Fargo-Moorhead Metropolitan Feasibility Study

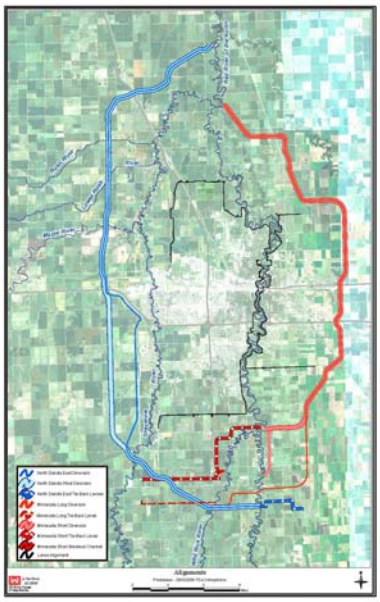
Presentation for

Community Leaders

November 24, 2009

Initial Screening Results

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



24 November 2009

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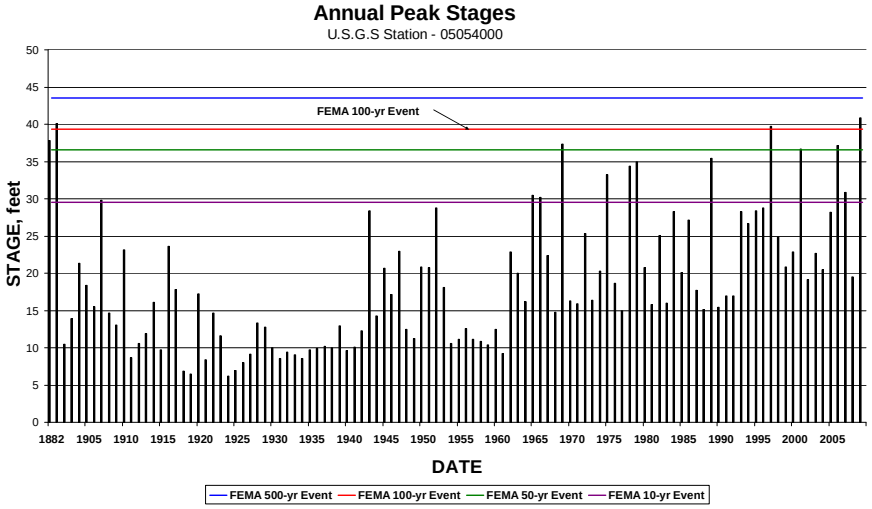

- ✓ 2009 flood in Fargo-Moorhead was approximately a FEMA 125-year (0.8% chance) flood.

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Preliminary Results

Fargo-Moorhead Metro Feasibility Study
Initial Screening Results, October 2009
Screened Alternatives Ranked by Net Benefits

Alternative	First Cost *	Avg Annual Net Benefits *	Residual Damages *	B/C Ratio	Downstream Impacts **
MN Short Diversion 25K	962	11.0	14.3	1.22	2.1
MN Short Diversion 35K	1,092	9.4	9.3	1.17	2.5
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	3.0
MN Long Diversion 35K	1,260	0.3	9.8	1.00	?
ND East Diversion 35K	1,337	-3.1	9.2	0.95	4.1
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
** Inches during 1% Chance flood (100-year)
Note: Expected average annual damages without a project are $73.7 million.

Preliminary Results

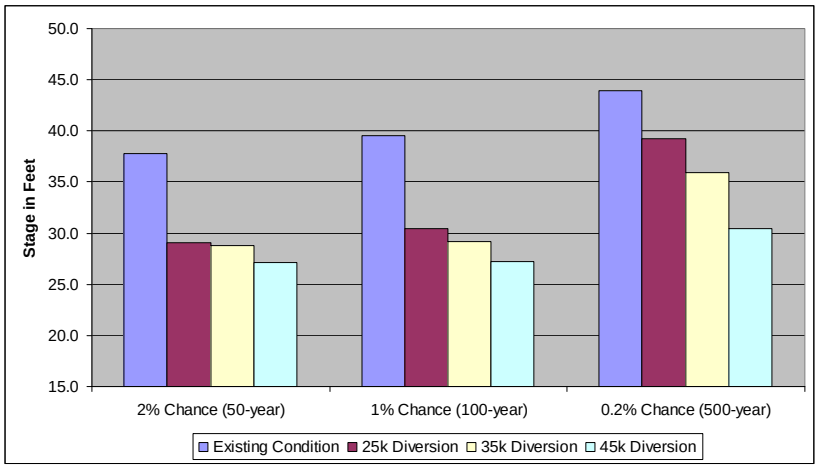
Effects of Diversions

	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



Fargo-Moorhead Metro Feasibility Study
Stage Reductions
based on Phase 1 Discharges and Steady Flow Modeling

