COUNTY COMMISSION RECORD, CAMDEN COUNTY, MISSOURI

Friday 03/28/2025

The Camden County Commission met with Presiding Commissioner Ike Skelton, First District Commissioner James Gohagan and Second District Commissioner Steve Dougan.

Meeting Agenda

Commissioner Gohagan made a motion to approve today's agenda. Commissioner Dougan seconded the motion. The motion passed by vote: Commissioner Gohagan (aye) and Commissioner Dougan (aye). Session opened at 9:00 A.M.

Prior Minutes

Commissioner Dougan made a motion to approve the previous meeting minutes from March 27, 2025. Commissioner Gohagan seconded the motion. The motion passed by vote: Commissioner Dougan (aye) and Commissioner Gohagan (aye).

New Business

SEMA & WSP- Floodplain Mapping Information/Update- Stephen Noe with WSP and Sydney Roberts with SEMA were present in-person for today's presentation and several other representatives were present online from WSP, SEMA and FEMA. Information was provided during presentation of how the floodplain information is gathered and then used to set the floodplains. Once the presentation was over, the floor was opened for public comment and questions. Several in attendance spoke/asked questions of Mr. Noe and Ms. Roberts. There were no motions made.

You may view today's meeting on www.camdencountymo.gov website, Departments → Commission, scroll to the bottom and click "View Past Meetings" and select today's date [3-28-25].

Flood Risk Review (FRR)
Camden County, Missouri

First FRR Meeting – March 8, 2023
Second FRR Meeting – March 28, 2025

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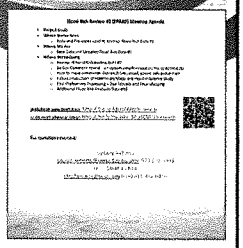
Our Agenda

Project Goals;

Where We've Been;

Where We Are;

Where We're Going;



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Introductions

- FEMA Region 7 – **Federal Emergency Management Agency**
  - Dawn Livingston – Regional Project Officer
  - Andy Megrail – CTP Program Supervisor
- Missouri SEMA – **State Emergency Management Agency**
  - Sydney Roberts – Floodplain Engineering and Mapping Section Manager
  - Patrick Lower – Floodplain Mapping Technical Assistant
  - Jacob Wornson – GIS Floodplain Mapping Technical Assistant
- WSP USA – **SEMA Mapping Partner**
  - Stephen Noe – Program Manager
  - Alicia Williams – Associate Project Manager
  - Ben Rufenacht – Lead Engineer
- And You!

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Current Effective Maps

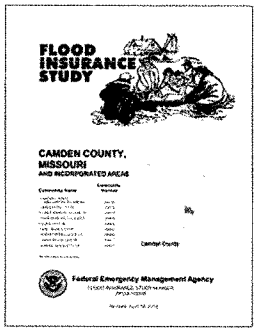
Camden County Effective Map Date is April 18, 2018.

Camden County
Jurisdictions

- Camden County (Unincorporated Areas)
- Camdenton
- Four Seasons
- Laurie (Morgan Co.)
- Linn Creek
- Osage Beach
- Richland (Pulaski Co.)
- Stoutland (Laclede Co.)
- Sunrise Beach

Blue text indicates Non-Participation in the NFIP.

- *Climax Springs, noted on FIS, disincorporated in 2015.*
- *Mack's Creek, noted on FIS, is a CDP.*



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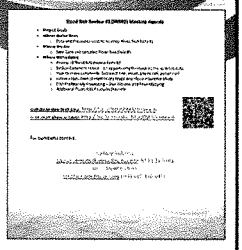
Our Agenda



Project Goals;

Where We've Been;

Where We Are;

Where We're Going;

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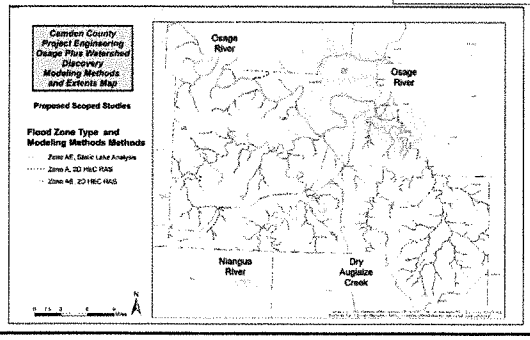
Project Goal: Camden County

We Are Mapping County-Wide
(1 square mile drainage area or existing mapping)

504 Miles of Streams



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Develop LiDAR Stream Networks

- Flow Paths and Stream Lines developed from Hydro-Enforced LiDAR
- Smaller Threshold for Contributing Drainage Area
  - 1 sq. Mile
  - 2 sq. Mile
  - 3 sq. Mile
  - ½ sq. Mile
  - ¼ sq. Mile
- FEMA extents
- 40-acre drainage
- 10-acre drainage
- 1-acre drainage

28

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Our Agenda

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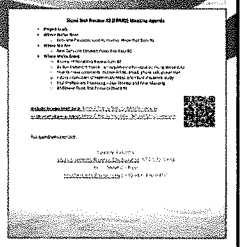
Where We've Been;

Where We Are;

Where We're Going;



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Where We've Been;

- Tasks completed to date include:
  - Acquire Base Map
  - Perform Field Survey
  - Develop Topographic Data
  - Develop Hydrologic Data
  - Develop Hydraulic Data
  - Develop Floodplain Data
  - FRR#1 Meeting – March 8, 2023
  - Addressing Comments
  - FRR#2 Meeting - Today

Data Development with 2D Modeling!

