Draft Environmental Assessment

# RESTORATION OF WILD RICE RIVER OVER THE HEIBERG DAM

The Wild Rice Watershed District
FEMA-1419-DR-MN, Project No. 936

*October 2004*

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# DRAFT ENVIRONMENTAL ASSESSMENT FOR RESTORATION OF WILD RICE RIVER OVER THE HEIBERG DAM

FOR

# WILD RICE WATERSHED DISTRICT
# FEMA-1419-DR-MN

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# I. Introduction

## 1.1 *Project Authority*

On June 9, 2002, severe storms, tornadoes, and flooding occurred in northern Minnesota which resulted in Federal Disaster Declaration FEMA-DR-1419-MN. As a result of the storms, 19 counties in Minnesota were declared eligible for federal disaster assistance. Under this program, the Wild Rice River Watershed District has applied for funding for the restoration of the Wild Rice River to its pre-disaster channel in Norman County.

Prior to June 2002, the natural course of the Wild Rice River in Norman County included a portion of the channel that forced the river to pass over Heiberg Dam. Flooding during June 2002 caused an earthen embankment washout upstream of the dam and the Wild Rice River now traverses through an historic sluice channel, thereby avoiding the dam. (Photograph 1 in Appendix A provides an aerial view of the dam, the pre-disaster channel over Heiberg Dam, and post-disaster sluice channel currently being utilized by the Wild Rice River.) The Heiberg Dam is an ice dam that serves to protect downstream areas from ice scour damage and flooding caused by ice jams. The Wild Rice Watershed District is proposing to repair the washed out embankment and restore the river to its pre-disaster channel and has applied for funding for this restoration from the Federal Emergency Management Agency (FEMA).

The project that the Wild Rice Watershed District is applying for funding for has multiple components, including the installation of a sheet pile and earthen embankment levee to replace the washed out embankment and lowering the existing Heiberg Dam. (Additional project details can be found in Section 2.2.) The project is estimated to cost $824,255, of which approximately $767,955 is potentially eligible for funding through the FEMA Public Assistance Program.

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-`288 (as amended) which has been codified in CFR 44 Subchapter D, Subpart G (Stafford Act) defines the types of costs which are eligible for reimbursement under FEMA's disaster relief program. The Stafford Act requires that in order for a project to be considered eligible for reimbursement, it must be for the repair or replacement of a structure or facility that was damaged by the declared disaster, and it must restore the structure or facility to its pre-disaster condition. Under certain circumstances described in the Stafford Act, an alternate, improved, or modified project can be funded. These circumstances are narrowly defined, however. A structure or facility can be modified if the modifications bring the structure up to current codes and standards, or if the modifications constitute improvements that will minimize the potential that the same structure will be damaged again during a similar disaster (mitigation against future events).

Based on the Stafford Act, the repair of the washed out earthen embankment would be eligible for FEMA funding. Repairs, removal, or alterations of the Heiberg Dam would not be eligible for funding, however, because the Heiberg Dam itself was not damaged

during this event. Although the earthen embankment was damaged, it is not a structural component of the Heiberg Dam because it was built at a different time, for a different purpose, and is not physically attached to the dam. The earthen embankment is related to the Heiberg Dam by proximity only. Costs for the proposed alterations of the Heiberg Dam would therefore be the responsibility of the Wild Rice Watershed District.

In accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA {40 Code of Federal Regulations (CFR) Parts 1500 through 1508}, and FEMA regulations for NEPA compliance (44 CFR Part 10), FEMA must fully understand and consider the environmental consequences of actions proposed for federal funding.

Although not being funded by FEMA, alterations of the Heiberg Dam that are being proposed as part of the repair project are considered a part of the project. This consideration is because NEPA requires that when conducting an assessment, all components of the project be considered in the assessment. Since alterations of the Heiberg Dam would not be occurring unless the embankment is repaired, environmental impacts from dam alterations must be included in the environmental assessment. For this reason, under NEPA, FEMA must also consider environmental impacts from dam alterations.

The purpose of this Environmental Assessment (EA) is to provide information on the potential environmental impacts of the restoration of the Wild Rice River to its pre-disaster river course over the Heiberg Dam, to meet FEMA's responsibilities under NEPA, and to determine whether to prepare an Environmental Impact Statement or if a Finding of No Significant Impact (FONSI) can be concluded.

## 1.2 *Project Location*

The Heiberg Dam is located in northwestern Minnesota in the southwest quarter of Township 144N, Range 44W, Section 16 at 47.28294N -96.2770 W. It is located within Normal County, approximately two miles north of the City of Twin Valley. The nearest large community is Ada, the Norman County seat, which is approximately 14 miles west of Heiberg Dam. Moorhead, MN is located approximately 50 miles southwest of Heiberg Dam.

A project location map can be found as Exhibit 1 in Appendix A.

## 1.3 *Purpose and Need*

The objective of FEMA's Public Assistance Program is to assist the community in recovering from damages caused by natural disasters. The purpose of the action alternative presented in this EA is to restore the Wild Rice River to its original pre-disaster river channel, directing the river course over the Heiberg Dam. The need for this project is to provide a management tool to help control problems associated with spring

ice break-ups along the Wild Rice River. These include river bank scour, flooding, and potential bridge damages.

As a result of the storm events that occurred in June 2002, the Wild Rice River broke through an earthen embankment that had previously directed the river course over the Heiberg Dam and through an ox-bow on the west side of State Route 32 in Norman County. Flooding during the event caused the earthen embankment washout at this location and the Wild Rice River now traverses through an historic mill/power house sluice channel upstream of the Heiberg Dam, thereby avoiding the dam and the oxbow.

The Heiberg Dam was originally built in the early 1900s for the purposes of generating power for a flour mill. The original dam was destroyed during a flood event in 1965. In 1977, the dam was restored with Wild Rice Watershed District and Norman County revenue funds. The purpose of the 1977 dam restoration was to help control problems associated with spring ice break-up and ice movement along the Wild Rice River. With the dam in place, a large covering of ice upstream of the dam retarded the movement of ice flow downstream until the downstream channel opened. As the downstream channel opened, the ice moved over the dam and was broken up into smaller pieces. The movement of the spring ice into smaller pieces had two beneficial effects. The smaller ice pieces resulted in smaller amounts of river bank scour and erosion. Additionally, the dam protected bridge abutments downstream since the smaller ice pieces were less likely to jam at bridge abutments. Ice jams at bridge abutments can result in damage to bridge structures and flooding upstream of the ice jams. The Heiberg Dam also protected the bridge immediately upstream (on State Route 32) from scour by creating a backwater effect that reduced velocity and thereby reduced scour and washout at these bridge abutments.

The need for the proposed project is to restore scour protection due to ice to downstream river banks and to protect downstream bridge abutments from ice jams. This provides for the need for floodwater management of the Wild Rice River during spring thaw events. An additional need for the project includes the need to restore scour protection to the upstream, Minnesota Department of Transportation's (MnDOT) State Route 32 bridge abutments.

The proposed project is located in rural Norman County, approximately two miles north of the nearest town of Twin Valley. The surrounding land is primarily agricultural, although the downstream town of Ada, MN is potentially affected by ice break-up on the Wild Rice River.

The President's Council on Environmental Quality has developed regulations for implementing the National Environmental Policy Act (NEPA). These federal regulations, set forth in Title 40, CFR Parts 1500-1508, require an evaluation of alternatives and a discussion of the potential environmental impacts of a proposed federal action as part of the environmental assessment process. The FEMA regulations, which establish FEMA's process for implementing NEPA, are set forth in 44 CFR Subpart 10. This EA was prepared in accordance with FEMA's regulations as required under NEPA.

As part of this NEPA review, the requirements of other environmental laws and executive orders are addressed.

## 1.4 *Existing Facility*

The Heiberg Dam is a sheet piling, rock-filled overflow structure with an approximate 155-foot crest at elevation 1000.0 feet; this overflow structure works in combination with upstream levees both north and south of the river at elevation 1009.0 feet. The dam worked in conjunction with an earthen embankment that was washed out during the June 2002 storm event. The Wild Rice Watershed District is proposing to alter the existing dam and replace the earthen embankment. The Heiberg Dam has a drainage area of approximately 900 square miles.

Located northeast of the Heiberg Dam and the washed out embankment is an old power house and associated buildings. The power house is composed of an original structure constructed in the 1920s and two attached additions. A second, separate building is located on the north side of the power house. These structures are vacant and in poor repair. The power house has experienced significant structural damage due to the re-routing of the Wild Rice River. The Wild Rice Watershed District is proposing to demolish these structures in order to provide access for construction equipment on the dam and embankment.

Photographs showing the existing facility and conditions can be found in Appendix B.

# II. Alternatives

Guidance is given in 40 CFR 1502.14 regarding NEPA's requirement for an alternative analysis that includes:

(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

Per 40 CFR 1502.14, a No Action Alternative must also be included.

Coordination began early between FEMA and the Wild Rice Watershed District to develop feasible alternatives. Further Coordination with U.S. Fish and Wildlife Service (U.S. F&WS), Minnesota Department of Natural Resources (MN DNR), and the White Earth Band of the Chippewa Tribe served to eliminate some alternatives as being unfeasible and led to the eventual choice of a preferred alternative.

The following section discusses the alternatives that were considered and a brief description of those that were eliminated as being unfeasible.

## 2.1. *No Action Alternative*

The No Action Alternative consists of not restoring the Wild Rice River to its historic channel, but allowing the river to continue within the historic mill/power house sluice channel. This alternative would result in the Wild Rice River continuing to by-pass the Heiberg Dam and the oxbow. This alternative does not fulfill the purpose and need of the project.

Further discussions of this alternative will refer to it as the *No Action Alternative.*

## *2.2 Restore Wild Rice River over Heiberg Dam, Lower Dam, Install Rock Arch Rapids (Preferred Alternative)*

This alternative consists of replacing the lost earthen embankment which was washed out immediately upstream of the Heiberg Dam, and thereby restore the Wild Rice River to its pre-disaster channel. The Wild Rice River would flow over the Heiberg Dam and through the oxbow in its pre-disaster course. The lost embankment would be replaced with a 220-ft combined sheet pile and earthen embankment levee. Sheet piling would be installed and would then act as a coffer dam and force the river back to its original course. An earthen embankment would then be built behind the sheet piling in the same location as the original earthen embankment. The sheet piling would remain in place in order to reinforce the earthen embankment and prevent damage during future flood events. The top of the embankment would be set at elevation 1009.0. This is the same elevation of the original embankment as indicated in the 1975 plans. These features result in the project fulfilling the stated purpose and need.

This alternative also includes additional features that were not part of the original purpose and need. This alternative includes modifications to the Heiberg Dam to improve the ice breaking function, installation of a rock arch rapids to provide for fish passage, and installation of bendway weirs to reduce stress on the vertical, north bank of the Wild Rice River.

The existing Heiberg Dam crest would be lowered from an elevation of 1000.0 to provide a 72-foot low flow weir at elevation 994.0 and an 83-foot high flow crest at elevation 996.0. Concrete ice blocks would be installed on top of the dam crest to assist in the breakup of ice.

A rock arch rapids would be installed below the dam to allow for fish migration over the dam, reduce stress on downstream banks, and increase safety by lowering the velocity of the water near the banks. The rock arch rapids would also eliminate the existing hydraulic roller effect. Additionally, two bendway weirs would be installed downstream of the dam to direct flow back towards the center of the channel and reduce stress on the north bank of the Wild Rice River.

An existing old power house with additions and adjacent building located northeast of the Heiberg Dam and embankment would be removed in order to provide access for construction equipment. This area would also act as a staging area during construction. Construction is expected to be completed within one season.

The project would result in the restoration of the Wild Rice River to its original course over the Heiberg Dam, thereby restoring ice scour protection and bridge embankment protection. In addition to fulfilling the state purpose and need, restoration of the Wild Rice River to its original channel would provide other benefits. Restoration of the Wild Rice River to its original channel would reduce erosion and sedimentation problems that are currently occurring and restore lost floodplain. This would also result in habitat restoration and improved water quality. The inclusion of concrete ice blocks would improve the dam's ability to effectively break up ice, the rock arch rapids would allow for fish migration and open up additional spawning areas to resident fish. The bendway weirs would reduce stress on a vertical north bank of the Wild Rice River.

A hydrologic study was conducted on the restoration of the Wild Rice River to its original channel and the environmental impacts that would occur. The findings from this study are summarized in Section 3.1.3. The complete study, entitled *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment*, is located in Appendix C.

A complete description of the project, plan drawings, and drawings of the concrete ice blocks and rock arch rapids are included in *Repair of Project No. 2 – Heiberg Dam*, in Appendix C.

Further discussions of this alternative will refer to as the *Preferred Alternative*.

## 2.3 *Restore Wild Rice River over Heiberg Dam, Without Improvements Alternative (Course Restoration Alternative)*

This alternative consists of replacing the lost earthen embankment which was washed out immediately upstream of the Heiberg Dam, and thereby restoring the Wild Rice River to its pre-disaster channel. The Wild Rice River would flow over the Heiberg Dam and through the oxbow in its pre-disaster course.

The restoration of the Wild Rice River to its pre-disaster course would be accomplished by installing sheet piling in the vicinity of the lost earthen embankment. This sheet piling would act as a coffer dam and force the river back to its original course. An earthen embankment would then be built behind the sheet piling in the same location as the original earthen embankment.

The existing old power house with additions and adjacent building located northeast of the Heiberg Dam and embankment would be removed in order to provide access for construction equipment. This area would also act as a staging area during construction. Construction is expected to be completed within one season.

The project would result in restoring the Wild Rice River to its original channel, thereby fulfilling the purpose and need of the project. In addition, this alternative would reduce erosion and sedimentation problems that are currently occurring and restore lost floodplain. Restoration of the Wild Rice River to its original channel would also result in habitat restoration and improved water quality. Since this alternative does not include the rock arch rapids, this alternative would result in the inability of fish to migrate to areas upstream of the dam and the loss of additional spawning areas to resident fish populations.

Further discussions of this alternative will refer to it as the *Course Restoration Alternative*.

## *2.4. Preliminary Alternatives Eliminated from Further Consideration*

### *2.4.1 Restore to Pre-disaster Conditions Alternative*

The Restore to Pre-disaster Conditions Alternative consists of repairing the washed out earthen embankment adjacent to the Heiberg Dam to pre-disaster conditions. This alternative would restore the embankment using earthen fill. No additional reinforcements would be used at the embankment, and no modifications would occur at the Heiberg Dam. This alternative is not feasible because the Wild Rice River is currently using the location of the lost earthen embankment as its river channel. Engineering constraints would require the use of sheet piling or other structural means to divert the Wild Rice River to a different course before repair of the earthen embankment could occur. Best construction practices and engineering constraints therefore prohibit the exclusive use of earthen fill. Although this alternative would fulfill the purpose and need, it

was dismissed from further study as being unfeasible due to engineering constraints.

### *2.4.2 Restore Wild Rice River to Pre-disaster Channel, Remove Hieberg Dam Alternative*

The Restore Wild Rice River to Pre-disaster Channel, Remove Hieberg Dam Alternative consists of repairing the washed out earthen embankment adjacent to the Heiberg Dam at the pre-disaster location and removing the Hieberg Dam. This alternative would restore the Wild Rice River to its pre-disaster channel, but the dam would no longer be in place. The removal of the Heiberg Dam would result in the loss of its ice breaking function, but would allow for the passage of fish within the Wild Rice River to areas upstream of the Heiberg Dam. Because of the loss of the Heiberg Dam's ice breaking function, this alternative does not meet the purpose and need.

As previously discussed in Section 1.1, the removal of the Heiberg Dam would not be eligible for funding because the Heiberg Dam was not damaged and is therefore not eligible for assistance. In order for the Heiberg Dam to be removed as part of this alternative, alternate funding would have to be identified and the removal would have to be approved by the Wild Rice Watershed District. This would be paramount to abandoning the project. The Wild Rice Watershed District determined that abandonment of the Heiberg Dam project is an unacceptable alternative because of considerable public opposition and the need for ice break-up benefits. On September 8, 2004, the Wild Rice Watershed District board of directors resolved to pursue repairs consistent with the Preferred Alternative. (Copy of resolution can be found in Appendix E.)

Public opposition and the Wild Rice Watershed District's resolution make this alternative sufficiently unlikely that this alternative was dismissed from further study.

### *2.4.3 Restore Wild Rice River over Heiberg Dam, With Improvements Alternative (Course Restoration With Improvements Alternative)*

This alternative consists of replacing the lost earthen embankment which was washed out immediately upstream of the Heiberg Dam, and thereby restoring the Wild Rice River to its pre-disaster channel. The Wild Rice River would flow over the Heiberg Dam and through the oxbow in its pre-disaster course. Sheet piling or other structural means would be used to divert the Wild Rice River back to its original pre-disaster channel. The sheet piling would remain in place in order to reinforce the earthen embankment and prevent damage during future flood events. This alternative would meet the purpose and need of the project.

This alternative includes the addition of a fish ladder and concrete ice blocks to the Heiberg Dam. The fish ladder would allow for the passage of fish within the

Wild Rice River to areas upstream of the dam and the addition of concrete ice blocks on top of the dam would improve the ice breaking function of the dam.

Coordination meetings were conducted with U.S. F&WS and MN DNR, Waters regarding this alternative. U.S. F&WS advised that fish ladders are not effective for the fish species found in this watershed and suggested that this alternative would not be sufficient to mitigate for the loss of fish habitat that the Heiberg Dam is currently responsible for. Additionally, MN DNR, Waters advised that MN DNR would not issue the required permit/s that would be needed for this alternative. This alternative was therefore dismissed from further study.

# III. Affected Environment and Environmental Consequences

## 3.1 *Physical Environment*

### *3.1.1 Topography*

The Wild Rice River watershed occupies a land area of approximately 2,080 square miles. Topography in the watershed is varied. The western portion of the watershed is glacial lake deposits of clay and silt from glacial Lake Agassiz, with areas of sand ridges and silty wetland depressions. The area is a flat plane with minimal slope and limited channel capacity. The watershed drains towards the north, towards the Red River, but has a poorly defined floodplain due to the flatness of the terrain.

