



**PROJECT KICKOFF MEETING**  
*Hill County Floodplain Mapping Project*

November 5, 2019

Purpose:

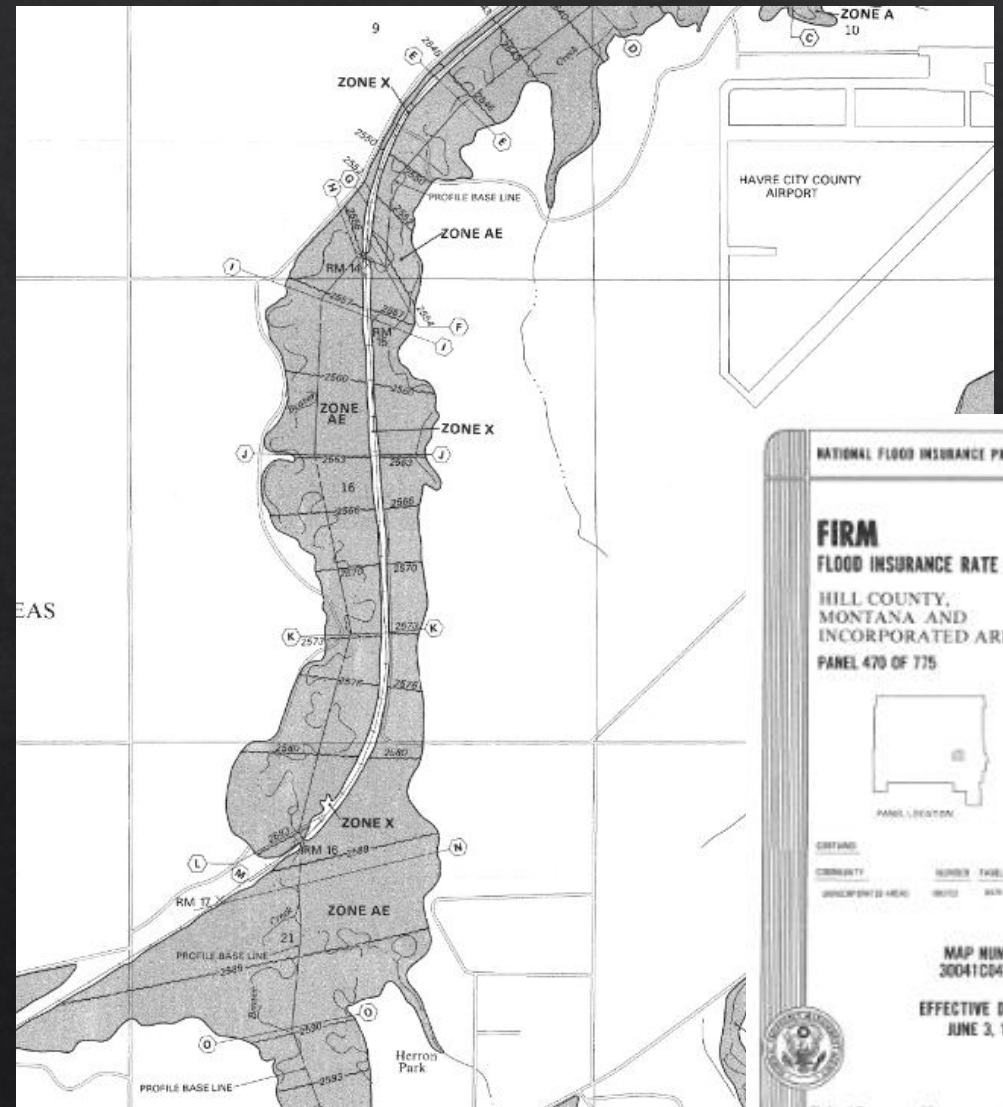
- Project Overview
- Review Project Team, Scope & Schedule
- Levee certification/accreditation
- Questions & Discussion

