

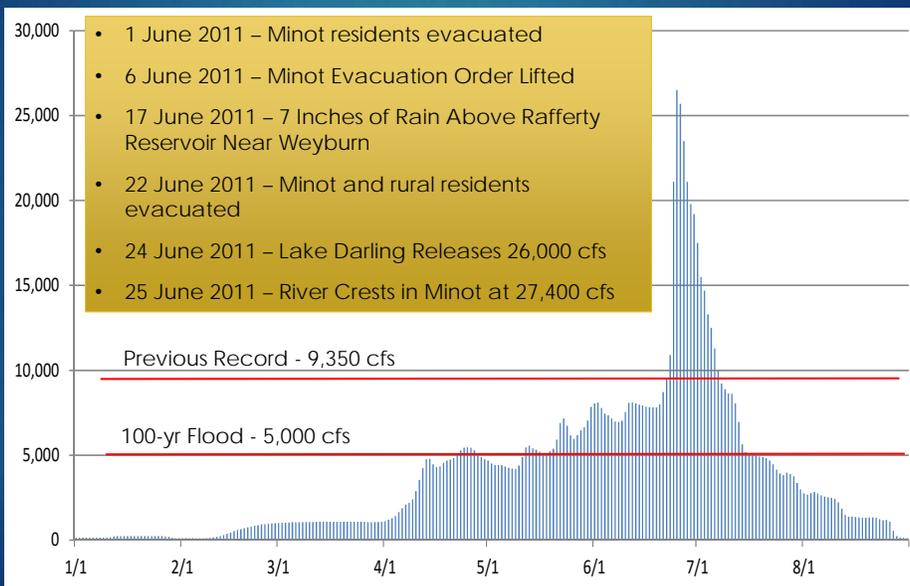
# Mouse River Enhanced Flood Protection Project

Briefing to the Water Topics Overview Committee

14 JUNE 2016



## Recap – June to August 2011





## Minot Damages Alone

- ▶ **4,100 homes were flooded**
- ▶ 3,100 homes extensively damaged or lost
- ▶ 1 in 10 homes with flood insurance
- ▶ **11,000+ individuals displaced**
- ▶ **6 Minot public schools severely damaged**
  - ▶ 2 schools complete losses
- ▶ **1,200 students displaced**
- ▶ **200+ businesses damaged**
- ▶ 51 park buildings damaged
- ▶ 5 baseball fields damaged
- ▶ 29 zoo buildings damaged
- ▶ Roosevelt pool and bathhouse lost
- ▶ Oakpark splash pad and mechanical building lost
- ▶ 12 churches damaged
- ▶ 20 + water system breaks
- ▶ 12 of 27 sanitary lift stations inundated with water
- ▶ 13 (all) water wells inundated with water
- ▶ 6 river pump stations damaged
- ▶ 30 to 40 sink holes from ground water
- ▶ 3 pedestrian bridges damaged
- ▶ 2 highway/street bridges damaged
- ▶ 277 street lights damaged
- ▶ 16 electrical feed points damaged
- ▶ 1,000 traffic signs damaged
- ▶ 51 miles of roads, sewer and water lines damaged
- ▶ 33 miles of storm sewers damaged

# Development of the Preliminary Engineering Reports (PER)

- ▶ Initial focus was on urban areas (Minot, Burlington, Sawyer, Velva, Mouse River Park)
- ▶ Residents within the valley needed information to make personal decisions



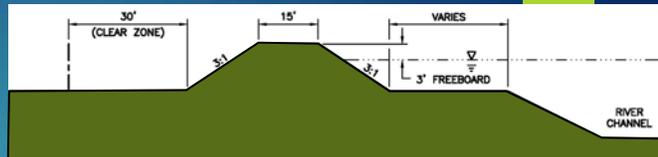
## PER Development – Urban Reaches

- ▶ Initial study timeline was condensed to 5 months



# Project Features

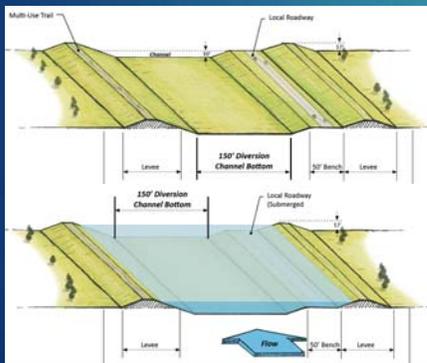
- ▶ 22 miles of levees
- ▶ 3 miles of flood walls
- ▶ 30 transportation (road and rail) closures