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Acquire Basemap Information

- **Aerials** by default are the USGS National Map
- **Roads** by default are MODOT and MO GIS
- **Political Boundaries** by default are MO State GIS Clearinghouse (MSDIS)

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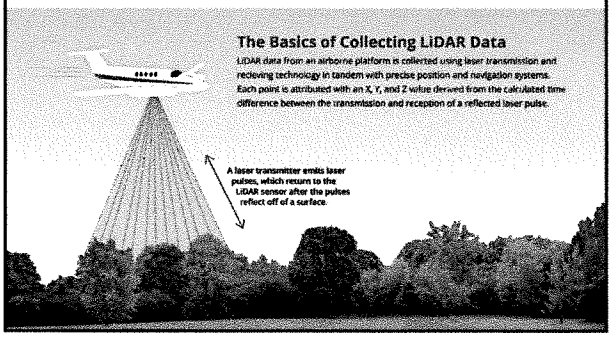
Develop Terrain



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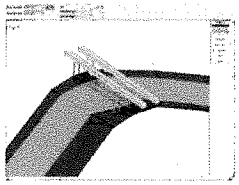
Field Survey Collection

Collect survey data where natural or man-made situations are obstructing the flow of the stream.

Roads and other Infrastructure Crossings



Red streams on the map

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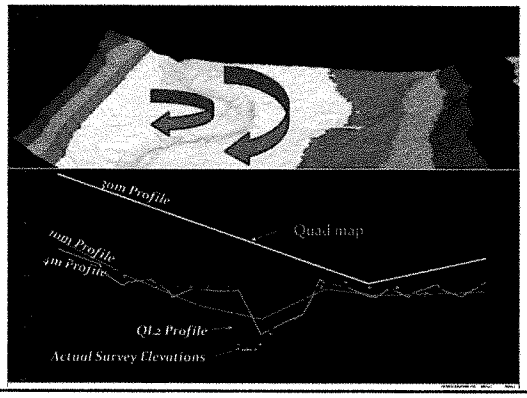
Cross-Section Accuracies



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Why 2D Modeling?

- Two-Dimensional (2D) modeling is the **new industry standard** for riverine modeling.
- Advances in computer technology along with increased **accuracy** of data have driven this change.
- The goal of the hydraulic model is to accurately simulate actual flow paths, storage and depths.
- Less assumptions are made resulting in improved accuracy.
- High visual graphic output of 2D models enhances communication.
- Accurate representations for complex conditions where water does not travel directly downstream.

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Benefits of 2D Hydraulic Modeling

Hydraulic Variables	One-dimensional (1D) Modelling*	Two-dimensional (2D) Modelling*	Stream Near You
Flow direction	***Assumed*** by user	***Computed***	✓
Flow paths	***Assumed*** by user	***Computed***	✓
Channel roughness	***Assumed*** constant between cross sections	***Assumed*** at each element	✓
Ineffective (blocked) flow areas	***Assumed*** by user	***Computed***	✓
Flow contraction and expansion through bridges	***Assumed*** by user	***Computed***	✓
Flow velocity	***Averaged*** at each cross section ***Assumed*** in one direction	Magnitude and direction ***Computed*** at each element	✓
Flow distribution	***Assumed*** based on conveyance	***Computed*** based on continuity	✓
Water surface elevation	***Assumed*** constant across cross sections	***Computed*** at each element	✓
Momentum	Not accounted for	***Computed*** at each element	✓

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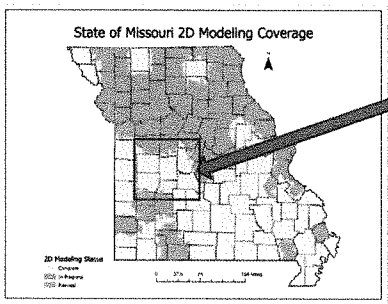
Statewide 2D by 2027 is the Goal!



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What's Important?

- **Volume of Runoff**
- **Timing of Runoff**
- Geometric Accuracy of Flow Paths
- Geometric Descriptions of any Restrictions
- Volume of Ponding

Missouri Modeling Goal: *To develop data-driven models that are easy to update as data changes.*

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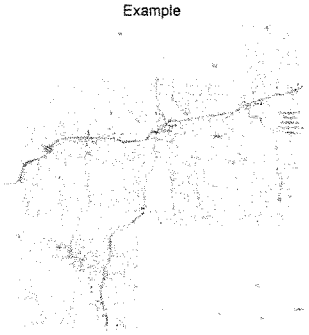
Two Dimensional Parameters

Example



Hydro Connections

- Dams
- Berms
- Roads
- Railroads
- Any raised ground in the digital LiDAR that has a culvert or bridge

Inputs

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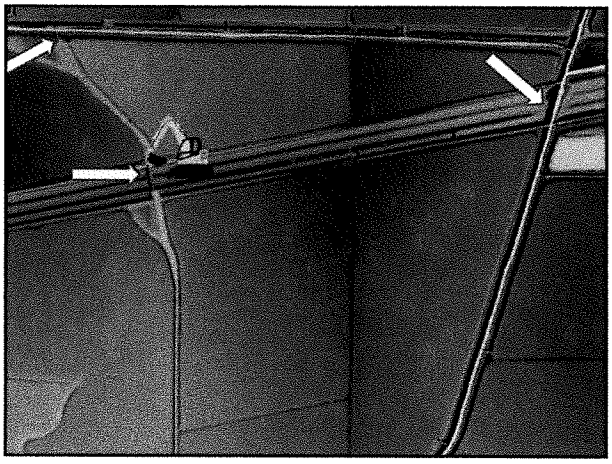

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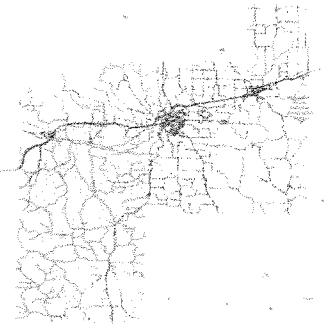
Two-Dimensional Model Parameters

Example

Break Lines

- Railroads
- Levees
- Agricultural Berms
- Dams
- MoDOT Roads
- County Roads
- Farm Roads



High Points – Water flows under / through.

