



**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  
**Dave DeGrandpre and Alex Bramlette**  
City Floodplain/Community Planning



Granite County

Missoula County  
**Matt Heimel and Bailey Minnich**  
County Floodplain Administrator / Planning



*Drummond, Montana*

Town of Drummond

Department of Natural Resources and Conservation  
**Tiffany Lyden**  
Mapping Outreach Specialist



Morrison-Maierle  
**Luke Carlson**  
Project Manager



**Doug Brugger**  
Floodplain Engineer

**Larry Schock**  
Regional Engineering Specialist

Allied Engineering  
**Andrew Graham**  
Project Manager



**Shylea Wingard**  
Floodplain Specialist

**Nadene Wadsworth**  
Mapping Outreach Specialist

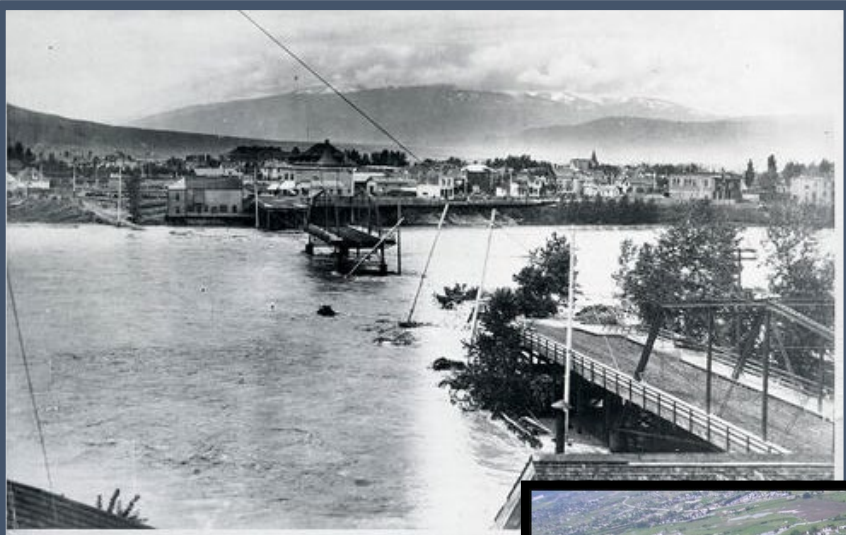
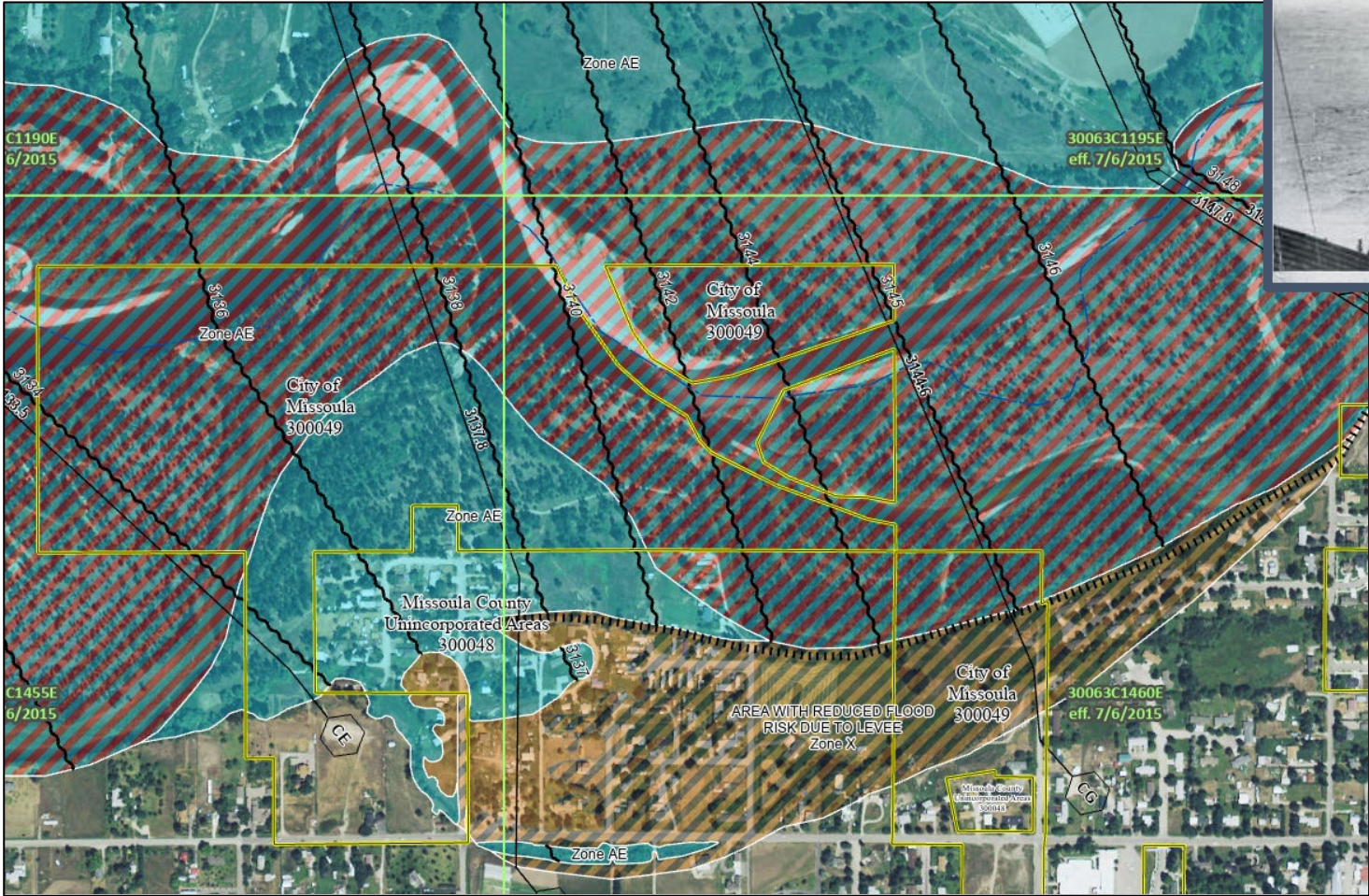
**Tom Chingas**  
Project Engineer

