



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

Oxbow/Hickson/Bakke Ring Levee Appendix C

Fargo Moorhead Metropolitan Area
Flood Risk Management Project

EA Document

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Oxbow/Hickson/Bakke Ring Levee Appendix C

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Oxbow/Hickson/Bakke Ring Levee

Appendix C

1 INTRODUCTION

1.1 Summary

Operation of the Fargo Moorhead Metropolitan Area Flood Risk Management Project (Project) would result in flood water being staged upstream of the cities of Fargo and Moorhead, including around the city of Oxbow, the village of Hickson, and the Bakke subdivision. The Final Feasibility Report and Environmental Impact Statement (FEIS) included acquiring all structures in fee in the Oxbow, Hickson, and Bakke area. The United States Army Corps of Engineers (Corps), at the request of the non-Federal sponsors, has determined that constructing a ring levee around the Oxbow, Hickson, and Bakke area is a viable alternative to a total fee acquisition. The ring levee around the Oxbow, Hickson, and Bakke area is the alternative recommended by the non-Federal sponsors. The cost to construct the proposed levee and associated features is estimated to be approximately \$65 million. The cost for a fee acquisition of all three communities, as presented in the FEIS, is estimated to cost approximately \$74 million.

1.2 Background

In the FEIS, the communities of Oxbow, Hickson, and Bakke are identified as being located within the Staging Area. During development of the FEIS, the city of Oxbow asked that either all residential structures be benefited by the construction of a permanent ring levee, or the entire community be acquired in fee. Through analysis during the feasibility phase it was determined that all residential structures could not be benefited. Due to their proximity to the riverbank and geotechnical stability issues, several homes would need to be removed to construct a ring levee to benefit the remainder of the communities. After the determination that all residential structures could not be benefited with a ring levee, it was recommended that the community be acquired in fee.

After the FEIS was completed, the non-Federal sponsors asked the Corps to analyze a ring levee option to benefit the three communities, with the understanding that several homes would need to be removed, but could be replaced on a one-for-one basis within the ring levee benefitted area.

1.3 Development of Alternative Alignments

An alignment was developed and is shown in Figure 1. This conceptual alignment was presented to the communities and general public at a meeting on January 8, 2013 in Fargo, North Dakota. Individual meetings were also held for residents of Oxbow, Hickson, and Bakke after the public meeting and the following two days in Hickson, North Dakota. The meetings were held to provide information on the proposed ring levee concept, to meet with impacted residents, and to address concerns about the

proposed ring levee. Residents impacted by the ring levee were invited, via letter, to attend the public meeting and to sign up for a one-to-one meeting.