# Identifying risk through mapping



# Flood Insurance Rate Maps

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



NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP

HILL COUNTY,  
MONTANA AND  
INCORPORATED AREAS  
PANEL 470 OF 775

MAP LOCATION

GRIDLINE	CITY/TOWN	NUMBER	SCALE	SECTION
1000 FEET	HEAD	1000	SCALE	1

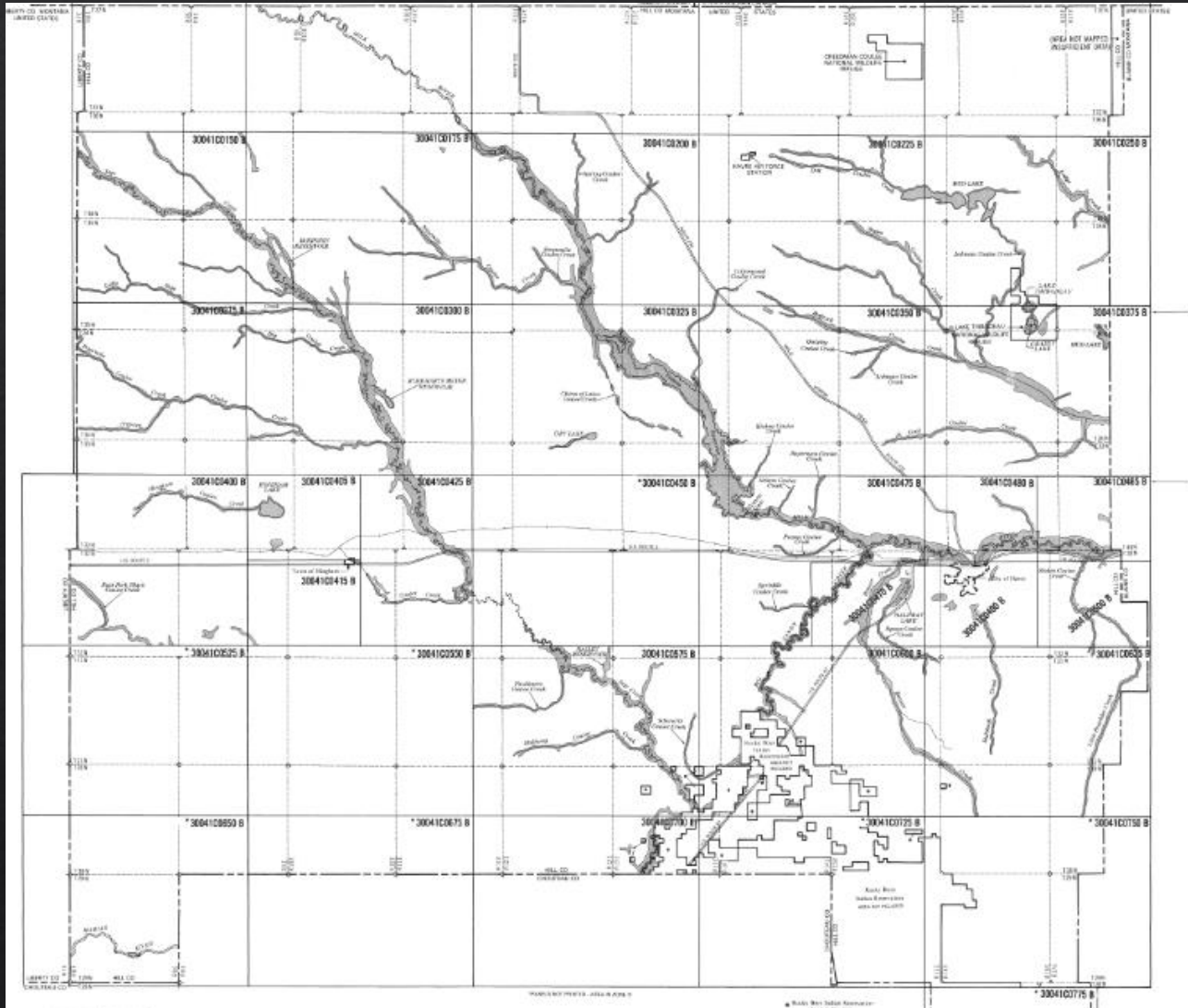
MAP NUMBER  
30041C0470 B

EFFECTIVE DATE:  
JUNE 3, 1988

Federal Emergency Management Agency

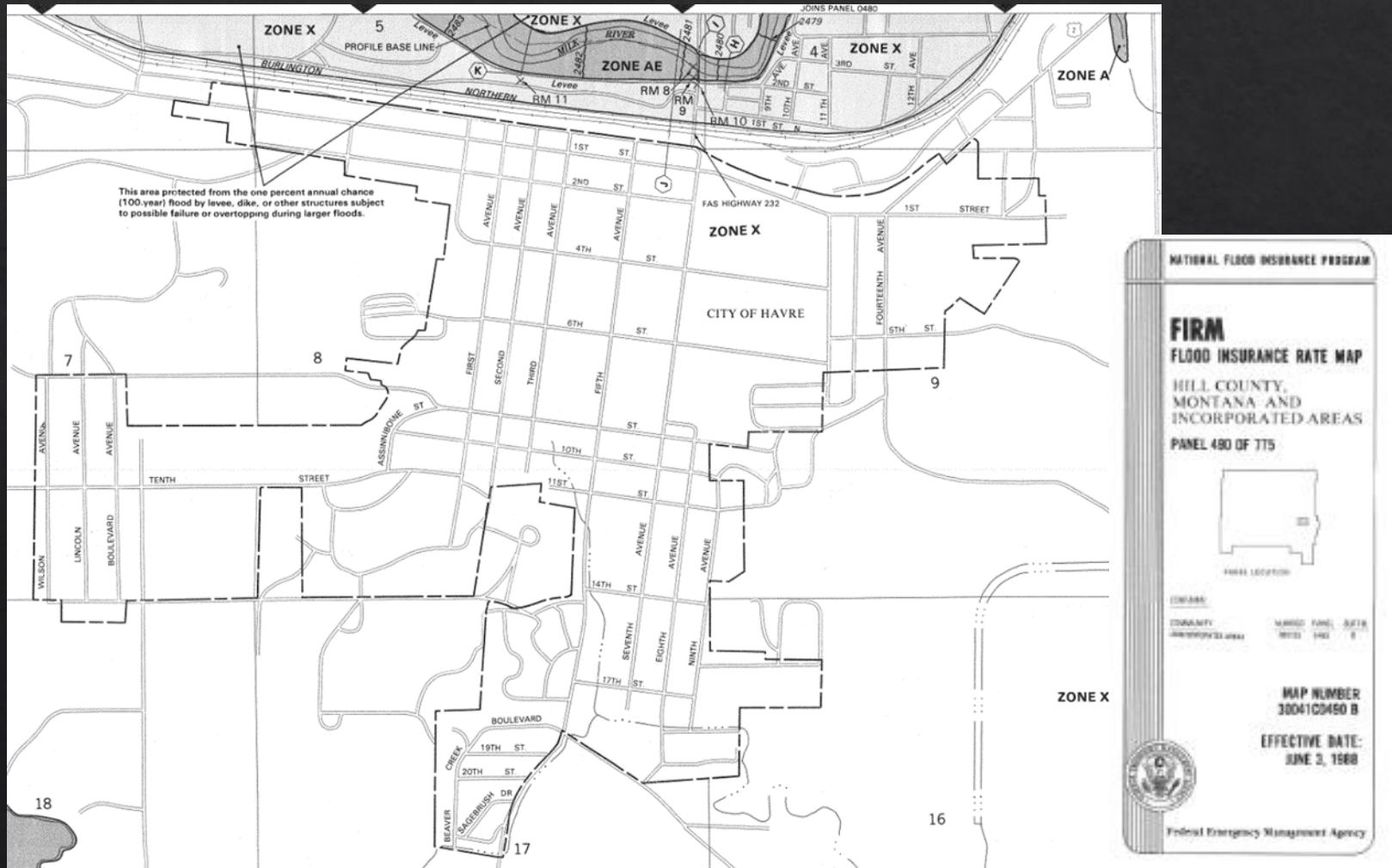
# Hill County - Floodplain Maps

- ◇ 1978 1<sup>st</sup> floodplain maps issued
- ◇ 1988 floodplain maps revised



# City of Havre- Floodplain Maps

◆ 1988 1<sup>st</sup> floodplain map issued



# Project Background

- ◆ **Pre 2019-** Discussions to have a new flood study and updated maps/ LiDAR work began
- ◆ **June 2019**– County submitted support Letter to DNRC to update floodplain maps
- ◆ **July 2019** – DNRC applied for FEMA grant
- ◆ **September 2019** – FEMA grant awarded; contractor selection and contracts
- ◆ **Fall 2019** –Project underway



## COUNTY OF HILL

Hill County Courthouse  
315 4th Street  
Havre, Montana 59501  
[406] 265-5481 Ext. 227  
Fax [406] 265-2445

RECEIVED

JUN 14 2019

DNRC

Steve Story, Chief  
Montana DNRC  
Water Operations  
1424 9<sup>th</sup> Avenue  
P.O. Box 201601  
Helena, MT. 59620-1601

Dear Mr. Story,

Hill County supports efforts to update flood studies and existing floodplain maps in our county. All the mapped floodplains on our Flood Insurance Rate Maps are based off flood studies and information from the late 1970s and 1980s; and many of the areas are Approximate Zone A areas with no flood elevations. We support updating the floodplain studies to replace our existing, outdated floodplain maps.