**Katie Shank**  
GIS Specialist





# Identifying Risk Through Mapping



Higgins Avenue  
1908 flood

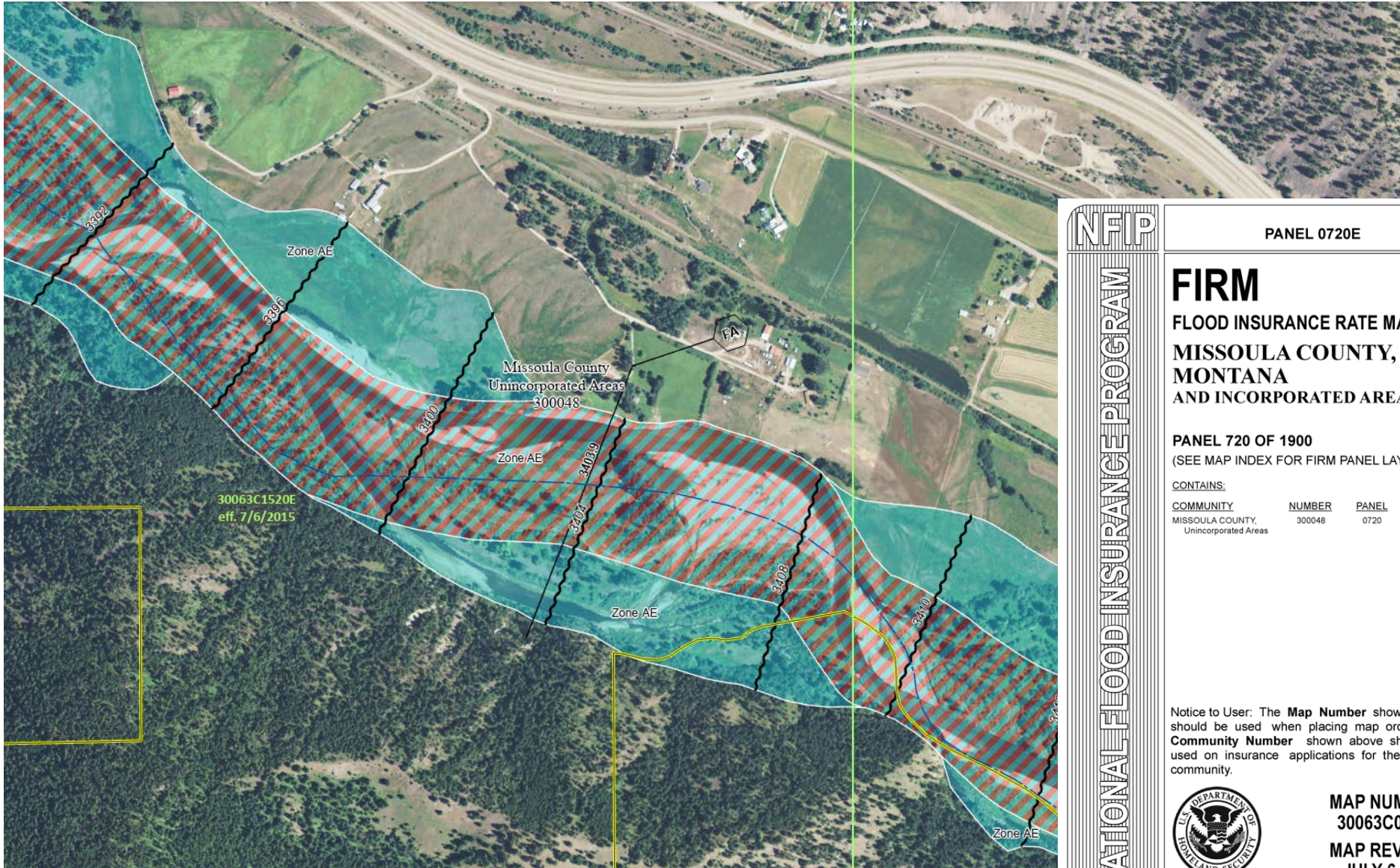


Orchard Homes/  
Tower Street area  
2011 & 2018 floods





# 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  


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1% annual chance flood