Source: USACE  
<http://www.fortusace.army.mil/docs/MMDL/FLD/Features.ctm?ID=3>

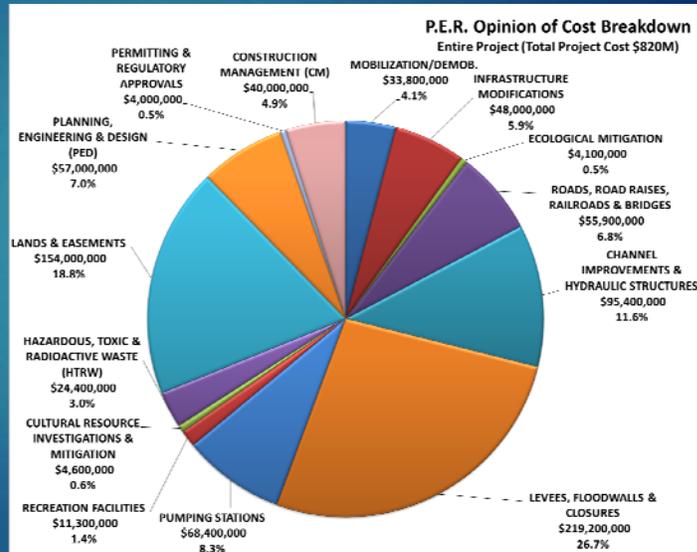
# Project Features

- ▶ 2 high flow bypasses



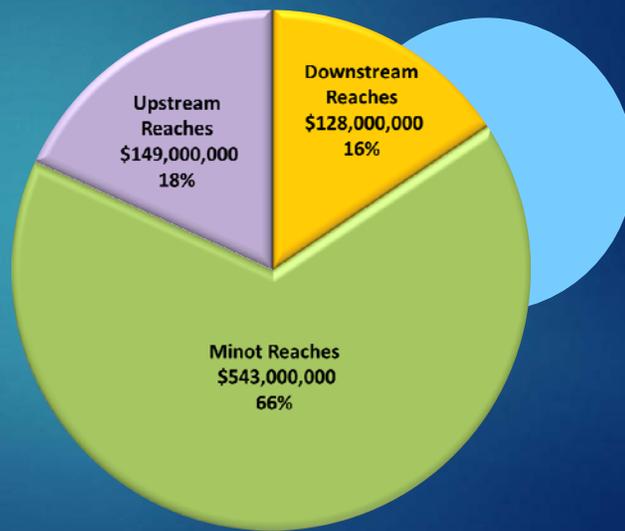
# Project Cost – Urban Areas

► \$820 million



# Project Cost – Urban Areas

- Roughly 2/3 of project cost is in Minot features
- Scaling analysis was performed for 10,000 cfs design level
- ~7% cost savings vs. ~60% reduction in protection level



# PER Development – Rural Reaches

- ▶ 16 February 2012
  - ▶ Stakeholder workshop established the path forward
- ▶ Degree of impacts based on
  - ▶ Intensity (peak flow rate and impacts to structures)
  - ▶ Duration (extended floods have lasting agricultural impact)
  - ▶ Timing (crop seeding, hay cutting, etc.)



# PER Development – Rural Reaches

## Agricultural Impacts

Flow Classification	Velva Area (cfs)	Towner Area (cfs)
Bankfull	1,500	500
Problematic	3,000	3,000
Catastrophic	10,000	10,000

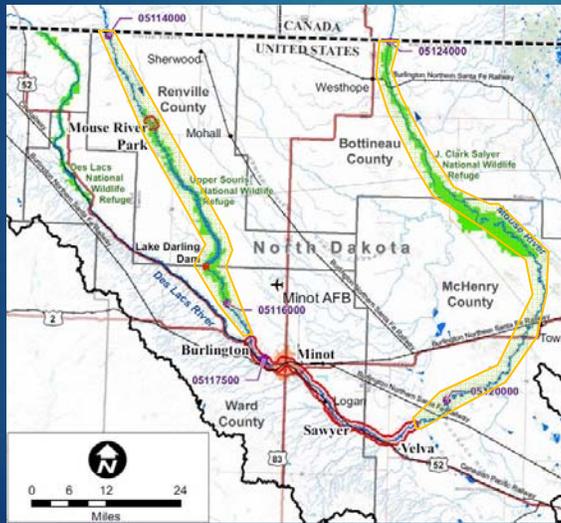
## Infrastructure Impacts

Flows (cfs)	Degree of Severity
2,000 to 5,000	Manageable and relatively minor
5,000 to 7,000	Major
7,000 and up	Catastrophic

