

Lower Arkansas Custom Watershed Floodplain Mapping Kickoff Meeting

March 5, 2019

Sumner County





Your engagement in this process is important to the success of this project, so thank you for taking the time to be here today!

Discussion Topics

- ▶ Introductions
- ▶ Program Overview
- ▶ Project Discussion
 - ▶ Overview
 - ▶ Scope
 - ▶ Timeline
- ▶ Community/Stakeholder Responsibilities

Why Have Floodplain Maps?

- ▶ Determine where flood insurance is needed and rate its cost.
 - ▶ Flood Insurance Rate Map (FIRM)
- ▶ To provide the basis for executing community floodplain management ordinances.
- ▶ Understand flood risk so communities can make informed planning decisions.

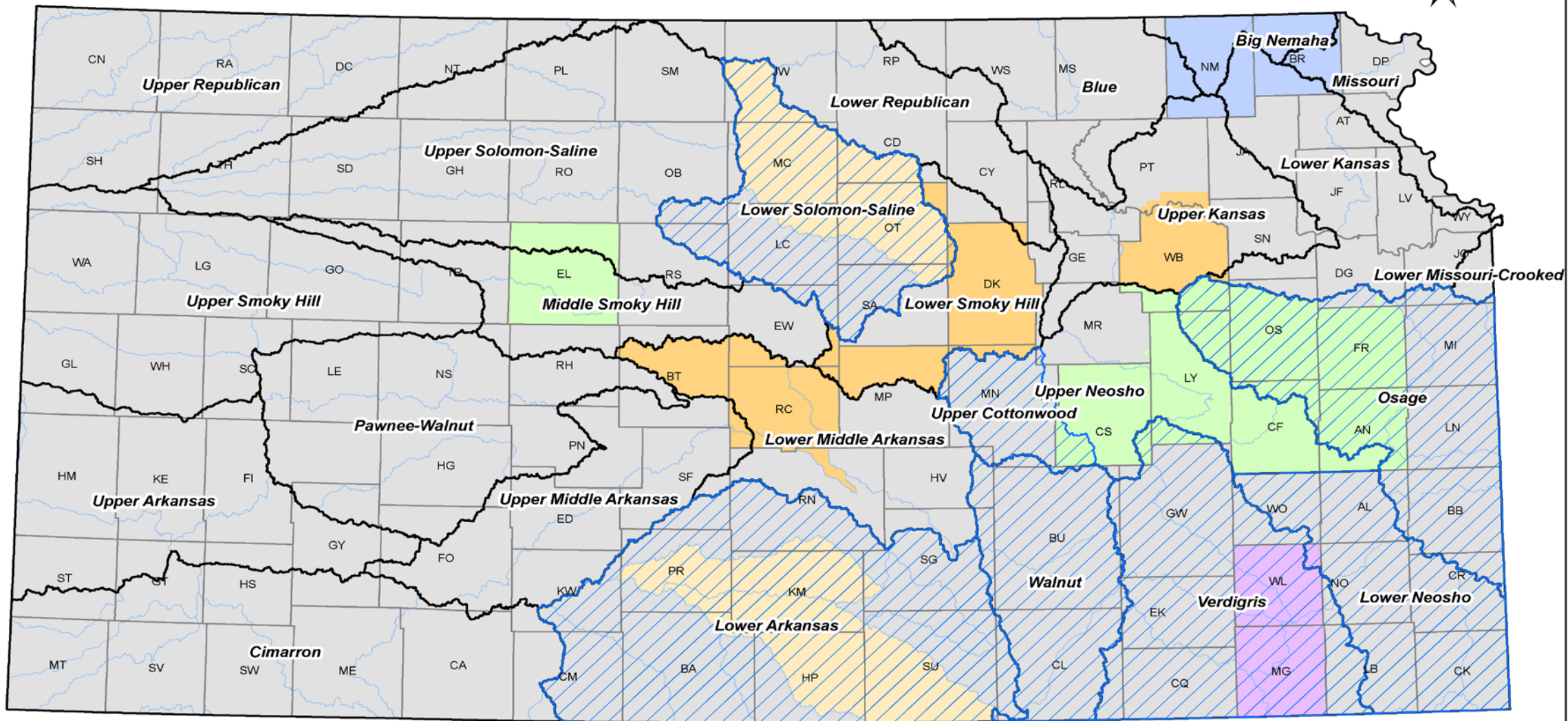
FEMA Floodplain Mapping Program

- ▶ Risk Mapping Assessment and Planning
- ▶ Supports the National Flood Insurance Program. Performed on a watershed basis.
- ▶ Consists of both Regulatory & Non-Regulatory Products.
- ▶ FEMA Program that provides communities with flood information and tools they can use to enhance their mitigation plans and take action to better protect their citizens.

Current Effective Information

- ▶ Outdated Topography
 - ▶ Newer QL2 and/or QL3 LiDAR available
- ▶ Outdated Engineering Inputs and Approach
 - ▶ New Regression Equations available
 - ▶ HEC-RAS 2D provides cost-effective unsteady watershed-wide analysis
- ▶ Aged FEMA Inventory

Current Projects, FY18 Projects, and Custom Watersheds



Current Projects

- Draft; Partial Draft (PT Phase II in development)
- Preliminary
- Underway

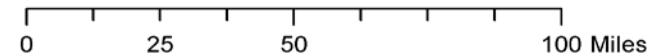
Upcoming FY18 Projects

- FY18 BLE Projects - scalable
- FY18 Regulatory Projects

Watersheds

- FOA Complete (Non-Reg Zone A)
- Custom Watersheds (labeled)
- HUC 8 Watersheds (not labeled)

September 13, 2018



How Will This Map Be Different?

- ▶ Digital County-wide Floodplains
- ▶ New Engineering using 2-D methodology
 - ▶ Updated LiDAR Topography
 - ▶ Enhanced hydrology
 - ▶ Enhanced hydraulics
- ▶ Non-Regulatory Flood Risk Products (FRPs)
 - ▶ Water Surface Elevation (WSE) grid - shows the flooding elevation or BFE (Base Flood Elevation)
 - ▶ Depth grid - depth of flooding

Project Goals

- ▶ Update floodplains in the county with modern mapping.
- ▶ Produce the highest quality mapping that we can.
- ▶ **Leave a map that communities BELIEVE.**
- ▶ Help communities and residents better understand and prepare for their flood risk.

Meeting Goals

- ▶ Please provide us comments on the scoping lines by April 12, 2019
 - ▶ We are requesting funding for Data Development this year for the FY19 Grant (September) to begin in January of 2020
 - ▶ Let us know areas of development where the ground surface has likely changed since the date of the 2015 Lidar
 - ▶ Provide As-Builts/grading plans and we can reconcile with the engineering and mapping data

Project Phases

Current Phases

Future Phases - not yet funded

Discovery
(BLE)
Summer 2019

Discovery
(Meeting)
Winter 2019

Data
Development/
Prelim
Distribution
2020

Post
Preliminary Due
Process & Final
Products
2021

Effective
Products for
Communities
2022

What is Base Level Engineering (BLE)?

- ▶ Development of Zone A engineering and mapping
- ▶ Meets mapping Standards for Flood Risk Projects (FEMA Policy Memo FP 204-078-1)
 - ▶ LiDAR Topography
 - ▶ National Weather Service (NWS) Rainfall
 - ▶ National Land Cover Database Land Use
 - ▶ NRCS Soil Information
 - ▶ USGS Gage Data Calibration
- ▶ Fluvial and Pluvial analyses for a true watershed approach to provide technically credible flood data to stakeholders.

BLE Review

- ▶ When BLE data become available, please review to let us know if the flood hazard data make sense
 - ▶ BLE data will be available in October 2019
 - ▶ There will also be another round of Community Review at the Flood Risk Review (FRR) Meeting in the Fall of 2020 after Data Development

What is Data Development?

- ▶ Engineering Modeling & Mapping used for project-wide update
- ▶ H&H Enhancements where Zone AE is scoped
 - ▶ Hydrology assessment at the reach level
 - ▶ Consideration of historical flooding events and other local data
 - ▶ Field-measured survey of structures, where specified
- ▶ FIRM Database, Panels, and FIS are updated
- ▶ Considers and addresses community review comments
- ▶ Preliminary products distribution

Project Tasks

- ▶ Base Level Engineering (BLE) - 2019
- ▶ Data Development Tasks - 2020
 - ▶ Base Map & Topography
 - ▶ Streets, PLSS, political boundaries, LiDAR
 - ▶ Perform Field Measurements on specific structures
 - ▶ Hydrology & Hydraulics
 - ▶ County-wide Floodplain Mapping & FIRM Database
- ▶ Preliminary Map Products
- ▶ Post-Preliminary Processing

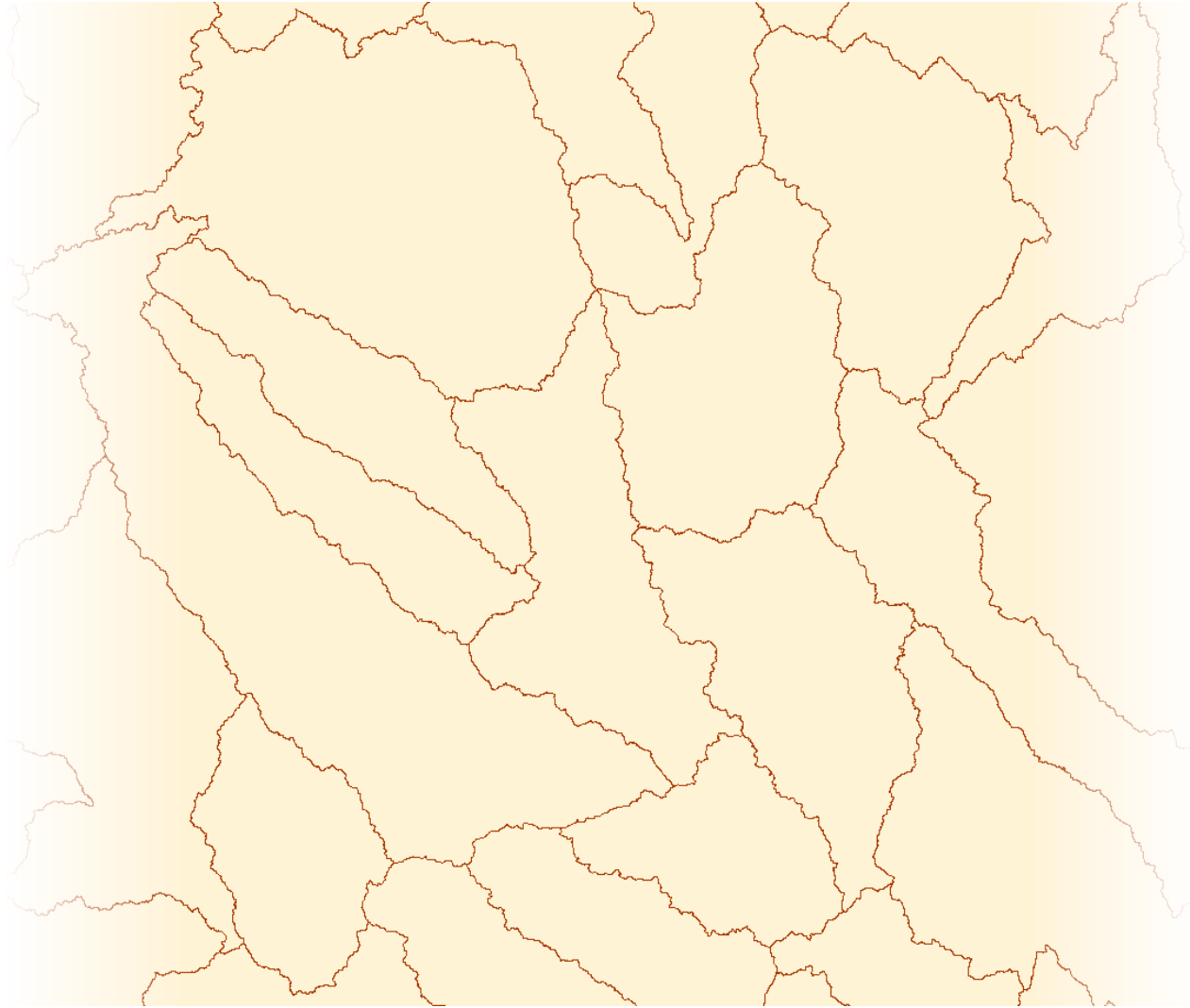
Project Milestones

- ▶ Kickoff Meeting - March 5, 2019
 - ▶ Community review of project scope
 - ▶ Discuss Community mapping needs & concerns
- ▶ BLE Data Creation - Completed in Fall 2019
- ▶ Discovery Meeting- ~Winter 2019
 - ▶ Community review of BLE flood hazard data
- ▶ Data Development - Completed in 2020

