

An aerial photograph of a town, likely in Valley County, showing a river, buildings, and trees with autumn foliage. The image is used as a background for the presentation slide.

# PROJECT KICKOFF MEETING

## *Valley County Floodplain Mapping Project*

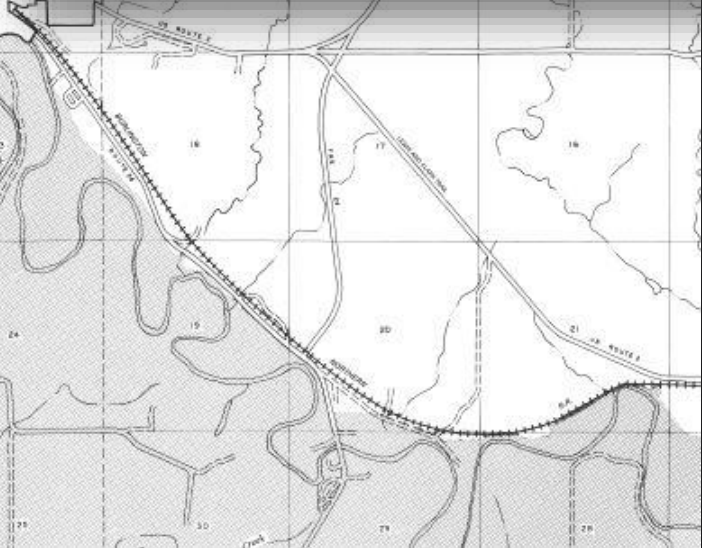
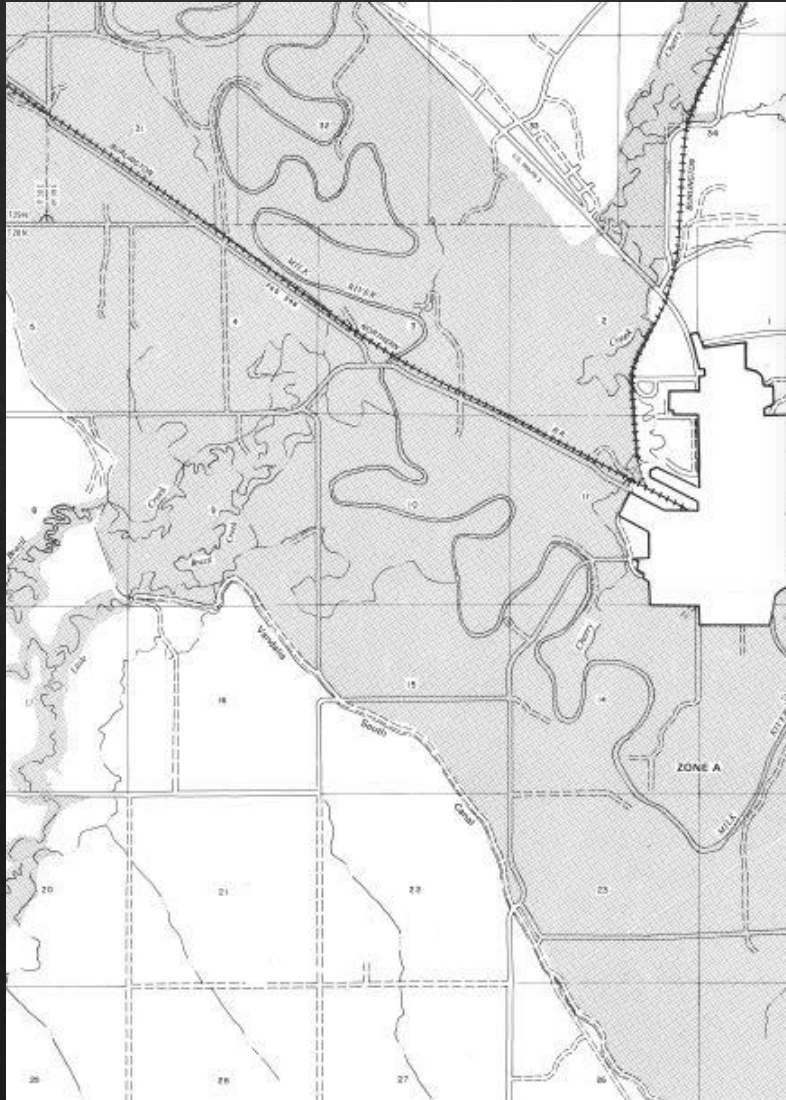
November 7, 2019

### Purpose:

- Project Overview
- Review Project Team, Scope & Schedule
- Levee mapping process
- Questions & Discussion

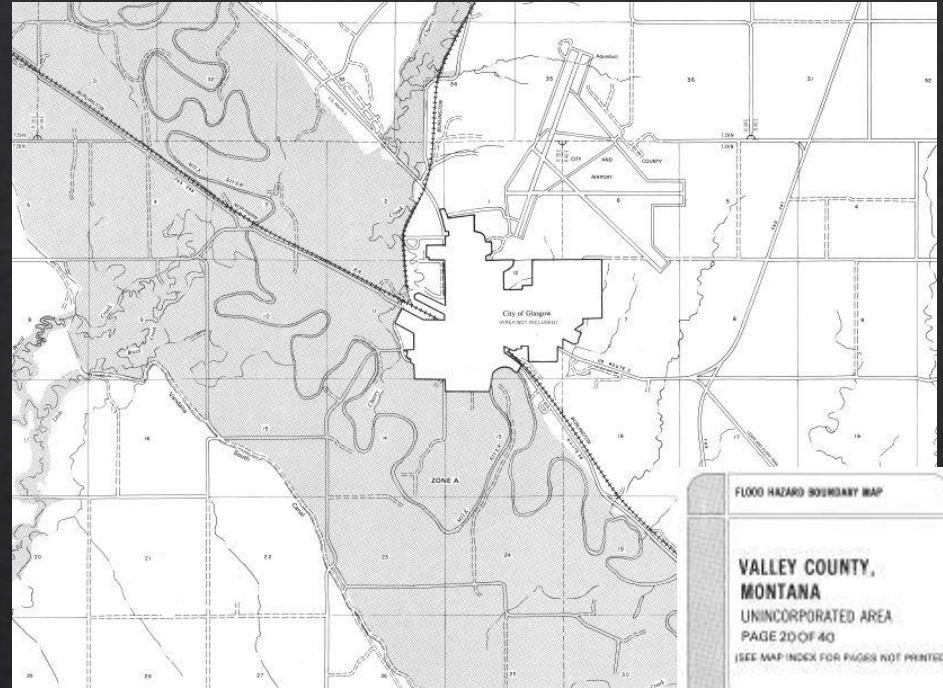


# Identifying risk through mapping



# Flood Insurance Rate Maps

- ◆ Used for various purposes
  - ◆ Local floodplain regulations
  - ◆ Flood insurance premiums
  - ◆ Local emergency planning
- ◆ Need periodic updating