As Hill County is in the final stages of our SWIF document and in the process of doing a breach study the updated flood plain maps will help the county better understand where our greatest concerns are. We have also recently updated our County Growth Policy. Having a better understanding of where our actual flood plains are will lead to better growth planning. Please note the attached map of the areas we would like studied.

Hill County is committed to protecting the river systems, managing flood risks and participating in the National Flood Insurance Program. Updated, detailed studies would be a benefit to Hill County residents and current information would allow for better regulation of flood prone areas.

Thank you for the opportunity to participate in this effort to update floodplain studies in Hill County. Having better available data will provide much needed support that the county has needed for a long time.

Sincerely,

Hill County Commissioners

Handwritten signature of Michael Wendland in blue ink.

Michael Wendland, Chair of the Board

Handwritten signature of Mark Peterson in blue ink.

Mark Peterson, Commissioner

Handwritten signature of Diane McLean in blue ink.

Diane McLean, Commissioner

# Milk River Floodplain Mapping Project

Update 2,325.5 stream miles

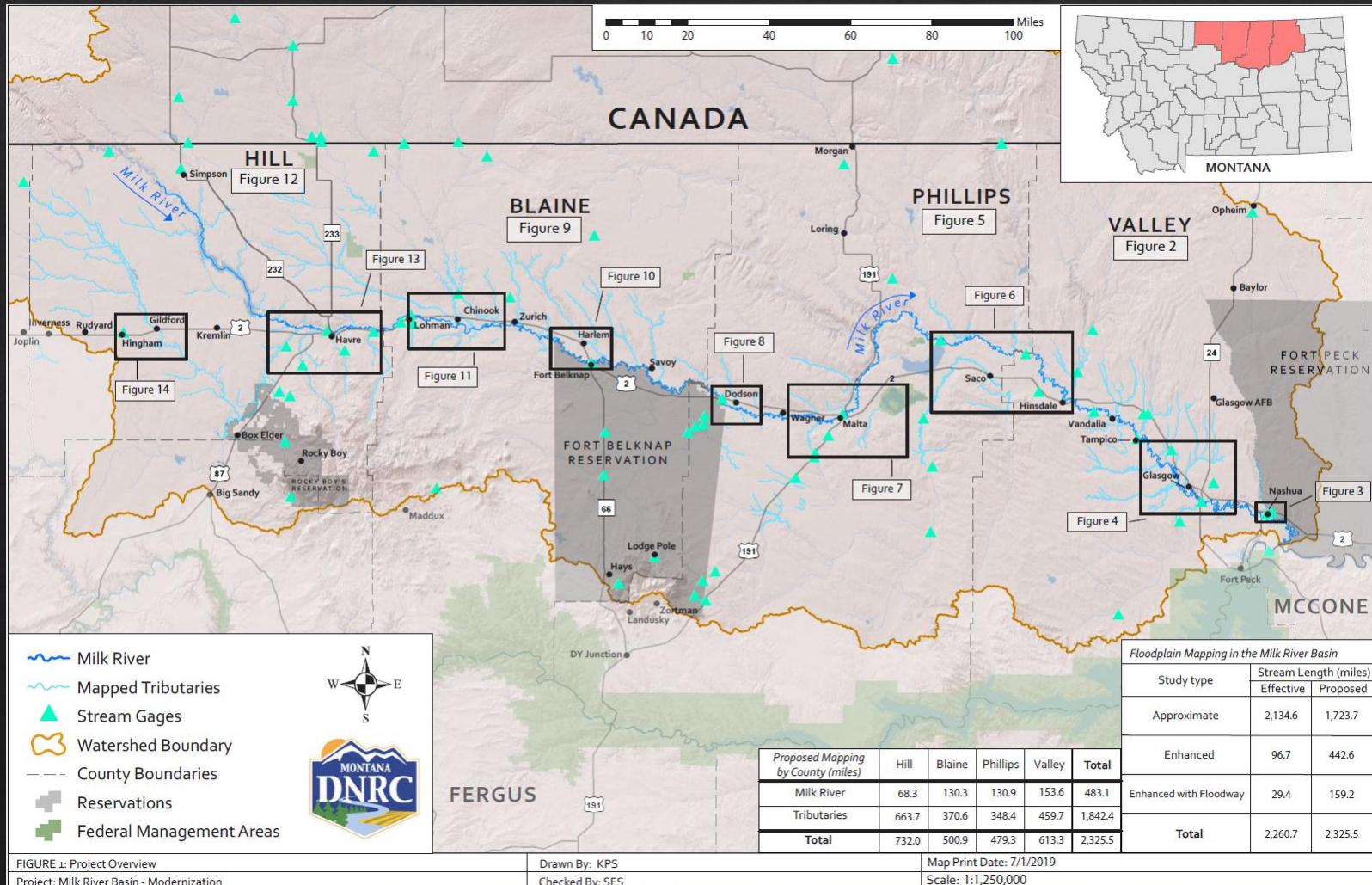
732 miles in Hill County

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

Photo taken

## Flood Study Steps

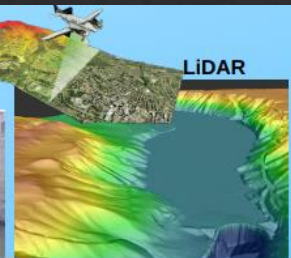
**Step 1 - Survey:** measurements are made of the topography around the river, along with any culverts, bridges, and road crossings. LiDAR uses an airplane to collect ground elevation over a large area, and ground survey supplements the airborne data.

