



**Floodplain Mapping Update:
Clark Fork & Bitterroot Rivers and Rock Creek
Missoula County & City of Missoula**

Public Open House Meetings

**October 18 – Fairgrounds | October 19 – Lolo School
October 20 – County Courthouse**

Project Partners

City of Missoula
Cassie Tripard
City Floodplain Administrator



Missoula County
Matt Heimel
County Floodplain Administrator



Granite County

Drummond, Montana

Town of Drummond

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Mapping Outreach Specialist



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Mapping Outreach Specialist

Katie Shank
GIS Specialist

Peri Turk
Floodplain Engineer

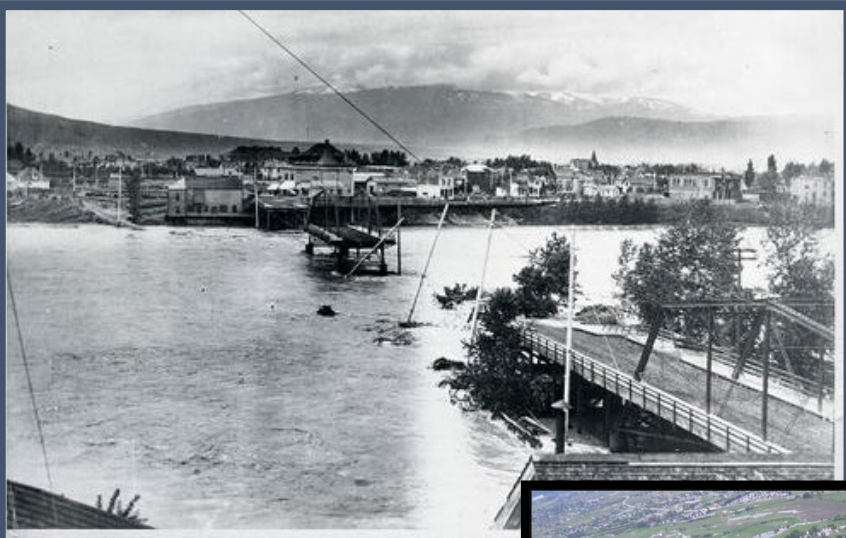
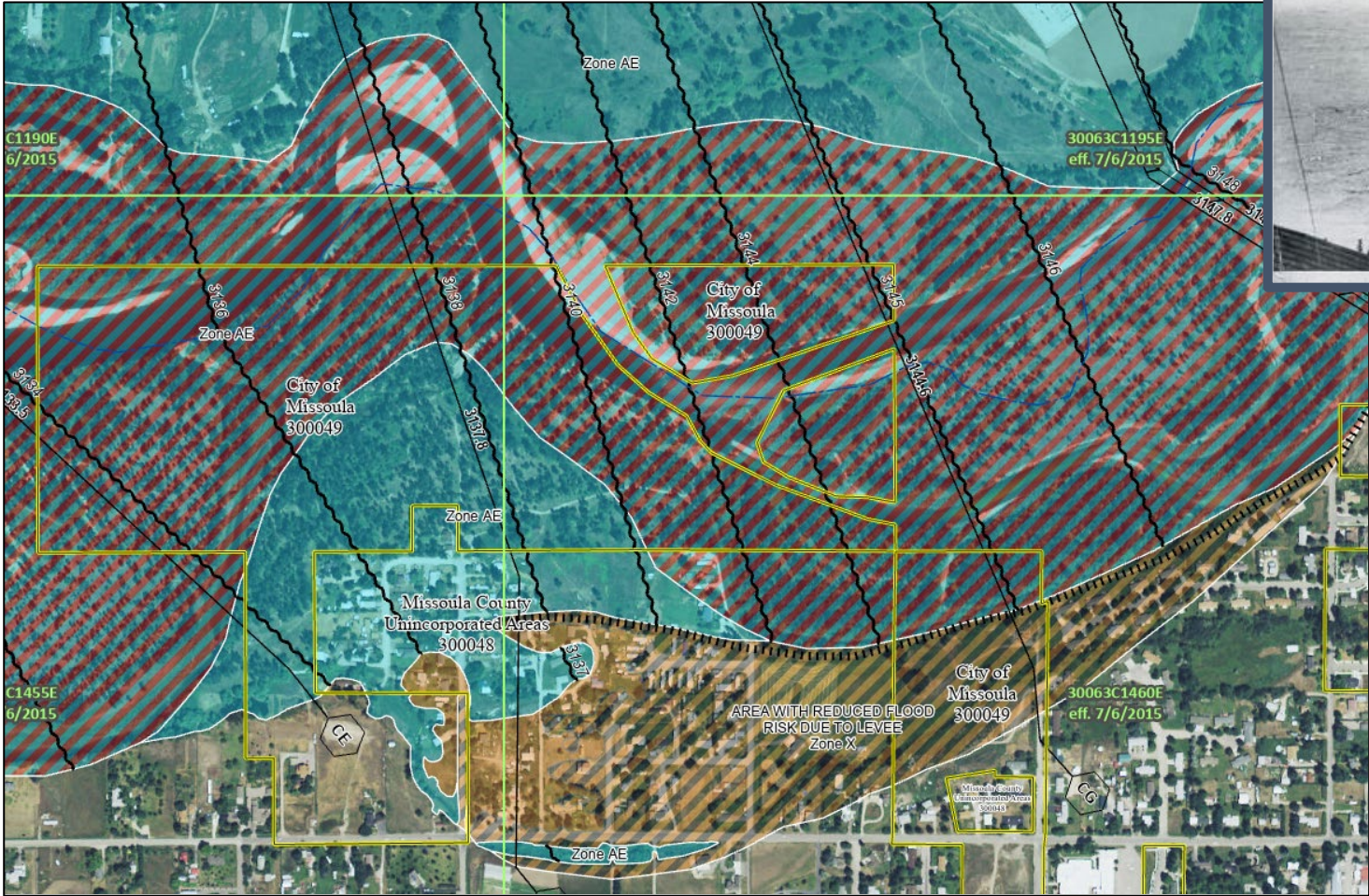
Morrison-Maierle
Luke Carlson
Project Manager



