Base Level Engineering Data Delivery Discussion

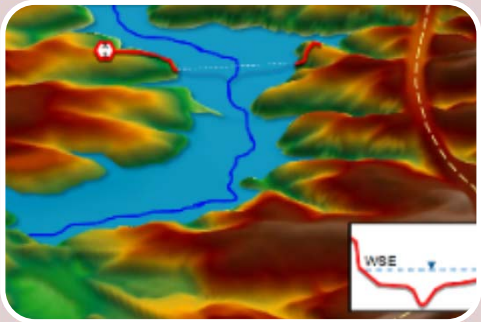
FEMA

Gila County, AZ
March 31, 2022

Discussion Topics

- FEMA Flood Risk Studies Overview
- Flood Study Types
- What is Base Level Engineering?
- Gila County BLE Scope
- BLE Approach and Mapping
- BLE Data Delivery
- Questions

Flood Risk Studies - *An Overview*



Hydrology

Volume of water?

When will storm water or runoff make it to the stream?

Hydraulics

Will the stream in question be able to convey all storm water or runoff that arrives?

Floodplain Mapping

What areas of a community will be inundated based on engineering analysis?

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Levels of FEMA Flood Hazard Studies

4 Detailed w/ Floodway

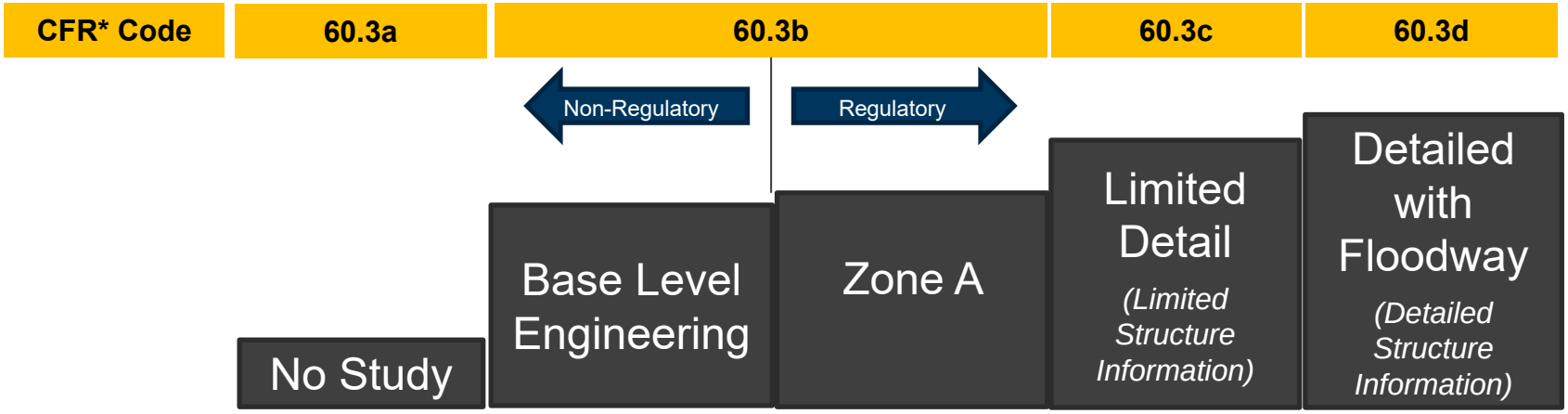
3 Limited Detailed Study

2 Base Level Engineering

1 Current Approximate (Zone A) Mapping

Scalable modeling now allow us to maintain an affordable inventory of flood hazard data

Creating Scalable Modeling



*- Code of Federal Regulations: applicable for development & floodplain management activities

Highly automated modeling; structure openings derived from NBI data base

Difference between BLE & Zone A is county acceptance/ request to revised a FIRM

Top of road and stream inverts based on LiDAR data; culvert sizes often based on field measurements / visual inspection

Detailed structure input based on as-built drawings or field survey. Regulatory floodways mapped to assist locals