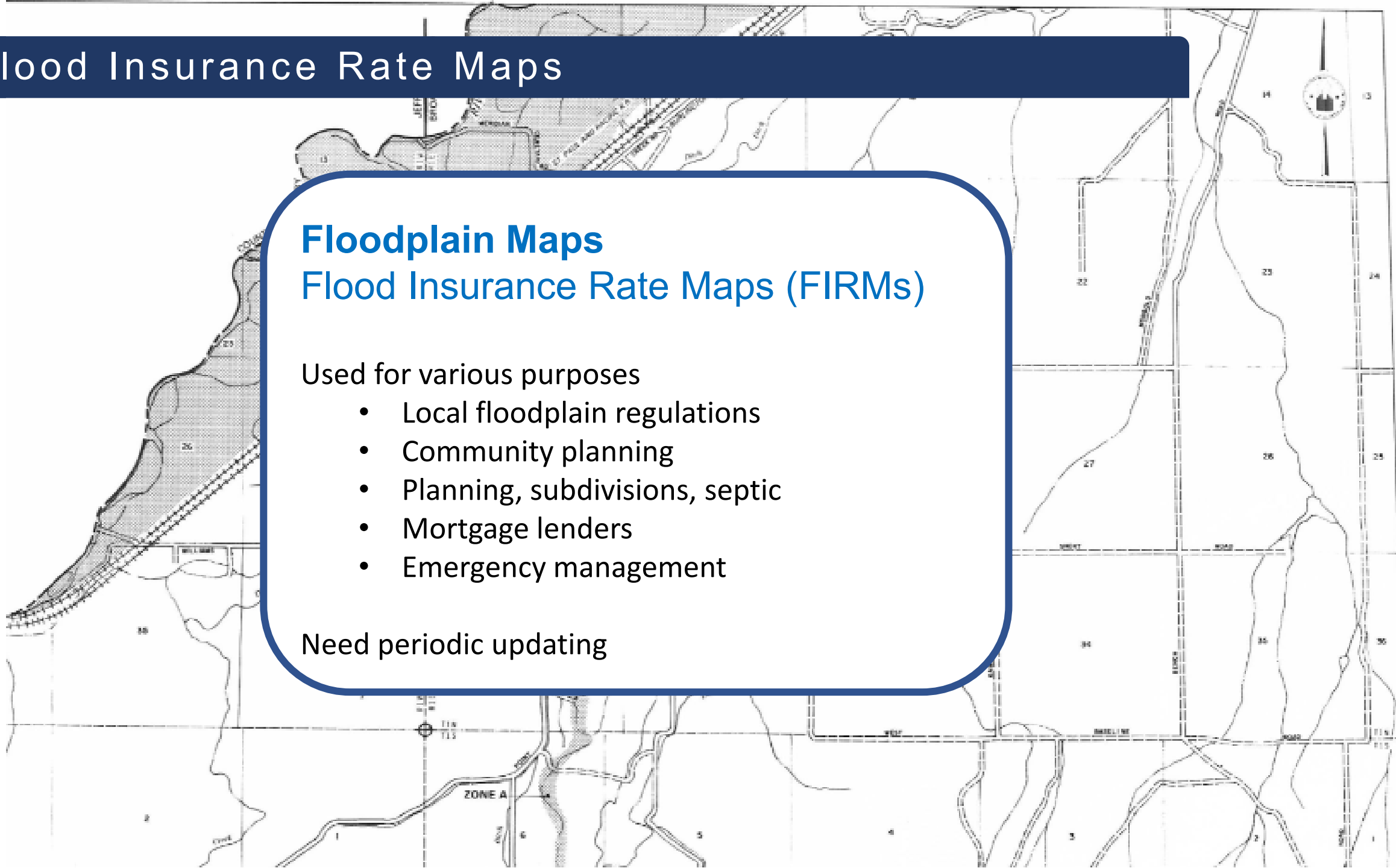
# Flood Insurance Rate Maps

## Floodplain Maps Flood Insurance Rate Maps (FIRMs)

Used for various purposes

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

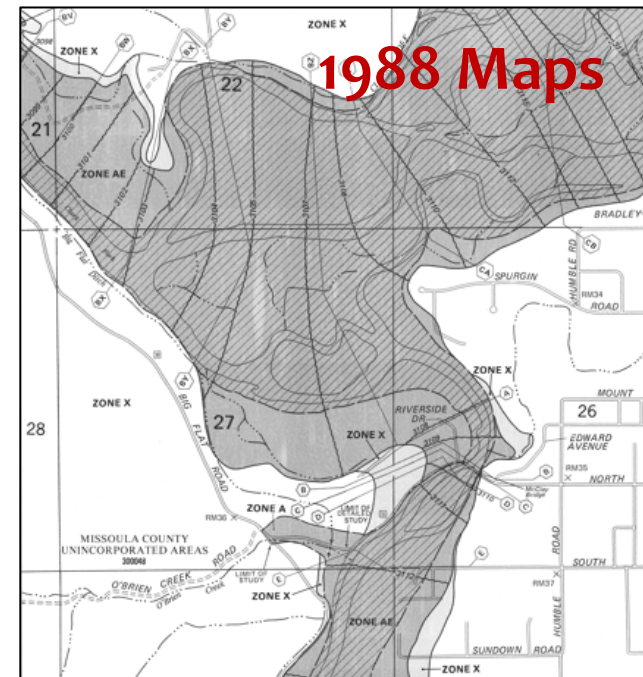
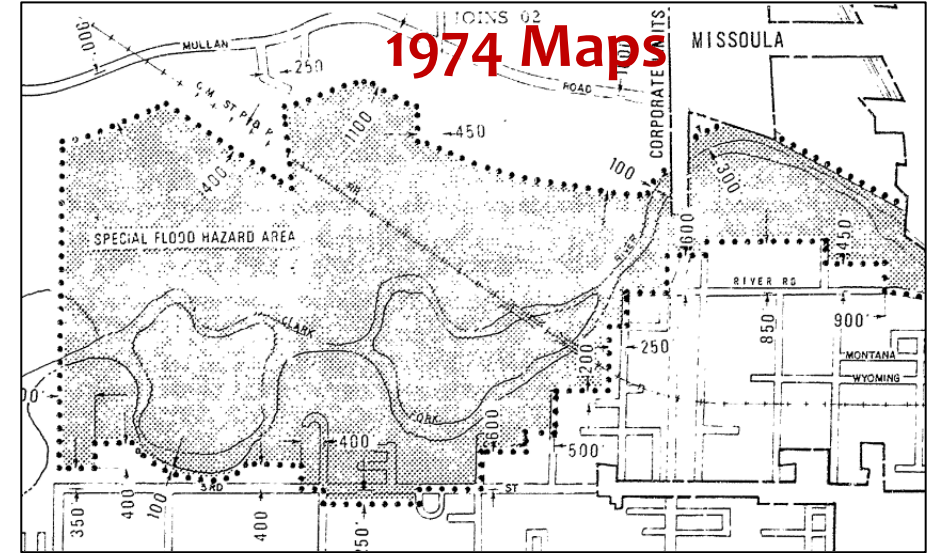
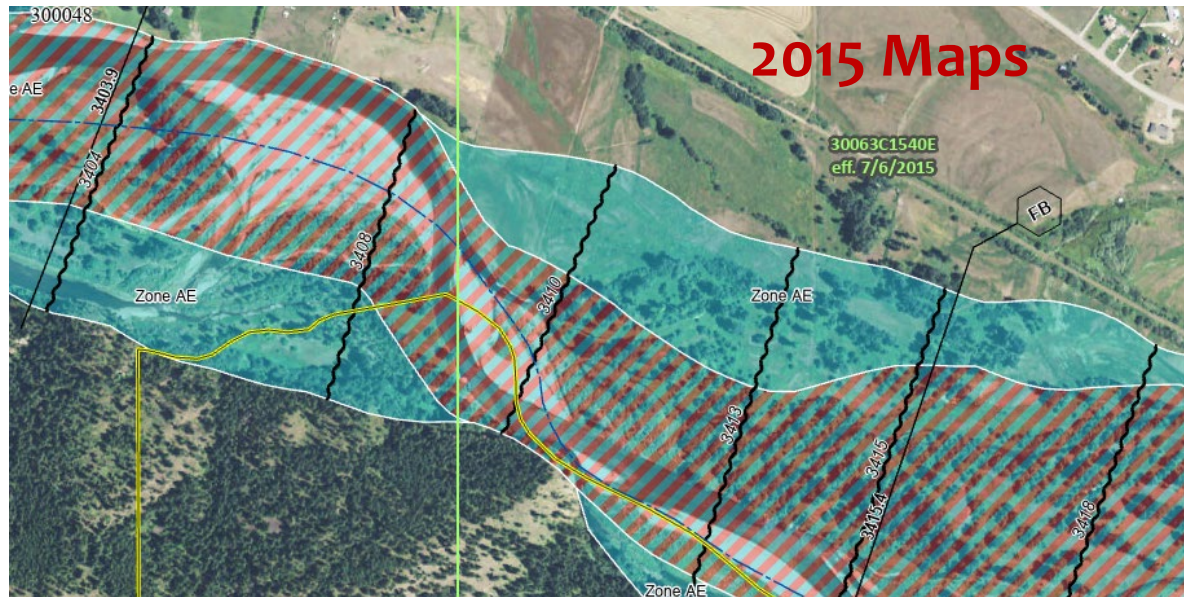
Need periodic updating