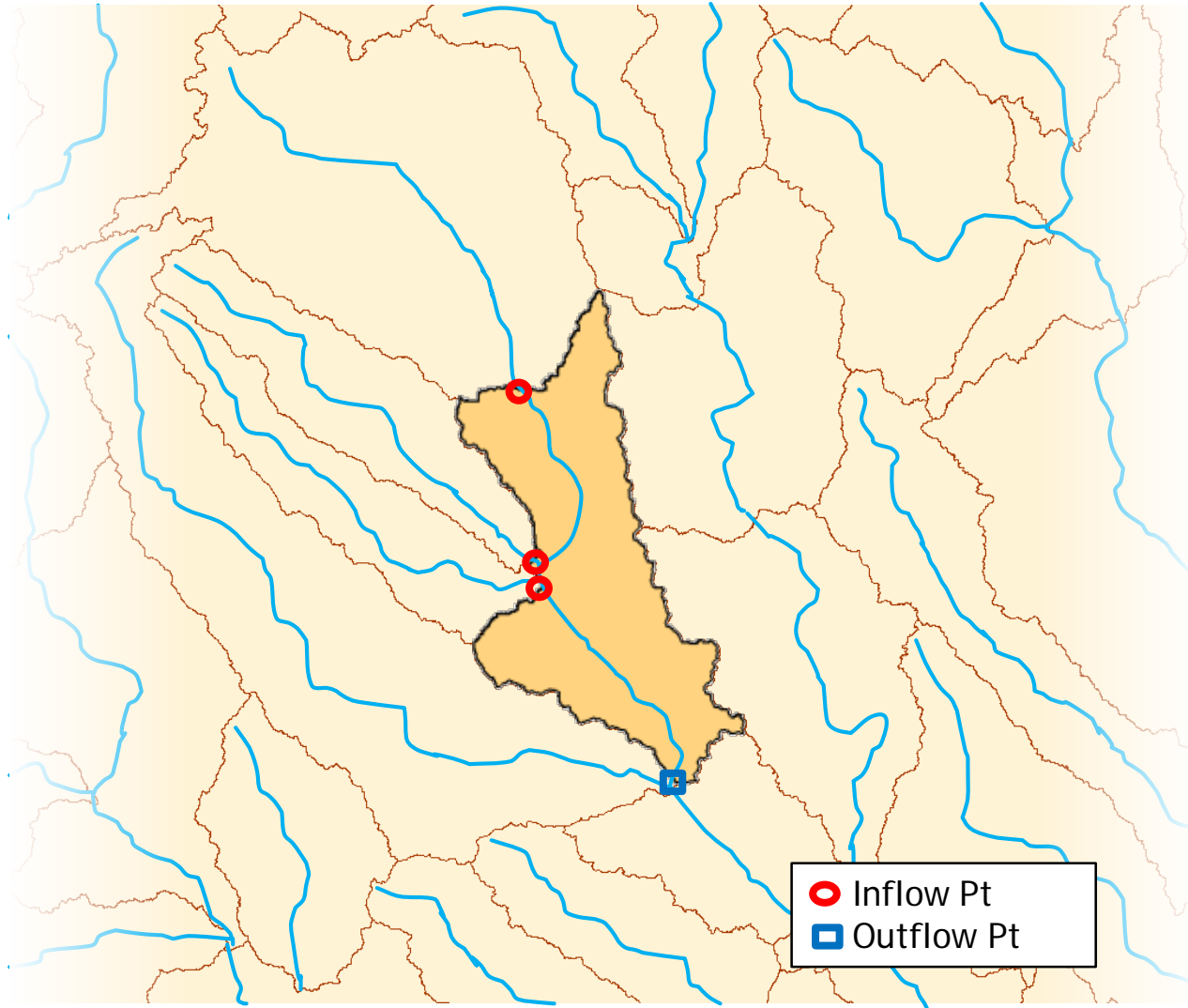
Project Milestones

- ▶ Flood Study Review Meeting - Fall 2020
 - ▶ Community Review period
- ▶ Public Open House - Spring 2021
 - ▶ Public Review period
- ▶ Preliminary Map Issuance - Summer 2021
 - ▶ GOAL: Have all concerns addressed before issuance.
- ▶ Effective Maps Issuance - Fall 2022

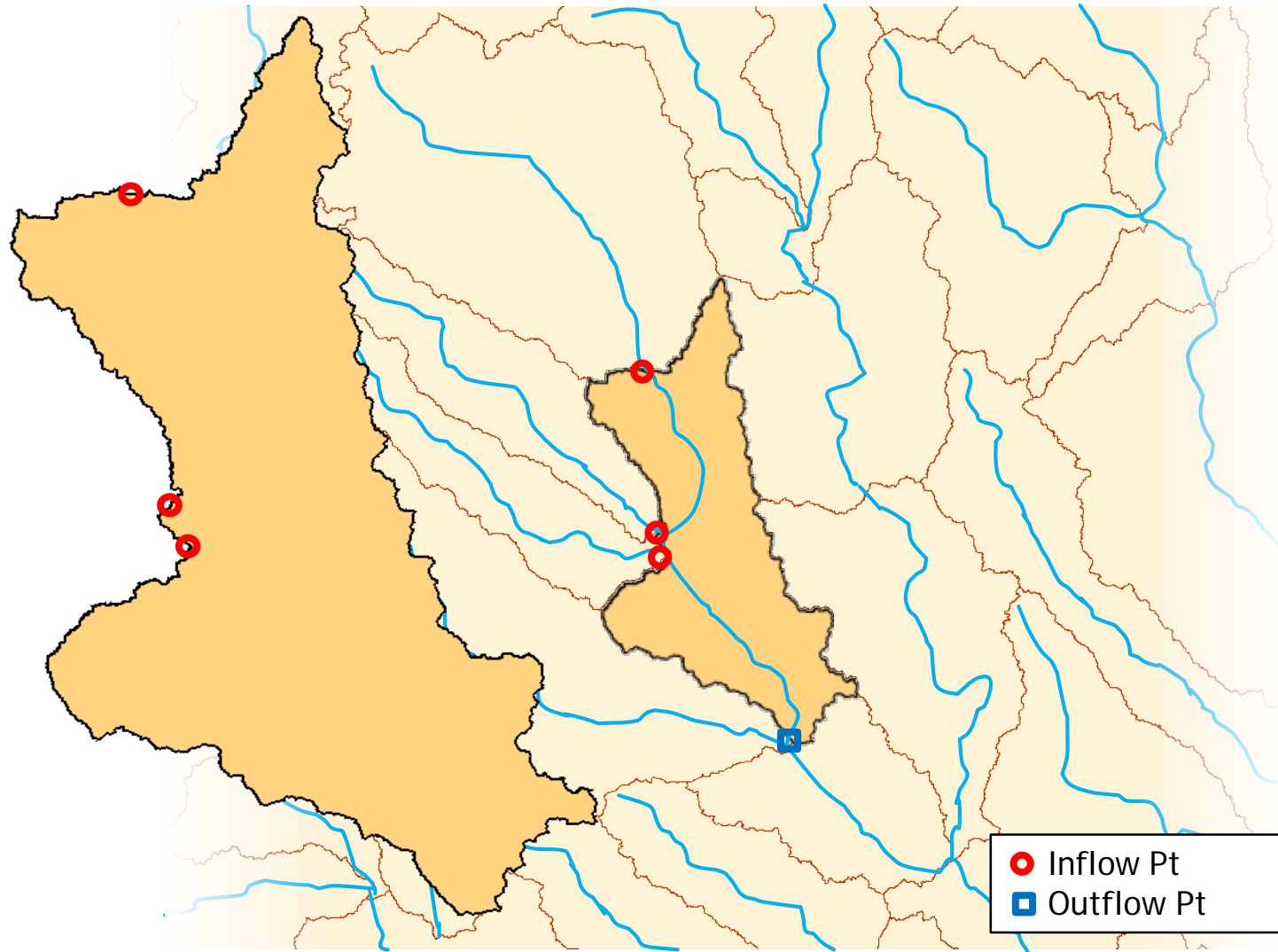
BLE Development Process



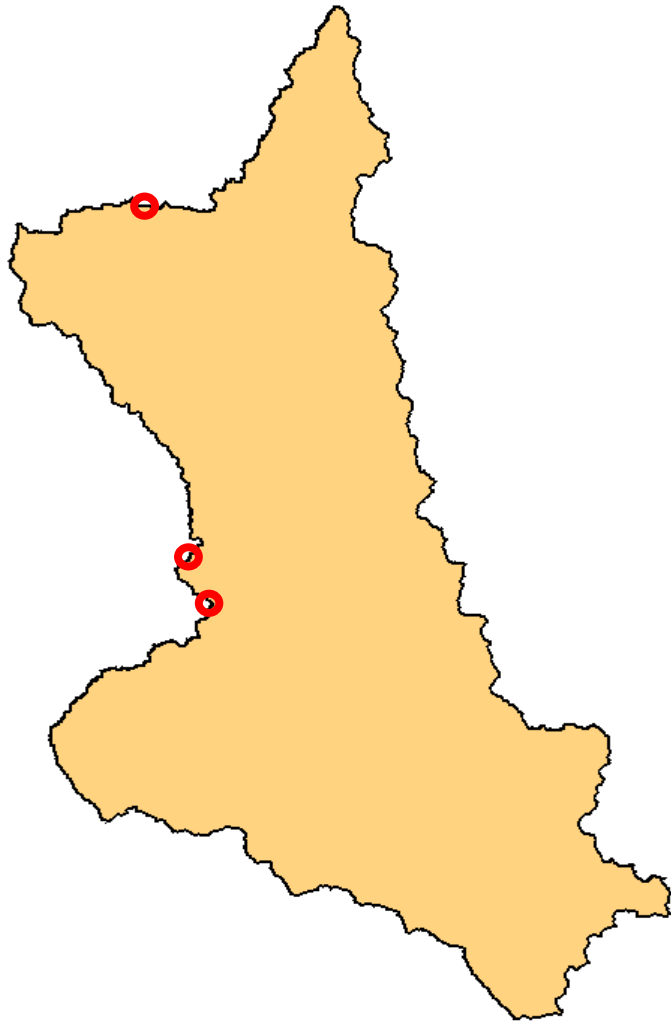
BLE Development Process



BLE Development Process

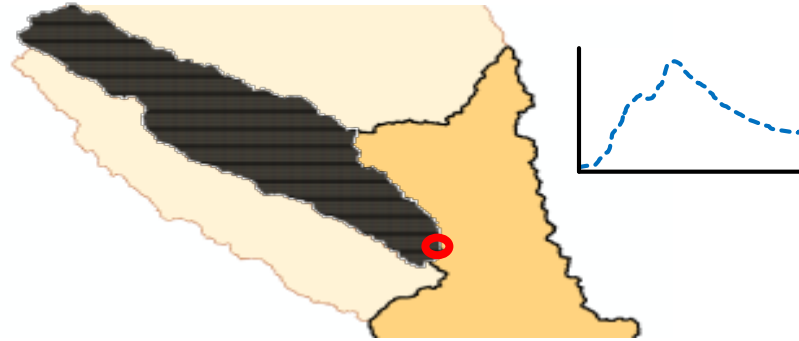


Model Inputs (Hydrology)



