



**US Army Corps  
of Engineers®**  
St. Paul District

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## **Appendix K: Environmental**

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Fargo Moorhead Metropolitan Area  
Flood Risk Management Project

**Reach 4**

**Diversion Channel and Rush River  
Inlet/Drop Structure**

Engineering and Design Phase

P2# 370365

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# Appendix K: Environmental

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### ATTACHMENTS

Attachment K-1. MFR Guidelines for Reach 1 Planting Plan of the Fargo Moorhead Diversion Channel

Attachment K-2. Fish Passage

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# Appendix K: Environmental

## K.1 SUMMARY OF IMPACTS

Impacts identified in the 2011 Fargo-Moorhead Metropolitan Area Flood Risk Management Feasibility Report and Environmental Impact Statement includes impacts to aquatic habitat, fish passage and connectivity, floodplain forest, wetland resources, and cultural resources.

### K.1.1 Aquatic Habitat

Impacts to aquatic habitat includes riverine habitat directly affected by individual project features to include the Red River Control Structure, Red River Outlet Structure, Wild Rice River Control Structure, Sheyenne River Aqueduct, Maple River Aqueduct, and the abandonment of 5 miles of channel on the Rush and Lower Rush Rivers.

### K.1.2 Fish Passage and Connectivity

Impacts to fish passage and connectivity result from staging water during operation of the flood control project, reducing connectivity.

### K.1.3 Floodplain Forest

The project will result in a loss of 131 acres of forested land consisting of floodplain forest, shelterbelts, and small pockets of trees around farmsteads.

### K.1.4 Wetlands

Wetlands delineation has recently been completed.

Wetland Type	Acres
Open Water	0.69
Seasonally Flooded Basin	1476.97
Shallow Marsh	106.38
Shrub-Carr	1.32
Wet Meadow	119.85
<b>Total Acres</b>	<b>1705.20</b>

In general, the majority of the wetlands impacted are low functioning farmed, seasonally flooded type.

### K.1.5 Cultural Resources

Phase 1 cultural resource surveys have been ongoing for the entire project area. Areas where phase 2 testing and evaluation will be needed have been identified and will continue to be identified as the phase 1 surveys are completed. Section K.4 below provides information on the cultural resources sites within Reach 4.

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## **K.2 OVERALL MITIGATION FEATURES**

### **K.2.1 Aquatic Habitat Mitigation Features**

Measures considered for aquatic habitat mitigation include performing full stream restoration, stream improvement via riparian corridor restoration, designing the low-flow channel to meander, and construction of fish passage.

### **K.2.2 Fish Passage and Connectivity**

Fish Passage and connectivity impacts will be mitigated for by building in-town levees so the project would operate less frequently, providing fish passage at the diversion channel outlet, the Rush River inlet, and providing fish passages at other existing dams in the region to include Drayton Dam and Wild Rice Dam. Agencies have supported the idea that fish passage be provided across the widest range of conditions practicable. For example, fish passage during floods is important as fish often move in response to pulse events, particularly during spring floods. The Fargo-Moorhead project has strived to provide fish passage during all but the largest flood events.

### **K.2.3 Floodplain Forest**

Mitigation to offset the impacts to floodplain forest includes converting 262 acres of floodplain farmland or pastured land into floodplain forest.

### **K.2.4 Wetlands**

The channel will be planted with native wetland species on the bottom and the fringe of the side slopes of the channel, with the remainder of the side slopes being planted as a prairie swale type community. A buffer strip of several hundred feet on either side of the diversion channel up to the embankment top will help limit encroachment from agricultural activities and will provide filtering of surface runoff into the diversion channel wetlands. In consultation with several plant experts, planting guidelines and seed mixes for various zones of the channel cross section have been developed that ensure project objectives are met (Attachment K-1).

### **K.2.5 Cultural**

Cultural resources mitigation for each Reach must be completed prior to the start of construction for that Reach. In addition, monitoring by a professional archeologist will be required during construction in select reaches of the project. No cultural resources mitigation or monitoring is needed for Reach 4.

## **K.3 REACH 4 MITIGATION FEATURES**

The environmental consideration for mitigation for this reach includes providing planting guidance to facilitate wetlands in the bottom of the diversion channel, and ensuring the low flow channel is designed to meander. These efforts are discussed in the Feasibility Report and Environmental Impact Statement (EIS).

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### **K.3.1 Fish Passage at Outlet Structure**

Successful mitigation of fish passage at the outlet structure includes design features that provide a pathway for the immigration and emigration of fish between the Red River and its tributaries. Important considerations include: (1) species of interest -identified through agency and stakeholder coordination, (2) design limitations – identified by essential goals and objectives of the project, including swim speed, (3) ability to monitor – stemming from a pre- and post- construction design, and (4) geomorphologic components of the system.

The rock ramp fishway being considered for Reach 4 consists of pool/riffle structures (Attachment K-2). Rock ramps are nature-like fishways designed to match the morphological characteristics of natural river habitat for the species present. Although rock riffles are not common on the Red River mainstem, the key to the design is that the small drops down the ramp are built to a height that gives fish the opportunity to rest between each drop. The riffles serve as the “steps” of the fishway.

