

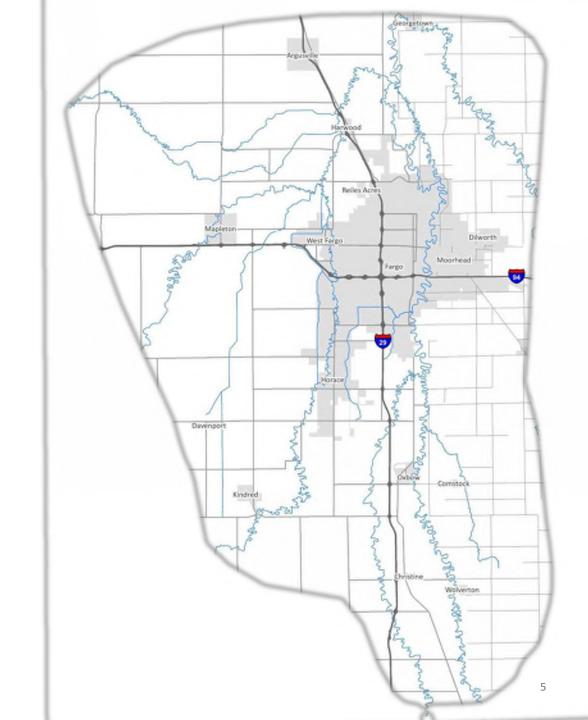


FM Area Diversion Project Operation

July 21/22, 2021

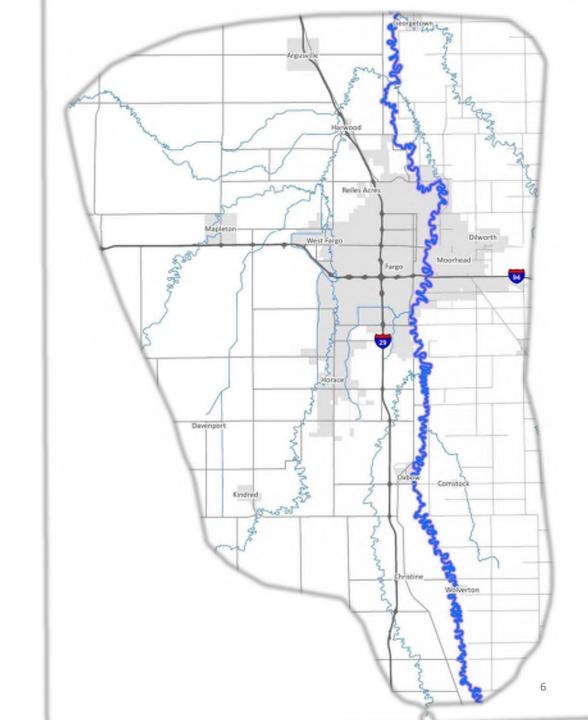
FM Area Diversion Open House & Informational Session
Greg Thompson, PE CFM, Houston-Moore Group

- Fargo/Moorhead Metropolitan Area
- Rivers



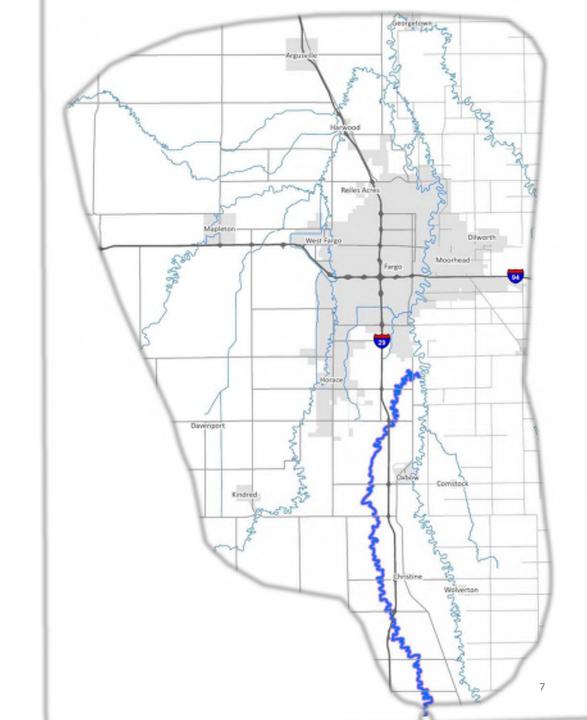
- Fargo/Moorhead Metropolitan Area
- Rivers

Red River of the North



- Fargo/Moorhead Metropolitan Area
- Rivers

Red River of the North Wild Rice River



- Fargo/Moorhead Metropolitan Area
- Rivers
 - Red River of the North
 - Wild Rice River
 - Sheyenne River



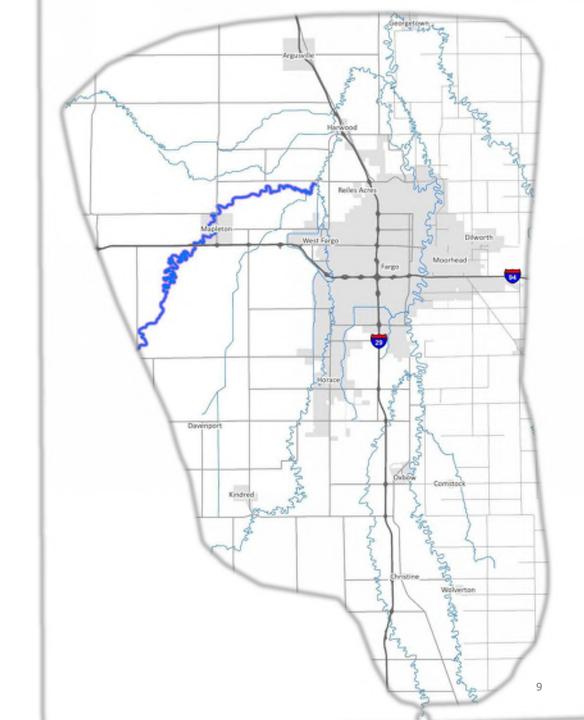
- Fargo/Moorhead Metropolitan Area
- Rivers

Red River of the North

Wild Rice River

Sheyenne River

Maple River



- Fargo/Moorhead Metropolitan Area
- Rivers

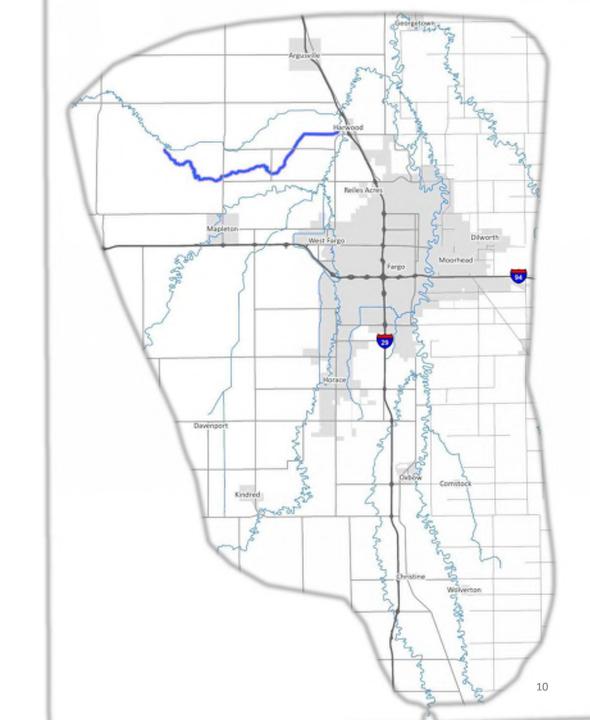
Red River of the North

Wild Rice River

Sheyenne River

Maple River

Lower Rush River



- Fargo/Moorhead Metropolitan Area
- Rivers

Red River of the North

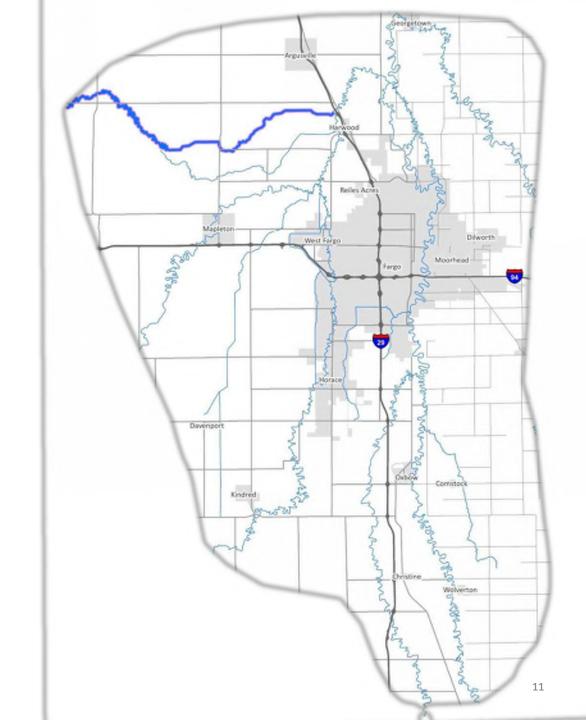
Wild Rice River

Sheyenne River

Maple River

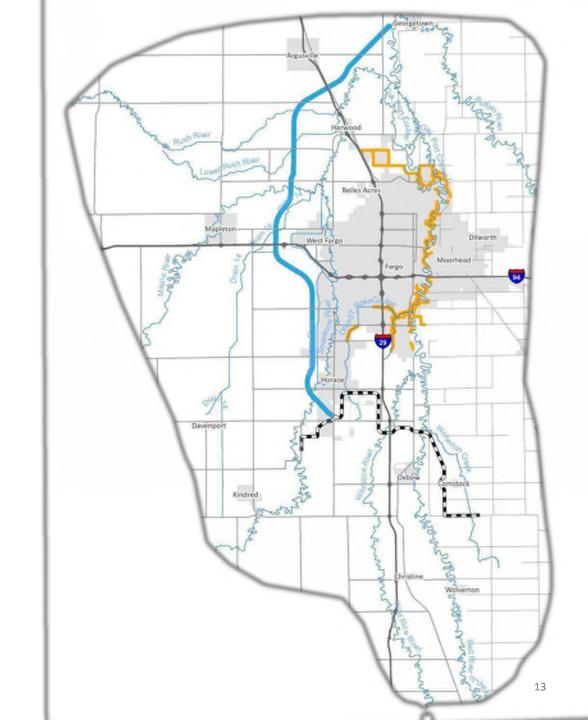
Lower Rush River

Rush River





- Diversion Channel and Associated Infrastructure
- Southern Embankment and Associated Infrastructure
- In-Town Levees

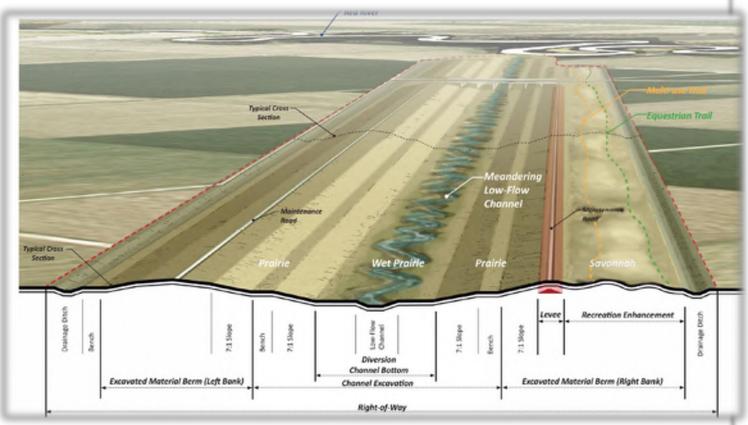


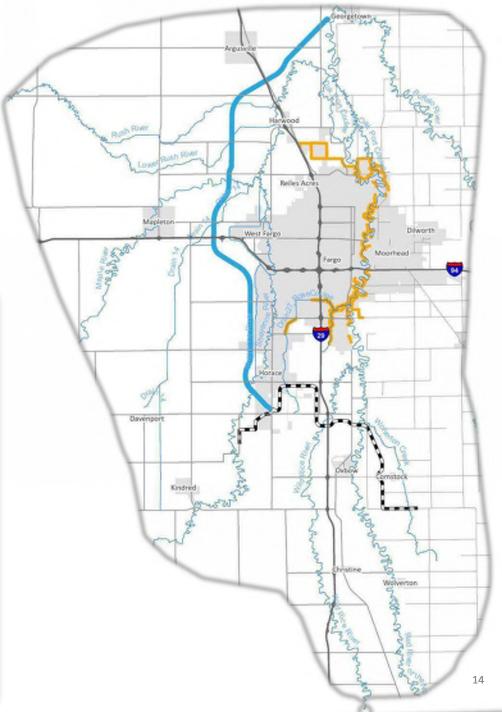
Diversion Channel and Associated Infrastructure

