

Fargo-Moorhead Metropolitan Area Flood Risk Management FMM Diversion Project

Fargo-Moorhead Diversion

Water Education Foundation Executive Briefing

July 13, 2012



US Army Corps of Engineers
BUILDING STRONG[®]



Presentation Outline

- Project Location
- Background
- Future without project
- Alternatives considered
- Federally Recommended Plan
- Current Design Efforts
- Moving forward
- Schedule



Project Location



- Fargo-Moorhead Metropolitan Area
 - ▶ 600 square miles
 - ▶ Along the Red River of the North
 - ▶ 150 miles from Emerson, Manitoba
 - ▶ Largest urban area in North Dakota and western Minnesota, principal regional economic center
 - ▶ 200,000 people in the metropolitan area
- Red River of the North Basin
 - ▶ Drainage area of 6,800 square miles upstream of Fargo-Moorhead



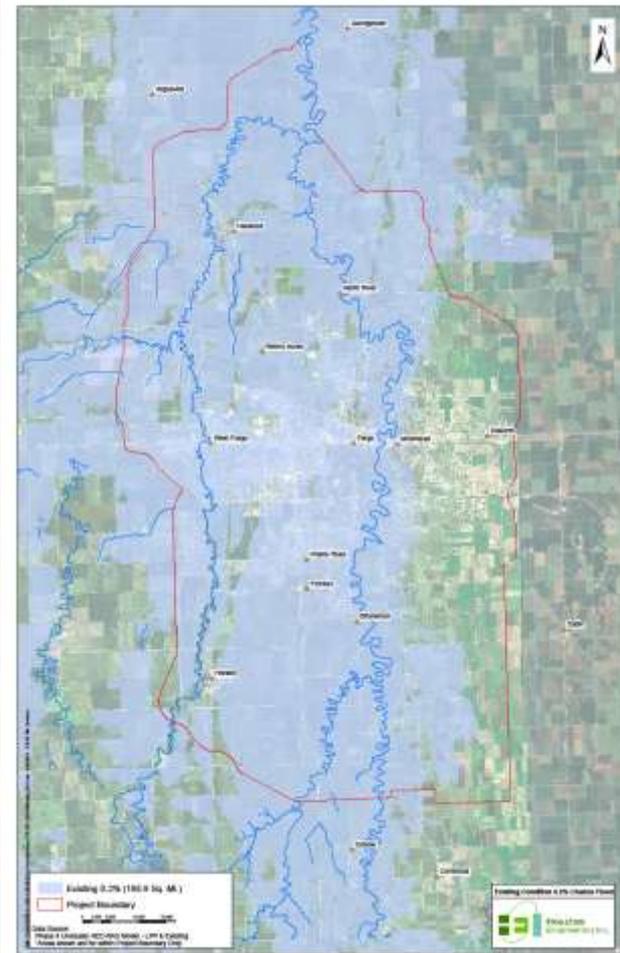
Background

- Red River Flood Stage = 18 feet on the Fargo gage
 - ▶ Exceeded in 48 of the past 109 years
 - ▶ Exceeded every year from 1993 through 2011
- Catastrophic damages have been prevented by emergency measures
 - ▶ 11 disaster declarations since 1989
- 2009 was the flood of record
 - ▶ Stage of 40.8 feet
 - ▶ 2-percent chance (50 year) event
 - ▶ Emergency measures cost approximately \$70M



Future Without Project Conditions

- Metro area will continue to be subject to flooding and rely on emergency responses
- Failure of emergency levees would be catastrophic
- Expected average annual flood damages greater than **\$194.8 million** and will continue to increase
- **\$10 billion** estimated damages from a 500-year flood



Future Without Project Conditions

- Study updated hydrology and hydraulics
- Expert panel (EOE) met to discuss climate variability – recommended non-traditional hydrologic analysis.

Flows	<u>1% Chance</u>	<u>0.2% Chance</u>
▶ EOE (wet cycle):	34,700 cfs	61,700 cfs
▶ Traditional Period of Record:	33,000 cfs	66,000 cfs
▶ Existing FEMA regulated:	29,300 cfs	



Evaluating & Screening Alternatives

- Phase 1
 - ▶ September 2008 – May 2009
 - ▶ Extension of reconnaissance effort
 - ▶ Diversion alternative and levee/floodwall alternative considered
- Phase 2
 - ▶ May 2009 – March 2010
 - ▶ Full range of alternatives considered
 - ▶ First iteration: no action and diversion channels to be carried forward
 - ▶ Second iteration: developed an array of diversion plans with capacities ranging from 10,000 to 35,000 cfs in North Dakota and Minnesota
 - ▶ Local sponsors requested the ND35K (North Dakota alignment with 35,000 cfs diversion) be pursued as the locally preferred plan (LPP)



Evaluating & Screening Alternatives

- Phase 3
 - ▶ March 2010 – September 2010
 - ▶ Refined plans and identified National Economic Development (NED) as the MN40K (Minnesota alignment with 40,000 cfs diversion) , LPP as the ND35K and Federally Comparable Plan (FCP) as the MN35K (Minnesota alignment with 35,000 cfs diversion)
 - ▶ Released DEIS in May 2010 for public review
- Phase 4
 - ▶ September 2010 – July 2011
 - ▶ Refined hydraulic models to define downstream and upstream impacts
 - ▶ Optimized LPP channel size—ND20K (North Dakota alignment with 20,000 cfs diversion)
 - ▶ Added upstream staging and storage to reduce downstream impacts
 - ▶ Released SDEIS in April 2011 for public review