**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.

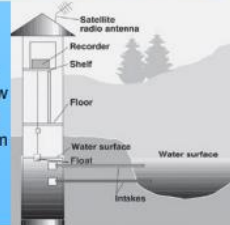
**Step 3 - Hydraulics:** once the first two steps are complete, calculations can show where the water will go during the flood. The elevation data is combined with the flood flow data to determine where the water will go when it overflows the channel.

**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.



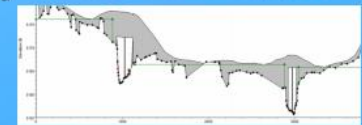
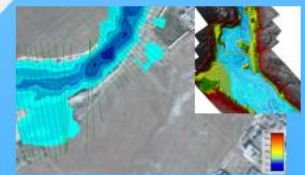
**Step 2 - Hydrology:** Stream gage stations are an important tool to determine flow rates. If nearby stream gages aren't available, gage data from a similar location is used to determine the flow rate.



### 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.



S33.T2N.R12W

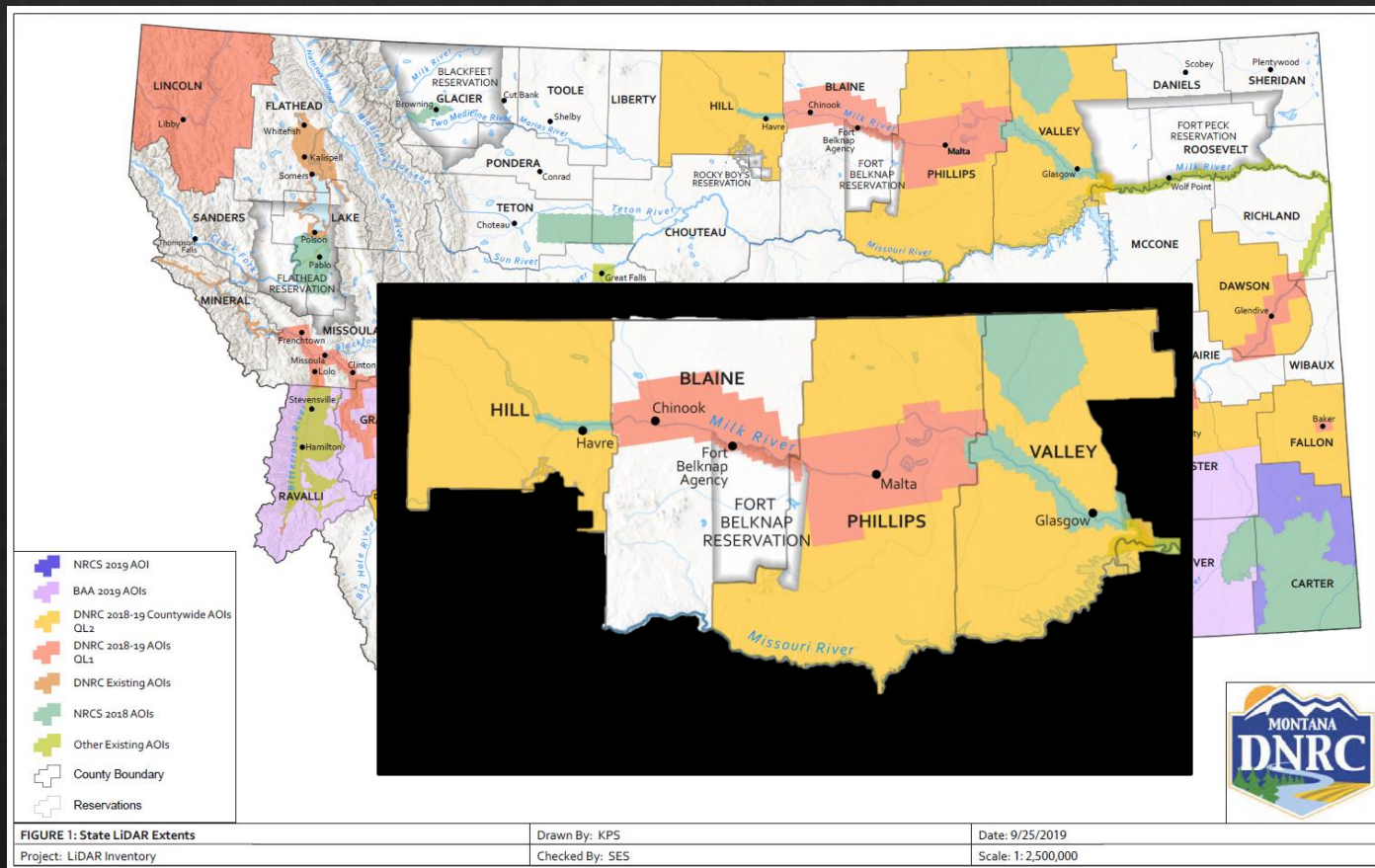
# Project Scope

## 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.

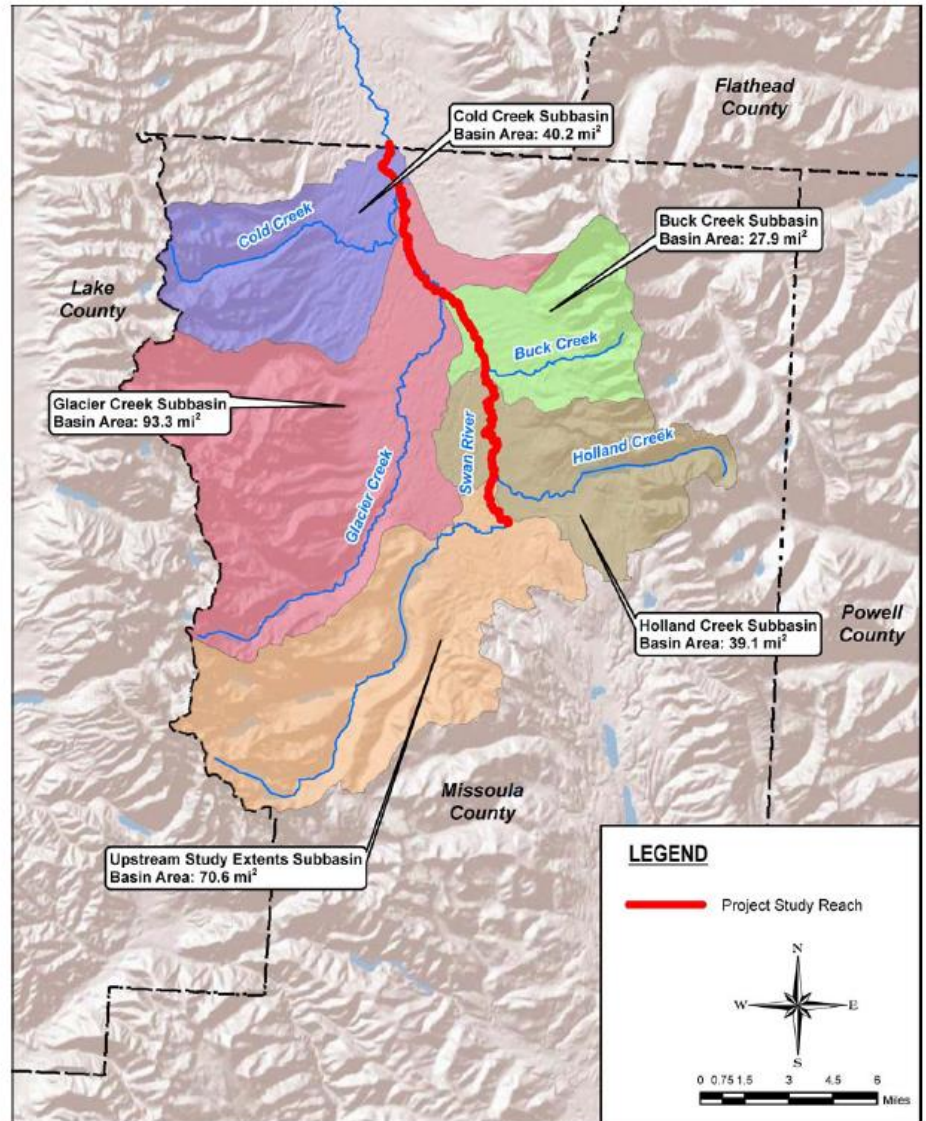


# Project Scope

## 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

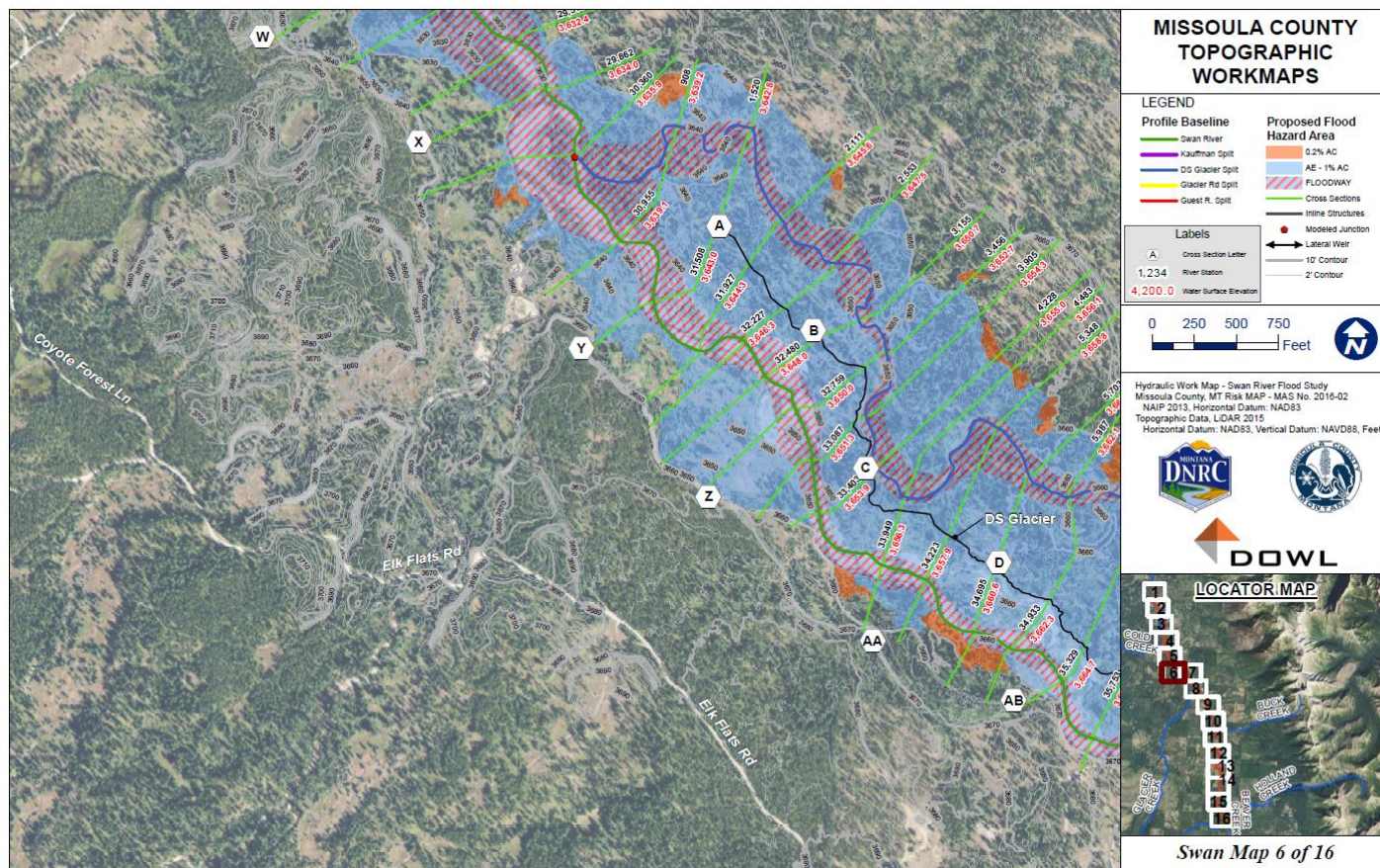
## Hydraulic Analysis and Floodplain Mapping