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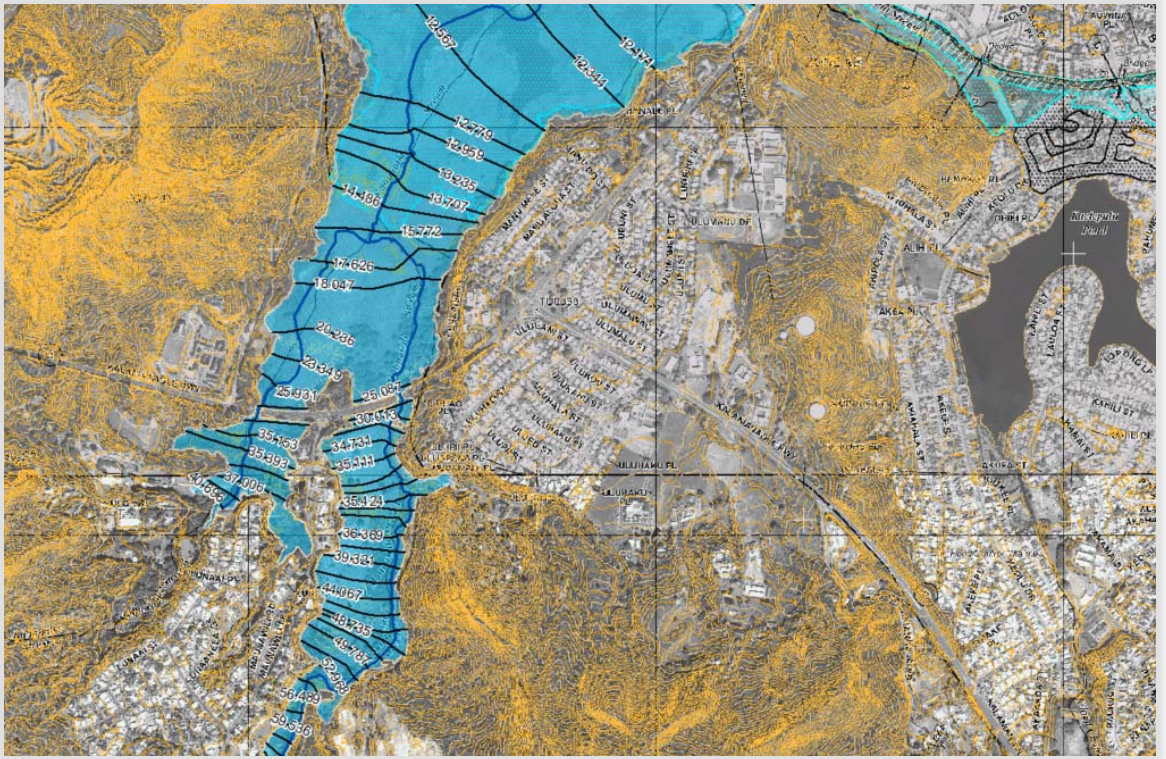
Base Level Engineering

- **Automated engineering analysis using LIDAR topographic data to provide flood hazard mapping where there is currently a gap**
  - For local use; leveraged by counties to determine building criteria in and around floodplains
  - Allows FEMA to assess the adequacy of current/effective flood Zones A & D
  - Flood hazard data that provides for broad risk communication
  - For incorporation into a future FIRM update