Allied Engineering
Andrew Graham
Project Manager



Identifying Risk Through Mapping



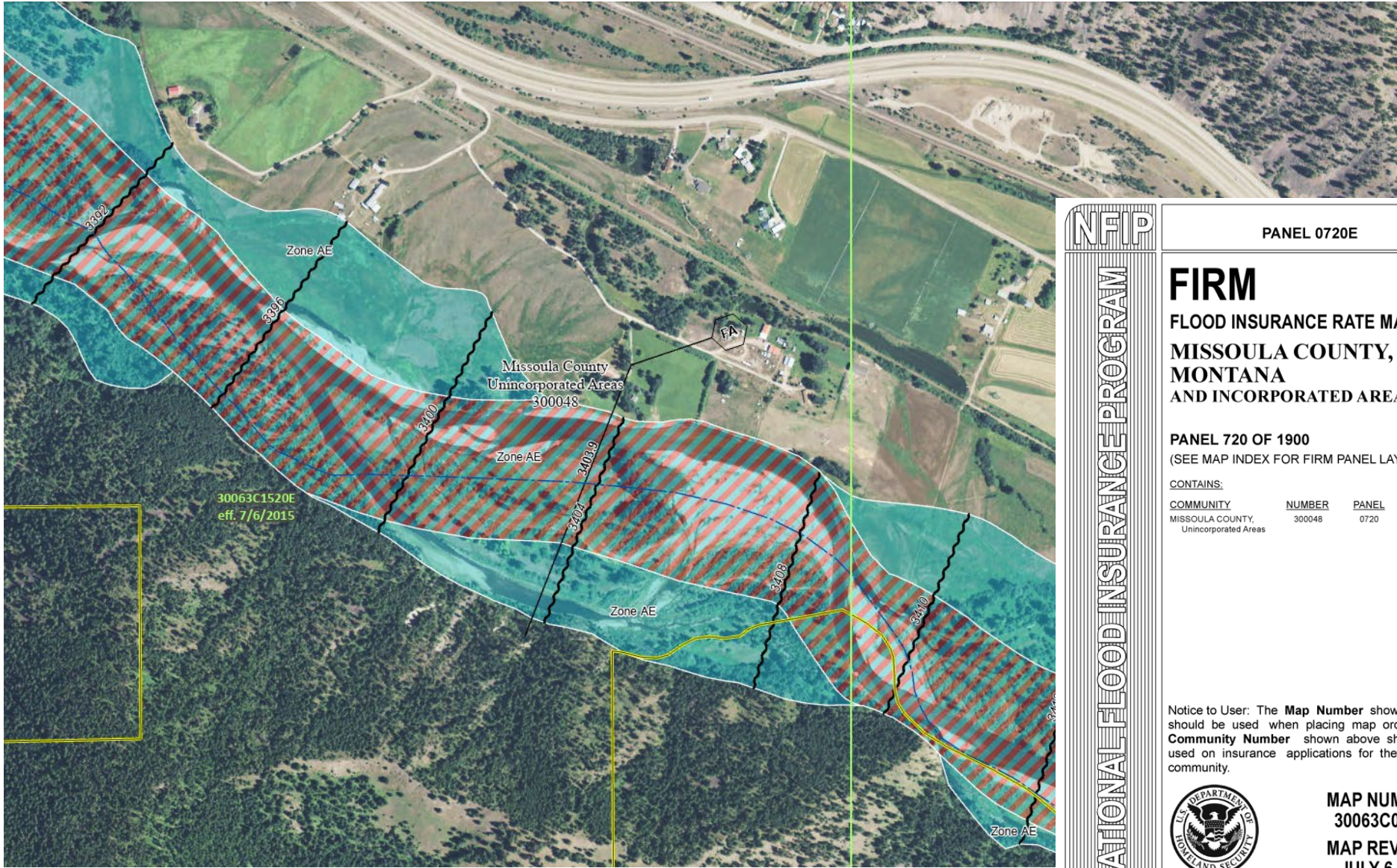
Higgins Avenue
1908 flood



Orchard Homes/
Tower Street area
2011 & 2018 floods



Flood Insurance Rate Maps



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0720E

FIRM


FLOOD INSURANCE RATE MAP
MISSOULA COUNTY,
MONTANA
AND INCORPORATED AREAS

PANEL 720 OF 1900
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MISSOULA COUNTY, Unincorporated Areas	300048	0720	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
30063C0720E
MAP REVISED
JULY 6, 2015