The eastern portion of the Wild Rice River watershed is primarily glacial till deposits of clay, silt, sand, gravel, cobble, and boulders. Upland areas are gently rolling to rugged. Streams located within the eastern portion are slow flowing and meandering, except where they have been channelized.

Elevations within the watershed range from more than 1500 feet in the eastern portion to 860 feet near the Red River.

Within the project vicinity near the Heiberg Dam, the area is characterized by glacial lake plain. This plain is flat, extremely level, and consists of sediment deposits up to 80 feet thick. The project is located within the beach ridge area of glacial Lake Agassiz bed and is gently sloping downwards towards the west. The topographic elevation at the river banks near the Heiberg Dam is 1000 feet above sea level.

The alteration of the course of the Wild Rice River resulted in changes to the topography of the river channel in the vicinity of the Heiberg Dam. Mr. Kevin Ruud of Norman County Environmental Services advised that the river channel has been widened for approximately 20 miles downstream of the Heiberg Dam. This channel widening is a result of the increased velocity of the Wild Rice River as it passes through a shortened channel compared to the meandering of its previous course. In addition, the increased flow velocities in the cutoff channel have resulted in this channel being deepened.

A U.S. Geologic Survey (USGS) topographic map can be found as Exhibit 2 in Appendix A.

#### *3.1.1.1 No Action Alternative*

The *No Action Alternative* would have a minimal impact on local topography. Scour from increased flow velocities would result in

continued channel modifications in the new cutoff channel. This has the potential to create minimal, local topographic changes.

#### *3.1.1.2 Preferred Alternative*

The *Preferred Alternative* would not have a direct impact on topography. This alternative would result in restoring the river course to its pre-disaster condition; future topographic alterations due to the new course would be prevented. The pre-disaster river channel is stable and not expected to cause topographic changes.

The *Preferred Alternative* could result in secondary impacts due to the requirement for fill to replace the washed out earthen embankment. Topography changes at the borrow site for this fill would occur; it is anticipated that fill would be obtained from an existing borrow-pit or gravel mine, and therefore the impacts would be minimal.

#### *3.1.1.3 Course Restoration Alternative*

The *Course Restoration Alternative* would not have direct impacts on topography. This alternative would result in restoring the river course to its pre-disaster condition; future topographic alteration due to the new course would be prevented. The pre-disaster river channel is stable and not expected to cause topographic changes.

The *Course Restoration Alternative* could result in secondary impacts due to the requirement for fill to replace the washed out earthen embankment. Topography changes at the borrow site for this fill would occur; it is anticipated that fill would be obtained from an existing borrow-pit or gravel mine, and therefore the impacts would be minimal.

### *3.1.2 Geology*

Geology underlying Norman County is composed of Archean Precambrian rocks consisting of slate, schist, granite and gabbroic rocks. Much of the Precambrian rock is covered with glacial till and glacial outwash. The glacial till consists of a variable mixture of clay, silt, sand, and boulders. The till has low water-bearing potential if clay-rich, moderate if sandy. The glacial outwash consists of sand and gravel with lesser amounts of silt or clay. The outwash is the primary source of water throughout central Minnesota.

#### *3.1.2.1 No Action Alternative*

The *No Action Alternative* would not have an impact on geology. .

#### *3.1.2.2 Preferred Alternative*

The *Preferred Alternative* could have an impact on geology. Minor secondary impacts may occur due to the requirement for fill for replacement of the washed out embankment. Impacts to the geology at the borrow site or mine could occur, if glacial till is used for fill. It is anticipated that fill would be obtained from an existing borrow-pit or gravel mine, and therefore the impacts would not be significant.

#### *3.1.2.3 Course Restoration Alternatives*

The *Course Restoration Alternative* could have an impact on geology. Minor secondary impacts may due to the requirement for fill for replacement of the washed out embankment. Impacts to the geology at the borrow site or mine could occur, if glacial till is used for fill. It is anticipated that fill would be obtained from an existing borrow-pit or gravel mine, and therefore the impacts would not be significant.

### *3.1.3 Seismicity*

The project area is underlain by lower Cambrian age alternating belts of volcanic and sedimentary rocks. The sedimentary belts consist of mudstone, siltstone, and some sandstone. The area is dissected by steeply dipping faults and a few low angle thrust faults.

Minnesota has one of the lowest occurrence levels of earthquakes in the United States. Minnesota earthquakes are attributed to minor reactivation of ancient faults in response to modern stresses. The closest recorded seismic activities occurred approximately 30 miles from the project location in Detroit Lakes. This earthquake occurred in 1939 and measured 3.9 on the Richter scale. An earthquake occurred in Walker, approximately 80 miles from the project location in 1982; this earthquake was estimated to have been 2.0 on the Richter scale.

The project area is not in a seismic zone.

#### *3.1.3.1 No Action Alternative*

Since the project area is not in a seismic zone, the *No Action Alternative* would not be impacted by seismicity.

#### *3.1.3.2 Preferred Alternative*

Since the project area is not in a seismic zone, the *Preferred Alternative* would not be impacted by seismicity.

#### *3.1.3.3 Course Restoration Alternative*

Since the project area is not in a seismic zone, the *Course Restoration Alternative* would not be impacted by seismicity.

### *3.1.4 Soils*

Soils within the Wild Rice River watershed consist primarily of silt, sand, and gravel that were deposited by running or receding water. The banks of the Wild Rice River are mapped as alluvial land and breaks and alluvial land.

Alluvial land consists of alluvial deposits along the banks of rivers, streams, or old channel bottoms. Alluvial land lacks uniformity of color and texture and shows little to no sign of soil development. The most common textures are stratified silty, sandy, and clayey materials. Small areas of Cashel soils are included in the mapping. Cashel soils are more developed and are found at higher elevations. Also included are areas of Fargo and Calvin depressional soils. Alluvial land occasionally floods, introducing grasses and scattered trees; these are the most common vegetative covers.

Breaks and alluvial land is moderately steep to steep land. It occupies areas along rivers and streams that drain into the Lake Agassiz basin. The soil materials are usually moderately fine to fine textured, and moderately dark to dark colored. Breaks and alluvial land lacks uniformity and is mixed with many varied and stratified materials. This land is seldom cultivated. Hardwood trees are the most common vegetative cover.

In the immediate vicinity of the Heiberg Dam, the soils are mapped by the U.S. Natural Resource Conservation Service (U.S. NRCS) as alluvial land, occasionally or frequently flooded. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* (Appendix C) determined that the soil within the Wild Rice River channel for a depth of up to seven feet is fine to medium sand. Mr. Kevin Ruud of the Norman County Environmental Services advised that a significant amount of scouring has occurred due to the increased velocities in the new cutoff channel and sedimentation has been deposited in the vicinity of the Wild Rice River where the new channel re-joins the historic river channel.

A U.S. NRCS soils map can be found as Exhibit 3 in Appendix A.

#### *3.1.4.1 No Action Alternative*

The *No Action Alternative* would have an impact on soils. Scouring and sedimentation would continue within the cutoff channel until the new channel stabilizes. This stabilization process can take a significant period of time, over which scouring of the river banks and adjacent agricultural

fields is possible. The resulting removal and re-deposition of soil would occur within the river channel and adjacent to the channel.

#### *3.1.4.2 Preferred Alternative*

The *Preferred Alternative* would not have an impact on soils. The Wild Rice River channel within the pre-disaster, oxbow course is stable and would not result in additional scouring or sedimentation.

#### *3.1.4.3 Course Restoration Alternative*

The *Course Restoration Alternative* would not have an impact on soils. The Wild Rice River channel within the pre-disaster, oxbow course is stable and would not result in additional scouring or sedimentation.

### *3.1.5 Prime Farmland*

The Farmland Protection Policy Act (FPPA) (P.L. 97-98, Sec. 1539-1549; U.S.C. 4201, et seq.) was enacted in 1981 (P.L. 98-98) to minimize the unnecessary conversion of farmland to non-agricultural uses as a result of federal actions. Programs administered by federal agencies must be compatible with state and local farmland protection policies and programs. The U.S. NRCS is responsible for protecting significant agricultural lands from irreversible conversions that result in the loss of an essential food or environmental resource.

Prime farmland is characterized as land with the best physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops (USDA, 1989). This land is either used for food or fiber crops or is available for those crops, but is not urban, built-up land, or water areas.

The U.S. NRCS was contacted on December 16, 2002 to determine if any prime or unique soils exist in the project area. (Copy of correspondence can be found in Appendix D.) Their undated response, located in Appendix E, indicated that because the proposed work would result in soil disturbance within the river channel only, the Farmland Protection Policy Act does not apply.

#### *3.1.5.1 No Action Alternative*

The *No Action* would not have direct impacts on prime farmland.

The *No Action Alternative* could potentially have secondary impacts on prime farmland. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* (Appendix C) determined that without course restoration, the Wild Rice River would modify channel longitudinal profiles and cross-section areas both upstream and downstream of the dam. These channel modifications could potentially

result in erosion significant enough to impact prime farmland. These secondary impacts, if any, cannot be predicted.

*3.1.5.2 Preferred Alternative*

The *Preferred Alternative* would not have direct impacts on prime farmland.

*3.1.5.2 Course Restoration Alternative*

The *Course Restoration Alternative* would not have direct impacts on prime farmland.

### *3.1.6 Hydrology*

The Wild Rice River watershed is located in the northwest portion of Minnesota within the central portion of the Red River Basin. It occupies about 2,080 square miles in parts of Norman, Clay, Mahnomen, Becker, Clearwater and Polk Counties. It is a drainage basin of the Red River, and its main tributaries include the Wild Rice River and the Marsh River. The tributaries of the Wild Rice River include its South Branch, the White Earth River, Marsh Creek, Felton Ditch, Moccasin Creek, Spring Creek, Mashaug Creek and Coon Creek. A maximum gage height at Hendrum (USGS gauging station 05064000) of 32.30 ft was recorded on April 21, 1979. The Hendrum gage is four miles upstream of the mouth of Wild Rice River and includes approximately 1,600 square miles of drainage area.

The proposed project is located on the Wild Rice River in Norman County, approximately 45 miles upstream of the confluence of the Wild Rice River and the Red River. The average channel slope of the entire reach downstream of the Heiberg Dam is 0.038 – 0.040%. Since the entire watershed is very flat, the floodplain area is very wide on both sides of the channel. The nearest gauging station to the Heiberg Dam is at Twin Valley (gauging station #0506250). Prior to the flood events of June 2002, the maximum discharge at this gauging station for the years that data is available (1909-2002) was 13,500 $ft^3/s$ (a 500-year storm event).

As a result of the storm event, the Wild Rice River altered its course from the pre-disaster channel over the Heiberg Dam and through an oxbow on the west side of State Route 32, to an historic sluice channel upstream of the Heiberg Dam. This has resulted in a new cutoff channel that is five times shorter than the length of the pre-disaster oxbow channel, with resulting changes in hydrologic and hydraulic characteristics, sediment transport, and channel stability both upstream and downstream of the dam. In order to evaluate these changes, a hydrologic and hydraulic assessment was conducted. This assessment, tiled *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment,* included a

HEC-RES hydraulic computation model as well as a qualitative assessment of the predicted changes. This complete study can be found in Appendix C and is summarized here.

The hydrologic/hydraulic study determined that as a result of the decrease in channel length (the post-disaster channel is 0.3 miles, the pre-disaster channel was 1.5 miles), the flow velocities for post-disaster conditions are eight times greater than pre-disaster conditions for small (one-year) storms. For major flood events (50-year, 100-year frequency storms), the velocity of the Wild Rice River has increased by a factor of two. Generally, the most significant and permanent modifications of sediment transport and channel morphology are produced by low and medium flows, because these last longer, occur more frequently, and the action of the flow in the channel boundaries is over a longer period of time.

As a result of the increased flow velocities, important erosion and sedimentation has developed in the Wild Rice River channel upstream and downstream of the cutoff channel. This process will continue for an indefinite period of time until the river reaches a new sediment transport equilibrium state. In addition, when the increased sediment load reaches downstream areas where the flow velocity is lower, settlement of the sediment would occur. This process would modify channel cross-section areas upstream and downstream, with multiple implications on flooding and sediment transport in the river. A new re-shaped channel longitudinal profile and cross-section would gradually take place that could create conditions for unexpected channel modifications on downstream reaches, some of them located far away from the dam. Field observations confirm that this modification is occurring and has resulted in the river channel having been widened for approximately 20 miles downstream of the dam. Additionally, scouring within the general vicinity of the Heiberg Dam has lowered the Wild Rice River channel by at least ten feet. Survey data from July 2003 indicated that the river bed immediate adjacent to the Heiberg Dam was 11.4 feet below the elevation of the bed prior to June 2002. Downcutting has been noted up to a mile upstream of the dam. Increased sediment transport has also been reported due to severe erosion at the cutoff channel.

The U.S. F&WS expressed concern regarding sediment transport in the Wild Rice River downstream of the Heiberg Dam in their letter of January 21, 2003. (Copy of correspondence can be found in Appendix E.) Besides concerns related to fish passage (discussed in Section 1.2.1), U.S. F&WS expressed concern that sediment-hungry waters resulting from sediment deposition upstream of the dam could initiate blow outs in the bluffs downstream of the dam if the river was restored to its pre-disaster course and the Heiberg Dam was once again functional. The U.S. F&WS was concerned that this would result in accelerated erosion that would affect both channel morphology and water quality. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* determined that this process does occur, but is more prevalent with high head dams; the Heiberg Dam is a low head dam. Additionally, the Heiberg Dam has

been in place since 1880 and the Wild Rice River has therefore adjusted itself to these conditions. Sediment transport on the entire reach, upstream and downstream of the dam, has developed according to these conditions. Restoring the Wild Rice River to its original, pre-disaster channel would restore the sediment transport to stable conditions. Conversely, maintaining the new cutoff channel would induce unexpected flow conditions that would impact channel stability and sediment transport for a long period of time.

#### *3.1.6.1 No Action Alternative*

The *No Action Alternative* would result in the continued in flow velocity increases and sediment transport, resulting in continued modifications of channel morphology, including longitudinal profile and cross-section changes. The exact result of these modifications to upstream and downstream conditions cannot be predicted.

#### *3.1.6.2 Preferred Alternative*

*The Preferred Alternative* would return the Wild Rice River to its original channel, thereby reducing flow velocities and restoring sediment transport to original, pre-disaster conditions.

The *Preferred Alternative* would have additional benefits to the local hydrology. This alternative includes the installation of a rock arch rapids below the dam to allow for fish migration. This rock arch rapids would also reduce stress on the banks by lowering the velocity of the water near the banks, and this would eliminate the existing hydraulic roller effect. Additionally, two bendway weirs would be installed downstream of the dam to direct flow back towards the center of the channel and reduce stress on the vertical, north bank of the Wild Rice River. Erosion would be minimized by both of these factors.

If the *Preferred Alternative* is chosen, a MN DNR, Waters Permit will be required since work will be conducted below the ordinary high water mark. Mr. Bob Merritt should be contacted for assistance in obtaining the permit (218-847-1580). Mr. Merritt advised that the U.S. Army Corps of Engineers (USACE) and Division of Waters permits may be applied for through the same form sent to the MN DNR. This form is available on-line and is titled: "Minnesota Local/State/Federal Forms for Water/Wetland Projects".

If the *Preferred Alternative* is chosen, a Section 404 permit from the USACE will be required since the Wild Rice River is considered Waters of the U.S. (personal communication, Mr. Leo Grabowski, USACE January 2, 2003). The Wild Rice Watershed District has already obtained

this permit. Army General Permit GP/LOP-98-MN was approved on June 30, 2004 for the *Preferred Alternative*.

#### *3.1.6.3 Course Restoration Alternative*

The *Course Restoration Alternative* would return the Wild Rice River to its original channel, thereby reducing flow velocities and restoring sediment transport to original, pre-disaster conditions.

If the *Course Restoration Alternative* is chosen, a MN DNR, Waters Permit will be required since work will be conducted below the ordinary high water mark. Mr. Bob Merritt may be contacted for assistance in obtaining the permit (218-847-1580). Mr. Merritt advised that the U.S. Army Corps of Engineers (USACE) and Division of Waters permits may be applied for through the same form sent to the MN DNR. This form is available on-line and is titled: "Minnesota Local/State/Federal Forms for Water/Wetland Projects". The Wild Rice Watershed District has begun coordination for obtaining this permit.

If the *Course Restoration Alternative* is chosen, a Section 404 permit from the USACE will be required since the Wild Rice River is considered Waters of the U.S. (personal communication, Mr. Leo Grabowski, USACE January 2, 2003). The Wild Rice Watershed District has already obtained this permit. Army General Permit GP/LOP-98-MN was approved on June 30, 2004 for the *Preferred Alternative*.

### *3.1.7 Water Quality*

The Minnesota Pollution Control Agency regularly monitors the Red River Basin, in which the Wild Rice watershed is located. The 2002 assessment for aquatic life determined that the Wild Rice River was full supporting for aquatic life. The 2002 assessment was not done for swimming. The 1998 report to the Congress of the United States determined the Wild Rice River to be non-supporting for swimming throughout its course. Suspected pollution sources within the entire watershed include non-point sources such as agricultural run-off, urban run-off, land disposal, and hydrologic modification.

The June 2002 storm event resulted in the Wild Rice River altering its course from the pre-disaster channel over the Heiberg Dam to an historic cutoff channel upstream of the Heiberg Dam. As a result, increased flow velocities are causing increased erosion in the vicinity of the cutoff channel and in areas downstream of the cutoff channel. This erosion has resulted in sedimentation transport and sediment erosion upstream and downstream of the cutoff channel. This process will continue for an indefinite period of time until the river reaches a new sediment transport equilibrium state. When the increased sediment load reaches

downstream areas where the flow velocity is lower, settlement of the sediment occurs. This increase in erosion, sediment transport, and settlement of sediment is impacting water quality throughout this reach of the Wild Rice River. These water quality impacts will continue for an indefinite period of time until a new sediment transport equilibrium state is reached.

*3.1.7.1 No Action Alternative*

The *No Action Alternative* would result in the continued erosion and sedimentation in the vicinity of the cutoff channel and in areas downstream, impacting water quality by increasing turbidity.

*3.1.7.2 Preferred Alternative*

The *Preferred Alternative* would result in the return of the Wild Rice River to its original channel, thereby reducing erosion and sedimentation in the vicinity of the cutoff channel and in areas downstream, thereby decreasing turbidity and improving water quality.