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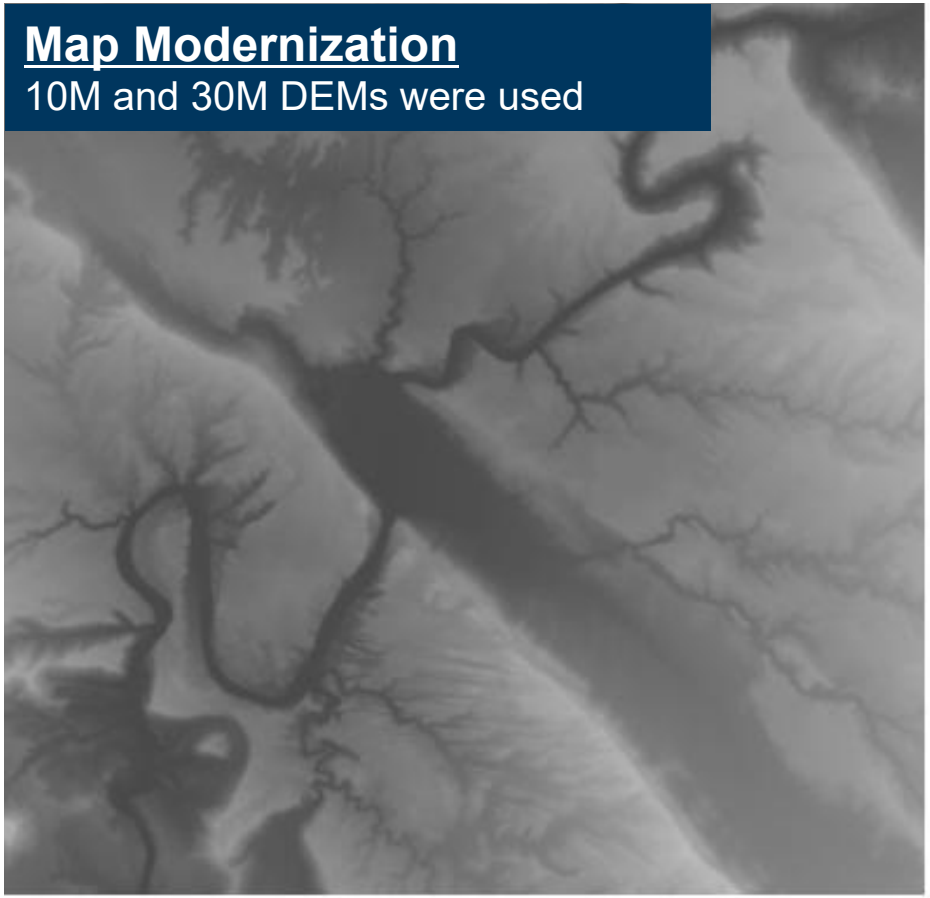
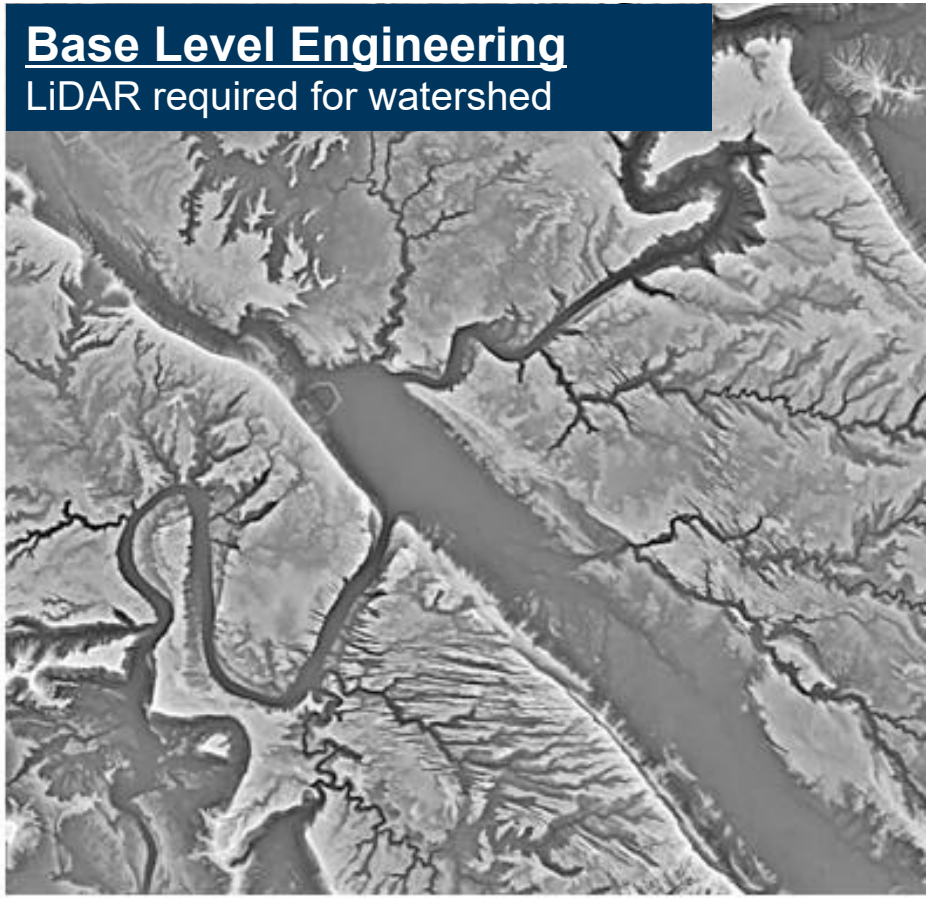
Base Level Engineering
High Resolution Elevation Data Required