FLOOD HAZARD BOUNDARY MAP

**VALLEY COUNTY,  
MONTANA**  
UNINCORPORATED AREA  
PAGE 20 OF 40  
(SEE MAP INDEX FOR PAGES NOT PRINTED)

EFFECTIVE DATE:  
FEBRUARY 21, 1978

CONVERTED BY LETTER  
EFFECTIVE 1/1/87

COMMUNITY-PANEL NO.  
300171 0020 A



U.S. DEPARTMENT OF HOUSING  
AND URBAN DEVELOPMENT  
FEDERAL INSURANCE ADMINISTRATION



# Valley County - Floodplain Maps

◇ 1978 floodplain maps



FLOOD HAZARD BOUNDARY MAP

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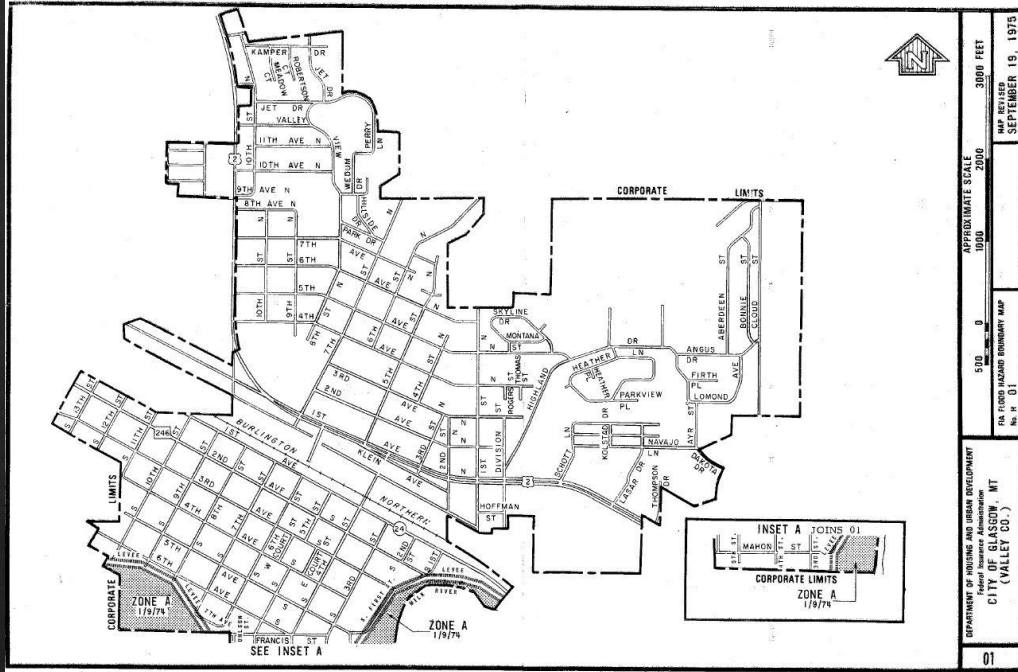
CONVERTED BY LETTER  
EFFECTIVE 1/1/07

COMMUNITY-PANEL NO.  
300171 0020 A



U.S. DEPARTMENT OF HOUSING  
AND URBAN DEVELOPMENT  
FEDERAL INSURANCE ADMINISTRATION

# City of Glasgow- Flood hazard map



City of Glasgow  
 1974 Map issued  
 1975 Map rescinded

**RECEIVED**

JUN 30 1975  
 MONT. DEPT. OF NATURAL  
 RESOURCES & CONSERVATION

July 27, 1975

Michael Baker, Jr., Inc.  
 Consulting Engineers  
 Box 3225  
 Harrisburg, Pennsylvania 17106

Subject: The Revised Flood Hazard Boundary Map  
 The City of Glasgow, Montana

Dear Sir:

I am enclosing a copy of the revised preliminary flood hazard map on which you have made the changes that we discussed in our letter of April 4, 1975.

I understand this map means that there are not any special flood hazard areas inside the levy surrounding the corporate limits of the City of Glasgow.

Please acknowledge. Thank you.

Sincerely,

*James L. Hines*  
 James L. Hines

JLH:ms

cc: Bob Smith

Flood Way Management Engineer  
 Flood Way Management Bureau  
 32 South Ewing  
 Helena, Montana 59601

Mr. Joe E. Brown  
 Flood Insurance Administrator  
 Federal Building  
 1961 Stout Street  
 Denver, Colorado 80202  
 The National Flood Insurance Program  
 Washington, D. C. 20410

# Why re-study and update the maps?



High flood events

Highest agricultural flood damages \$1.4m

Highest flood claims \$1.5m

Largest amount of Repetitive Loss properties



Existing maps need updating





# Project Background

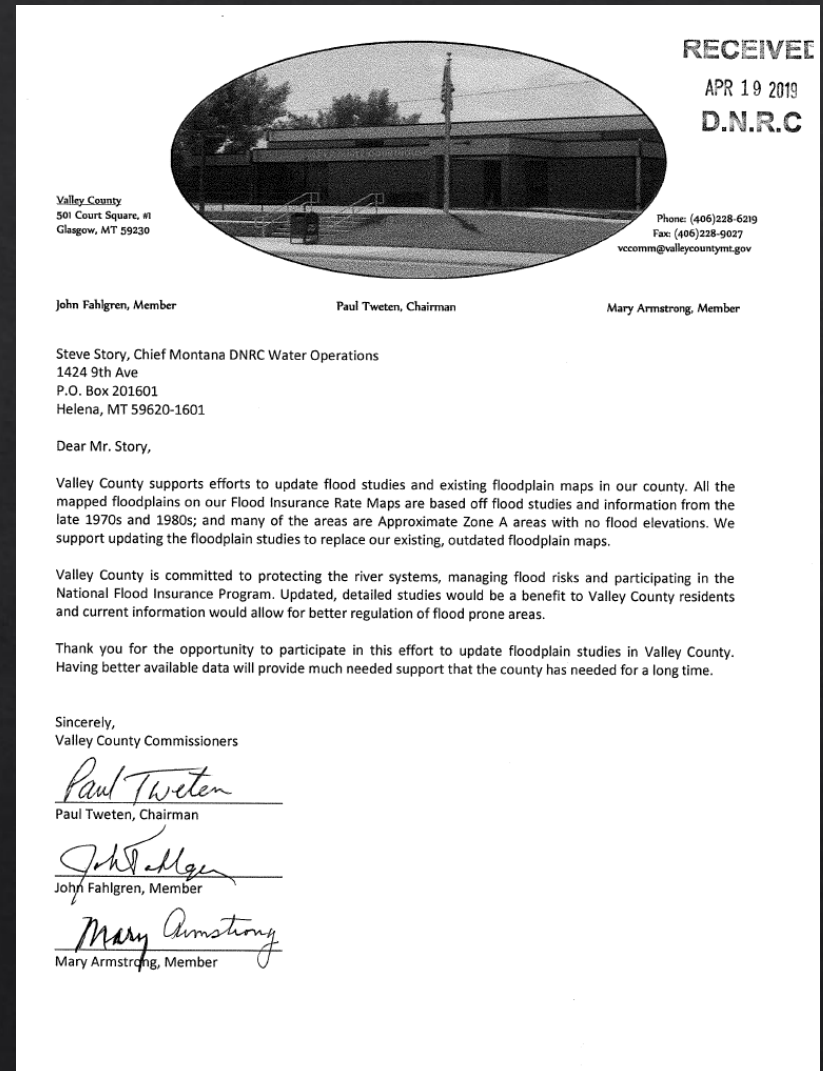
**Pre 2019-** Discussions to have a new flood study and updated maps/ LiDAR work began