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



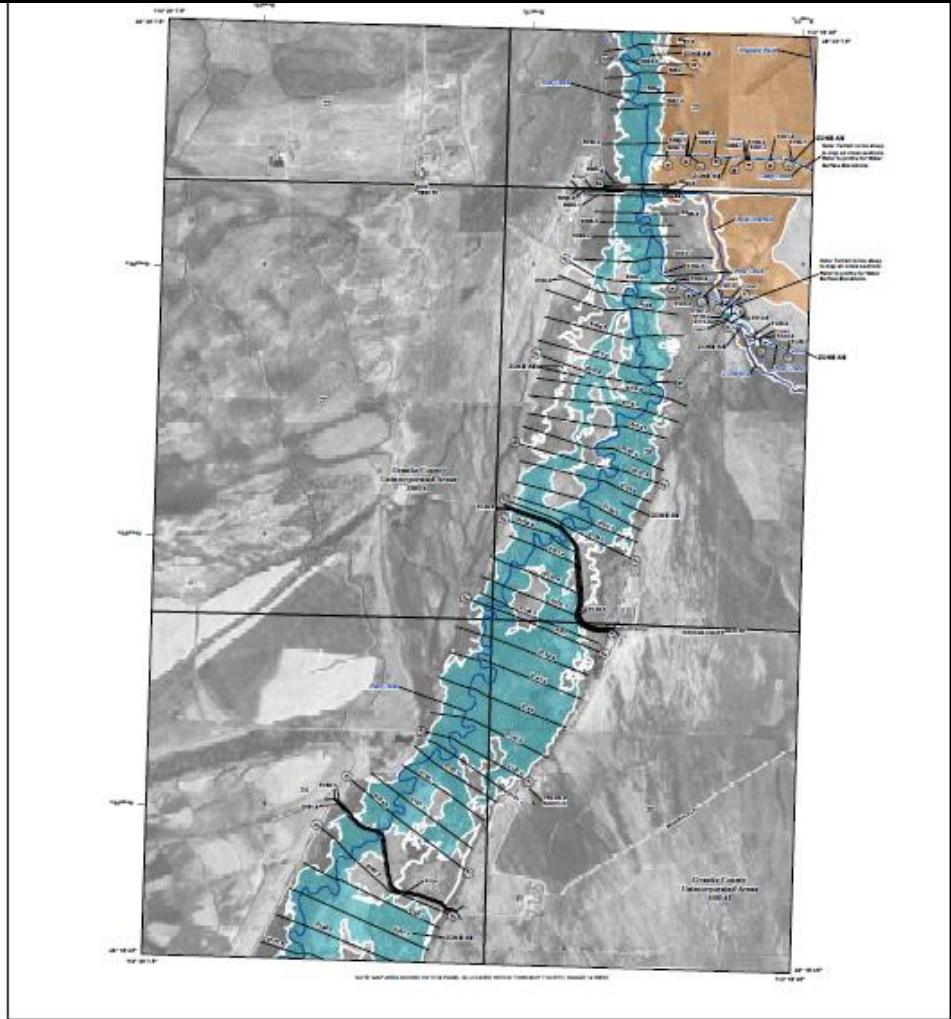
Prepared For:  
Montana Department of Natural Resources and Conservation  
Water Resources Division  
24 9<sup>th</sup> Avenue  
Helena, MT 59620

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**

FOR INFORMATION PURPOSES ONLY AND NOT FOR PUBLIC USE. THIS INFORMATION IS FOR OFFICIAL USE ONLY. THIS INFORMATION IS NOT TO BE USED FOR ANY OTHER PURPOSE. THIS INFORMATION IS NOT TO BE USED FOR ANY OTHER PURPOSE. THIS INFORMATION IS NOT TO BE USED FOR ANY OTHER PURPOSE.

**SPECIAL FLOOD HAZARD AREAS**

	National Base Flood Elevation (NBE)
	Regulatory Floodway
	1% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage area of less than one square mile
	0.2% Annual Chance Flood Hazard, Areas of 0.2% Annual Chance Flood with average depth less than one foot or with drainage area of less than one square mile
	Area with Backwater Flood Hazard
	Area of Moderate Flood Hazard
	Area of Undersaturation Flood Hazard

**OTHER AREAS**

	Channel, Canal, or Storm Drain
	Coastal Flood Hazard
	Flood Hazard Boundary
	Flood Hazard Boundary Line
	Flood Hazard Boundary Line
	Flood Hazard Boundary Line

**OTHER FEATURES**

	Corps Station with 1% Annual Chance Water Surface Elevation (WSE)
	Control Structure
	Profile Station
	Spring/Well Feature
	Area Flood Elevation (AFE)
	Limit of Study
	Jurisdiction Boundary

**NOTES TO USERS**

For information and updates about the map, please contact the project manager at the address provided below. The project manager is responsible for providing the most current information. The project manager is responsible for providing the most current information. The project manager is responsible for providing the most current information.

**SCALE**

Graphic scale: 1 inch = 1000 feet. Text scale: 1:62,500.

**PANEL LOCATOR**



PRELIMINARY  
05/18/2014

# 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:

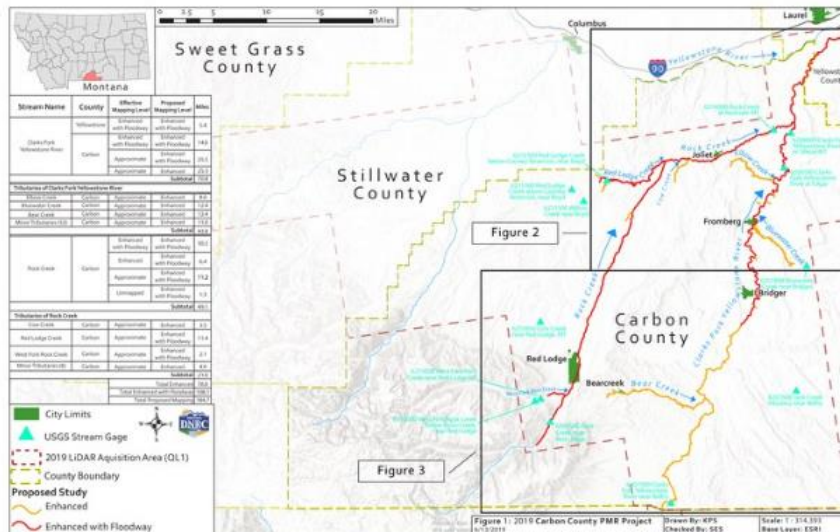
Carbon County floodplain maps were modernized through a Digitized Flood Insurance Rate Map (DFIRM) project in 2012. The maps were converted from paper to the digital environment. Most of the mapped floodplains in the county are still based off flood studies from the late 1970s and early 1980s. The 2012 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.