Map Modernization
10M and 30M DEMs were used



Base Level Engineering
LiDAR required for watershed



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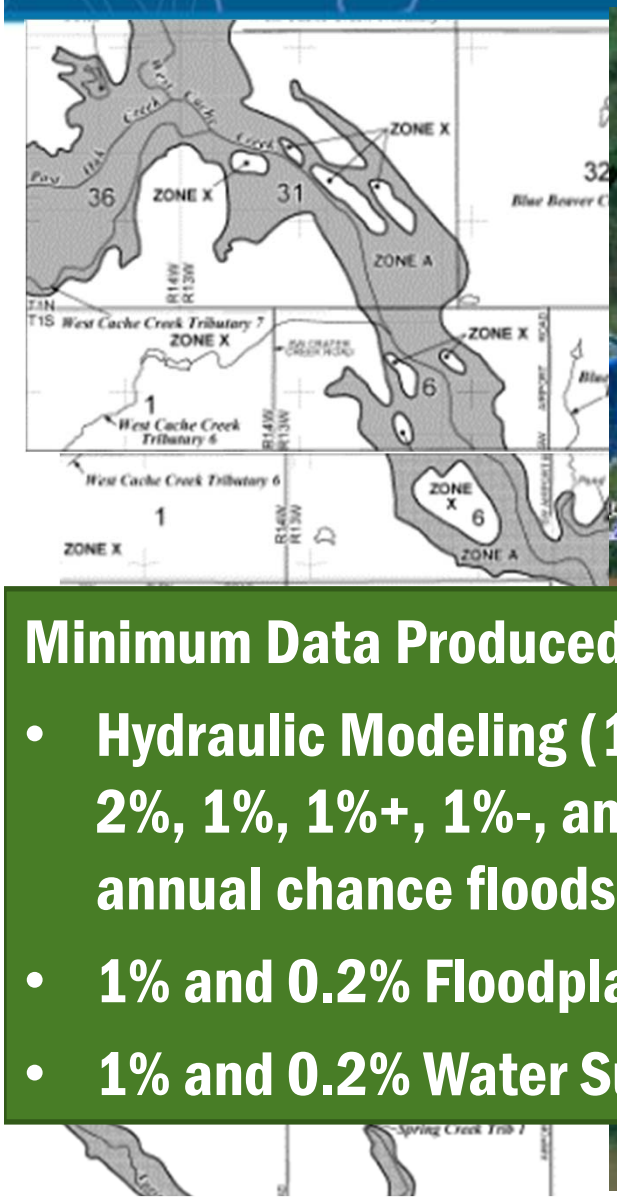
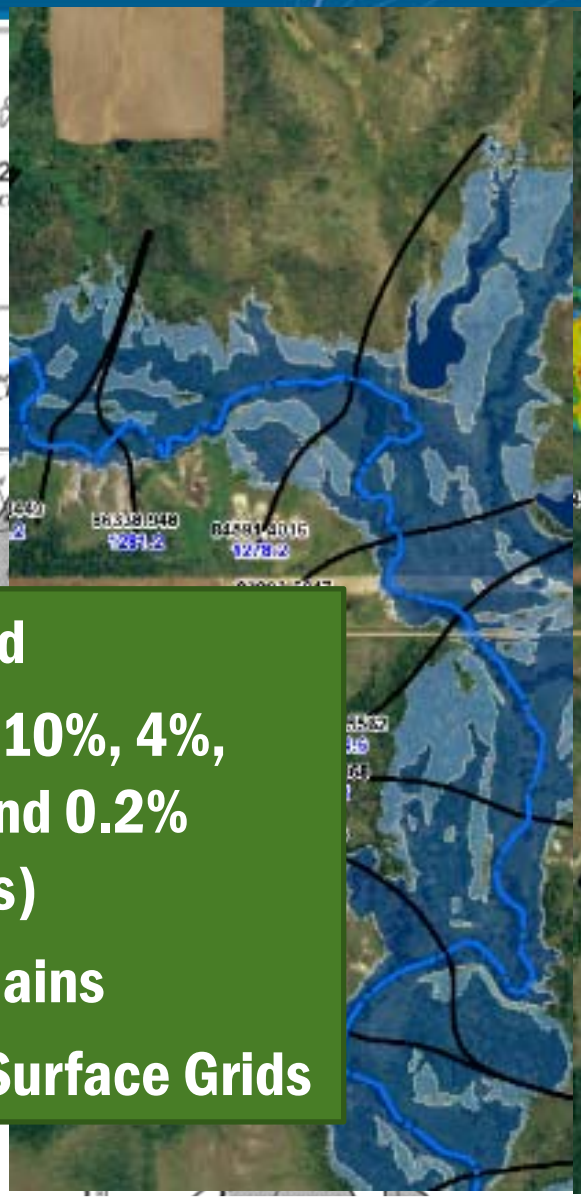
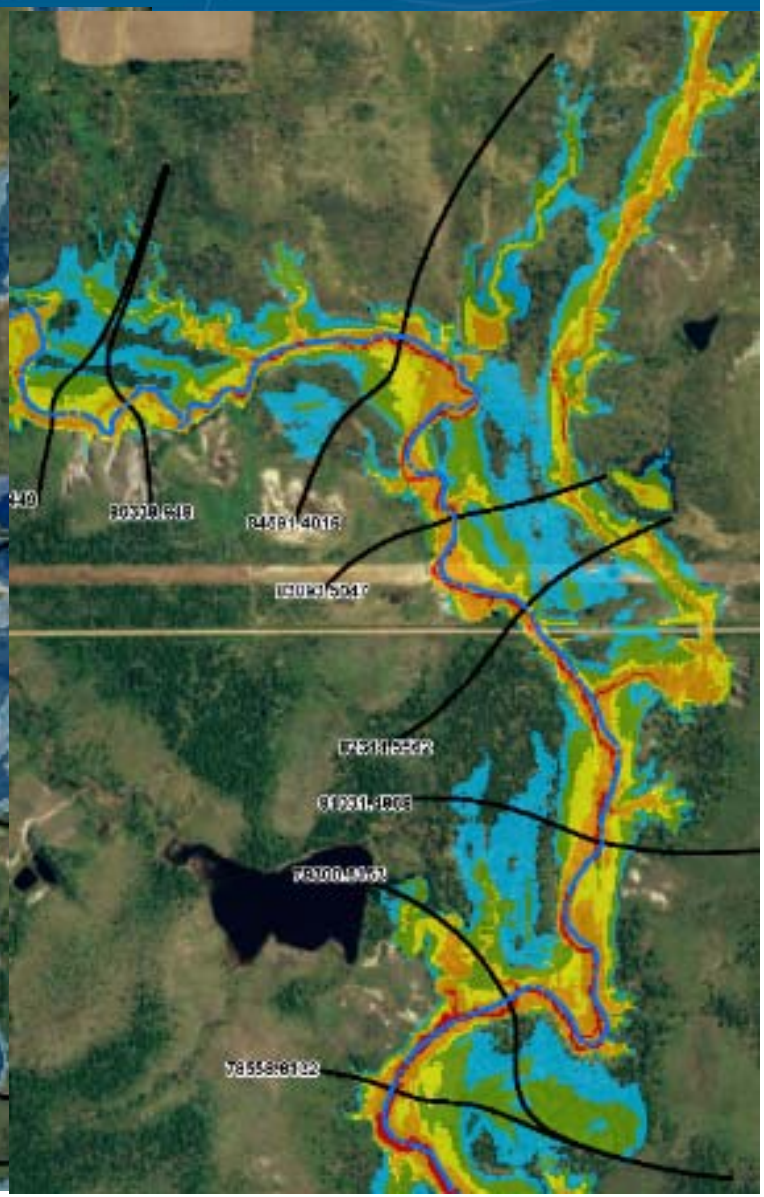
Base Level Engineering Products