Length = 30 miles

Depth ~ 20 feet

Bottom width varies from 200-300 feet





Diversion Channel and Associated Infrastructure
 Two Aqueduct Structures





• Diversion Channel and Associated Infrastructure Rush and Lower Rush River Inlets

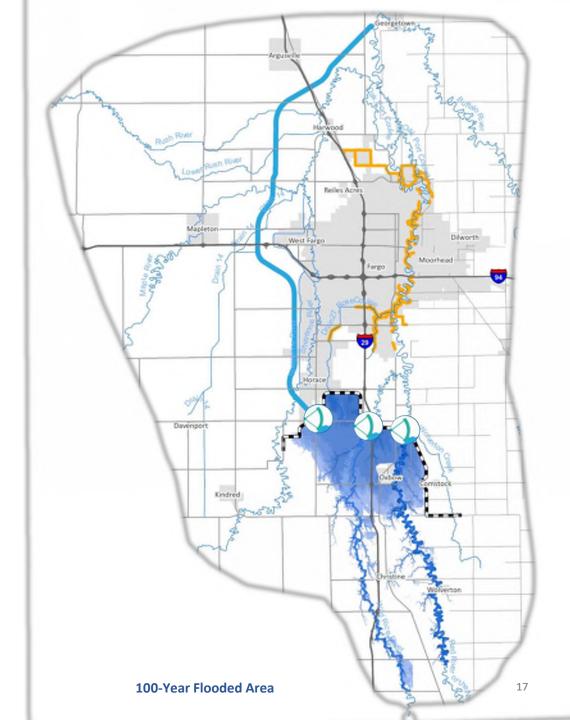
Legal Drain Inlets

Local Ditch and Drain Inlets



- Southern Embankment and Associated Infrastructure Embankment ~ 20-miles Long
 Three Gated Control Structures
 - Diversion Inlet & Control Structure
 - Wild Rice River Control Structure
 - Red River Control Structure





Southern Embankment and Associated Infrastructure

Embankment ~ 20-miles Long

Three Gated Control Structures

- Diversion Inlet & Control Structure
- Wild Rice River Control Structure
- Red River Control Structure

Upstream Mitigation Area (UMA)

Four Mitigation Zones

Zone 1 – Cass/Clay County – 100/500-year 1' impact

Zone 2 – Richland/Wilkin County – 100/500-year 1' impact

Zone 3 – North Dakota – 100-year 0.5' impact

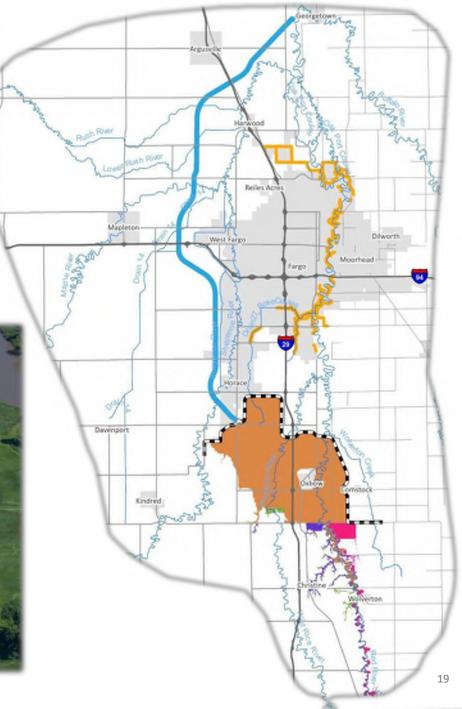
Zone 4 – Minnesota 0.1' impact on all events up to and including PMF



In-Town Levees
 Certifiable to River Stage 37 feet







Project Terminology

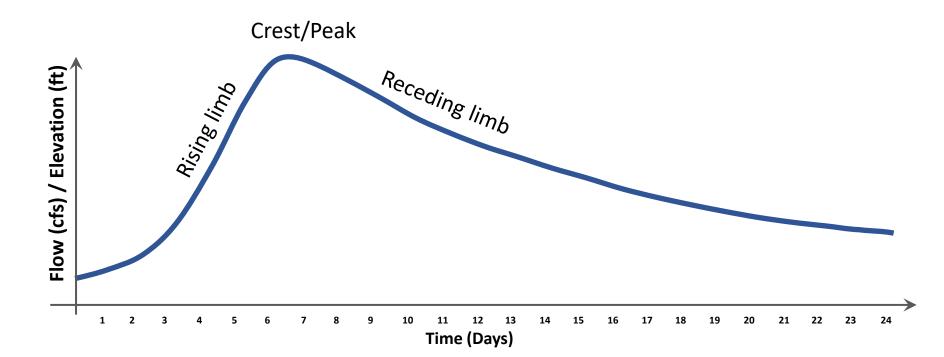


Terminology



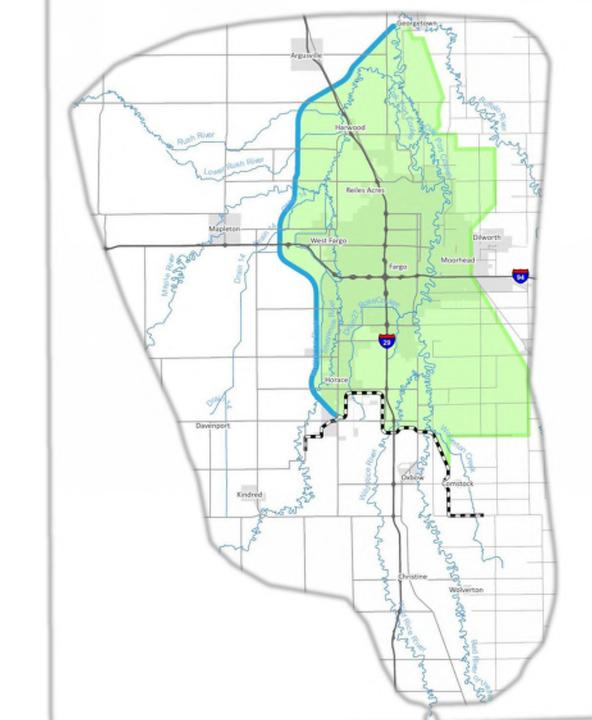
- Flow The amount of water moving through a river, measured in cubic feet per second (cfs)
- Streamflow Gages River flows are measured using streamflow gages
- Hydrograph Plot showing the rate of flow, or elevation versus time at a specific location





Terminology

Protected Area/In-Town Area
 FM Metro Area with reduced flood risk due to the project

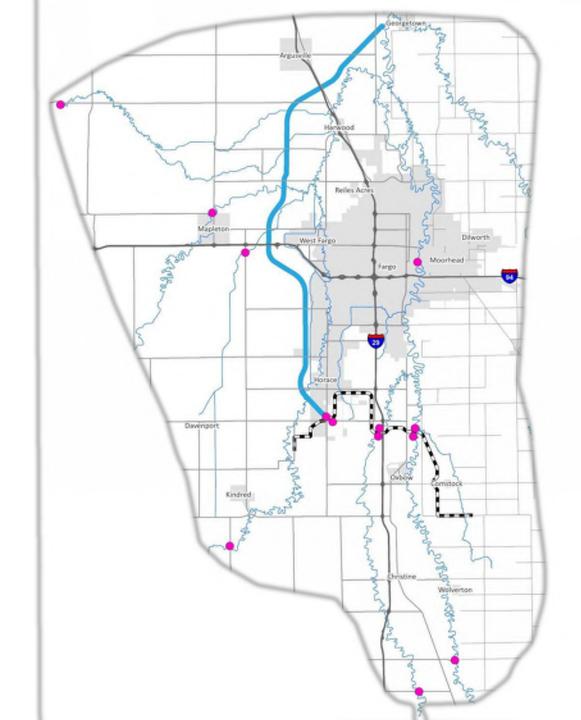


Streamflow Gages

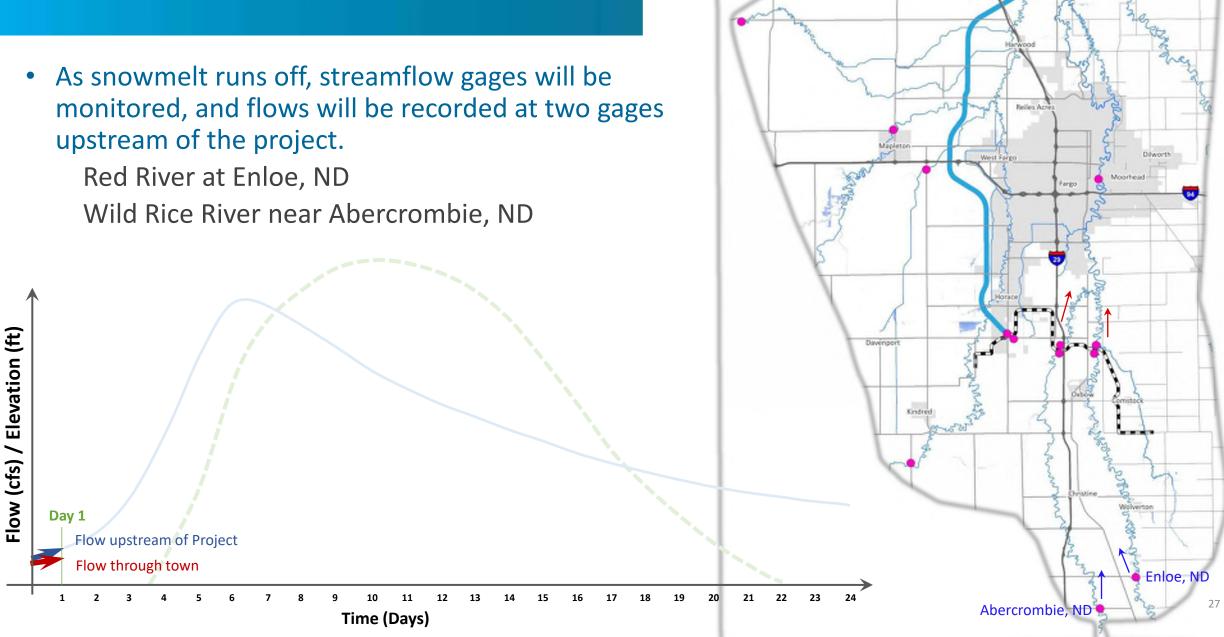
Project Related Gages

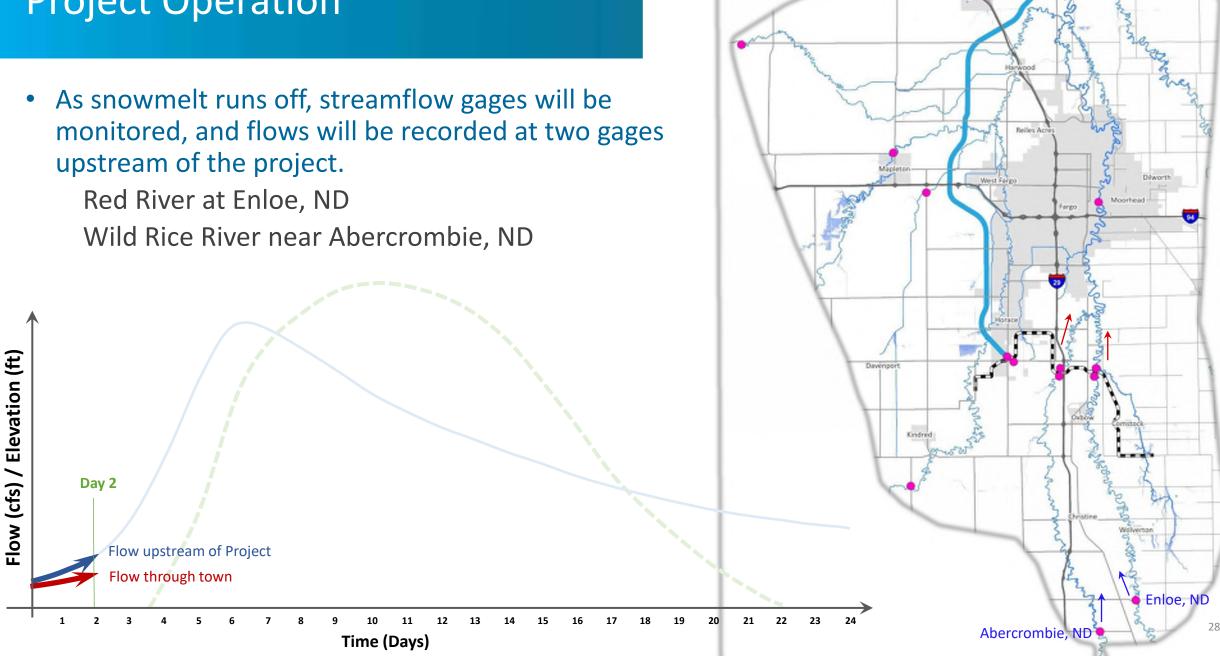
- Red River of the North at Fargo, ND
- Red River of the North at Enloe, ND
- Wild Rice River near Abercrombie, ND
- Sheyenne River on Gol Road near Kindred, ND
- Maple River near Mapleton, ND
- Rush River at Amenia, ND
- Drain 14 at Cass County Road 15*
- Red River Control Structure*
- Wild Rice River Control Structure*
- Diversion Inlet & Control Structure*

