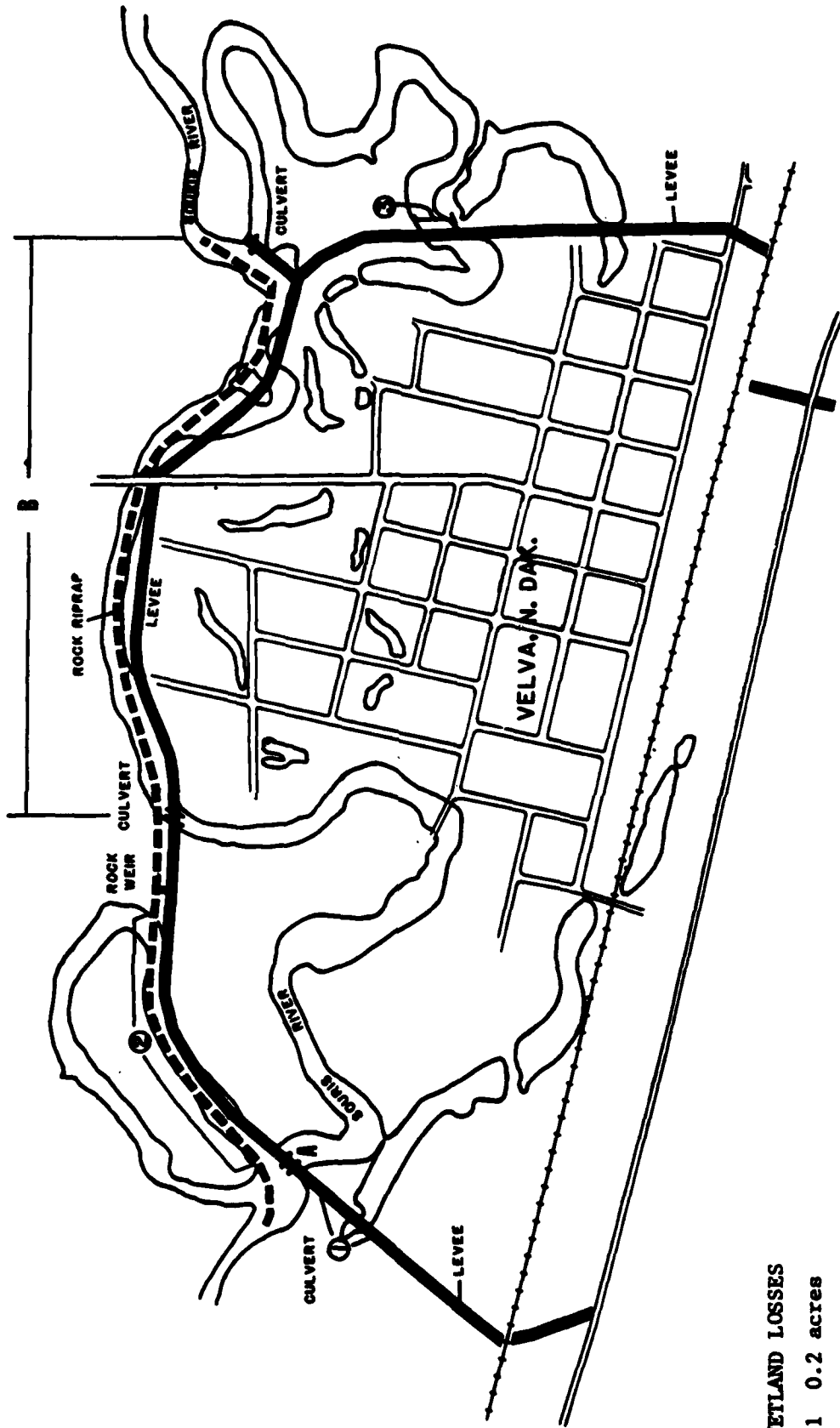
(4) Effects on the Aquatic Food Web: The long-term effect on total productivity of the area is expected to be minor, although there would be a temporary disruption to the aquatic biota present and slight changes in localized community structure and composition.

(5) Effects on Special Aquatic Sites

(a) Sanctuaries and Refuges: The J. Clark Salyer National Wildlife Refuge is located approximately 100 river miles downstream of the project area. It is unlikely that the proposed project would have any impact on the refuge.

(b) Wetlands: Three wetland areas (excluding stream channel aquatic areas) would be affected by the proposed project (see Map 1). Fill material would be placed in 0.2 acres of wetland in area 1, located along the upstream end of the proposed levee. Because an existing dike across a portion of the wetland causes it to be dry for most of the year, this area is of limited value. Wetland area 2 covers 3.9 acres and is the portion of the oxbow channel that would become part of the high discharge cutoff channel. This area would

MAP I



WETLAND LOSSES

- 1 0.2 acres
- 2 3.9 acres
- 3 0.2 acres

STREAMBANK/BOTTOM MODIFICATION

- A 2.9 acres
- B 12.8 acres

be dredged and excavated as part of the cutoff channel and the wetland area would be severely modified. The subsequent fill activity for the levee construction and bank stabilization would therefore have minimal impact on the already highly disturbed area. Wetland area 3 is located in the old oxbow channel near the downstream edge of the levee. Approximately 0.2 acre of this wetland would be buried and removed from production permanently during construction of the levee.

Because of the small acreage of affected wetlands, their limited quality, and the abundance of similar habitat in the area, the fill activity is not expected to have significant adverse impacts on wetland habitat in the area.

(6) Threatened and Endangered Species: The proposed activity should have no impact on threatened or endangered species.

(7) Other Wildlife: The change from a natural bank area to a riprap bank area would have a negative impact on bank-dwelling wildlife such as muskrat (Ondatra zibethica) and beaver (Castor canadensis).

(8) Actions to Minimize Impact: Culverts placed in the portion of the main channel that would be cut off by the levee to allow a maximum flow of 170 ft³/s would minimize impacts on the biota present. Culverts added to the plug that would be constructed across the mouth of the oxbow channel near the downstream edge of Velva would allow flow into the area and would reduce the plug's impedance of fish movement.