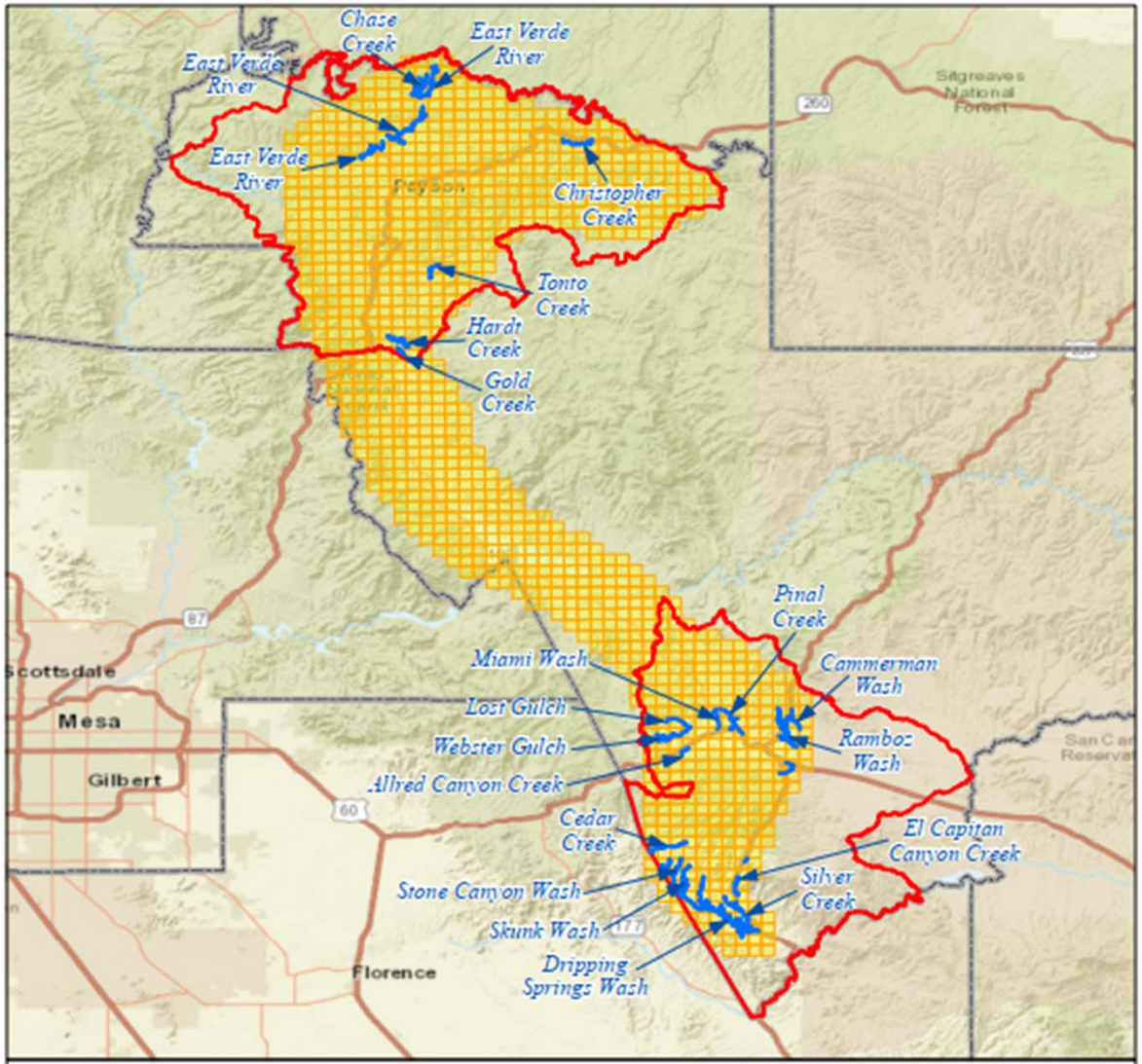




Minimum Data Produced

- **Hydraulic Modeling (10%, 4%, 2%, 1%, 1%+, 1%-, and 0.2% annual chance floods)**
- **1% and 0.2% Floodplains**
- **1% and 0.2% Water Surface Grids**

Gila County – Current Scope of Work



Gila County, Arizona Base Level Engineering

- **Current study streams, totaling 145 miles, are associated with existing Zone A areas**

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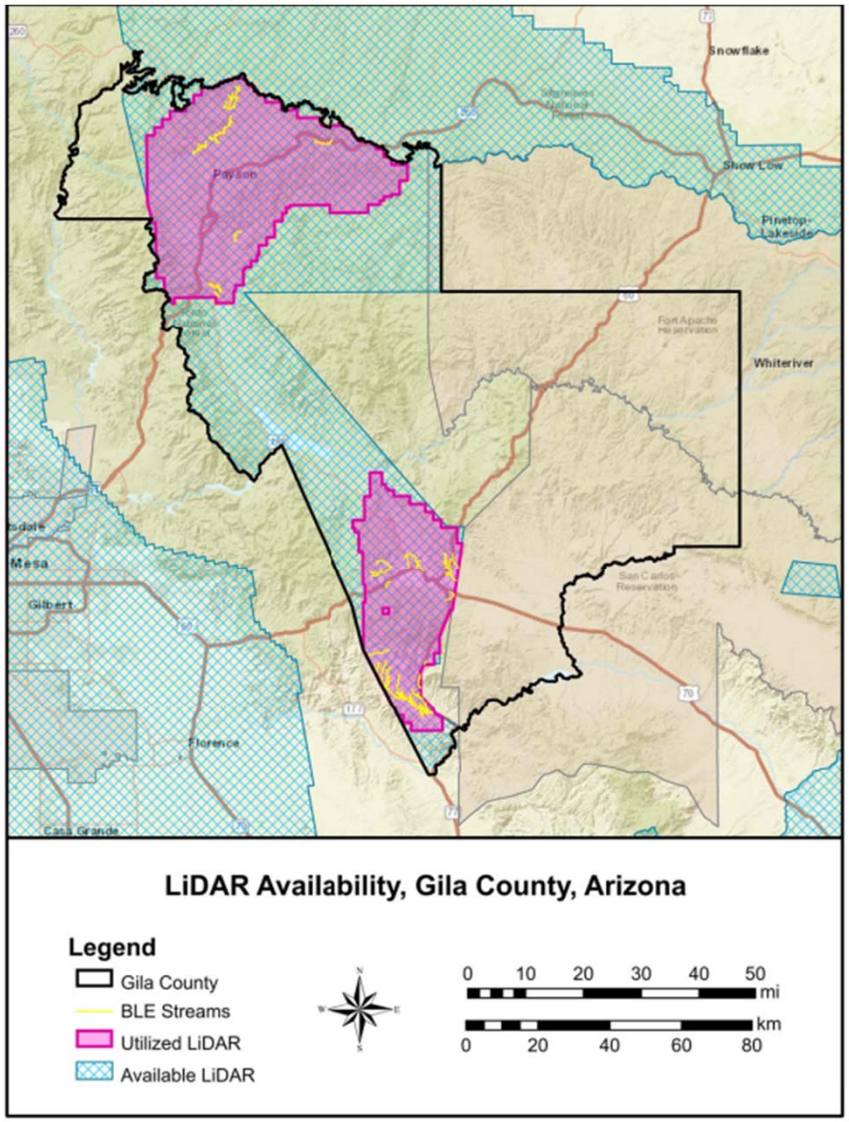
Gila County – LiDAR Availability