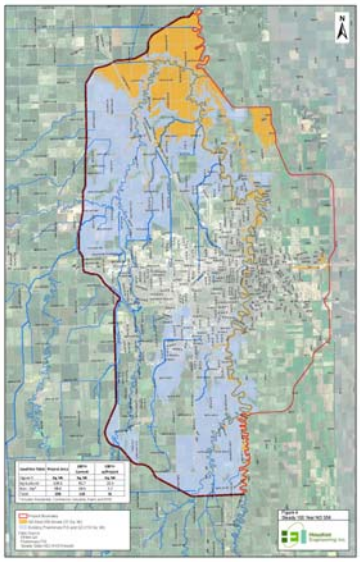
100-Year Event

Diversion Capacity	Just Upstream of Sheyenne River		Cass Co. Hwy 20		USGS Gage		52nd Ave. So.		Cass Co. Hwy 16	
	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k
25k Diversion	0.2	N/A	2.5	N/A	8.2	N/A	8.7	N/A	0.6	N/A
35k Diversion	0.2	2.4	2.7	3.9	9.0	9.4	9.7	9.7	0.7	7.9
45k Diversion	0.2	2.9	3.2	4.2	11.0	9.8	12.4	10.2	0.9	8.5

500-Year Event

Diversion Capacity	Just Upstream of Sheyenne River		Cass Co. Hwy 20		USGS Gage		52nd Ave. So.		Cass Co. Hwy 16	
	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k	MN Short	ND East 35k ND West 45k
25k Diversion	0.2	N/A	1.9	N/A	3.8	N/A	2.8	N/A	-0.2	N/A
35k Diversion	0.3	2.6	2.6	3.6	7.1	7.6	6.1	6.4	-0.2	3.9
45k Diversion	0.3	3.8	3.5	5.4	11.4	12.2	11.4	11.8	-0.2	8.6

Future 100-Year Floodplain



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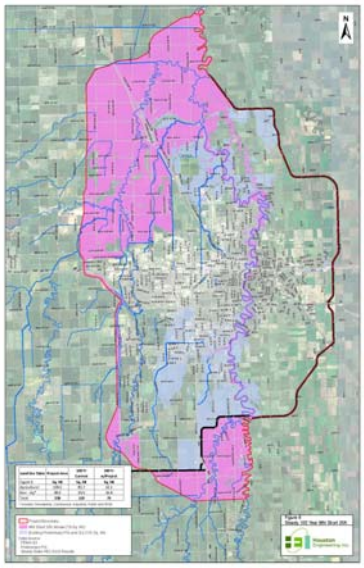

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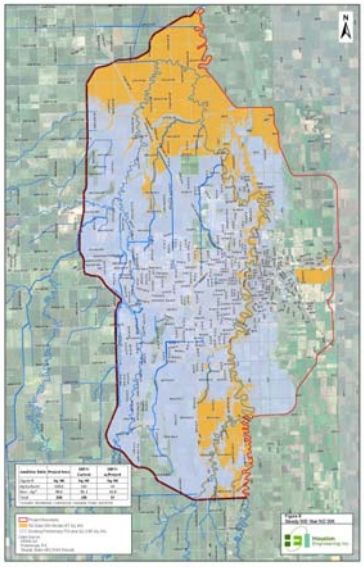
Future 500-Year Floodplain



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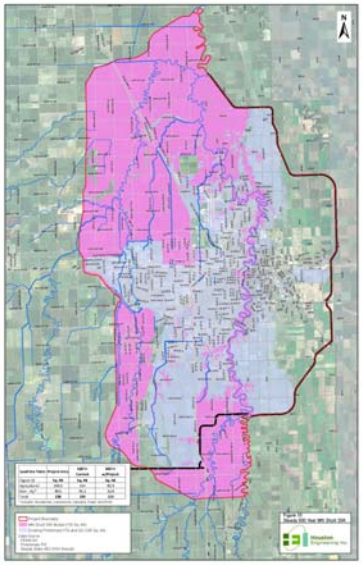

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Path Forward

- **Uncertainties:**
  - Natural Resource impacts
    - Mitigation costs not accounted
    - Sub-Committee developed to work with resource agencies on issues.
      - Mitigation costs to be estimated if necessary – Greater potential in ND.
  - Additional project benefits – ND diversion provides benefits from other rivers
    - Preliminary Estimate - $500,000 - $1 million average annual.
  - Impacts to downstream landowners
    - Diversion impacts (range from 1.5-3.0 inches MN and 2.4-4.1 inches ND)

Path Forward

- **Recommend further analysis of:**
  - **Minnesota Short Diversion Alignments**
    - **Continued development of 20, 25, 30, and 35K capacities**
    - **Development of Red River Control Structure**
    - **Optimize inlet location**
    - **Optimize tie-back levees**
    - **General alignments to remain the same – will be modified in future**
  - **North Dakota East Alignment**
    - **Determine extra benefits from tributary floods**
    - **Develop 30 and 35K capacities**
    - **Develop Red River Control Structure**
    - **Develop tributary crossing structures**
    - **General alignments to remain the same – will be modified in future**
  - **ND Mini Diversion**
    - **Determine if small ND Diversion could be viable**
      - **Divert water from Maple, Rush, and Lower Rush to the Red River.**

Local Decision Makers

- ✓ **Review Questions**
  - ✓ What level of risk is tolerable?
    - ✓ Stage of 36 feet at the gage for 500-year flood.
  - ✓ What locally preferred options need to be retained?
    - ✓ 30 & 35K ND and 35K MN
    - ✓ 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

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