F. Proposed Disposal Site Determination

(1) Mixing Zone Determination: Because the fill material is clean, the mixing zone for suspended contaminants would be very minimal. A turbidity and suspended particulate plume would be generated by the fill activity, but the mixing zone should be small enough that it would not impede fish movement or intersect spawning or nursery areas or municipal water intakes.

(2) Determination of Compliance with Applicable Water Quality Standards: The Souris River is classified as a class IA stream by the State of North Dakota (Regulation 61-28-02). Water quality in class IA streams must be maintained at a level to permit the following: fish, wildlife, and recreation use; municipal and domestic water supply; industrial water supply; and agricultural uses. Because of the clean nature of the fill material, it is unlikely that North Dakota State water quality standards developed to protect these uses would be violated by any of the fill activities.

(3) Potential Effects on Human Use Characteristics: The proposed high rock banks and the straightened channel would reduce the aesthetic quality of the Souris River in the project area for canoeists and hikers. In addition, during low flows (less than 500 ft³/s), small fishing boats and canoes would have to be portaged around the rock weir.

G. Determination of Cumulative Effects on the Aquatic Ecosystem: Implementation of the proposed fill activity would cause no significant cumulative impacts on the aquatic ecosystem.

H. Determination of Secondary Effects on the Aquatic Ecosystem: There should be no secondary impacts of the proposed fill activities.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

The proposed fill activity would be in compliance with Section 404(b)(1) guidelines of the Clean Water Act. Other alternatives, including floodplain evacuation, construction of a diversion channel, and levee alignment alternatives, were initially considered, but were determined not practicable because of economic and/or environmental considerations. The practicable alternatives considered include two upstream and three downstream levee alignment alternatives. The upstream alternatives would all have similar environmental impacts, but the proposed plan would be less costly. The proposed downstream levee alignment was selected because it would be the least disruptive to aquatic and terrestrial habitat in the area and it had the lowest cost. (A more detailed evaluation of alternatives is presented in the EIS.)

The proposed fill activity would be in compliance with all State of North Dakota water quality standards, Section 307 of the Clean Water Act, and the Endangered Species Act of 1973, as amended. The proposed fill activities should not have a significant impact on human health and welfare. Plankton, benthic organisms, fish, and bank dwelling wildlife would be disrupted because of the following factors: burial of existing aquatic habitat; change in current circulation patterns and velocity; change of physical substrate; and increased turbidity and suspended particulates during construction. However, most of these disruptions would be minor and/or temporary. The rock riprap could provide better benthic habitat than now exists and it would reduce erosion and turbidity. Therefore, the proposed fill activity should not have a significant adverse impact on the aquatic ecosystem diversity, productivity, and stability. There should not be any significant adverse effects on recreational values, aesthetics, and economic values of the area.

Several steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem:

(1) Dredged material would not be used as fill material; only clean material from the excavated dry bank areas, existing emergency levee, and a local borrow pit would be used. This would greatly reduce the chance of suspension of contaminants during placement.

(2) Using mechanical means to place the fill material and riprapping with rock shortly after construction, would reduce the effects on turbidity and suspended particulate levels and movement of material from the site.

(3) Installing culverts to allow a maximum flow of 170 ft³/s in the levee that would block off the existing channel upstream of Velva. This area could then maintain an aquatic community similar to that which now exists.

(4) Installing culverts through the proposed closure of the old oxbow channel near the downstream end of Velva would allow better water circulation and would reduce the impacts on fish movement in the area.

On the basis of this evaluation, it has been determined that the proposed disposal site complies with the requirements of the guidelines for the discharge of fill material.

EXHIBIT 1

Study Authorization

STUDY AUTHORIZATION

Senate Report 97-256:

The Committee is aware of the pressing need for additional flood control measures on the Souris River to prevent serious and recurrent flooding that affects thousands of people in Minot and the outlying areas. Flood protection planning has been in progress since 1957 and more than \$25,000,000 has been spent since 1969 for emergency flood fighting activities in Minot and surrounding areas.

This implementation schedule for the project will both keep it within budget restrictions and insure significant flood control protection as quickly as possible. This phase of the Burlington Dam project has a 3.3 cost-benefit ratio. While the Committee realizes that this phase will not provide complete flood protection by itself, we feel it is a logical and cost-effective step and has the strong support of local interests.

The funds provided are to be used to raise Lake Darling by approximately 4 feet and to implement work on upstream and downstream flood control measures. This Committee directs that the Corps take no further actions to construct Burlington Dam until expressly directed to do so by the Committee.

The Committee also directs that the Corps expeditiously prepare a report on the mitigation needs related to raising Lake Darling and submit the report to Congress. It is unclear at this time whether any mitigation lands will be needed, however, we urge the Corps to carefully consider the impacts of any possible mitigation, specifically on agricultural activity and on affected landowners. An amount not to exceed \$1,000,000 from available funds shall be made available for this work in fiscal year 1982. Work on these necessary flood protection measures should proceed while the mitigation report is being prepared.

Public Law 97-88, 4 Dec. 1981 (Energy and Water Development Appropriations Act).

Sec. 111. The Chief of Engineers is hereby directed to raise the dam at Lake Darling, North Dakota, by approximately four feet and to implement upstream and downstream flood control measures.

EXHIBIT 2

Executive Order 11988
and
Executive Order 11990
Analysis

Executive Order 11988

Executive Order (EO) 11988 requires Federal agencies to recognize the significant values of floodplains and to consider the public benefits that would result from restoring and preserving floodplains. The following paragraphs evaluate the project with respect to EO 11988 under guidelines given in 33 CFR part 240 (ER 1165-2-26). The evaluation is presented in 4 sections: description of areas of concern; project induced development; practicable alternatives; and modifications to the project.

