

**FLOOD DIVERSION BOARD OF AUTHORITY
Special Meeting
Tuesday, October 23, 2012
8:00 AM**

Fargo City Commission Room
Fargo City Hall
200 3rd Street North

1. Call to order
2. Discussion on further study of ring levee concept
3. Next Meeting
4. Adjournment

cc: Local Media



DECISION PAPER NO.: DP-00018

Date: 10/23/2012

Recommend Board of Authority request USACE to conduct analysis for possible ring dike/levee plan for the Oxbow area

RECOMMENDATION FOR BOARD ACTION:

- 1. Motion is made that the Board of Authority request the United States Army Corps of Engineers (USACE) to work with the Oxbow, Hickson, and Bakke residents to conduct analysis of the ring dike/levee concept for the Oxbow area.

SUMMARY OF DECISION TOPIC:

- 1. After completion of the Feasibility Study, the USACE and the Authority have conducted additional analysis (<http://www.fmdiversion.com/techdocs.asp>) to improve the overall project by increasing value, decreasing risk, and minimizing impacts. The Analysis combined (1) incorporating provisions for more flow through town to allow a River Stage of 35 feet by constructing/improving in-Town levees, and (2) adding adjustable gates on the inlet channel to provide operational flexibility, and (3) examine southern alignment options.
- 2. On October 11, 2012, the Board decided to include the in-town levees and the adjustable gates. In addition, the Board narrowed the southern alignment options down to Value Engineering options VE#13 A or VE#13 C and directed the technical team to continue analysis of these two options with a recommendation to be presented at the November 8, 2012 Board meeting.
- 3. As a result of continued efforts to minimize upstream impacts and as a result of public input, the concept of a ring levee to protect the Oxbow area was introduced a few weeks ago. The USACE has agreed to consider a levee/ring dike concept for the Oxbow area. It has become apparent that additional information and detail should be developed to allow an informed decision to be made regarding inclusion of a ring levee in the Project.
- 4. A levee/ring dike solution for the Oxbow area may further reduce impacts in the upstream area.
- 5. The analysis of a ring dike/levee solution for the Oxbow area will take into account the technical data from VE#13 A and VE#13 C, however, the recommendation to support one of these alternatives will not be dependent on the Oxbow area levee/ring dike analysis.
- 6. The information developed in the analysis will be shared with the Oxbow area community for their consideration and decision making.

EVALUATION OF KEY FACTORS FOR DECISION MAKING:

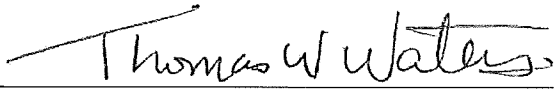
ADVANTAGES:

- a. Potentially reduced impacts to Oxbow, Pleasant Township, and the Kindred School District.
- b. Potentially less residential structure impacts.
- c. Potential cost reduction to the project.

DISADVANTAGES:

- a. No significant disadvantages.

Submitted by:



Tom Waters, P.E., P.M.P.
CH2M HILL
Program Manager
Fargo-Moorhead Area Diversion Project

Oct 22, 2012

Date

Brian C. Berg, Clay County Administrator

Concur: X Non-Concur: _____

Michael J. Redlinger, Moorhead City Manager

Concur: X Non-Concur _____

Keith Berndt, Cass County Administrator

Concur: X Non-Concur: _____

April Walker, Fargo City Engineer

Concur: X Non-Concur _____

Mark Bittner, Fargo Director of Engineering

Concur: X Non-Concur: _____

Pat Zavoral, Fargo City Administrator

Concur: X Non-Concur _____

David Overbo, Clay County Engineer

Concur: X Non-Concur: _____

Robert Zimmerman, Moorhead City Engineer

Concur: X Non-Concur _____



AUTHORITY WORK DIRECTIVE

AWD-00020 REV-0

Oxbow Area Levee Assistance

TO: Houston-Moore Group, LLC WORK TYPE: WIK

OWNER: Fargo-Moorhead Metro Diversion Authority DATE INITIATED: 10/23/2012

PROJECT: Fargo-Moorhead Diversion Engineering Design

PROJECT NO.: Choose an item.