# 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

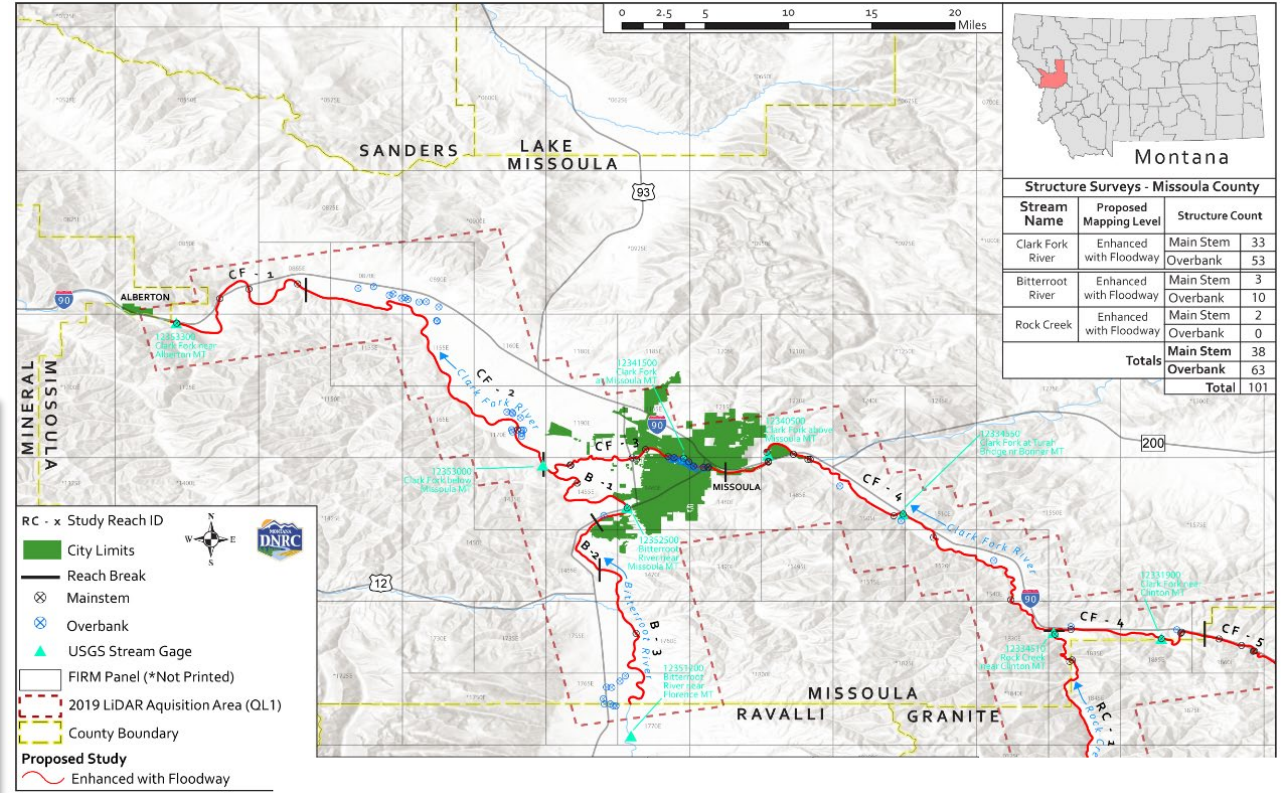
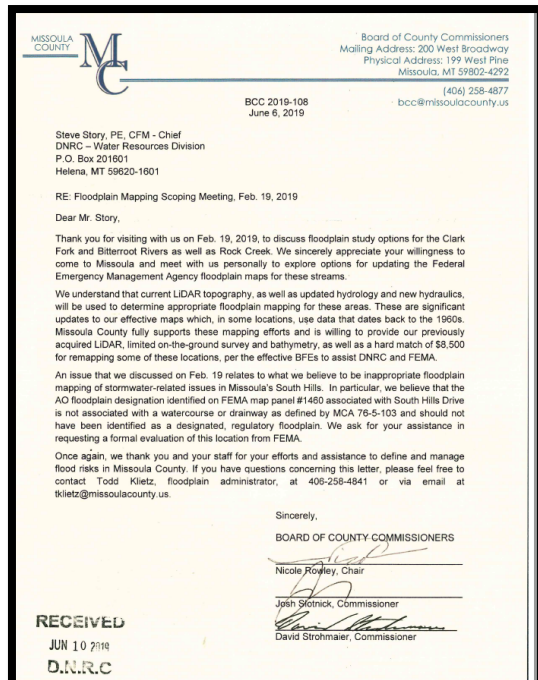
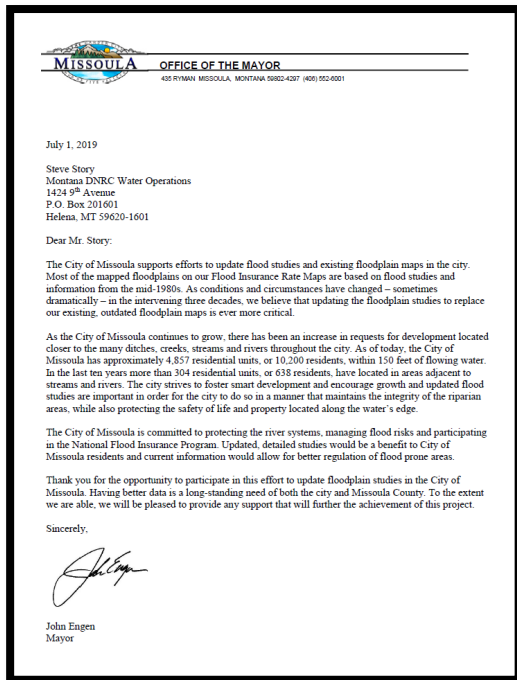


**Current maps are mostly based off data from 80s**

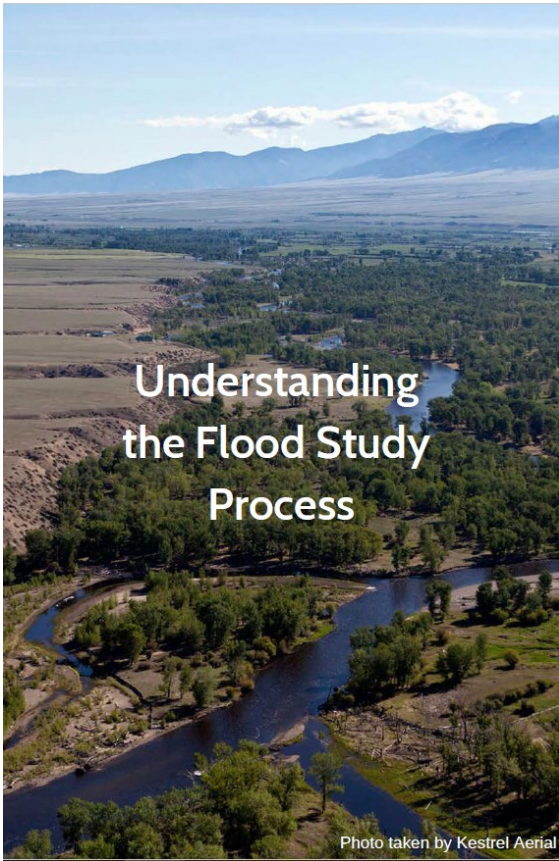


# Floodplain Mapping Update

- **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

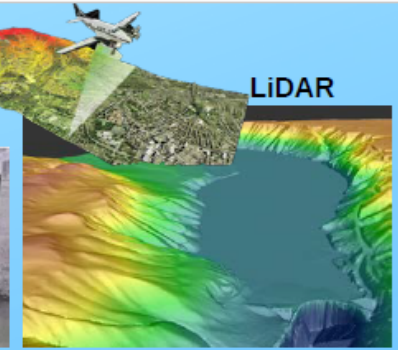
**Step 1 - Survey:** measurements are made of the topography around the river, along with any culverts, bridges, and road crossings. LiDAR uses an airplane to collect ground elevation over a large area, and ground survey supplements the airborne data.