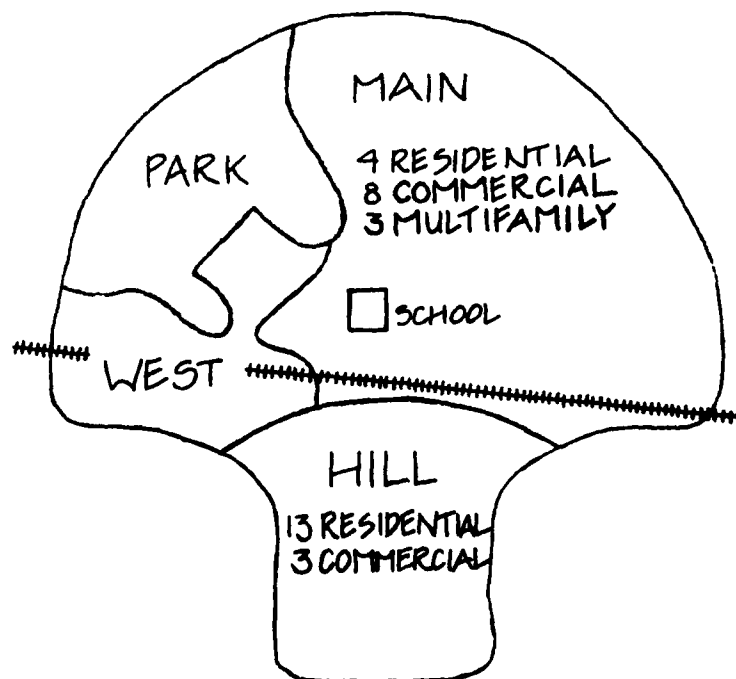
1. Description of Areas of Concern

In the Velva floodplain, which will be protected from the 100-year flood, three categories of development can be distinguished. The largest area (210 acres) is developed for residential and commercial use. There are a few undeveloped lots interspersed in this area, and some latent demand exists for more intensive development on presently developed lots (primarily for structural improvements and garages), pending removal of flood insurance regulations. This area would see some increases in development, but there is clearly no practicable alternative if flood protection is provided to the city as a whole. The second area is the city park. The park is a highly valued city resource, and it is very unlikely that it would experience development pressure for non-recreational use. The third area is 30 acres presently used for agriculture in the west (upstream) end of the city, across from the park and near the diversion structure. This is the area of main concern for project compliance with EO 11988.

2. Project Induced Development

a. Development Without the Project. If we assume a future which basically continues present social and economic conditions and continued floodplain regulations, development would likely continue at a similar pace. Development during the past 8 years has consistently avoided the west area (Figure 1).

Figure 1. Distribution of Building Permits, Velva, N.D., 1975-81.



If the past rate (2.5 residential or multi-family permits per year) and average mix (3.1 housing units for each permit) of development were continued, the next 50 years could see 125 permits issued and 380 new housing units constructed. This is a high estimate, for although Velva's housing stock did increase by 18.6 percent in the last decade, population declined by 11.3 percent.

The location of these units would depend on development costs, attractiveness, and accessibility. Accessibility is highest in the main part of town, nearly as good in the west section, and lower on the hill. Comparative attractiveness of the three areas cannot be rated for this evaluation, but many residents have retired to Velva for a sheltered respite from their windier upland farms, and the hill area may be seen as less attractive on that count. Because accessibility and attractiveness factors are apparently best in the main (developed) area, we may assume that about 10 percent of the permits issued would be for that area (which has minimal lot availability). The remaining 112 permits would presumably be allocated between the hill and west areas of town, based primarily on comparative development costs. Federal flood insurance regulations require placement of fill to elevate development in floodplain areas, and that cost affects land values and construction costs.

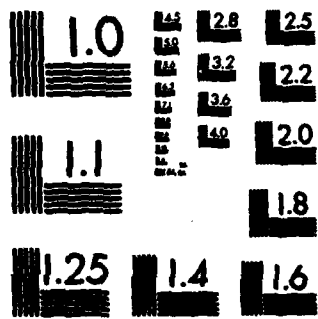
	<u>West</u>	<u>Hill</u>
Land cost per acre	\$20,000	\$22,400
Fill cost per acre	19,000	-0-
Total cost per acre	39,000	22,400
Average cost per site	9,750	5,600
(@ 4 sites per acre)	(\$4,150 difference per site)	

Because of this difference, it seems reasonable to assume that development would continue on the hill rather than in the west area, under without-project conditions.

b. Development With the Project. The only factors which would be significantly changed are assumed to be the land costs and necessity for fill in the floodplain. With the project, development costs for the two areas would be:

	<u>West</u>	<u>Hill</u>
Land cost per acre	\$24,000	\$22,400
Fill cost per acre	-0-	-0-
Total cost per acre	24,000	22,400
Average cost per site	6,000	5,600
(@ 4 sites per acre)	(\$400 difference per site)	

The project would reduce the absolute development costs in the west area floodplain and would reduce the difference in development costs between that area and the hill area. Because the accessibility and attractiveness (shelter) factors are somewhat better for the west area, this cost difference will no longer preclude development there. Perhaps half of the 112 projected permits would be issued for the west area if the flood protection project were in place.



MICROCOPY RESOLUTION TEST CHART
 NATIONAL BUREAU OF STANDARDS-1963-A

c. Conclusion. A reasonable estimate of floodplain (west area) development indicates 56 permits with the project and none without. The project as it is presently formulated would therefore induce development.

3. Practicable Alternatives

Although there are no practicable alternatives to a structural alternative, there are levee alignments which would exclude the 30 undeveloped acres in the west area, and would therefore not induce floodplain development in that area. The economic, social, and environmental costs of these other alignments are all considerably higher, however. One alignment which would exclude about half of the undeveloped west area (FEDC on Plate 2) would present fewer technical and cost problems, but would still induce considerable development. Excluding the 30 west acres from protection would require some combination of removal of homes, higher project costs, destruction of riverine environment, and major disruption to the city park. For these reasons, protecting the west area is probably the best solution.

There are practicable alternatives to new development in the west area. As shown in Figure 1, present development is being increasingly attracted to the hill area, and considerable future development is already platted there. Even with the project, 56 permits could be issued for the hill area over the next 50 years. This area is a reasonable alternative to floodplain development, and it could absorb all future development needs, if the city develops appropriate land use plans.