### **K.3.2 Wetland Planting Guidelines**

As noted above, to meet the mitigation requirements for planting the diversion channel with wetland species the vegetation establishment guidelines for the diversion channel are being developed. One goal of the planting plan is to limit the potential for the establishment of undesirable species (such as cattails, willow, etc.), compatible with conveyance criteria (resulting in a Manning’s roughness  $n$  value of .03 or less), and resilient to maintenance activities.

## **K.4 CULTURAL RESOURCES**

Reach 4 was surveyed for cultural resources in July 2010 (original Rush River crossing), June and October 2011 (diversion alignment), and May and October 2012 (revised diversion alignment). Parcels along 167th Avenue plus two excavated material pile (EMP) areas and a construction staging area were surveyed for cultural resources in November 2012 and June 2013. One parcel along 167th Avenue remains to be surveyed for cultural resources in the fall of 2013. Four archeological sites and two built-environment linear resources were recorded in the Reach 4 area.

Archeological site 32CS5177 is a historic cultural material scatter in Section 20, Township 141 North, Range 49 West. Prehistoric isolated find spots 32CSX369 and 32CSX383 are each single projectile points found in the SW¼ and SE¼ of Section 36, Township 141 North, Range 50 West. These three sites were recommended as not eligible to the National Register of Historic Places (Meier et al., 2013 draft, *The Fargo-Moorhead Flood Risk Management Project, Cass County, North Dakota, and Clay County, Minnesota: Results of Phase I Cultural Resources Investigations, 2012*, URS Corp., Denver, Colorado). Coordination with the North Dakota SHPO to confirm their non-eligibility is ongoing.

Prehistoric find spot site 32CSX384 consists of a Knife River flint biface and a mineralized bison bone fragment, also found in Section 36, Township 141 North, Range 50 West. Additional testing was recommended at this site location to determine its eligibility to the National Register (Tucker et al., 2012, *The Fargo-Moorhead Flood Risk Management Project, Cass County, North Dakota and Clay County, Minnesota: Results of Phase I Cultural Resources Investigations, 2010-2011*, URS Corp., Denver,

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Colorado). Phase II testing was conducted at this find spot in November 2012 and no additional artifacts were encountered. As a result, this find spot is recommended as not eligible to the National Register (Jones et al., 2013, *Phase II Evaluation of Archaeological Sites 32CS0201 & 32CSX384, Reaches 1 and 4, of the Fargo-Moorhead Metro Flood Risk Management Diversion Channel Alignment, Cass County, North Dakota*, Great Lakes Archaeological Research Center, Milwaukee, Wisconsin). The North Dakota SHPO is expected to concur that this find spot site is not eligible to the National Register and no further cultural resources work at its location is necessary.

Finally, the channelized portion of the Rush River in Section 25, Township 141 North, Range 50 West, was recorded as Feature 2 (Rush River Drain No. 12), and a segment of drainage ditch in the center of Section 36, Township 141 North, Range 50 West, was recorded as Feature 2 South, of linear resource 32CS5113, historic flood control ditch channels. Tucker et al. (2012:219, Table 136) recommends these segments of channelized river and drainage ditch as eligible to the National Register due to their association “with the historical events surrounding the significant flooding that has occurred in and around the area since it was settled” as the ditch was dug and the river channelized “to allow for settlement and continued use of the area, both for residential and agricultural purposes.” The Corps of Engineers does not concur with these recommendations at this time. Coordination with the North Dakota SHPO regarding the National Register eligibility or non-eligibility of the drainage ditch segment and channelized segment of the Rush River is ongoing pending preparation of a historic context on historic drainage ditching in the Red River Valley in North Dakota.

## **K.5 ENVIRONMENTAL SURVEYS AND MONITORING**

Raptor surveys were conducted by the Corps and the USFWS during the spring of 2012 and 2013. Surveys will be conducted each spring prior to construction for Reach 4.

Based on the cultural resources programmatic agreement, any project excavation within 100 meters (328 feet) of any river (Red River outlet, Rush River, Lower Rush River, Maple River, Sheyenne River, Wild Rice River, and Red River inlet), at the proposed crossing location as well as the portion of the diversion alignment where it crosses through the oxbow area south of the Maple River should be monitored by a qualified professional archeologist.

## **K.6 NEPA COMPLIANCE**

The proposed plan for the diversion channel was discussed in the 2011 Fargo-Moorhead Metropolitan Area Flood Risk Management Final Feasibility Report and Environmental Impact Statement. Changes to the original layout for the Rush River inlet consisted of a modified inlet structure and an optimization of the diversion alignment. A Supplemental Environmental Assessment and 404(b)1 analysis is being prepared to address changes in impacts caused by alignment changes, construction of levees in-town to provide the opportunity to allow more flow through town, and the construction of a levee around the communities of Hickson, Bakke, and Oxbow. A draft Supplemental Environmental Assessment and



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supplemental 404(b)1 was made available for public review with the comment period ending 15 July 2013. Comments received are currently being addressed.