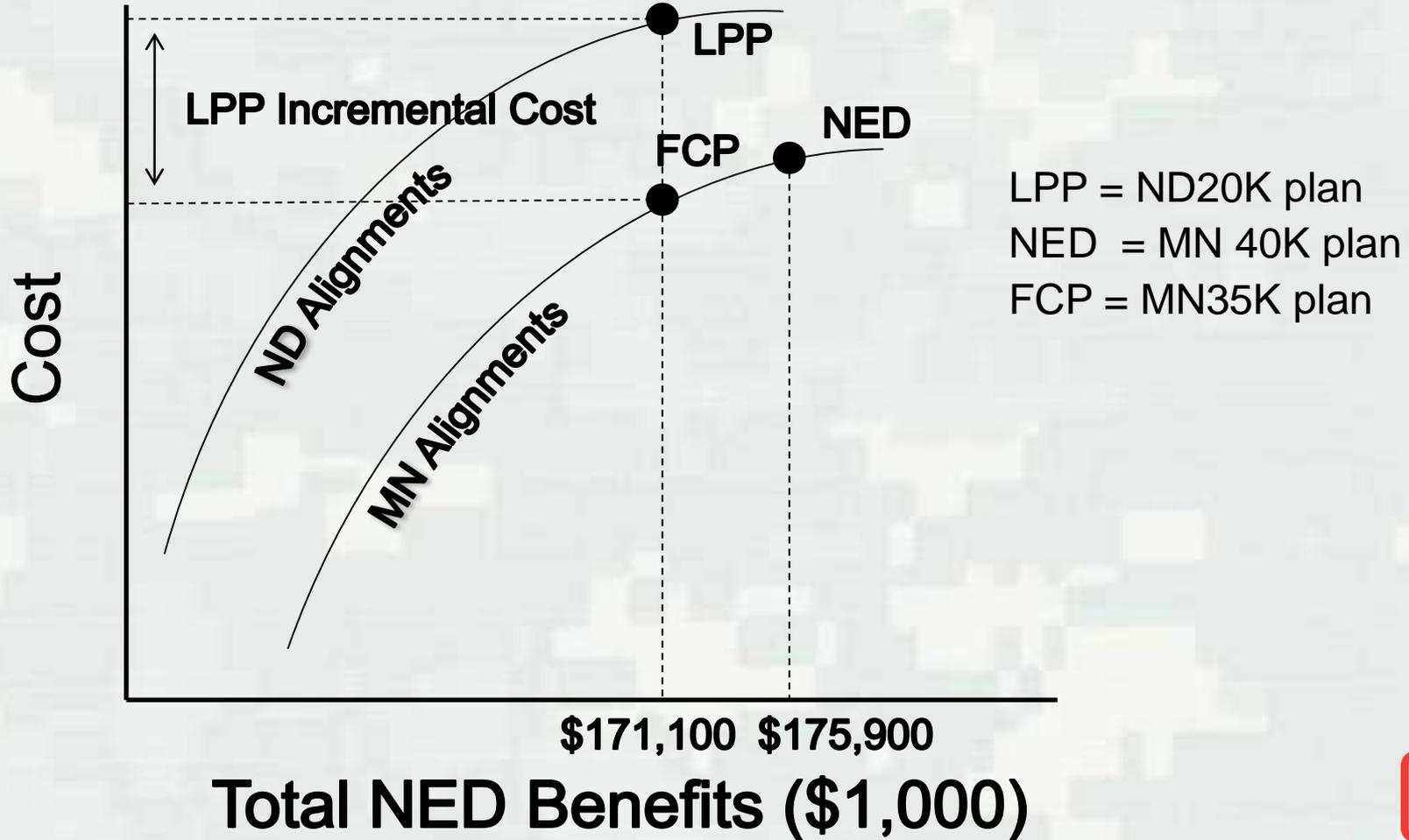


FCP Defined in Phase 3

- OASA(CW) approved the LPP using the FCP as the basis for cost-sharing
- NED maximized net benefits—MN 40K plan
- LPP is the ND20K plan
- FCP is a smaller version of the NED plan that matches the LPP total benefits
- Federal share of the LPP is capped at the Federal share of the FCP



FCP Defined in Phase 3



Phase 4 Array of Alternatives

- No Action
- Three Diversion channels:
 - ▶ Federally Comparable Plan (FCP)
 - MN35K diversion with moderate downstream impacts
 - ▶ Locally Preferred Plan (LPP)
 - ND20K diversion with upstream staging and storage and negligible downstream impacts
 - ▶ North Dakota 35,000 cfs (ND35K)
 - Diversion with downstream impacts to Canada