The *Preferred Alternative* includes the installation of a rock arch rapids that would reduce the stress on banks, and eliminate the existing hydraulic roller effect. Additionally, two bendway weirs would be installed downstream of the dam to direct flow back towards the center of the channel and reduce stress on the north bank of the Wild Rice River. Both of these improvements would reduce erosion and sedimentation to below pre-disaster conditions, thereby improving water quality.

The *Preferred Alternatives* would result in temporary water quality impacts due to construction activities. Mitigation techniques should be implemented to limit the water quality impacts to the Wild Rice River caused by these activities. These activities include, but are not limited to, installation of temporary silt fences and/or straw bales and staging of equipment on previously developed areas. If project activities include stockpiling of soil or fill on-site, the applicant should cover these soils to prevent fugitive dust and erosion into the river; following construction, any bare soils would be vegetated to prevent future soil erosion**.**

Additionally, USACE General Permit (GP/LOP-98-MN) conditions must be complied with Condition 7. Erosion and siltation controls require that:

> Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark must be permanently stabilized at the earliest practicable date. Work should be done in accordance with state-approved, published practices, such as

defined in Minnesota Pollution Control Agency Document, *Protecting Water Quality in Urban Areas – Best Management Practices for Minnesota.*

#### *3.1.7.3 Course Restoration Alternative*

The *Course Restoration Alternative* would result in the return of the Wild Rice River to its original channel, thereby reducing erosion and sedimentation in the vicinity of the cutoff channel and in areas downstream, thereby decreasing turbidity and improving water quality.

The *Course Restoration Alternative* would result in temporary water quality impacts due to construction activities. Mitigation techniques should be implemented to limit the water quality impacts to the Wild Rice River caused by these activities. These activities include, but are not limited to, installation of temporary silt fences and/or straw bales and staging of equipment on previously developed areas. If project activities include stockpiling of soil or fill on-site, the applicant should cover these soils to prevent fugitive dust and erosion into the river; following construction, any bare soils would be vegetated to prevent future soil erosion**.**

Additionally, USACE General Permit (GP/LOP-98-MN) conditions must be complied with Condition 7. Erosion and siltation controls requires that:

> Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark must be permanently stabilized at the earliest practicable date. Work should be done in accordance with state-approved, published practices, such as defined in Minnesota Pollution Control Agency Document, *Protecting Water Quality in Urban Areas – Best Management Practices for Minnesota.*

### *3.1.8 Groundwater*

Although groundwater underlies most of the Wild Rice River watershed, only small amounts of groundwater are accessible in most of the watershed. In the eastern portion of the watershed, larger amounts of groundwater are available due to sand and gravel outwashes. Groundwater is found near the land surface or between 100 and 300 feet below the surface. Water moves through the system of bedrock and glacial drift in a regional flow system generally towards the north. Most of the eastern uplands are recharge areas for groundwater.

Most of the municipalities within the region use groundwater for their public water supplies. Groundwater is primarily used for irrigation and public use and averages 1,030 acre-feet per year.

Much of the groundwater in the watershed is of poor quality, containing high levels of total dissolved solids. Groundwater in the surficial aquifers has concentrations of total dissolved solids ranging from 300 to 700 milligrams per liter. The surficial aquifers are impacted by nitrate-nitrogen concentrations found locally beneath cropland. Calcium bicarbonate is also found in high concentrations. As the groundwater moves down gradient, magnesium and sulfate become predominant. In the deeper aquifers, the groundwater is characterized predominantly by sodium and chloride with dissolved solids concentrations in excess of 1,000 milligrams per liter. Arsenic, boron, and manganese have also been found in this aquifer.

The project location is not located within a designated Sole Source Aquifer. A Sole Source Aquifer is an aquifer designated by the U.S. Environmental Protection Agency (U.S. EPA) as the "sole or principal" source of drinking water for a given aquifer service area. In order for an aquifer to be designated as a Sole Source Aquifer, the aquifer must be needed to supply 50% or more of the drinking water for that area and a municipality or agency must petition the U.S. EPA for the designation. Once designated, any project within the designated area that is receiving federal financial assistance must have the project plans reviewed by the U.S. EPA. The nearest Sole Source Aquifer to the project is the Mille Lacs aquifer located in central Minnesota. No Sole Source Aquifers are located within the project vicinity.

#### *3.1.8.1 No Action Alternative*

Since the Wild Rice River is a groundwater discharge area, the *No Action Alternative* would not have an impact on groundwater.

#### *3.1.8.2 Preferred Alternative*

Since the Wild Rice River is a groundwater discharge area, the *Preferred Alternative* would not have an impact on groundwater.

#### *3.1.8.3 Course Restoration Alternative*

Since the Wild Rice River is a groundwater discharge area, the *Course Restoration Alternative* would not have an impact on groundwater

### *3.1.9 Ice Control*

The Heiberg Dam was constructed to act as an ice control dam. According the Wild Rice Watershed District, the purpose of the dam is to help control problems

associated with spring ice break-up and movement along the Wild Rice River. With the dam in place, a large covering of ice upstream of the dam retards the movement of ice flow downstream until the downstream channel is open. As the downstream channel is opened, the ice moves over the dam and is broken into smaller pieces. The movement of the spring ice into smaller pieces has two beneficial effects. The smaller ice pieces result in smaller amounts of river bank scour and erosion. Additionally, the dam protects bridge abutments downstream since the smaller ice pieces are less likely to jam at bridge abutments. The Heiberg Dam also protects the bridge immediately upstream (over State Route 32) from scour by creating a backwater effect that reduces velocity, and thereby reduces scour and washout at the bridge abutments.

Comments received from the USACE (personal communication January 2, 2003) and the MN DNR (personal communication January 3, 2003) questioned the effectiveness of the Heiberg Dam to adequately fulfill these ice control benefits. The U.S. F&WS advised in a letter dated January 21, 2003 that the Heiberg Dam does not provide effective ice protection (see Appendix E). No studies have been performed to demonstrate the effectiveness of the Heiberg Dam for ice control. No models are available to evaluate this function. Anecdotal information provided by the various resources available for this assessment is conflicting.

#### *3.1.9.1 No Action Alternative*

According to the Wild Rice Watershed District, the *No Action Alternative* would have an impact on ice control within the Wild Rice River. The ice breaking function of the dam would be lost, resulting in potential bank scour, increased erosion, and increased risk of bridge damages from ice.

#### *3.1.9.2 Preferred Alternative*

The *Preferred Alternative* would facilitate ice control by restoring the Wild Rice River over the Heiberg Dam and by installing concrete sloped blocks on top of the dam. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* (Appendix C) suggests that ice control can be improved by the addition of concrete sloped blocks on top of the existing dam. This would result in the reduction of bank scour, decreased erosion, and increased protection to bridges.

#### *3.1.9.3 Course Restoration*

The *Course Restoration Alternative* would facilitate ice control by restoring the Wild Rice River over the Heiberg Dam and restoring ice control. This would result in the reduction of bank scour, decreased erosion, and increased protection to bridges. The amount of ice control that would be provided by this alternative is under discussion, however, since the effectiveness of the Heiberg Dam in controlling ice downstream

of the dam has not been demonstrated. Its effectiveness of controlling ice at the State Route 32 bridge immediately upstream of the dam has been attested to by MnDOT.

*3.1.10 Floodplain Management (Executive Order 11988)*

The site of the Heiberg Dam, abandoned Wild Rice River oxbow channel, and new Wild Rice River cutoff channel are located within the 100-year floodplain as indicated in the Flood Insurance Rate Map (FIRM), community panel #27107C 0175 D for Norman County, Minnesota (Unincorporated Areas) (Exhibit 4 in Appendix A).

Executive Order (EO) 11988 requires Federal agencies to take action to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits Federal agencies from funding construction in the 100-year floodplain unless there are no practicable alternatives. FEMA's regulations for complying with EO 11988 are promulgated in 44 CFR Part 9.

44 CFR Part 9 requires that FEMA apply the Eight-Step Decision-Making Process to ensure that it funds projects consistent with EO 11988. This process requires that once a determination has been made that a proposed project is located within a 100-year floodplain, that the public be informed, practicable alternatives be examined, all direct or indirect impacts be identified, and impacts be minimized. The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives as the Eight-Step Decision-Making Process. Therefore, steps in the Eight-Step Decision-Making Process have been combined with the NEPA process.

Initial Public Notices were published in the Forum on July 29, 2002 and the Star Tribune on July 22, 2002 for work which would occur as a result of this disaster. A copy of these public notices and affidavits of publication are included in Appendix F.

On October 12, 2004, a second public notice was published in the Norman County Index inviting the public to review and comment on the Draft EA (a copy of this public notice and affidavit of publication will be included in the Final EA).

Detailed Floodplain Management 8-Step Criteria Reviews for all alternatives were conducted. Documentation related to these reviews is provided in Appendix G.

In addition to EO 11988, work within the floodplain is regulated by state and/or local ordinances. Minnesota Regulation, parts 6120. 2500-6120. 3900, delegated responsibility to local governmental units to adopt regulations designed to minimize flood losses. As a result, the Board of Commissioners of Norman County, Minnesota implemented the Norman County Shoreland and Flood Plain

Management. Telephone conversations on July 13, 2004 with Norman County Environmental Services provided information on County requirements for projects located within the floodplain. The Norman County Zoning Ordinance states that any fill or materials proposed to be deposited in the floodway would be allowed only upon issuance of a Conditional Use Permit. The fill or materials must be shown to have some beneficial purpose and the amount cannot exceed that which is necessary to achieve the proposed purpose. The Norman County Zoning Ordinance further states that any flood control works shall require a Conditional Use Permit, approved by the State Department of Conservation and the USACE.

#### *3.1.10.1 No Action Alternative*

The *No Action Alternative* would result in the loss of 180 acres of floodplain adjacent to the pre-disaster, oxbow channel. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* (Appendix C) determined that flow is diverted to the new cutoff channel during low and medium flows of the Wild Rice River. The size of the floodplain associated with the new cutoff channel would increase in size to compensate for the loss of floodplain associated with the oxbow channel. Floodplain size would most likely also increase downstream of the cutoff channel, depending on the eventual hydrologic/morphologic changes due to the stabilization of the new cutoff channel. Increased erosion, sediment transport, and downstream settlement of sediment and adjustments to the floodplain would continue until stabilization occurs.

#### *3.1.10.2 Preferred Alternative*

The *Preferred Alternative* would result in the restoration of the Wild Rice River to its pre-disaster, oxbow channel. This would restore the natural flow to approximately 1.5 miles of former Wild Rice channel downstream of dam, and restore approximately 180 acres of corresponding floodplain areas and natural habitat conditions. Restoration of the river to the original channel would also result in reduced scouring and erosion, sediment transport and settlement, and improved water quality.

The *Preferred Alternative* includes the installation of a rock arch rapids that would reduce the stress on banks, and eliminate the existing hydraulic roller effect. Additionally, two bendway weirs would be installed downstream of the dam to direct flow back towards the center of the channel and reduce stress on the north bank of the Wild Rice River. Both of these improvements would reduce erosion and sedimentation to below pre-disaster conditions, thereby improving channel stability and improving water quality.

For the *Preferred Alternative*, the applicant will be required to obtain and comply with all necessary permits required by the Norman County Floodplain Coordinator.

#### *3.1.10.3 Course Restoration Alternative*

The *Course Restoration Alternative* would also result in the restoration of the Wild Rice River to its pre-disaster, oxbow channel. This would restore the natural flow to approximately 1.5 miles of former Wild Rice channel downstream of dam, and restore approximately 180 acres of corresponding floodplain areas and natural habitat conditions. Restoration of the river to the original would also result in reduced scouring and erosion, sediment transport and settlement, and improved water quality.

The *Course Restoration Alternative* does not implement measures to reduce stress on the banks downstream of the washout or assist in the breakup of ice over the Heiberg Dam. This alternative may therefore not fully comply with 44 CFR, Chapter 1, Part 9.11(f)(3) which states, "For any action taken by the Agency which affects the floodplain or wetland and which has resulted in, or will result in, harm to the floodplain or wetland, the Agency shall act to restore and preserve the natural and beneficial values served by floodplains and wetlands".

For the *Course Restoration Alternative*, the applicant will be required to obtain and comply with all necessary permits required by the Norman County Floodplain Coordinator.

### *3.1.11 Air Quality*

The Clean Air Act requires the U.S. EPA to set National Ambient Air Quality Standards for pollutants considered to be harmful to public health and the environment. The Clean Air Act established two types of national air quality standards: primary and secondary. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings. Current criteria pollutants are carbon monoxide (CO), nitrogen dioxide ($NO_2$), ozone ($O_3$), lead (Pb), particulate matter ($PM_{10}$), and sulfur dioxide ($SO_2$).

The Minnesota Pollution Control Agency monitors air quality in the state. According to David Kelso of the Minnesota Pollution Control Agency (personal communication, January 14, 2003), there are no air monitoring stations within the vicinity of the Wild Rice River watershed. Norman County is in an attainment area with regards to air quality standards, including the new 8-hour ozone

standard publish April 30, 2004 by the U.S. EPA, since it is not within the Minneapolis-St. Paul metropolitan area. The Minneapolis-St, Paul metropolitan area is the only portion of Minnesota not in attainment of air quality standards.

#### *3.1.11.1 No Action Alternative*

No impacts to air quality would occur as a result of the *No Action Alternative.*

#### *3.1.11.2 Preferred Alternative*

The *Preferred Alternative* would have no long term impacts to air quality. Short term, minor impacts to air quality will occur. Air pollutants would be generated from equipment during construction of the project. These impacts might include emissions from internal combustion engines and fugitive dust. Internal combustion engines have the potential to emit CO, volatile organic compounds (VOCs), $NO_2$, $O_3$, and $PM_{10}$. These increases would be short term and the impacts are not expected to be significant. To reduce fugitive dust emissions, the applicant will water down construction areas when necessary. To reduce emissions, internal combustion engine running times will be kept to a minimum.

#### *3.1.11.3 Course Restoration Alternative*

The *Course Restoration Alternatives* would have no long term impacts to air quality. Short term, minor impacts to air quality will occur. Air pollutants would be generated from equipment during construction of the project. These impacts might include emissions from internal combustion engines and fugitive dust. Internal combustion engines have the potential to emit CO, volatile organic compounds (VOCs), $NO_2$, $O_3$, and $PM_{10}$. These increases would be short term and the impacts are not expected to be significant. To reduce fugitive dust emissions, the applicant will water down construction areas when necessary. To reduce emissions, internal combustion engine running times will be kept to a minimum.

## *3.2 Biological Environment*

### *3.2.1 Flora*

The MN DNR has adopted the U.S. Forest Services' National Hierarchical Framework of Ecological Units for classifying ecological systems. This ecological classification system classifies land areas according to specific geology, climate, topography, plant communities, soil types, and other ecological factors.

The MN DNR has identified three provinces within the state; they are Prairie Parkland, Eastern Broadleaf Forest (deciduous), and Laurentian Mixed Forest (coniferous). The project area is located within the Prairie Parkland province. The Prairie Parkland province covers most of Minnesota. Types of prairies found within this province prior to settlement included dry prairies, dry oak savannas, mesic prairies, wet prairies and calcareous seepage fens.

The project area is located within Norman County, which has lost most of its pre-settlement Prairie Parkland habitat. Norman County is dominated primarily by agricultural land with thin strips of riparian habitat located adjacent to rivers. This riparian habitat is composed of remnant Prairie Parkland and includes floodplain forest, wet prairies, and dry prairie areas. Riparian habitat is important because it provides the only available habitat left in an area that is heavily agricultural. Additionally, riparian habitat functions as migratory and travel corridors, particularly along the Wild Rice River, and as a buffer between the rivers and the agricultural fields.

A stream survey assessment conducted by the MN DNR in September 1999 determined that hardwood forest dominates the watershed's cover in reaches four and five of the Wild Rice River. (The Heiberg Dam splits the Wild Rice River into reaches four and five.) The MN DNR determined that agriculture land was more abundant at further distances from the river. In the immediate vicinity of the project, the Heiberg Dam is located within riparian habitat composed of floodplain forest. The most common tree species in the immediate project vicinity include elm, box elder, and green ash. Other species include eastern cottonwood, basswood, and willow.

#### *3.2.1.1 No Action Alternative*

The *No Action Alternative* would result in the loss of floodplain associated with the forested habitat contained adjacent to the pre-disaster, oxbow channel. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* (Appendix C) determined that flow is diverted to the new cutoff channel during low and medium flows of the Wild Rice River. Due to increased flow velocities within the new cutoff channel, the Wild Rice River has scoured this new channel to a deeper level, thereby lowering the normal water level in the Wild Rice River. MnDOT advised that the new channel is as much as ten feet deeper in the vicinity of the State Route 32 bridge. The lowered normal water level, coupled with the presence of the Heiberg Dam, has resulted in the cutting off of the Wild Rice River from its historic oxbow channel during all but extreme flood events. The loss of flow in this oxbow channel would result in changes in vegetation for the 1.5 linear miles of former Wild Rice River floodplain. The change in vegetation may not be significant, and could result in a minor ecological shift to species adapted to drier habitats.

A potential secondary impact could occur as a result of the *No Action Alternative*. The forested, riparian habitat associated with the oxbow channel is currently privately owned. The loss of regular flooding to this area could result in the property owner/s' developing the land for agricultural or residential purposes. If this were to occur, the loss of forested habitat would be significant and could amount to 180 acres.

The new cutoff channel currently has riparian habitat consisting of floodplain forest associated with it, but for a significantly shorter distance (0.3 miles). The forested area associated with this channel could experience a minor ecological shift to species adapted to wetter habitats. This area is currently forested and only a slight shift in species would occur.

#### *3.2.1.2 Preferred Alternative*

The *Preferred Alternative* would have minimal impacts on flora. The restoration of flow in the oxbow channel would restore the hydrologic regime supporting vegetation for the 1.5 linear miles of former Wild Rice River floodplain. This would ensure that a minor ecological shift to species adapted to drier habitats would not occur.

By restoring the floodplain to the riparian habitat associated with the 1.5 linear miles of pre-disaster channel, thereby preventing a shift in ecology, the *Preferred Alternative* would prevent the development of the property by property owners.