GENERAL LEDGER DIVISIONAL CODE: 7915 = WIK - Project Design
Assigned by PMC

PROJECT CODE: _____
Contact Jamie Bullock, Grants Accountant, for setting up new accounting codes.

The following additions, deletions, or revisions to the Work have been ordered and authorized:

OBJECTIVE:

Upon request, provide Work-in-Kind (WIK) assistance to USACE to develop the concept of a levee/ring dike to protect the Oxbow area.

BACKGROUND:

As a result of continued efforts to minimize upstream impacts and as a result of public input, the concept of a ring levee to protect the Oxbow area was introduced a few weeks ago. The USACE has agreed to consider a levee/ring dike concept for the Oxbow area. It has become apparent that additional information and detail should be developed to allow an informed decision to be made regarding inclusion of a ring levee in the Project.

SCOPE:

Provide as requested assistance to USACE. Scope items may include, but may not be limited to:

1. Respond to information requests by affected residences and develop information for, and participate in, presentations or public meetings.
2. Conduct a geotechnical site visit of the levee site to observe surface features.
3. Determine existing utilities and utility relocation requirements.
4. Begin conceptual design of the levees and/or floodwalls, interior layout (street layout, storm water sewer, storage, and lift station sizing, house relocation planning, and golf course layout), and external infrastructure (road raises for egress).

DELIVERABLES:

As requested

SCHEDULE:

Provide assistance through February 28, 2013

HOW WORK IS PERFORMED:

This work will be performed on a time and material basis.



211 Ninth Street South, Box 2806, Fargo, ND 58108-2806
Phone 701-241-5600 Fax 701-241-5728

October 23, 2012

Aaron Snyder
Chief, Project Management Branch
U.S. Army Corps of Engineers
St. Paul District
180 5th St. East
St. Paul, MN 55101-1678

Subject: Fargo-Moorhead Area Diversion Project
Analysis Request for Oxbow Area Ring-Levee Concept

Dear Mr. Snyder:

The Flood Diversion Authority passed a motion at its special board meeting today, October 23, 2012, requesting the United States Army Corps of Engineers (USACE) work with the Oxbow, Hickson, and Bakke residents to conduct analysis of the ring dike/levee concept for the Oxbow area. Please accept this letter as a formal request to conduct the analysis.

The concept of the Oxbow area ring-levee was developed as a result of continued efforts to minimize upstream impacts associated with the Fargo-Moorhead (FM) Area Flood Diversion Project, and as a result of public input received after presentation of the Post-Feasibility Analysis on September 13, 2012. The USACE has agreed to consider the ring-levee concept for the Oxbow area if the Diversion Authority and communities express interest. Since introduction of the concept, it has become apparent that additional information and detail should be developed to allow an informed decision to be made regarding inclusion of a ring levee in the Project. The information developed in the analysis shall be shared with the Diversion Authority and Oxbow area communities for their consideration and decision making.

Respectfully,

Tim Mahoney
Vice Chair, Flood Diversion Board of Authority

City of Fargo
Dennis Walaker
Tim Mahoney
Brad Wimmer

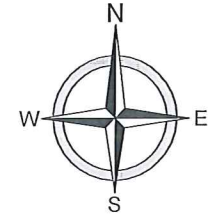
City of Moorhead
Nancy Otto

Cass County
Darrell Vanyo, *Chair*
Scott Wagner
Mike Thorstad
(City of West Fargo)

Clay County
Kevin Campbell

Cass County Joint
Water Resource District
Rodger Olson

Buffalo-Red River
Watershed District
Gerald Van Amburg
(ex-officio)



PRELIMINARY



FARGO - MOORHEAD AREA
 FLOOD RISK MANAGEMENT PROJECT
 LAND MANAGEMENT EVALUATION NO. 1
 OXBOW, HICKSON, BAKKE LEVEL

DATE:	07.26.12
REVISED:	MM.DD.YY
REVISED:	MM.DD.YY
REVISED:	MM.DD.YY
REVISED:	###
REVISED:	###
RECORD:	MM.DD.YY
PROJECT No.	16474
DRAWN BY:	RJK
CHECKED BY:	TKJ
PROJ. MANAGER:	LTB
PROJ. ENGINEER:	LTB

C-101
 SHEET 1 OF 1

Ring Levee Concept – Fact Check for Oxbow

October 16, 2012

Q1: What are the water levels and the duration of the event for the following flood scenarios?