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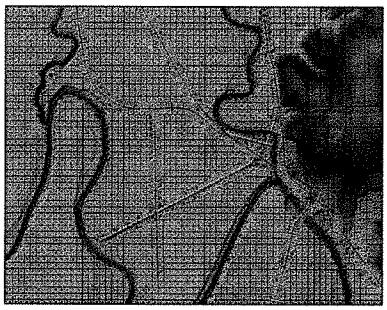
What is a MESH?

- Railroads
- Levees
- Agricultural Berms
- Dams
- MODOT Roads
- County Roads
- Farm Roads



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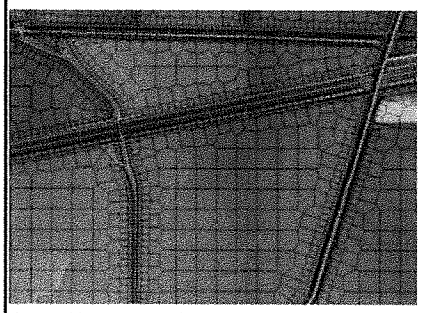
Two-Dimensional Model Set Up



Unstructured Computational Mesh with Detailed Terrain Data developed from LiDAR

Mesh

- With the input 2D area boundaries, land use data and terrain data, a 2D computational mesh can be developed.
- HEC-RAS uses a finite-volume solution scheme.
- For each cell, with 3 to 8 sides, the cross-section information is derived at the faces of the cell with storage information developed within the cell's area.

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Hydrology – Volume of Runoff

- How much of the rainfall makes it to the creek, stream, or river?
- Rainfall is captured by:
  - The soil (we assume it's not too dry and not too wet)
  - The vegetation (plants and trees capture a large amount of rainfall that eventually evaporates)
  - And depressions in the ground (sinkholes too)
- What gets by all these traps goes to the channel!

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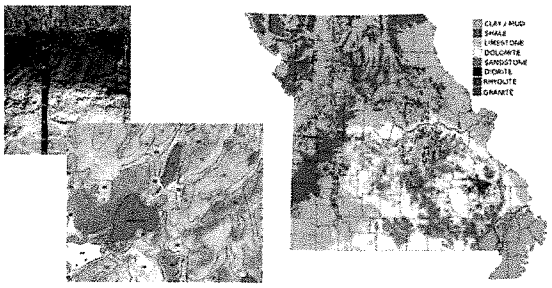
Soil Classification Data



Hydrologic Soil by Groups – A, B, C and D

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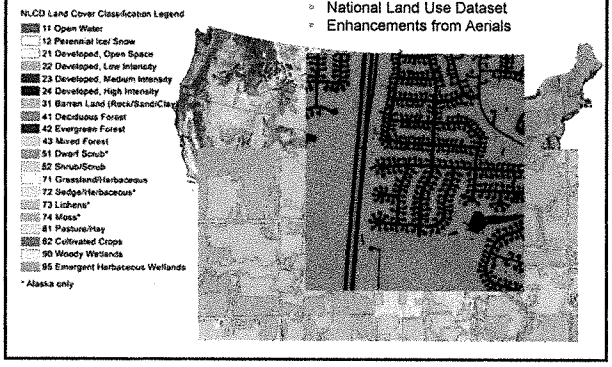
Land Use

- Local Land Use Plans
- National Land Use Dataset
- Enhancements from Aerials



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Compute Curve Numbers

Summary of Curve Number Values with the Associated Land Use and Soil Data

Landuse Description	Hydrologic Soil Group			
	A	B	C	D
Developed, Open Space	39	61	74	80
Developed, Low Intensity	49	69	79	84
Developed, Medium Intensity	61	75	83	87
Developed, High Intensity	89	92	94	95
Deciduous Forest	36	60	73	79
Shrub/Scrub	35	56	70	77
Herbaceous	49	69	79	84
Hay/Pasture	49	69	79	84
Cultivated Crops	64	75	82	85
Woody Wetlands	30	55	70	77
Emergent Herbaceous Wetlands	71	78	85	89
Open Water	98	98	98	98

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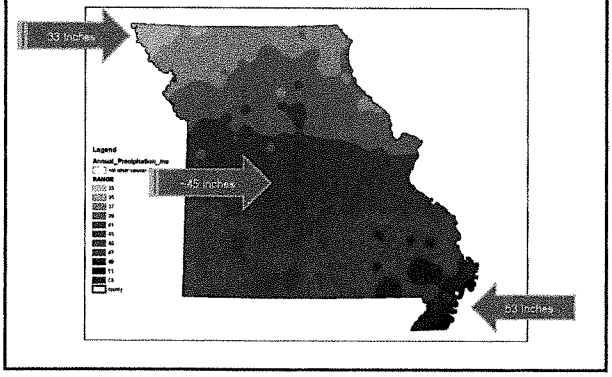
Annual Precipitation