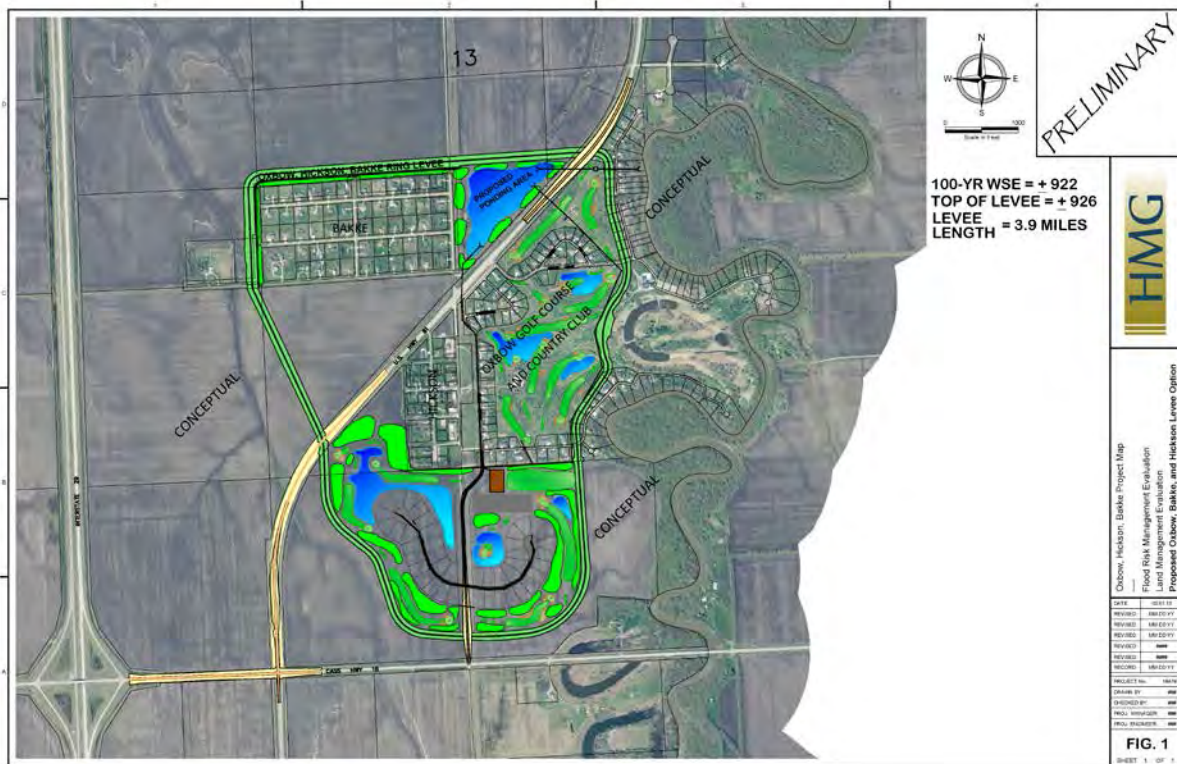


Figure 1 Ring Levee Alignment

Over 150 people attended the public meeting and 76 individual meetings were held in person or over the phone. An anonymous, informal survey was also provided to residents to gain additional information from impacted residents. The survey results indicate that many residents of Oxbow support the ring levee concept, while many Bakke and Hickson residents do not support the ring levee concept.

On January 23, 2013, the city of Oxbow City Council carried a motion to remove from the record a previous resolution as it related to any opposition against the Project. In addition, it also carried a motion to rescind a previous resolution which supported the Richland Wilkin JPA (Joint-Powers Agreement) formed to oppose the Project. On January 10, 2013, Pleasant Township passed a Resolution of Opposition to Fargo-Moorhead Metropolitan Area Flood Risk Management Project. The resolution is in opposition of the diversion project as well as the proposed ring levee for the communities of Oxbow, Hickson, and Bakke.

Because of the varying support and opposition to the ring levee concept, two additional alternatives were developed. The additional alternative alignments are as follows: ring levee for Oxbow and Hickson with a fee acquisition for Bakke residents; ring levee for Oxbow only with fee acquisitions for Hickson and Bakke residents. All three alternative alignments are shown in Figure 2.