^{*} New gages to be implemented as part of the project



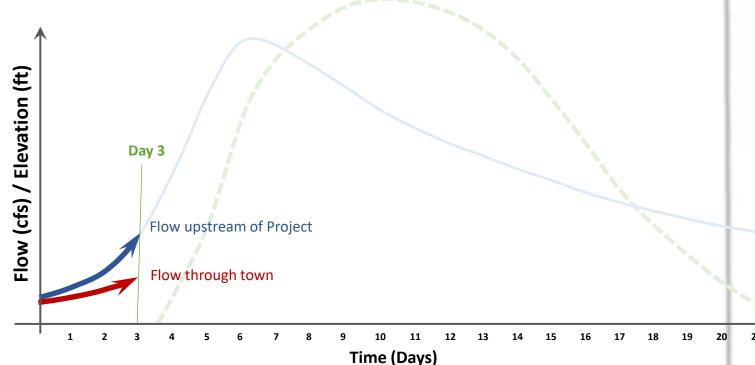


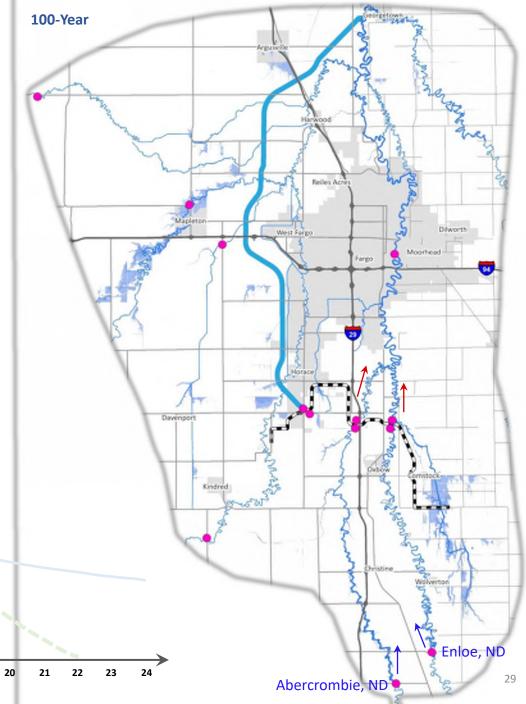




 As snowmelt runs off, streamflow gages will be monitored, and flows will be recorded at two gages upstream of the project.

Red River at Enloe, ND Wild Rice River near Abercrombie, ND





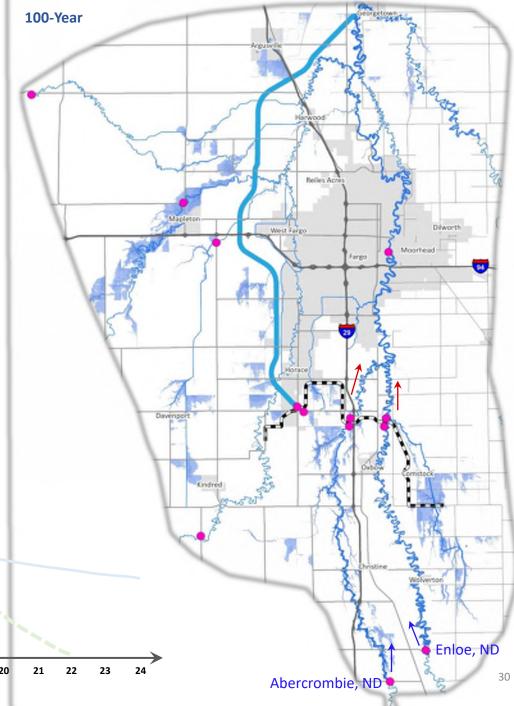
 As snowmelt runs off, streamflow gages will be monitored, and flows will be recorded at two gages upstream of the project.

Red River at Enloe, ND Wild Rice River near Abercrombie, ND

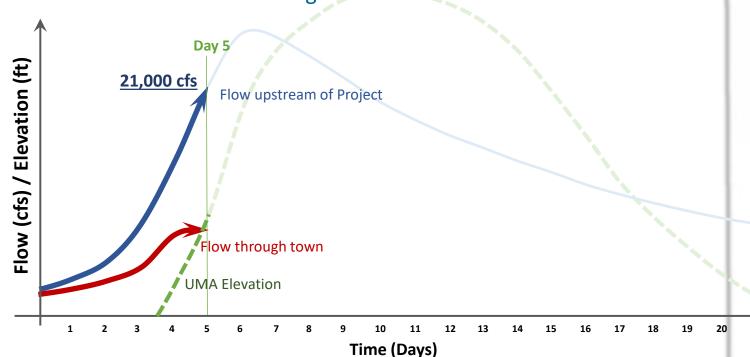


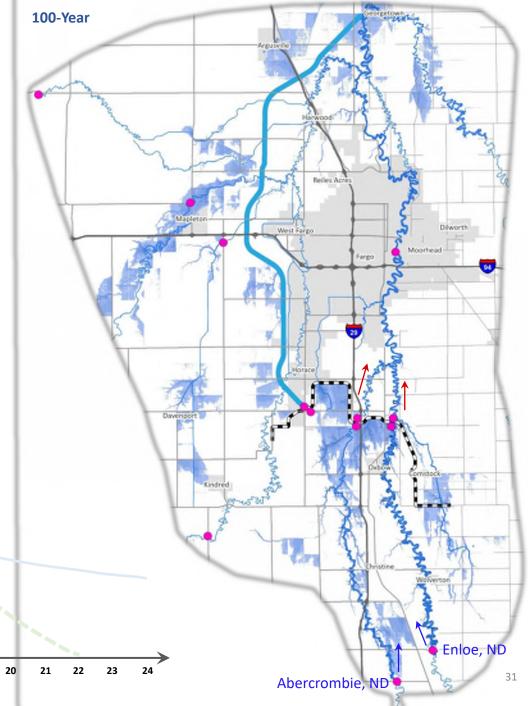


Time (Days)

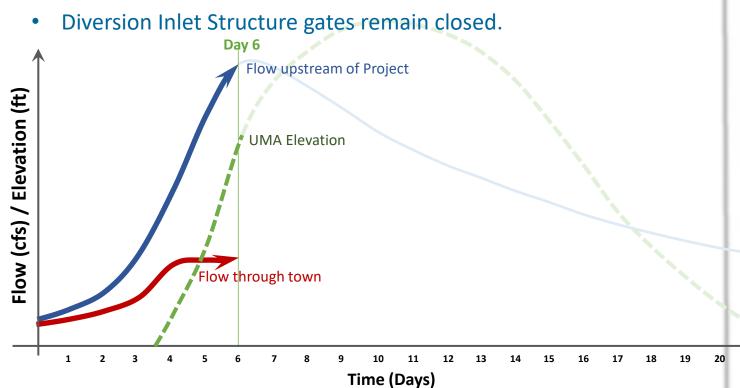


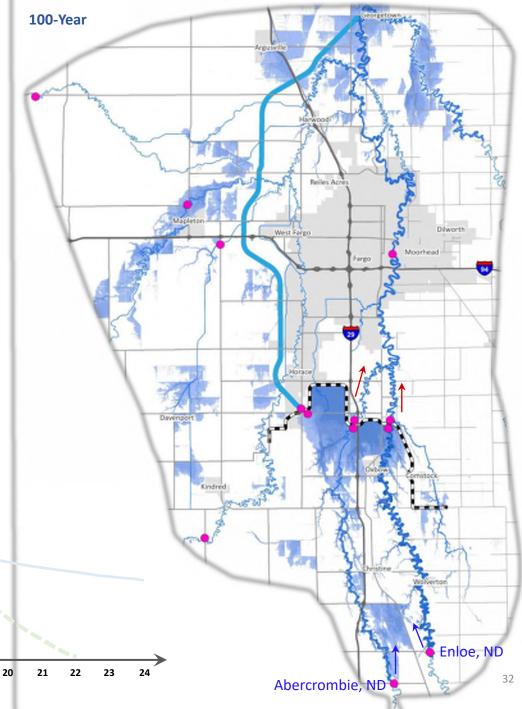
- Project Operation begins when the total flow at the upstream gages reaches 21,000 cfs. (~37-feet at Fargo Gage)
- At this time, flows are recorded at the Red River and Wild Rice River Structures, and the two structures will be operated to maintain a uniform flow into the Protected Area.
- At this time, the UMA will begin to store water.
- Diversion Inlet Structure gates remain closed.



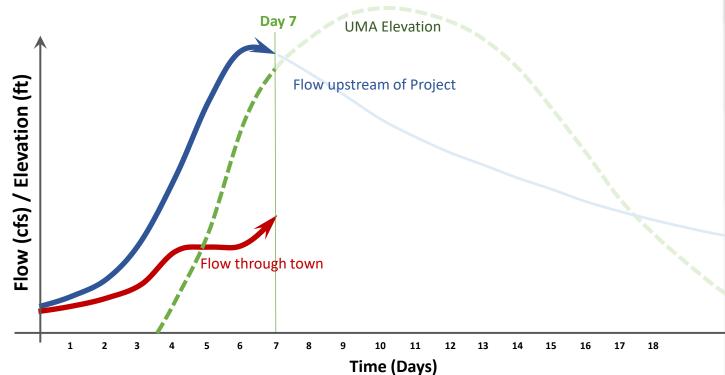


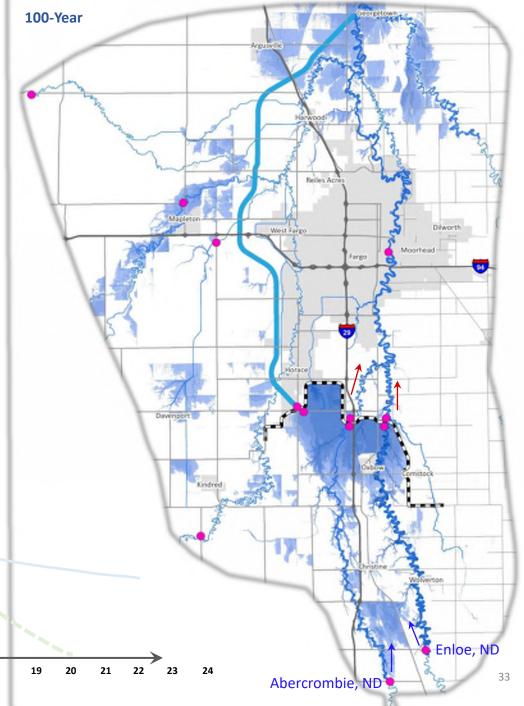
- Project Operation begins when the total flow at the upstream gages reaches 21,000 cfs. (~37-feet at Fargo Gage)
- At this time, flows are recorded at the Red River and Wild Rice River Structures, and the two structures will be operated to maintain a uniform flow into the Protected Area.
- At this time, the UMA will begin to store water.