The *Preferred Alternative* would have minor impacts to vegetation immediately adjacent to the dam as a result of equipment access. The project is expected to result in the removal of approximately one-third acre of trees, primarily on the north side of the river near the existing power house. The area will be re-vegetated using the MN DOT Standard Mix 650CT, which consists of Kentucky bluegrass, Canada bluegrass, hard fescue, and perennial rye grass. Loss of mature trees and conversion of one-third acre of forest to grassland is not expected to result in a significant impact. In time, natural succession would most likely result in the area naturally restoring to forest.

#### *3.2.1.3 Course Restoration Alternative*

The *Course Restoration Alternative* would have the same impacts on flora as the Preferred Alternative. The floodplain would be restored to the riparian habitat associated with the 1.5 linear miles of pre-disaster channel, thereby preventing a shift in ecology or the potential development of the property by property owners.

The *Course Restoration Alternative* would have the same minor impacts as the Preferred Alternative to vegetation immediately adjacent to the dam as a result of equipment access. The project is expected to result in the removal of approximately one-third acre of trees, primarily on the north side of the river near the existing power house. The area will be re-vegetated using the MN DOT Standard Mix 650CT, which consists of Kentucky bluegrass, Canada bluegrass, hard fescue, and perennial rye grass. Loss of mature trees and conversion of one-third acre of forest to grassland is not expected to result in a significant impact. In time, natural succession would most likely result in the area naturally restoring to forest.

### *3.2.2 Fish*

Fish are an important resource within the Wild Rice River and are therefore monitored by both the Minnesota Pollution Control Agency and the MN DNR. During a 1995 joint monitoring session, a total of 33 fish species in 12 families were identified. The predominant fish species were smallmouth bass, northern pike, channel catfish, walleye, and various minnows. Northern pike and rock bass also occurred, primarily in deeper pools. The species richness was high in most reaches when compared to other sites in the Red River Basin.

During a 1995 Wild Rice River longitudinal survey, the MN DNR found gamefish within the river including smallmouth bass, walleye, northern pike, and channel catfish. The 1995 study found, however, that 89.7% of all of the game fish sampled were found downstream of the Heiberg Dam. Of the total of 15 large fish species found; eight of these species were not found above the dam and two fish species were found above the dam but not below it. (*1995 Wild Rice River Longitudinal Survey Preliminary Report*, MN Pollution Control Agency, January 1996)

The following table, provided by the MN DNR, identifies those specific fish species found in the Wild Rice River both upstream and downstream of the Heiberg Dam during the 1995 study.

| Species | Upstream of Heiberg Dam | Downstream of Heiberg Dam |
|---|---|---|
| chestnut lamprey *(Ichthyomyzon castaneus)* | X | |
| silver lamprey *(Ichthyomyzon unicuspis)* | | X |
| mooneye *(Hiodon tergisus)* | | X |
| goldeye *(Hiodon alosoides)* | | X |
| common shiner *(Luxilus cornutus)* | X | X |
| emerald shiner *(Notropis atherinoides)* | | X |
| sand shiner *(Notropis stramineus)* | X | X |
| bigmouth shiner *(Notropis dorsalis)* | | X |
| creek chub *(Semotilus atromaculatus)* | X | X |
| carp *(Cyprinus carpio)* | | X |
| pearl dace *(Margariscus margarita)* | | X |
| blacknose dace *(Rhinichthys atratulus)* | X | X |
| spotfin shiner *(Cyprinella spiloptera)* | | X |
| fathead minnow (*Phimephales promelas*) | X | X |
| hornyhead chub (*Nocomis biguttatus*) | X | X |
| northern redbelly dace *(Phoxinus eos)* | X | |
| longnose dace *(Rhinichthys cataractae)* | X | X |
| quillback *(Carpoides cyprinus)* | | X |
| silver redhorse *(Moxostoma anisurum)* | X | X |
| golden redhorse *(Moxostoma erythrurum)* | X | X |
| shorthead redhorse *(Moxostoma macrolepidotum)* | | X |
| longnose sucker *(Catastomus commersoni)* | X | X |
| channel catfish *(Ictalurus punctatus)* | | X |
| stonecat *(Noturus flavus)* | X | X |
| tadpole madtom *(Noturus gyrinus)* | | X |
| brown bullhead *(Ameiurus nebulosus)* | X | X |
| black bullhead *(Ameiurus melas)* | X | X |
| northern pike *(Esox lucius)* | X | X |
| central mudminnow *(Umbra limi)* | X | |
| trout-perch *(Percopsis omiscomaycus)* | X | X |
| burbot *(Lota lota)* | | X |
| brook stickleback *(Culea inconstans)* | X | |
| rock bass *(Ambloplites rupestris)* | X | X |
| bluegill *(Lepomis macrochirus)* | | X |
| pumpkinseed *(Lepomis gibbosus)* | | |
| smallmouth bass *(Micropterus dolomieui)* | | X |
| walleye *(Stizostedion vitreum)* | | X |
| sauger *(Stizostedion canadense)* | | X |
| yellow perch *(Perca flavescens)* | X | |
| Johnny darter *(Etheostoma nigrum)* | X | X |
| logperch *(Percina caprodes)* | X | X |
| blackside darter *(Percina maculate)* | X | X |
| Iowa darter *(Etheostoma exile)* | X | |
| freshwater drum *(Aplodinotus grunniens)* | | X |

During a second study which was conducted in 1999 by the MN DNR, ten fish species found below the dam were not found above the dam. Species found only downstream included channel catfish, smallmouth bass, walleye, sauger, goldeye, shorthead redhorse, and quillback. Nine species were only found above the dam. The upstream species consisted primarily of minnows and lacustrine fish such as yellow perch, largemouth bass, pumpkinseed sunfish, and bluegill. Anecdotal evidence provided to the MN DNR from angler reports indicated that channel catfish, walleye, and northern pike were found in reaches upstream of the dam in the 1970s, prior to the installation of the dam. (*Stream Survey Descriptive Summary* of the Wild Rice River, 06/01/1999-09/17/1999 provided by MN DNR.)

The MN DNR also calculated an Index of Biotic Integrity (IBI) for different locations within the Wild Rice River during the 1999 study. The IBI developed for the Lake Agassiz Plain ecoregion includes species composition, trophic composition, reproductive guild, functional guild, fish abundance, and condition. Scores from 12-20 are considered to have very poor biotic integrity, scores from 21-30 have poor integrity, scores of 31-40 have fair integrity, scores of 41-50 have good integrity, and scores above 50 have excellent integrity. Sampling at downstream locations provided IBI scores of 40 or higher. Sampling at Faith, MN, located upstream of the Heiberg Dam, provided an IBI of 32.

The Wild Rice River provides an important spawning area for fish ascending from the Red River. Although fish resources are found throughout the river, the area upstream of the Heiberg Dam offers some of the best spawning habitat within the watershed. The Heiberg Dam prevents fish from traveling upstream to this area, however.

*The Red River Basin Stream Survey Report* *Wild Rice Watershed 2000* developed by the MN DNR, Division of Fisheries reports:

> Removal or modification of Heiberg Dam would re-connect upstream and downstream reaches and result in a healthier and more productive river system. Both upstream and downstream habitats in Wild Rice River and its tributaries are critical for fishes. Upper reaches of Wild Rice River and its tributaries provide important spawning, rearing, and seasonal habitat for adults during spring, summer, and fall. Specifically, the relatively high gradient stream segments that flow through the beach ridge have the capacity to provide spawning habitat for several species including smallmouth bass, walleye, and lake sturgeon. Stream segments above the beach ridge have the potential to provide rearing habitat for juvenile fishes of many species, and seasonal habitat for a variety of adult game fish species. Downstream reaches provide spawning and rearing habitat for some species but also, and perhaps more importantly, provide essential refuge habitat for many species during the winter and in periods of low flow. Heiberg Dam disconnects the upstream and downstream reaches,

which prohibits free access to important habitats during critical time periods.

A letter received from the U.S. F&WS dated January 21, 2003 advised that the Heiberg Dam has cut off fishery access to 120 miles of upstream Wild Rice River. Prior to its construction, game fish (including bass, northern pike, and walleye) were documented from the mouth of the river to the headwaters. After its construction, walleye, catfish, and some bass species were not found in the upstream portion of the river despite the fact that this area possesses the best habitat for these species.

More recently, fish sampling was again conducted by the MN DNR after the June 2002 storm event which resulted in the Wild Rice River course change to the cutoff channel upstream of Heiberg Dam. This fish sampling, done in June 2003, indicated that species previously found only downstream of the dam are again being seen upstream of the dam. Per the June 2003 sampling event, the following species are located both upstream and downstream of the Heiberg Dam.

| **Species** | **Upstream of Heiberg Dam** | **Downstream of Heiberg Dam** |
|---|---|---|
| goldeye *(Hiodon alosoides)* | X | X |
| common shiner *(Luxilus cornutus)* | X | |
| creek chub *(Semotilus atromaculatus)* | X | |
| hornyhead chub (*Nocomis biguttatus*) | X | |
| quillback *(Carpoides cyprinus)* | X | X |
| golden redhorse *(Moxostoma erythrurum)* | X | X |
| shorthead redhorse *(Moxostoma macrolepidotum)* | X | X |
| channel catfish *(Ictalurus punctatus)* | X | X |
| stonecat *(Noturus flavus)* | X | X |
| brown bullhead *(Ameiurus nebulosus)* | X | |
| black bullhead *(Ameiurus melas)* | X | |
| rock bass *(Ambloplites rupestris)* | X | X |
| bluegill *(Lepomis macrochirus)* | X | |
| pumpkinseed *(Lepomis gibbosus)* | X | |
| smallmouth bass *(Micropterus dolomieui)* | | X |
| walleye *(Stizostedion vitreum)* | X | |
| white sucker (*Catostomus commersoni*) | X | |
| yellow bullhead (*Ameiurus natalis*) | X | |
| freshwater drum *(Aplodinotus grunniens)* | X | X |

As can be seen from the table above, some of the game fish found only downstream of the Heiberg Dam during previous studies are now occurring upstream of the dam. The game fish species walleye and channel catfish, as well

as non-game fish species goldeye, shorthead, redhorse, and quillback which were previously only found downstream, are now occurring upstream of the dam. It is reasonable to assume that in time all fish species would be found throughout this portion of the Wild Rice River as long as fish passage isn't prohibited.

A particular concern of the proposed project is its potential impacts on the lake sturgeon. The lake sturgeon (*Acipenser fulvescens)* is listed as a species of special concern in Minnesota. It is typically found in larger rivers such as the Red River and the St. Croix River. Both the MN DNR and the White Earth Band of the Chippewa Tribe have instituted a reintroduction program for the lake sturgeon in this area. This program is an effort to reverse the declining populations resulting from excessive harvesting and loss of habitat. The lake sturgeon has not occurred within the Wild Rice River in recent years. Due to the MN DNR program, populations in the state are steadily improving and the MN DNR hopes to re-introduce this species to the Wild Rice River. The White Earth Band of the Chippewa Tribe has been reintroducing the lake sturgeon to the White Earth Lake, which feeds into the White Earth River (a tributary to the Wild Rice River upstream of the Heiberg Dam) for three years. The Heiberg Dam acts as an impediment to travel for this fish species and does not support this reintroduction program.

#### *3.2.2.1 No Action Alternative*

The *No Action Alternative* would impact fish resources. Water quality would be impacted due to increased sedimentation and increased turbidity due the hydrologic changes of the Wild Rice River. Increased sedimentation would continue until the new river channel stabilizes, which could be a significant period of time. Water quality impacts can effect fish respiration and reproduction. Total river length would be shorter, resulting in an overall decrease in the quantity of macroinvertebrate and fish habitat. Access to high quality spawning areas upstream of the Heiberg Dam would, however, result in a positive impact to fish resources. Furthermore, since the rerouting of the Wild Rice River, fish populations have been replenished upstream of the Heiberg Dam.

#### *3.2.2.2 Preferred Alternative*

The *Preferred Alternative* would impact fish resources. Water quality would improve due to the decreases in sedimentation and turbidity and the total river length would be restored, resulting in an overall increase in the quantity of macroinvertebrate and fish habitat. Access to high quality spawning areas upstream of the dam would be provided by a rock arch rapids that would allow for fish migration.

#### *3.2.2.3 Course Restoration Alternative*

The *Course Restoration Alternative* would impact fish resources. Water quality would improve due to the decreases in sedimentation and turbidity. The total river length would be restored, resulting in an overall increase in the quantity of macroinvertebrate and fish habitat. Fish would be prevented from reaching the high quality spawning grounds located upstream of the Heiberg Dam. This alternative may also negatively impact the lake sturgeon reintroduction program.

### *3.2.3 Wildlife*

The riparian zone adjacent to rivers provides habitat for deer, coyotes, fox, beavers, raccoons, opossums, squirrels, rabbits, birds of prey, and a variety of birds. Additionally, numerous birds utilize this area during migration.

#### *3.2.3.1 No Action Alternative*

The *No Action Alternative* would result in the loss of floodplain associated with the riparian habitat contained adjacent to the pre-disaster, oxbow channel. The loss of flow in the oxbow channel would result in changes in vegetation for the 1.5-mile length of former floodplain. The change in vegetation may not be significant, and may only result in a minor ecological shift to species adapted to drier habitats, which would not greatly affect wildlife.

A potential secondary impact could occur as a result of the *No Action Alternative*. As previously discussed, the riparian habitat associated with the oxbow channel is currently privately owned. The loss of regular flooding to this area could result in the property owner/s' developing the land for agricultural or residential purposes. If this were to occur, the loss of forested habitat would be significant and could amount to 180 acres. If this were to occur, there would be significant impacts to wildlife due to the loss of this habitat.

The *No Action Alternative* would result in the gain of riparian habitat associated with the new cutoff channel. This channel would have floodplain associated with it, but for a significantly shorter distance (0.3 miles). Floodplain forest associated with this channel would not be a significant mitigation factor if a loss of 180 acres of forested habitat adjacent to the pre-disaster channel occurs.

#### *3.2.3.2 Preferred Alternative*

The *Preferred Alternative* would have minimal impacts on wildlife. The existing riparian habitat associated with the oxbow channel floodplain

would be restored, thereby protecting wildlife habitat. Removal of some vegetation along the banks to allow access for the machinery would remove some habitat, but this would most likely restore itself with the passage of time. Additionally, short-term impacts would be expected due to construction activity while work was on-going. The introduction of machinery and personnel would result in wildlife temporarily vacating the area. Neither of these impacts are expected to be significant.

#### *3.2.3.3 Course Restoration Alternative*

The *Course Restoration Alternative* would have minimal impacts on wildlife. The existing riparian habitat associated with the oxbow channel floodplain would be restored, thereby protecting wildlife habitat. Removal of some vegetation along the banks to allow access for the machinery would remove some habitat, but this would most likely restore itself with the passage of time. Additionally, short-term impacts would be expected due to construction activity while work was on-going. The introduction of machinery and personnel would result in wildlife temporarily vacating the area. Neither of these impacts are expected to be significant.

### 3.*2.4 Wetlands (Executive Order 11990)*

The National Wetland Inventory (NWI) map for the Twin Valley quadrangle was referenced for information related to the presence of wetlands within the project area. Within the vicinity of the Heiberg Dam, the NWI map indicates that the abandoned Wild Rice River channel is classified as a wetland. The river is listed as a lower perennial, permanently flooded riverine system with an unconsolidated shore (R2USC). This type of system is not considered a wetland system by the USACE, but a river system. Wetlands may be associated with the river banks, however.

An environmental resource map indicating the NWI identified wetlands located in the project vicinity can be found as Exhibit 5 in Appendix A.

A site visit conducted on October 23, 2002 by a professional wetland scientist confirmed that wetlands are associated with the river banks within the vicinity of the project.

Executive Order 11990, Protection of Wetlands, requires federal agencies to take action to minimize the loss of wetlands. FEMA's regulations for complying with EO 11988 are promulgated in 44 CFR Part 9. The NEPA compliance process also requires the identification of any direct or indirect impacts to wetlands which may result from federally funded actions.

FEMA applies the Eight-Step Decision-Making Process to ensure that it funds projects consistent with EO 11990. This process is the same process as required for compliance with EO 11988 (Floodplain Management). Initial Public Notices were published in the Forum on July 29, 2002 and the Star Tribune on July 22, 2002 for work which would occur as a result of this disaster. A copy of these public notices and affidavits of publication are included in Appendix F.

The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives as the Eight-Step Decision-Making Process. Therefore, further steps in the Eight-Step Decision-Making Process have been applied through implementation of the NEPA process.

On October 12, 2004, a second public notice was published in the Norman County Index inviting the public to review and comment on the Draft EA (a copy of this public notice and affidavit of publication will be included in the Final EA). Through the publications of these notices and through the study of alternatives contained within this EA, the Eight-Step Decision-Making Process has been applied.

#### *3.2.4.1 No Action Alternative*

The *No Action Alternative* would result in the loss of wetlands associated with the river banks located along the pre-disaster, oxbow river channel. The exact quantity of these wetlands is unknown, but is estimated to be approximately one acre. Wetlands would develop along the banks of the new cutoff river channel, resulting in the natural creation of approximately 0.10 acre of wetlands.

The *No Action Alternative* could also result in secondary or cumulative wetland impacts. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* determined that without channel restoration, the Wild Rice River would modify channel longitudinal profiles and cross-section areas both upstream and downstream of the dam. These channel modifications could potentially result in wetland impacts.

#### *3.2.4.2 Preferred Alternative*

The *Preferred Alternative* would result in the restoration of approximately one acre of lost wetland. Minor impacts to wetlands in the immediate vicinity of the proposed project would occur as a result of this alternative, however. Due to the placement of rock slope protection, the immediate banks of the Wild Rice River (and the associated wetlands) would be impacted for an approximate total length of 360 feet on the west side of the dam. Additionally, the bendway weirs located within the river channel would result in rock placement at the banks for an additional 60 linear

feet. These wetland impacts are not considered significant, especially considering that the project potentially restores 3.0 linear miles of wetland associated with the banks of the river once the pre-disaster channel is restored.

For the *Preferred Alternative*, the applicant would be required to obtain the appropriate USACE permit as well as either a MN DNR Public Work Permit Program or Wetland Conservation Act permit. Compliance with permit conditions will ensure that wetland impacts are minimized.