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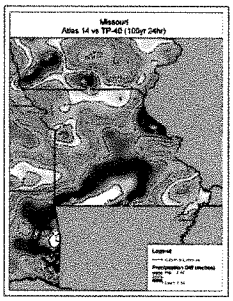
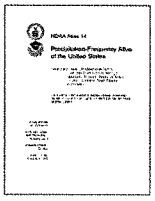
Rainfall Frequency and Amounts

(1% 24hr event)





Varies from -0.5 inches to +1.0 inches

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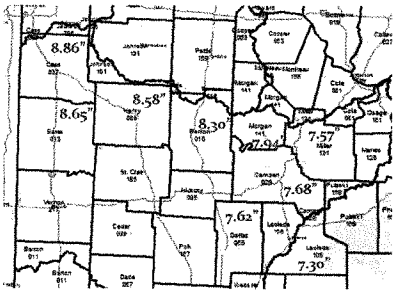
Atlas 14 24-Hour 1% Rainfall Depths



The rainfall depths data for each county is leverage data obtained from NOAA

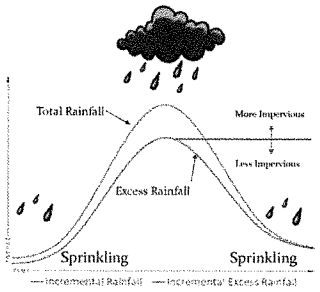
https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

50

2D Hydrology

Excess Rainfall

- A Type II distribution was selected for the rainfall hyetograph
- The excess rainfall is the amount that leaves the mesh cell.



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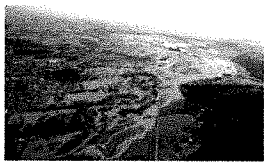
Hydraulics – Timing of Runoff

- How high will all that water get once it gets to the creek, river, stream, bridge, culvert, or road?
- The height of the water surface is determined by:
  - The slope of the ground (how steep or flat is the stream?)
  - The vegetation (plants and trees provide obstructions that slow down the water which makes it go higher)
  - How confined is the channel? (Is it wide or narrow?)
  - Infrastructure obstacles (How many road crossings?)



Digital description of ground for water to flow from one place to another that determines the direction and path, accounts for roughness, volume of attenuation, time to travel with a result of the predicted WSEL at a point of interest

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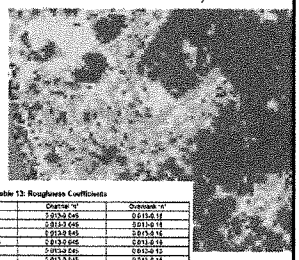
Detailed Landuse

Model Landuse Layers for CN per Mesh

Detailed per New Aerials

National Landuse Layer



Examples

Table 13: Roughness Coefficients

Flooding Source	Channel "n"	Overbank "n"
Bear Creek	0.013-0.045	0.013-0.16
Bear Creek Tributary 20	0.013-0.045	0.013-0.16
Bear Creek Tributary 22	0.013-0.045	0.013-0.16
Bear Creek Zone A Streams	0.013-0.045	0.013-0.16
Big Creek	0.013-0.045	0.013-0.16
Dixie Branch	0.013-0.045	0.013-0.11
Iron Mobile Charles Watershed Zone A Streams	0.013-0.045	0.013-0.11
Pelkus Watershed Zone A Streams	0.013-0.045	0.013-0.11

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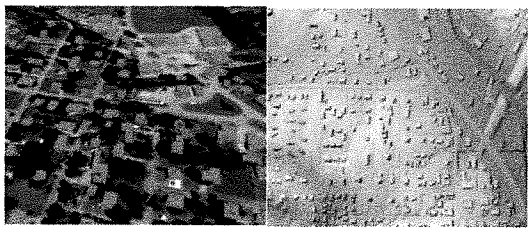
Building Footprint Extraction from LiDAR – 3D Features



Aerial View

Terrain View

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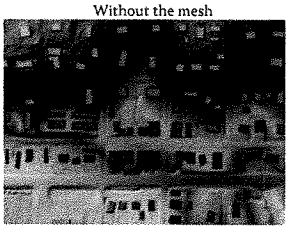
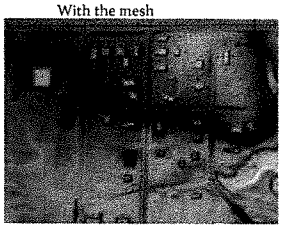
Building Footprints in the Model

- View of the 3D Buildings in the model

Without the mesh



With the mesh



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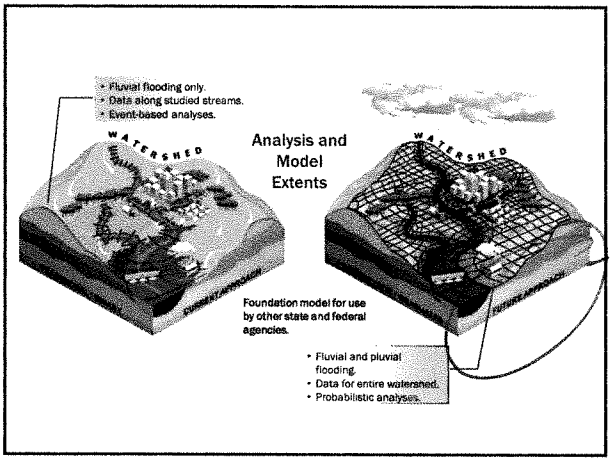

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Question ?

Why is my regulatory floodplain different from the model results?