INFLOW HYDROGRAPHS

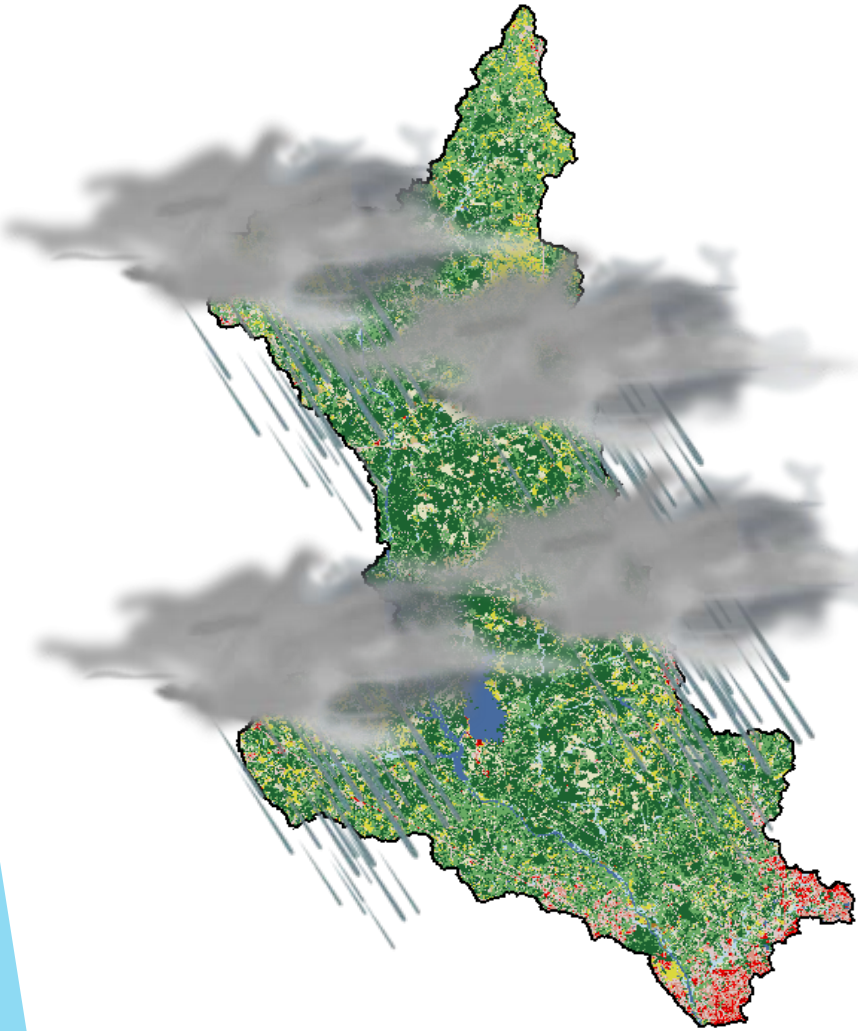
- ▶ Option 1: Use outflow hydrographs from upstream 2D model as inflow



- ▶ Option 2: Generate hydrographs from simple HEC-HMS models

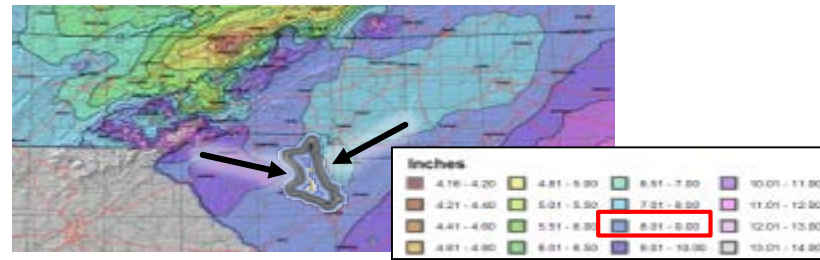


Model Inputs (Hydrology)

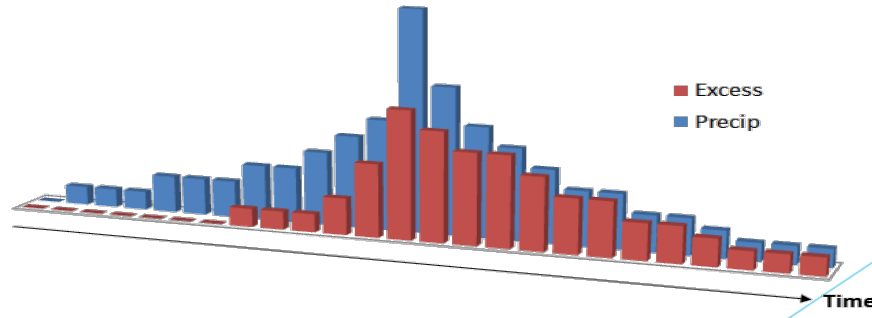


PRECIPITATION (RAIN-on-GRID)

- ▶ NOAA Precipitation Frequency Data Server or Atlas 14



- ▶ Simple HEC-HMS model developed to determine excess rainfall to apply within the 2D model (HEC-RAS 5.0)



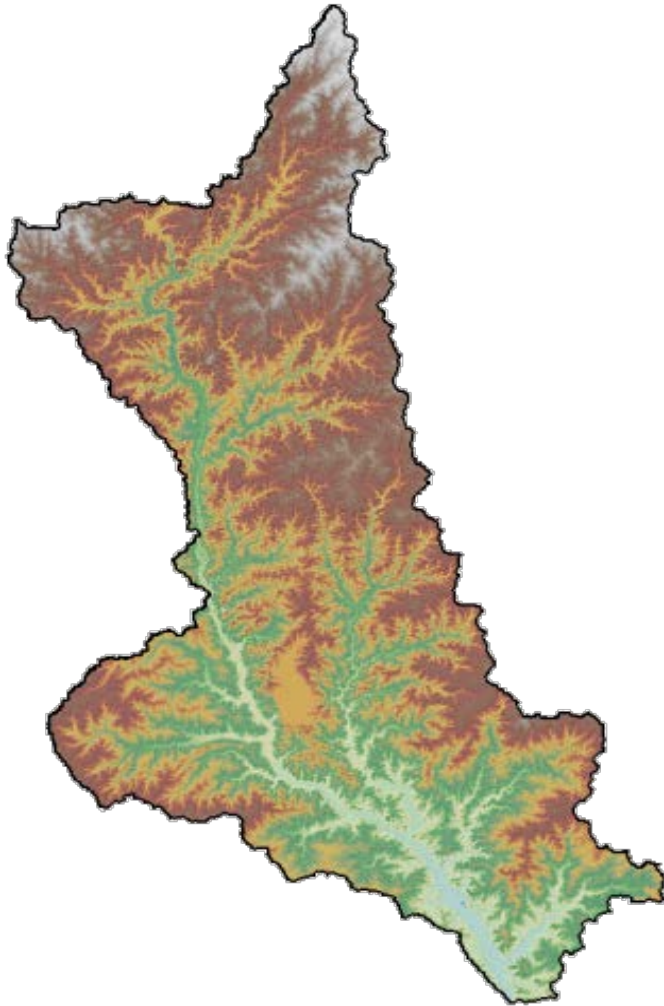
Model Inputs (H&H)



LAND USE & SOILS

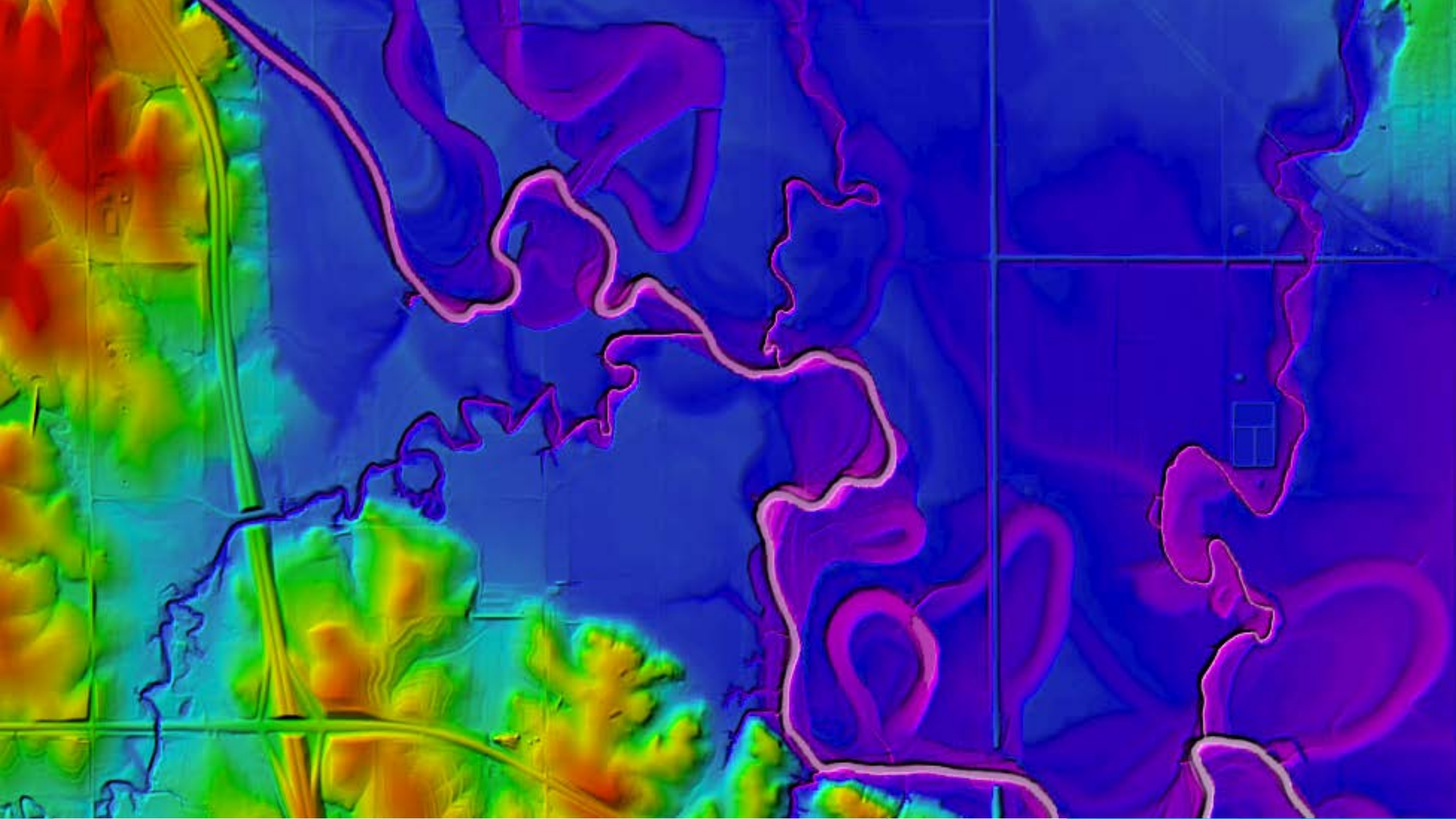
- ▶ Land Use: National Land Cover Database (2011)
- ▶ Soils: NRCS Web Soil Survey
- ▶ Used as an input in all HEC-HMS models to support the calculation of Curve Numbers and Lag Times
- ▶ Also used within the 2D model to estimate roughness values