**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.

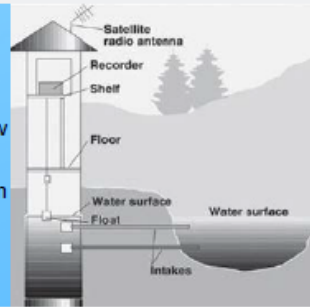
**Step 1 - Survey:** The type of the survey depends on the size of the study area and type of study.



LiDAR

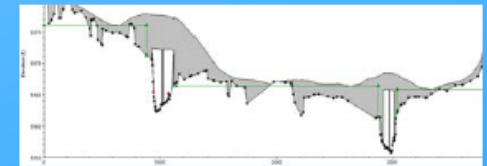
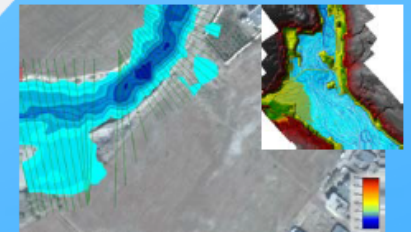


**Step 2 - Hydrology:** Stream gage stations are an important tool to determine flow rates. If nearby stream gages aren't available, gage data from a similar location is used to determine the flow rate.



**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



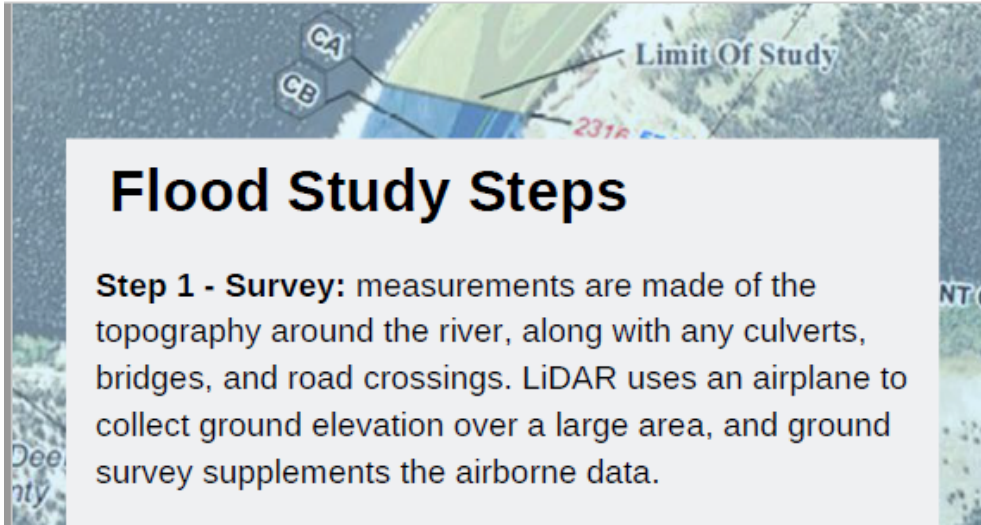
**Step 4 - Mapping (delineation):**

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





# LIDAR (Light Detection & Ranging) = Detailed Topography











## 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.

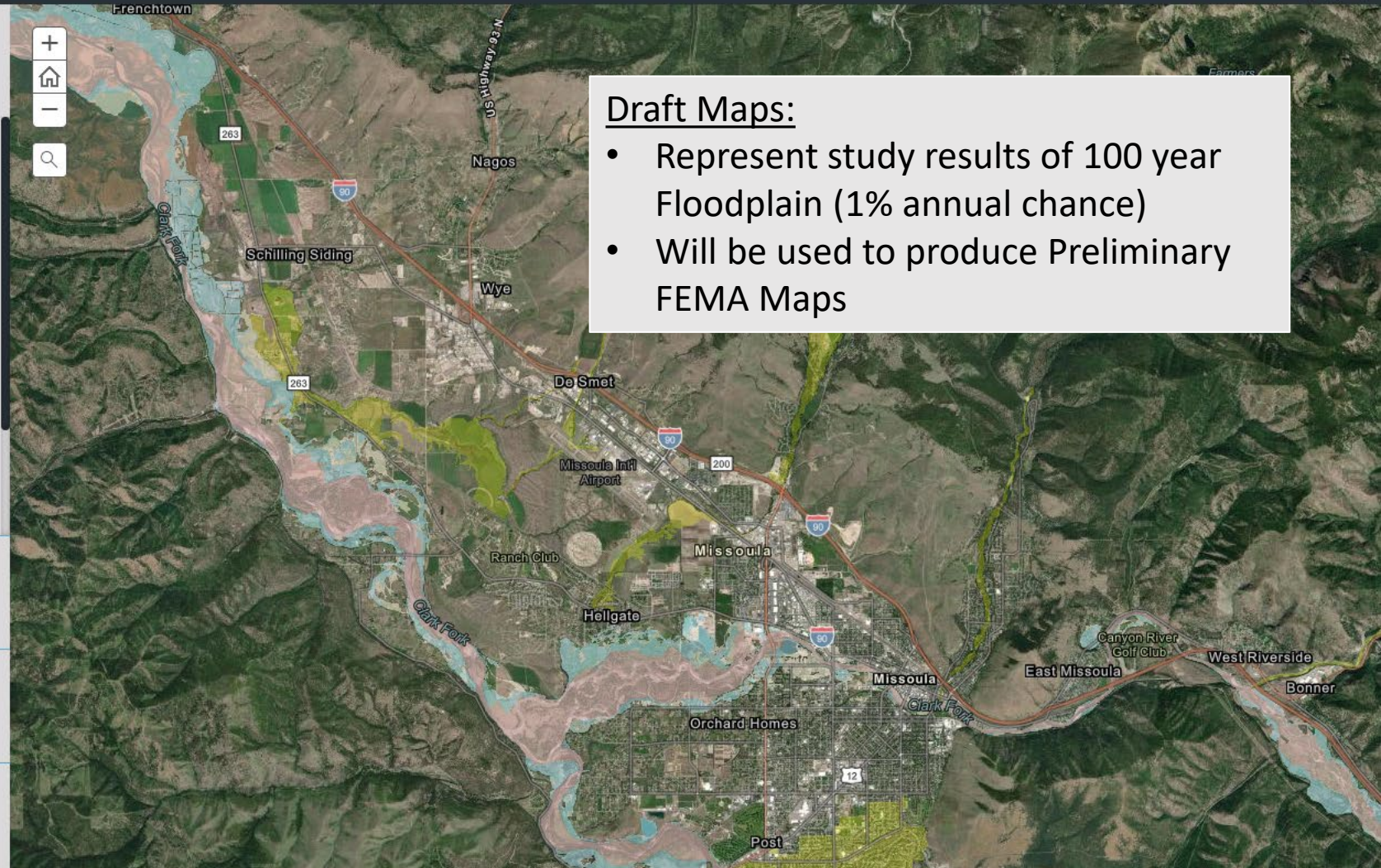
To see the current FEMA mapping, go to section 2.