A1: See the following table

Return Frequency	Existing Conditions		VE13 Opt A w/gates and flow through town	
	Water Level at Hwy 81 north of Oxbow	Duration of WSEL above 914'	Water Level at Hwy 81 north of Oxbow	Duration of Staging (WSEL above 914')
10-year	909.44	0 days	910.14*	0 days
50-year (approx 2009)	914.90	4 days	921.46	9 days
100-year	915.72	5.5 days	922.06	10.5 days
500-year	917.29	9.5 days	922.09	10.5 days

*note: small difference between existing and with-project conditions at 10-year is due to connecting channel between Wild Rice and Red Rivers.

Q2: What will be the levee slope ratio? Have heard both 5:1 and 7:1

A2: The technical details associated with the ring-levee will need to be developed, but it is anticipated that slopes of 5:1 on both the inside and outside would be adequate to meet all design standards.

Q3: How will the levee system be constructed? What are the options for prevention of water erosion? What is the likelihood of a failure to the levee system?

A3: The proposed ring levee would be constructed and operated following the rigorous design, operation, inspection, and maintenance criteria established by the US Army Corps of Engineers and FEMA. These are the same standards that will be used for the embankments associated with the FM Diversion Project and other ring levees in the Red River Valley.

Analyses related to water velocity and wind/wave action would be required to determine what measures would be necessary to prevent erosion. Most levees in the Red River Valley do not require any erosion prevention measures above establishment of vegetation.

Q4: What safety measures would be in place during a flood event? Safety plan, warning systems, etc.

A4: An important part of the ring levee plan would be the inclusion of an evacuation plan as well as an early-warning system. The details of both would be developed by the USACE with input from the community and local officials.

Q5: There are concerns of storm sewer gate failures flooding out the community. How do we mitigate for a storm sewer gate failure?

A5: As is necessary with most flood damage reduction projects, penetrations through levees at storm water outfalls will be necessary. Any penetrations through the ring-levee would be designed with redundancy and systems to prevent failure, in accordance with the robust USACE design standards. A typical outfall would include a gate well which would contain a positive closure system and a secondary closure. The positive closure would likely be a sluice gate while the redundant closure would likely be stop logs to employ if the gates are inoperable. Details of the internal drainage plan and storm water outfalls would be finalized during design.

Q6: How will elevated roads be constructed? There are concerns that elevated roads will impose extra hazards to the community, especially during times when driving during inclement weather.

A6: The proposed grade raises to Cass County Highways 18 and 81, along with Interstate 29 in the upstream staging area were consistent with those proposed during feasibility. The edge of driving lane elevations for the grade raises were set at the 100-year staging elevation with the project in operation. For Interstate 29, the proposed road section consists of a 38 foot wide roadway section and 6:1 sideslopes. For Highways 18 and 81, the proposed road section consists of a 32 foot wide pavement section and 4:1 sideslopes. The proposed grade raises will need to be evaluated more during final design.

Q7: During the construction process, will the community be able to build new infrastructure, homes and the golf course prior to the removal of homes and the construction of the levee system?

A7: The construction schedule and phasing will be worked out through detailed design by the USACE with input from the local community and local officials. It is likely that the ring-levee and new infrastructure could be built in phases to allow for removal of homes after new systems are in place.

Q8: Will buyouts be offered to all homeowners with the levee system? Would this be the responsibility of the DA, not the Corps?