#### *3.2.4.3 Course Restoration Alternative*

The *Course Restoration Alternative* would result in the restoration of approximately one acre of lost wetland. Minor impacts to wetlands in the immediate vicinity of the proposed project would occur as a result of this alternative, however. Due to the placement of rock slope protection, the immediate banks of the Wild Rice River (and the associated wetlands) would be impacted for an approximate total length of 360 feet on the west side of the dam. These wetland impacts are not considered significant, especially considering that the project potentially restores 3.0 linear miles of wetland associated with the banks of the river once the pre-disaster channel is restored.

For the *Course Restoration Alternative*, the applicant would be required to obtain the appropriate USACE permit as well as either a MN DNR Public Work Permit Program or Wetland Conservation Act permit. Compliance with permit conditions will ensure that wetland impacts are minimized.

### *3.2.5 Threatened and Endangered Species*

In accordance with Section 7 of the Endangered Species Act (ESA) of 1973, the project area was evaluated for potential occurrences of federally threatened and endangered species. The ESA requires any federal agency that funds, authorizes, or carries out an action to ensure that their action is not likely to jeopardize the continued existence of any endangered or threatened species (including plant species) or result in the destruction or adverse modification of designated critical habitats.

Correspondence dated January 21, 2003 from the U.S. F&WS advised that there are no federally listed threatened or endangered species within the proposed project area. (Copies of correspondence can be found in Appendices D and E.)

Correspondence dated January 8, 2003 from the MN DNR Natural Heritage and Nongame Research Program advised that there are two known occurrences of rare species or natural communities located within the project area. (A copy of this correspondence can be found in Appendix E.)

The few-flowered spike-rush (*Eleocharis quinqueflora*), a plant species of Special Concern, was documented in 1963 near where State Route 32 crosses of the Wild Rice River. The few-flowered spike rush may be impacted by this proposed project. Because habitat adjacent to the Wild Rice River is similar both upstream and downstream of the dam, there is significant potential for the presence of this species within the area of the abandoned oxbow. Species of Special Concern are species being monitored by the State of Minnesota but which do not receive any regulatory protection.

The second resource identified in MN DNR correspondence is a greater prairie-chicken (*Tympanus cupido*) booming ground. The correspondence indicates that this resource is not anticipated to be affected by the proposed project.

An environmental resource map indicating the presence of known protected species can be found as Exhibit 5 in Appendix A.

#### *3.2.5.1 No Action Alternative*

The *No Action Alternative* would not impact any threatened or endangered species.

#### *3.2.5.2 Preferred Alternative*

The MN DNR advised in their correspondence dated January 8, 2003 that the *Preferred Alternative* may impact the few-flowered spike-rush. The MN DNR recommended that disturbances to wetland areas surrounding the Heiberg Dam be minimized as much as possible.

#### *3.2.5.3 Course Restoration Alternative*

The MN DNR advised in their correspondence dated January 8, 2003 that the *Course Restoration Alternative* may impact the few-flowered spike-rush. The MN DNR recommended that disturbances to wetland areas surrounding the Heiberg Dam be minimized as much as possible.

### *3.2.6 Critical Habitat*

The Endangered Species Act (ESA) defines critical habitat as those geographical areas which may require special management considerations or protection and which are essential for bringing an endangered or threatened species to the point where it no longer needs the legal protection of the ESA.

#### *3.2.6.1 No Action Alternative*

There is no critical habitat located within the vicinity of the proposed project; no impacts would occur as a result of the *No Action Alternative.*

Correspondence dated January 21, 2003 from the U.S. F&WS advised that no further consultation under Section 7 of the Endangered Species Act of 1973 is required. (A copy of this correspondence can be found in Appendix E.)

#### *3.2.6.2 Preferred Alternative*

There is no critical habitat located within the vicinity of the proposed project; no impacts would occur as a result of the *Preferred Alternative.*

Correspondence dated January 21, 2003 from the U.S. F&WS advised that no further consultation under Section 7 of the Endangered Species Act of 1973 is required.

#### *3.2.6.3 Course Restoration Alternative*

There is no critical habitat located within the vicinity of the proposed project; no impacts would occur as a result of the *Course Restoration Alternative.*

Correspondence dated January 21, 2003 from the U.S. F&WS advised that no further consultation under Section 7 of the Endangered Species Act of 1973 is required.

## *3.3 Hazardous Materials*

Hazardous wastes are regulated by both the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986.

According to the U.S. EPA online archives (provided by Envirofacts), 24 U.S. EPA-regulated facilities are located within the vicinity of Ada, MN. Of these facilities, 18 are RCRA facilities, three are AIRS facilities (stationary air pollution sources), two are surface water dischargers regulated by Permit Compliance System (PCS), and one is a multi-activity facility. No CERCLA sites are present. No U.S. EPA-regulated facilities are located in the immediate vicinity of the project. Furthermore, the Minnesota Pollution Control Agency does not indicate any regulated sites within the vicinity of the Heiberg Dam (A map indicating this can be found as Exhibit 6 in Appendix A.)

The Clean Air Act (CAA) requires the U.S. EPA to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. In accordance with Section 112 of the CAA, the U.S. EPA established the National Emissions Standards for Hazardous Air Pollutants (NESHAP) to protect the public. Asbestos was one of the first air pollutants to be regulated under Section 112. The NESHAP asbestos regulations protect the public by minimizing the release of asbestos fibers during activities involving the processing, handling, and disposal of asbestos containing materials (ACM). Accordingly, NESHAP specifies work practices to be following during demolitions of structures. Substantial amounts of ACM were used throughout commercial and public buildings from 1946 until 1972. ACM was used for fireproofing, soundproofing, decorative, and other purposes in roofing, insulation, and other building materials.

Minnesota Department of Health (MDH) standards for asbestos are found in Minnesota Statutes, sections 326.70 to 326.81 and Minnesota Rules, parts 4620.3000 through 4620.3724. These standards apply to the removal or disturbance of friable asbestos-containing materials in commercial and residential buildings. They specify licensed supervisors and workers to conduct ACM hazard reduction, which includes abatement and interim controls.

MDH also has standards for the removal or the reduction of lead-based paint and lead contaminated dust, water, and soil hazards. These standards are found in Minnesota Statutes, sections 144.9501 to 144.9509 and in Minnesota Rules, parts 4761.1000 through 4761.1220. Lead-based paint was used on steel structures in Minnesota until 1990 and lead-based paint can be found in many places, including the exterior and interior of buildings. When buildings containing lead paint are removed, lead-paint dust can be generated. This can cause inhalation, absorption, or ingestion of lead laden dust by workers and/or surrounding inhabitants to occur. The Minnesota standards require the use of licensed supervisors and workers to conduct lead hazard reduction, which includes abatement and interim controls. Licensed inspectors and risk assessors also conduct lead inspections, lead hazard screens, and lead risk assessment according to these standards.

The power house and the two attached additions were built in the 1920s using conventional building materials that were common during this era. It is probable that lead-based paint was historically used on or in the structure. Additionally, renovations to the facility that included installation of ACM could have occurred between 1946 and 1972.

The applicant will ensure that all required permits are in place prior to demolition and demolition must be performed in compliance with the Minnesota State Building Code. The Minnesota Pollution Control Board and the MDH should be notified if the presence of lead-based paint or ACM is confirmed. In accordance with local building codes, a building permit will be required to demolish a dwelling or commercial buildings of any size.

Other regulated materials that would be involved in the proposed project would be fuels used by the equipment necessary for construction work. It is not expected that, used properly, fuel from this equipment would result in a release to the environment.

Although subsurface hazardous materials are not anticipated to be present, excavation activities could expose or otherwise affect subsurface hazardous wastes or materials.

### *3.3.1 No Action Alternative*

The *No Action Alternative* would not have any impacts related to hazardous materials or waste.

### *3.3.2 Preferred Alternative*

The *Preferred Alternative* requires the demolition of the power house for construction equipment access to the Heiberg Dam. The applicant will contract a licensed asbestos and/or lead abatement contractor to conduct an inspection of the building prior to demolition for any ACM, lead-based paint, or other hazardous materials. Any ACM, lead-based paint, or other hazardous materials will be removed in compliance with Minnesota state regulations and disposed of in an approved landfill. The Minnesota Pollution Control Board and the MDH should be notified if the presence of lead-based paint or ACM is confirmed. Any other regulated materials contained within the building will be removed and disposed of by the applicant in accordance with applicable local, state, and federal regulations.

The applicant will ensure that all required permits are in place prior to demolition; demolition must be performed in compliance with the Minnesota State Building Code. In accordance with local building codes, a building permit will be required to demolish a dwelling or commercial buildings of any size.

The firm contracted for the work will be required to use Minnesota's Pollution Control Agency's approved best management practices (BMPs) to control and contain spills as provided in *Protected Water Quality in Urban Environments*. These BMPs detail spill plans and employee training.

Any hazardous materials discovered, generated, or used during implementation of the proposed project shall be handled and disposed of by the project applicant in accordance with applicable local, state, and federal regulations.

The *Preferred Alternative* is not expected to have significant impacts related to hazardous materials. Any hazardous materials discovered, generated, or used during implementation of the proposed project shall be disposed of and handled by the project applicant in accordance with applicable local, state, and federal regulations.

### *3.3.3 Course Restoration Alternative*

The *Course Restoration Alternative* requires the demolition of the power house for construction equipment access to the Heiberg Dam. The applicant will contract a licensed asbestos and/or lead abatement contractor to conduct an inspection of the building prior to demolition for any ACM, lead-based paint, or other hazardous materials. Any ACM, lead-based paint, or other hazardous materials will be removed in compliance with Minnesota state regulations and disposed of in an approved landfill. The Minnesota Pollution Control Board and the Minnesota Department of Health should be notified if the presence of lead-based paint or ACM is confirmed. Any other regulated materials contained within the building will be removed and disposed of by the applicant in accordance with applicable local, state, and federal regulations.

The applicant will ensure that all required permits are in place prior to demolition and must be performed in compliance with the Minnesota State Building Code. In accordance with local building codes, a building permit will required to demolish dwelling or commercial buildings of any size.

The firm contracted for the work will be required to use Minnesota's Pollution Control Agency's approved BMPs to control and contain spills as provided in *Protected Water Quality in Urban Environments*. These BMPs detail spill plans and employee training.

Any hazardous materials discovered, generated, or used during implementation of the proposed project shall be handled and disposed of by the project applicant in accordance with applicable local, state, and federal regulations.

The *Course Restoration Alternative* is not expected to have significant impacts related to hazardous materials. Any hazardous materials discovered, generated, or used during implementation of the proposed project shall be disposed of and handled by the project applicant in accordance with applicable local, state, and federal regulations.

## ***3.4 Socioeconomics***

### *3.4.1 Zoning and Land Use*

In accordance with the Zoning Ordinance passed by the Norman County Board on May 6, 1971 and amended on August 8, 1998 and November, 16 2000; Norman County is segregated into five zoning "districts": Agricultural Districts, General Flood Plain Districts, Shoreline Special Protection Districts, Conservation Districts, and Airport Zones.

The Norman County "Zoning District Map" identifies the boundaries of these Districts. This map was reviewed. The area surrounding the Heiberg Dam

consists of Agricultural and General Flood Plain districts. Any land adjacent to the Wild Rice River downstream of the Heiberg Dam and potentially impacted by the project is also classified primarily as being within an Agricultural or General Flood Plain District.

**Agricultural Districts**

The Norman County Zoning Ordinance identifies the permitted use of Agricultural Districts as "a farm residence; 1 mobile home when associated with farm operation; general farming and related buildings, horticulture, field crops; dairying; livestock raising; wildlife, forest and wetland management; apiaries and home occupations" with a minimum lot size of 3 acres and building height limitations of two stories or 25 feet, whichever is greater.

Agriculture is an important industry to the State of Minnesota and Norman County. Total gross income from farming in the State of Minnesota totaled $9.7 billion in 2001, while the total net farm income was $695.5 million. The average Minnesota farm had a gross income of $123,281 and net income of $8,804 in 2001. In 2001, Minnesota was the top state in America for the production of turkeys, sugar beets, and peas. It was second in the production of oats, spring wheat, sweet corn, canola, and wild rice; third in the production of hogs; and fourth in the productions of soybeans, flaxseed, and cheese.

Norman County 1997 census information indicates that a total of 670 farms, with an average of 721 acres per farm, are located within the county. A total of 483,041 acres of land were contained within farms within the county, with a total cropland of 435,252 acres. Crops produced in 2001 in Norman County consisted of wheat (8,131,000 bushels, 176,900 acres in production), soybeans (4,501,200 bushels, 136,400 acres in production), hay (52,800 tons, 18,100 acres in production), oats (62,700 bushels, 1,100 acres in production), sugar beets (953,900 bushels, 50,000 acres in production), sunflower (15,640,000 pounds, 12,200 acres in production), barley (435,200 bushels, 6,800 acres in production), and corn (2,161,600 bushels, 19,300 acres in production). Norman County is ranked second in the state's wheat production. To a lesser degree, Norman County also produces hogs, pigs, and cattle.

**General Flood Plain Districts**

The Norman County Zoning Ordinance states that the basic purpose of the General Flood Plain District is to guide development in the floodplain areas consistent with the flooding threat and the community's land needs. The ordinance identifies General Flood Plain Districts' permitted use as agricultural, industrial-commercial, private and public recreational, residential, conditional use, and includes special provisions that apply provided that they do not require structures, fill, or storage of materials or equipment. In addition, the ordinance requires that no use shall adversely affect the efficiency or unduly restrict the

capacity of the channels or floodways of any tributary to the main stream, drainage ditch, or any other drainage facility or system.

*3.4.1.1 No Action Alternative*

The *No Action Alternative* would not have any significant impacts on land use or zoning. There is the potential that the long term effect of changes in flooding regimes adjacent to the two Wild Rice River channels could result in the conversion of land from Agricultural Districts to General Flood Plain Districts, or vice versa. Since agriculture is a permitted land use in a General Flood Plain District, any impacts from such conversions would not be significant.

The *No Action Alternative* may have secondary impacts on agriculture due to the loss of the ice breaking function of the Heiberg Dam. The ice breaking function of the dam serves to protect agricultural resources by reducing channel scour and erosion which could impact adjacent agricultural fields and by reducing flooding which could occur due to ice jams at downstream bridges. Increased flooding due to the loss of this the Heiberg Dam could result in agricultural impacts if flooding occurs during the spring planting season. Excessive agricultural impacts due to scouring or flooding could lead to property owner's removal of certain fields from agricultural production.

*3.4.1.2 Preferred Alternative*

The *Preferred Alternative* would not have any significant impacts on land use or zoning. There is the potential that the long term effect of changes in flooding regimes adjacent to the two Wild Rice River channels could result in the conversion of land from Agricultural Districts to General Flood Plain Districts, or vice versa. Since agriculture is a permitted land use in a General Flood Plain District, any impacts from such conversions would not be significant.

The *Preferred Alternative* may have secondary impacts on land use due to the reduction of channel scour and erosion and to the restoration of the ice breaking function of the Heiberg Dam. These alternatives have the potential to reduce flooding during spring ice break-up, which could benefit agriculture and lead to additional property being converted to agricultural production.

*3.4.1.3 Course Restoration Alternative*

The *Course Restoration Alternative* would not have any significant impacts on land use or zoning. There is the potential that the long term effect of changes in flooding regimes adjacent to the two Wild Rice River

channels could result in the conversion of land from Agricultural Districts to General Flood Plain Districts, or vice versa. Since agriculture is a permitted land use in a General Flood Plain District, any impacts from such conversions would not be significant.

The *Course Restoration Alternative* may have secondary impacts on land use due to the reduction of channel scour and erosion and to the restoration of the ice breaking function of the Heiberg Dam. These alternatives have the potential to reduce flooding during spring ice break-up, which could benefit agriculture and lead to additional property being converted to agricultural production.

### *3.4.2 Recreational Opportunities*

The Wild Rice River provides many recreational opportunities for Norman County and Minnesota residents. Recreational opportunities include hiking, fishing, hunting, bird watching, swimming, and canoeing. The entire reach is navigable by small boats in wet years and by canoes at all times. The oxbow of the Wild Rice River provided approximately 1.5 miles of wooded area. The current cutoff channel limits the stretch of wooded area to approximately 0.5 mile. Currently, the Heiberg Dam is an obstacle to boating by preventing passage, unless the boater wishes to portage around the dam. A designated public canoe access is located at the Heiberg Park near the dam.

#### *3.4.2.1 No Action*

The *No Action Alternative* would have impacts on the recreational activities provided by the Wild Rice River. The current channel cutoff increases flow and turbidity of the water, limiting recreational activities such as canoeing and swimming. Portaging of canoes around the Heiberg Dam would no longer be required, however.

The shortened course of the Wild Rice River also reduces recreational activities because the shorter course results in less resource. Recreational fishing would improve, however, due to the ability of fish to migrate to higher quality spawning areas upstream of the Heiberg Dam.

#### *3.4.2.2 Preferred Alternative*

The *Preferred Alternative* would have direct impacts on the recreational activities of the Wild Rice River. This alternative would provide additional recreational opportunities related to the increased length of the river channel with access to the oxbow. The re-routing of the Wild Rice River over the Heiberg Dam would prohibit canoeing and swimming within the area immediately upstream and downstream of the dam and require portaging of canoes. The installation of a rock arch rapids would

result in improved recreational fishing due to the ability of fish to migrate to higher quality spawning areas.

#### *3.4.2.3 Course Restoration Alternative*

The *Course Restoration Alternative* would have direct impacts on the recreational activities of the Wild Rice River. This alternative would provide additional recreational opportunities related to the increased length of the river channel with access to the oxbow. The re-routing of the Wild Rice River over the Heiberg Dam would prohibit canoeing and swimming within the area immediately upstream and downstream of the dam and require portaging of canoes. The loss of fish migration to higher quality spawning areas reduce recreational fishing opportunities.

### *3.4.3 Visual Resources*

The Heiberg Dam is a low head dam constructed of rock filled sheet piling. A concrete cap tops the dam, covering the rock. The dam is located on the west side of State Route 32; the Heiberg Park of Twin Valley is located adjacent to the dam. On the north side of the Wild Rice River, west of State Route 32, the surrounding land is floodplain and heavily forested. An historic power house is currently located on the north side. This power house, and associated additions, have fallen into poor repair and are scheduled to be removed. On the south side of the dam, west of State Route 32, open land makes up Heiberg Park. On the east side of State Route 32, floodplain forest is predominant, with some open parkland.