Red is Pluvial and is the flows to the SFHAs on Floodplain Maps – Not Regulatory

Green is Fluvial and will be the SFHAs on Floodplain Maps - Regulatory

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Why are the BFE lines curved?

We will have **Evaluation Lines** (cross-sections) going forward....

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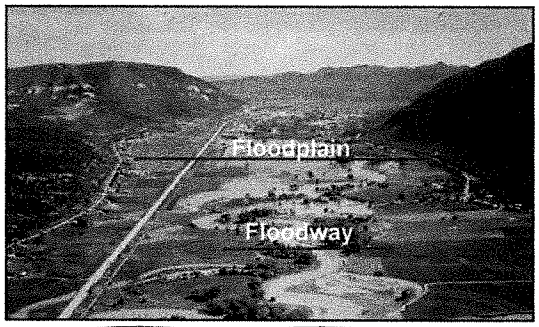
Floodplain vs. Floodway



Red streams will have a Floodway

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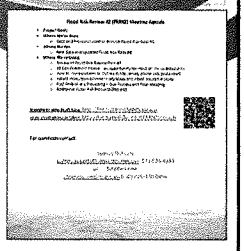

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Where We Are;

Flood Risk Review Meeting #2 - Today

- Reviewing the working-set of Flood Risk Data and providing comments!
- Your comments are welcome now and you are encouraged to provide input!

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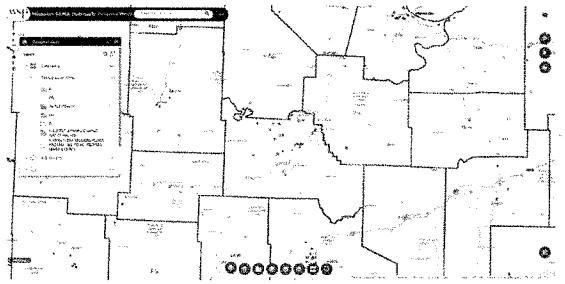
Comments Received



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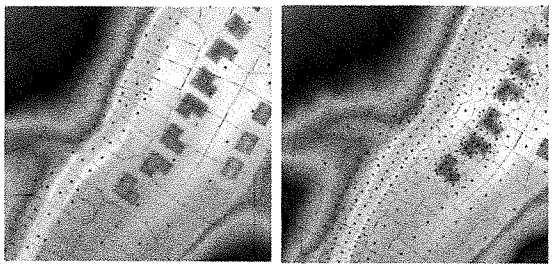
Example of addressing comments

"Check cell size for street overflow".
Cell size decreased and breaklines added for overflow area.



This example is in Pulaski County

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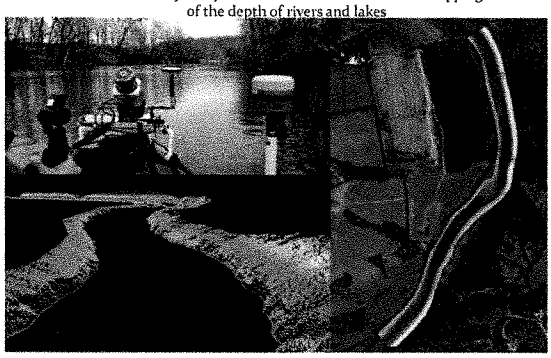
USACE Bathymetry Data received

Riverine bathymetry refers to the measurement and mapping of the depth of rivers and lakes



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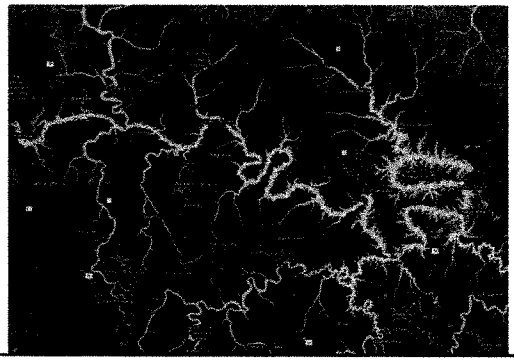

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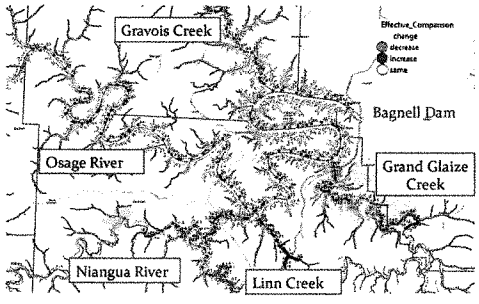
Changes in Lake Elevation