**June 2019-** County provided letter of support for the project

**July 2019-** DNRC applied for FEMA grant

**September 2019-** Grant awarded by FEMA

**Fall 2019-** project underway



# Milk River Floodplain Mapping Project

Update 2,325.5 stream miles

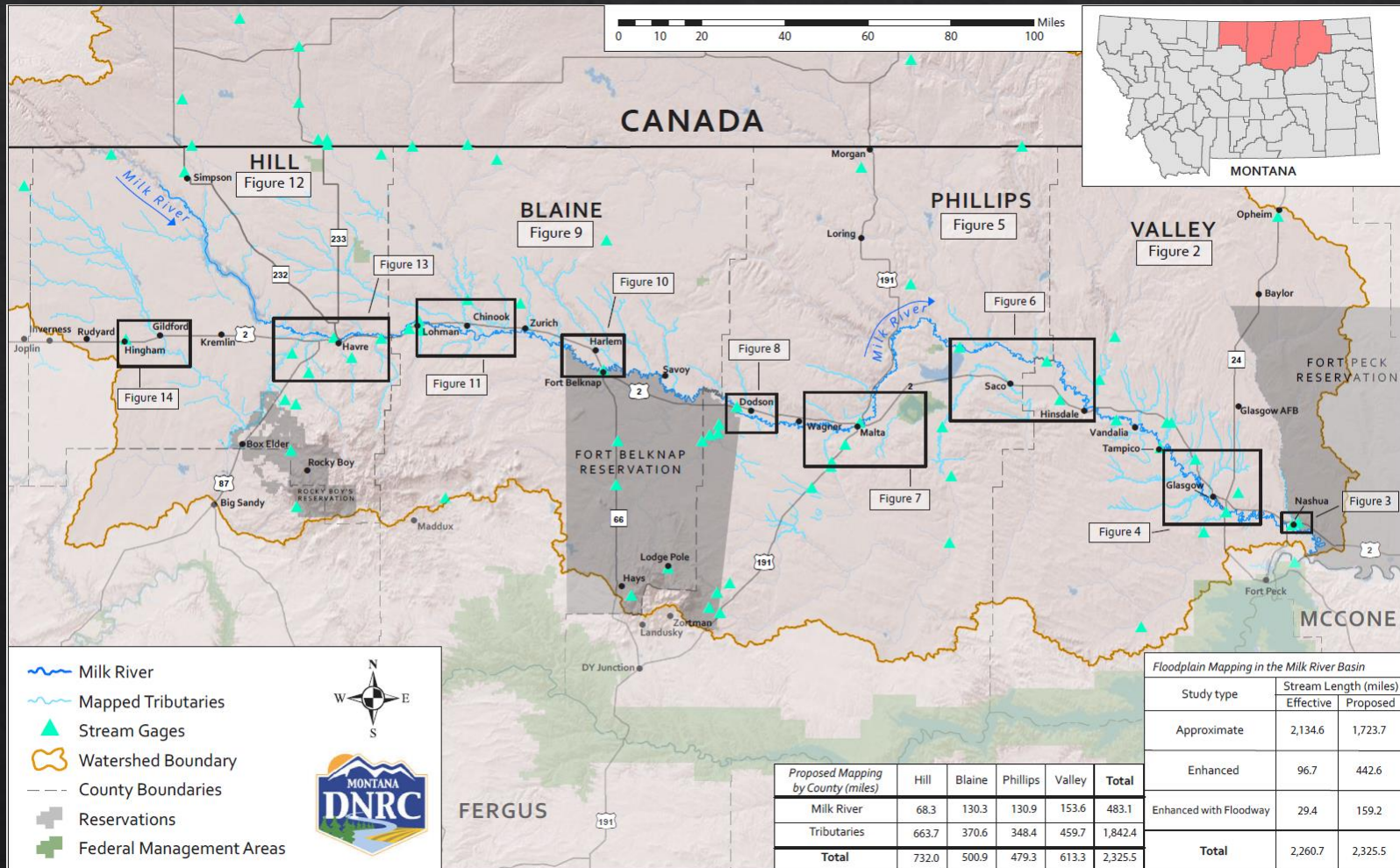
732 miles in Hill County

500.9 miles in Blaine County

479 miles in Phillips County

613 miles in Valley County

Project Funding:  
**\$3,544,000 FEMA**





# Project Team – Milk River project

- ◆ DNRC Floodplain Staff – Tiffany Lyden, Nadene Wadsworth, Steve Story, Katie Shank, Doug Brugger, Worby McNamee, Traci Sears



- ◆ Communities



Valley  
County  
Montana

- ◆ FEMA Region VIII



- ◆ DNRC Contractors:

- ◆ Topography/LiDAR – Quantum Spatial



- ◆ Survey Work– Bathymetric survey-River Design Group



Structure survey- Great West



- ◆ Hydrology- USGS and Michael Baker



- ◆ Hydraulic Analysis and Floodplain Mapping -



Michael Baker

# Understanding the Flood Study Process

## Flood Study Steps

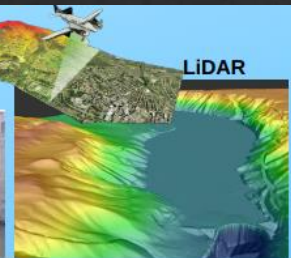
**Step 1 - Survey:** measurements are made of the topography around the river, along with any culverts, bridges, and road crossings. LiDAR uses an airplane to collect ground elevation over a large area, and ground survey supplements the airborne data.

**Step 2 - Hydrology:** determines how much water there will be in the river during a flood event. Data from stream gages will tell how many cubic feet of water per second the river will carry during the flood.

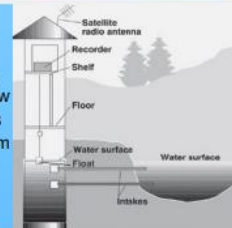
**Step 3 - Hydraulics:** once the first two steps are complete, calculations can show where the water will go during the flood. The elevation data is combined with the flood flow data to determine where the water will go when it overflows the channel.

**Step 4 - Mapping (delineation):** the results from step 3 are combined with the elevation data and official maps to see how far the water will spread out. The area shown to be underwater during the flood is the regulatory floodplain.

**Step 1 - Survey:** The type of the survey depends on the size of the study area and type of study.



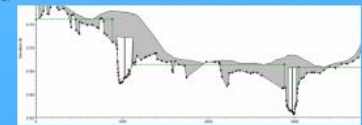
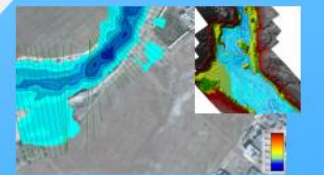
**Step 2 - Hydrology:** Stream gage stations are an important tool to determine flow rates. If nearby stream gages aren't available, gage data from a similar location is used to determine the flow rate.



### Step 3 - Hydraulics:

5 main components to the model

- 1) Hydrology (stream flow data)
- 2) Cross Sections (measurements of the river bottom at key locations)
- 3) Roughness (thickness of vegetation, land cover, etc determined by surveyors)
- 4) Structures (road crossings, culverts, bridges, etc.)
- 5) Downstream conditions



### Step 4 - Mapping (delineation):

The result will be the floodplain boundary and a depth grid identifying the shallower and deeper areas of flooding.