-  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](http://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](#).

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#### 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](#).

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#### 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 \[Show/Hide\]](#)

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#### Draft data reports



Three draft data reports are shown: 1. Structure Survey Report for Missoula-Granite FIRM, MAI No. 2019-02. 2. Hydrologic Analysis Report for Missoula-Granite FIRM, MAI No. 2019-02. 3. Hydraulic Analysis and Floodplain Mapping Report for Bitterroot River (Tributary Study) - Missoula County, MT. Logos for DNRC, Granite County, and FEMA are also visible.



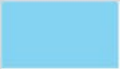




# Draft Maps – ready for review

## 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







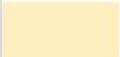
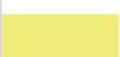
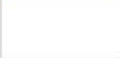
# Draft Map Viewer

## Missoula-Granite Floodplain Mapping Update

A Story Map



### 1 Draft Floodplain Mapping

-  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 - Current Maps

## Missoula-Granite Floodplain Mapping Update

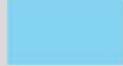



A Story Map



### 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

A Story Map






1 Draft Floodplain Mapping

2 Current FEMA Floodplain Mapping

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

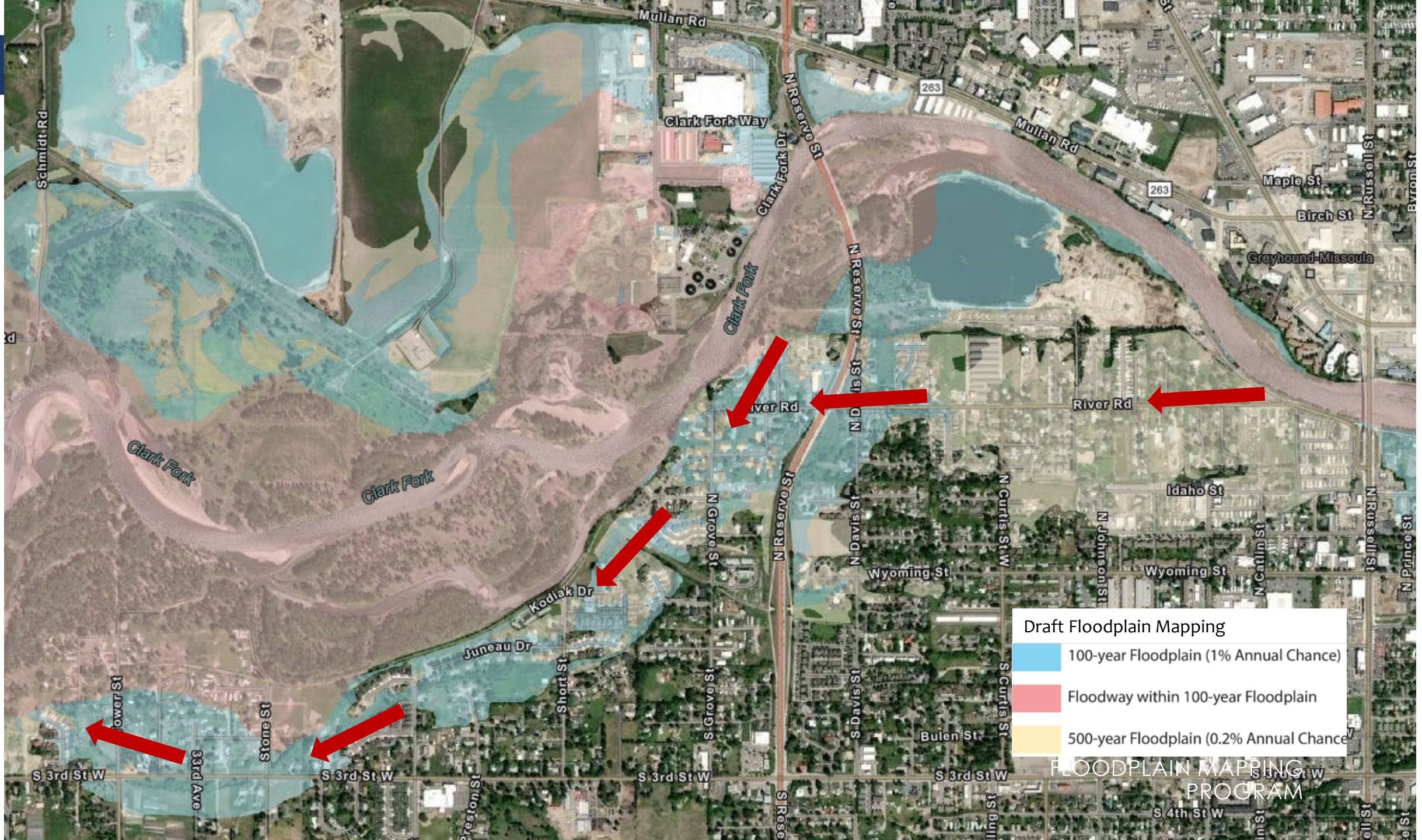
4 Compare Draft Floodway Map to Current FEMA Floodway Map