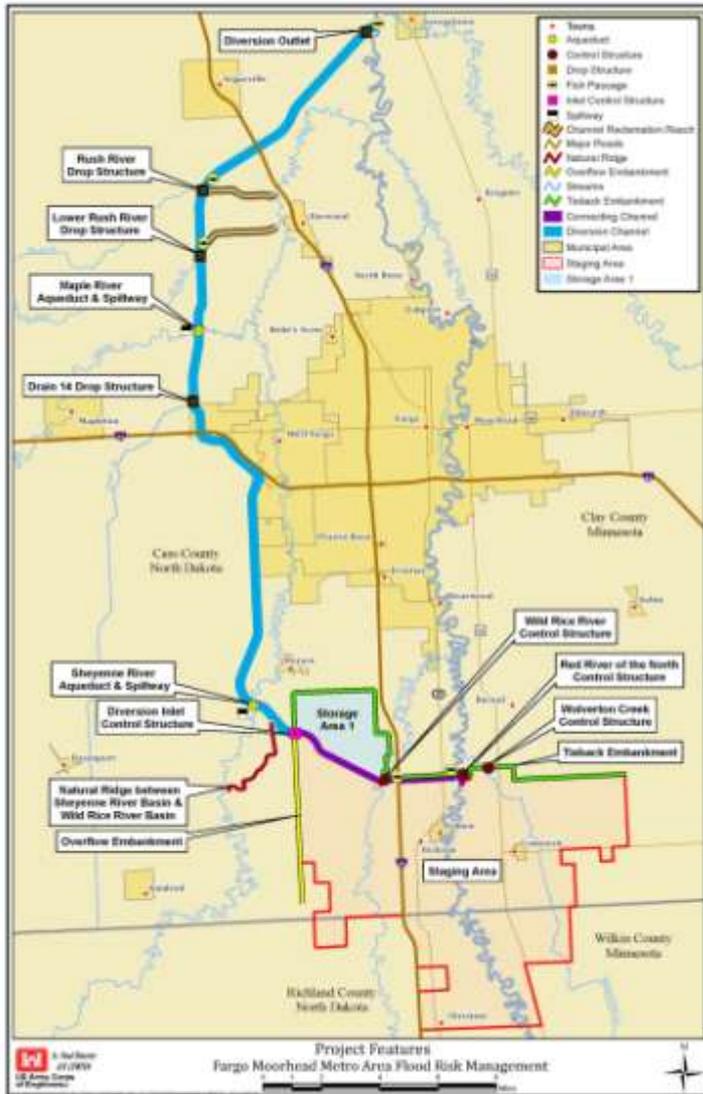


Alternatives Considered

- Non-structural
- Levees/floodwalls
- Upper basin storage
- Retention/controlled field runoff
- Diversion channels
- Combinations
 - ▶ Diversions and Levees
- Various levels considered
 - ▶ 10,000 to 45,000 cubic feet per second capacity diversions
 - ▶ Up to 1-percent chance levees
 - Levees unable to achieve 1-percent level of risk reduction



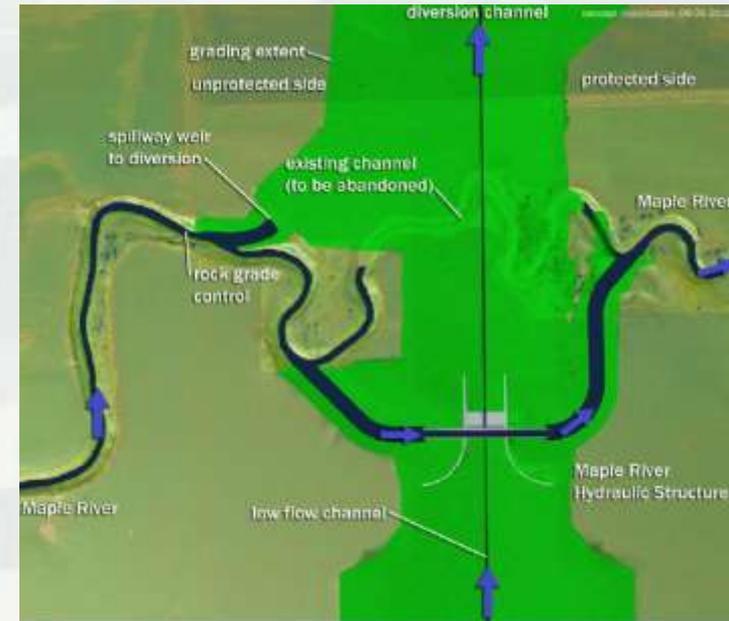
Federally Recommended Plan



- *Plan components*
 - ▶ *Diversion channel constructed in North Dakota*
 - 20,000 cubic feet per second
 - ▶ 50,000 acre feet storage area
 - ▶ 150,000 acre feet staging area
 - ▶ 35-mile diversion
 - ▶ 12 miles of tie-back embankments
 - ▶ Control structures on the Red & Wild Rice rivers
 - ▶ Aqueduct & spillway structures on the Sheyenne & Maple rivers
 - ▶ Rock ramp drop structures on the Lower Rush & Rush rivers
 - ▶ Meandering low-flow channel
 - ▶ Non-structural mitigation for impacts in the storage & staging areas