4. Modifications to the Project

Discussions between the city of Velva and the Corps were initiated in August 1982 to evaluate the possibility of zoning the west area to preclude new development. The Corps proposed that the city zone all protected areas which are presently in either agricultural or recreational use for their continued use in either of those categories. This would allow the city some flexibility in its future recreational development, while not increasing residential and commercial development in the natural floodplain. The requirement for zoning would be written into the Local Cooperation Agreement.

The city will consider this modification during the period between the draft and the final EIS, so it is not presently known whether this zoning requirement will become a part of the project. Although the project currently must be shown as not in compliance with EO 11988, it would comply if the zoning requirement is adopted.

Executive Order 11990

Executive Order (EO) 11990 recognizes the significant values provided by wetlands and provides specific measures for their protection. The following paragraphs evaluate the project with respect to EO 11990 using guidelines published in the Federal Register (10 June 1980, page 39412). The evaluation is presented in three sections: analysis of alternatives; methods to minimize impacts; and statement of compliance.

Analysis of Alternatives - Of the alternatives considered, only one involved less impact on wetlands than the recommended alternative. This alternative called for relocation of the entire city of Velva and was not practical because of excessive costs and social disruption.

Methods to Minimize Impact - Two features were incorporated into the recommended plan for the purpose of minimizing wetland impacts. These include providing maximum flows of 160 ft³/s to the old river channel around Velva Park; and installing a culvert to provide water to the oxbow wetland surrounding the Velva natural area. One feature (placement of rocks in the stream channel to improve fish habitat) will be studied during development of plans and specifications for construction. Three additional features for minimizing adverse wetland impacts were studied and found to be impractical. These included: enhancing flows to wetlands inside the levee near point H on plate 2; creating wetlands in the area; and using larger culverts to decrease velocities and minimize restrictions on fish movement in the Velva Park area.

Statement of Compliance - The proposed project is in compliance with EO 11990 for the following reasons: (1) there is no practicable alternative to the recommended plan which involves less wetland damage; (2) the public was involved throughout the study (see section 7.00 in the EIS); (3) minimizing adverse effects on wetlands was an important consideration in designating a recommended plan.

EXHIBIT 3

**Fish and Wildlife Coordination Act Report
and
Corps Responses**

Corps Response to Fish and Wildlife Service Recommendations

The following are Fish and Wildlife Service (FWS) recommendations and specific Corps responses. These responses were sent to the FWS in October 1982 for their review and comment. Coordination with FWS will be maintained to insure that all of their recommendations are adopted to the maximum extent possible.

FWS Recommendation 1:

1. Work in the watercourse be timed to avoid the principal fish spawning months of March, April, and May.

Corps response:

Recommendation adopted.

FWS Recommendation 2:

2. Borrow areas for levee material should be located outside woodlands or other high-value habitat areas, preferably in existing active pits. Any new borrow areas should be reviewed by FWS and NDGFD prior to approval.

Corps response:

Recommendation adopted.

FWS Recommendation 3:

3. Plans be designed and construction conducted in a manner which avoids woodlands to the extent possible. Felled trees should be disposed of in an approved dump site, used as firewood, or left in constructed brush piles.

Corps response:

Project design avoid woodlands as much as possible. Disposal methods for felled trees will be developed in conjunction with plans and specifications for construction, and will promote constructive uses of the disposal material to the extent practical.

FWS Recommendation 4:

4. Riprapping the south bank of the widened river channel extend as far as possible below the normal flow line and include one or more areas of bottom substrate. Additional costs have not been determined. The location and extent of the rock placement will be determined during detailed planning.

Corps response:

Under current project proposals, riprap on both channel banks would extend down the banks and a short distance into the channel bottom. Riprap would also be placed across the entire channel bottom in the vicinity of the highway 41 bridge. Placement of additional riprap in the channel bottom may be possible in other areas. The exact location, amount, and size of the riprap would be determined during development of plans and specifications for construction.

FWS Recommendation 5:

5. Twenty-eight acres, or two times the direct loss of wooded cover, be planted by the Corps of Engineers on project lands. Such plantings will be in multirow blocks along the north channel banks of the modified river channel and the high flow channel and on other available sites. Species and planting designs will be coordinated with the North Dakota Game and Fish Department during detailed planning. Estimated cost for 28 acres is \$7,000 for planting and \$7,000 for 5 years of maintenance.

Corps response:

Preliminary review of project lands indicates that a maximum of 5 acres would be available for revegetation. This acreage is located in fill areas along the modified channel. The north channel bank could not be planted with woody species below elevation 1518 because the vegetation would resist flows during periods of high discharge. The project may require purchase of some land on the north bank above this elevation; the exact number of acres available for planting will be determined during development of plans and specifications for construction.

Some non-project lands may be revegetated as a result of the project. The city of Velva is currently considering creating a park in a cropland area inside the levee. Some trees would probably be planted in conjunction with this park. Also, removal of the temporary levee in some areas may result in some plantings to cover disturbed areas. In this manner, the project would probably stimulate additional revegetation on approximately 4 acres.

As described above, a total of 9 acres would probably be revegetated in conjunction with the recommended project. In order to plant more than 9 acres, additional land would have to be purchased.

FWS Recommendation 6:

6. All disturbed areas and levee slopes be planted with native grass species. Planting rates, species and maintenance recommendations will be determined during detailed planning. Estimated costs are \$70 per acre for establishing grass and \$10 per acre for annual maintenance.

Corps response:

Recommendation adopted.

FWS Recommendation 7:

7. Compensation of wetland losses up to 5 acres be accomplished by the Corps of Engineers by development of new wetlands and by preventing drainage of and providing water supply to existing oxbow channels. Additional costs for this compensation can be determined in the next phase of study. Water supply feasibility be investigated from the river channel to the upstream and downstream oxbows and from pumping stations. Feasibility of high flow channel and (downstream) cutoff channel wetland development by excavation, diking or combinations of both, be determined.