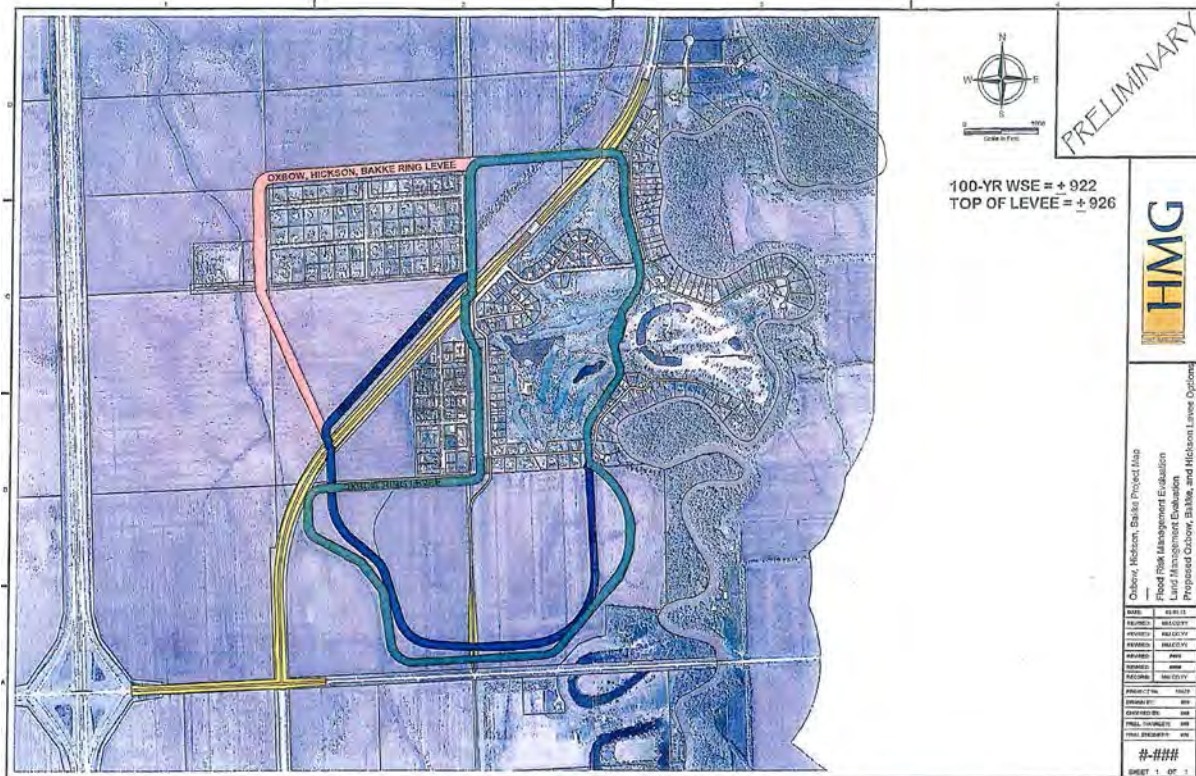


Figure 2 Alternative Alignments

1.4 Comparison of Alternative Alignments

Each alternative alignment would provide benefits up to the 0.2-percent chance (500-year) event. The full Oxbow, Hickson, and Bakke alignment would cost approximately \$65 million and benefit 196 properties. The Oxbow/Hickson ring levee alternative would cost approximately \$85 million and benefit 139 properties and the Oxbow-only ring levee alternative would cost approximately \$90 million and benefit 106 properties. All alignments would maintain the Oxbow Country Club.

The full alignment would benefit the church, community center, and businesses in Hickson and Oxbow. The full alignment would maintain this area’s tax base for the Kindred School District, while the Oxbow/Hickson alternative alignment would reduce the tax base by \$21 million and the Oxbow-only alternative alignment would reduce the tax base by \$26 million.

Table 1 provides additional information on the costs and other information related to each levee alignment.

Table 1 Oxbow, Hickson, and Bakke Area Levee Alternatives

Options	Technically Feasible	Properties Protected	Cost					Community Preference
			Total	Buyout (Staging)	Buyout (Alignment)	Design	Construction	
100% Buyout	Yes	0	\$74M (all 2018+)	\$74M	\$0	\$0	\$0	O: No B: Yes H: TBD
Full OHB Levee	Yes	196	\$65M (all 2013/15)	\$0	\$24M	\$5M	\$36M	O: Yes B: No H: TBD
OH only Levee	Yes	139	\$85M (\$64M-2013/15; 21M-2018+)	\$21M	\$24M	\$5M	\$35M	O: Yes B: Yes H: TBD
Oxbow only Levee	Yes	106	\$90M (\$64M-2013/15; 26M-2018+)	\$26M	\$24M	\$5M	\$35M	O: Yes B: Yes H: TBD

1.5 Recommendation of Proposed Alternative by the non-Federal Sponsors

The non-Federal sponsors recommended that the Corps consider the full Oxbow, Hickson, and Bakke alignment because it benefits the most properties and is the lowest in cost.

2 PROPOSED ALTERNATIVE

The full Oxbow, Hickson, and Bakke ring levee would be designed to provide flood risk management for the Oxbow, Hickson, and Bakke area, transportation improvements intended to maintain access to the communities, and infrastructure to replace public and private infrastructure affected by the construction of the ring levee. The alignment for the proposed alternative is a conceptual alignment that may be modified during detailed design studies; any changes in alignment will be evaluated for changes to impacts from what is being discussed in this EA. It is not anticipated at this time that there would be an appreciable change in scope or magnitude to impacts. The attached technical memorandum, entitled “Oxbow, Hickson, Bakke Ring Levee”, outlines a feasibility level design and cost estimate for constructing a ring levee for the Oxbow, Hickson, and Bakke area.

The full Oxbow, Hickson, and Bakke ring levee, shown in Figure 3, surrounds Hickson, Bakke, and a portion of Oxbow. Oxbow is located along the banks of the Red River of the North and generally

consists of residential lots surrounding the Oxbow Country Club. A number of residential lots as well as the country club would be impacted by the levee alignment. The alignment would generally parallel the Red River through residential areas in both the north and south portions of Oxbow and would cross directly through the Oxbow Country Club. The alignment would parallel the north edge of Bakke and southward along the west edge of Bakke and Hickson. From the southeast edge of Oxbow and the southwest edge of Hickson, the levee would encompass a previously agricultural area and surround new residential lots and golf holes. The new residential lots and golf holes would be constructed to mitigate those lost due to the construction of the levee. Where it would be adjacent to existing residential lots, the embankment would be located a sufficient distance from the edge of residential lots to allow for clear space needed for levee maintenance, drainage features, and a vegetative buffer. The levee would be located a sufficient distance from the Red River to ensure geotechnical stability.