Photo taken

S33.T2N.R12W



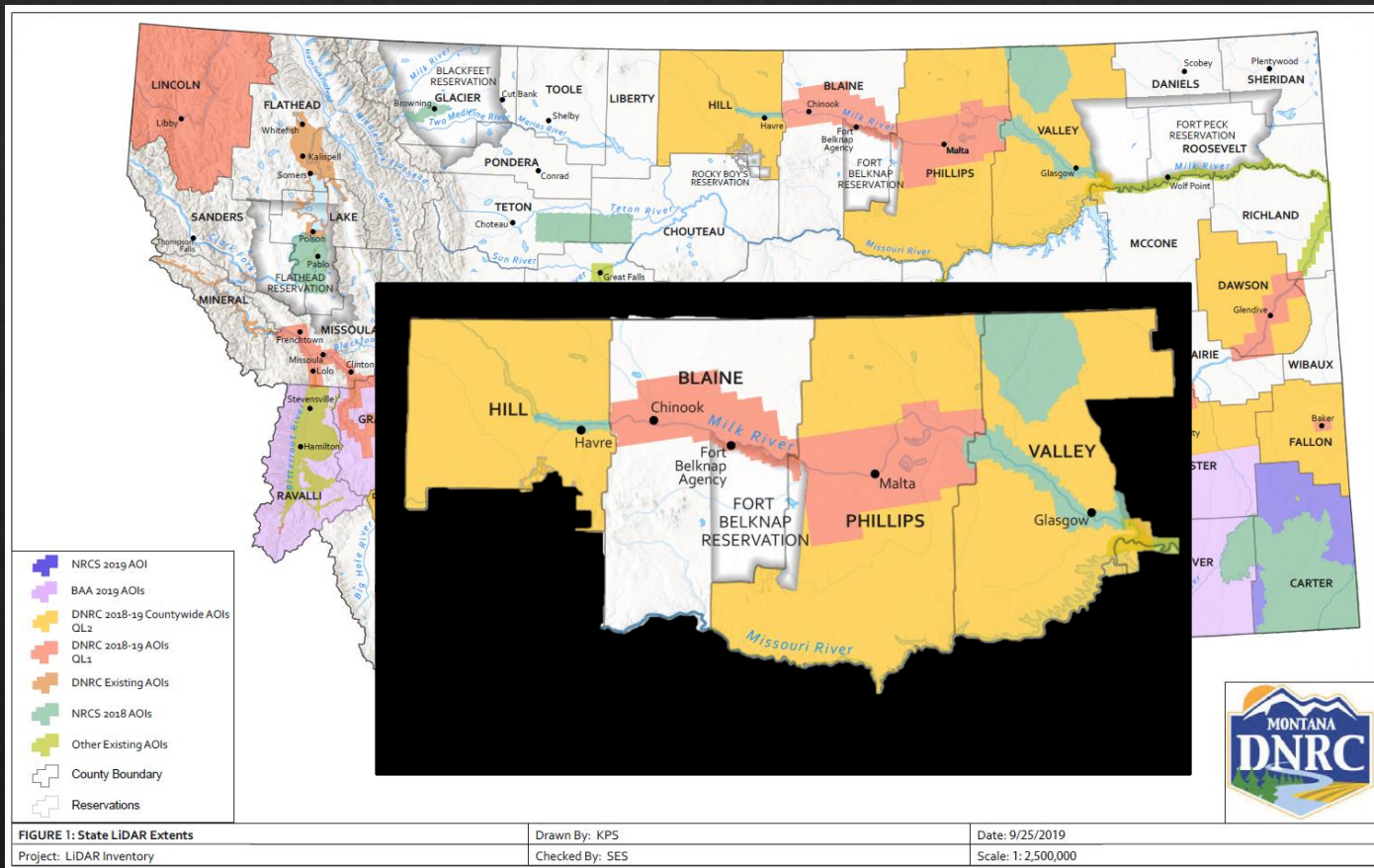
# Project Scope

## Topographic Data Collection



◆ Lidar Data Acquisition:

◆ LiDAR uses an airplane to collect ground elevation over a large area, and Ground Survey supplements the airborne data.



# Project Scope

## Survey Work

Provides in-stream and bridge/crossing data needed for hydraulic modeling and floodplain mapping.



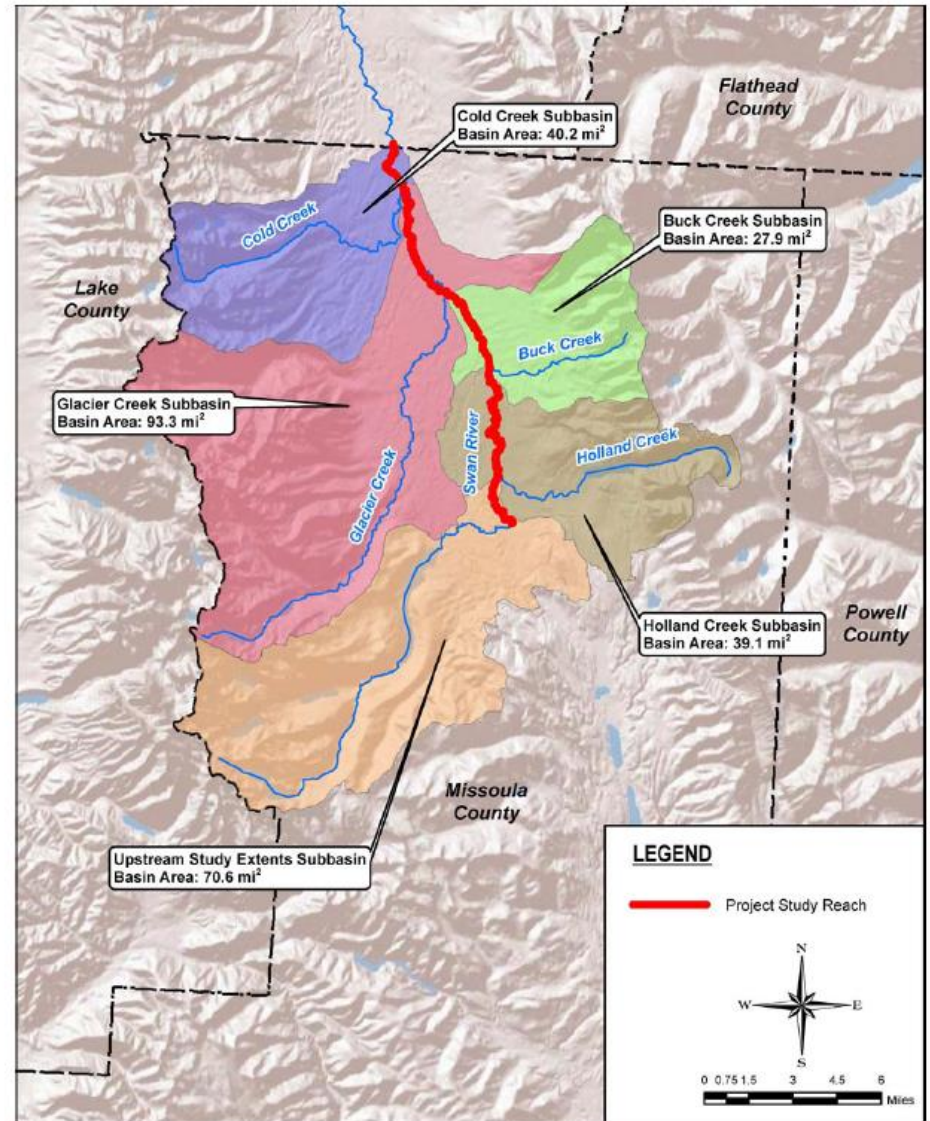


# Project Scope

## Hydrology

Determines how much water there will be in the river during a flood event. Data from stream gages will tell how many cubic feet per second the river will carry.

Figure 3: Drainage Basin Area





# Project Scope

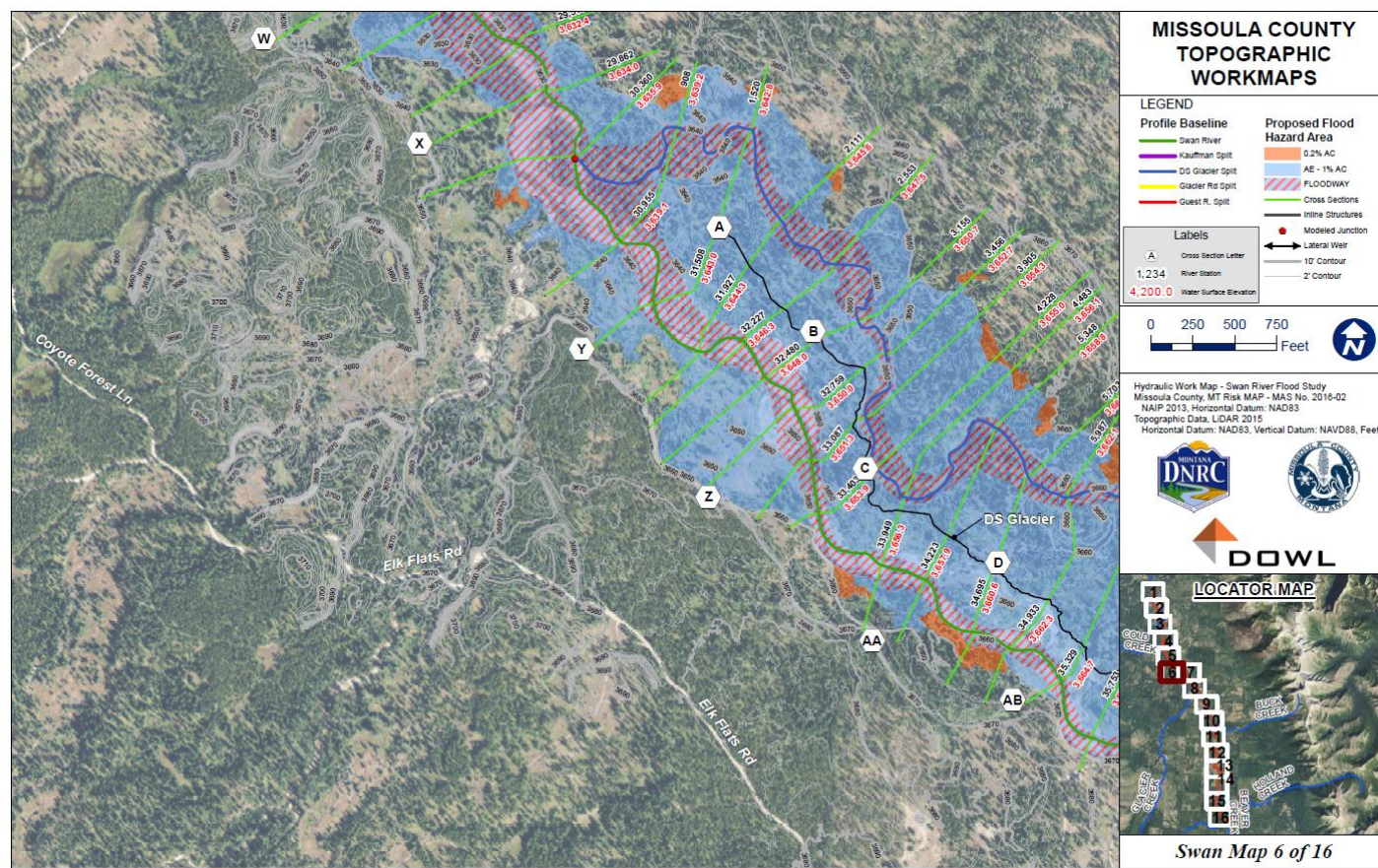
## Hydraulic Analysis and Floodplain Mapping