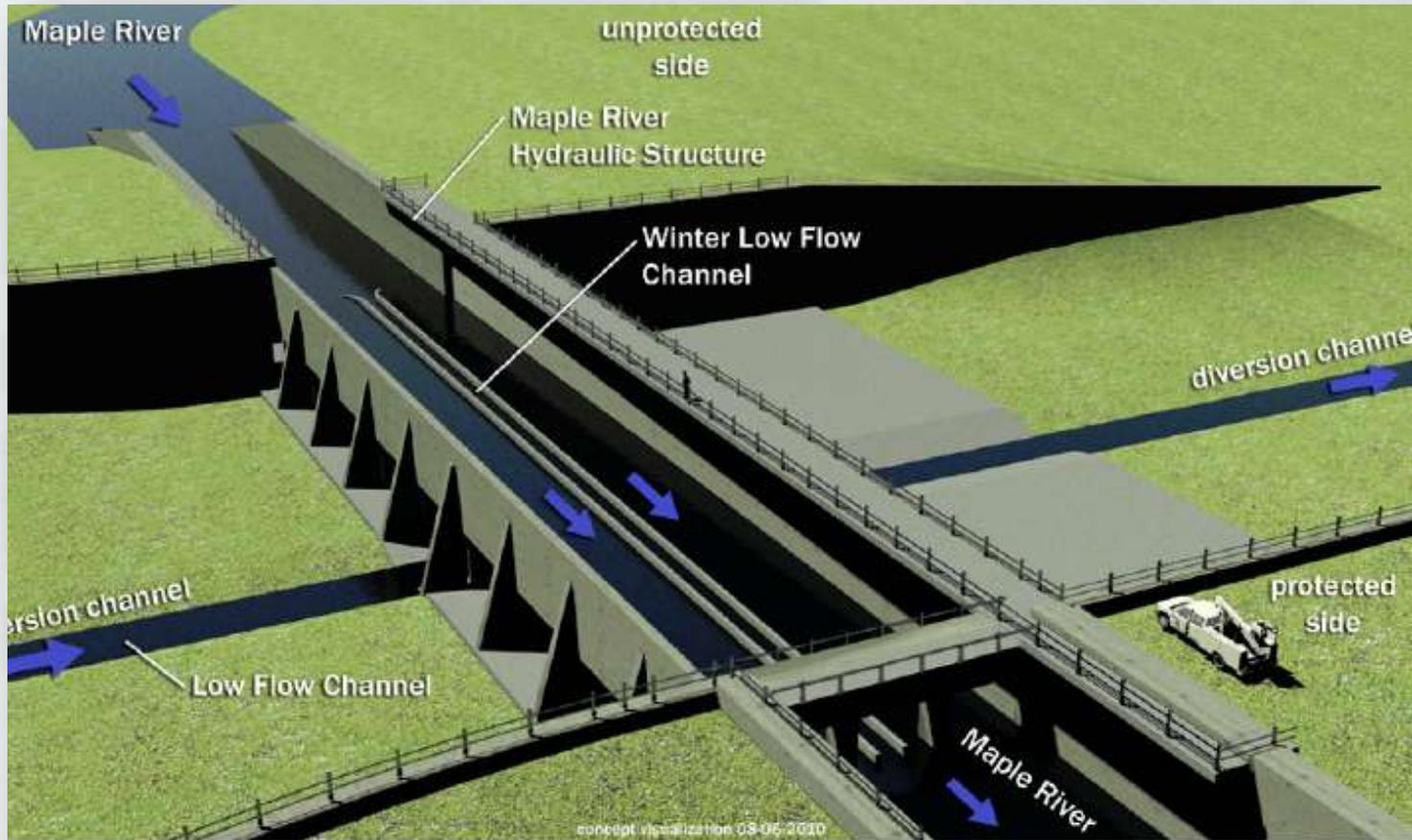
Tributary Aqueduct – Maple River



From Feasibility Report



Tributary Aqueducts – Maple River

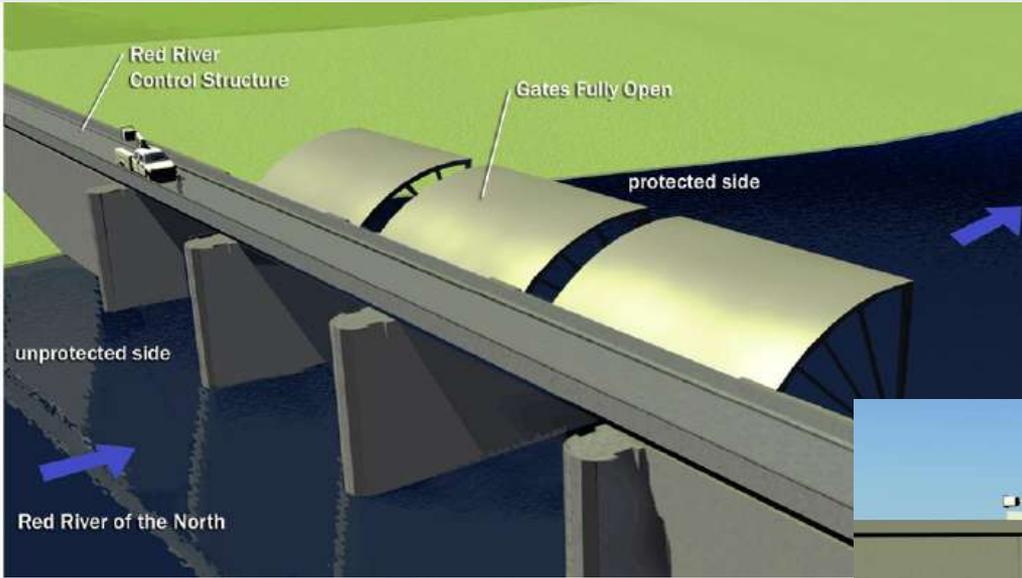


From Feasibility Report

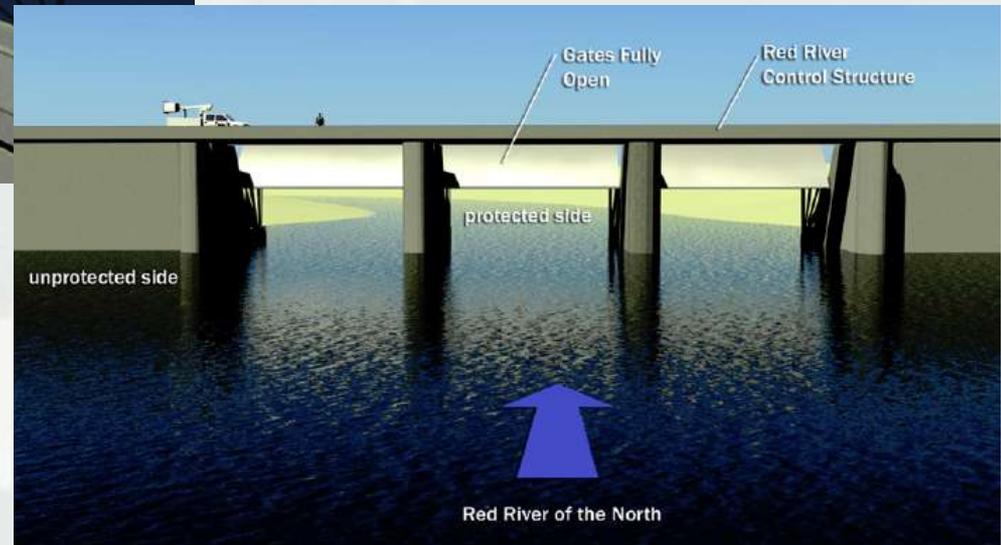


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Gated Control Structures



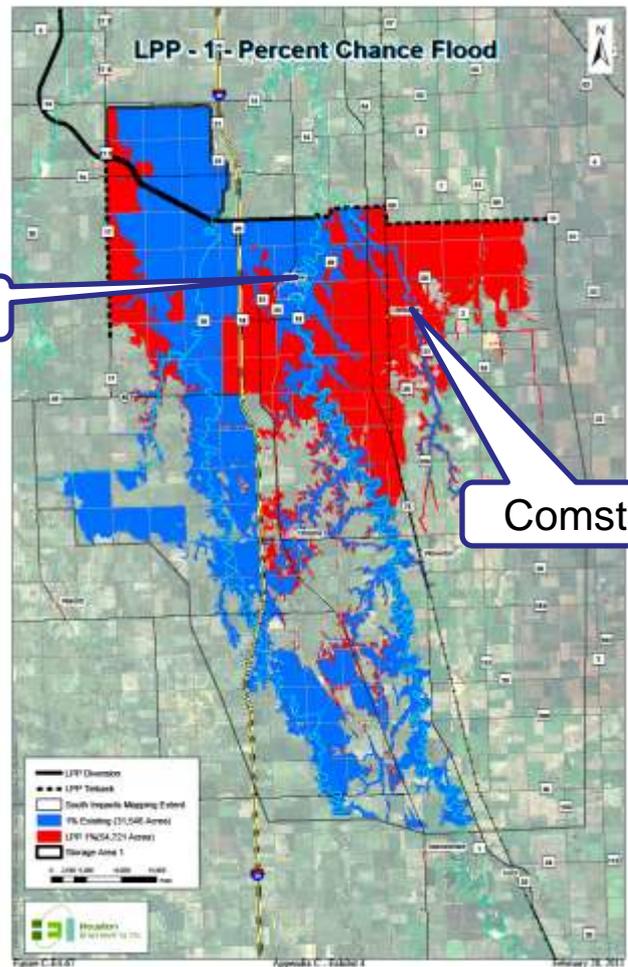
- Red River Structure
 - ▶ 3 tainter gates