## Target Flows at the Verendrye Gage

Date	Target Flow (or less)
May 1	1,500
May 30 through November 1	500

# PER Development – Rural Reaches



- ▶ Evaluation of 12 Alternatives to Reduce Flooding Impacts in Rural Areas
- ▶ Reservoir Modifications (Structural and Nonstructural)
- ▶ Conveyance Improvements
- ▶ Acquisitions, Relocations, Ring Dikes

# PER Development – Rural Reaches

Most Viable Alternatives:

- ▶ Advanced Discharge from Lake Darling
- ▶ Non-Structural Flood Storage Increase at Lake Darling
- ▶ Structure Acquisition, Relocation or Ring Dikes (StARR Program)

Alternative	Effectiveness Assessment		Implementation Evaluation		Anticipated Cost Range
	Agricultural Impact Reduction	Infrastructure Impact Reduction	Overall Implementability	Greatest Challenges	
ALTERNATIVE 1 Advanced Discharge from Lake Darling	Effective at reducing duration of inundation from Velva to Bantley during 1979 and 2001 Floods, also somewhat effective for the 1975 and 1979 Floods.	Minor reduction of impacts for other select Floods.	✓	Concerns about increased water discharges, requires modification of Annex A, possible water rights and refuge compatibility issues.	\$ Minimal capital cost
ALTERNATIVE 2 Increased Target Discharge of Minot	Minor reduction of impacts for the 2011 Flood, effective at reducing duration of inundation from Velva to Bantley for the 1975, 1976, and 1979 Floods.	Minor reduction of impacts for the 2011 Flood, minor structure impacts upstream for the 1975, 1976, and 1979 Floods.	✗	Increased inundation for some Floods, more losses in 100-year floodplain, possible water rights and refuge compatibility issues.	\$ Minimal capital cost
ALTERNATIVE 3 Non-Structural Flood Storage Increase in Lake Darling	Effective at reducing duration of inundation from Velva to Bantley for the 1975, 1976, and 1979 Floods.	Minor reduction of impacts for other select Floods.	⚠	Concerns about increased water discharges, requires modification of Annex A, possible water rights and refuge compatibility issues (same as from Alternative 1).	\$ Minimal capital cost
ALTERNATIVE 4 Structural Flood Storage Increase in Lake Darling	Minor reduction of impacts for the 2011 Flood.	Minor reduction of impacts for the 2011 Flood.	✗	Subsidence, cost, coordination with Canals, recreational concerns.	\$\$\$ [\$200-700 million]
ALTERNATIVE 5 Ring Dikes	No significant impact reduction (ring dikes only protect structures).	Effective at reducing impacts to buildings for Floods up to the 2011 magnitude Flood, but no reduction of impacts to roadways, railroads, or bridges.	✓	Individual landowners must provide cost share and conduct maintenance.	\$ [\$10-50 million]
ALTERNATIVE 6 Boundary Diversion	Effective at reducing impacts for the 2011 Flood in all reaches.	Effective at reducing impacts for the 2011 Flood in all reaches.	✗	Major negative impacts likely for many of the tributaries, including impacts to Canals, silviculture, consumables.	\$\$\$\$ [\$2.8 billion]
ALTERNATIVE 7 Channelization Improvements Downstream of Velva	Minor reduction of impacts.	For the Velva to Bantley reach, effective at reducing impacts to buildings for the 2009 Flood, minor reductions in impacts to roadways and railroads for the 2009, 2010, and 2011 Floods.	✗	Likely difficulty in obtaining USACE permit for channel excavation.	\$\$ [\$100-400 million]
ALTERNATIVE 8 Bridge Modifications	Minor reductions of impacts.	Effective at reducing impacts to bridges, but minor or no reduction of impacts to buildings, roadways, or railroads.	✓	Some environmental and erosion/sedimentation impacts.	\$\$ [\$30-100 million]
ALTERNATIVE 9 Modality JCDNWR Dam Operations	Minor reduction of impacts for the 2010 Flood in the Bantley to Wheelock reach.	Minor reduction of impacts to roadways and railroads for the 2009, 2010, and 2011 Floods in the Bantley to Wheelock reach.	✗	Likely difficulty in obtaining USACE and USACE permits, compatibility issues with refuge missions.	\$ Minimal capital cost
ALTERNATIVE 10 Modality JCDNWR Hydraulic Structures	Minor reduction of impacts for the 2009, 2010, and 2011 Floods in the Bantley to Wheelock reach.	Minor reduction of impacts for the 2009, 2010, and 2011 Floods in the Bantley to Wheelock reach.	✗	Likely difficulty in obtaining USACE and USACE permits, compatibility issues with refuge missions.	\$\$ [\$30-100 million]
ALTERNATIVE 11 Remove Trapped Water after the Flood Recedes	Impact reduction is likely if (1) topography allows the trapped water to be conveyed back to the channel by gravity and (2) elevation of the river has receded below the dam crest by approximately May 31.	Impacts expected, depends on final locations implemented.	✓	Concerns about erosion downstream of culverts, ongoing maintenance to maintain effectiveness.	\$ [\$3-10 million]
ALTERNATIVE 12 Flood Storage on Tributaries to the Mouse River	50% and 70% reduction scenarios are effective at reducing inundation during the 2009 and 2010 Floods.	50% and 70% reduction scenarios are effective at reducing inundation during the 2009 and 2010 Floods.	⚠	Site identification, possible difficulty in obtaining permits.	\$\$ [\$10-300 million]