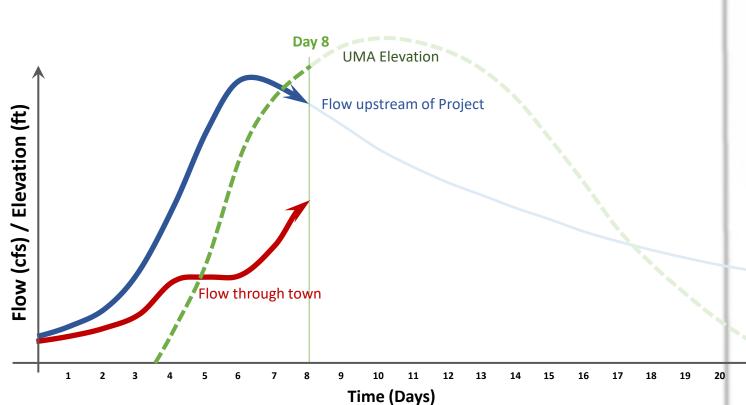


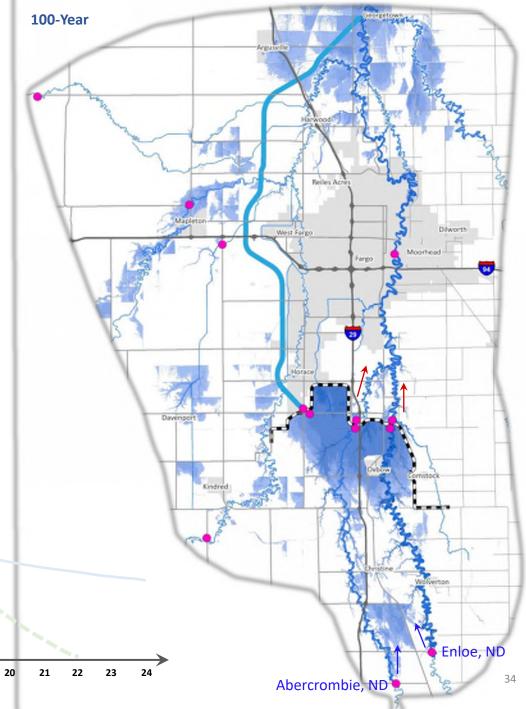
- Flows are recorded at each of the tributary river gages
- Project operations are controlled to minimize impacts downstream of the Diversion Outlet
- Diversion Inlet Structure gates remain closed.





- Flows are recorded at each of the tributary river gages
- Project operations are controlled to minimize impacts downstream of the Diversion Outlet
- Diversion Inlet Structure gates remain closed.



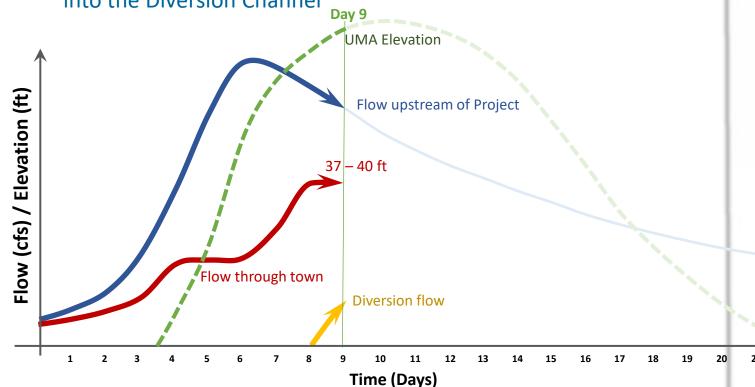


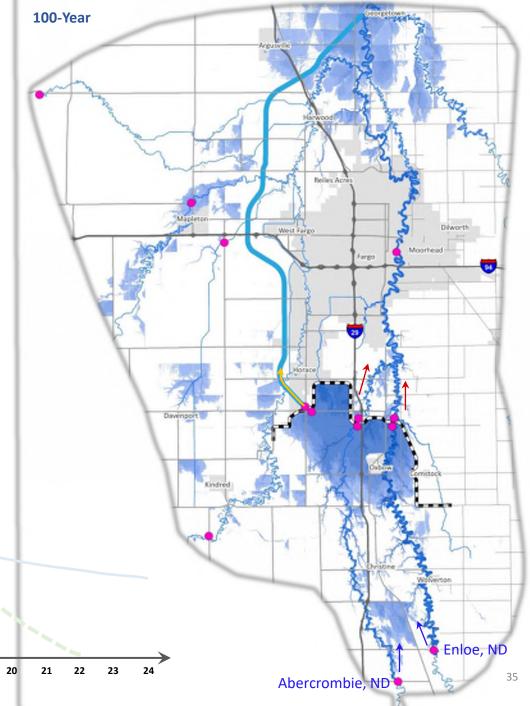
 Flows through town are limited based on the magnitude of the incoming flood

100-year event ~ 37-feet (Fargo gage)

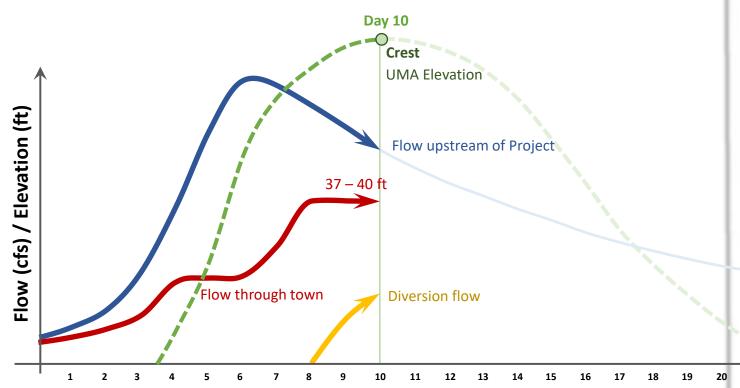
500-year event ~ 40-feet (Fargo gage)

 When the designed Project Flow exceeds the maximum allowable flow through town, additional flow will be passed into the Diversion Channel

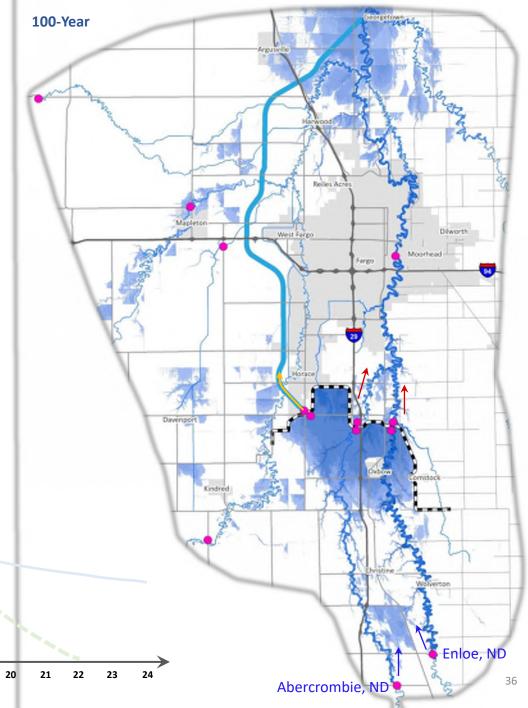




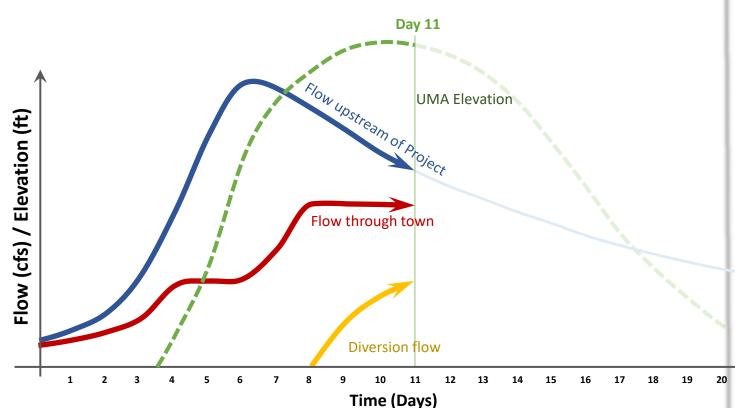
 Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.

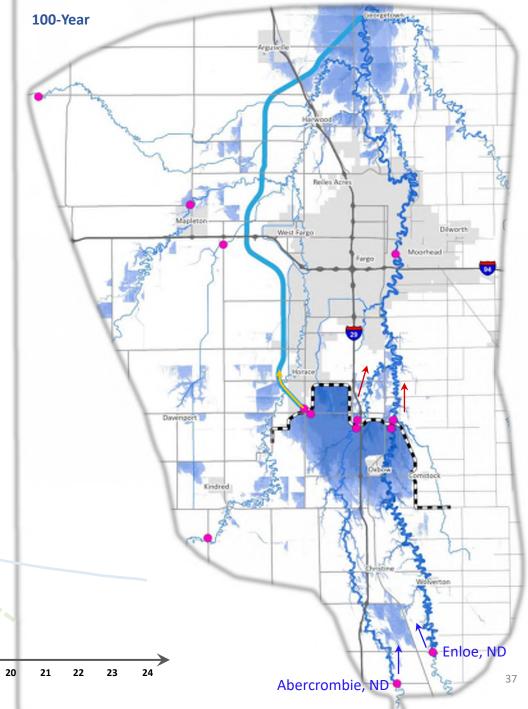


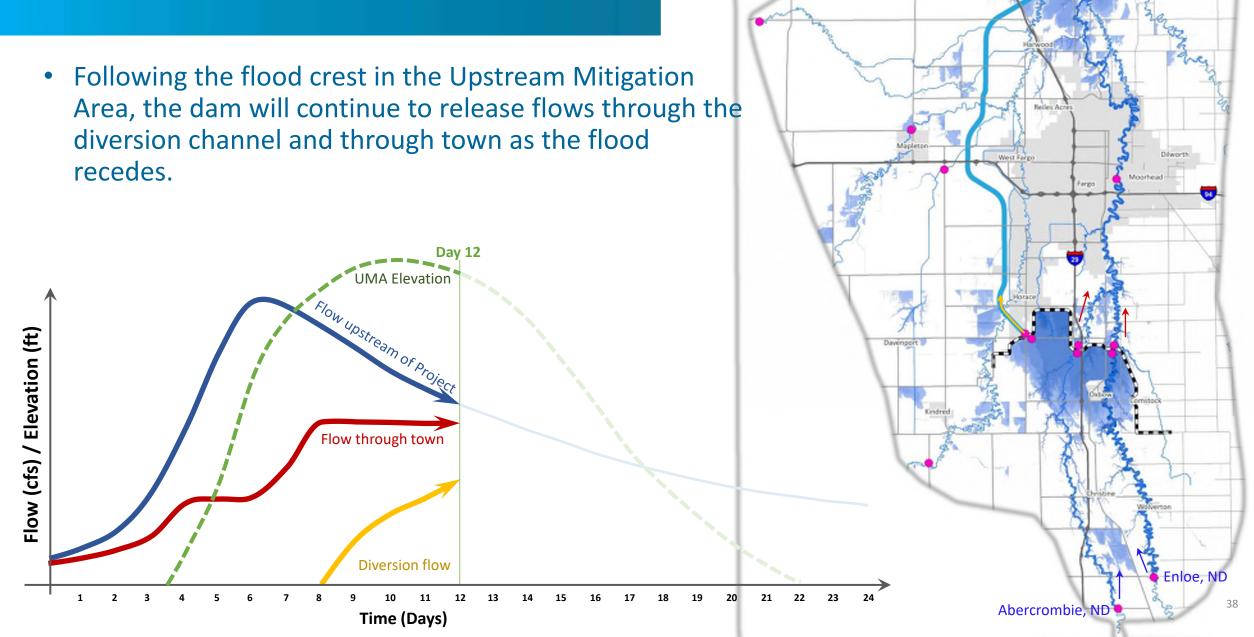
Time (Days)