Although the Heiberg Dam can be seen from State Route 32, the dam would be a minimal visual resource to drivers and passengers in vehicles using the roadway because of the speed at which they are traveling. The Heiberg Dam is also visible from Heiberg Park. Visual aesthetics would be more important to visitors of the park or to people utilizing the area for recreation purposes.

#### *3.4.3.1 No Action Alternative*

The *No Action Alternative* would not have any impacts on the visual aesthetics of the area.

#### *3.4.3.2 Preferred Alternative*

The *Preferred Alternative* would have positive impacts on the visual aesthetics at the Heiberg Dam. In this alternative, the dam would be lowered, concrete blocks would be added to the top of the dam, and the washed out embankment would be restored. These alterations would be localized to the dam area itself, and would not change the visual aesthetics of the surrounding floodplain forest. Since the dam is already a structure composed of concrete and sheet piling, the addition of concrete blocks on

top would not alter its aesthetics. It is likely that the addition of the rock arch rapids, and the resulting tumbling of water, would be perceived as an improvement to aesthetics. Removal of the power house and additions would also improve the visual aesthetics because the structures have fallen into such a poor state of repair.

#### *3.4.3.3 Course Restoration Alternative*

The *Course Restoration Alternative* would have minor, positive impacts on the visual aesthetics of the Heiberg Dam. In this alternative the dam would not be modified in any way and the washed out embankment would be restored. This alternative would restore the area to pre-disaster conditions and not significantly impact the visual aesthetics. This alternative also includes the removal of the power house/additions, which would result in improvements to the visual aesthetics of the area.

### *3.4.4 Noise*

Noise, defined for the purposes of this discussion as undesirable sound, is federally regulated by the Noise Control Act of 1972 (NCA). Although the NCA gives the U.S. EPA authority to prepare guidelines for acceptable ambient noise levels, it only charges federal agencies that operate noise-producing facilities or equipment to implement noise standards. The U.S. EPA guidelines, and those of many federal agencies, state that outdoor sound level in excess of 55 decibels are "normally unacceptable" for noise-sensitive land uses such as residences, schools, and hospitals.

Existing ambient noise levels in the project vicinity are consistent with rural areas. The Norman County Zoning Ordinance does include a noise standard that applies to incidental traffic, parking, loading, construction, and farming or maintenance operations.

#### *3.4.4.1 No Action Alternative*

No noise impacts would be expected from the *No Action Alternative*.

#### *3.4.4.2 Preferred Alternative*

The *Preferred Alternative* would have short term impacts on noise levels. The use of construction equipment to restore the earthen embankment would result in an increase in noise levels. It is anticipated that this project would require the use of standard construction equipment consisting of dozers, excavators, trucks, and compactors. Vibratory and/or impact hammers may be needed to install sheet pile along the bank of the Wild Rice River. These impacts are not expected to be significant and there are no sensitive receptors immediately adjacent to the project. Four

residences are located in the general vicinity, but are shielded from the Heiberg Dam by distance and/or trees. Exhibit 6 in Appendix A indicates the locations of these residential receptors. No long term impacts are associated with these alternatives.

#### *3.4.4.3 Course Restoration Alternative*

The *Course Restoration Alternative* would have short term impacts on noise levels. The use of construction equipment to restore the earthen embankment would result in an increase in noise levels. It is anticipated that this project would require the use of standard construction equipment consisting of dozers, excavators, trucks, and compactors. Vibratory and/or impact hammers may be needed to install sheet pile along the bank of the Wild Rice River. These impacts are not expected to be significant and there are no sensitive receptors immediately adjacent to the project. Four residences are located in the general vicinity, but are shielded from the Heiberg Dam by distance and/or trees. Exhibit 6 in Appendix A indicates the locations of these residential receptors. No long term impacts are associated with these alternatives.

### *3.4.5 Public Services and Utilities*

Public services include police, fire, schools, and libraries and are discussed below; included is a discussion on utilities in the project area.

**Schools**

The project area is served by the Norman County East School District #2215. School District #2215 serves the communities of Gary, Twin Valley, and Flom, Minnesota.

The Norman County East Elementary School is located in Gary and the Norman County East High School is located in Twin Valley. In addition, special education services are offered in the Norman County East School District.

The community education program in Norman County East offers a variety of classes from crocheting to word processing to open gym. The fee for the classes range, and they are typically offered in the elementary or high school. Access Minnesota Main Street is also available to area residents, and provides an electronic commerce curriculum via the internet.

## Libraries

The libraries that exist in the project area include the Norman County East Public School Library and the Norman County Library. The Norman County Library is located in the Dekko Center in Ada, the county seat.

In addition, the Lake Agassiz Regional Library (LARL) is a consolidated public library system serving the residents of seven counties in northwest Minnesota. LARL is comprised of 13 branch libraries, a mobile library, and a regional office. The regional office and library headquarters are located in Moorhead, MN. The mobile library visits Twin Valley approximately twice a month.

## Utilities

The Heiberg Dam is located approximately two miles north Twin Valley. The City of Twin Valley has its own water and sewer system. North of the Heiberg Dam, the City of Gary has its own water system and is working on introducing a sewer system.

The majority of the Twin Valley/Gary area electrical services are provided by Otter Tail Power Company. The Otter Tail Power Company is headquartered in Fergus Falls and has an office in Crookston. The Wild Rice Electric Coop provides power to the rural areas and is located in Mahnomen, MN. The City of Ada also has an electric company.

Information on public services and utilities was provided by Tina Murn, Twin Valley City Clerk (personal communication, January 6, 2003), and supplemented with internet research.

## Police Services

The Heiberg Dam is located approximately two miles north of Twin Valley, MN. The Heiberg Park is located adjacent to the Heiberg Dam and is owned by the City of Twin Valley. The Heiberg Dam and surrounding area falls under the jurisdiction of the Norman County Sheriff's department. The Heiberg Park falls under the jurisdiction of the Twin Valley Police Department.

The nearest Norman County Sheriff's office is located at 15 Second Avenue in Ada, MN. This location is approximately 14 miles west of the Heiberg Dam.

The City of Twin Valley's Police Department is located at the Heritage Center, 104 First Street, in Twin Valley. The Twin Valley Police Department consists of five officers that are available to the public 24 hours a day, and are available to assist the Norman County Sheriff Department as needed

**Fire Protection and Rescue Services**

The Heiberg Dam is located approximately two miles north of the City of Twin Valley. Twin Valley has a volunteer fire department consisting of 24 members. The city contracts with six surrounding townships to provide fire protection service, including the project vicinity. The Twin Valley Volunteer Fire Department Garage is located at 107 2nd Street in Twin Valley.

In addition to Fire Protection, Twin Valley also provides Rescue Services. The Twin Valley Rescue Services is a first responders unit that provides immediate care until the Norman County Ambulance service arrives. The Twin Valley Rescue Service is located along State Route 32, near Lincoln Avenue in the Joe Merihy Building.

Information on police, fire, and rescue services was provided by Denette Gwyn, Norman County Sheriff's Office (personal communication, July 15, 2004), supplemented with internet research.

*3.4.5.1 No Action Alternative*

The *No Action Alternative* has the potential to impact emergency services. Without the restoration of the Wild Rice River to its pre-disaster course, scour will continue to occur at the State Route 32 bridge abutments. Increased scour, particularly during future flood events, could result in the loss of this bridge. If this were to occur, emergency services dependent on State Route 32 would be interrupted.

*3.4.5.2 Preferred Alternative*

The *Preferred Alternative* is not expected to impact public services or utilities. No road closures are anticipated to result from the project, therefore, emergency services would not be affected. Utilities would not need to be relocated due to the proposed project.

*3.4.5.3 Course Restoration Alternative*

The *Course Restoration Alternative* is not expected to impact public services or utilities. No road closures are anticipated to result from the project, therefore, emergency services would not be affected. Utilities would not need to be relocated due to the proposed project.

*3.4.6 Traffic and Circulation*

Prior to June 2002, the Wild Rice River passed over Heiberg Dam and traversed through an oxbow on the west side of State Route 32. Hieberg Dam is near State Route 32, south of State Route 200. The dam is located in the transportation

jurisdiction of MnDOT's District 2, headquartered in Bemidji/Crookston. The Norman County Highway Department has offices in both Gary and Twin Valley.

Information has been provided by Mr. Lou Tasa, Assitant District Engineer/State Aid, MnDOT Division 2A (personal conversation, January 6, 2003), and Mr. Dwayne Hill, MnDOT East Region Operations Support Engineer (personal conversation, January 8, 2003). MnDOT Bridge #9019 over the Wild Rice River on State Route 32 near Twin Valley is located approximately 300 feet upstream of the Heiberg Dam. The bridge is located within the backwaters when the dam is functioning; the dam functioned to slow the velocity of the water at the bridge. Since the dam has been by-passed by the cutoff channel, the velocity of the water has increased by eight times during low flow events and doubled during high flow events. The increased velocities due to the shortened river channel are causing scour damage to the bridge. Scour is resulting in the loss of protection at the bridge supports.

This bridge was built in 1956 and bridge designers were not concerned with susceptibility to scour at that time. Soil conditions underlying the sand in the Wild Rice River is hardpan, and the bearing for the bridge was reached quickly, therefore the pilings are short. If half of the piling is exposed, the pier could tip. The bridge was closed after the June 2002 flooding because the increase velocity washed out the riprap, thereby exposing the pilings. The *Restoration of Wild Rice River at Heiberg Dam, Hydrologic and Hydraulic Assessment* (Appendix C) concurs that an increased flow velocity has resulted in placing the MnDOT bridge in potential danger.

In addition to the MnDOT Bridge on State Route 32, the Heiberg Dam acts to break up spring ice and reduce the risk of ice jams at other downstream bridges. Ice jams have the potential to cause structural damage to bridges and abutments.

According to MnDOT, the average daily traffic on State Route 32 south of State Route 200 was 1,500-1,999 vehicles per day in 2001; while it was 1,000-1,499 vehicles per day north of State Route 200. Average daily traffic was 1,000-1,499 vehicles per day in 2001 on State Route 200 west of State Route 32, and 500-999 vehicles per day in 2001 east of State Route 32.

#### *3.4.6.1 No Action Alternative*

Impacts from the *No Action Alternative* could be significant for the MnDOT Bridge #9019. MnDOT will need to explore alternatives for rehabilitating the bridge to withstand the increased velocity, or replace the bridge. Such work would cause temporary closure of the bridge and would impact the local transportation of the surrounding communities, especially Twin Valley. Since the river channel has scoured a significant amount, MnDOT is concerned that another event may re-expose the pier and abutment footings and piling and that the bridge would have to be

closed due to safety concerns. It is possible that a collapse could occur. Additionally, the *No Action Alternative* would result in the loss of ice protection from downstream bridges.

*3.4.6.2 Preferred Alternative*

The *Preferred Alternative* would protect the MnDOT bridge, potentially protect other downstream bridges, and therefore positively impact the local transportation network.

During construction, no road closures are anticipated to result from this alternative; therefore there would be no short term impacts to traffic and circulation from the *Preferred Alternative.*

*3.4.6.3 Course Restoration Alternative*

The *Course Restoration Alternative* would protect the MnDOT bridge, potentially protect other downstream bridges, and therefore positively impact the local transportation network.

During construction, no road closures are anticipated to result from this alternative; therefore there would be no short term impacts to traffic and circulation from the *Course Restoration Alternative.*

*3.4.7 Economics*

**City of Twin Valley**

The Heiberg Dam is located in near the City of Twin Valley in Norman County. The 2000 census shows a population of 865 persons in Twin Valley. The median value of owner occupied units in Twin Valley was $30,000 compared to $43,600 for Norman County, and $122,400 for the State of Minnesota.

The 2000 annual per capita income of Twin Valley was $13,865 compared to $15,895 for Norman County and $23,198 for the State of Minnesota. The percentage of the 2000 civilian labor force unemployed was 2.6% in Twin Valley compared to 6.1% in Norman County, and 4.1% for the State of Minnesota.

**Norman County**

The 2000 census shows a population of 7,442 persons in Norman County. The 2000 population density for Norman County was 8.5 persons per square mile, compared to 61.8 persons per square mile for the State of Minnesota. The median value of owner occupied units in Norman County was $43,600 compared to $122,400 for the State of Minnesota.

The 2000 annual per capita income of Norman County was $15,895 compared to $23,198 for the State of Minnesota. The percentage of the 2000 civilian labor force unemployed was 6.1% in Norman County compared to 4.1% for the State of Minnesota.

**White Earth Band of the Chippewa Tribe**

The Wild Rice Watershed extends 120 miles upstream of the Heiberg Dam. The White Earth Band of the Chippewa Tribe is located in the watershed, and they could potentially be impacted by the project. The White Earth Band uses the Wild Rice River for subsistence fishing and the Heiberg Dam impacts fish resources within the river. The river is also used for recreational purposes and some tourism.

*3.4.7.1 No Action Alternative*

The *No Action Alternative* could have a negative impact on economics in Twin Valley. If the Wild Rice River is not restored to its pre-disaster oxbow channel and flooding were to occur again, the riprap around MnDOT Bridge #9019 on State Route 32 could be washed out. Businesses within Twin Valley noted a definite decline in business during the closure of MnDOT Bridge #9019 following the June 2002 storm events. If the bridge closed due to damage caused by scour, it would result in loss of business within Twin Valley.

The *No Action Alternative* could have a negative impact on economics in Norman County. If the Wild Rice River is not restored to its pre-disaster oxbow channel and flooding were to occur again, the riprap around MnDOT Bridge #9019 on State Route 32 could be washed out. Economics within the county could be impacted if agricultural related shipments were hampered by the loss of the use of State Route 32.

The *No Action Alternative* would allow fish passage to riverine habitats upstream of the Heiberg Dam. This would improve fishing within tribal lands belonging to the White Earth Band. Loss of the 1.5-mile oxbow within the river reduces the recreational potential of the river.

*3.4.7.2 Preferred Alternative*

The *Preferred Alternative* is expected to have economic impacts in the Twin Valley area or the Norman County area.

The *Preferred Alternative* would allow fish passage to riverine habitat upstream of the Heiberg Dam. This would improve fishing within tribal lands belonging to the White Earth Band. Restoration of the 1.5-mile oxbow within the river increases the recreational potential of the river.

#### *3.4.7.2 Course Restoration Alternative*

The *Course Restoration Alternatives* is expected to have economic impacts in the Twin Valley area or the Norman County area.

The *Course Restoration Alternative* would impede fish passage to riverine habitat upstream of the Heiberg Dam because this alternative does not include alterations that allow for fish passage. This alternative could have negative impacts on subsistence fishing with potential economic impacts to the White Earth Band of the Chippewa Tribe. Restoration of the 1.5-mile oxbow within the river increases the recreational potential of the river, however.

### *3.4.8 Environmental Justice*

On February 11, 1994, President Clinton signed Executive Order (EO) 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations". This EO directs federal agencies "to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations in the United States . . . "

The potential impacts to minority and low-income populations have been reviewed in accordance with FEMA's policy of implementing EO 12898. The 2000 census data shows that less than six percent of Norman County is non-white. Heiberg Dam is located approximately one mile from the City of Twin Valley. Similar to Norman County, the 2000 census data shows that less than six percent of Twin Valley is non-white. The proposed project will not disproportionately affect minority or low income populations within the City of Twin Valley.

The Department of Health and Human Services establishes poverty level guidelines that are updated annually. According to the 2000 census (which uses 1999 income data), approximately 10%, or 749, of individuals in Norman County fall in the poverty level. Poverty level is 11%, or 82 individuals in the City of Twin Valley. The proposed project will not disproportionately affect minority or low income populations within Norman County.

The White Earth Band of the Chippewa Tribe is located within the Wild Rice River Watershed. The reservation is located in Mahnomen County, which is adjacent to Norman County; the reservation boundaries are less than 20 miles from the project location. The White Earth Band of the Chippewa is a federally recognized tribe. The 1995 tribal enrollment was 20,852 with 4,546 living within the reservation. The annual per capita income was $4,917. The Wild Rice

River's headwaters are located on the reservation and tribal members utilize the river for subsistence fishing and tourist opportunities. The proposed project has the potential to impact this minority population.

In compliance with FEMA's policy regarding the implementation of EO 12898, Environmental Justice, the socioeconomic conditions and potential effects related to the *No Action, Proposed,* and *Course Restoration Alternatives* have been reviewed.

#### *3.4.8.1 No Action Alternative*

The *No Action Alternative* would have impacts on the White Earth Band of the Chippewa Tribe. This alternative allows for fish passage on the Wild Rice River, which will support tribal fishing upstream of the dam. Additionally, this alternative would support the Tribe's lake sturgeon reintroduction program and tourist opportunities.

#### *3.4.8.2 Preferred Alternative*

The *Preferred Alternative* would have impacts on the White Earth Band of the Chippewa Tribe. This alternative allows for fish passage on the Wild Rice River, which will support tribal fishing upstream of the dam. Additionally, this alternative would support the Tribe's lake sturgeon reintroduction program and tourist opportunities.

#### *3.4.8.3 Course Restoration Alternative*

The *Course Restoration Alternative* would have a negative impact on the White Earth Band of the Chippewa Tribe. The restoration of the Wild Rice River to its pre-disaster course over the Heiberg Dam would impede fish passage, and therefore interfere with tribal fishing. Additionally, this alternative would negatively impact the Tribe's lake sturgeon reintroduction program, limiting fishing and tourist opportunities. These impacts would most likely not be sufficient to warrant classification as a "disproportionately high and adverse human health or environmental" effect.

### *3.4.9 Safety and Security*

On April 21, 1997 President Clinton signed Executive Order (EO) 13045, entitled "Protection of Children from Environmental Health Risks and Safety Risks". This EO directs federal agencies to "make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or

safety risks." EO 13045 does not apply to the project because none of the alternatives would disproportionately affect children.