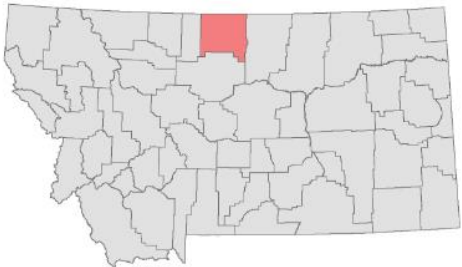
### Project Points of Contact

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

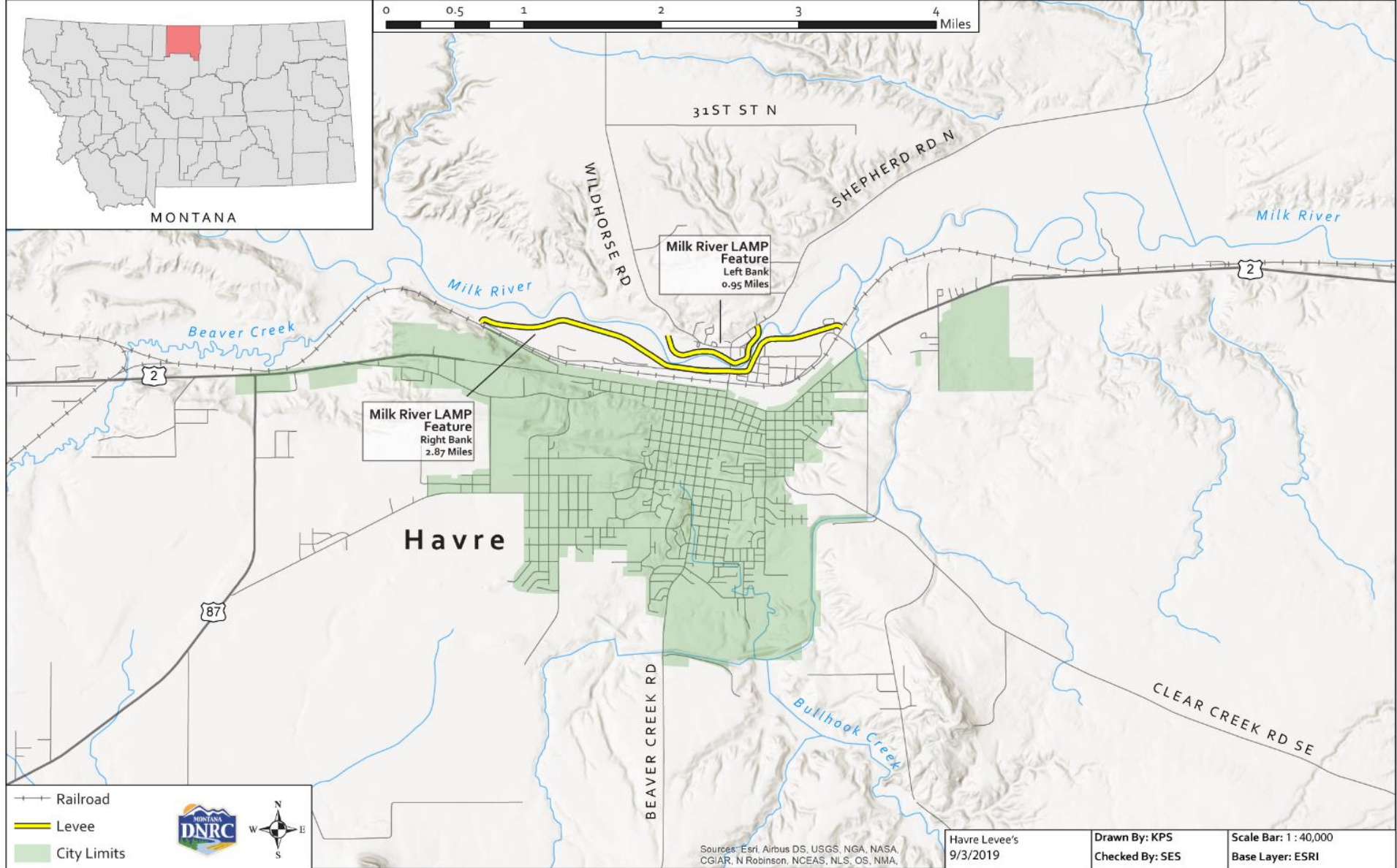
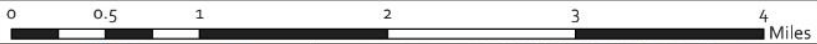
**Tiffany Lyden**  
MT DNRC Outreach Specialist  
(406)444-0599  
[email](#)

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

[Manage portals](#)



MONTANA



Milk River LAMP Feature  
Left Bank  
0.95 Miles

Milk River LAMP Feature  
Right Bank  
2.87 Miles

Havre

- +— Railroad
- Levee
- City Limits



Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA

Havre Levee's  
9/3/2019

Drawn By: KPS  
Checked By: SES

Scale Bar: 1 : 40,000  
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 201401  
HELENA, MONTANA 59620-1401

October 28, 2019

Hill County Commissioners  
315 4<sup>th</sup> Street  
Havre, MT 59501

Dear Commissioners :

The Department of Natural Resources and Conservation (DNRC) floodplain program and Hill 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 in 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 Hill County: Milk River Right Bank and Milk River Left Bank (see attached figure). The existing status of these levees, based on the effective FIRMs is:

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

As the Owner/Sponsor of these levee systems, the county 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 county's intent to pursue FEMA accreditation of the levee systems defined above.