Federal Emergency Management Agency

100 year flood

1% annual chance
flood

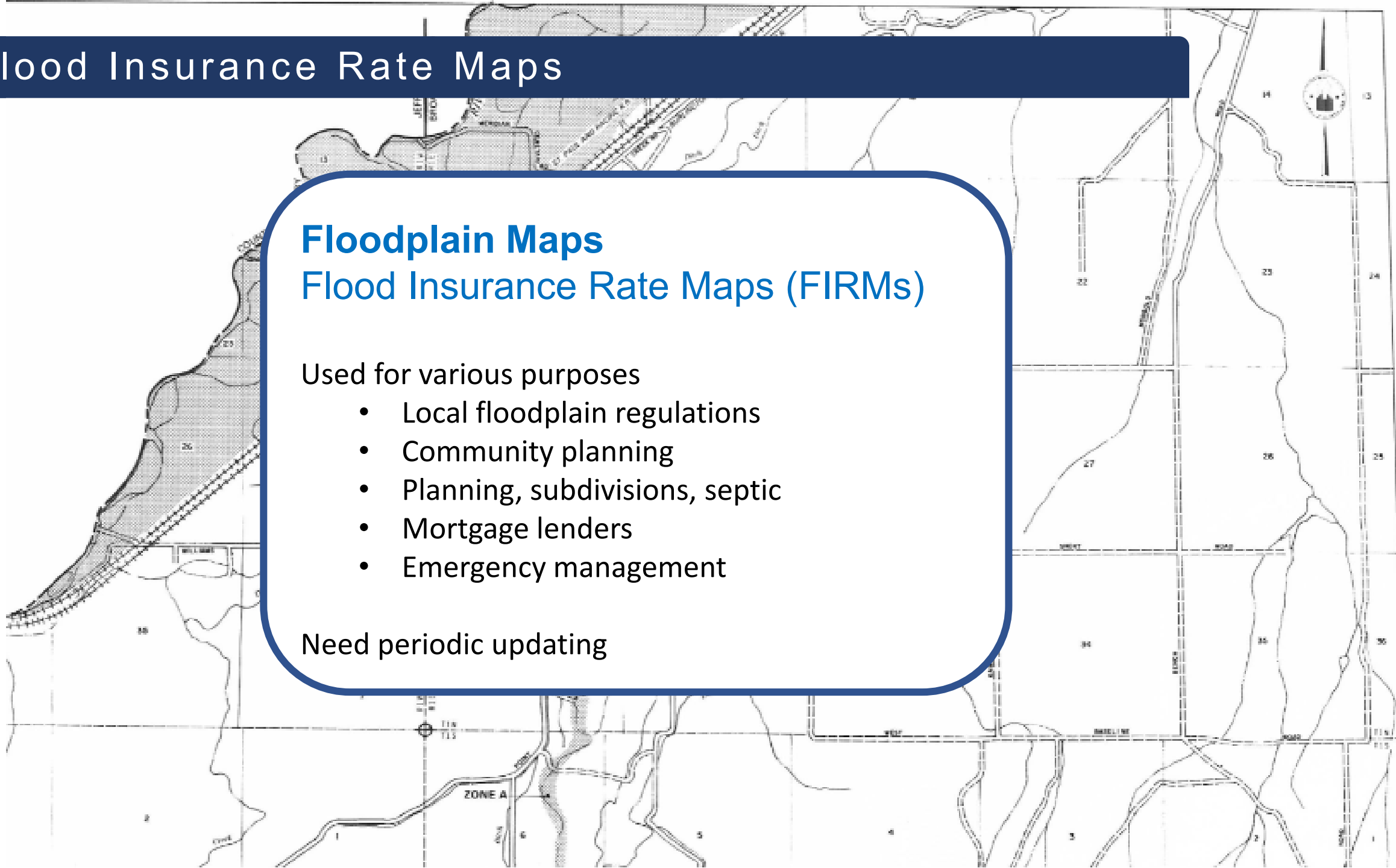
Flood Insurance Rate Maps

Floodplain Maps Flood Insurance Rate Maps (FIRMs)

Used for various purposes

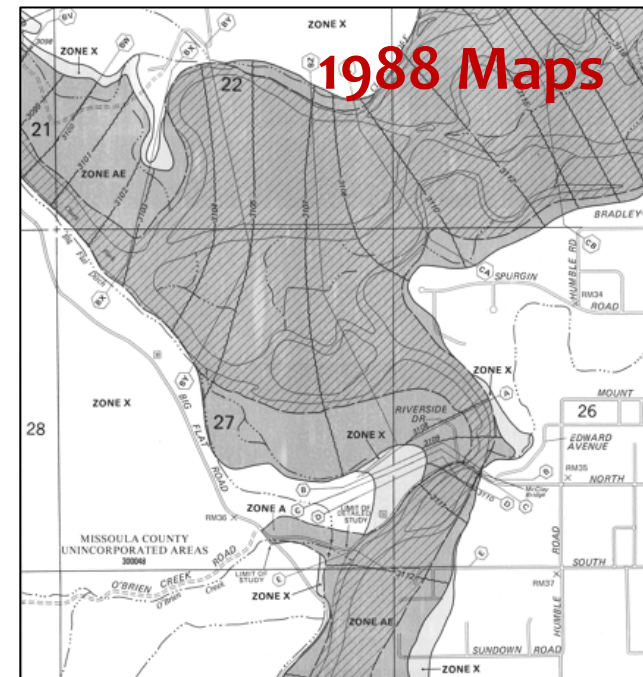
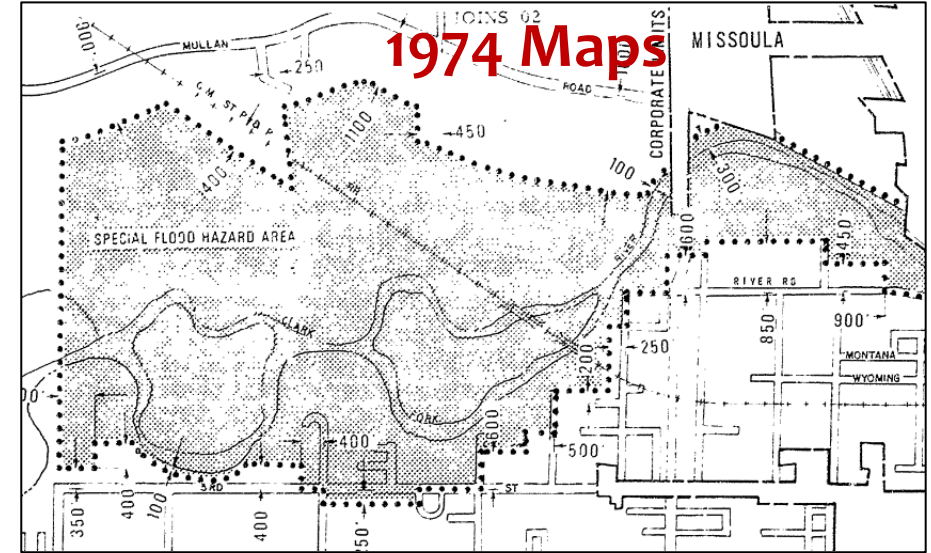
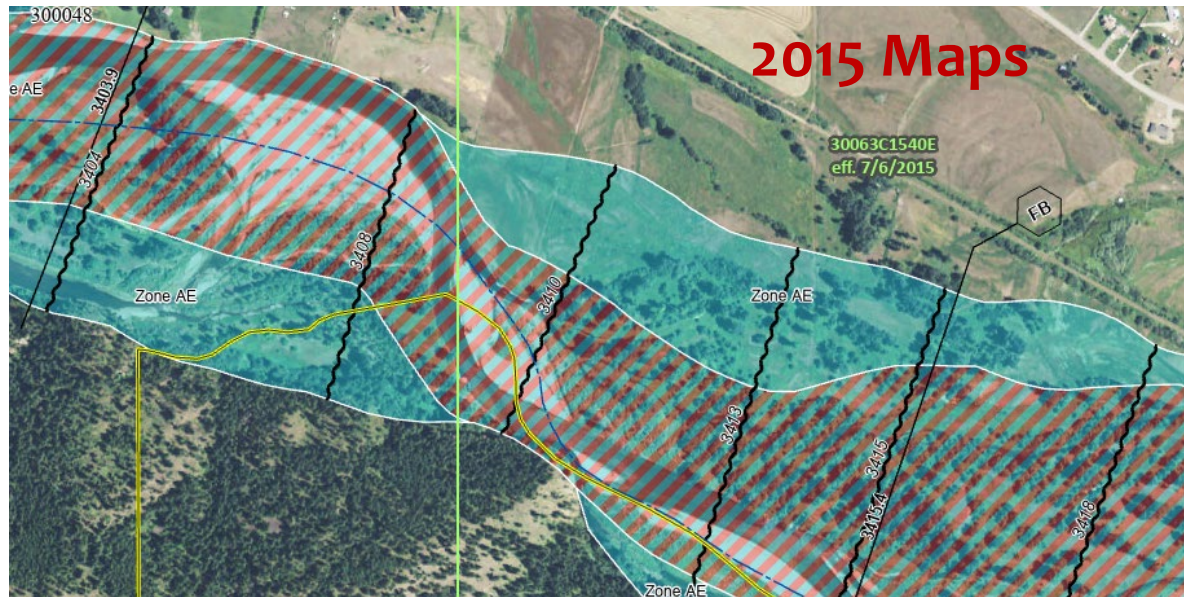
- Local floodplain regulations
- Community planning
- Planning, subdivisions, septic
- Mortgage lenders
- Emergency management