A8: Acquisition of property in fee title would be limited to those properties directly impacted by the levee or those properties that would remain in the staging area. The remaining properties within the ring levees would be provided flood risk reduction benefits and would not require a buyout. Acquisition of property is the responsibility of the local sponsor. Buyout options for the remaining properties would be subject to negotiation with the local sponsor, the Diversion Authority.

Q9: At what flood level (return frequency) does water start touching the ring-levee?

A9: Flood water would touch the ring-levee during a flood that is somewhere between the 10% (10-year) and 2% (50-year) flood. The existing ground along the conceptual ring-levee alignment is generally between 914 feet and 915 feet. The 10% frequency water surface elevation is approximately 910.6 feet and the 2% elevation is approximately 921.5 feet. Hydraulic models specific to events between the 10% and 2% events are not available.

Q10: Who is responsible for maintenance of the ring levee?

A10: The operation and maintenance (O&M) costs associated with the ring levee would be the responsibility of the non-Federal sponsors (i.e., the entity that signs the Project Partnership Agreement (PPA) with the Corps for the overall Diversion project. In this case, those entities would likely be Fargo, Moorhead, and the Diversion Authority).

Frequently Asked Questions

Oxbow / Hickson / Bakke Ring Levee Option

October 16, 2012

- Q1. Why has the position on a ring-levee changed? The feasibility study recommended buy-outs for areas with staging depths greater than three feet.
- A1. Several factors and changes have contributed to the development of a ring dike-levee concept for the Oxbow area, including: (1) The three-foot and greater criteria for buy-outs in the feasibility study was used to guide cost estimates and plan development. (2) The City of Oxbow, through a resolution dated January 19, 2011, took the position that if homes need to be purchased and removed for mitigation, then the entire community needs to be offered the same buyout options. As the project has continued to evolve, it became apparent that if the position of Oxbow is changing, then a partial buyout of the community and construction of a ring levee could be an option. Local resolutions are taken into consideration as part of the Corps process. (3) Input from the public, local leaders, state leaders, and others after the September 13 Post-Feasibility Public Meetings included strong interest in further development of options to save the Oxbow area from buy-outs. Based on these factors, the Diversion Authority approached the Corps about a ring dike-levee concept and together the concept was advanced for consideration.
- Q2. What is the height of the proposed ring levee around the Oxbow area?
- A2. The proposed ring levee would have a top elevation of approximately 926 feet above sea level (NAVD1988 datum) and ranges in height from 9 feet to 12 feet based on existing ground conditions and the proposed alignment with the exception of the reach crossing the golf course which would be higher.
- Q3. Will the proposed ring levee require removal of any structures?
- A3. The proposed ring levee would require removal of approximately 40 structures on the east side of Oxbow and near the existing drainage along the west edge of Bakke. The structures would need to be removed to allow for proper construction of the proposed ring levee. Soil stability and proximity of the proposed ring levee to the Red River are key considerations in selecting a suitable alignment.
- Q4. Will the proposed ring levee surround Oxbow, Hickson, and Bakke?
- A4. This decision is still to be determined, and may be made, in part, based on the wishes of the communities. The original ring-levee alignment concept included surrounding all three communities. In addition, the proposed alignment would provide space for relocating the

existing structures in east Oxbow and Bakke that would need to be removed for construction of the levee. The expansion area is proposed to be south of the existing Oxbow boundary.

Q5. Will the proposed ring levee be safe?

A5. The proposed ring levee would be constructed following the rigorous design, operation, inspection, and maintenance criteria established by the US Army Corps of Engineers and FEMA. These are the same standards that will be used for the embankments associated with the FM Diversion Project and other ring levees in the Red River Valley.

Q6. What level of flood risk reduction will be provided by the proposed ring levee?

A6. The proposed ring levee would be designed and constructed with four (4) feet of overbuild (freeboard), which is in excess of the 500-year flood level.

Q7. What level of event would cause overtopping of the proposed ring levee?

A7. The top of the proposed ring levee is going to be similar to the top elevation of the southern embankment – it would take an extremely large event to cause an overtopping, in excess of a 500-year event.

Q8. Will the communities inside the ring levee be able to grow?