On January 5, 1990 President Bush signed Executive Order (EO) 12699, entitled "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction". This EO directs federal agencies' "development and promulgation of specifications, building standards, design criteria, and construction practices to achieve appropriate earthquake resistance for new . . . structures," and directs federal agencies to conduct "an examination of alternative provisions and requirements for reducing earthquake hazards through Federal and federally financed construction, loans, loan guarantees, and licenses…". EO 12699 does not apply to this project because the area is not located within a seismic zone.
Dam safety issues are applicable to this project. Dams are built to maintain lake levels, flood control, power production, and to provide a source for water supply. Dam failure can result in the quick release of all the water in the reservoir, and the rapid and unexpected flooding downstream can cause loss of life and significant property damages. Dams have the potential of failing due to inadequate design, improper operation, inadequate maintenance, or unusually large floods. The MN DNR has the regulatory authority over dam activities in the State of Minnesota and is responsible for inspecting, reviewing designs, issuing dam safety permits, and determining the scope of work for local government owned dams.

#### *3.4.9.1 No Action Alternative*

The *No Action Alternative* has the potential to impact safety and security for area residents. If the Wild Rice River is not restored to its pre-disaster oxbow channel and flooding was to occur again, the riprap around MnDOT Bridge #9019 on State Route 32 could be washed out. If the bridge were to collapse, it would result in unsafe conditions for residents.

#### *3.4.9.2 Preferred Alternative*

The *Preferred Alternative* would allow for the protection of the Bridge #9019 from future flooding events and would provide reliable access for emergency vehicles and equipment, therefore public safety and welfare would be maintained. The presence of a low-head dam creates its own safety factor, however. There have been over 100 deaths in Minnesota due to drowning accidents associated with low head dams (personal communication, MN DNR July 22, 2003).

The *Preferred Alternative* includes the installation of a rock arch rapids that would be installed below the dam. The rock arch rapids would increase safety by lowering the velocity of the water on the downstream side of the dam. This feature would help minimize the inherent risk of some types of drowning accidents at the dam.

There is the potential for safety concerns associated with the *Preferred Alternative* should dam failure occur. If this alternative is chosen, the applicant would be required to obtain a dam safety permit from the MN DNR Division of Waters and comply with all permit conditions. MN DNR's review of the engineering plans and the applicant's compliance with permit conditions will minimize the dangers associated with potential dam failure.

To minimize risks to safety and human health during project construction, all construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. Additionally, all activities will be conducted in a safe manner in accordance with standards specified in Occupational Safety and Health Act (OSHA) regulations.

#### *3.4.9.3 Course Restoration Alternative*

The *Course Restoration Alternatives* would allow for the protection of the Bridge #9019 from future flooding events and would provide reliable access for emergency vehicles and equipment, therefore public safety and welfare would be maintained. The presence of a low-head dam creates its own safety factor, however. There have been over 100 deaths in Minnesota due to drowning accidents associated with low head dams (personal communication, MN DNR July 22, 2003).

There is the potential for safety concerns associated with the *Course Restoration Alternatives* should dam failure occur. If this alternative is chosen, the applicant would be required to obtain a dam safety permit from the MN DNR Division of Waters and comply with all permit conditions. MN DNR's review of the engineering plans and the applicant's compliance with permit conditions will minimize the dangers associated with potential dam failure.

To minimize risks to safety and human health during project construction, all construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. Additionally, all activities will be conducted in a safe manner in accordance with standards specified in Occupational Safety and Health Act (OSHA) regulations.

## *3.5 Cultural Resources*

In addition to review under NEPA, consideration of impacts to cultural resources is mandated under Section 106 of the National Historic Preservation Act (NHPA), as amended and implemented by 36 CFR Part 800. Requirements include identification of significant historic properties that may be impacted by the proposed action. Historic

properties are defined as archaeological sites, standing structures, or other historic resources listed in or eligible for listing in the National Register of Historic Places (36 CFR 60.4).

As defined in 36 CFR Part 800.16(d), the Area of Potential Effect (APE) "is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist."

In addition to identifying historic properties that may exist in the proposed project's APE, FEMA must also determine, in consultation with the appropriate State Historic Preservation Officer (SHPO), what effect, if any, the action will have on historic properties. Moreover, if the project would have an adverse effect on these properties, FEMA must consult with SHPO on ways to avoid, minimize, or mitigate the adverse impacts to resources considered important in our nation's history.

### *3.5.1 Historic Architecture*

Cultural resources include archaeological or cultural sites, standing structures, and other historic properties considered to be eligible for or listed on the National Register of Historic Places. The NHPA, Section 106 mandates that federal agencies consider the impact of their undertakings on historic properties within the project's APE.

The project location has potential historic significance due to its involvement with early settlement in Norman County. The site of the Heiberg Dam was originally a flour and saw mill constructed in 1876. In addition to the flour mill, a community park was established adjacent to the mill. The park contained a pavilion, concession stand, benches, and tables, and community events were frequently held at the park. In 1882, Jorgen Faye Heiberg purchased the mill and erected a modern mill on the site. In 1892, improvements were made to the mill that included rebuilding the dam. Events continued to be held at the adjacent community park, including a special event in June 1902. At that time, a two-day festival was held at the park that included gubernatorial debates between the National Prohibitionists, Republicans, and Democratic parties.

The flour mill was closed in 1919 and new structures were erected in the early 1920s to accommodate electric power production. The power plant has since undergone various improvements and has changed ownership several times. The historic power plant currently consists of two remaining buildings which have fallen into a state of disrepair. These buildings include the power house with two additions and an adjacent out-building.

Extensive research was conducted on the historical background of the Heiberg Dam, the power house, and the associated additions and out-building. Due to the fact that neither of the original flour mills are present, that the machinery which produced the electric power and defined the historical character of the power

house building is no longer present, and that the structures are in poor repair, FEMA made a determination that the Heiberg Mill complex is not eligible for listing on the National Register of Historic Places.

In a letter to the SHPO dated August 26, 2003, FEMA requested from SHPO concurrence that the Hieberg Mill complex did not merit inclusion in the National Register of Historic places because it does not retain sufficient architectural merit and historical association for inclusion. On September 30, 2003, SHPO concurred with FEMA's determination and concluded that no historic properties would be affected by the project.

Complete copies of the FEMA determination with historic and architectural information, as well as the SHPO response, are located in Appendix H.

#### *3.5.1.1 No Action Alternative*

The *No Action Alternative* would not impact historic architecture.

#### *3.5.1.2 Preferred Alternative*

The *Preferred Alternative* would not impact historic architecture.

#### *3.5.1.3 Course Restoration Alternative*

The *Course Restoration Alternative* would not impact historic architecture.

### *3.5.2 Archaeological Resources*

Information was obtained from the Minnesota Historical Society database on know archaeological resources. This database identified three potential historic/archaeological resources within the project vicinity, including a burial mound located approximately 0.7 miles northwest of the project. In a letter dated February 11, 2003, the Minnesota Historical Society advised that the project posed no archaeological concerns.

An environmental resource map indicating the presence of known archaeological resources can be found as Exhibit 5 in Appendix A.

#### *3.5.2.1 No Action Alternative*

The *No Action* Alternative would have no impacts on the archeological resources.

#### *3.5.2.2 Preferred Alternative*

The *Preferred Alternative* would require ground disturbing activities during implementation of this project. Archeological resources are not anticipated within the project area. However, when ground disturbing activities occur during implementation of this project, the applicant will monitor excavation activity. If any artifacts or human remains are found during the excavation process, all work is to cease and the applicant will notify FEMA, the State of Minnesota, and the SHPO. It is not anticipated that the *Preferred Alternative* would impact archeological resources.

#### *3.5.2.3 Course Restoration Alternative*

The *Course Restoration Alternative* would require ground disturbing activities during implementation of this project. Archeological resources are not anticipated within the project area. However, when ground disturbing activities occur during implementation of this project, the applicant will monitor excavation activity. If any artifacts or human remains are found during the excavation process, all work is to cease and the applicant will notify FEMA, the State of Minnesota, and the SHPO. It is not anticipated that the *Course Restoration Alternatives* would impact archeological resources.

### *3.5.3 American Indian Coordination and Religious Sites*

On November 6, 2000, President Clinton signed EO 13175, entitled "Consultation and Coordination with Indian Tribal Governments". This EO directs federal agencies "to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes..."

The White Earth Band of the Chippewa Tribe has a strong interest in the Wild Rice River and projects affecting it. The Wild Rice River originates on the White Earth Reservation and the Heiberg Dam has historically blocked fish migration to both the portions of the river that lie within the reservation and to several lakes located within the reservation. Additionally, the White Earth Band is actively involved in a lake sturgeon restoration project within the watershed in an effort to restore a resource that early Native American cultures were partially dependent upon.

All interested parties, including the Wild Rice Watershed District, FEMA, U.S. F&WS, and the MN DNR have coordinated with the White Earth Band throughout this project's history. FEMA began formal consultation on June 21, 2003 with a letter advising the White Earth Band of the proposed project and

requesting comments. A meeting of all interested parties was held to discuss the project in the Wild Rice Watershed District's Ada, MN office on July 22, 2003. The White Earth Band was invited to attend and a representative did attend this meeting.

In compliance with FEMA's policy regarding the implementation of EO 13175, Consultation and Coordination with Indian Tribal Governments, regular and meaningful consultation and collaboration with tribal officials in the development of this project have occurred.

*3.5.3.1 No Action Alternative*

The White Earth Band of the Chippewa Tribe does not support the *No Action Alternative.* The *No Action Alternative* would not improve fish species diversity, nor provide recreational opportunities to 120 miles of upstream habitat.

*3.5.3.2 Preferred Alternative*

On March 25, 2004, the White Earth Reservation Tribal Council sent a letter to the Wild Rice Watershed District supporting the *Preferred Alternative* because it would restore fish passage, improve fish species diversity, and provide navigation and recreational opportunities to 120 miles of upstream habitat. (A copy of this correspondence can be found in Appendix E.)

*3.5.3.3 Course Restoration Alternative*

The White Earth Band of the Chippewa Tribe does not support the *Course Restoration Alternative.* The *Course Restoration Alternative* would impact fish resources by preventing fish from reaching the high quality spawning grounds located upstream of the Heiberg Dam. The White Earth Band of the Chippewa Tribe is also involved in a lake sturgeon reintroduction program. The *Course Restoration Alternative* would negatively impact this program.

The following table summarizes the expected impacts from the different alternatives.

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| **Physical Environment** | 3.1 | | | |
| Topography | 3.1.1 | Scour from increased flow velocities may create minimal, local topographic changes due to channel modifications. | Minimal secondary impacts may result from removal of borrow for earthen embankment. | Minimal secondary impacts may result from removal of borrow for earthen embankment. |
| Geology, Seismicity, and Soils | 3.1.2 | No impacts to geology.<br><br>Scouring and sedimentation would occur over time, resulting in the removal and re-deposition of soils within the river channel and adjacent to the channel.<br><br>Potential secondary impacts to prime farmland due to erosion upstream and downstream from continued channel modification. | Minimal secondary impacts to geology may result from removal of borrow for earthen embankment if glacial fill used.<br><br>Reduced scouring and sedimentation would minimize removal and re-deposition of soils within and adjacent to channel.<br><br>No impacts to prime farmland. | Minimal secondary impacts to geology may result from removal of borrow for earthen embankment if glacial fill is used.<br><br>Reduced scouring and sedimentation would minimize removal and re-deposition of soils within and adjacent to channel.<br><br>No impacts to prime farmland. |

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| Water Resources and Water Quality | 3.1.3 | Increased flow velocities due to shortened cutoff channel would result in modifications to channel morphology.<br><br>Increased turbidity would occur due to increased erosion and sedimentation.<br><br>No impacts to groundwater.<br><br>Loss of ice breaking functions could result in bank scour, increased erosion, and increased risk of bridge damages. | Restoration of normal flow velocities would prevent significant modifications to channel morphology.<br><br>Improved water quality would result due to decreased erosion and sedimentation. Short term water quality impacts due to construction activities.<br><br>No impacts to groundwater.<br><br>Restoration of ice breaking functions would decrease bank scour, decrease erosion, and increase bridge protection. Installation of concrete sloped blocks on top of dam would improve this function. | Restoration of normal flow velocities would prevent significant modifications to channel morphology.<br><br>Improved water quality would result due to decreased erosion and sedimentation. Short-term water quality impacts due to construction activities.<br><br>No impacts to groundwater.<br><br>Restoration of ice breaking functions would decrease bank scour, decrease erosion, and increase bridge protection. |
| Floodplain Management | 3.1.4 | Loss of approximately 180 acres of floodplain associated with pre- | Restoration of approximately 180 acres of floodplain associated with | Restoration of approximately 180 acres of floodplain associated with |

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| | | disaster oxbow channel. Creation of additional floodplain associated with post-disaster cutoff channel and areas downstream. | the pre-disaster oxbow channel.<br><br>Reduced stress on banks would reduce erosion and sedimentation, improving floodplain values. | the pre-disaster oxbow channel. |
| Air Quality | 3.1.5 | None | Short term impacts due to construction equipment. | Short term impacts due to construction equipment. |
| **Biological Environment** | 3.2 | | | |
| Terrestrial and Aquatic Environment | 3.2.1 | Loss of floodplain associated with 180 acres of riparian habitat at pre-disaster oxbow channel, potential shift in vegetative species; potential secondary impact of development of riparian habitat associated with oxbow channel; creation of floodplain associated with riparian habitat at post-disaster cutoff channel, potential shift in vegetative species. | Restoration of floodplain associated with 180 acres of riparian habitat at pre-disaster oxbow channel; loss of a few individual trees due to equipment access for construction. | Restoration of floodplain associated with 180 acres of riparian habitat at pre-disaster oxbow channel; loss of a few individual trees due to equipment access for construction. |

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| | | Water quality impacts due to increased sedimentation could negatively impact fish; positive impact of allowing access to 120 miles of high quality habitat and spawning areas upstream of dam; total length of river shortened from 1.5 miles to 0.3 miles, reducing habitat area. | Improved water quality due to decreased sedimentation; positive impact of allowing access to 120 miles of high quality habitat and spawning areas upstream of dam via rock arch rapids; total length of river restored to 1.5 miles, increasing habitat area | Improved water quality due to decreased sedimentation; loss of access to 120 miles of high quality habitat and spawning areas upstream of dam; potential impacts to lake sturgeon reintroduction program due to restricted movement; total length of river restored to 1.5 miles, increasing habitat area. |
| | | Shift in vegetative species due to loss of floodplain associated with 180 acres of riparian habitat would not be a significant impact to wildlife unless secondary impacts related to property development occurs. Secondary impacts could potentially result in the loss of up to 180 acres of wildlife habitat. | Minimal impacts on wildlife. Riparian habitat would be protected against secondary impacts. Short term, temporary impacts due to loss of some vegetation required to provide access for construction equipment and temporary disruption impacts due to machinery and personnel during construction. | Minimal impacts on wildlife. Riparian habitat would be protected against secondary impacts. Short term, temporary impacts due to loss of some vegetation required to provide access for construction equipment and temporary disruption impacts due to machinery and personnel during construction. |

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| Wetlands | 3.2.2 | Loss of approximately one acre of wetland associated with the pre-disaster oxbow channel. Creation of approximately 0.10 acre of wetlands associated with the post-disaster cutoff channel.<br><br>Potential secondary impacts due to modifications to channel morphology. | Restoration of approximately one acre of wetland associated with the pre-disaster oxbow channel. | Restoration of approximately one acre of wetland associated with the pre-disaster oxbow channel. |
| Threatened and Endangered Species | 3.2.3 | None | Potential impacts to few-flowered spike-rush, a Minnesota State Species of Concern. | Potential impacts to few-flowered spike-rush, a Minnesota State Species of Concern. |
| Critical Habitat | 3.2.4 | None | None | None |
| **Hazardous Materials** | 3.3 | None | None | None |
| **Socioeconomics** | 3.4 | | | |
| Zoning and Land Use | 3.4.1 | Potential indirect impact to agriculture due to scouring or flooding. | Potential indirect impact to agriculture due to less scouring or flooding. | Potential indirect impact to agriculture due to less scouring or flooding. |
| Recreational Opportunities | 3.4.2 | Limits fishing and swimming due to increased flow and turbidity. | Provides additional opportunities due to increased channel length, canoeing and swimming limited in | Provides additional opportunities due to increased channel length, canoeing and swimming limited in |

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| | | | dam vicinity. | dam vicinity. |
| Visual Resources | 3.4.3 | None | Removal of power house and additional of rock arch rapids/tumbling water would have positive impacts. | Removal of power house would have minor positive impacts. |
| Noise | 3.4.4 | None | Short term impacts due to construction equipment. | Short term impacts due to construction equipment. |
| Public Services and Utilities | 3.4.5 | None | None | None |
| Traffic and Circulation | 3.4.6 | Ice scour to Bridge #9019 on State Route 32 could result in the loss of the bridge, as well as loss bridges downstream. Road closures could result. | Ice scour protection would be provided to Bridge #9019 on State Route 32, as well as downstream bridges. Road closures would be avoided. | Ice scour protection would be provided to Bridge #9019 on State Route 32, as well as downstream bridges. Road closures would be avoided. |
| Economics | 3.4.7 | Potential impacts to if State Route 32 closed due to bridge scour.<br><br>Positive impacts to the White Earth Band due to improved fishing. | None to Twin Valley or Norman County.<br><br>Potential positive impacts to White Earth Band due to improved fishing. | None to Twin Valley or Norman County.<br><br>Negative impacts to White Earth Band due to decline of fishing. |
| Environmental Justice | 3.4.8 | None | None | Negative impacts to White Earth Band due to loss of fish passage |

# AFFECTED ENVIRONMENT AND IMPACTS

**Table 1 - Impact Summary**

| Affected Environment | Location of Text Discussion (Section No., Page No.) | Summary of Impacts | | |
|---|---|---|---|---|
| | | Alternative 1 - No Action Alternative | Alternative 2 – Preferred Alternative | Alternative 3 –Course Restoration Alternative |
| | | | | and impacts on subsistence fishing. |
| Safety and Security | 3.4.9 | Safety issues related to the potential collapse of bridge on State Route 32. | Improved safety due to protection of bridge on State Route 32. Potential drowning risk due to low head dams. Potential risk of dam failure. | Improved safety due to protection of bridge on State Route 32. Potential drowning risk due to low head dams. Potential risk of dam failure. |
| **Cultural Resources** | 3.5 | | | |
| Historic Architecture | 3.5.1 | None | None | None |
| Archeological Resources | 3.5.2 | None | None | None |
| Indian Coordination and Religious Sites | 3.5.3 | Does not improve fish species diversity nor provide recreational opportunities. | Restores fish passage, improves fish species diversity, provides recreational opportunities. | Prevent fish passage, interfere with lake sturgeon reintroduction, does not provide recreational opportunities. |

## IV. Public Participation

Initial Public Notices were published in the Forum on July 29, 2002 and the Star Tribune on July 22, 2002 for work which would occur as a result of this disaster. A copy of these public notices and affidavits of publication are included in Appendix F.