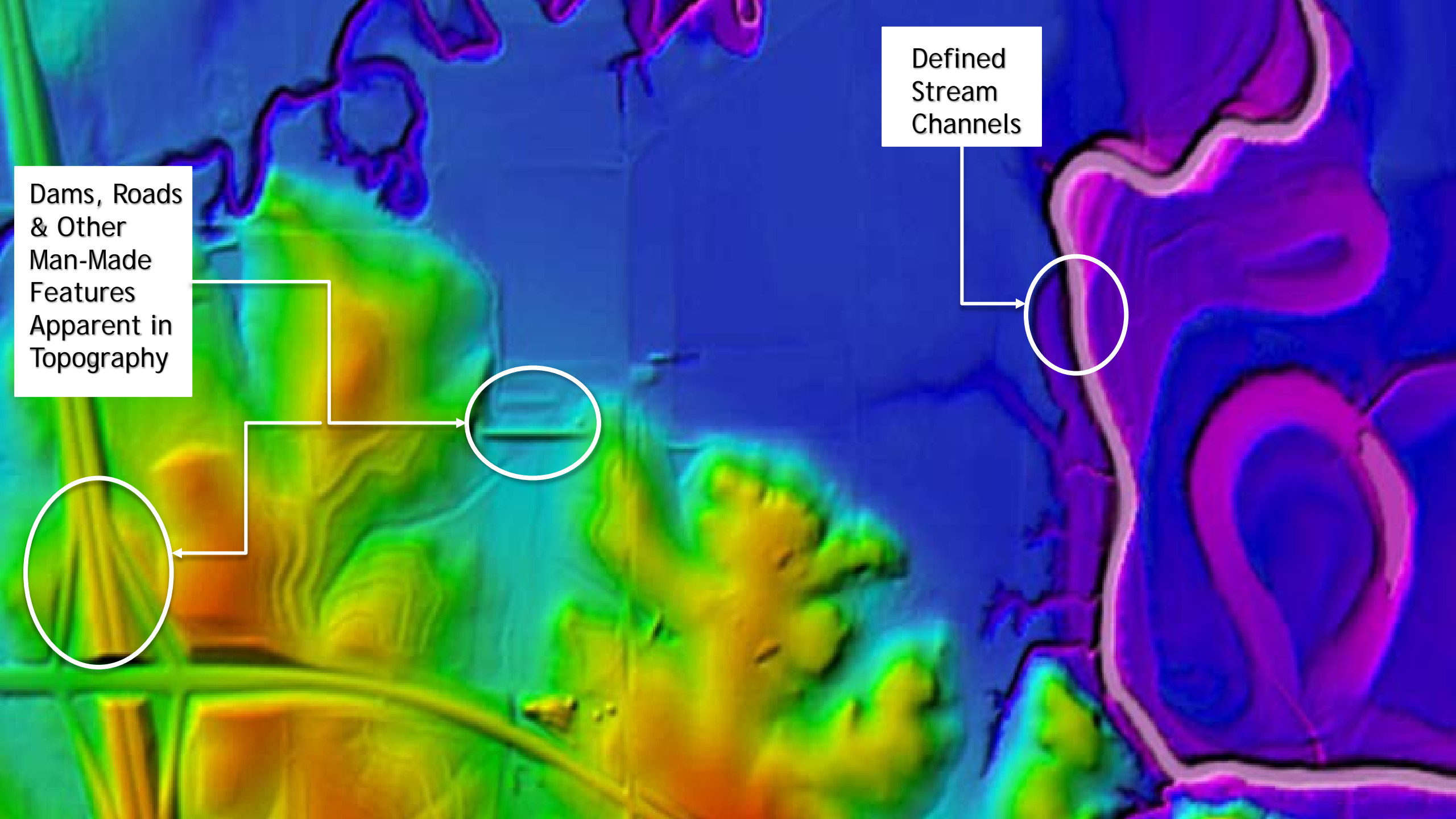
Model Inputs (Hydraulics)



TERRAIN

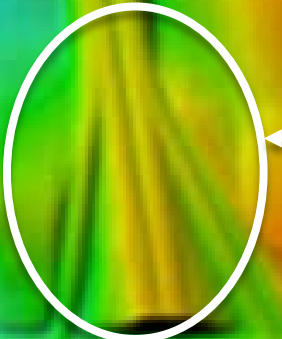
- ▶ LiDAR-derived DEM
- ▶ DEM assured to meet FEMA SID 43 vertical accuracy standards
 - ▶ Current KS coverage is QL3
 - ▶ QL2 LiDAR available in 2019
- ▶ Critical component to carry LSBLE products through regulatory process