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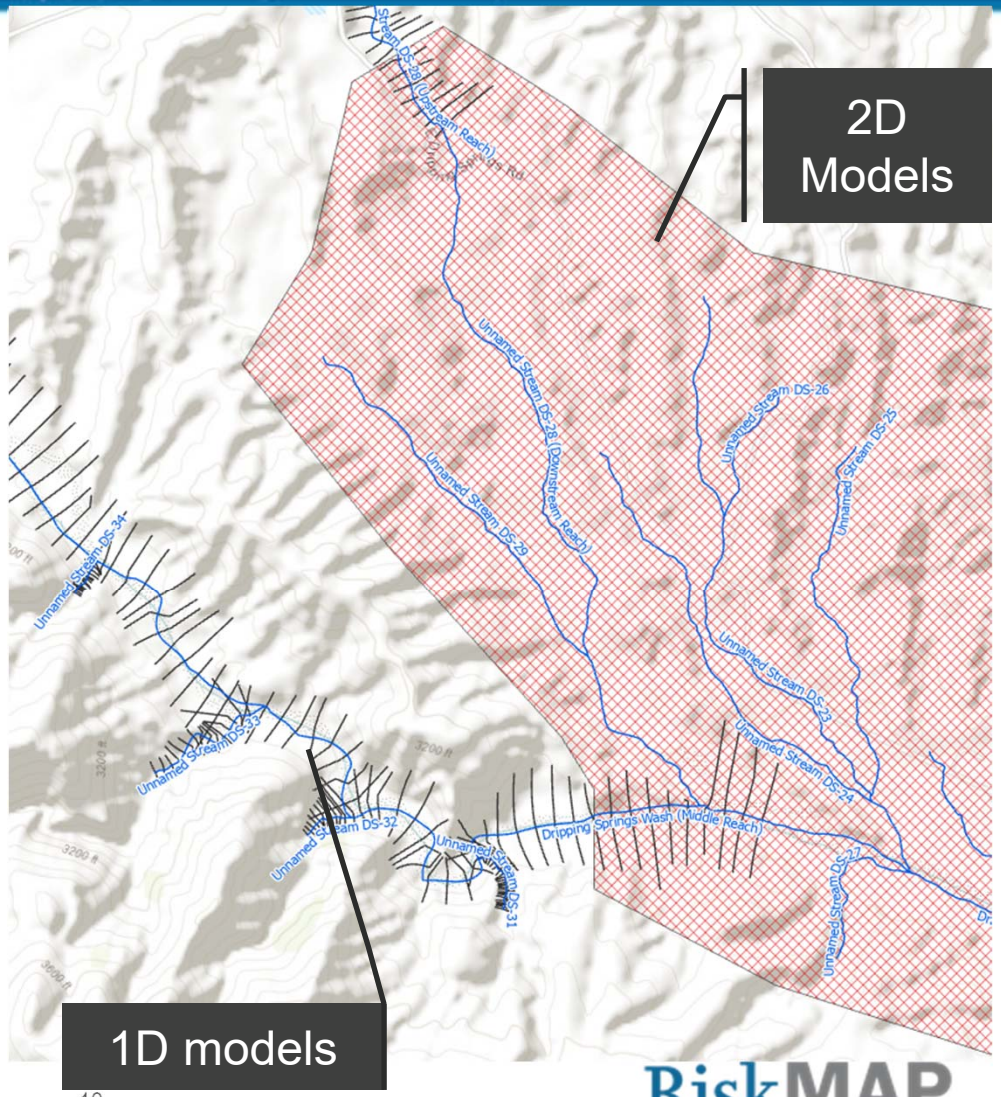
Base Level Engineering – 1D vs 2D model areas

- **Types of Analysis**
  - 1D and 2D based on
    - Complex flow patterns
    - Flow leaving the main channel
    - Geomorphic (topography) review of the vicinity
- **Peak Flows Computed from Rural Regression Equations**
- **Tie into detailed studies**