## System-Wide Improvement Framework (SWIF)

- ▶ 2011 caused significant levee damages that weren't immediately repaired
- ▶ Regulations and guidance have changed since construction of the original federal project
- ▶ SWIF is being prepared to:
  - ▶ Prioritize remedial actions
  - ▶ Maintain eligibility for federal assistance under P.L. 84-99
  - ▶ Illustrate the interrelationship of the existing project, the existing deficiencies, and the Mouse River Enhanced Flood Protection Project



## Environmental Impact Statement

- ▶ EIS being prepared for the project from Burlington through Minot
  - ▶ Estimated completion by September 2016



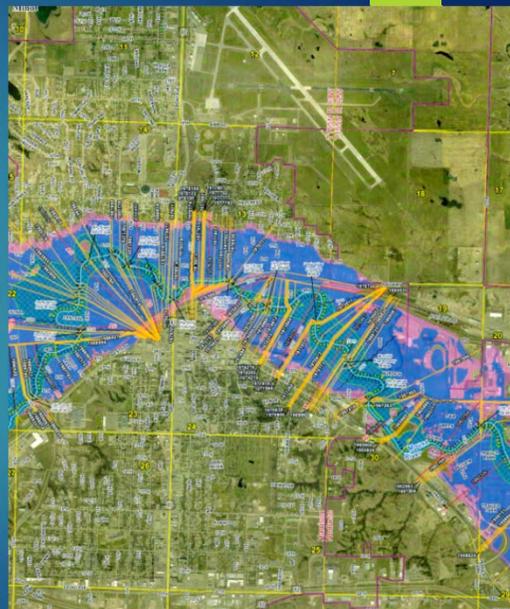
# Securing USACE Involvement

- ▶ Following four years of effort, the SRJB and USACE entered into an agreement to study the Mouse (Souris) River to determine feasibility for federal interest in future construction



# Urgency

- ▶ Change in hydrology / climate
- ▶ Vulnerable population in the valley
  - ▶ Affordable housing supply
  - ▶ Elderly
- ▶ Revised FEMA Flood Insurance Rate Maps
  - ▶ 100-year flow rate doubles from 5,000 cfs to 10,000 cfs
  - ▶ Majority of valley will be within the regulatory floodplain
  - ▶ Anticipated effective April 2018



# Initial Focus

- ▶ West Minot Future Regulatory Floodplain



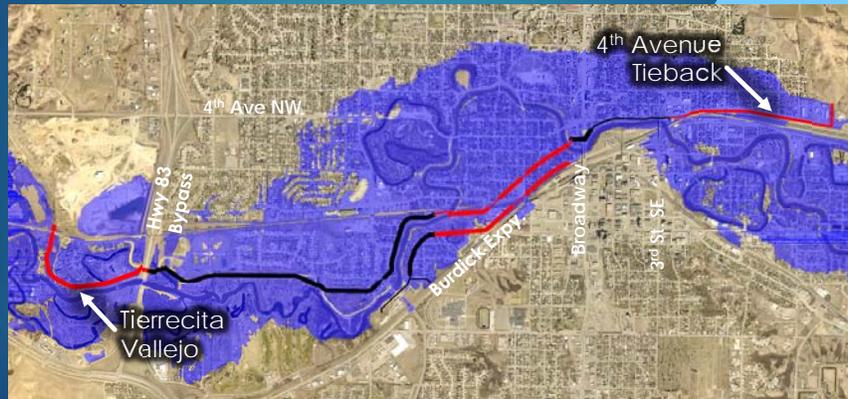
# Initial Focus

- ▶ Water Treatment Plant Phase is Under Construction
- ▶ Remaining Three Phases are in Final Design (2017 Construction)



## Initial Focus

- ▶ Future Phases Tie Portions of the Project to High Ground



## Initial Focus

- ▶ Reduce Flood Risk to Approximately 60% of Homes in Minot



Thank you.

