



**CITY OF Fargo**  **CITY OF MOORHEAD MINNESOTA**

## Why We Are Here

- ✓ Fargo-Moorhead area has significant flood risk
- ✓ Provide the public with information on the alternatives considered, initial results, and the path forward.
- ✓ We need local consensus on the path forward.



Fargo-Moorhead Flood 2009

19 October 2009 2



## Funding and Costs

- ✓ Study costs are shared 50% federal, 50% non-federal
- ✓ Congress provides federal funds to the Corps
- ✓ Non-federal funding is provided by:
  - ✓ City of Fargo, ND
  - ✓ City of Moorhead, MN
  - ✓ Buffalo-Red River Watershed District, MN
  - ✓ Cass County, ND
- ✓ Estimated study cost: \$6,400,000
- ✓ Construction costs are shared 65% fed, 35% non-fed



## Study Goals

- ✓ Develop a system to reduce regional flood risk
- ✓ Determine the Federal role in implementation
- ✓ Document findings in a Feasibility Report
- ✓ Recommend a project to Congress



## Study Area

- ✓ Fargo-Moorhead metropolitan & surrounding area
  - ✓ North: Harwood, ND & Kragens, MN
  - ✓ South: Oxbow, ND
  - ✓ East: Dilworth, MN
  - ✓ West: West Fargo, ND



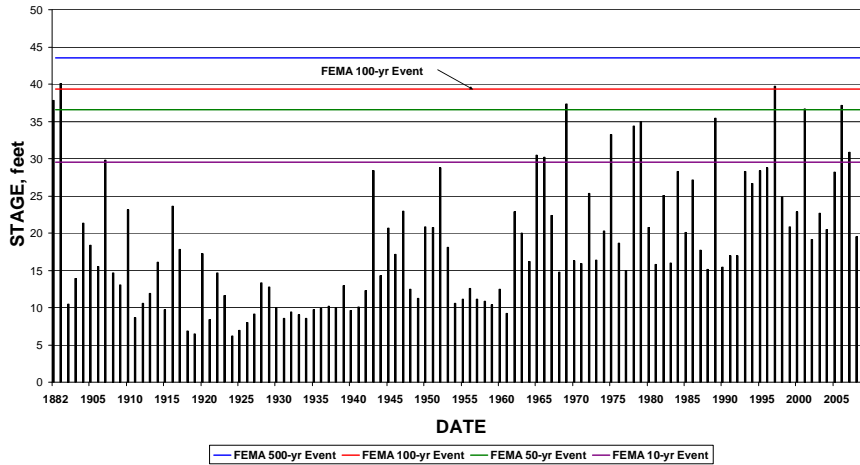
## Risk

- ✓ The 2009 flood was approximately a 125 year flood event.
- ✓ Successful flood fights lead to a false sense of security.
- ✓ It would be very difficult to fight floods larger than the 2009 flood.
- ✓ Failure of emergency levees would be catastrophic.



Building of 2<sup>nd</sup> St. Levee for 2009 Fargo-Moorhead Flood

**Annual Peak Stages**  
U.S.G.S Station - 05054000



- ✓ 2009 flood in Fargo-Moorhead was approximately a FEMA 125-year (0.8% chance) flood.

**Alternatives**

- ✓ No Action: Continue Emergency Measures
- ✓ Nonstructural measures
  - ✓ Buy and relocate flood-prone structures
  - ✓ Flood proofing
  - ✓ Elevate structures
  - ✓ Flood warning systems
  - ✓ Flood insurance
  - ✓ Wetlands
  - ✓ Grasslands



## Alternatives

- ✓ Increase conveyance
  - ✓ Diversion channels around the study area
    - ✓ In Minnesota
    - ✓ In North Dakota
  - ✓ Underground tunnels
  - ✓ Interstate 29 viaduct
  - ✓ Increase conveyance in Oakport Coulee
  - ✓ Cutoff channels (to short-cut existing meanders)
  - ✓ Flattening the slopes on river bank
  - ✓ Dredge river deeper and wider
  - ✓ Replacing bridges