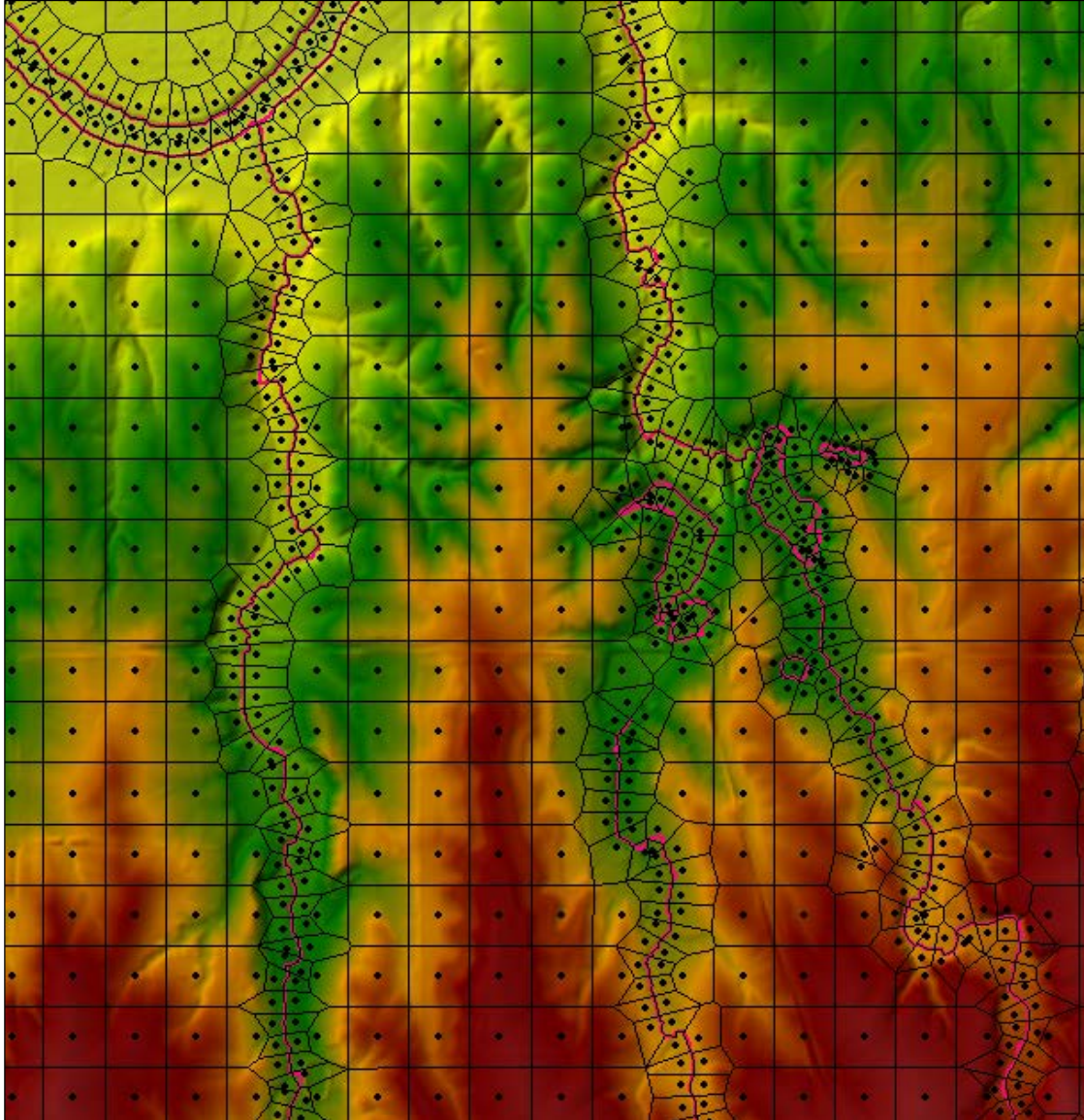


Dams, Roads
& Other
Man-Made
Features
Apparent in
Topography

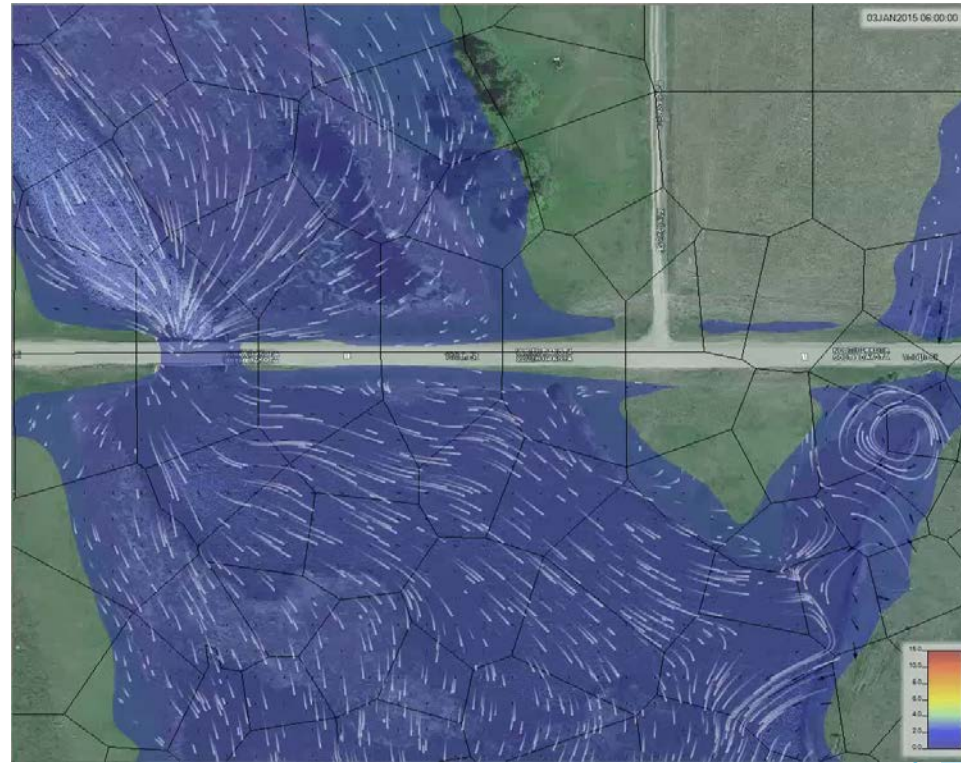
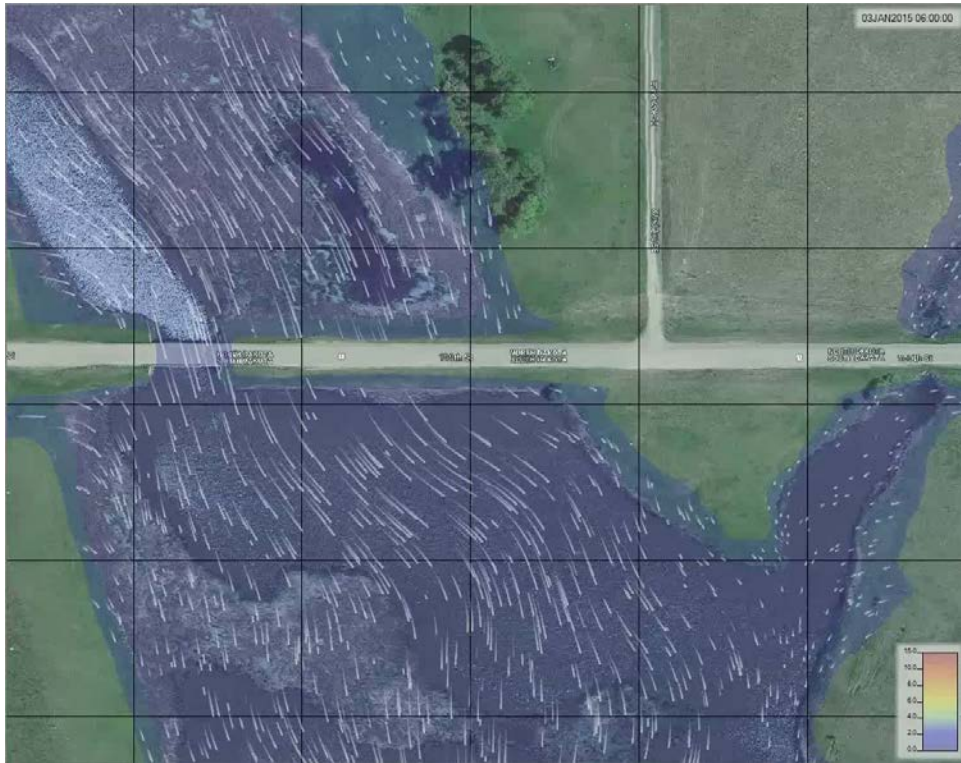
Defined
Stream
Channels



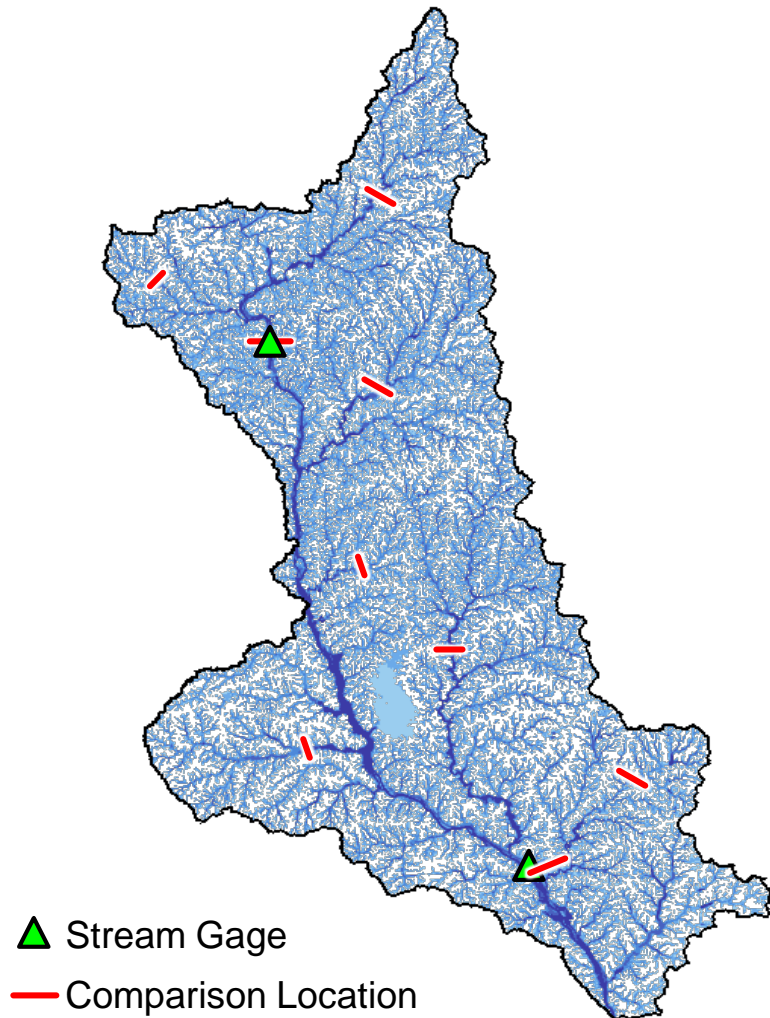
2D Mesh Refinements with Breaklines



2D Mesh Refinements with Breaklines



Model Verification

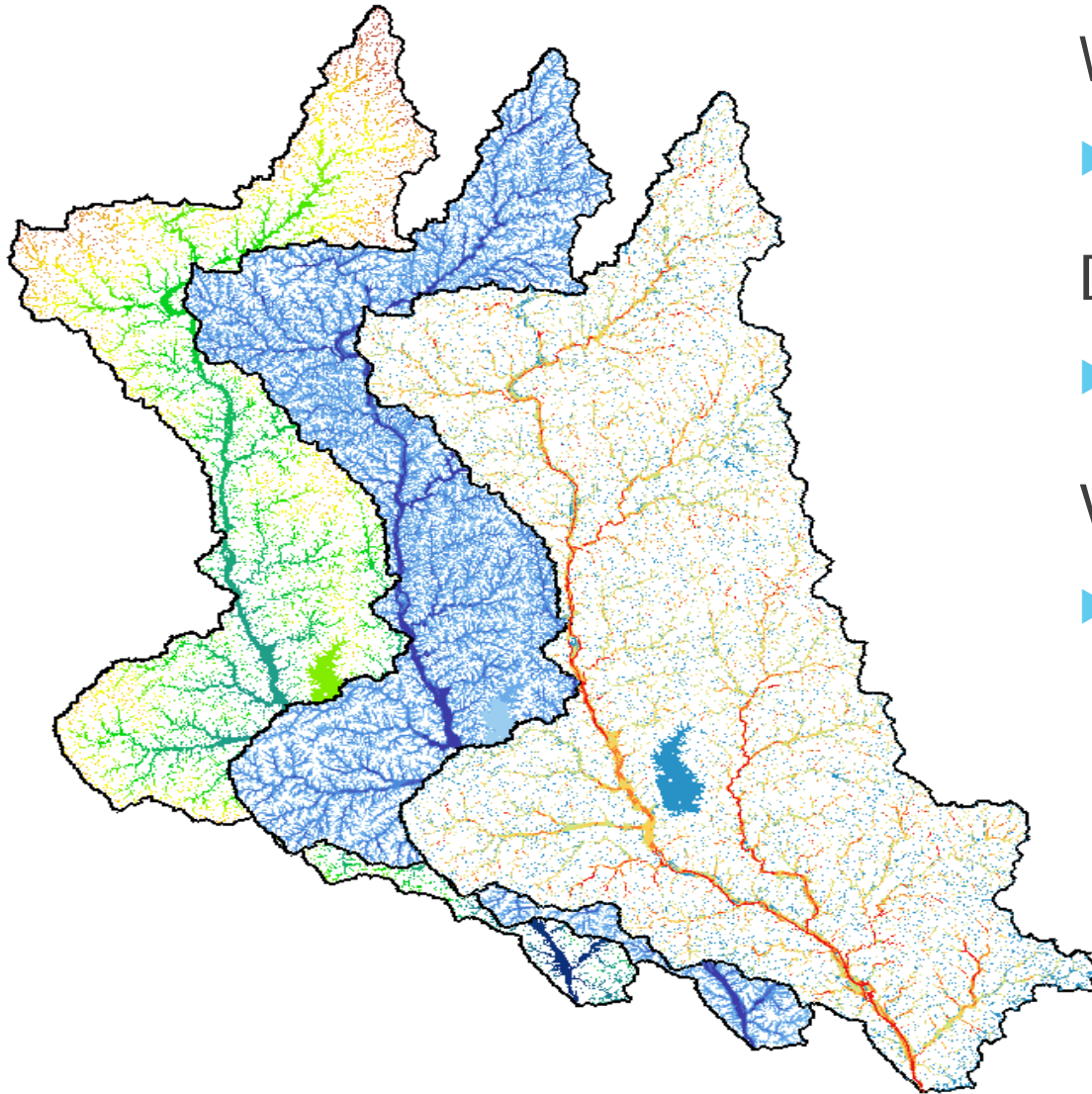


REASONABILITY CHECKS

- ▶ Multiple comparison check locations added to the 2D model (at gages and other representative locations within the study area)
- ▶ 1% annual chance peak discharges, WSELs, and/or flood boundaries from 2D model compared with other available data at these locations (gage analysis, regression equations (USGS StreamStats), effective study*, etc.)

*age and level of detail of effective study are taken into consideration when weighing comparisons