Hydraulic modeling (where the water will go when it overflows the channel) and engineering to produce draft maps.



Hydraulic Analysis Report

Swan River  
Missoula County, MT  
July 2016



Prepared For:  
Montana Department of Natural Resources and Conservation  
Water Resources Division  
24 9<sup>th</sup> Avenue  
Helena, MT 59620

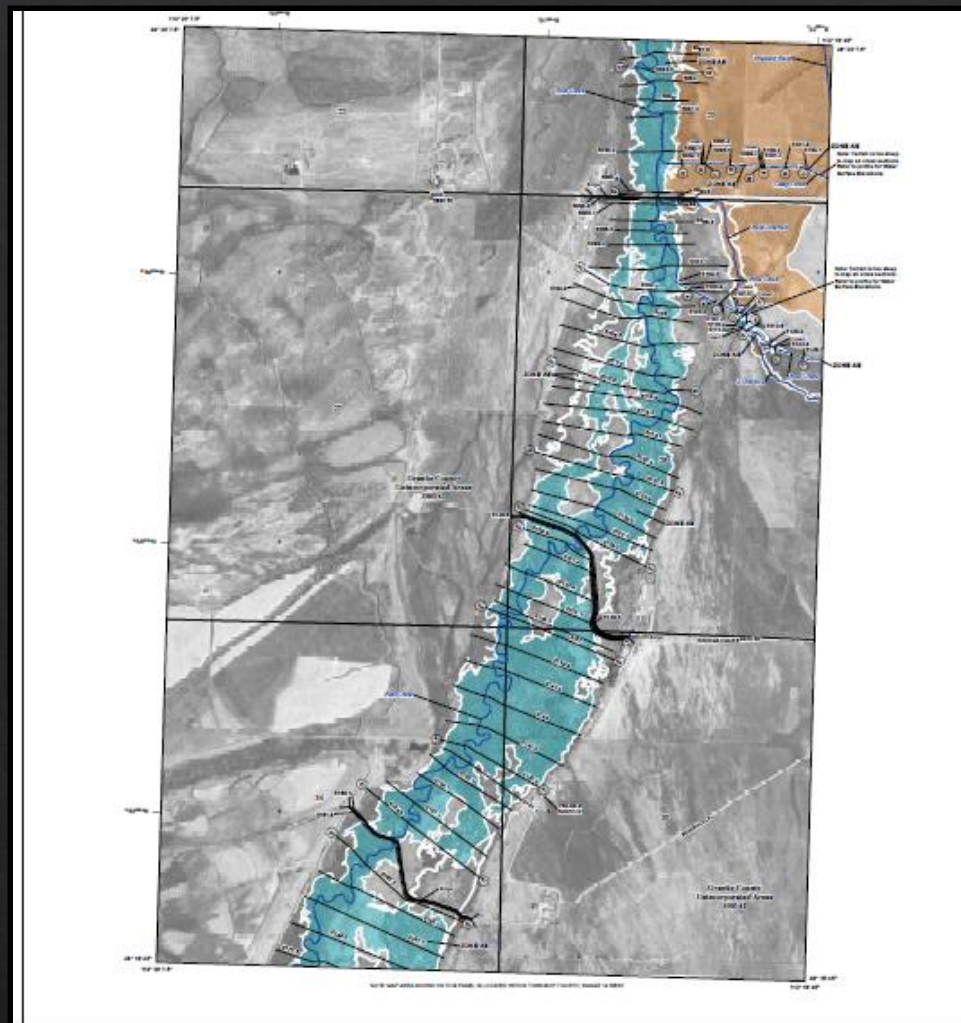
Prepared By:  
DOWL  
2 North 32<sup>nd</sup> Street, Suite 700  
Helena, MT 59101



# Project Scope

## FEMA Map Production

- ◆ Preliminary Maps
- ◆ Public Review
- ◆ Maps Finalized



### FLOOD HAZARD INFORMATION

ALL INFORMATION CONTAINED ON THIS MAP IS FOR PUBLIC USE ONLY. NO WARRANTY IS EXTENDED ON THIS DATA AND NO RESPONSIBILITY FOR ACCURACY OR COMPLETENESS IS ASSUMED. FOR MORE INFORMATION, VISIT [HTTP://WWW.FEMA.GOV](http://www.fema.gov)

SPECIAL FLOOD HAZARD AREAS	DESCRIPTION
	100-Year Base Flood Elevation (BFE) (1% AEP) or Depth (Zone of 100, 500, 1,000)
	Regulatory Flooding
	1% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than 100 square miles (1000)
	Future Condition 1% Annual Chance Flood Hazard (Zone 1)
	Areas with Reduced Flood Hazard (see Note, Zone 1)
	Areas of Minimal Flood Hazard (Zone 2)
	Area of Undevelopment Flood Hazard (Zone 3)
	Channel, Canal, or Storm Sewer Associated or Flanking by Non-vented Lanes, Dike, or Floodwall
	Non-vented Lanes, Dike, or Floodwall
	Creek Bedlines with 1% Annual Chance Water Surface Elevation (BFE)
	Crested Butte
	Crested Butte
	Public Facilities
	Spring/Utility Features
	Base Flood Elevation (BFE) (1% AEP)
	Line of Study
	Arbitration Boundary

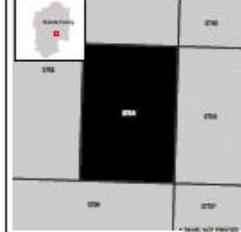
### NOTES TO USERS

For information and updates about this map, including product information, visit the FEMA website. For more information, visit [www.fema.gov](http://www.fema.gov). For more information, visit [www.fema.gov](http://www.fema.gov). For more information, visit [www.fema.gov](http://www.fema.gov). For more information, visit [www.fema.gov](http://www.fema.gov).