A8. The proposed ring levee alignment provides space for relocating the existing homes in east Oxbow and potentially Bakke that would need to be removed for construction of the levee. The proposed alignment also includes an undeveloped area between Hickson and Bakke. The final determination of growth allowed will be made during the design phase.

Q9. Is it possible to add new lots within the ring-levee to accommodate the lots needed for construction of the ring levee? Is it possible to add additional lots beyond those needed for the ring-levee?

A9. This would likely be subject to negotiations between the City of Oxbow, USACE, and local sponsors. Relocation of new lots to replace lots that were bought out is an option that can be pursued.

Q10. Will the proposed ring levee impact the Kindred school district?

A10. The proposed ring levee would allow for most of the homes in Oxbow, and potentially Hickson, and Bakke to remain within the Kindred school district, but not all.

Q11. How will access be provided to the communities inside the proposed ring levee?

A11. Highway 81 would be raised to provide access over the proposed ring levee. Other access provisions will be evaluated during the design phase.

Q12. Will access be provided during flood events? Would northbound Highway 81 close?

A12. Access during flood events would be provided up to a 100-year flood event. Specific details on routes would be considered moving forward. The proposed alignment would include raising Highways 81 and 18 to allow access to I-29 up to effectively a 500-year event.

Q13. Will an evacuation plan be developed?

A13. Yes, a Flood Warning and Emergency Evacuation Plan (FWEEP) will be developed. The evacuation route would likely take evacuees to Interstate-29 via Highways 81 and 18.

Q14. How will elevated roads be constructed? How will safety on the elevated roads be incorporated?

A14. The proposed grade raises to Cass County Highways 18 and 81, along with Interstate 29 in the upstream staging area were consistent with those proposed during feasibility. The edge of driving lane elevations for the grade raises were set at the 100-year staging elevation with the project in operation. For Interstate 29, the proposed road section consists of a 38 foot wide roadway section and 6:1 sideslopes. For Highways 18 and 81, the proposed road section consists of a 32 foot wide pavement section and 4:1 sideslopes. The proposed grade raises will need to be evaluated more during final design.

Q15. If a ring levee is built, homes in the path of the levee would have to be purchased. Will other home owners within the newly ringed-in community also be offered buyouts or are they on their own? What if we don't want to live behind/inside the proposed ring levee?

A15. If the levee option is ultimately decided to be the best option moving forward, acquisitions of property in fee title would be limited to those properties directly impacted by the levee or those properties that would remain in the staging area. The remaining properties within the ring levees would be provided flood risk reduction benefits and would not require a buyout according to USACE policy. Buyout options for the remaining properties would be subject to negotiation with the local sponsor, the Diversion Authority.

Q16. Who will maintain the proposed ring levee?

A16. The operation and maintenance (O&M) requirements (including costs for O&M) associated with the ring levee would be the responsibility of the non-Federal sponsors (i.e., the entity that signs the Project Partnership Agreement (PPA) with the Corps for the overall Diversion project. In this case, those entities would likely be Fargo, Moorhead, and the Diversion Authority). USACE and FEMA criteria will apply to operation, maintenance and inspection of the ring levee.

Q17. Will properties inside the proposed ring levee be required to have flood insurance?

A17. The levee will be designed and constructed in accordance with the highest levee standards, including those required by FEMA for levee certification. Structures protected by a "FEMA Certified" levee are not required to purchase flood insurance, although voluntary purchase of flood insurance would be available.

Q18. Will the plan include internal drainage?

A18. Yes, per Army Corps of Engineers criteria. The internal drainage plan would likely include a retention pond, gate structure(s), and pump station(s) sized to accommodate rain/precipitation events inside the ring-levee.

Q19. Would infrastructure that is necessary for a community to survive a flood – drainage, pumps, dual electrical feeds, sewer backup be included in this ring dike plan? Will a siren alert system be provided in case of an emergency?