Model Outputs



WSEL Grids

- ▶ 10%, 4%, 2%, 1%, 0.2%, 1%+, 1%-

Depth Grids

- ▶ 10%, 4%, 2%, 1%, 0.2%, 1%+, 1%-

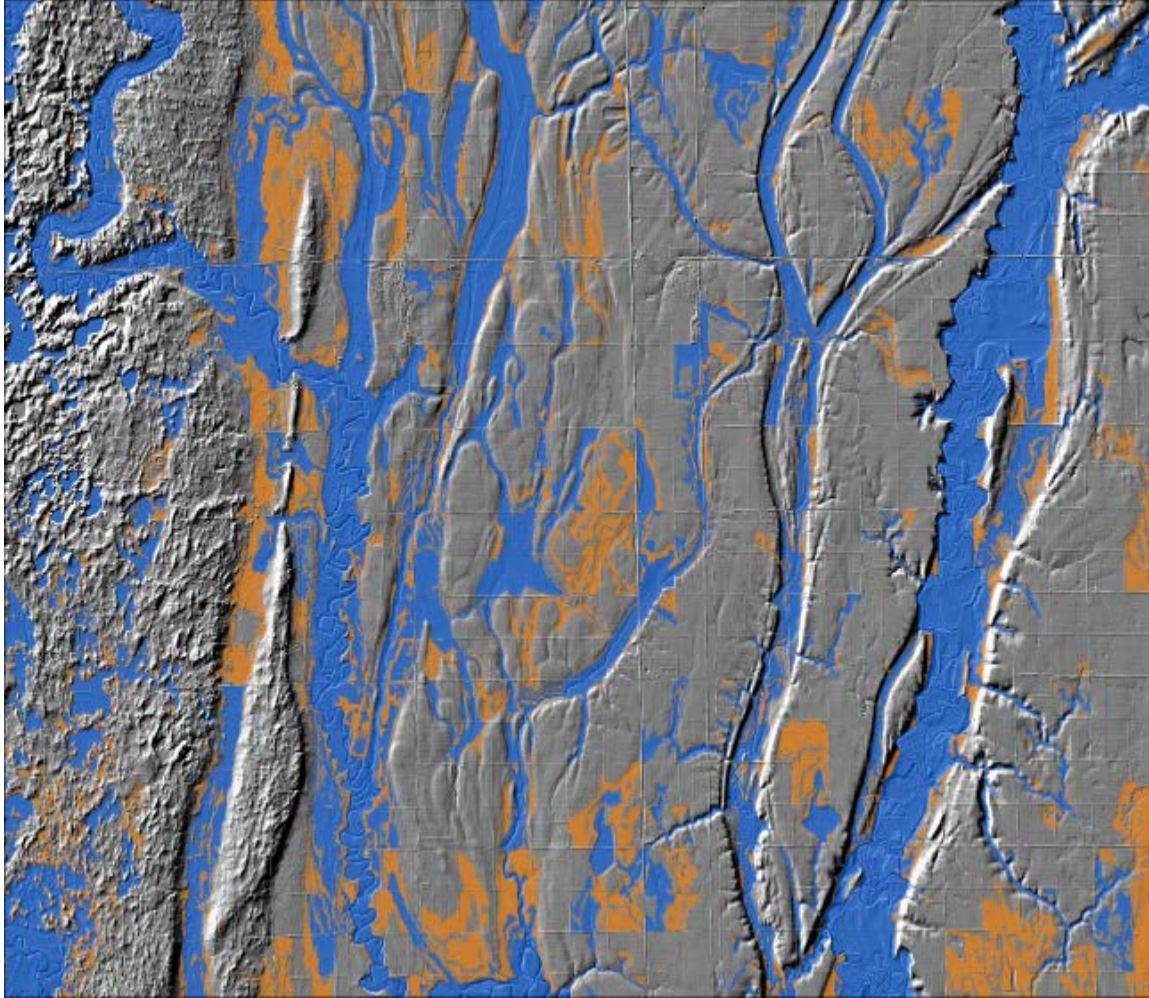
Velocity Grids

- ▶ 1% (others as needed)