 - ▶ Each tainter gate (50 feet wide and 47 feet high)



- Wild Rice River Structure
 - ▶ 2 tainter gates
 - ▶ Each tainter gate (30 feet wide and 30 feet high)

FMM Diversion Project

Upstream Storage and Staging

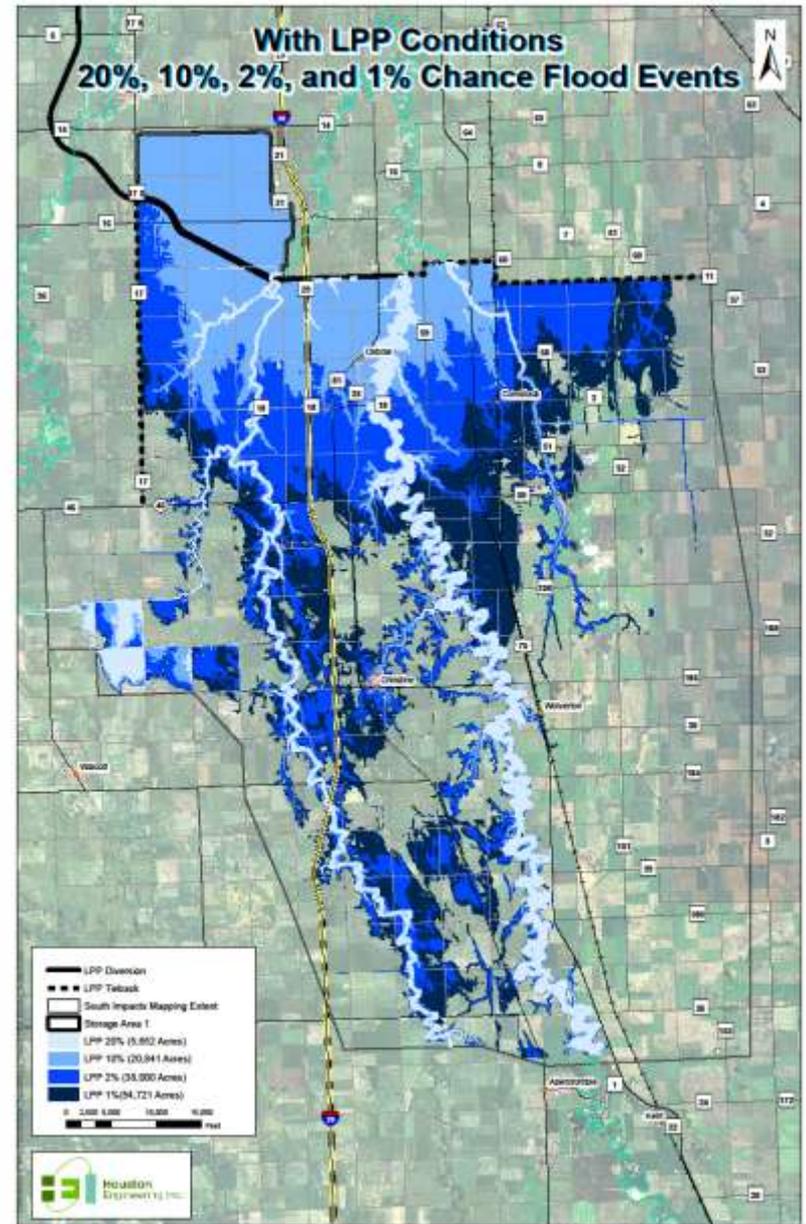


- To minimize downstream impacts
- Blue = existing 100-yr flood plain
- Red = 100-yr flood plain with project
- 33,930 Acres affected
- Number of structures
 - ▶ 387 residences
 - ▶ 424 non-residences