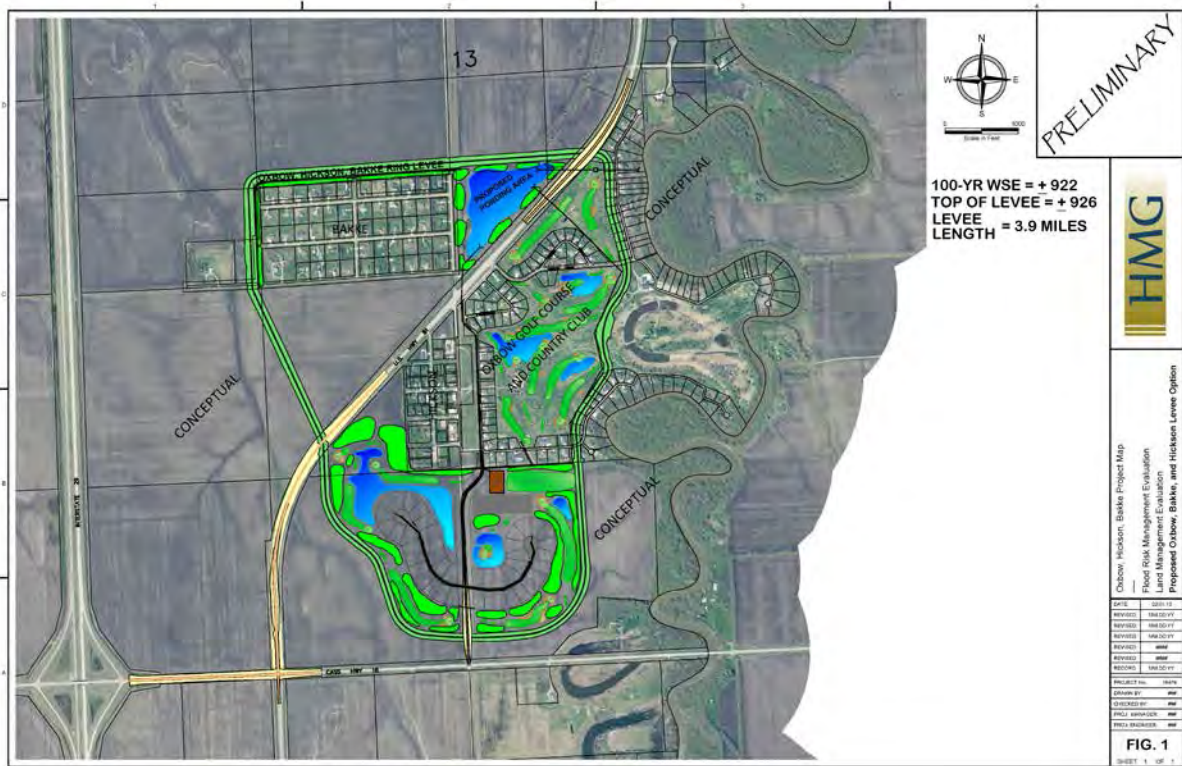


Figure 3 Proposed Alternative Full Oxbow/Hickson/Bakke Alignment

2.1 Impacts to Roads and Highways

Cass County Highway 81 would need to be reconstructed in two places. Two of the reconstructed areas are where the highway intersects the proposed Oxbow, Hickson, and Bakke ring levee. Both the north and south intersections would need to be gradually raised to maintain a safe line of sight for travel and meet the minimum height requirement for the proposed levee. The raise would extend through the intersection with Highway 18 to allow residents to access their homes in a time of flood. South of Cass County Highway 18, Highway 81 will gradually slope until it ties into the existing road grade.

Cass County Highway 18 between Cass County Highway 81 and Interstate 29 would also be raised. Raising the road would allow the residents of the Oxbow, Hickson, and Bakke communities to access their homes and business during events up to a 0.2-percent chance (500-year) event.

Cass County Highway 25 would be raised where it intersects the proposed Oxbow, Hickson, and Bakke ring levee on the south side of the communities. The change in road grade would begin at the intersection of Cass County Highways 25 and 18 until it reaches its maximum elevation height as it crosses the proposed ring levee, and it would then be graded back until it meets the existing roadway elevations.