Need periodic updating



Current Floodplain Maps – Clark Fork/Bitterroot and Rock Cr

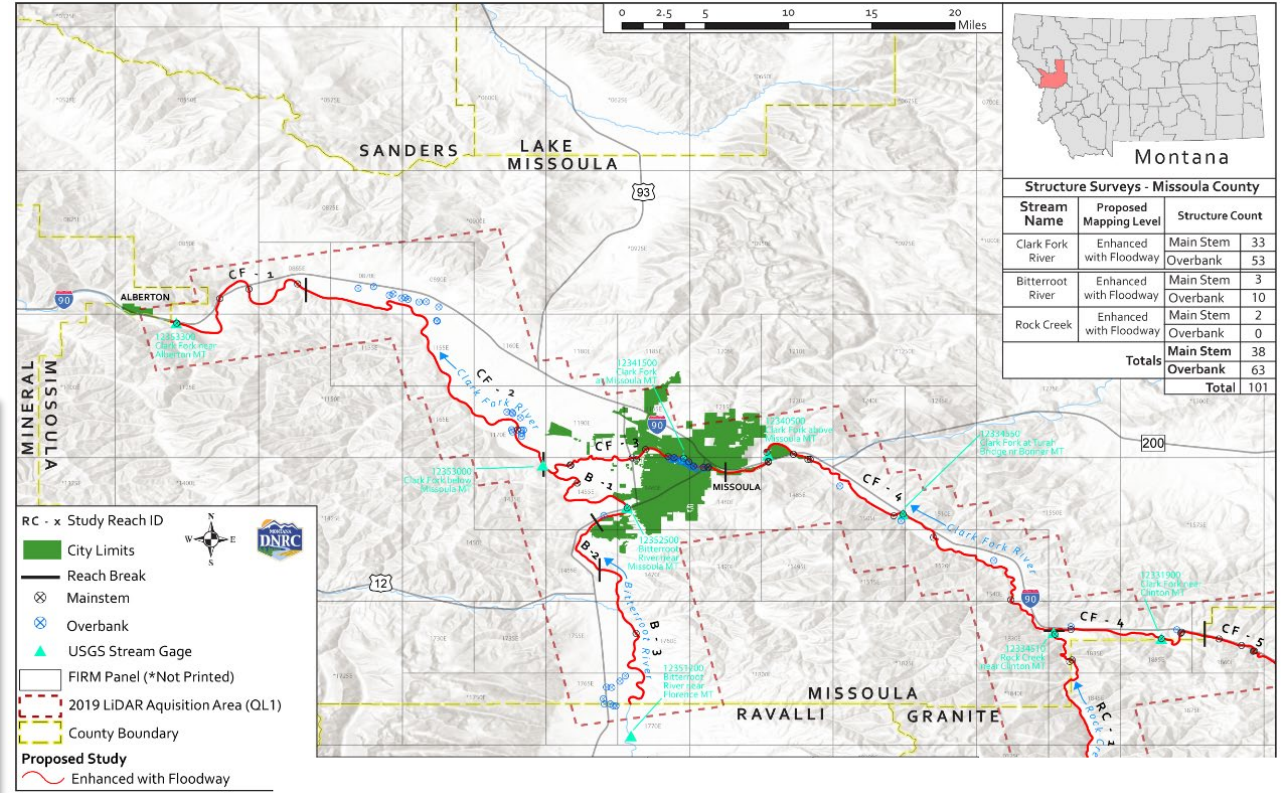
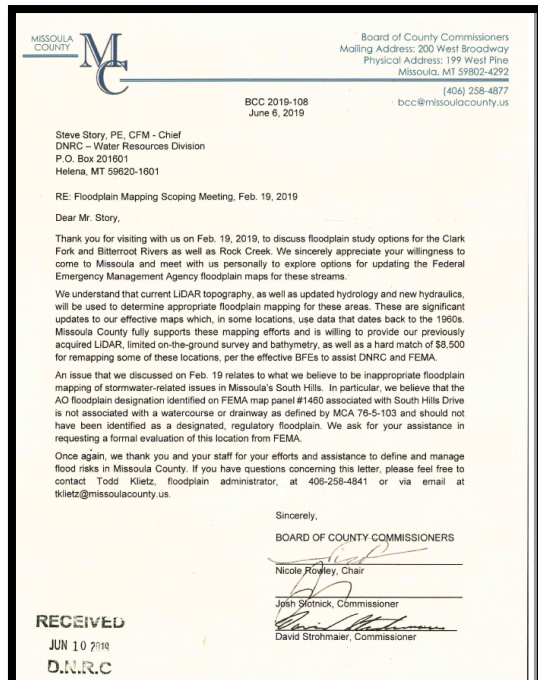
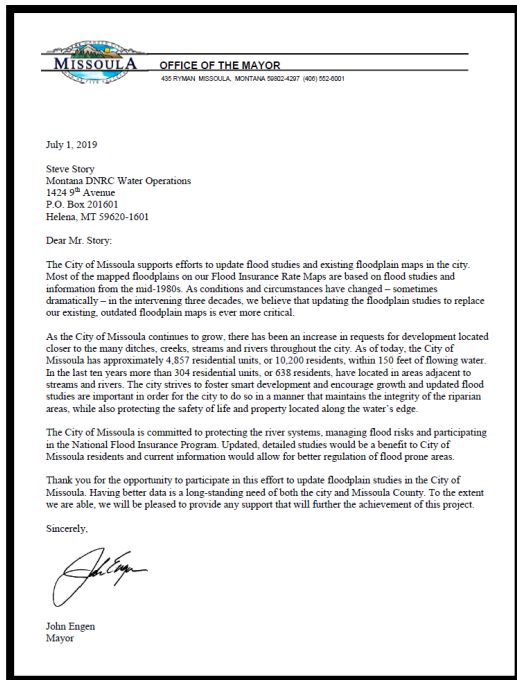
- 1974 - Flood Hazard Maps
- 1980s - FEMA Flood Insurance Rate Maps
 - some revisions, small updates
- 2015 – Maps converted to digital format