### SCALE



### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
SHARPE COUNTY, MISSOURI  
Map 774-1200

PRELIMINARY  
05/18/2014

100% WATER  
100% LAND

100% WATER  
100% LAND

100% WATER  
100% LAND

# Estimated Project Schedule

Topographic (LiDAR) – Complete

Survey Work- completed early 2021

Hydrology- completed mid to late 2021

Hydraulics-

    Tributaries-completed mid 2022

    Milk River- phase II

Draft Maps

Public review of draft maps

FEMA Map Production/  
Preliminary Maps

Public review of preliminary maps

FEMA maps finalized





# Community Contribution

## ATTENTION SWAN RIVER PROPERTY OWNERS in or near the FLOODPLAIN...

Missoula County is currently working with FEMA and Montana DNRC to update floodplain maps for the Swan River. FEMA's Preliminary Digital Flood Insurance Rate Maps (DFIRM) are intended to provide more reliable and detailed information about flood-prone areas along the Swan River. You are receiving this postcard because proposed floodplain mapping changes could affect your property.

[www.missoulacounty.us/swanfp](http://www.missoulacounty.us/swanfp)

Visit the County's website above to view FEMA's Preliminary DFIRM showing proposed floodplain changes and/or attend the public open house to get more information about this project.

### PUBLIC OPEN HOUSE

Tuesday, June 20, 2017 | 6:00 p.m. - 7:00 p.m.  
Swan Valley Community Hall | 6803 HWY 83N, Condon, MT

Staff from the DNRC Floodplain Program and Missoula County will be on hand during the open house to answer questions and provide an overview of the project. We ask anyone with information relevant to potential flood hazards to share information at the meeting.

We look forward to seeing you there. For more information, contact Todd or Tiffany.



**TODD KLIETZ**

Missoula County Floodplain Administrator  
tklietz@missoulacounty.us  
406.258.4841

**TIFFANY LYDEN**

MT DNRC  
tlyden@mt.gov  
406.444.0599



# Project Webpage

## Carbon County Flood Maps Update

by [Nadene Wadsworth](#) — last modified Oct 17, 2019 01:18 PM — [History](#)

### Background on the floodplain maps in the County:

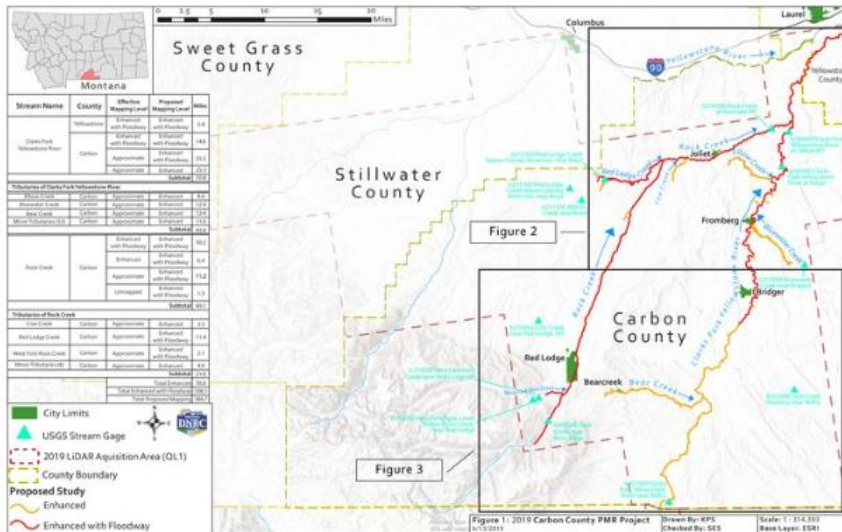
Carbon County floodplain maps were modernized through a Digitized Flood Insurance Rate Map (DFIRM) project in 2012. The maps were converted from paper to the digital environment. Most of the mapped floodplains in the county are still based off flood studies from the late 1970s and early 1980s. The 2012 DFIRM project entailed digital conversion of the effective floodplains in the county, with the exception of revised hydraulics and mapping on 9 miles of the Clarks Fork of the Yellowstone (upstream from the Carbon/Yellowstone County border). This revision, however, did not include updated hydrology or survey data. In 2017 a Partial Mapping Revision (PMR) was completed for the portion of the Yellowstone River in the county. The PMR leveraged US Army Corps of Engineers information from a Yellowstone River corridor study and updated floodplain mapping in Stillwater and Yellowstone Counties to update and replace the approximate floodplain mapping on the Carbon County side of the Yellowstone River with enhanced and floodway mapping.

### 2019 Project

DNRC with support from Carbon County applied and received a FEMA grant to update the flood study and floodplain maps for the Clarks Fork of the Yellowstone, Rock Creek, and tributaries.

DNRC held a project kick off meetings on October 3rd & 4th, 2019 with Carbon County, Joliet, Red Lodge, Bear Creek, and Fromberg. [To view the slides that were presented click here.](#)

Below are the figures of the study extents for the project.



### Project Points of Contact

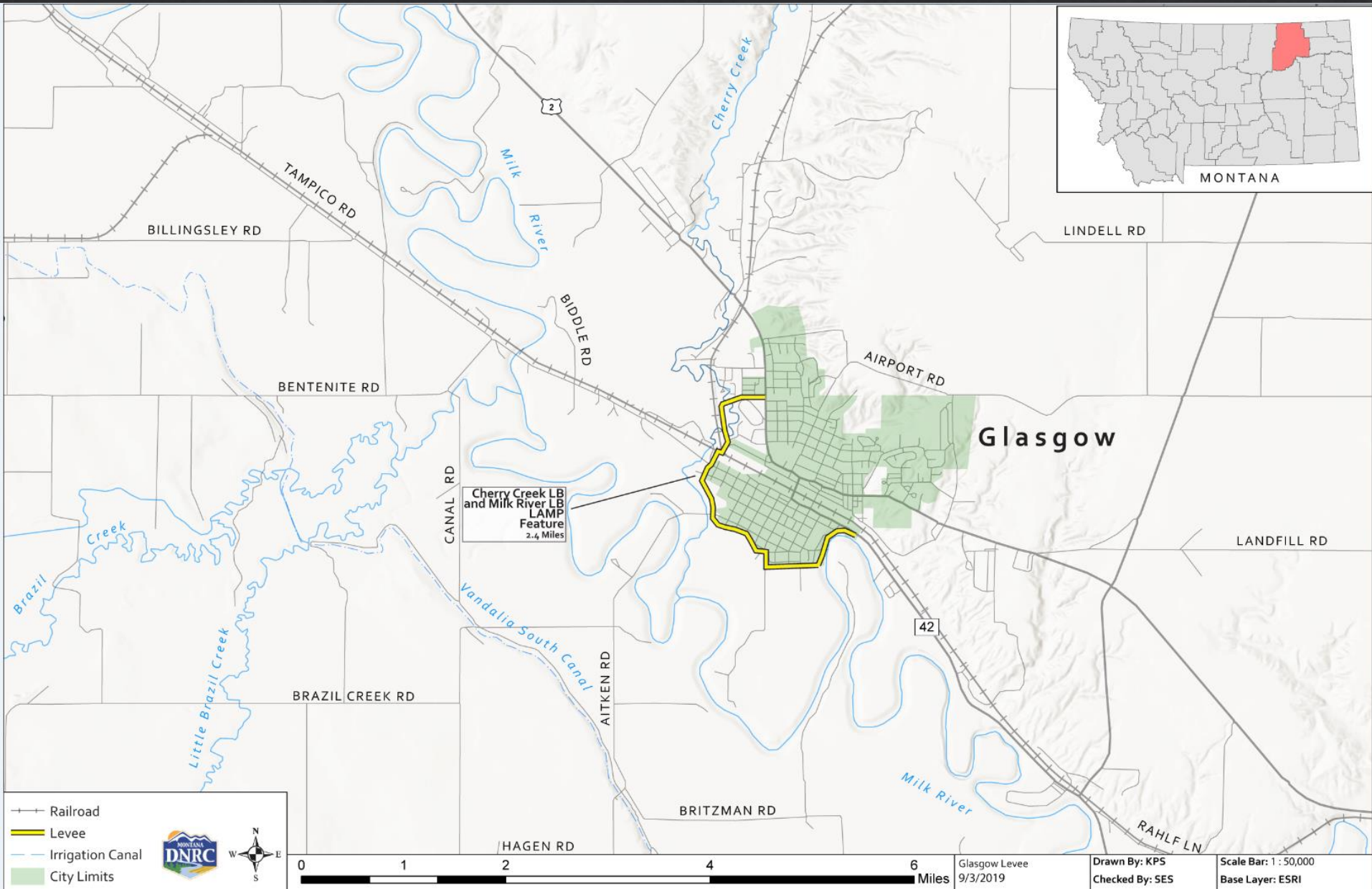
**Annie Gillespie**  
Carbon County Floodplain Administrator  
(406) 445-7300  
[email](#)