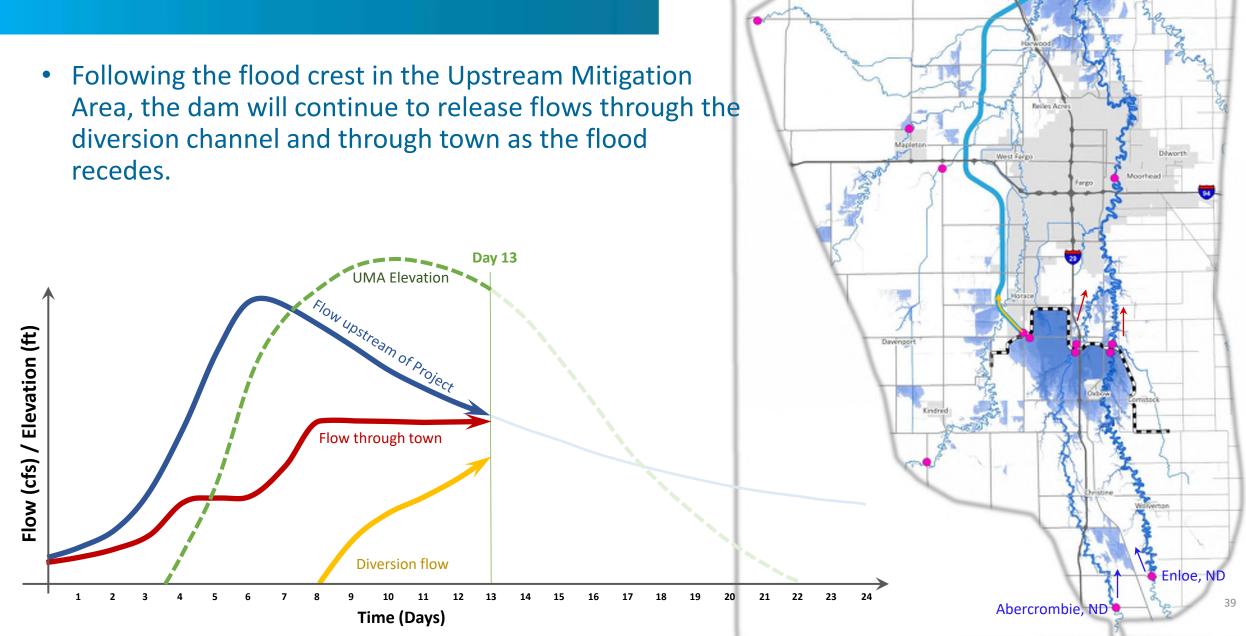


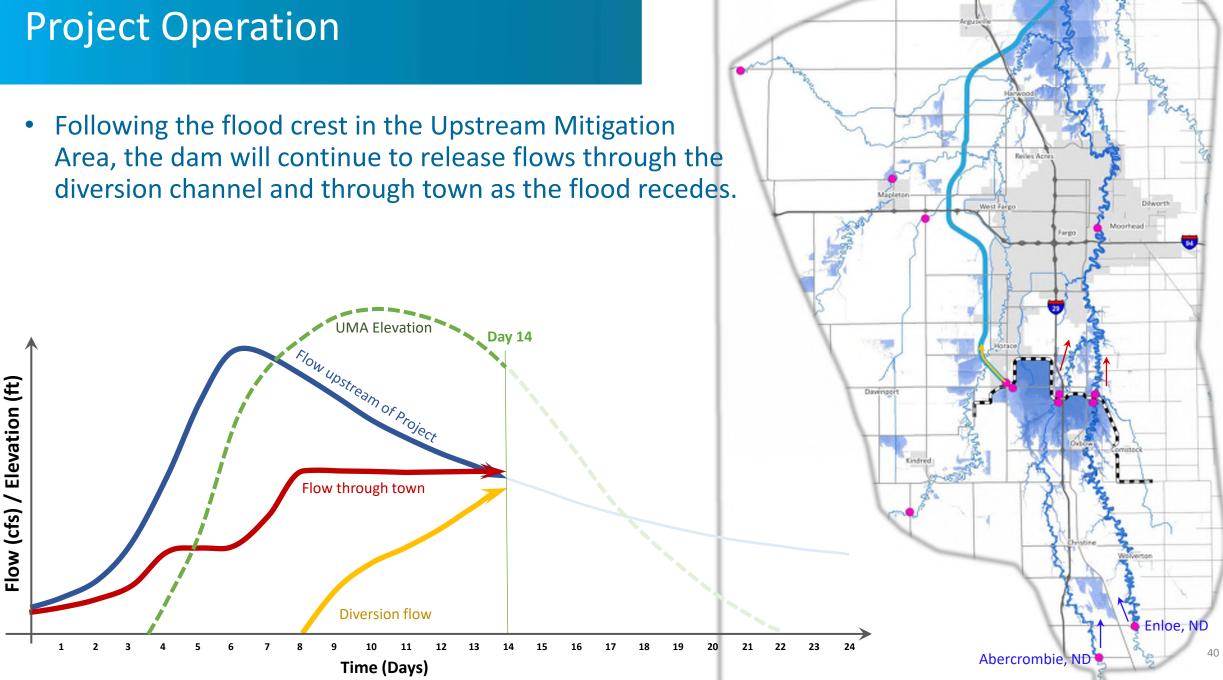
 Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.





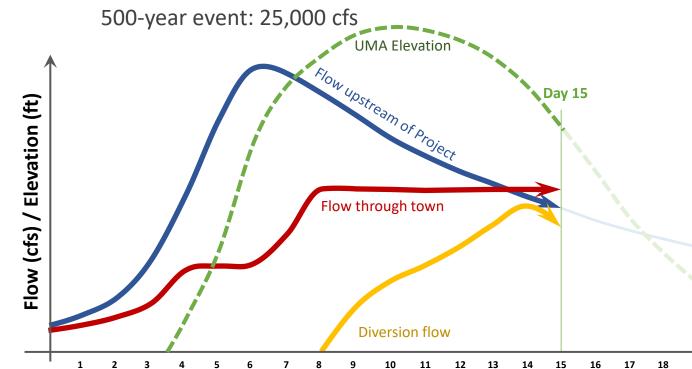




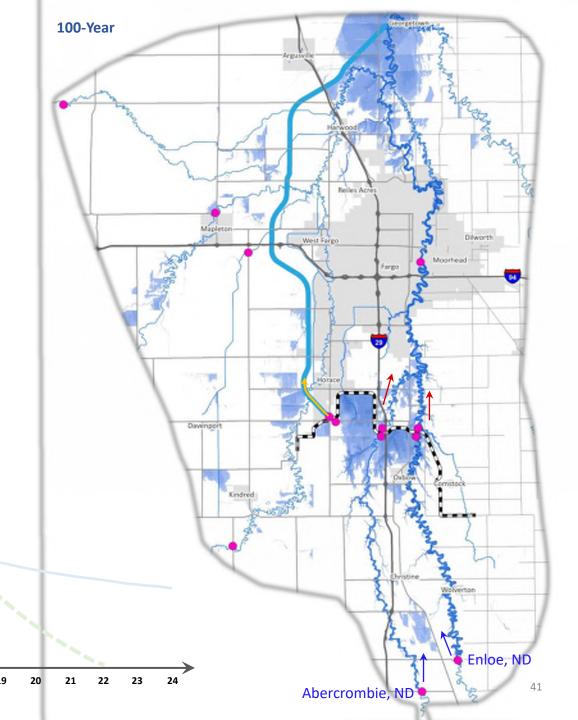


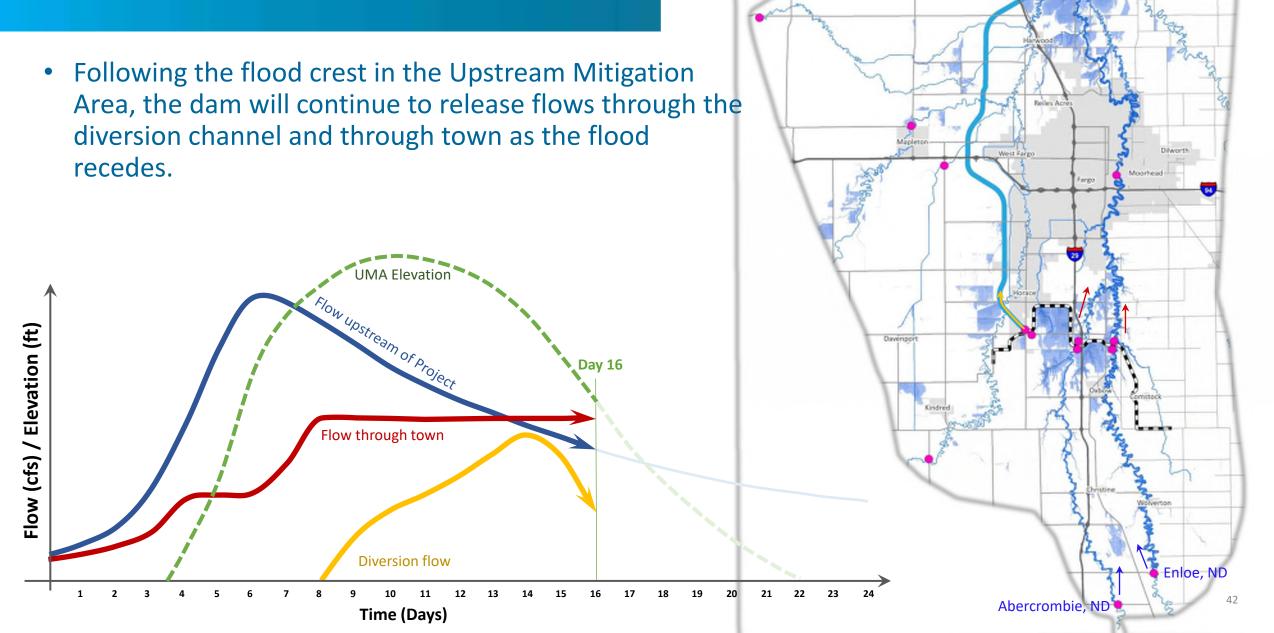
- Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.
- Flows through Diversion channel are limited based on the magnitude of the incoming flood