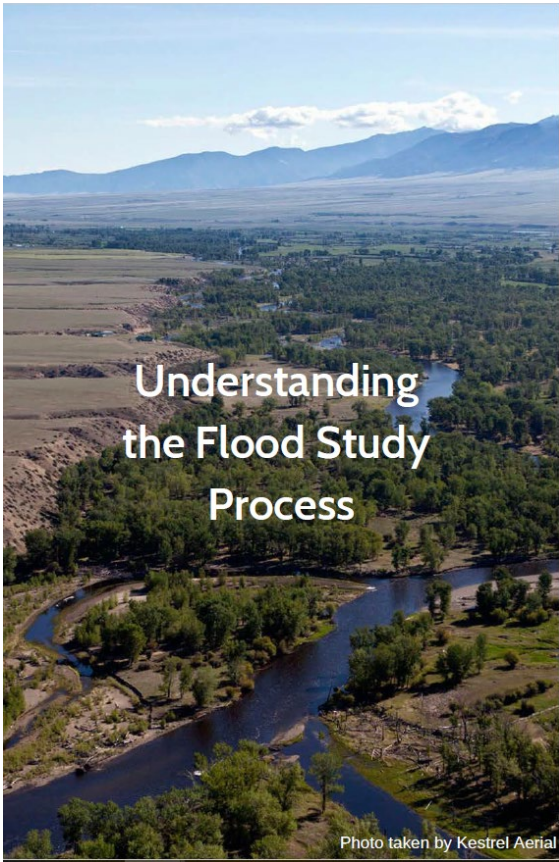


Current maps are mostly based off data from 80s

Floodplain Mapping Update

- **Pre-2019** County & City expressed need for updated information, requested updates
- **July 2019** FEMA grant:
 - Clark Fork River
 - Bitterroot River
 - Rock Creek
- **Fall 2019 and onward** Data collection and flood study work





Flood Study Steps

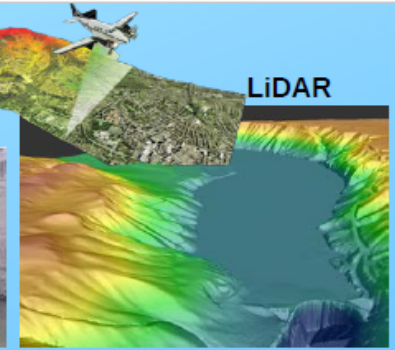
Step 1 - Survey: measurements are made of the topography around the river, along with any culverts, bridges, and road crossings. LiDAR uses an airplane to collect ground elevation over a large area, and ground survey supplements the airborne data.

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.

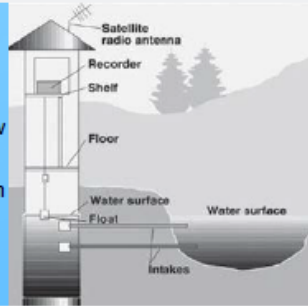
Step 3 - Hydraulics: once the first two steps are complete, calculations can show where the water will go during the flood. The elevation data is combined with the flood flow data to determine where the water will go when it overflows the channel.

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.

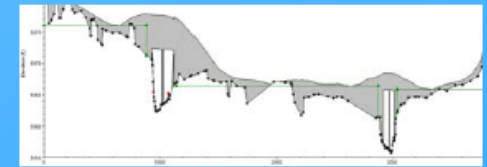
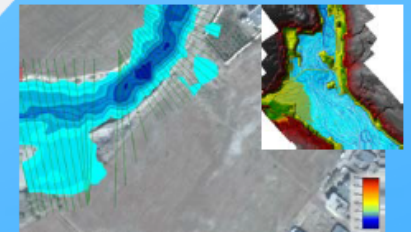


Step 2 - Hydrology: Stream gage stations are an important tool to determine flow rates. If nearby stream gages aren't available, gage data from a similar location is used to determine the flow rate.



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.









Missoula-Granite Floodplain Mapping Update

1 Draft Floodplain Mapping

The flood hazard information in this section is currently a **draft** product. It only includes selected areas pertaining to this study in Missoula and Granite Counties. The draft floodplain designations are undergoing public review and are based on updated flood study information.