**Tiffany Lyden**  
MT DNRC Outreach Specialist  
(406)444-0599  
[email](#)

**Nadene Wadsworth**  
MT DNRC Outreach Specialist  
(406)444-6732  
[email](#)

[Manage portals](#)





Cherry Creek LB  
and Milk River LAMP  
Feature  
2.4 Miles

Glasgow

- +— Railroad
- Levee
- Irrigation Canal
- City Limits



Glasgow Levee  
9/3/2019

Drawn By: KPS  
Checked By: SES

Scale Bar: 1 : 50,000  
Base Layer: ESRI

DEPARTMENT OF NATURAL RESOURCES  
AND CONSERVATION



STEVE BULLOCK  
GOVERNOR

DIRECTOR'S OFFICE (406) 444-2074  
TELEFAX NUMBER (406) 444-2684

STATE OF MONTANA

WATER RESOURCES DIVISION (406) 444-6601  
TELEFAX NUMBERS (406) 444-0533 / (406) 444-5918  
<http://www.dnrc.mt.gov>

1424 9TH AVENUE  
PO BOX 201601  
HELENA, MONTANA 59620-1601

October 28, 2019

Mayor Becky Erickson  
319 3<sup>rd</sup> St. S  
Glasgow, MT 59230

Dear Mayor Erickson :

The Department of Natural Resources and Conservation (DNRC) floodplain program, The City of Glasgow, and Valley County have been collaborating to undertake a new flood hazard study for the Milk River watershed which will update the existing Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). FEMA recently awarded DNRC a grant to complete the project. Accordingly, we are beginning the process of scheduling community kickoff meetings and launching the initial project tasks.

The new study requires a review and assessment of any existing flood protection systems for the Milk River watershed. FEMA requires that Levee Sponsor/Owners provide engineering certification to ensure the levees are sound and to qualify for a reduced flood risk category on the landward side of the levee systems, in accordance with FEMA's accreditation requirements (44 CFR 65.10). DNRC has identified two levees that are owned and maintained by The City of Glasgow: The Cherry Creek Left Bank and Milk Left Bank (see attached figure). The existing status of these levees, based on the effective FIRMs is:

- The Cherry Creek Left Bank and Milk Left Bank levees show a reduced risk on the landward side of the levees

As the Owner/Sponsor of these levee systems, the city is responsible for providing all the necessary data, documentation, and certification (by a licensed professional engineer) to FEMA and DNRC, demonstrating that the levee systems comply with FEMA's minimum requirements for accreditation (per 44 CFR 65.10).

This letter serves as our formal request of the city's intent to pursue FEMA accreditation of the levee systems defined above.

The city may choose to pursue certification at the city's expense for potential accreditation by FEMA. Accreditation status from FEMA will result in the levee showing reduced risk on the landward side of the levee system(s) on the future FIRMs. Residents that live behind an accredited levee may receive reduced flood insurance premiums.

The city may choose not to pursue certification/accreditation, which would result in a different flood mapping process. The levee would be modeled and potentially mapped as not reducing the risk on the landward side of the levee system(s). As a result, residents living behind non-certified/non-accredited levees that have a federally backed mortgage would be required to carry flood insurance at the high-risk premium.

Understanding the city's intent will help DNRC facilitate the flood study process, along with coordinating the project schedule and study methods. Additionally, we request the city provide us with a designated point of contact for all levee related information and questions, as well as the contact information for whichever engineering firm the city may choose to work with, if certification/accreditation is the path forward. Should you have any questions, please contact Nadene Wadsworth at [Nadene.wadsworth@mt.gov](mailto:Nadene.wadsworth@mt.gov) (406) 444-6732 or myself [sestory@mt.gov](mailto:sestory@mt.gov) (406) 444-6816.

For your convenience, we have prepared a sample 'letter of intent' template. If you could, please fill it out and return it to our office with all the information by February 28, 2020.

Thank you,

A handwritten signature in blue ink, appearing to read "Steve Story".

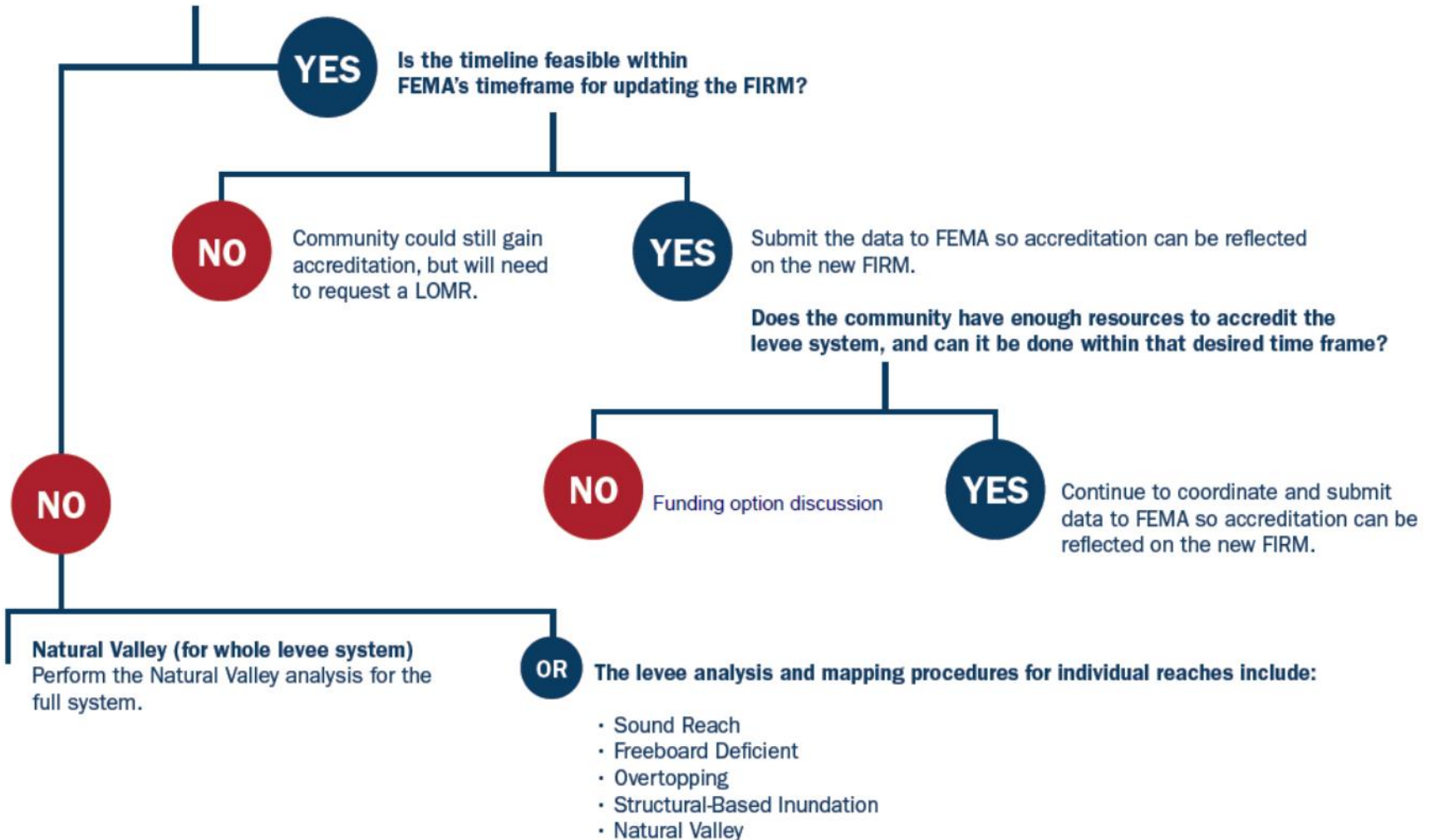
Steve Story, PE, CFM  
Chief, Water Operations Bureau