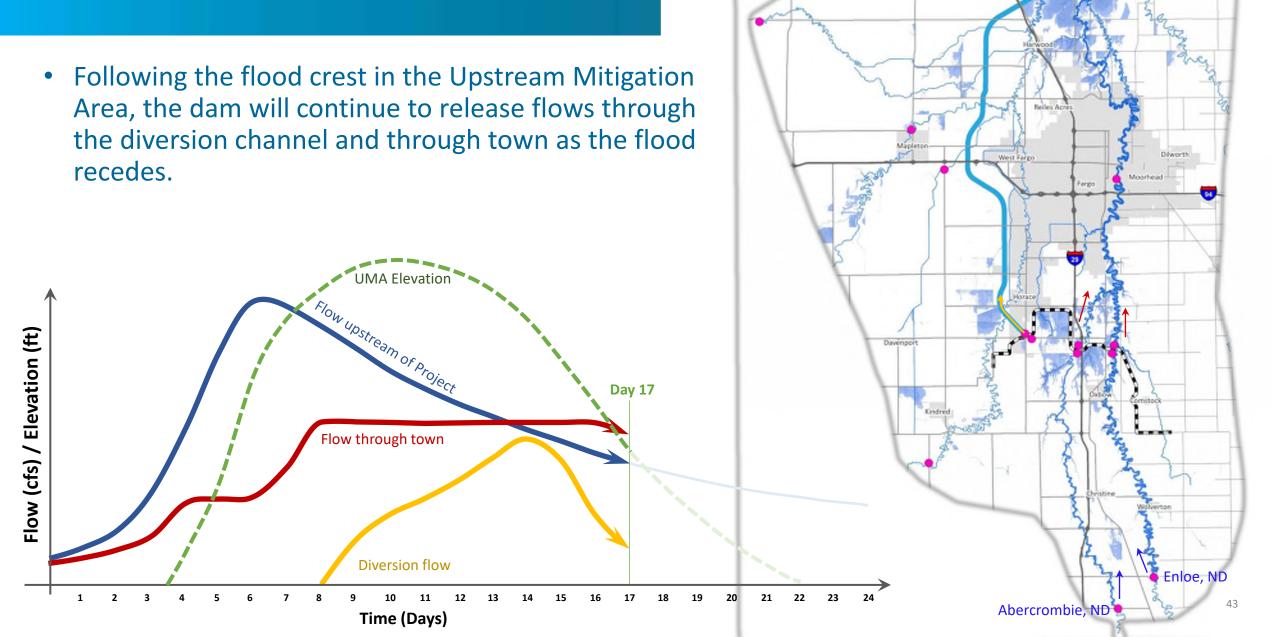
Up to 100-year event: 20,000 cfs

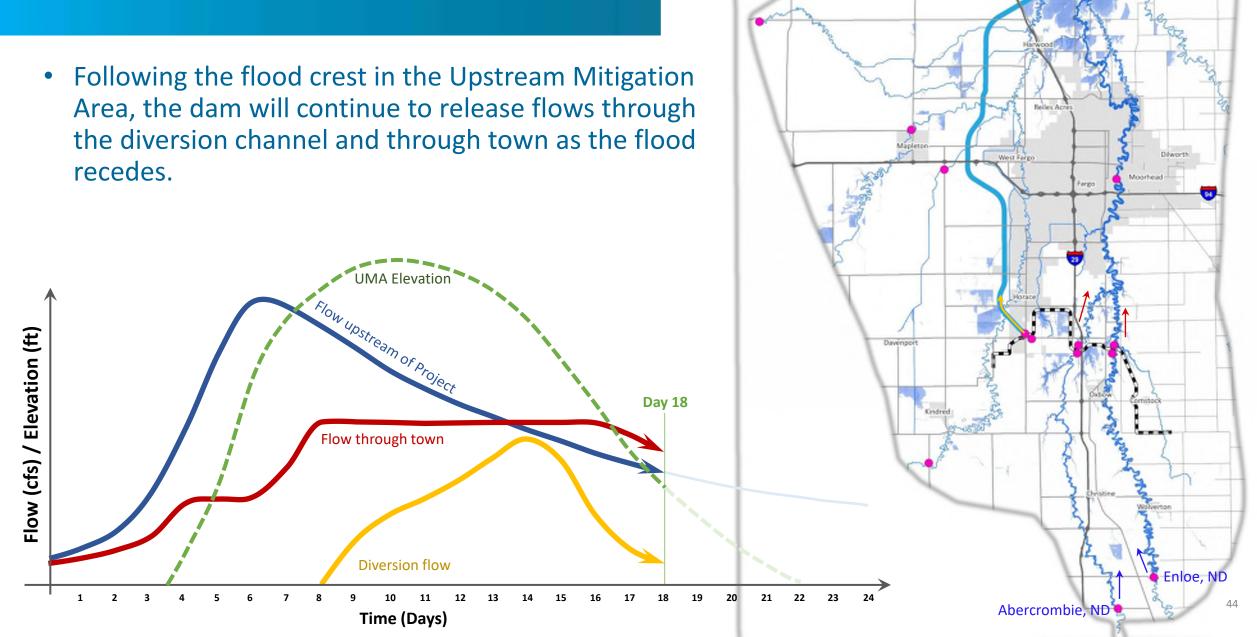


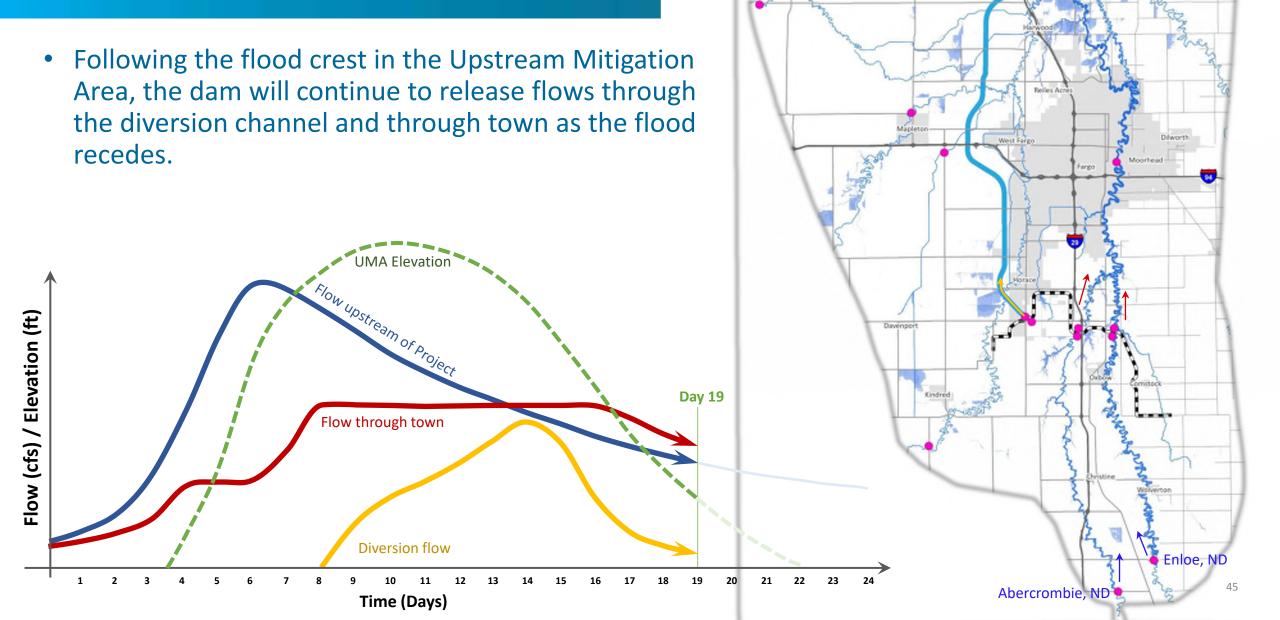
Time (Days)



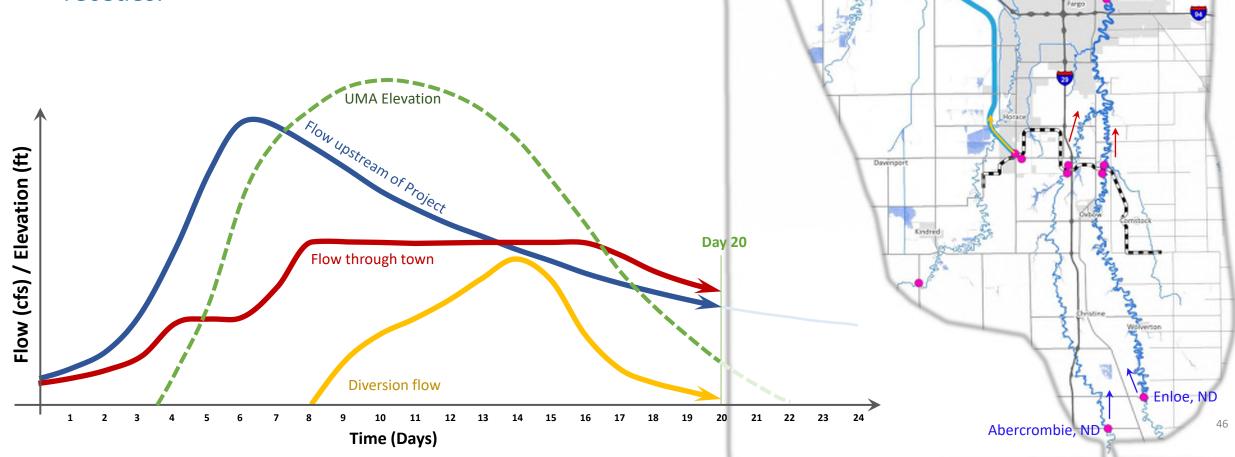




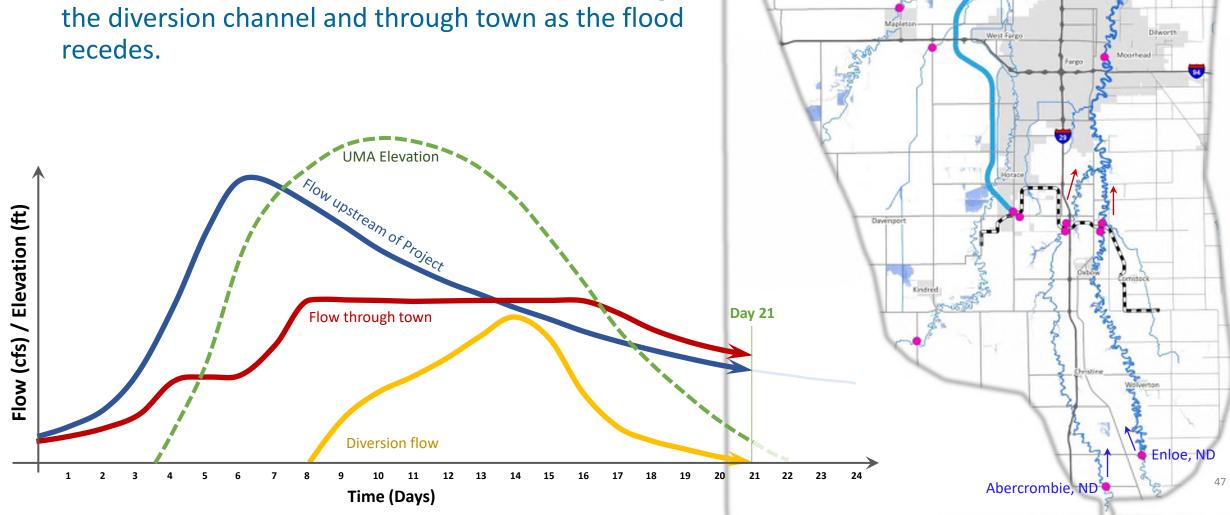




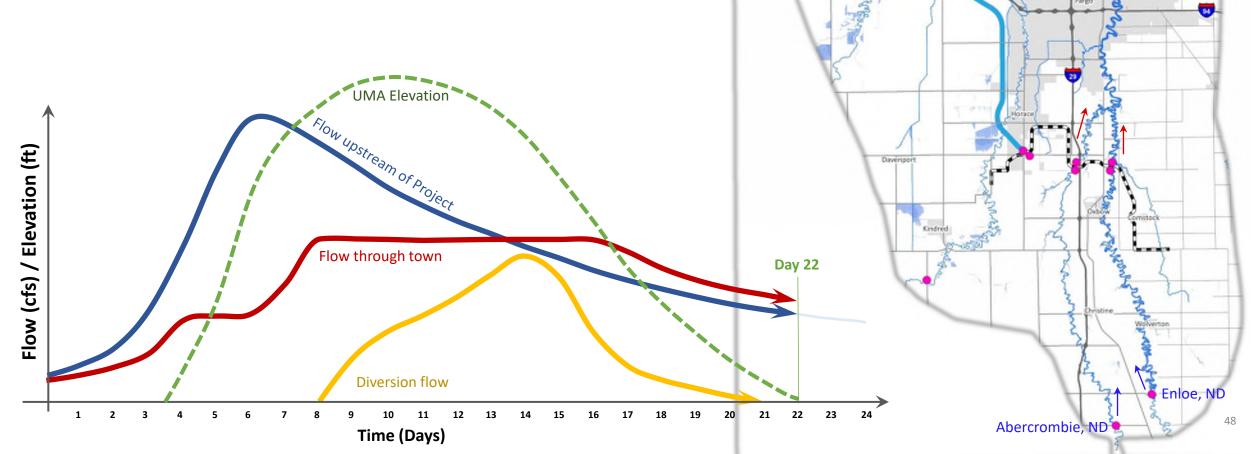
 Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.