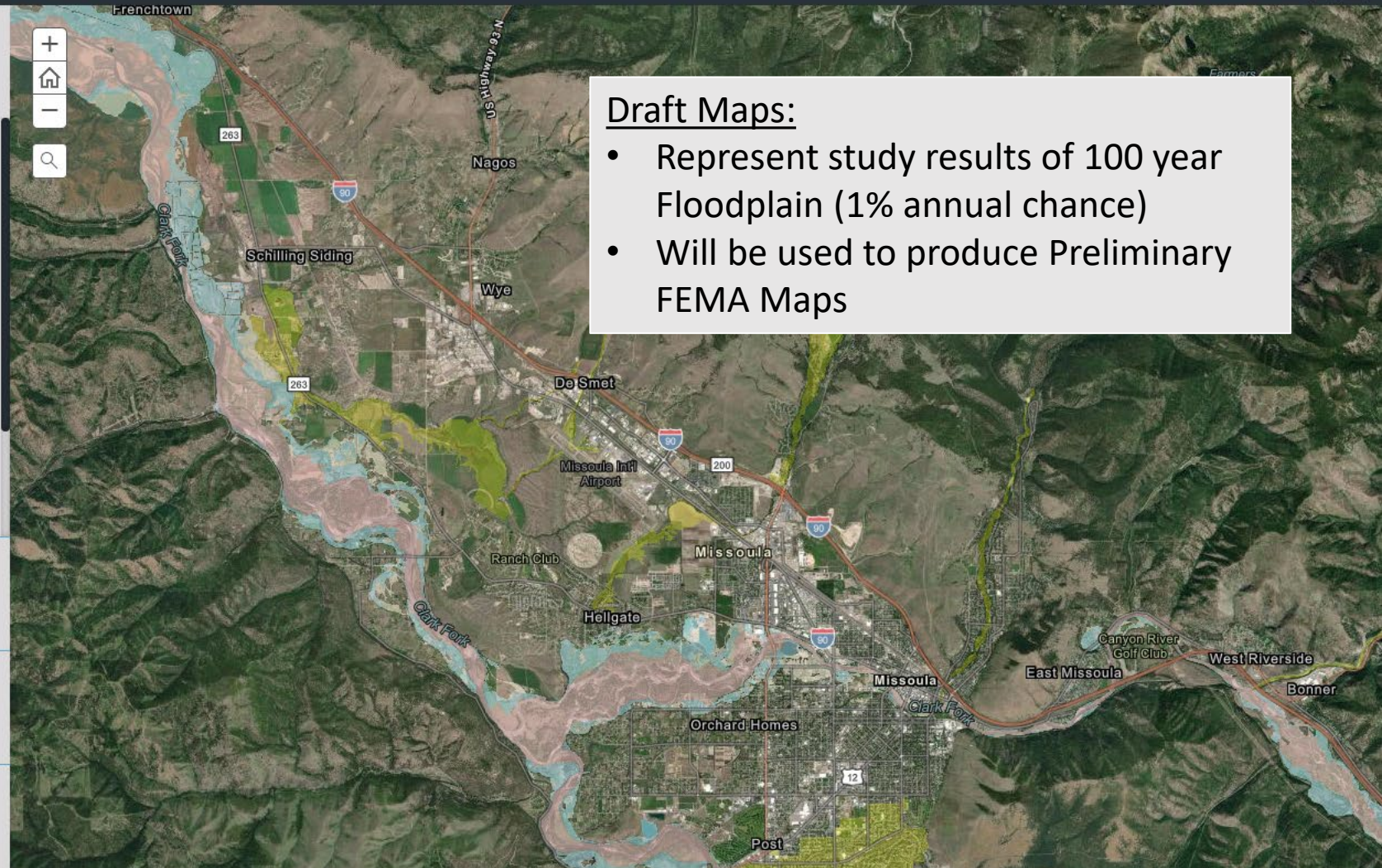
To see the current FEMA mapping, go to section 2.

-  100-year Floodplain (1% Annual Chance)
-  Floodway within 100-year Floodplain
-  500-year Floodplain (0.2% Annual Chance)
-  Current Effective FEMA Mapping

2 Current FEMA Floodplain Mapping

3 Compare Draft 100-year Floodplain Map to Current FEMA Floodplain Map

4 Compare Draft Floodway Map to Current FEMA Floodway Map



Draft Maps:

- Represent study results of 100 year Floodplain (1% annual chance)
- Will be used to produce Preliminary FEMA Maps


www.floodplain.mt.gov/missoula-granite

- draft map viewer
- reports
- study details and timeline

can also access from:

<https://www.engagemissoula.com/floodplain-mapping-project>

<https://tinyurl.com/3nc24dhm>



Missoula-Granite Floodplain Maps Update

Missoula and Granite Counties are working with MT DNRC and FEMA to update and produce new Flood Insurance Rate Maps (FIRMS) for the Clark Fork River, Bitterroot River, Rock Creek, and Rock Creek Tributaries. Updated floodplain maps will depict the latest, most accurate flood risk data, and will eventually replace the existing floodplain maps which are based on data from the 1970s.

For more information, see: [Background on existing floodplain maps.](#)

Meeting Information

Public Open House Meetings for Missoula County and the City of Missoula:

Tuesday, Oct 18 6pm Commercial Building at the Missoula Fairgrounds
Wednesday, Oct 19, 6pm Lolo School Lower Gym Lolo
Thursday, Oct 20, 6pm Missoula County Courthouse Sophie Moiese Room

Virtual Option will be offered all three nights

Zoom link: <https://ogilvy.zoom.us/j/93562758029>

Passcode: 7477

To register (not required) for the virtual option for the meetings please [click here.](#)

DNRC held project kickoff meetings on October 23, 2019 with Missoula County and the City of Missoula. [To view the slides that were presented click here.](#)


View Draft Data

Draft Map Viewer
[click here](#)

Draft maps and studies need to go through a lengthy technical and public review process. When finalized, new maps could have effects on some property owners in mapped 100-year floodplains. Click on your county below to learn about the floodplain designations referenced on the maps:

- ▶ [Missoula County \[Show/Hide\]](#)
- ▶ [Granite County \[Show/Hide\]](#)

Draft data reports



The image shows three report covers. The first is 'Missoula-Granite FIRM, M&A No. 2019-02 Structure Survey Report'. The second is 'Missoula-Granite FIRM, M&A No. 2019-02 Missoula and Granite Counties, Montana Hydrologic Analysis Report'. The third is 'Hydraulic Analysis and Floodplain Mapping Report Bitterroot River (Tributary Study) - Missoula County, MT'. Logos for DNRC, Granite County, and FEMA are visible at the bottom of the reports.