cc: Robert Kompel, City of Glasgow Floodplain Administrator  
Mark English, FEMA

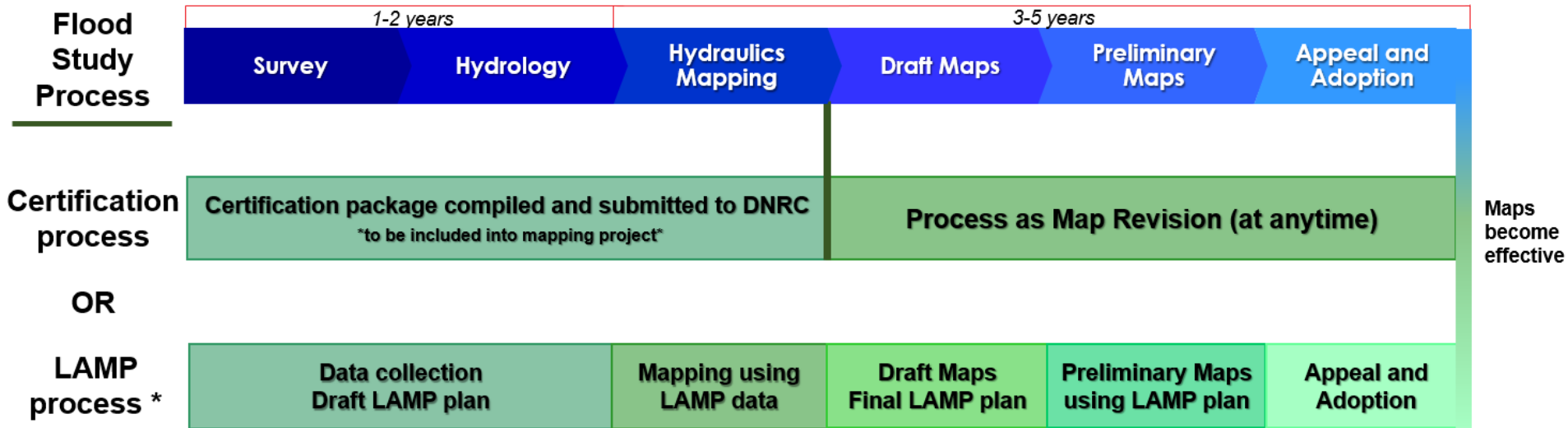


Determining your path forward:

# DO YOU INTEND TO ACCREDIT YOUR LEVEE SYSTEM?



# Levee Mapping Timeframe



LAMP (Levee Analysis and Mapping Procedures) mapping process for non-accredited levees, or levees that may not be able to be certified during mapping projects.



# Meeting the Criteria for Accrediting Levee Systems on Flood Insurance Rate Maps: How-To Guide for Floodplain Managers and Engineers

The National Flood Insurance Program (NFIP) defines a levee system in Title 44, Chapter 1, Section 59.1 of the Code of Federal Regulations ([44 CFR 59.1](#)) as a flood risk reduction system that consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices to protect a hydraulically distinct area. Within the NFIP, a levee is a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

As part of the [flood mapping process](#), the Federal Emergency Management Agency (FEMA), and its State and local mapping partners, review and evaluate levee system data and documentation. Any community and/or other party seeking recognition or continued recognition of a levee system on a Flood Insurance Rate Map (FIRM) must provide FEMA with data and documentation, certified by a registered professional engineer, showing that the levee system is expected to provide 1-percent-annual-chance (base) flood risk reduction.

To be mapped on a FIRM as providing base flood risk reduction, levee systems must meet and continue to meet the NFIP minimum design, operation, and maintenance requirements described in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations ([44 CFR 65.10](#)). FEMA has posted several guidance documents related to levee accreditation, mapping, and other topics. Please access the [Levee Resources Library](#) for updated guidance documents. To help clarify the responsibilities of community officials, levee owners, or other parties seeking recognition of a levee system identified during a study/mapping project, FEMA has posted several [guidance documents](#) related to levee accreditation, mapping, and other related topics. This document provides information regarding how FEMA maps levee systems, a checklist of the types of data and documentation that must be submitted for levee systems to be accredited on FIRMs, and an index of further resources.

## A NOTE ABOUT FLOOD RISK AND FLOOD INSURANCE

Levee systems are designed to provide a specific level of protection. They can be overtopped or fail during flood events larger than those for which the system was designed. Levee systems also decay over time, which may increase the likelihood of failure. They require regular maintenance and periodic upgrades to retain their level of protection. When levees do fail, the resulting damage, including loss of life, may be much greater than if the levee system had not been built.

For all these reasons, FEMA strongly encourages people in levee-impacted areas to understand their flood risk, know and follow evacuation procedures, and protect their property by purchasing flood insurance, floodproofing their structure, or taking other precautionary measures. For more information on flood insurance, please visit [FloodSmart.gov](#).



Design Criteria		Section of the NFIP Regulations: 65.10(b)
<p><b>Description:</b> For levee systems to be accredited by FEMA, communities and/or levee owners must submit data and documentation to show that adequate design and operations and maintenance systems are in place to provide reasonable assurance that the levee has, and will continue to have, base flood risk reduction capability.</p>		
<p><b>Checklist for Design Criteria:</b></p>		
■	<p><b>Freeboard.</b> The minimum freeboard required is 3 feet above the Base Flood Elevation (BFE) all along the length of the levee, with an additional 1 foot within 100 feet of structures (such as bridges) or wherever the flow is restricted, and an additional 0.5 foot at the upstream end of a levee. Levees impacted by coastal flooding have special freeboard requirements (see Paragraphs 65.10(b)(1)(iii) and (iv)).</p>	
■	<p><b>Closures.</b> All openings must be provided with closure devices that are structural parts of the system during operation and designed according to sound engineering practice.</p>	
■	<p><b>Embankment Protection.</b> Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.</p>	
■	<p><b>Embankment and Foundation Stability Analyses.</b> Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided must evaluate expected seepage during loading conditions associated with the base flood and must demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (USACE) Engineer Manual 1110-2-1913, <i>Design and Construction of Levees</i>, (Chapter 6, Section II), may be used.</p>	
■	<p><b>Settlement Analyses.</b> Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in USACE Engineer Manual 1110-1-1904, <i>Soil Mechanics Design—Settlement Analysis</i>, must be submitted.</p>	

## RISK MAPPING, ASSESSMENT, AND PLANNING PROGRAM (RISK MAP)

The Federal Emergency Management Agency's Risk MAP Program delivers quality data that increases public awareness and leads to action to reduce risk to life and property. Risk MAP is a nationwide program that works in collaboration with States, Tribes, and Local communities using best available science, rigorously vetted standards, and expert analysis to identify risk and promote mitigation action, resulting in safer, more resilient communities.







Photo Credit: LCTRfan , YouTube [https://www.youtube.com/watch?v=vX4qn\\_aLnHQ](https://www.youtube.com/watch?v=vX4qn_aLnHQ)

# Thank You

Tiffany Lyden  
MT DNRC

[Tlyden@mt.gov](mailto:Tlyden@mt.gov)  
(406) 444-0599

Nadene Wadsworth  
MT DNRC

[Nadene.Wadsworth@mt.gov](mailto:Nadene.Wadsworth@mt.gov)  
(406) 444-6732