Corps response:

Flows to the 5-acre oxbow wetland next to the cutoff channel would be enhanced. The river channel and oxbow wetland upstream of the wier would be inundated under all flow conditions, and their wetland habitat should therefore be retained. The feasibility of enhancing flows to the 5-acre wetland next to the cutoff channel will be determined during development of plans and specifications for construction.

The wetland area described above is the only one in which enhancement is practical. Providing continuous flows through the downstream oxbow is not possible unless major structural modifications are made (construction of a second weir and two gated outlet structures). The modifications would add considerable expense and are therefore considered impractical. Creation of wetlands at borrow sites may be possible; however, the practicability of this recommendation will have to be determined during development of plans and specifications for construction.

FWS Recommendation 8:

8. Normal flows to 140 ft³/s be maintained through the channel around Velva Park.

Corps response:

Maximum flows of 170 ft³/s would be possible through the channel around Velva Park. The operating plan which controls flows through the old channel is explained on page 12. These maximum flows would occur whenever discharge on the river was between 160 ft³/s and approximately 5,000 ft³/s. Above 5,000 ft³/s all flow would follow the cutoff channel, and the channel around Velva Park would be used for ponding.

**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE**

DRAFT

**FISH AND WILDLIFE RESOURCES
IN RELATION TO THE
SOURIS RIVER AT VELVA
FLOOD CONTROL PROJECT
NORTH DAKOTA**

PREPARED BY:

**BISMARCK FIELD OFFICE
U.S. FISH AND WILDLIFE SERVICE
BISMARCK, NORTH DAKOTA**



United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Colonel Edward G. Rapp, District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

DRAFT

Dear Colonel Rapp:

This Fish and Wildlife Report provides an assessment of the local flood control project on the Souris River at Velva, North Dakota. This report is to accompany the Corps of Engineers Detailed Project Report through the final review process. It has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, amended; 16 U.S.C. 661 et seq.). It is also consistent with the intent of the National Environmental Policy Act of 1969 (P.L. 91-190; 83 Stat. 852,856). It addresses the effects of the proposed project on fish and wildlife resources, and conveys recommendations which are designed to prevent, mitigate or compensate adverse effects to these resources. This report supercedes all previous reports which apply to Velva. Comments on the conclusion and recommendations of this report by the North Dakota Game and Fish Department (NDGFD) are contained in the attached letter dated _____, 1982, by Commissioner Dale Henegar.

Section 7(c) of the Endangered Species Act, 87 Stat. 884, as amended, requires that your agency ask the Secretary of the Interior, through the U.S. Fish and Wildlife Service, whether any listed or proposed endangered or threatened species may be present in the area of each federal construction project. The peregrine falcon (Falco peregrinus) and bald eagle (Haliaeetus leucocephalus) may be present in the project area. Both species are present as migrants or in a transient status during spring and fall seasons. Your environmental document or a separate biological assessment should address these species and provide conclusions as to whether or not the project is likely to affect them.

A Department of the Army permit, issued pursuant to Section 404 (P.L. 92-500) may be required for the placement of fill material into the Souris River for construction of the channel and levee system.

In the view of the Service, the plan is in compliance with Executive Order 11988, Floodplain Management. While construction will take place on the Souris River floodplain, wildlife habitat and other environmental values should not be seriously affected provided mitigation recommendations are accepted and implemented.

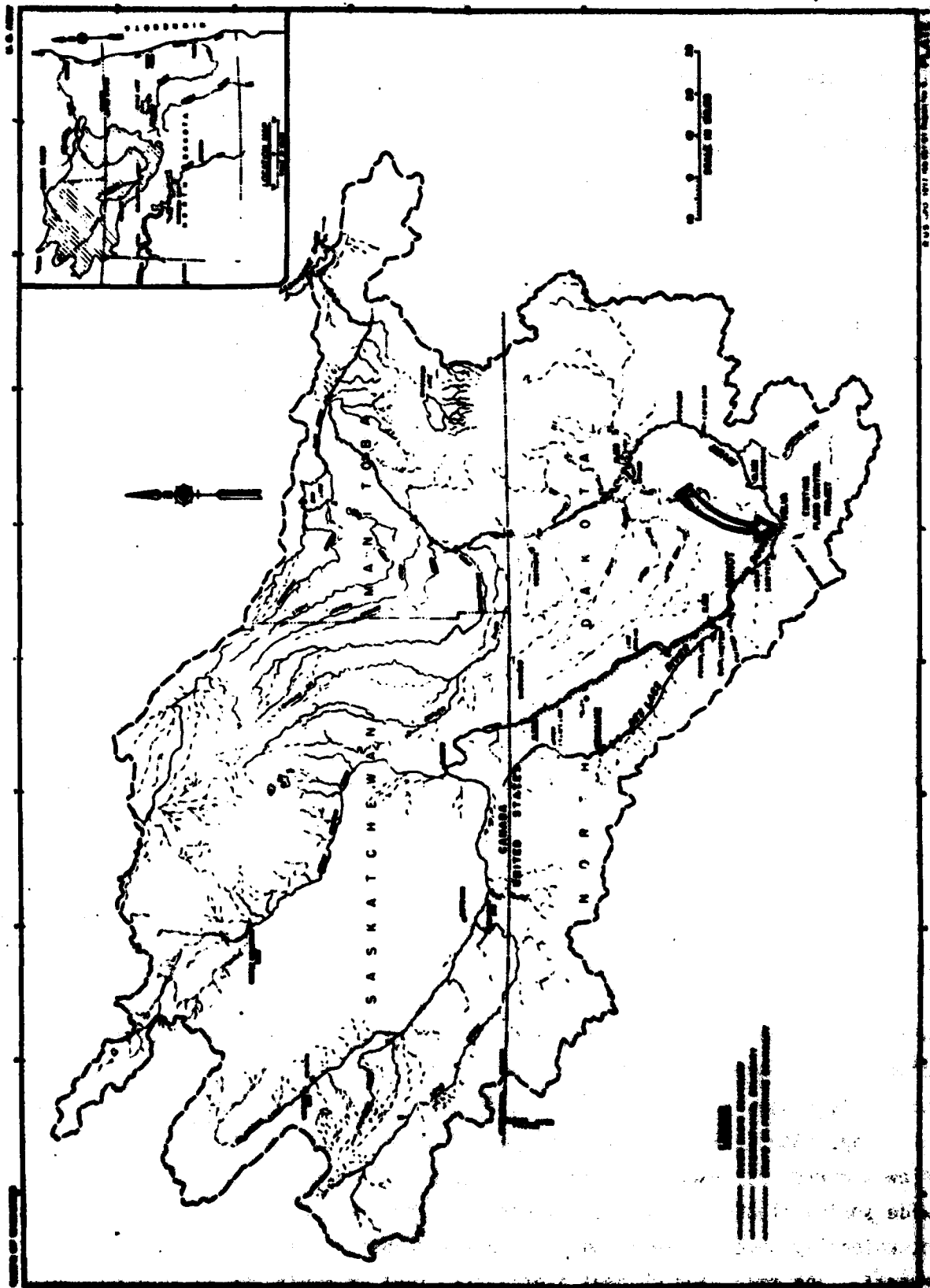
Our recommendations and associated costs for mitigating and compensating project-induced fish and wildlife losses are consistent with the Presidential Directive (of June 1978) on environmental quality and water resources management. That directive states:

In all project construction appropriation requests, agencies shall include designated funds for all environmental mitigation required for the project and shall require that mitigation funds be spent concurrently and proportionately with construction funds throughout the life of the project.

DESCRIPTION OF THE AREA

Velva is located near the western edge of McHenry County at the southern terminus of the Souris River Loop (see map). This city of 1,101 people parallels the south bank of the Souris River for nearly 1 mile. It is essentially all within the river floodplain. The Souris River, a tributary of the Assiniboine River, has a total watershed area of about 11,000 square miles at Velva.

The surrounding area is glacial ground moraine containing numerous prairie pothole wetlands and is used principally for growing small grains, sunflowers, hay and livestock. The valley floor is flat and about three-fourths mile in width. The Souris River is very sinuous (about two to one) with numerous channel changes which create oxbow wetlands. The adjacent riparian forest community ranges up to one-half mile in width where river loops have inhibited clearing. Souris River flows are typical of prairie streams, ranging from no-flow occurrences (except for reservoir releases) in summer and fall to valley wide spring floods, which usually occur in April and May. Tributary drainages occasionally have severe floods from heavy rainstorms as well as from spring runoff. The main stem channel averages 80 feet in width and 12 feet in depth.



DESCRIPTION OF THE PROJECT

A flood prevention project consisting principally of channel and levee work was installed on the small tributary of Bonnes Coulee following the flash flood of 1962. No changes are presently being recommended.

A levee system to reduce damages to Velva from the Souris River was installed on an emergency basis in 1969 during the flood period. Improvements to the system to prevent further damages were made in 1970 and 1976.

The present proposal is basically an upgrade of the existing system to withstand a 100-year flood event of 17,500 cfs peak flow of the Souris. Included are a high flow cutoff channel and a new levee alignment on the west side of Velva, interior drainage facilities, and consideration of alternative levee alignments at both ends of the existing project. A control structure on the cutoff channel would provide for normal low flows through the existing river loop in Velva Park. Channel widening and straightening for a distance of approximately 3,330 feet below the cutoff channel would take place to facilitate passage of the high flows.

The earth levee would be approximately 10,130 feet in length with an average height of 8 feet, top width of 10 feet and 3:1 side slopes.

EVALUATION METHODOLOGY

The Habitat Evaluation Procedures were not used in field investigations. They were not appropriate for this study, which utilized primarily existing data during a short time period.

Inspections of the watershed area and the project site were supplemented by determining impacts from analyzing aerial imagery, maps of project features and descriptions provided by the Corps of Engineers.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Terrestrial Resources

Woodlands - The principal project area terrestrial habitat is the riparian, or floodplain forest which parallels the river. Patches of native woodlands also occur in the tributary drainages. Farmstead and field shelterbelts and urban tree plantings supplement this resource. The wooded corridor provides habitat for white-tailed deer and nesting wood ducks. Raptors nest and hunt in the valley. The woodlands also provide year-round habitat for songbirds and migratory habitat for a variety of passerine species.

Wetlands - Within the valley area, wetlands are restricted to the riverine and palustrine types, which consist of the live and cutoff river channels, respectively. The surrounding moraine contains the palustrine pothole wetlands. Waterfowl use in the immediate project area consists mainly of nesting wood ducks, but mallards and other species also use the river. Furbearers include beaver, muskrat, mink and raccoon. Water birds such as black-crowned night herons and grebes also occupy these habitats along with blackbirds, marsh wrens and many other bird species.

Grasslands - Remaining grasslands exist principally in association with steep valley breaks, wet meadows and light sandy soils. Conservation of remaining grasslands is an important component of wildlife resource objectives. Values are increased for those areas associated with wetlands and woodlands.

Future Conditions - Gradual conversion of the three terrestrial habitat types to cropland is expected to continue in the watershed. If irrigation projects are developed, habitat loss rates will increase correspondingly.

Aquatic Resources

Under the North Dakota permanent stream evaluation, the Souris River from Canadian border to Canadian border is rated Class I, Critical. Its high fishery value is due to excellent forage fish production, a good sport fishery

on northern pike, yellow perch and walleye, and excellent reproduction of northern pike. The river also receives moderate recreational usage. The present fishery value is dependent on high spring flows which allow for spawning and movement of the fish populations. Many areas of this river winterkill periodically, which also makes the fish movements more important.

Water quality, together with frequent no-flow conditions, are limiting factors to the fishery. Nonpoint source pollution, municipal wastes, industrial discharges and wetland drainage are the principal sources of the water quality problems. As new wastewater treatment plants are constructed, pollution from those sources will decline. Wetland drainage is expected to continue and will offset to some degree the reductions in point sources.