## Alternatives

- ✓ Flood barriers
  - ✓ Levees
  - ✓ Floodwalls
  - ✓ Invisible floodwalls
  - ✓ Gate closures
  - ✓ Pump stations
- ✓ Flood storage
  - ✓ Large dams upstream
  - ✓ Distributed storage
  - ✓ Controlled field runoff
  - ✓ Storage ponds, also used for water conservation



Floodwall at Grand Forks



## Initial Screening Criteria

- ✓ **Effectiveness:** Ability to provide acceptable level of flood risk management
- ✓ **Environmental Effects:** Effects on natural and cultural resources
- ✓ **Social Effects:** Effects on socio-economic resources
- ✓ **Acceptability:** Controversy and potential effects on community
- ✓ **Implementability:** Technical, social, legal or institutional issues
- ✓ **Cost:** The first cost of the project and operations and maintenance.
- ✓ **Risk:** The uncertainties surrounding the project
- ✓ **Separable Mitigation:** Is separable mitigation required and what is the cost
- ✓ **Cost Effectiveness:** Comparison of benefits and costs



## Initial Screening Results

- ✓ No Action: Continue Emergency Measures
- ✓ Diversion Channels
  - ✓ Minnesota
  - ✓ North Dakota
- ✓ Levees

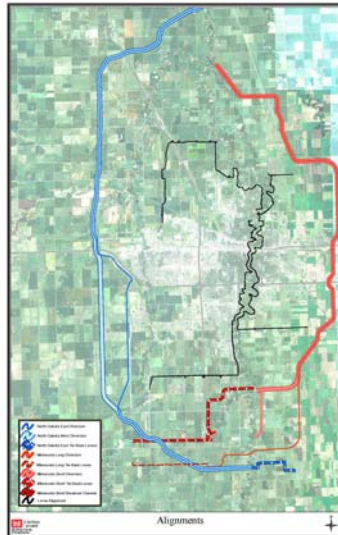




## Detailed Analysis

### ✓ Completed Detailed Analysis

- ✓ MN Diversions
  - ✓ 6 separate plans (2 alignments & 3 capacities: 25,000, 35,000, and 45,000 cfs)
  
- ✓ ND Diversions
  - ✓ 3 separate plans (ND West 35,000 & 45,000 and ND East 35,000 cfs capacity)
  
- ✓ Levee Alternative
  - ✓ 2 separate plans [2% chance (50-year) and 1% chance (100-year)]
  
- ✓ Non-Structural Alternatives
  - ✓ 3 separate plans (100, 200, and 500-year)





## Preliminary Results

Screened Alternatives Ranked by Net Benefits

Alternative	First Cost *	Avg Annual Net Benefits *	Residual Damages *	B/C Ratio
MN Short Diversion 25K	962	11.0	14.3	1.22
MN Short Diversion 35K	1,092	9.4	9.3	1.17
Levee 1% chance (100-year)	902	7.7	20.9	1.17
MN Long Diversion 25K	1,055	5.6	15.0	1.10
MN Short Diversion 45K	1,264	2.5	7.4	1.04
MN Long Diversion 35K	1,260	0.3	9.8	1.00
ND East Diversion 35K	1,337	-3.1	9.2	0.95
ND West Diversion 35K	1,363	-4.4	9.2	0.94
Levee 2% chance (50-year)	840	-5.3	37.1	0.88
ND West Diversion 45K	1,439	-6.7	7.6	0.91
MN Long Diversion 45K	1,459	-8.3	8.2	0.89

\* In millions of dollars

Note: Expected average annual damages without a project are \$73.7 million.