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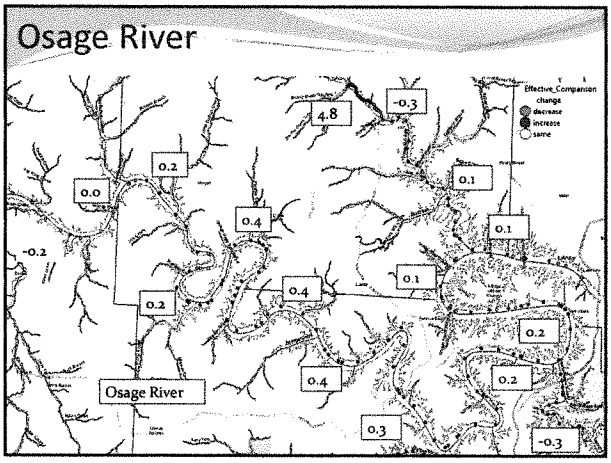
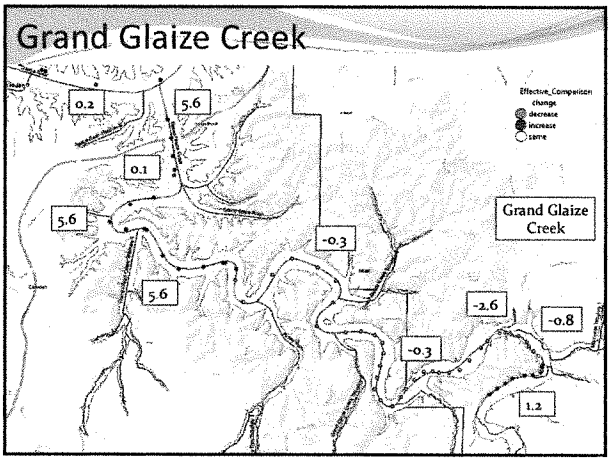
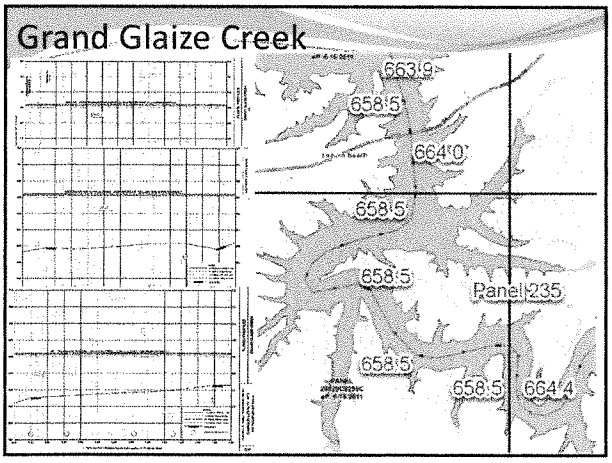

Osage River
Effective_Comparison
change
decrease
increase
same
4.8
-0.3
0.2
0.0
0.4
0.1
0.1
-0.2
0.2
0.4
0.1
0.2
0.4
0.2
Osage River
0.3
-0.3

68

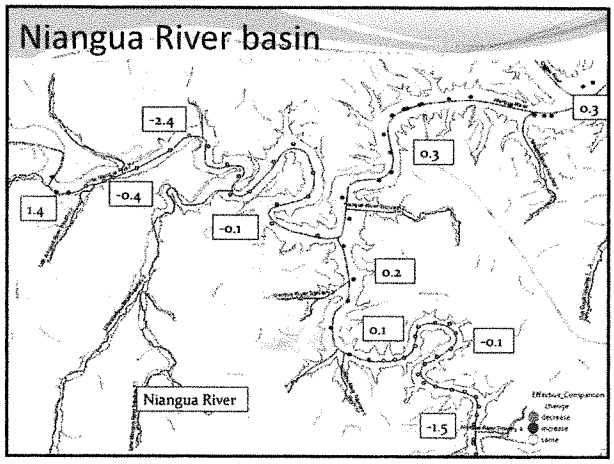

Grand Glaize Creek
Effective_Comparison
change
decrease
increase
same
0.2
5.6
0.1
5.6
-0.3
Grand Glaize Creek
5.6
-2.6
-0.8
-0.3
1.2

69


Grand Glaize Creek
663'9
658'5
664'0
658'5
658'5
Panel 235
658'5
658'5
664'4

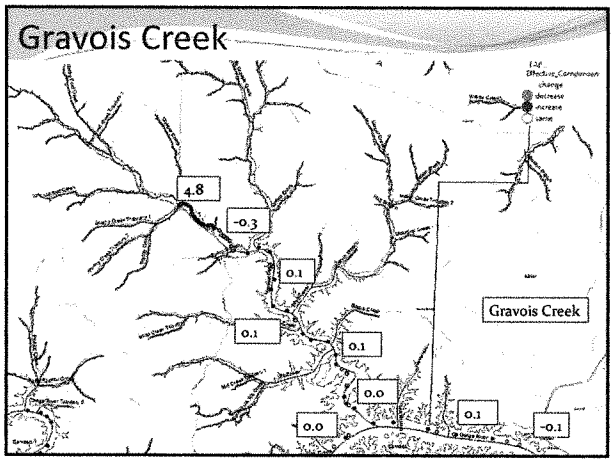
70

Niangua River basin



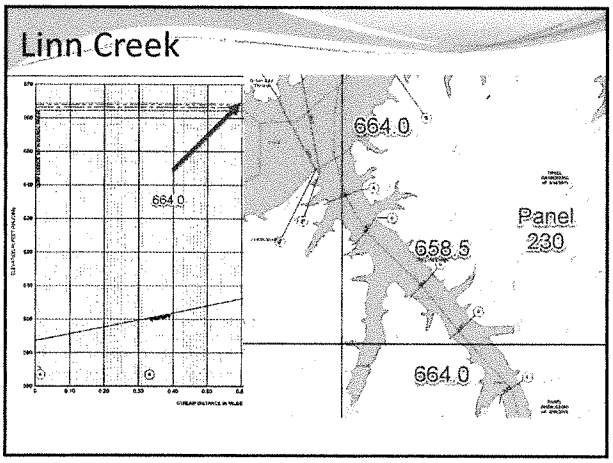
71

Gravois Creek



72

Linn Creek



73

Flood Risk Review Meeting

What is the purpose of a Flood Risk Review Meeting?