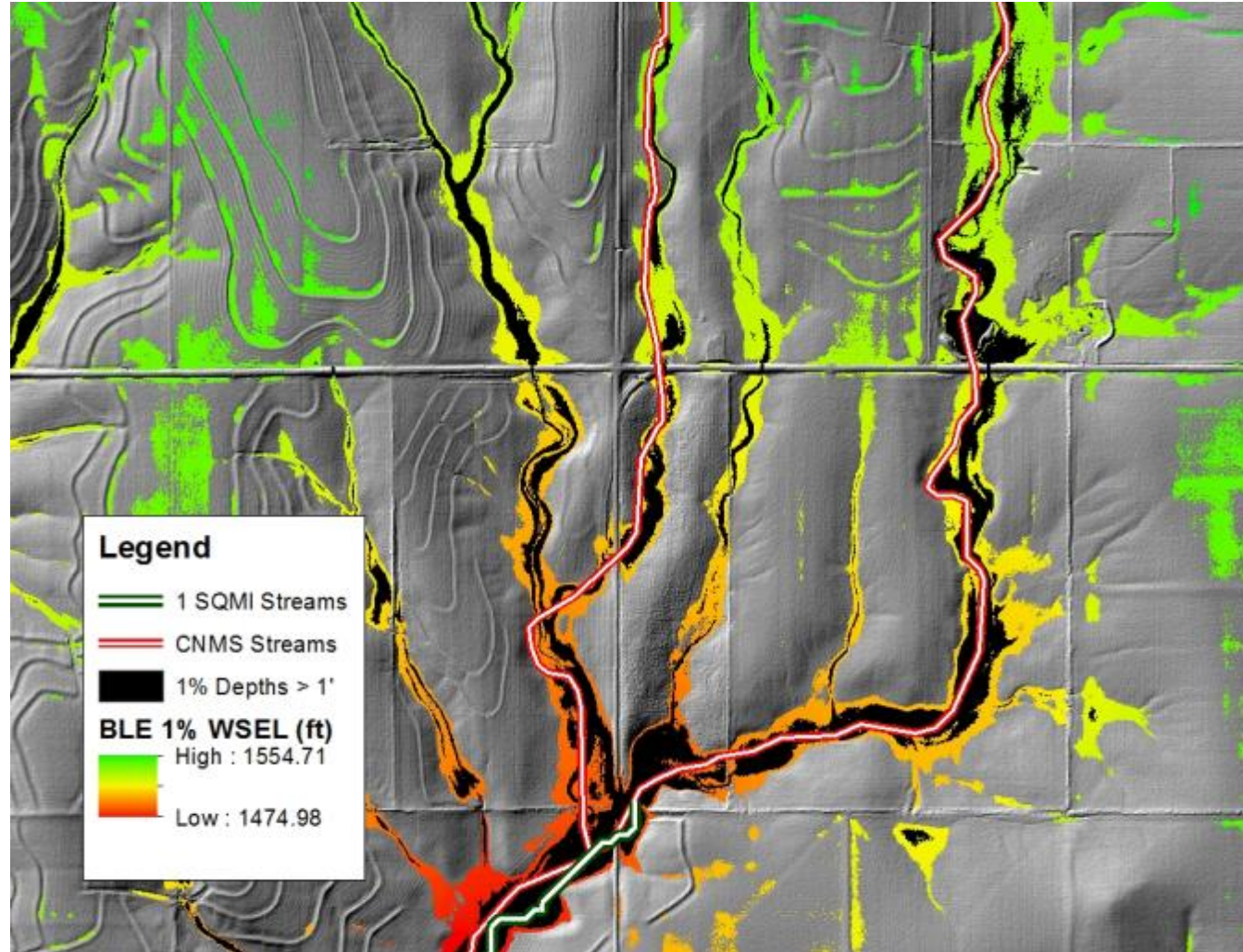
Engineering to Mapping



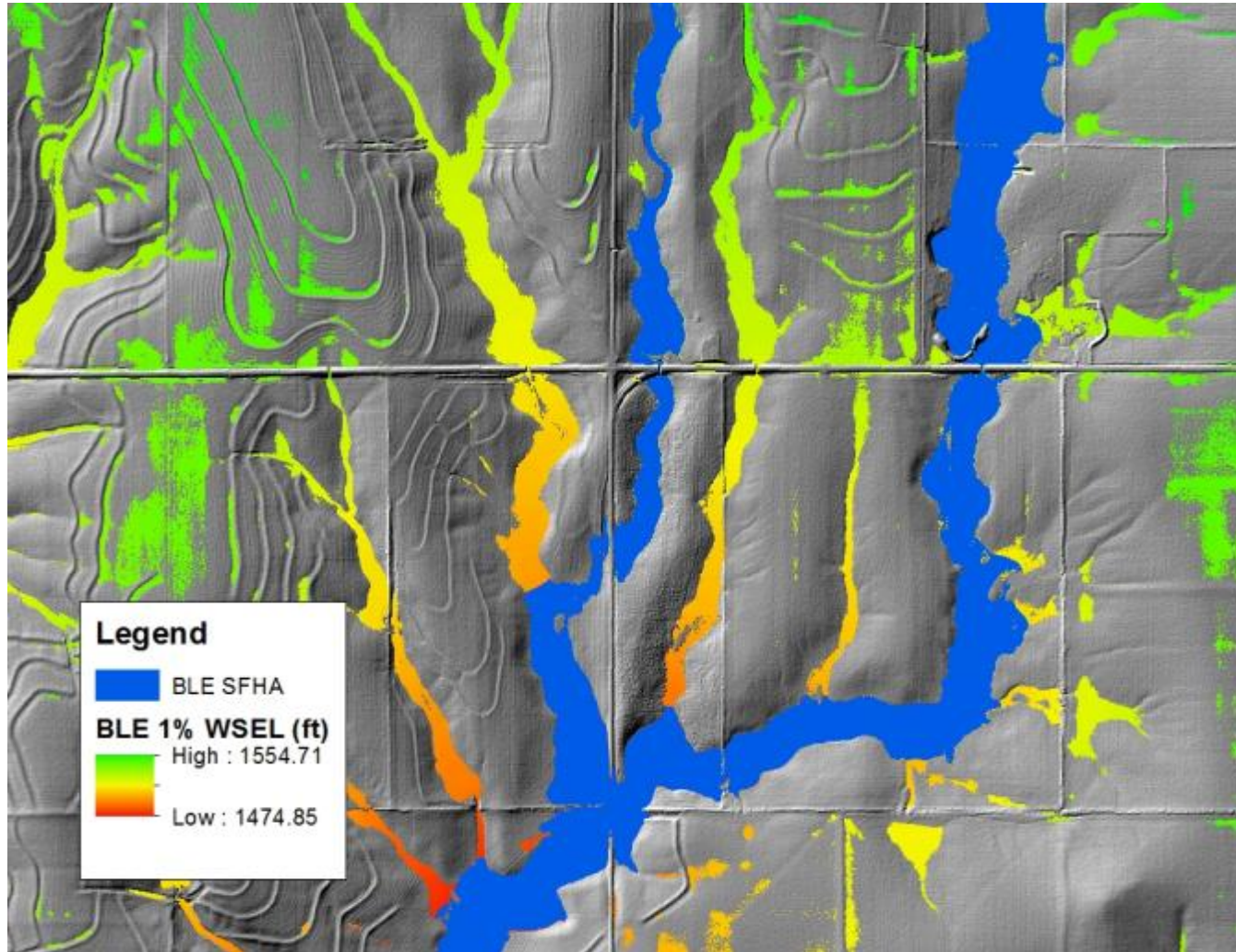
Engineering to Mapping



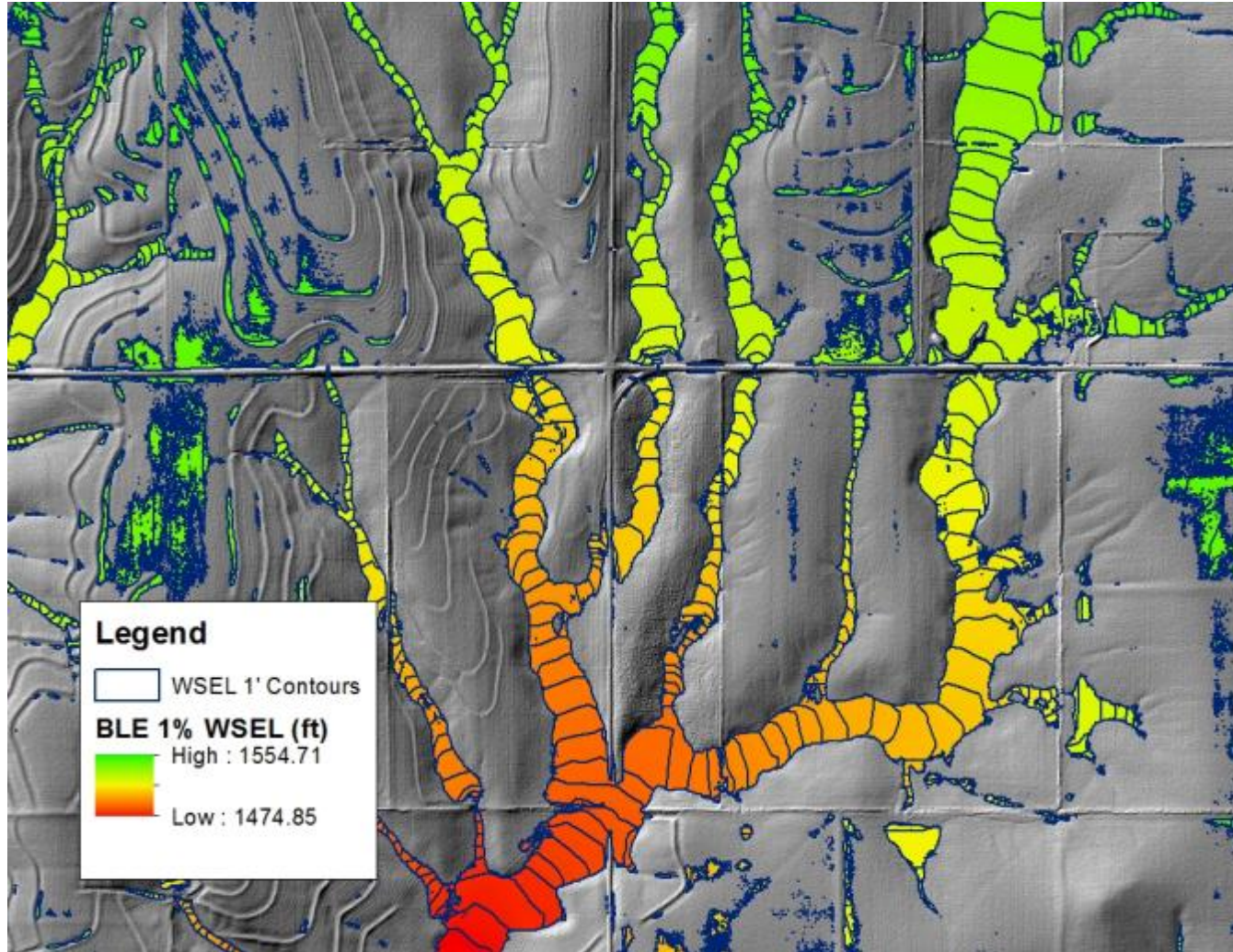
Engineering to Mapping



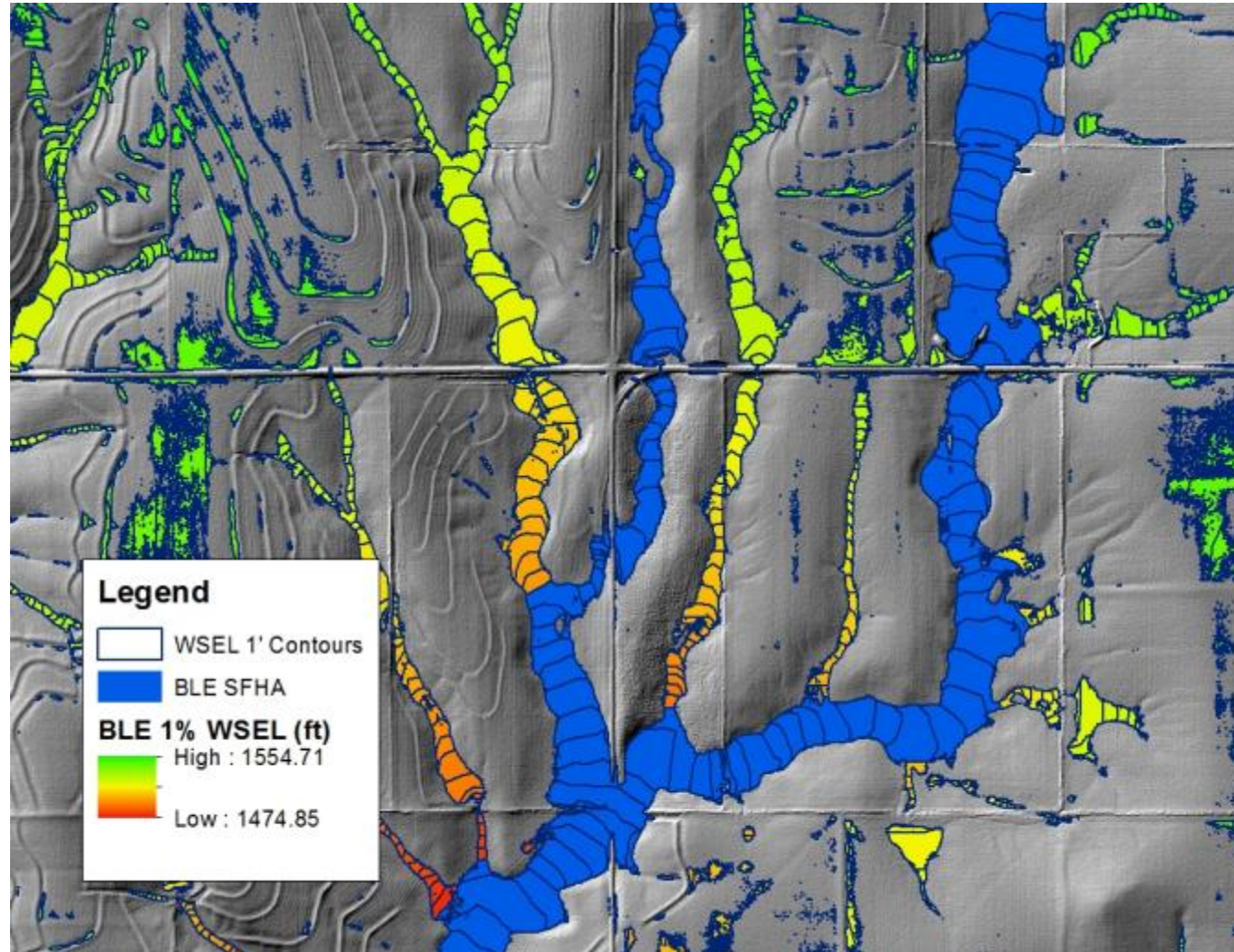
Engineering to Mapping



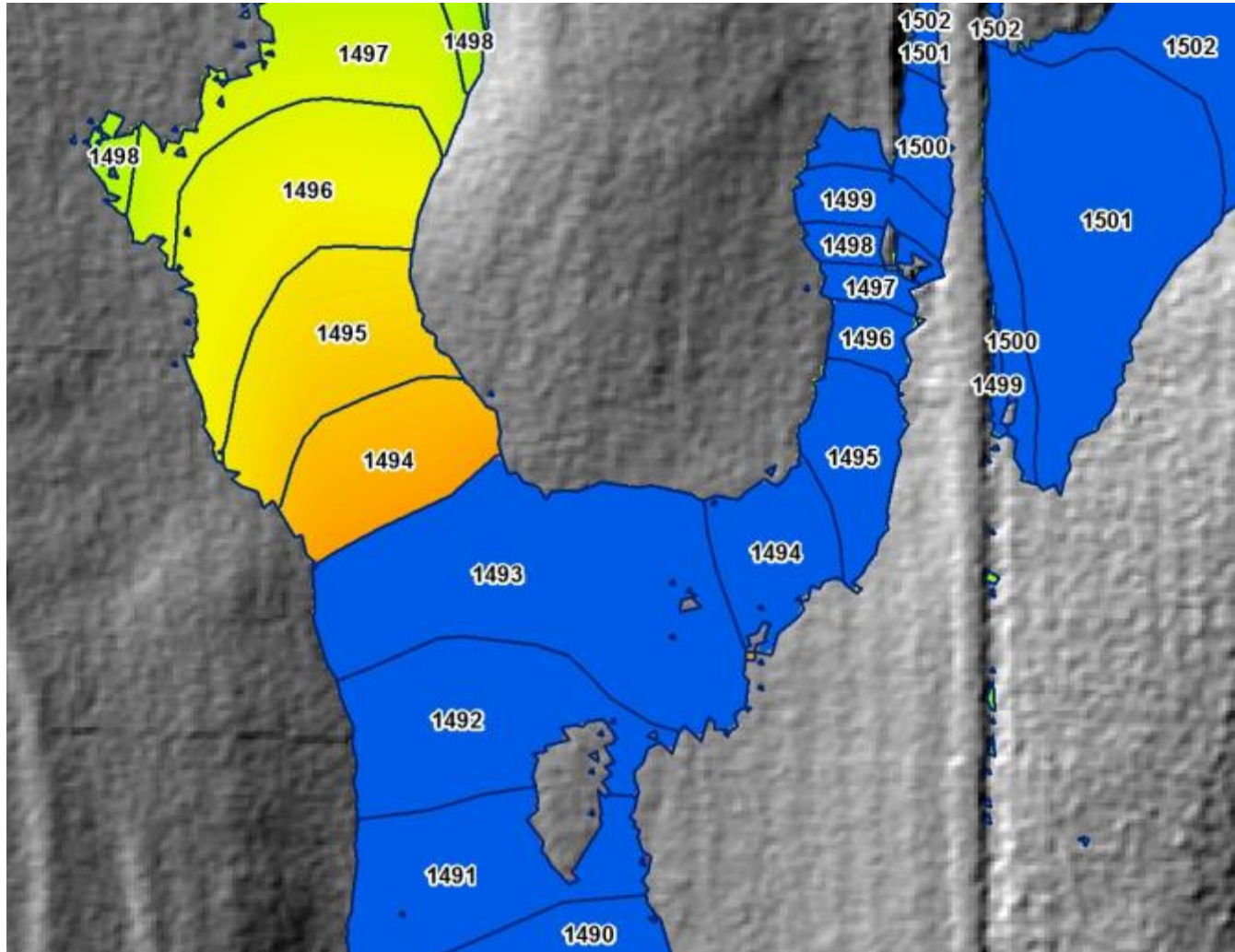
Engineering to Mapping



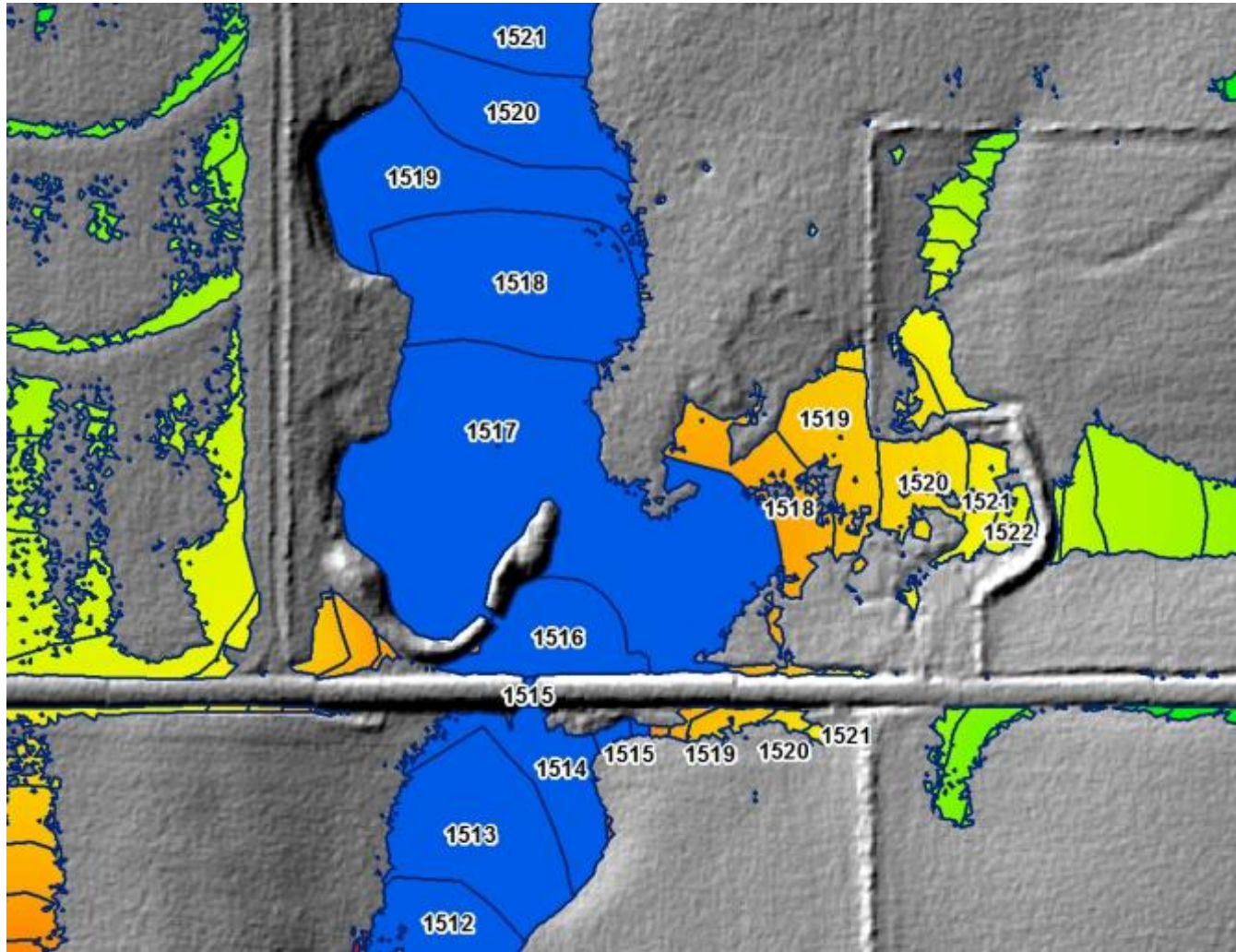
Engineering to Mapping



Engineering to Mapping



Engineering to Mapping



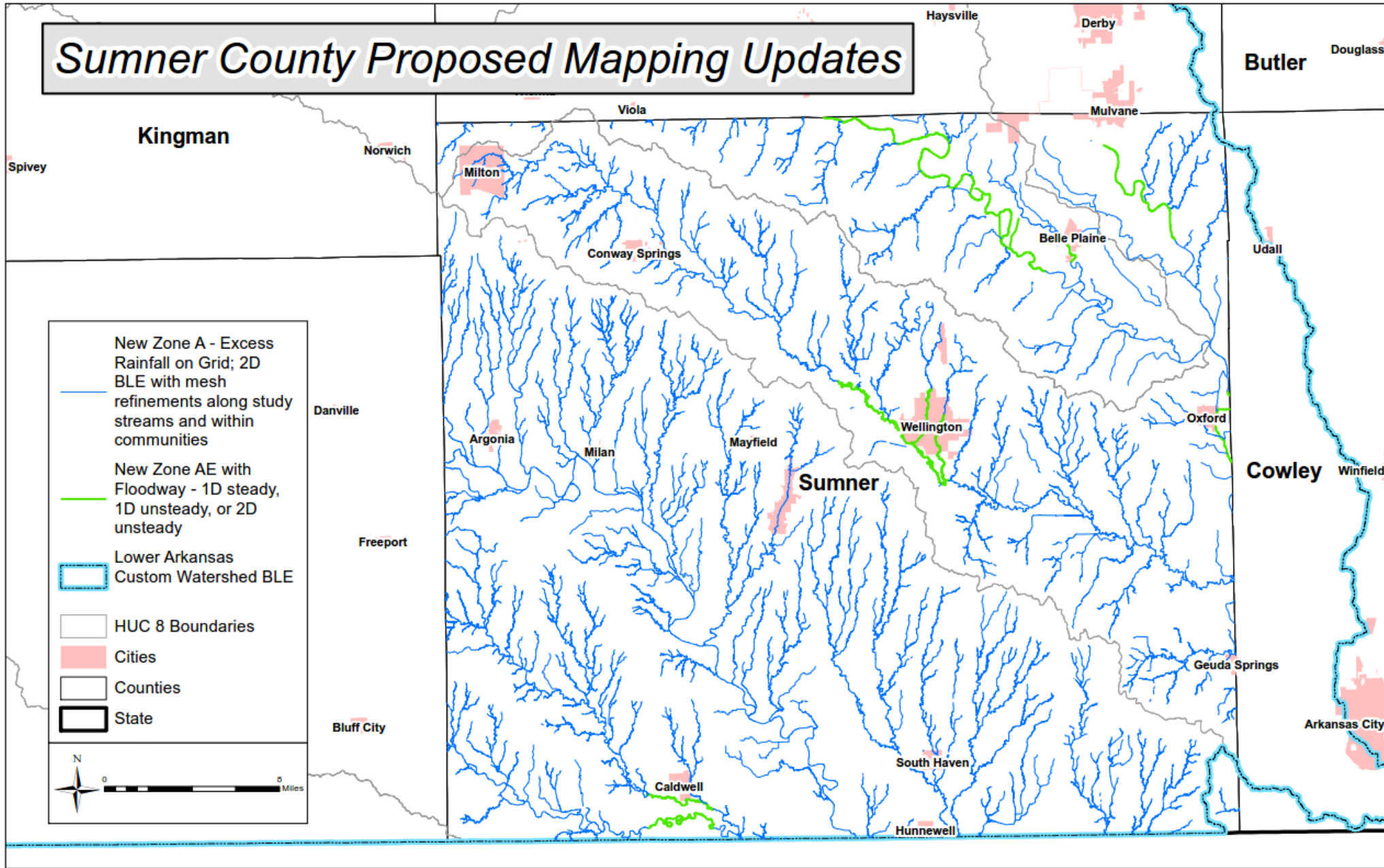
BLE Products

- ▶ Composite High-Resolution Terrain
- ▶ Engineering
 - ▶ HMS Models
 - ▶ RAS Models
- ▶ Geospatial
 - ▶ WSEL Grids (10, 4, 2, 1-, 1, 1+, 0.2%)
 - ▶ Depth Grids (10, 4, 2, 1-, 1, 1+, 0.2%)
 - ▶ Velocity Grid (1% [others as necessary])
 - ▶ S_Fld_Haz_Ar (1% Zone A and 0.2% Shaded X)
 - ▶ Additional_1pct

Sumner County Proposed Scope

- ▶ Zone AE with floodway for portions of:
 - ▶ Arkansas River
 - ▶ Ninnescah River
 - ▶ Bluff Creek
 - ▶ Belle Plaine: Euphrates Creek
 - ▶ Caldwell: Fall Creek
 - ▶ Wellington: Slate Creek, Rock Island Slough, Hargis Creek
- ▶ Zone A
 - ▶ Remaining flooding sources that drain greater than 1 square mile with a BLE depth greater than 1'

Sumner County Proposed Mapping Updates



Sumner County Proposed Scope Approach

- ▶ Zone AE with Floodway
 - ▶ 1D Steady
 - ▶ 1D Unsteady (wider than steady; more representative of flood risk)
 - ▶ 2D Unsteady (wider than steady; more representative of flood risk)
 - ▶ Include structure field survey
 - ▶ Rapid field survey to include fundamental structure measurements.
Desktop analysis to associate structure with LiDAR elevation.
- ▶ Zone A
 - ▶ Leverage existing mapping from Discovery BLE

Floodway Discussion

- ▶ 1D Steady
 - ▶ Historically the most common approach
 - ▶ Typically narrower
 - ▶ Does not consider lost storage in both effective and ineffective flow areas and its impacts to flow rates and timing
 - ▶ Interpolated in between cross sections
- ▶ 1D Unsteady (more representative than 1D steady)
 - ▶ Typically wider
 - ▶ Loss of storage in floodway fringe makes it likely that peak discharge will be higher
 - ▶ Flow rate increases are likely to cause elevation increases
 - ▶ Floodway width increased to meet maximum allowable surcharge limit
 - ▶ Interpolated in between cross sections
- ▶ 2D Unsteady (more representative than 1D steady)
 - ▶ Typically wider for the same reasons as 1D Unsteady
 - ▶ All points, not just along a cross section, are considered for the maximum allowable surcharge limit
 - ▶ FEMA actively reviewing current standards, which have more associated with 1D approaches

Technical Review Process

- ▶ Contractor Internal Review
 - ▶ Engineering reviewed by independent personnel and subject matter experts within their organization