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







Schmidt Rd

S 3rd St W

33rd Ave

Stone St

S 3rd St W

Juneau Dr

Short St

S 3rd St W

S Grove St

S Reserve St

N Reserve St

S Davis St

N Davis St

Bulen St

N Curtis St W

S 3rd St W

S 3rd St W

N Curtis St W

S 4th St W

Wyoming St

Idaho St

River Rd

Mullan Rd

263

263

Mullan Rd

Clark Fork Way

Clark Fork Dr

N Grove St

Lower Rd

Wyoming St

Greyhound-Missoula

Birch St

Maple St

N Russell St

N D St

N Russell St

N Russell St

Byron St

S 3rd St W

S 3rd St W

S 3rd St W

S 3rd St W

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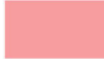
S 3rd St W




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](http://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.



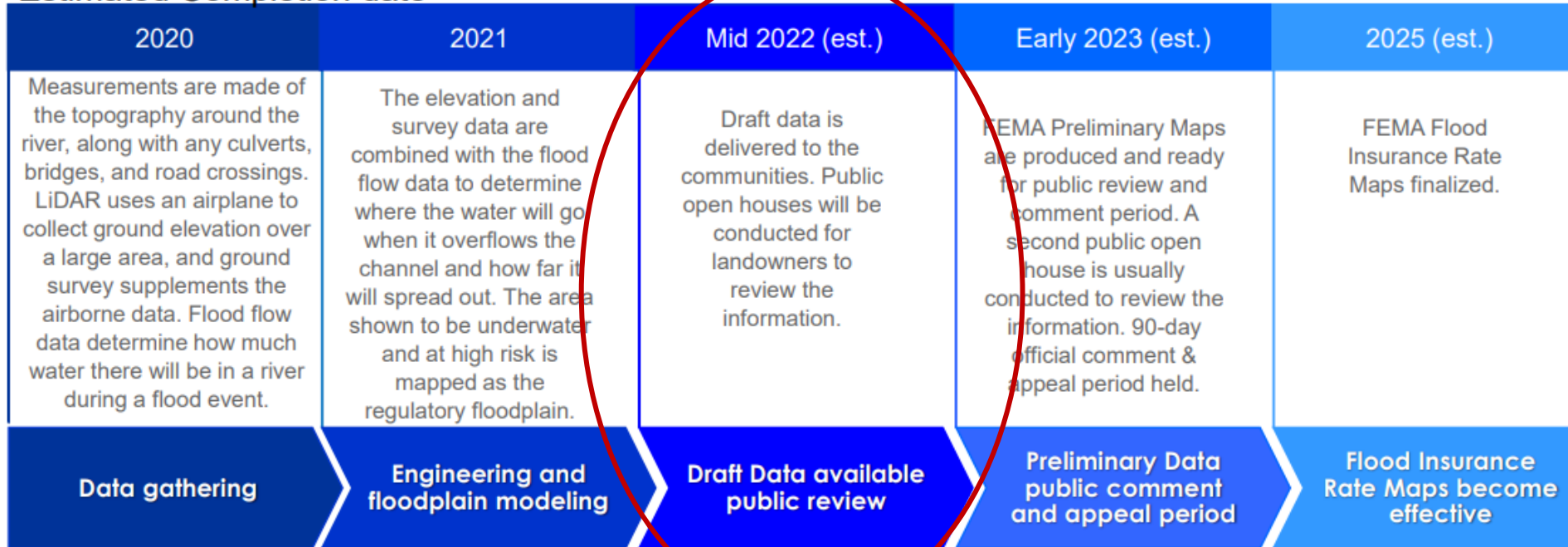


# Estimated Timeline



## Project Timeline Missoula-Granite Floodplain Maps Update

### Estimated Completion date



#### Flood Study Conducted

4 steps of a flood study.

- 1) Survey & LiDAR
- 2) Hydrology (flood flow)
- 3) Hydraulics (engineering)
- 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  
Dave DeGrandpre

County Staff  
Matt Heimel  
Bailey Minnich

DNRC  
Doug Brugger  
Larry Schock  
Tiffany Lyden  
Katie Shank  
Shylea Wingard

Morrison-Maierle  
Luke Carlson  
Allie Stone  
Allied Engineering  
Andrew Graham  
Tom Chingas



# Virtual Attendees

Floodplain Mapping Specialist  
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Floodplain Mapping Specialist  
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FLOODPLAIN MAPPING  
PROGRAM