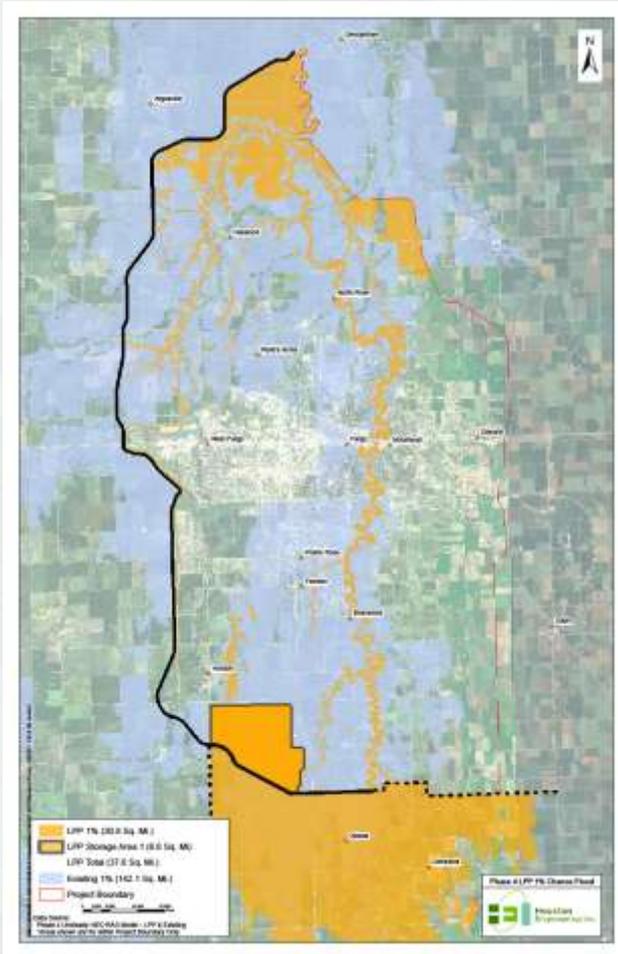
Project Operation:

EVENT	FLOWS (cfs)
20% - Chance (5-yr)	12,150
2007 Summer	13,500
10% - Chance (10-yr)	17,000
2% - Chance (50-yr)	29,300
2009 Flood of Record	29,500
1% - Chance (100-yr)	34,700
0.2% - Chance (500-yr)	61,700