 - ▶ Occurs during BLE development phase, and
 - ▶ Occurs during Data Development phase
- ▶ Independent Technical Review (ITR)
 - ▶ Engineering reviewed by personnel and subject matter experts from a KDA contractor who did not perform the analyses
 - ▶ Occurs during BLE Development phase, and
 - ▶ Occurs during Data Development phase
- ▶ KDA Review
 - ▶ Visual review
 - ▶ “eye test”
 - ▶ Identify impacts of data and mapping
- ▶ FEMA Review
 - ▶ Formal quality review process

What Should Community Officials DO?

- ▶ Stay aware of the project
- ▶ Identification of Areas of Concern and provide any existing information (first task)
- ▶ ENGINEERING AND MAP REVIEW
- ▶ PUBLIC REVIEW NOTIFICATION
 - ▶ Inform public of map review opportunity
 - ▶ Encourage public participation
- ▶ PLAN PUBLIC OUTREACH
 - ▶ Public Open House
 - ▶ When, where, how, get the word out
 - ▶ Long Term Outreach

Staying Informed

- ▶ Email List
 - ▶ Get me names, addresses, and titles
 - ▶ Will be main source of project updates
- ▶ Project Updates
 - ▶ Minimum of quarterly
 - ▶ When important milestones are reached
 - ▶ When action is necessary (reminders)
- ▶ Meetings
 - ▶ 5 planned in-person meetings
 - ▶ Kickoff, Discovery Meeting, Flood Risk Review, Open House, Post-Preliminary CCO meeting
 - ▶ Others as needed
- ▶ **DON'T HESITATE TO CALL, WE ARE AVAILABLE**

Online Project Information

▶ Project Website

- ▶ Scoping Maps, Project Timeline, Meeting Presentations, Newsletters, Technical Reports, Web Review Map

▶ Web Review Map

- ▶ Project Scope Review
- ▶ Draft Floodplain Review (when available)

▶ Story Maps

- ▶ Project Info
- ▶ “Floodplain Current”: Mapping Process ‘Nuts and Bolts’

What Should You Do Next?

- ▶ **Project Scope Review**
 - ▶ Look at and understand the scope planned for your community.
 - ▶ Review and comment within 30 days (more if needed).
 - ▶ How do the stream extents look? Are we missing anything?
- ▶ **Provide Areas of Concern and Existing Data**
 - ▶ Provide information on community needs or areas of specific concern.
 - ▶ Do you have drainage studies, stormwater plans, capital improvement plans, upcoming projects?
- ▶ **Project Kickoff Survey**
 - ▶ Follow up email, please fill out and return
- ▶ **Organize Working Groups**

Key Takeaways

- ▶ Process is going to take time
 - ▶ Maps will not be Effective until 2021 or 2022
- ▶ **Get it right before Preliminary!**
 - ▶ Review information as it becomes available
 - ▶ Get out the word and encourage participation
- ▶ You need ownership of your regulatory map and to believe what it says
- ▶ **We are available to answer your questions**

Q & A

Tara Lanzrath

Floodplain Mapping Coordinator
Kansas Department of Agriculture
Division of Water Resources

785-296-2513

tara.lanzrath@ks.gov