Mitigation Policy

The habitat to be impacted consists of riverine elements of floodplain forest, live and cutoff river channel, and some agricultural land. These correspond with Resource Category 3 of the Fish and Wildlife Mitigation Policy. The designation criteria for these habitats are: high-to-medium value for evaluation species and is relatively abundant on a national basis. The goal is no net loss of total habitat value.

EVALUATION OF ALTERNATIVE PLANS

During previous studies, the nonstructural measures of floodplain evacuation, floodproofing, floodplain regulations, flood insurance and combinations thereof were evaluated by the Corps of Engineers.

The present study included review of the floodplain evacuation alternative, a diversion channel alternative, five upstream levee alignments and three downstream levee alignments. After a preliminary review, the evacuation, diversion channel and three upstream alignments were eliminated from further consideration by the Corps of Engineers. Only the proposed plan and the remaining levee alignment alternatives described in this report were evaluated by the Fish and Wildlife Service.

Levee Alignment Alternatives

Three alignments at the downstream end and two at the upstream end were given detailed consideration. As shown on the enclosed Map X, they are: ACFG, ACDEFG, GHIKM, GHIJL and GHJL. The same design criteria were applied to all of them.

The principal differences in impact for the two upstream alignments relates to the fact that ACFG would enclose about 16 acres of cropland. This area would be subject to induced development for residential or industrial purposes. Since the cropland provides little in the way of wildlife value and is abundant in the vicinity no significant adverse effect would occur unless the subsequent development encroached upon or otherwise affected the adjacent wetland area.

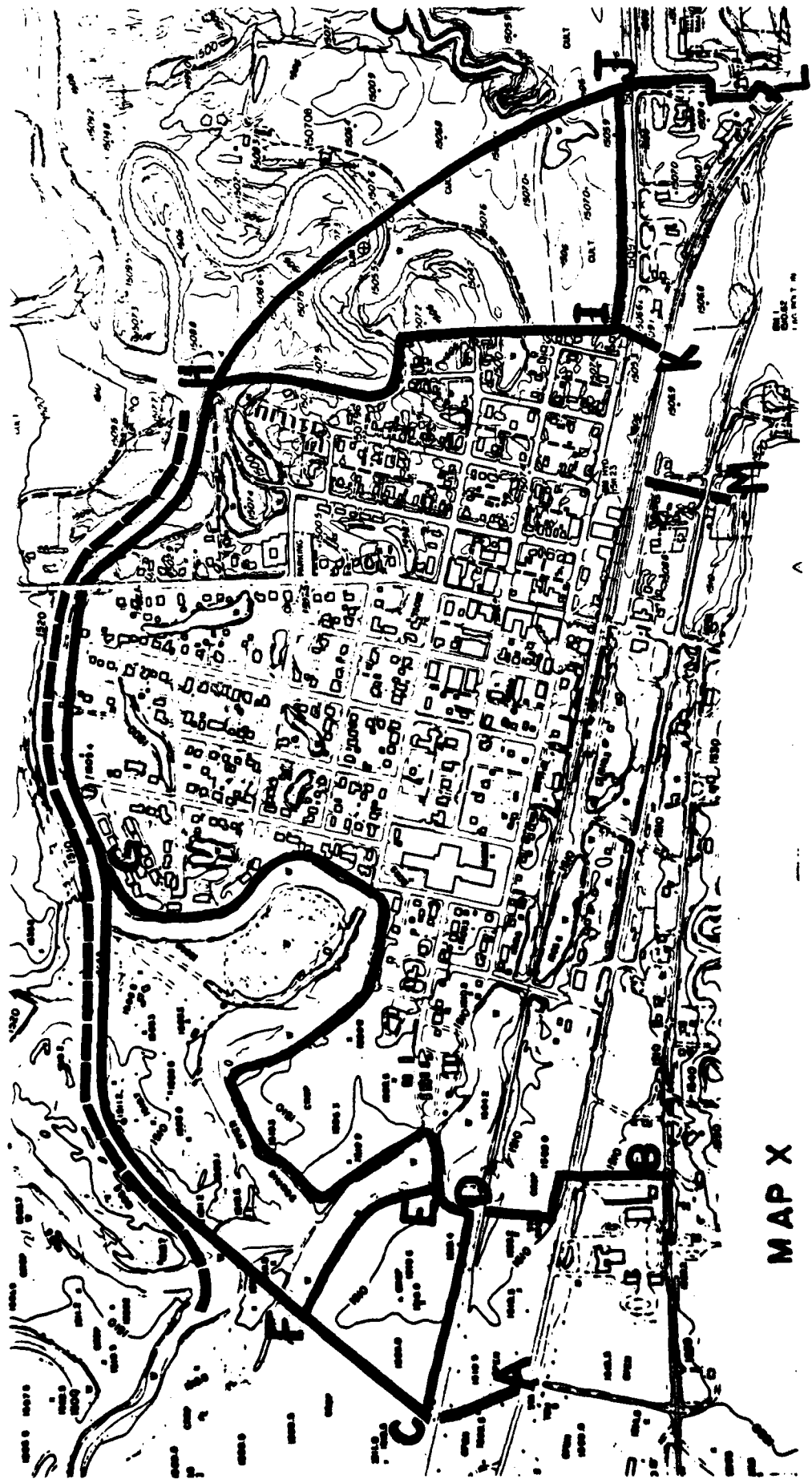
The downstream alternative GHJL would bisect a 20-acre wooded area inside a cutoff oxbow. The area is owned and used by the city as a natural area and includes a nature walk. In addition to clearing about 2 acres of the floodplain forest, the portion of the area inside the levee would be subjected to increased developmental pressure. This alignment was not recommended.

The other two downstream alignments differ principally in the amount of developed areas protected. There is no significant difference in terms of fish and wildlife impact.

After final analysis, alignment ACFG-HIKM was recommended by the Corps of Engineers. The decision was based partly on economic and partly on environmental and floodplain considerations.