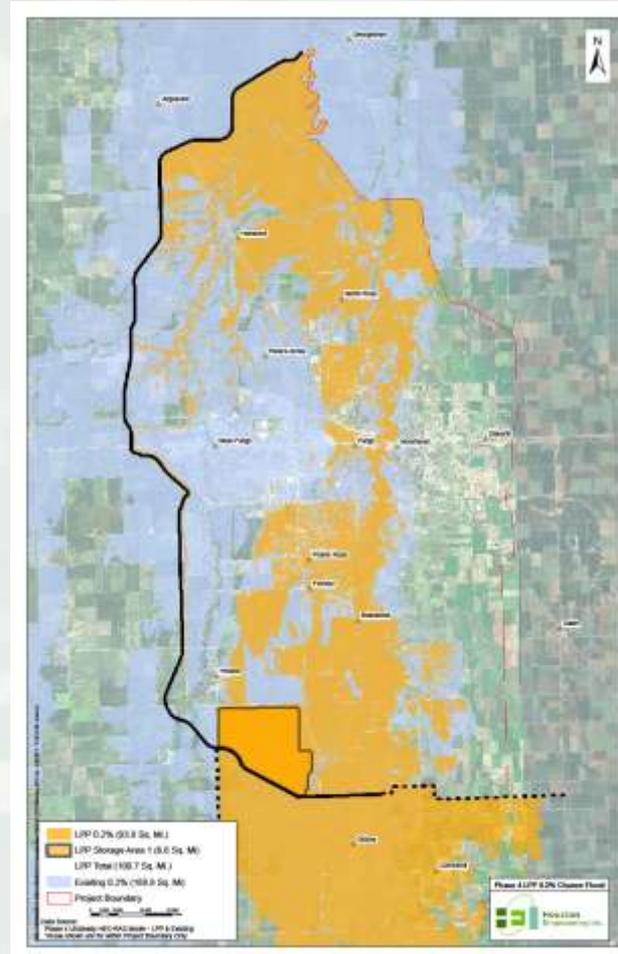


With-Project Conditions

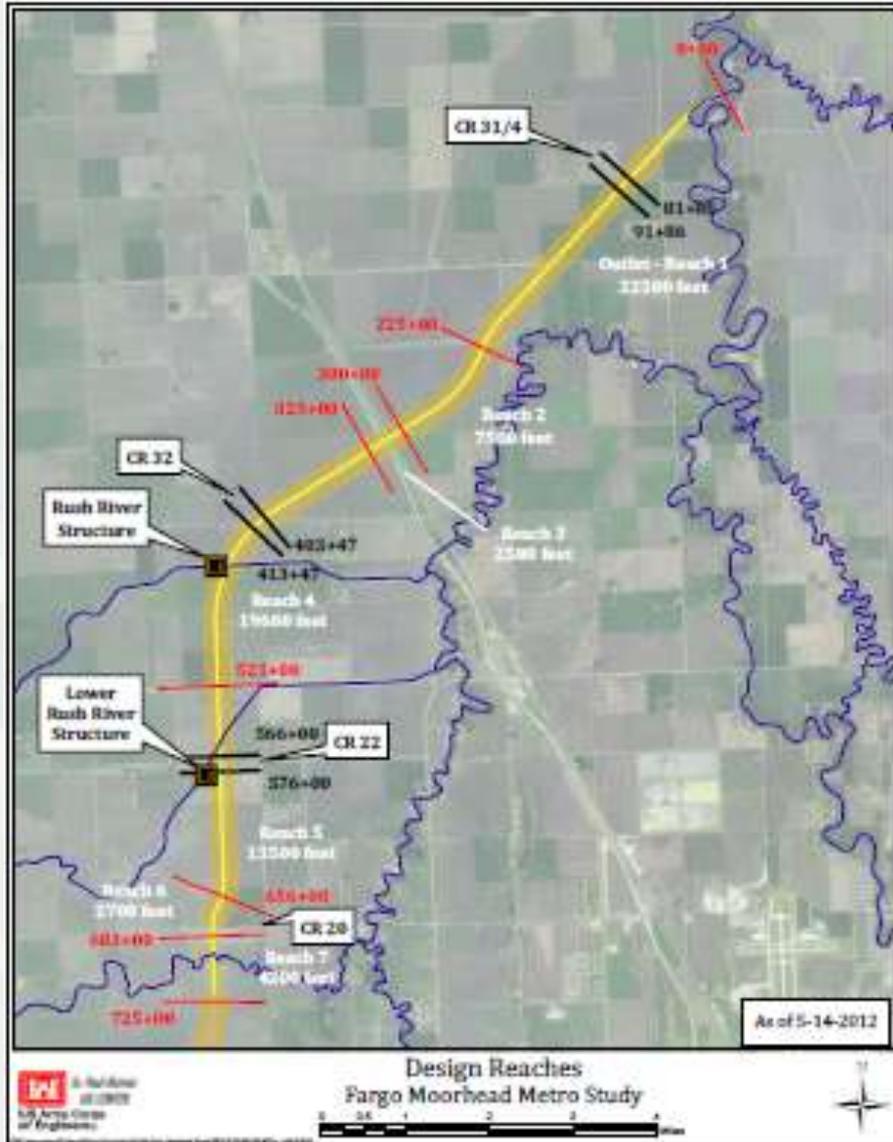
1% Chance Flood Event



0.2% Chance Flood Event



Current Design Efforts

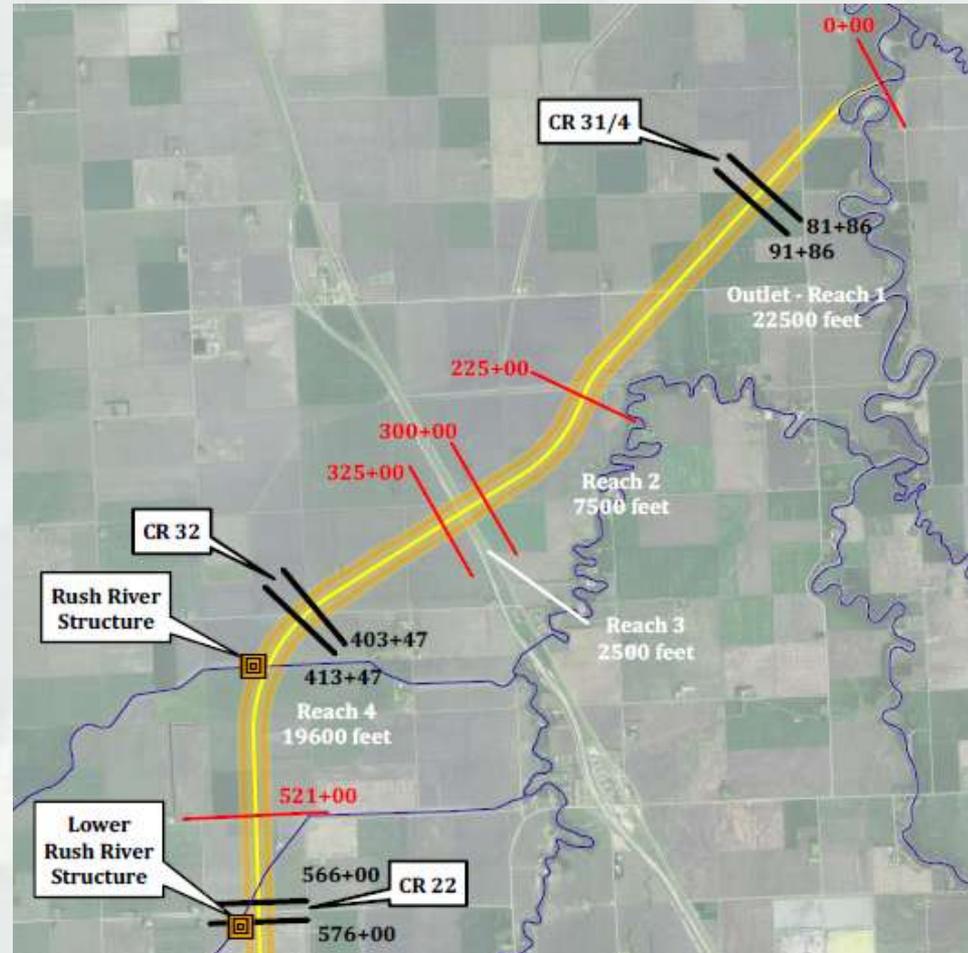


- Have started design activities for:
 - Outlet/Reach1
 - Reach 2
 - Reach 3
 - Reach 4
 - Rush River structure
 - Reach 5
 - Lower Rush River structure
 - Reach 7 (Maple River aqueduct)
 - Environmental mitigation projects
- The bridges will be designed by the sponsors
 - CR 31/4
 - CR 32
 - CR 22
 - CR 20