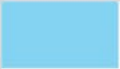




Draft Maps – ready for review

Missoula-Granite Floodplain Mapping Update

A Story Map



1 Draft Floodplain Mapping

-  100-year Floodplain (1% Annual Chance)
-  Floodway within 100-year Floodplain
-  500-year Floodplain (0.2% Annual Chance)
-  Current Effective FEMA Mapping Not Included in Mapping Update
-  Cross Sections - Flood Elevations (in Feet)

2 Current FEMA Floodplain Mapping

3 Compare Draft 100-year Floodplain Map to Current FEMA Floodplain Map

4 Compare Draft Floodway Map to Current FEMA Floodway Map





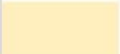


Draft Map Viewer

Missoula-Granite Floodplain Mapping Update

A Story Map



1 Draft Floodplain Mapping

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Draft Map Viewer - Current Maps

Missoula-Granite Floodplain Mapping Update

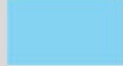



A Story Map



1 Draft Floodplain Mapping

2 Current FEMA Floodplain Mapping

The FEMA floodplain boundaries and information were digitized from current FEMA maps. This viewer is not intended to be used for regulatory purposes and should only be used as a visualization tool. The official FEMA maps and other flood hazard products are available from the FEMA Map Service Center online at: <http://www.msc.fema.gov>

-  100-year Floodplain (1% Annual Chance)
-  Floodway within 100-year Floodplain
-  500-year Floodplain (0.2% Annual Chance)
-  Cross Sections - Flood Elevations (in Feet)

3 Compare Draft 100-year Floodplain Map to Current FEMA Floodplain Map

4 Compare Draft Floodway Map to Current FEMA Floodway Map






Draft Map Viewer – Floodplain Changes

Missoula-Granite Floodplain Mapping Update

- 1 Draft Floodplain Mapping
- 2 Current FEMA Floodplain Mapping
- 3 Compare Draft 100-year Floodplain Map to Current FEMA Floodplain Map

This section compares the proposed 100-Year (1% Annual Chance) floodplain mapping to the current FEMA 100 year (1% Annual Chance) Floodplain maps in portions of Missoula and Granite Counties. The 100-Year Floodplain is considered to have a HIGH flood risk, it is the area expected to be inundated by a flood event having a 1% chance of being equaled or exceeded in any given year.

-  Land Removed from FEMA Floodplain
-  Land Added to FEMA Floodplain
-  No Change to FEMA Floodplain

- 4 Compare Draft Floodway Map to Current FEMA Floodway Map






Draft Map Viewer – Floodway Changes

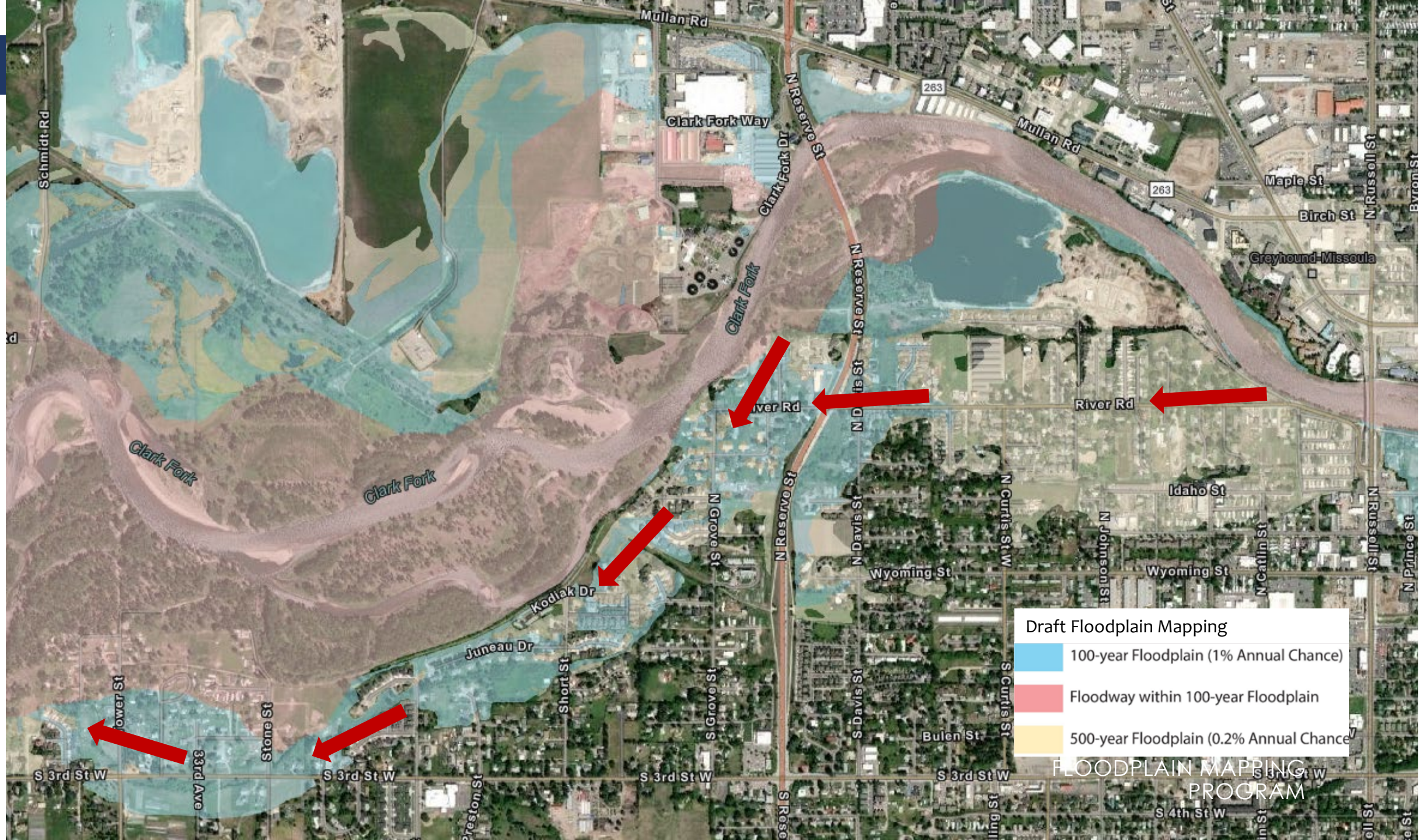
Missoula-Granite Floodplain Mapping Update

- 1 Draft Floodplain Mapping
- 2 Current FEMA Floodplain Mapping
- 3 Compare Draft 100-year Floodplain Map to Current FEMA Floodplain Map
- 4 Compare Draft Floodway Map to Current FEMA Floodway Map

This section compares the proposed Floodway to the Floodway on the current FEMA maps in portions of Missoula and Granite Counties. A Floodway is the area within the 100-Year floodplain that must be kept free from new development so that the 100-Year flood can be carried without substantial increases in flood heights. The Floodway will usually see the deepest and fastest water during a 100-year flood event.