2.2 Impacts to Local Structures

The construction of the ring levee would result in the removal of approximately 40 homes as well as disruptions to the Oxbow Country Club including several golf holes and the club house. The ring levee plan includes replacement of lost infrastructure, including residential lots and associated infrastructure and reconfiguration of the Oxbow Country Club. Replacement infrastructure described here is conceptual and would be subject to modifications through consultation with the city of Oxbow and the Oxbow Country Club during final design. The plan included here is intended to produce an overall footprint and cost estimate for the purpose of determining impacts of the proposed action. The following sections include a more detailed description of infrastructure replaced as part of the ring levee plan.

The proposed Oxbow, Hickson, and Bakke ring levee would require alteration of some of the infrastructure of the benefited communities. Most of the alterations would occur in the city of Oxbow, where a significant portion of the existing infrastructure is located under the proposed alignment or outside of the benefited area. To mitigate for the loss of infrastructure, an Oxbow addition is proposed. The Oxbow addition would include additional residential lots and new holes for the golf course and country club. The proposed Oxbow addition, as conceptualized, would extend the existing Sunset Drive south and shift the alignment along Cass County Highway 25, where it would cross the ring levee at a minimum elevation of 926 feet to meet levee height requirements and tie into Cass County Highway 25. The proposed road would include one intersection that services two cul-de-sacs, where the proposed residential lots would be located for the Oxbow addition. In addition to residential lots, the Oxbow Country Club would be relocated along Sunset Drive to allow for easy access to the clubhouse from either Cass County Highway 81 or Cass County Highway 18. Proposed roadways in the Oxbow addition would be paved. The proposed layout is a concept and may be altered in the future based on input from the local communities, the country club, the golf course architect, and other local authorities.

The existing sanitary sewer system serving the Oxbow Drive and Oxbow Circle area generally flows west to east to a lift station located outside of the ring levee area. This lift station would be abandoned and removed. A new lift station located near Oxbow Drive within the benefited area of the levee would be constructed to maintain sewer service to that portion of the City. The proposed Oxbow addition would require a new sanitary system that ties into an existing sanitary pipe network system located near the intersection of Sunset Drive and Riverbend Road. The system would be gravity fed into the existing system.

The existing water main for the city of Oxbow has a connecting loop that would be located on the un-benefited side of the levee. To maintain the loop, a pipe running parallel to the levee along the golf course that ties the water lines at Riverbend Road and Oxbow Drive together is included. The proposed Oxbow addition would tie into the existing water main located near the intersection of Sunset Drive and Riverbend Road.

The existing storm system generally slopes from west to east and ultimately outfalls into the Red River. To reduce the number of pipes crossing the levee, two separate pipe network systems are proposed, one that utilizes the existing storm pipe network and one that would be for the proposed Oxbow addition. Both systems would outfall into a proposed ponding area within the benefited area. The proposed ring levee does not create conflicts with the sanitary, water, or transportation infrastructure for the Hickson or Bakke communities.

2.3 Oxbow Golf Course

The proposed Oxbow, Hickson, and Bakke ring levee would create a need to re-configure the golf course as well as relocate the clubhouse and other facilities provided by the Oxbow Country Club. Eight golf holes and the driving range would need to be relocated and three other golf holes require alterations to accommodate the proposed ring levee. Interior drainage would be designed to convey water to a proposed retention basin. Sanitary sewer, storm sewer, water lines, and parking lots needed to service the Oxbow Country Club, the golf course, and the other amenities offered by the country club would be tied into the new urban infrastructure along the proposed Sunset Drive alignment.

2.4 Internal Drainage

The internal drainage for the Oxbow, Hickson, and Bakke ring levee would be comprised of a combination of open channels, storm sewer, a stormwater ponding area, and a storm sewer pump station. The combination of the available storage and pumping capacity of the pump station would be sized to prevent internal flooding during a river flood event when the gravity outfall is inoperable. The ponding area would be located east of the Bakke addition and northwest of the Cass County Highway 81.

The existing conditions in the city of Oxbow include a storm sewer network and overland drainage on the golf course. These systems both ultimately outfall into the Red River and would need to be altered to accommodate the proposed ring levee. The proposed storm sewer system would be routed to outfall into the proposed ponding area. The drainage in the proposed Oxbow addition would be part of a separate storm sewer system that would outfall into the proposed ponding area. The Bakke addition and the Hickson area currently use open ditches to accommodate their storm water runoff. Both areas would use the existing channels to accommodate runoff to the proposed ponding area. As a part of the storm water detention system, there would be a pump station located on the north end of the proposed ponding area, which, during times of flooding, would pump water out of the ponding area and into the Red River. The pump station design would include a sluice gate to allow the gravity system to be positively closed during periods of flooding to prevent back flow of floodwater.