The selected plan will have the following impacts:

1. 14.4 acres of natural woody vegetation will be destroyed.
2. 5.1 acres of palustrine wetlands, primarily oxbows, will be altered at three locations. This includes 1.2 acres of filling and 3.9 acres of excavation. An additional 5 acres could be drained as a result of the excavation.



3. Sediments and possibly other pollutants from construction activities will be added to the watercourse.
4. High flows will be eliminated from about 4,400 feet of river channel.
5. About 6.5 acres of riverine wetland, or live river channel, will be altered. This includes filling about .5 acres at two levee crossings, and widening and straightening about 3,300 feet or 6 acres. The channel alterations will temporarily disrupt fish habitat, removing streamside vegetation, substrate and benthic invertebrates. There will also be direct disturbance of fish and increased turbidities. The channel length will be reduced by about 250 feet. Together with the two channel fills, there will be a permanent loss of about 350 feet in channel length.

Approximately 14 acres of natural wooded area and 9 acres of open space that is presently outside the levee will be enclosed within the new levee. This area is presently a city park. This land use is not expected to change, although some park facilities may be relocated as a result of the project.

Interior ponding during flood events will contain the runoff water primarily in existing oxbow channels. The interior drainage facilities are not expected to have any significant impact. Use of these existing wet areas will help to preserve them. Pumping stations could be used to augment water supply to the oxbow that surrounds the city's natural area.

DISCUSSION/MITIGATION ENHANCEMENT

The adverse effects of the selected plan can be reduced by several methods. One way is to use construction methods that minimize clearing, erosion and pollution into the watercourse. Avoidance of work in the watercourse during the spawning season (March, April and May) will reduce the disruption of fish movements.

The loss of woody vegetation should be compensated by plantings, to the extent feasible. The normal requirement by the North Dakota Game and Fish Department is for a replacement ratio of 2 acres of plantings for each acre of loss. If sufficient project lands are available or other sites can be located in the area, plantings totalling 28 acres are required. As a minimum, the north banks of the cutoff channel and the downstream 3,330 feet of modified natural channel should be replanted. These woody plantings should be as wide as possible.

All disturbed areas required to be kept open and levee slopes should be revegetated with native herbaceous plantings.

The use of channel riprap, in addition to stabilization, can provide substrate for fish food organisms and fish spawning. Placement of rock below the high-water mark and on portions of the channel bottom would be most effective.

The direct losses of palustrine wetlands may be compensated by development of additional wetlands and/or providing improved water supply to several oxbow areas. The feasibility of such developments should be examined at the following locations:

1. The oxbow to be excavated for the high flow channel. In the unexcavated north loop, weirs or other barriers should be retained or installed at both ends as necessary to prevent drainage. The upper end of this loop should be investigated for the feasibility of improving recharge by means of adding an inlet feature. The high flow channel itself may be beaded or diked to provide wetland habitat.
2. The oxbow area surrounding the wooded natural area, near the downstream end of the project. Water recharge may be possible by installing an inlet culvert from the river channel and by pumping from the interior drainage system.
3. The small river loop, about 250 feet in length, located near the lower end of the reach of the modified channel. This area will be cut off. The channel remnant should be retained as wetland, and may be enlarged if additional borrow material is needed.

Exclusion of high flows from the Velva Park river loop will restrict fish entry and exit if control gates are completely closed. It is preferred, from a fishery standpoint, to continue flows through the park loop during flood events. This is when major movements are likely to occur. A less desirable alternative is that gates should be reopened as soon as possible during flood recessions. The absence of flood flows in the loop will reduce productivity of the riparian vegetation, but should not materially affect the existing fishery. The impacts of reduced water availability and barriers to fish movements will be reduced by allowing the maximum allowable flows through the loop (estimated at 140 cfs), and to retain flow during flood periods.

RECOMMENDATIONS

1. Work in the watercourse be timed to avoid the principal fish spawning months of March, April and May.
2. Borrow areas for levee material should be located outside woodlands or other high-value habitat areas, preferably in existing active pits. Any new borrow areas should be reviewed by FWS and NDGFD prior to approval.
3. Plans be designed and construction conducted in a manner which avoids woodlands to the extent possible. Felled trees should be disposed of in an approved dump site, used as firewood or left in constructed brush piles.
4. Riprapping the south bank of the widened river channel extend as far as possible below the normal flow line and include one or more areas of bottom substrate. Additional costs have not been determined. The location and extent of the rock placement will be determined during detailed planning.
5. Twenty-eight acres, or two times the direct loss of wooded cover, be planted by the Corps of Engineers on project lands. Such plantings will be in multirow blocks along the north channel banks of the modified

river channel and the high flow channel and on other available sites. Species and planting designs will be coordinated with the North Dakota Game and Fish Department during detailed planning. Estimated cost for 28 acres is \$7,000 for planting and \$7,000 for 5 years of maintenance.

6. All disturbed areas and levee slopes be planted with native grass species. Planting rates, species and maintenance recommendations will be determined during detailed planning. Estimated costs are \$70 per acre for establishing grass and \$10 per acre for annual maintenance.
7. Compensation of wetland losses up to 5 acres be accomplished by the Corps of Engineers by development of new wetlands and by preventing drainage of and providing water supply to existing oxbow channels. Additional costs for this compensation can be determined in the next phase of study. Water supply feasibility be investigated from the river channel to the upstream and downstream oxbows and from pumping stations. Feasibility of high flow channel and (downstream) cutoff channel wetland development by excavation, diking or combinations of both, be determined.
8. Normal flows to 140 cfs be maintained through the channel around Velva Park.

SUMMARY

This reports the Service's assessment of the Velva project. Harmful environmental effects are relatively minor and susceptible to reduction and compensation through careful planning. The selected plan is acceptable from a fish and wildlife standpoint.

Implementation of the above recommendations will prevent, mitigate or compensate for adverse effects on fish and wildlife resources. If implemented, the Service will have no objection to project construction.

We appreciate this opportunity to provide the evaluation and recommendations for fish and wildlife resources in the Velva area. Please notify us of any changes in project plans and contact us if you have any questions concerning this report. We also request that you inform us of actions taken on each of the recommendations.

Sincerely,

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