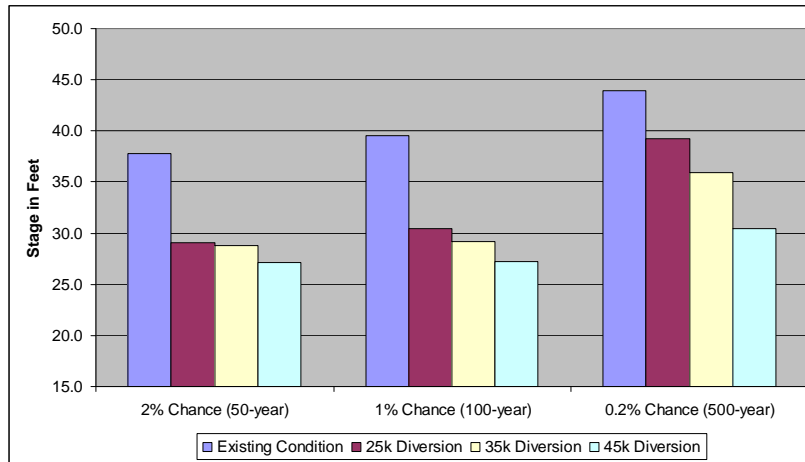
## Preliminary Results Effects of Diversions

	STAGE at the FARGO GAGE		
	2% Chance (50-year)	1% Chance (100-year)	0.2% Chance (500-year)
Existing Condition	37.8	39.5	43.9
25k Diversion	29.1	30.4	39.2
35k Diversion	28.8	29.2	35.9
45k Diversion	27.1	27.2	30.4

Stage	Impacts
27	Fargo Elm Street closed
30	Fargo 2nd Street Dike installed
31	Moorhead 1st Ave. North closed
32	First homes in Moorhead threatened
35	First homes in Fargo threatened
40.8	2009 Flood Record Stage



## Preliminary Results Effects of Diversions



## Path Forward

### ✓ **Uncertainties:**

- ✓ Natural Resource impacts (fish passage – greater for ND diversion alignments)
  - ✓ Mitigation costs not accounted
- ✓ Additional project benefits – ND diversion provides benefits from other rivers
- ✓ Impacts to upstream/downstream landowners
  - ✓ Known levee impacts, not accounted
  - ✓ Unknown diversion impacts, not accounted

### ✓ **Upcoming Tasks**

- ✓ Develop additional benefit information
- ✓ Develop costs for any negative impacts
- ✓ Develop additional capacity alternatives
- ✓ Refine alignments



## Path Forward

- ✓ **Recommend further analysis of:**
  - ✓ **Minnesota Short Diversion Alignments**
    - ✓ Develop new 20K, 30K, 40K capacities
    - ✓ Update 25K & 35K capacities with new hydrology
    - ✓ Optimize
  - ✓ **North Dakota East Alignment**
    - ✓ Determine extra benefits from tributary floods
    - ✓ Depending on extra benefits decide with sponsors on path forward
  - ✓ **Levee Alignments**
    - ✓ Develop additional levee profiles – 1.5% chance (75-year)



## F-M METRO STUDY TIMELINE

- ✓ **Jan 2010:** Identify unofficial tentatively selected plan
- ✓ **Jan 2010:** Public Meeting
- ✓ **Mar 2010:** Independent External Peer Review
- ✓ **May 2010:** Formal Public Review of Feasibility Report
- ✓ **Sep 2010:** Finalize feasibility report
- ✓ **Dec 2010:** Transmit recommendation to Congress
- ✓ **Jan 2011:** Begin Plans and Specifications
- ✓ **Apr 2012:** Begin Construction



## Local Decision Makers

- ✓ **Review Questions/Decisions Handout**
  - ✓ What level of risk is tolerable?
  - ✓ What locally preferred options need to be retained?
    - ✓ Need local decisions by December 1, 2009
  - ✓ Identify sponsors for construction and ongoing O&M
  - ✓ Define non-federal cost sharing arrangements
    - ✓ Non-federal share of the NED plan will be 35-50% of costs
    - ✓ All costs in excess of the NED plan are 100% non-federal
  - ✓ Develop local consensus



## Contact Information

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