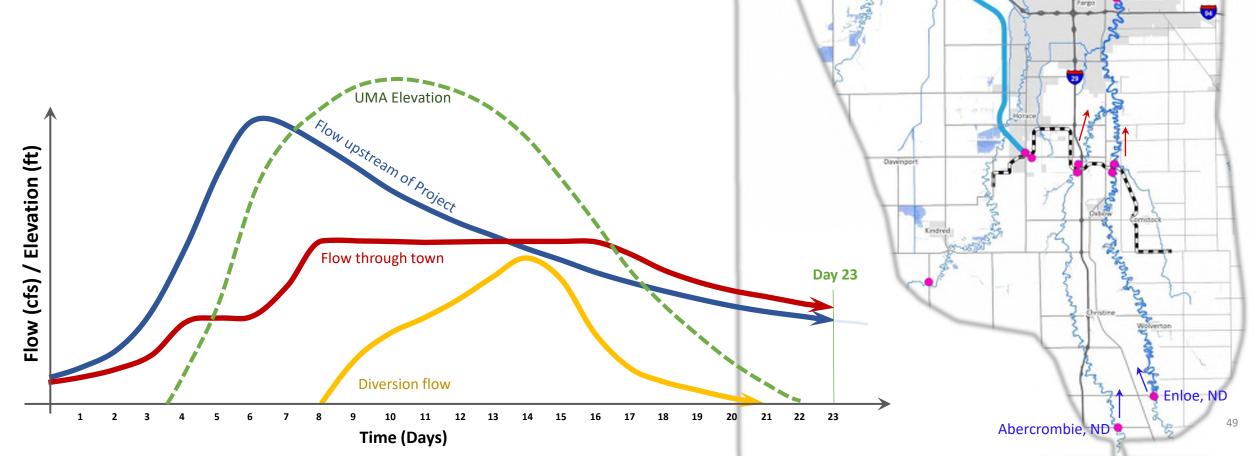
Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.



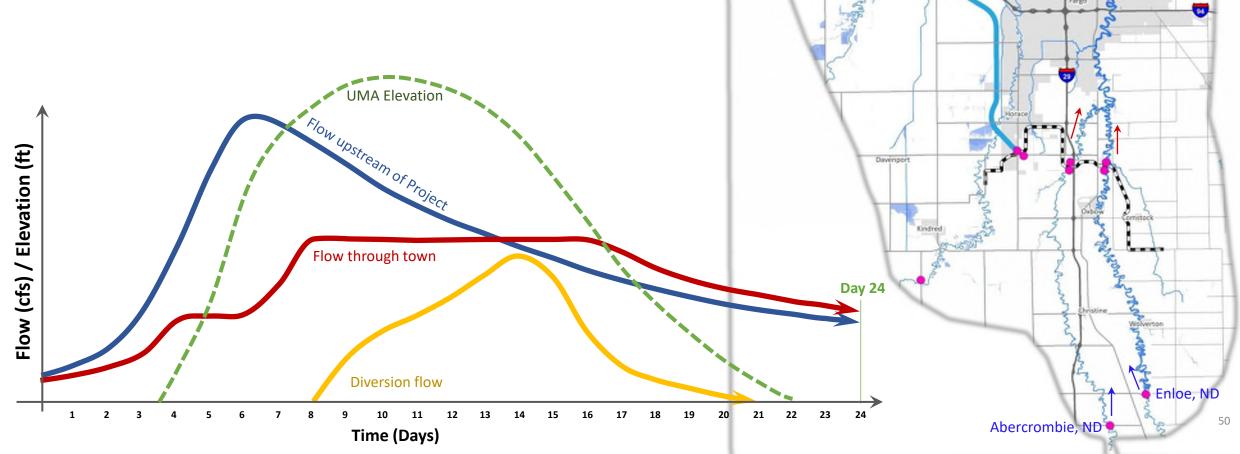
• Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.



 Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.

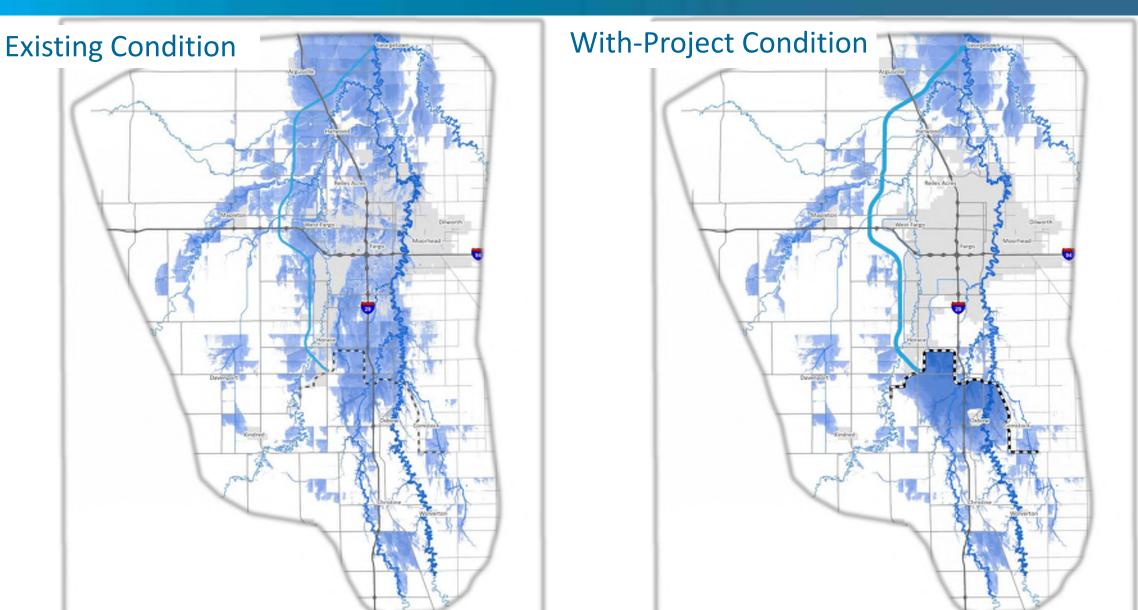


• Following the flood crest in the Upstream Mitigation Area, the dam will continue to release flows through the diversion channel and through town as the flood recedes.



100-Year Flood Inundation









Mitigation Programs Overview Landowner Informational Meeting

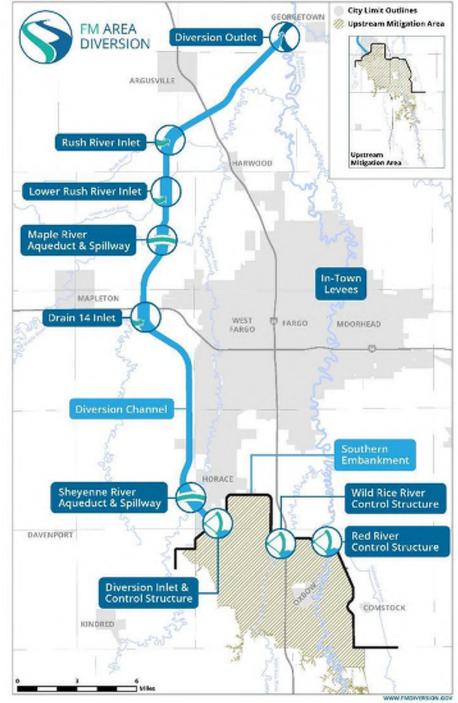
July 21 & 22, 2021 Hickson Community Center

Eric Dodds, PE, AE2S

FM Area Diversion



- Diversion Channel and Associated Infrastructure
 - 30-mile channel
 - Road, Railroad, and River crossings
- Southern Embankment and Associated Infrastructure
 - 20-mile embankment
 - Three gated control structures
- Upstream Mitigation Area
 - Temporary staging of flood waters to prevent downstream impacts
- In-town Levees
 - Earth levees
 - Floodwalls
 - Pump Stations



Property Rights Acquisition & Mitigation Plan



- "Mitigation Plan" outlines the processes used to acquire the necessary property rights
- Outlines various programs developed to mitigate project impacts
- Developed by MFDA in coordination with USACE, and in consultation with ND Office of State Engineer and MN Department of Natural Resources
- Update being developed to match Settlement Agreement and final Permit Conditions

Mitigation Information



Project website: www.fmdiversion.gov/lands

Land Agents

- Primary Point of Contact for property owners
- Available to help answer questions and guide property owners through the process

Property Rights Acquisition & Mitigation Plan



Table of Contents

- Property Acquisition Philosophies
- Typical Property Acquisition Process
- Offer Presentation and Negotiation Process
- Acquisition Program for Voluntary Sale of Property
- Organic Farmland Acquisition Plan
- Disposal of Excess Property
- Mitigation of Properties in the Upstream Mitigation Area
- Flowage Easement Plan
- Zoning of Properties Downstream of Southern Embankment
- Alternative Dispute Resolution Board

- Cemetery Mitigation Plan
- Mitigation of Historic Properties
- Post-Operation Debris Clean-Up Plan:
 - Private Lands
 - Public Lands
- Growing Season Supplemental Crop Loss Program
- Prevent Plant Crop Insurance Program
- Financial Assurance Plan for O&M and On-going Mitigation
- Mitigation Communications and Notification Plan
- Pre-Operation Mitigation for Impacted Roadways

Property Rights Acquisition & Mitigation Plan



Table of Contents

- Property Acquisition Philosophies
- Typical Property Acquisition Process
- Offer Presentation and Negotiation Process
- Acquisition Program for Voluntary Sale of Property
- Organic Farmland Acquisition Plan
- Disposal of Excess Property
- Mitigation of Properties in the Upstream Mitigation Area
- Flowage Easement Plan
- Zoning of Properties Downstream of Southern Embankment
- Alternative Dispute Resolution Board

- Cemetery Mitigation Plan
- Mitigation of Historic Properties
- Post-Operation Debris Clean-Up Plan:
 - Private Lands
 - Public Lands
- Growing Season Supplemental Crop Loss Program
- Prevent Plant Crop Insurance Program
- Financial Assurance Plan for O&M and On-going Mitigation
- Mitigation Communications and Notification Plan
- Pre-Operation Mitigation for Impacted Roadways

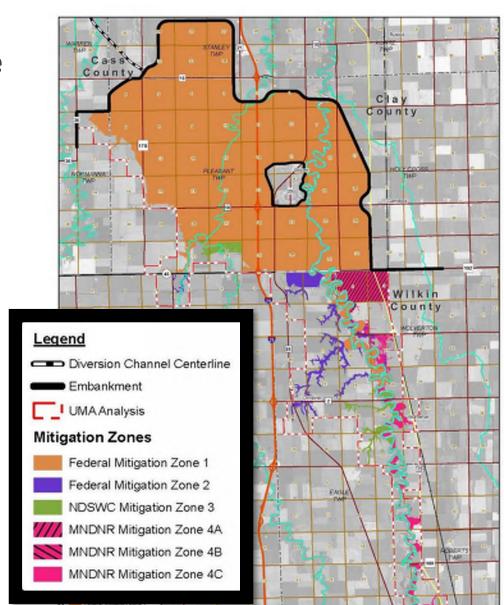
Upstream Mitigation Area



"UMA" is where the MFDA is required to obtain property rights as mitigation for the temporary storage of floodwaters when the project operates

UMA is Split into Four (4) Mitigation Zones

- Federal Mitigation Zone 1
- Federal Mitigation Zone 2
- ND Mitigation Zone 3
- MN Mitigation Zone 4
 - Zone 4A
 - Zone 4B
 - Zone 4C





Federal Mitigation Zone 1

- Depth difference of 1-foot or greater for the 100-year and 500-year flood events (whichever is greater) within Cass and Clay Counties
- Depth difference of 1-foot or greater for the 100-year and 500-year flood events (whichever is greater) along the Red River corridor within Richland and Wilkin Counties
- Defines the operating pool or floodwater storage volume required to ensure the planned operation of the project, which includes minimizing downstream impacts
- Development will not be allowed within Zone 1 (structures must be purchased and removed)
- Placement of fill will not be allowed within Zone 1
- Flowage Easements will be required in order to establish a property right



Federal Mitigation Zone 2

- Depth difference of 1 foot or greater for the 100-year and 500-year flood events (whichever is greater) within Richland and Wilkin Counties
- Limited placement of fill will be allowed in Zone 2, within the terms and conditions of the flowage easement and in accordance with state and federal floodplain regulations.
- Development will be allowed, but structures must be constructed at least one-foot higher than the elevation of the with-project 500-year flood event water surface elevation
- Flowage easements will be required in order to establish a property right



NDOSE Mitigation Zone 3

- This is an area in North Dakota beyond Federal Mitigation Zone 1 and Zone 2 where the project causes a hydraulic effect of 0.5-feet or more at the 100-year flood event
- Flowage easements will be required in order to establish a property right