- Why do we do this work?
  - It is so we can update your communities' flood risk and assessment data.
- Why has this County been selected?
  - Many of the communities previously mapped by the National Flood Insurance Program (NFIP) have information on their DFIRM maps that are over 30 years old.
  - Better data and science is available to produce more accurate flood data, and provide better data to communicate risk..
- Why are you important to this process?
  - You understand the flood risk across the county
  - Your experience and knowledge increases the value of the data

74

30-Day Comment Period

30-Day Comment Period Flood Risk Review Meeting

- We want your input on these maps.
  - This is your opportunity to have a say in what the end results look like and the best opportunity to achieve those changes by front porch conversations
  - If you provide us feedback at this stage, we can and will work with you to address your concerns and incorporate them into the models.
  - The 30-day comment period begins today.

75

Some Items to Review

- Hydroconnectors
- Breaklines
- Areas that flood that are not within flood risk plotted areas.
- Areas plotted within flood risk areas that do not flood.
- Points of highwater for a particular previous flood event.

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Our Agenda

Project Goals;

Where We've Been;

Where We Are;

Where We're Going;

77

Where We're Going!

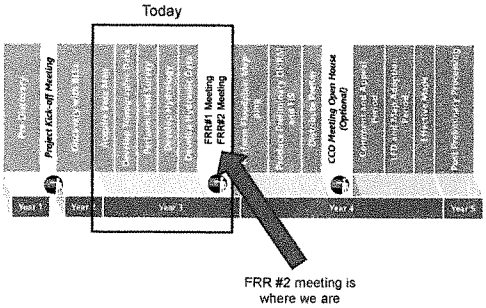
Future tasks to complete the project:

- Develop the draft FIRM database (*Summer 2025*)
- Preliminary Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) Production (*Fall 2025/Winter 2026*)
- Hold CCO Meeting ***(front porch opportunities closing)*** *(Spring 2026)*
- Begin Formal Appeal Process **(front porch over)** (*Summer 2026*)
- Letter of Final Determination (LFD) issued and formal ordinance and map adoption begins (*Winter 2026*)

Still lots of opportunities to change the data ...

78

Life Cycle of a Floodplain Mapping Project



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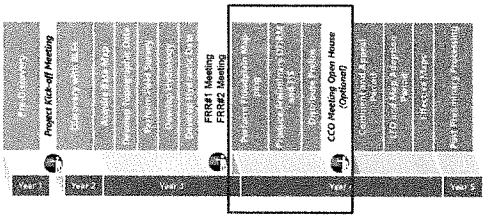
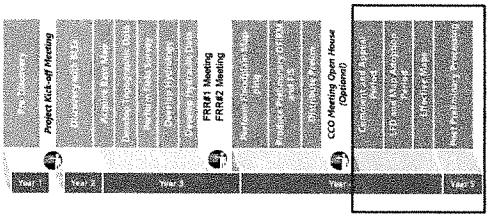
Preliminary Map Products and Communications



Fall 2025 and Winter 2025/2026

80

Post Preliminary Process Meetings and Communications



Summer 2026

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Automated Map Production (AMP)

Traditional Example

AMP Example

88

88

Cross Sections or No Cross Sections?

Evaluation Lines are the new Cross Sections

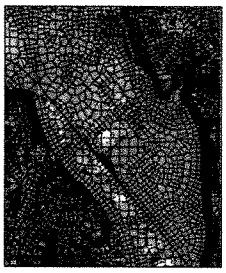
- WSEL Contours of shorelined SFHA
- Density depends on slope of WSEL and mapping standards.
- Minimum is to have an evaluation line no further apart than 1" of map scale (500 to 1000 ft).

89

Evaluation Lines

2D to Regulatory

No cross-sections like we have in 1D Interconnected Cells and Cell Faces



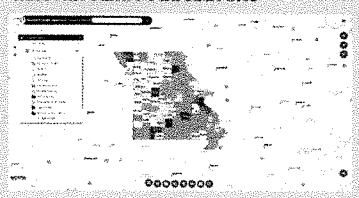
Vs.

Cross-sections are the modeling base unit Can be incorporated directly into the regulatory maps

90

Reviewing the Updates

User Guide:
Missouri SEMA Outreach Site



We're sending this user guide to help navigate how to review your updated data.....

91

Flood Risk Data Review Process

- We want your input on these maps.
  - This is your opportunity to have a say in what the end results look like and the best opportunity to achieve those changes by front porch conversations
  - If you provide us feedback at this stage, we can and will work with you to address your concerns and incorporate them into the draft flood risk data!
  - The 30-day comment period begins today.
  - You'll receive an electronic notification stating the actual ending date for comments, which should be in May.

92

Some Items to Review

- Hydroconnectors
- Breaklines
- Areas that flood that are not within flood risk plotted areas.
- Areas plotted within flood risk areas that do not flood.
- Points of highwater for a particular previous flood event.
- Changes that occurred with the 6.0 model updates.