The county may choose to pursue certification at the county's expense for potential accreditation by FEMA. Accreditation status from FEMA will result in the levee(s) 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 county 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 county's intent will help DNRC facilitate the flood study process along with coordinating the project schedule and study methods. Additionally, we request the county 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 county 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,

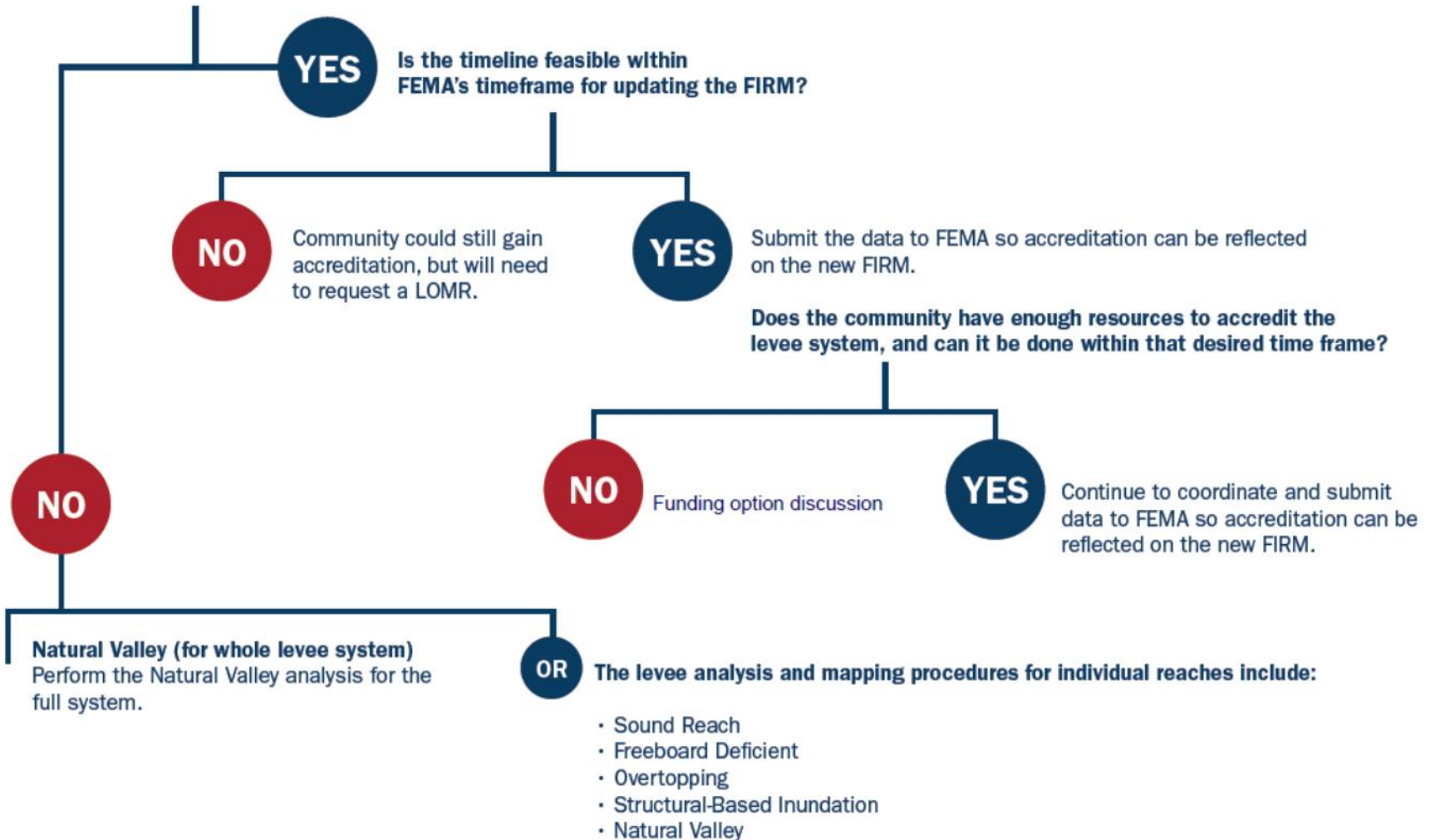
A handwritten signature in blue ink, appearing to read "Steve Story".

Steve Story, PE, CFM  
Chief, Water Operations Bureau

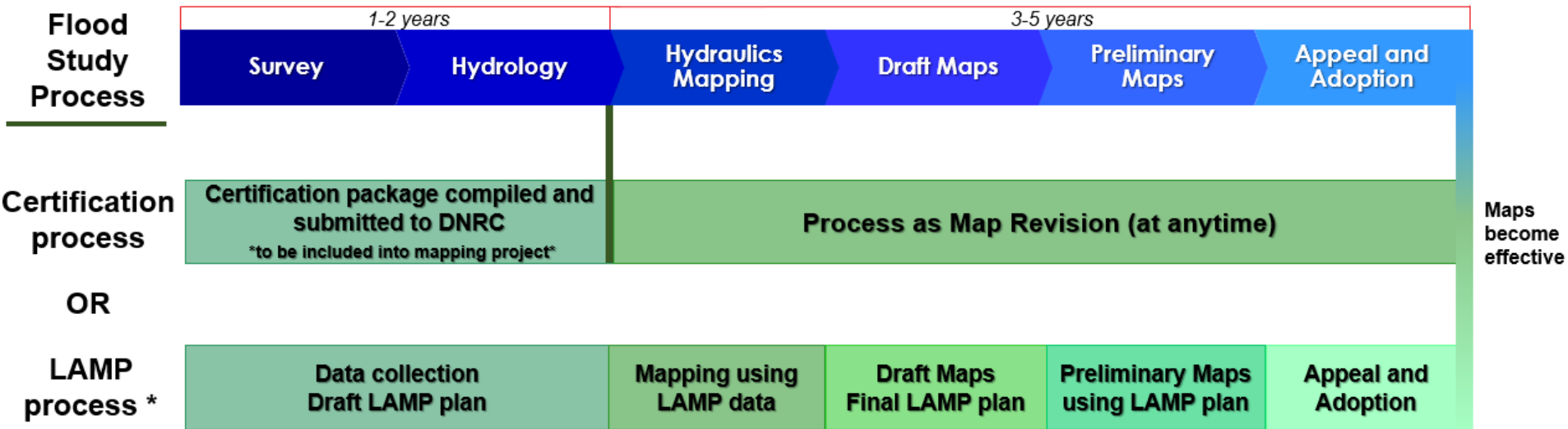
cc: Amy Ferguson, Hill County Floodplain Administrator  
Dave Sheppard, Hill County DES  
Mark English, FEMA

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.

\*Tentative timeframe (conceptual process, dependent on data collection, grant funding; updates to the timeframe will be provided as we move through the project)

# 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.





# 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