One public meeting has been held to discuss the proposed project. A meeting was sponsored by the Wild Rice Watershed District and conducted at the Twin Valley Community Center on October 29, 2004. The meeting was advertised in the Norman County Index, and reported on in the Norman County Index. The purpose of the meeting was to receive public input regarding repair options. Attendees were advised of fish passage issues and comments were solicited. Twenty-five attendees signed in at the meeting, and two written comments were received. Both comments favored restoring the Wild Rice River to its original channel, maintaining the Heiberg Dam at its original height, and installing a structure that would allow for fish passage.

As part of the NEPA process, a Public Notice was filed with the Norman County Index on October 12, 2004. This public notice advised that a draft Environmental Assessment could be reviewed at the City of Twin Valley, City Hall and the Ada Public Library in Ada, MN. The public was given 15 days for the opportunity to review the document and respond. This document was also made available for review on-line at www.fema.gov/mit/ep/assess.htm.

# V. Mitigation Measures and Permits

This section summarizes the mitigation measures and permits that would be required for the various alternatives.

**Mitigation**

Per Section 3.1.3, both the *Preferred* and *Course Restoration Alternatives* would result in temporary water quality impacts due to construction activities. If either alternative is chosen, mitigation techniques should be implemented to limit the water quality impacts to the Wild Rice River caused by these activities. These activities include, but are not limited to, installation of temporary silt fences and/or straw bales and staging of equipment on previously developed areas. If project activities include stockpiling of soil or fill on-site, the applicant should cover these soils to prevent fugitive dust and erosion into the river; following construction, any bare soils should be vegetated to prevent future soil erosion**.**

Additionally, USACE General Permit (GP/LOP-98-MN) conditions must be complied with. Condition 7. Erosion and siltation controls requires that:

Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark must be permanently stabilized at the earliest practicable date. Work should be done in accordance with state-approved, published practices, such as defined in Minnesota Pollution Control Agency Document, *Protecting Water Quality in Urban Areas – Best Management Practices for Minnesota.*

Per Section, 3.1.5, both the *Preferred* and *Course Restoration Alternatives* would result in short term air quality impacts during construction. To reduce fugitive dust emissions, the applicant will water down construction areas when necessary. To reduce emissions, internal combustion engine running times will be kept to a minimum.

Per Section 3.2.1, both the *Preferred* and *Course Restoration Alternatives* would have minor impacts to vegetation immediately adjacent to the dam as a result of equipment access. The area will be re-vegetated using the MN DOT Standard Mix 650CT, which consists of Kentucky bluegrass, Canada bluegrass, hard fescue, and perennial rye grass.

Per Section 3.2.3, both the *Preferred Alternative* and the *Course Restoration Alternative* may impact the few-flowered spike-rush. The MN DNR recommended that disturbances to wetland areas surrounding the Heiberg Dam be minimized as much as possible.

Per Section 3.3, both the *Preferred* and *Course Restoration Alternatives* require the demolition of the power house and associated structures. The applicant will contract a licensed asbestos abatement contractor to conduct an inspection of the building prior to demolition for any ACM or other hazardous materials. Any ACM will be removed in compliance with Minnesota state regulations and disposed of in an approved landfill. Any other regulated materials contained

within the building will be removed and disposed of by the applicant in accordance with applicable local, state, and federal regulations.

The firm contracted for the demolition work will be required to use Minnesota's Pollution Control Agency's approved BMPs to control and contain spills as provided in *Protected Water Quality in Urban Environments*. These BMPs detail spill plans and employee training.

Any hazardous materials discovered, generated, or used during implementation of the proposed project shall be disposed of and handled by the project applicant in accordance with applicable local, state, and federal regulations.

Per Section 3.4.9, both the *Preferred* and *Course Restoration Alternatives* would be utilizing construction equipment. All construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. Additionally, all activities will be conducted in a safe manner in accordance with standards specified in Occupational Safety and Health Act (OSHA) regulations.

Per Section 3.5.2, both the *Preferred Alternative* and the *Course Restoration Alternative* would require ground disturbing activities during implementation of this project. When ground disturbing activities occur during implementation of this project, the applicant will monitor excavation activity. If any artifacts or human remains are found during the excavation process, all work is to cease and the applicant will notify FEMA, the State of Minnesota, and the SHPO.

**Permits**

Per Section 3.13, both the *Preferred* and *Course Restoration Alternatives* would require work below the ordinary high water mark. A MN DNR, Waters Permit will be required. Mr. Bob Merritt should be contacted for assistance in obtaining the permit (218-847-1580). Mr. Merritt advised that the USACE and Division of Waters permits may be applied for through the same form sent to the MN DNR. This form is available on-line and is titled: "Minnesota Local/State/Federal Forms for Water/Wetland Projects". The Wild Rice Watershed District has begun coordination for obtaining this permit.

Per Section 3.13, both the *Preferred* and *Course Restoration Alternatives* would require work within Waters of the U.S. A Section 404 USACE permit will be required. The Wild Rice Watershed District has already obtained this permit. Army General Permit GP/LOP-98-MN was approved on June 30, 2004 for the *Preferred Alternative*.

Per Section 3.1.4, work for either the *Preferred* or *Course Restoration Alternatives* would be required to obtain a Norman County Conditional Use Permit. The fill or materials must be shown to have some beneficial purpose and the amount cannot exceed that which is necessary to achieve the proposed purpose. The Conditional Use Permit must be approved by the State Department of Conservation and the USACE. The applicant will be required to obtain and comply with all necessary permits required by the Norman County Floodplain Coordinator.

Per Section 3.2.2, both the *Preferred* and *Course Restoration Alternatives* would impact wetlands. The applicant is required to obtain the appropriate USACE permit as well as either a MN DNR Public Work Permit Program or Wetland Conservation Act permit. The applicant will comply with all permit conditions.

Per Section 3.3, both the *Preferred* and *Course Restoration Alternatives* require the demolition of the power house and associated structures. Per the Minnesota State Building Code, a building permit will be required to demolish a dwelling or commercial buildings of any size.

Per Section 3.4.9, both the *Preferred* and *Course Restoration Alternatives* have potential safety issues should dam failure occur. The applicant is required to obtain a dam safety permit from the MN DNR Division of Waters and comply with all permit conditions.

**Permits Not Required**

The Norman County Engineering Office advises that a permit would not be required for either the *Preferred* or *Course Restoration Alternative* (personal communication, Mr. Clint Rasmusson, Norman County Engineering Office, December 31, 2002).

The Minnesota Pollution Control Authority advised that a NPDES permit will be required for this project if greater than one acre of land will be disturbed. It is not anticipated that either the *Preferred* or *Course Restoration Alternative* will disturb one area of land.

# VI. Consultations and References

This section summarizes the consultations, resource agency coordination, and references that were conducted in the course of developing this EA.

Per Section 3.1.2, the U.S. NRCS was contacted on December 16, 2002 to determine if any prime or unique soils exist in the project area. This agency advised that the Farmland Protection Policy Act does not apply to this project.

Per Section 3.1.3, the U.S. F&WS expressed concern regarding sediment transport in the Wild Rice River downstream of the Heiberg Dam in their letter of January 21, 2003. The letter suggested that sediment-hungry waters resulting from sediment deposition upstream of the dam could initiate blow outs in the bluffs downstream of the dam if the river was restored to its pre-disaster course and the Heiberg Dam was once again functional.

Per Section 3.1.3, a telephone conversation took place on January 2, 2003 with Mr. Leo Grabowski of the USACE (218-829-8402). Mr. Grabowski provided information on USACE permit requirements and the effectiveness of the Heiberg Dam as an ice control structure.

Per Section 3.1.3, a telephone conversation took place with Mr. Luther Aadland of the MN DNR on January 3, 2003 (218-739-7449). Mr. Aadland provided information on the effectiveness of the Heiberg Dam as an ice control structure.

Per Section 3.1.4, a telephone conversation occurred on July 13, 2004 with the Norman County Environmental Services regarding County requirements for projects located within the floodplain. Mr. Kevin Ruud of the Norman County Environmental Services (218-784-5493) was consulted.

Per Section 3.1.5, Mr. David Kelso of the Minnesota Pollution Control Agency was contacted on January 14, 2003 (651-296-7802). Mr. Kelso was consulted regarding air quality issues in Minnesota.

Per Sections 3.2.1/3.2.3, a letter was received from the U.S. F&WS dated January 21, 2003 advising that the Heiberg Dam cuts off fishery access to 120 miles of upstream habitat within the Wild Rice River. This letter also advised that there are no federally listed threatened or endangered species within the proposed project area.

Per Section 3.2.3, correspondence dated January 8, 2003 was received from the MN DNR Natural Heritage and Nongame Research Program. This letter provided information on known occurrences of rare species or natural communities located within the project area. This letter also advised that the project could impact the few-flowered spike-rush. The MN DNR recommended that disturbances to wetland areas surrounding the Heiberg Dam be minimized as much as possible.

Per Section 3.4.1, a telephone conversation took place on July 13, 2004 with the Norman County Environmental Services (218-784-5493). Mr. Kevin Ruud provided information on zoning within the project area.

Per Section 3.4.5,a telephone conversation took place on January 6, 2003 with Twin Valley City Clerk Tina Murn (218-584-5254). Ms. Murn provided information on public services and utilities.

Per Section 3.4.5, a telephone conversation took place on July 15, 2004 with Ms. Denette Gwyn of the Norman County Sheriff's Office (218-784-5444). Ms. Gwyn provided information on police, fire, and rescue services.

Per Section 3.4.6, a telephone conversation took place on January 6, 2003 with Mr. Lou Tasa, Assitant District Engineer/State Aid, MnDOT Division 2A (218-755-3808). Mr. Tasa provided information on traffic volumes and hydrologic conditions at MnDOT Bridge #9019.

Per Section 3.4.5, a telephone conversation took place on January 8, 2003 with Mr. Dwayne Hill, MnDOT East Region Operations Support Engineer (218-755-4470). Mr. Hill provided information on hydrologic conditions at MnDOT Bridge #9019.

Per Section 3.5.1, FEMA wrote the SHPO on August 26, 2003 requesting concurrence that the Hieberg Mill complex did not merit inclusion in the National Register of Historic. On September 30, 2003, SHPO concurred with FEMA's determination and concluded that no historic properties would be affected by the project.

Per Section 3.5.2, the SHPO was contacted requesting information regarding the potential for the presence of archaeological resources. In a letter dated February 11, 2003, the SHPO advised that the project posed no archaeological concerns.

Per Section 3.5.3, the White Earth Reservation Tribal Council sent a letter to the Wild Rice Watershed District on March 25, 2004 supporting the *Preferred Alternative*

Coordination has occurred with various resource and regulatory agencies. In addition, the following agencies and organizations have been sent this EA for their comments.

Federal Emergency Management Agency
536 South Clark Street
Chicago, IL 60605

State of Minnesota
Department of Homeland Security and
Emergency Management
Attention: Ms. Sharon Kelly
444 Cedar Street
St. Paul, MN 55101

U.S. Fish and Wildlife Service
Twin Cities Ecological Services Field Office
4101 East 80th Street
Bloomington, MN 55425

Minnesota Historical Society (SHPO)
(SHPO Number 2003-0860)
345 Kellog Boulevard West
St. Paul, MN 55102-1906

U.S. Natural Resource Conservation Service
East Second Avenue South
St. Paul, MN 55155

MN Dept of Natural Resources, Waters
Mr. John Linc Stine
500 Lafayette Road
St. Paul, MN 55155

MN Department of Natural Resources
Division of Ecological Services
Attention: Mr. Tom Balcom
500 Lafayette Road
St. Paul, MN 55155

MN Department of Natural Resources
Division of Ecological Services
Attention: Mr. Luther Aadland
1509 First Avenue North
Fergus Falls, MN 56537

MN Department of Natural Resources, Waters
Attention: Mr. Robert Merritt
14583 County Highway 19
Detroit Lakes, MN 56501

U.S. Army Corps of Engineers-Regulatory
Attention: Mr. Leo Grabowski
10867 East Gull Lake Drive NW
Brainerd, MN 56401

Wild Rice Watershed District
Attention: Mr. Jerry Bennet
11 Fifth Avenue East
Ada, MN 56510

White Earth Band of the Chippewa Tribe
Attention: Mr. John Annette
41044 South Ice Cracking Road
Ponsford, MN 56575

MN Center for Environmental Advocacy
Attention: Mr. Henry VanOffelen
50785 Bucks Mill Road
Detroit Lakes, MN 56501

Norman County Highway Department
County Engineer Office
814 Main Street
Ada, MN 56510

County of Norman
Engineering Office
16 Third Street E
Ada, MN 56510

Norman County Environmental Service
Attention: Mr. Kevin Ruud
16 Third Avenue East
Ada, MN 56510

City of Twin Valley
City Hall
107 Second Street SW
Twin Valley, MN 56584

Ada Public Library
107 Fourth Avenue E
Ada, MN 56510

Houston Engineering, Inc.
Attention: Mr. Jerry Bents
2505 North University Drive
Fargo, ND 58105

MN Deprt of Natural Resources, Waters
Attention: Mr. Larry Kramka
Regional Hydrologist
2115 Birchmont Beach Drive NE
Bemidji, MN 56601

## VII. Secondary and Cumulative Impacts

This section summarizes the secondary and cumulative impacts that were discussed in previous portions of this EA.

Per Section 3.1.1, both the *Preferred Alternative* and the *Course Restoration Alternative* would have secondary impacts on topography due to the requirement for fill to replace the washed out earthen embankment. Topography changes at the borrow site for this fill would occur; impacts would not be significant.

Per Section 31.2, both the *Preferred* and the *Course Restoration Alternatives* could have minor secondary impacts on geology. Impacts to the geology at the borrow site or mine could occur if glacial till is used for fill to replace the earthen embankment. Impacts would not be significant.

Per Section 3.1.2, the *No Action Alternative* could potentially have secondary impacts on prime farmland. Without channel restoration, the Wild Rice River will modify channel longitudinal profiles and cross-section areas both upstream and downstream of the dam. These channel modifications could potentially result in erosion significant enough to impact prime farmland.

Per Section 3.2.1, the *No Action Alternative* could have a potential secondary impacts on riparian habitat. The loss of regular flooding to the oxbow channel could result in the property owner/s' developing the land for agricultural or residential purposes. If this were to occur, the loss of forested, riparian habitat would be significant and could amount to 180 acres.

Per Section 3.2.1, the *No Action Alternative* could have a potential secondary impact on wildlife. As previously discussed, the loss of regular flooding to the oxbow channel could result in the development of this land. If this were to occur, the loss of forested habitat could have significant impacts on wildlife.

Per Section 3.2.2, the *No Action Alternative* could result in secondary or cumulative impacts to wetlands. Without channel restoration, the Wild Rice River will modify channel longitudinal profiles and cross-section areas both upstream and downstream of the dam. These channel modifications could potentially result in wetland impacts.

Per Section 3.4.1, the *No Action Alternative* could have secondary impacts on agriculture due to the loss of the ice breaking function of the Heiberg Dam. The ice breaking function of the dam serves to protect agricultural resources by reducing channel scour and erosion which could impact adjacent agricultural fields and by reducing flooding which could occur due to ice jams at downstream bridges. Increased flooding due to the loss of the Heiberg Dam could result in agricultural impacts if flooding occurs during the spring planting season. Excessive agricultural impacts due to scouring or flooding could lead to property owner's removal of certain fields from agricultural production.

Per Section 3.4.1, both the *Preferred Alternative* and *Course Restoration Alternative* may have secondary impacts on land use. These alternatives have the potential to reduce flooding during

spring ice break-up, which could benefit agriculture and lead to additional property being converted to agricultural production.

## VIII. List of Preparers

This EA was prepared by

Consoer Townsend Envirodyne Engineers Inc.
303 East Wacker Drive
Suite 600
Chicago, IL 60601

with contributions by:

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Brian Smith, Senior Scientist (QA/QC)
Susan Weber, Senior Planner, CTE Engineers

## INDEX OF ACRONYMS

| | |
|---|---|
| ACM | asbestos containing material |
| APE | area of potential effect |
| BMPs | best management practices |
| CAA | Clean Air Act |
| CEQ | President's Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CERCLA | Comprehensive Environmental Response Compensation and Liability Act |
| CO | carbon monoxide |
| EA | Environmental Assessment |
| ECS | Ecological Classification System |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| ESA | Endangered Species Act |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FONSI | Finding of No Significant Impact |
| IBI | Index of Biotic Integrity |
| LARL | Lake Agassiz Regional Library |
| MDH | Minnesota Department of Health |
| MN DNR | Minnesota Department of Natural Resources |
| MnDOT | Minnesota Department of Transportation |
| NCA | Noise Control Act |
| NEPA | National Environmental Policy Act |
| NESHAP | National Emissions Standards for Hazardous Air Pollutants |
| NPDES | National Pollution Discharge Elimination System |
| NHPA | National Historic Preservation Act |
| $NO_2$ | nitrogen dioxide |
| NWI | National Wetland Inventory |
| $0_3$ | ozone |
| OSHA | Occupational Safety and Health Act |
| Pb | lead |
| $PM_{10}$ | particulate matter |
| RCRA | Resource Conservation and Recovery Act |
| SHPO | State Historic Preservation Officer |
| $SO_2$ | sulfur dioxide |
| USACE | United States Army Corps of Engineers |
| USDA | Unites States Department of Agriculture |
| U.S. EPA | U.S. Environmental Protection Agency |
| U.S. F&WS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geologic Survey |
| U.S. NRCS | U.S. Natural Resource Conservation Service |
| VOCs | volatile organic compounds |