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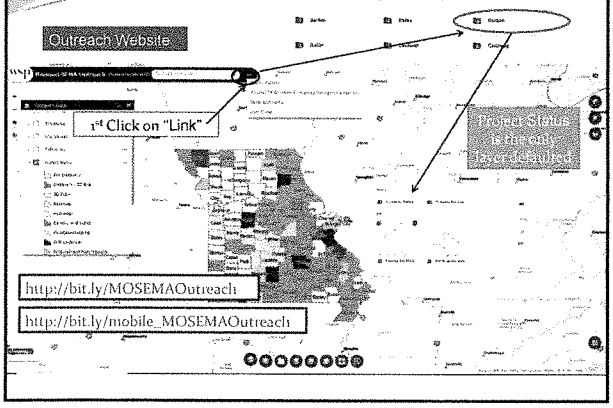
Some Tools to Assist with Communications



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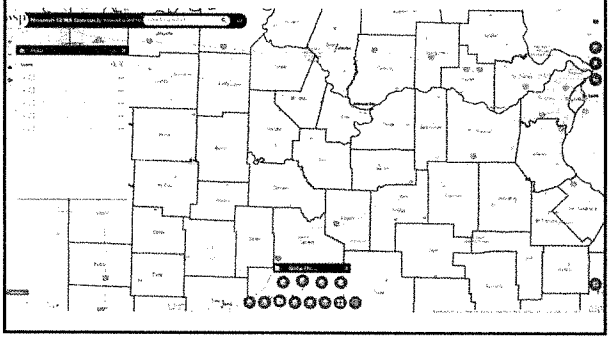
FRR#2 Data

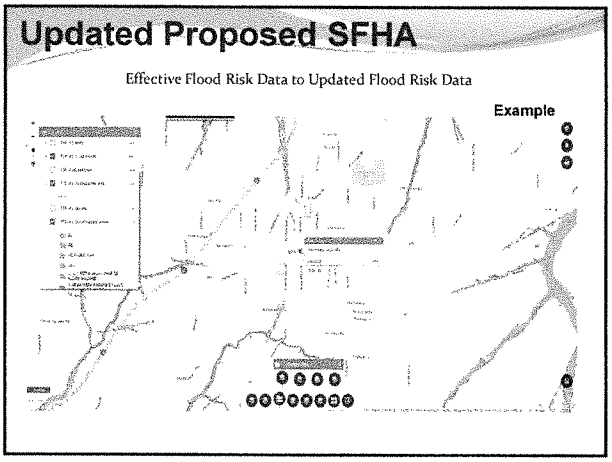
We'll demonstrate this live!



95

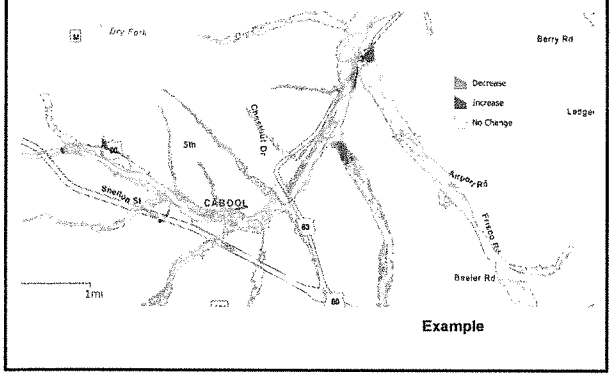
Updated Proposed SFHA

Effective Flood Risk Data to Updated Flood Risk Data



96

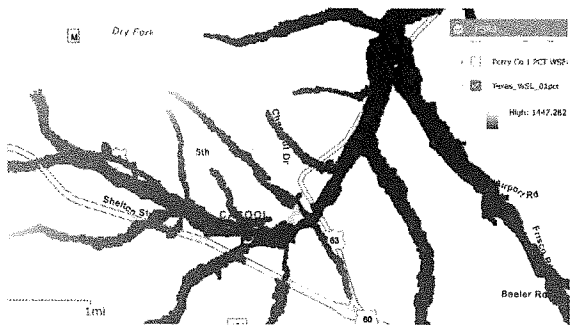
Changes Since Last FIRM (CSLF)



97

Water Surface Elevations (WSELs)

Point and Click



Example

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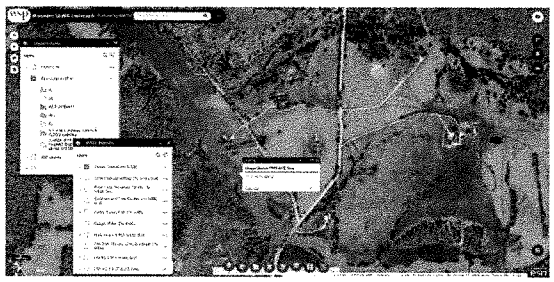
Using the WSELs



99

If you need assistance.....

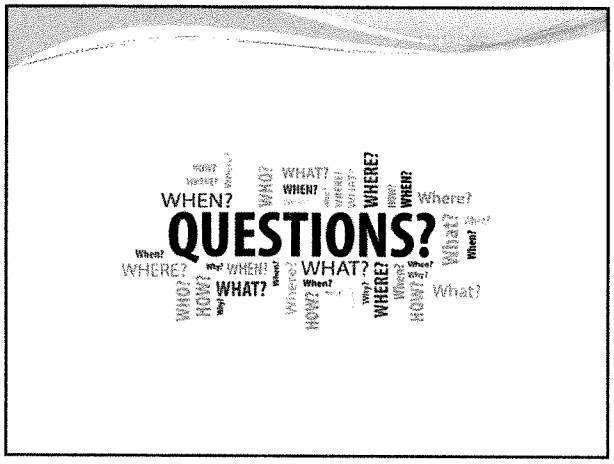
If you need help navigating these maps via the website, please call:

Sydney Roberts at 573-526-9383,

or

Stephen Noe at 615-430-0456

100



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Adjourn: With no further official business on the agenda, Commissioner Dougan made a motion to adjourn to any unofficial business that may develop during the day. Commissioner Gohagan seconded the motion. The motion passed by vote: Commissioner Dougan (aye) and Commissioner Gohagan (aye). Session closed at 11:27 A.M.

Ordered that the Commission adjourn until further notice.

Ike Skelton, Presiding Commissioner

Jordan Stanton, Admin. Assistant