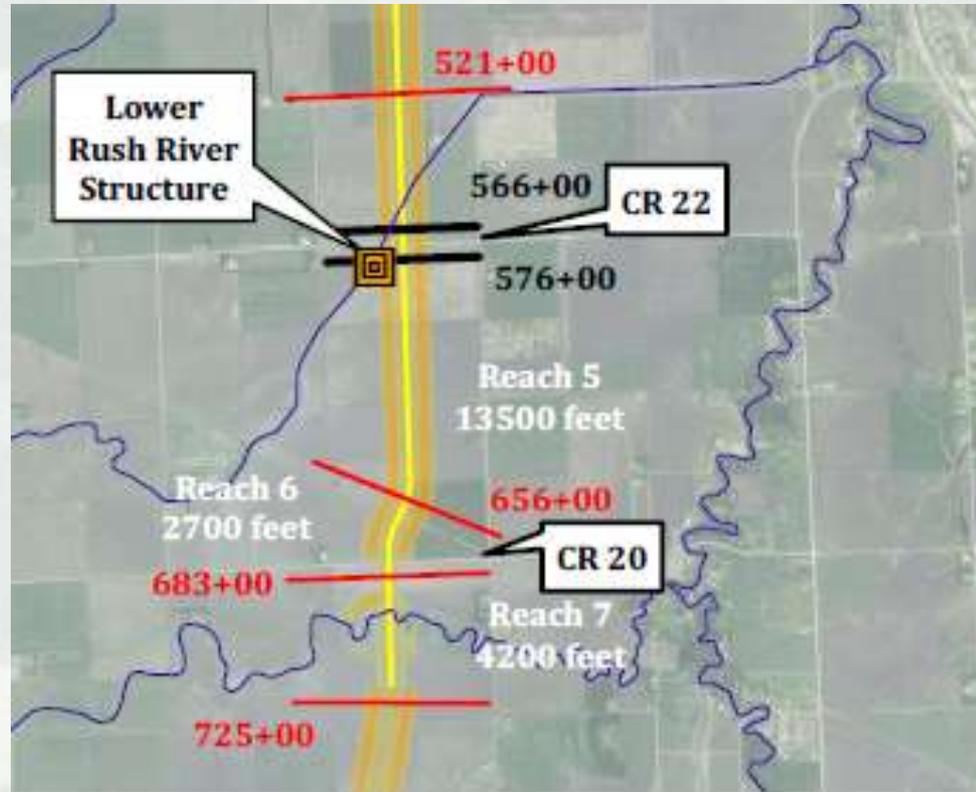
Current Design Reaches

- Outlet/Design Reach 1
- CR 31/4 Bridge (Local Sponsor)
- Design Reach 2
- Design Reach 3 – I-29/CR 81/Railroad Bridges (Local Sponsor)
- Design Reach 4 – Includes Rush River Structure
- CR 32 Bridge (Local Sponsor)



Current Design Reaches

- Design Reach 5 – Includes Lower Rush River Structure
- CR 22 Bridge (Local Sponsor)
- Design Reach 6 – CR 20/Rail Road Bridges (Local Sponsor)
- Design Reach 7 – Maple River Aqueduct



Moving Forward

Continued analysis to improve overall project by increasing value and decreasing future risks:

- Continue to work on technical information
- Value Engineering Studies
- Examine cost saving measures identified in feasibility study



Project Schedule

- Once authorized and funded by Congress
 - ▶ +3 months - Sign Project Partnership Agreement
 - ▶ +6 months – Earliest construction start
 - ▶ + 8.5 years – Project Operable*

- Earliest construction start
 - ▶ Summer 2013



** 8.5 year construction period based on \$240 Million/year funding stream*



Diversions Authority Website

The screenshot shows the website's header with the title "Fargo Moorhead Diversion" and a search bar. A navigation menu includes links for "PROJECT STATUS", "ABOUT THE PROJECT", "ABOUT THE AUTHORITY", "NEWS", "VIEWPOINTS", "CALENDAR", "LIBRARY", "LINKS", and "COMMENTS". The main content area is titled "About the Project" and contains several sections: "THE DIVERSION IN DEPTH" with three paragraphs of text, "The Need for the Project" with an image and a link, "Project History" with a link, "Project Timeline" with a link, "Mitigation" with a link, and "Frequently Asked Questions" with an image and a link. A map is visible at the bottom right of the content area.

Fargo Moorhead Diversion Search for: Search

SITE MAP | CONTACT US | HOME

PROJECT STATUS ABOUT THE PROJECT ABOUT THE AUTHORITY NEWS VIEWPOINTS CALENDAR LIBRARY LINKS COMMENTS

About the Project

This description of the diversion plan focuses on the recommended Federal plan (also known as the Locally Preferred Plan). For full details, read the [Final Feasibility Report and Environmental Impact Statement, July 2011](#).

THE DIVERSION IN DEPTH

Flooding in the Red River Valley has become increasingly severe and frequent. It threatens our visibility and quality of life for the entire region. In fact, during times of severe flooding, the potential damages alone to the Fargo-Moorhead area are estimated at more than \$194 million a year without a flood diversion that includes upstream staging and storage.

A three-year study led by the Corps of Engineers, and also involving local engineering firms, looked at many options, including levees, floodwalls, retention, etc.; and found the current diversion plan is the only concept that would significantly reduce flood risk in the Fargo-Moorhead area from flood events larger than the flood of 2000.

The alignment of the 20,000 cfs diversion channel with upstream staging and storage would start approximately four miles south of the confluence of the Red and Wild Rice Rivers and extend west and north around the cities of Horace, Fargo, West Fargo and Harwood. It ultimately would re-enter the Red River north of the confluence of the Red and Sheyenne Rivers near the city of Georgetown, MN. Along the 36 mile path it would cross the Wild Rice, Sheyenne, Maple, Lower Rush and Rush rivers and incorporate the existing Horace to West Fargo Sheyenne River diversion channel.

The basic North Dakota alignment remained the same as in the earlier screening phase, except where it was adjusted northwest of Harwood, ND to avoid Drain 13. Some significant design changes were made for the recommended Federal plan, including the addition of staging and storage, along with optimization of the channel cross section. The plan includes 19 highway bridges and 4 railroad bridges that cross the diversion channel.

The channel capacity was modified from previous phases to account for the storage and staging areas that were included. The inclusion of these areas allowed for the capacity of the diversion channel to be reduced to approximately 20,000 cfs. The diversion channel was designed to keep the 1-percent chance event flood flows below existing ground in the diversion channel as much as possible to limit impacts to drainage outside the channel.

The Need for the Project

Learn why the Fargo Moorhead Diversion is critically needed. [Click Here](#)

Project History

Learn about how this project came about. [Click Here](#)

Project Timeline

View a timeline for the project. [Click Here](#)

Mitigation

Learn about Project Mitigation. [Click Here](#)

Frequently Asked Questions

Find answers to commonly asked questions and learn about common misconceptions about the project. [Click Here](#)

<http://www.FMDiversion.com>