-  Land Removed from FEMA Floodway
-  Land Added to FEMA Floodway
-  No Change to FEMA Floodway





Draft Floodplain Mapping



- 100-year Floodplain (1% Annual Chance)
- Floodway within 100-year Floodplain
- 500-year Floodplain (0.2% Annual Chance)

FLOODPLAIN MAPPING PROGRAM


Know where your property or building is in relation to the draft floodplain boundaries and flood risk zones

Draft Floodplain Mapping

High-risk area

-  100-year Floodplain (1% Annual Chance)
-  Floodway

Moderate-risk area

-  500-year Floodplain (0.2% Annual Chance)

Low-risk area

View the draft maps at home:

www.floodplain.mt.gov/missoula-granite

Also accessible from:

<https://www.engagemissoula.com/floodplain-mapping-project>

<https://tinyurl.com/3nc24dhm>

FLOODPLAIN REGULATIONS

City of Missoula and Missoula County have floodplain regulations that regulate development within the 100-year floodplain.

Floodplain permits are required for any manmade activities including construction and modifications to existing structures.

New construction and additions- elevated 2' **Improvements** and additions to existing structures \geq 50% of building's value, will require the entire structure to be brought into compliance.
No new buildings and limited development is allowed in the **Floodway**



FLOOD INSURANCE

Flood insurance is mandatory for buildings with a federally backed loan in a high-risk flood zone.

Flood insurance is not mandatory in a lower risk zone but is highly recommended. Lenders can always require insurance in any zone.

Landowners can buy **flood insurance** to protect their assets; renters can buy **flood insurance** for their contents.

Flood insurance is the best form of personal risk management and provides important economic protection against flooding.

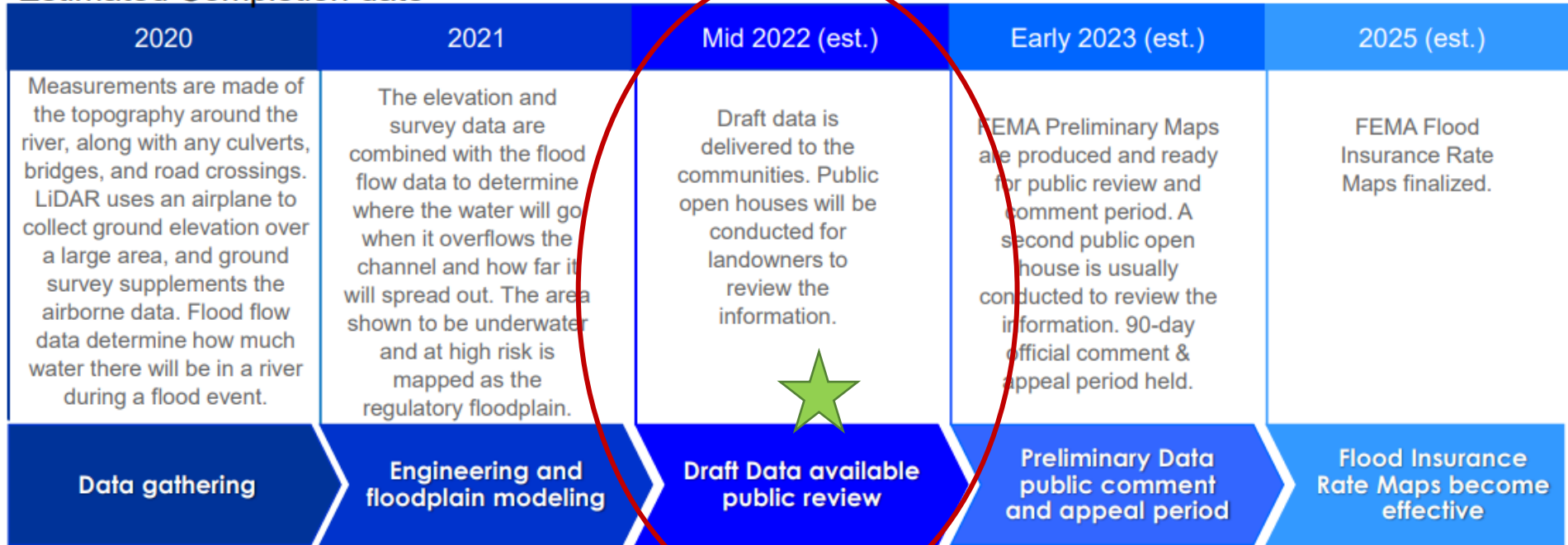


Estimated Timeline



Project Timeline Missoula-Granite Floodplain Maps Update

Estimated Completion date



Flood Study Conducted
 4 steps of a flood study.
 1) Survey & LiDAR 3) Hydraulics (engineering)
 2) Hydrology (flood flow) 4) Mapping (delineation)

Public Review
 2 public open houses are usually held during this time. Once at draft map stage and again at preliminary map stage.
 During this time public comments are encouraged. There will be an official 90-day appeal period after the maps become preliminary.

Resiliency and Mitigation efforts
 Once new maps become effective the community can determine what mitigation efforts it would like to pursue to reduce flood risks.

- Thank You -

Staff You Can Speak With

City Staff

Cassie Tripard
Alex Bramlette
Dave DeGrandpre

County Staff

Matt Heimel
Bailey Minnich

DNRC

Doug Brugger
Larry Schock
Tiffany Lyden
Traci Sears
Katie Shank
Peri Turk
Shylea Wingard

Morrison-Maierle

Luke Carlson

Allied Engineering

Andrew Graham

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FLOODPLAIN MAPPING
PROGRAM