A19. The design of the levee would meet all Corps and FEMA standards and would include all necessary infrastructure upgrades which would include a number of items, such as internal drainage and pumps. A technical team would work out those details with the local community. Emergency notification systems would be implemented as part of the levee design if determined to be necessary by the Corps and the local community.

Q20. How will the design mitigate for failure of the storm sewer gates and internal drainage features?

A20. As is necessary with most flood damage reduction projects, penetrations through levees at storm water outfalls will be necessary. Any penetrations through the ring-levee would be designed with redundancy and systems to prevent failure, in accordance with the robust USACE design standards. A typical outfall would include a gate well which would contain a positive closure system and a secondary closure. The positive closure would likely be a sluice gate while the redundant closure would likely be stop logs to employ if the gates are inoperable. Details of the internal drainage plan and storm water outfalls would be finalized during design.

Q21. How fast could a failure of the levee occur? If a failure occurs, will the communities be inundated immediately?

A21. The levees will be professionally designed and constructed, and failure except for extreme flood events which lead to overtopping is highly unlikely. For extreme events, the evacuation plan will have been implemented well prior to a risk of an event which could potentially cause overtopping. In addition, generally there would be leading indicators that a problem was occurring which would give emergency responders some time to sound emergency warnings and take additional measures to prevent the failure. During flood events the system would be heavily monitored, day and night. Similar to overtopping of the bowl at Oxbow today, a potential inundation would likely not be immediate.

Q22. If the residents of Oxbow/Hickson/Bakke agree to consider a levee, what does that mean for the alignment decision, and going forward? Does an agreement to consider a ring levee commit the area to a levee or deprive residents the right to opt for a full buyout?

A22. A commitment to consider a levee would result in development of the many details that would need to be worked out in the future. This would not eliminate the possibility of a full buyout. The full determination would be made through the Corps NEPA process.

Q23. The Oxbow Clubhouse and a number of holes on the course are lost to a levee. What is the replacement process in a situation like this? What gets rebuilt and what standard?

A23. Generally, the federal acquisition rules adhered to by the Corps of Engineers require replacement or buyout of the facilities with equivalent facilities, and would be part of the negotiation process with the relocation specialist assigned to the particular property.

Q24. After a flood event recedes, what should the community expect in terms of debris, dead fish, etc?

A24. The community could expect a similar situation as they see today when the rural areas are flooded. It is important to remember the frequency of operation and that the proposed project will only operate for a 10% (10-year) event or greater.

Q25. What is the Corps' preference with regard to a levee or buyout and why?

A25. The Corps has indicated that the current recommended path forward would be VE13-A alignment with a buyout of structures with more than 3 feet in total depth, as described in the FEIS. Removal of flood prone structures from the floodplain using non-structural alternatives such as buyouts is a very beneficial, long-term floodplain management strategy. However, the Corps is now willing to consider a ring levee option in lieu of using non-structural alternatives such as buyouts.

Q26. What are the water levels and the duration of the event for the following flood scenarios?

A26. See table below.

Return Frequency	Existing Conditions		With Proposed Project VE13-A + Inlet Gates + In-Town Levees	
	Water Level at Hwy 81 north of Oxbow	Duration of WSEL above 914'	Water Level at Hwy 81 north of Oxbow	Duration of Staging (WSEL above 914')
10-year	909.44	0 days	910.14*	0 days
50-year (approx 2009)	914.90	4 days	921.46	9 days
100-year	915.72	5.5 days	922.06	10.5 days
500-year	917.29	9.5 days	922.09	10.5 days

Q27. What will be the side slope of the proposed ring-levee ratio?

A27. The technical details associated with the ring-levee will need to be developed, but it is anticipated that slopes of 5:1 on both the inside and outside would be adequate to meet all design standards.

Q28. How will the levee system be constructed? What are the options for prevention of water erosion? What is the likelihood of a failure to the levee system?

A28. The levee would be constructed in accordance with the US Army Corps of Engineers (USACE) levee design standards. Analyses related to water velocity and wind/wave action would be required to determine what measures would be necessary to prevent erosion. Most levees in the Red River Valley do not require any erosion prevention measures above establishment of vegetation.