MDNR Mitigation Zone 4:

- This is an area in Minnesota beyond Federal Mitigation Zone 1 and Zone 2 where the project causes a hydraulic effect of 0.1-feet or more from flood events up to and including the PMF flood event
- Mitigation Zone 4 is divided into three sub-zones reflecting the flood event that defines the boundary of impacts
 - Zone 4A: Area in Minnesota beyond Federal Mitigation Zone 1 and Zone 2 where the project causes a hydraulic effect of 0.1-feet or more at the **PMF flood** event
 - Zone 4B: Area in Minnesota beyond Federal Mitigation Zone 1 and Zone 2 where the Project causes a hydraulic effect of 0.1-feet or more at the **500-year flood** event
 - Zone 4C: Area in Minnesota beyond Federal Mitigation Zone 1 and Zone 2 where the Project causes a hydraulic effect of 0.1-feet or more at the **100-year flood** event
- Flowage easements will be required in order to establish a property right

Mitigation for Existing Structures



Structure Mitigation within Zones 2, 3, & 4:

- If the structure is impacted by the project, an offer to acquire and remove the structure will be made
- Alternative mitigation options for structures impacted by the project may be available if the property owner does not want a buyout, and if the alternative mitigation is less expensive than a buyout
- Impacted structures are those within or touched by a Mitigation Zone



Mitigation for Existing Structures



Structure Mitigation within Zones 2, 3, & 4 continued:

Alternative mitigation of structures impacted by the project must follow these mitigation requirements:

- Structures must be removed from the with-project 100-year (one percent annual chance exceedance) floodplain in accordance with local, state, and FEMA guidance and standards
- Constructing a non-accredited ring levee to provide "real protection"
- Raising or elevating the structure
- Relocation of structure to non-affected area

Individual ring levees will not be accredited

Individual, non-accredited ring levees cannot be used to remove the structure from the 100-year (one percent) annual chance exceedance floodplain

Floodplain Management Quick Guide

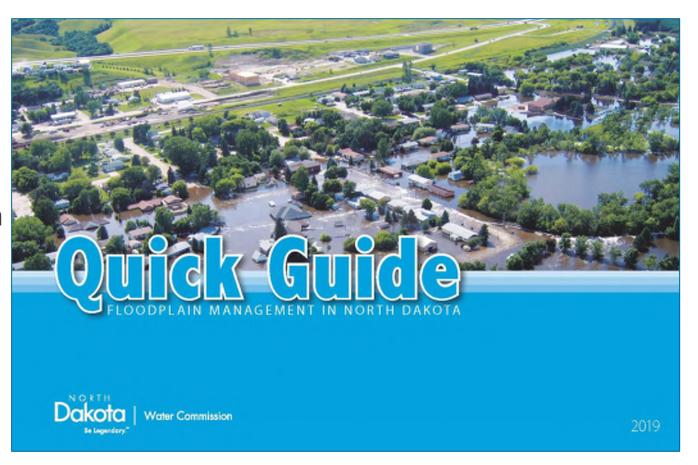


North Dakota:

https://www.swc.nd.gov/pdfs/floodplain_quick_guide.pdf

Minnes ota:

https://files.dnr.state.mn.us/waters/waterm gmt_section/floodplain/2020-mnfloodplain-mgt-quick-guide.pdf



Mitigation for Existing Structures



Structure Mitigation within Zones 2, 3, & 4 continued:

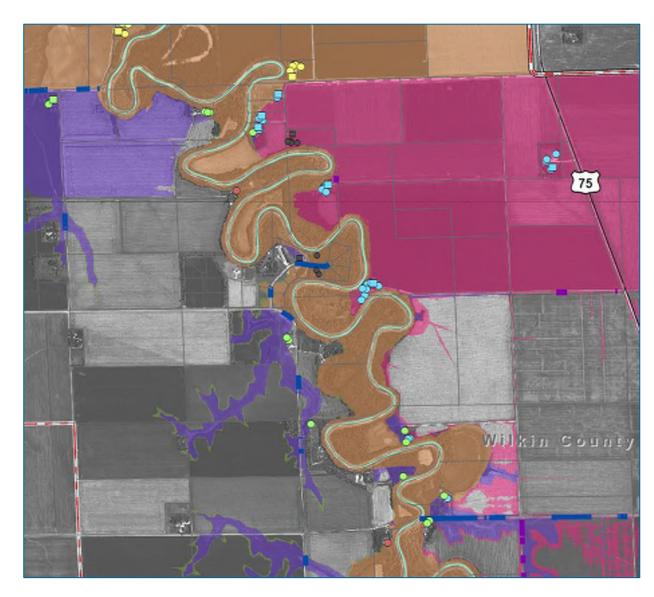
Alternative mitigation continued:

- The MFDA will fund the mitigation of impacted structures
- The MFDA will not compensate for any changes in flood insurance costs as a result of future policy changes by FEMA
- Owner accepts the flooding risks to the structure site
- Owner accepts risks of access to the structure site
- Structure site will require dry access to a level of 100-year flood minus 1-foot (see Dry Access slide)
- If the structure is not impacted by the project, no mitigation will be provided

Dry Access Consideration



- Dry access must be available to the structure site
- Dry access is defined as roads having no more than one-foot of water during the 100-year flood event
- Roads in Zone 1 will not be raised
- Roads outside of Zone 1 may not be able to be raised – need technical review



Flowage Easement = Property Right



- Crown Appraisals, Inc. under contract
- Phase 1 study complete in 2018, Phase 1b update complete in 2020
- Phase 2 started in early 2021
 - Crown appraisals team
 - Meeting with Property Owners
 - Market based appraisal of value of flowage easement
 - Anticipate completion in late 2021
- See Project website:
 - www.fmdiversion.gov/flowageeasements/
 - Q&A section, Informational Video, sample flowage easement
 - Sign-up for appointment with Crown Appraisals

Flowage Easement = Property Rights



Property Rights Today

- ▼ Farm the property
- Lease the property
- ✓ Install drainage
- **✓** Construct buildings
- ✓ Incur only natural flood risk

Property Rights After the Project

- **▼** Farm the property
- ✓ Lease the property
- **✓** Install drainage
- Construct buildings
- Incur only natural flood risk



LOSS OF DEVELOPMENT RIGHTS



FLOOD RISK

FLOWAGE EASEMENT

Timeline for Acquiring Property Rights



Property Rights for Southern Embankment – acquired in phases

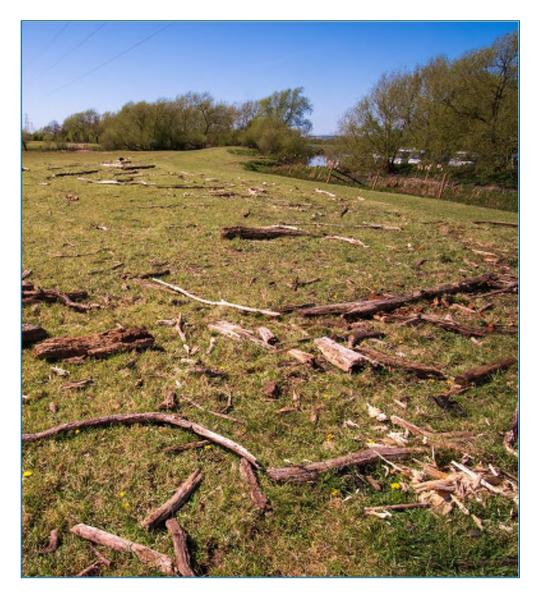
- Property Rights for UMA must be acquired prior to construction of last phase of southern embankment
 - Last Segment in ND = SE-3 December 2024 / January 2025
 - Last Segment in MN = SE-5 December 2024 / January 2025

- See Project website for property acquisition schedule:
 - https://fmdiversion.gov/lands-schedule/

Post Operation Debris Clean-Up Program (Private Lands)



- Project Operation may cause debris to accumulate within the UMA, impacting farming
- MFDA committed to conduct flood debris clean-up operations in the UMA
 - Remove debris
 - Repair non-structural property damage
 - Within 10 days of project operation completion
- Landowner or tenant may remove debris and submit the costs for reimbursement
 - Pre-qualified contractors
 - Reasonable compensation
- Adaptive approach
- Sub-committee will be established



Post Ops Repair & Clean-Up Program (Public Lands)



Concern from Townships, Cemeteries,
 Watershed Districts, etc. about damage caused by Project Operation

 Public Property Repair Plan is Mirrored after FEMA Disaster Assistance

 Allow Government Entities to Contract for Repair and Clean-up Work, then Submit for Reimbursement to Diversion Authority



Crop Insurance Programs



MFDA committed to provide additional mitigation for producers in UMA.

Retained crop insurance development firm: Watts & Associates

- 1. Growing Season Crop Loss
- 2. Prevent Plant Crop Insurance
- MFDA will offer a rider that provides producers with supplemental crop loss coverage for the risk associated with Project operations
- Anticipated that federal crop insurance programs will not cover damages caused by Project operations









Development & Implementation of Crop Loss Compensation Program for Farmland Impacted by the FM Area Diversion

Alex Offerdahl, Watts and Associates Billings, MT July 2021



Current Status of Deliverables & Proposed Direction for Future Refinements

Introduction



- The MFDA has partnered with Watts and Associates Inc. (W&A) to explore and develop a supplemental insurance policy to compensate affected producers for any losses associated with operation of the project.
- W&A is the leading developer of crop insurance products for USDA and private insurance companies.
- W&A will assess the risks and develop a supplemental insurance product to complement Federal Crop Insurance.

Background



- Farmers in the upstream mitigation area are concerned the potential operation of the diversion will prevent planting or damage crops in wet years.
- Growers are familiar with the current Federal Crop Insurance program administered by the United States Department of Agriculture Risk Management Agency (USDA-RMA); nearly every arable acres is insured in the upstream mitigation area.
- Federal Crop Insurance coverage specifically excludes losses as a result of 'man-made' government action.
- The MFDA has agreed to provide supplemental crop insurance coverage to compensate producers for the value of any losses stemming from operation of the project; effectively adding this peril back into their crop insurance policies.

Crop Insurance Risk Mitigation Overview



- The crop insurance risk mitigation project was divided into two interrelated phases.
- Phase I
 - Utilization of existing crop insurance program through USDA-RMA.
 - Develop administrative procedures for utilizing existing crop insurance infrastructure.
- Phase II
 - Develop a non-reinsured supplemental (NRS) insurance product designed specifically for the upstream mitigation area.

Phase I Components Delivered to Date



- Phase I provided the following information to MFDA:
 - An overview of how growers utilize the current FCIC crop insurance system;
 - A communications framework for MFDA to utilize in working with growers in the upstream mitigation area with regard to project operation and potential crop loss events;
 - A draft agreement for MFDA and growers to utilize in understanding how MFDA will apply the current crop insurance infrastructure when working with growers in the retention area;
 - An example of loss adjustment for a single peril loss.

Agreement with Upstream Stakeholders



- MFDA entered into the Settlement Agreement with upstream stakeholders in Fall 2020.
- Part of the Settlement Agreement referenced the utilization of crop insurance as a component of risk mitigation.
- This resulted in a revised approach to Phase II:
 - Coverage for Summer Crop Loss and Prevented Planting Losses
 - Development of an expected crop loss forecast.
 - Development of a specific non-reinsured supplemental (NRS) product for the retention area.

Where Do We Stand?



- Completed an aggregate rating analysis of the 29,500 acre upstream mitigation area.
 - Demonstrates an absolute worst case loss scenario for the upstream mitigation area and the expected annual cost of losses.
- Completed a detailed rating analysis of each parcel in the upstream mitigation area.
 - Hydrologic modeling developed for MFDA was utilized in this exercise.
 - This rating report indicated the risk of loss due to project operation is expected to be manageable.

Next Steps in Phase II



- Develop crop insurance policy materials for the non-reinsured supplemental (NRS)
 product to be offered to all affected upstream farmers in the upstream mitigation area.
 - The policy will protect producers from additional risks imposed by the operation of the project
 - Producers will receive payments for both Prevented Planting and post planting crop losses
 - Producers will be compensated for reductions to crop insurance guarantees or additional premiums that may be due as a result of the operation of the project
- Communicate Policy details, examples of payment determinations, and underwriting process to affected farmers.