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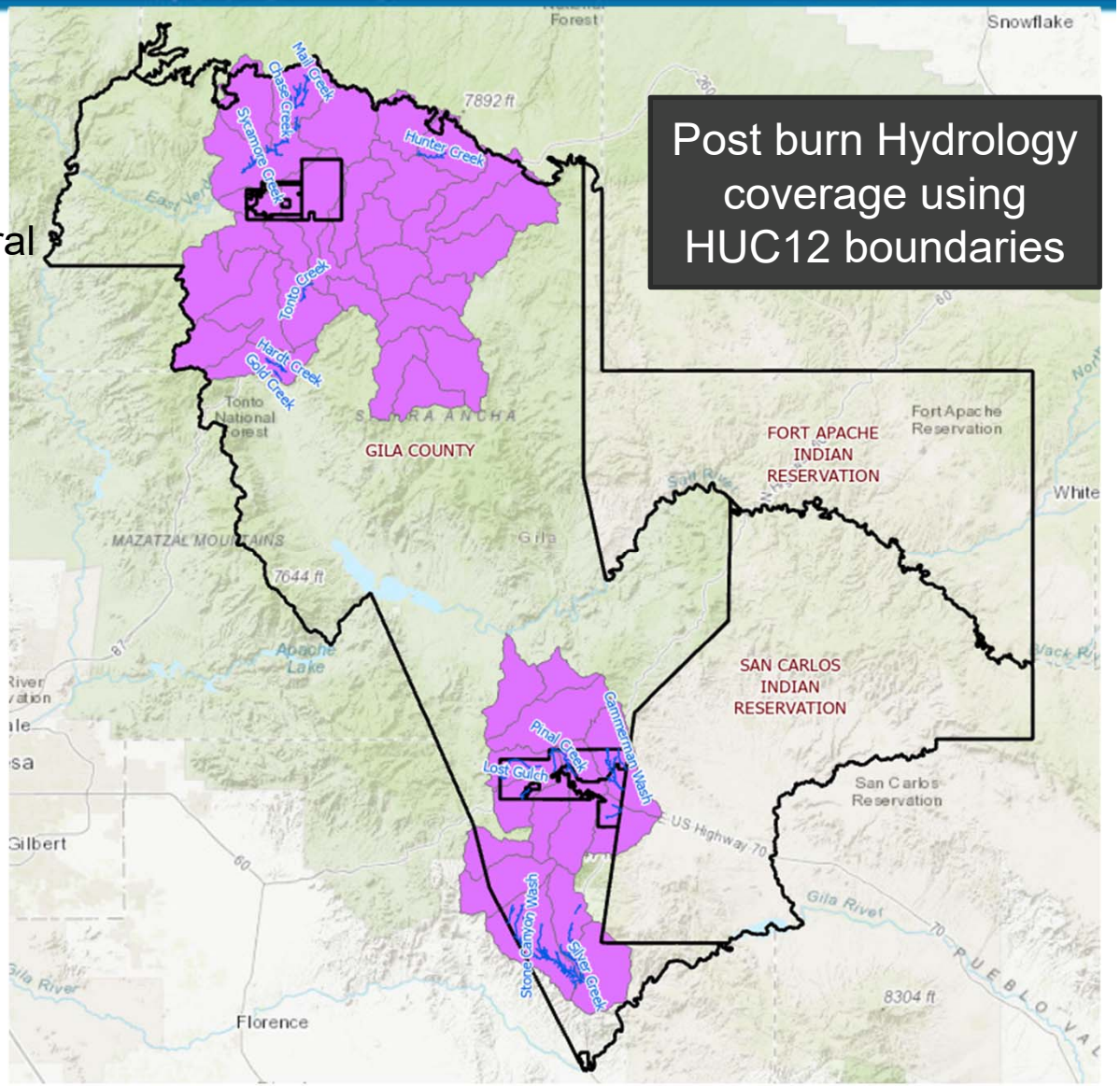
Base Level Engineering (BLE) - Hydrology

- **Hydrology Approach**
  - Created Stream Network and Watershed Delineation
  - Peak Flows Computed from Rural Regression Equations
  - Post-Burn Hydrology flows Calculated using excel spreadsheet
    - 10yr flows increased by 195%
    - 100yr flows increased by 100%
    - 500yr Flows increased by 85%



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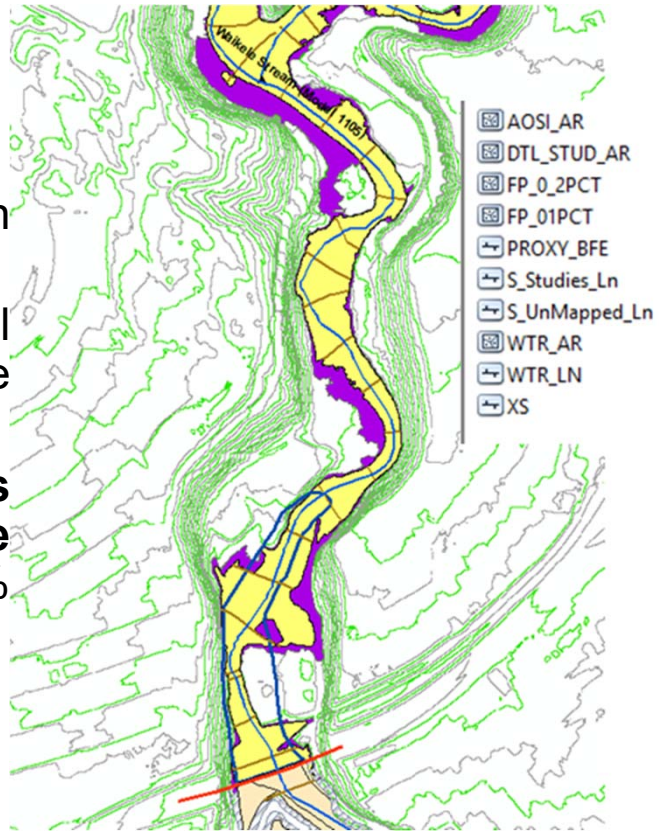
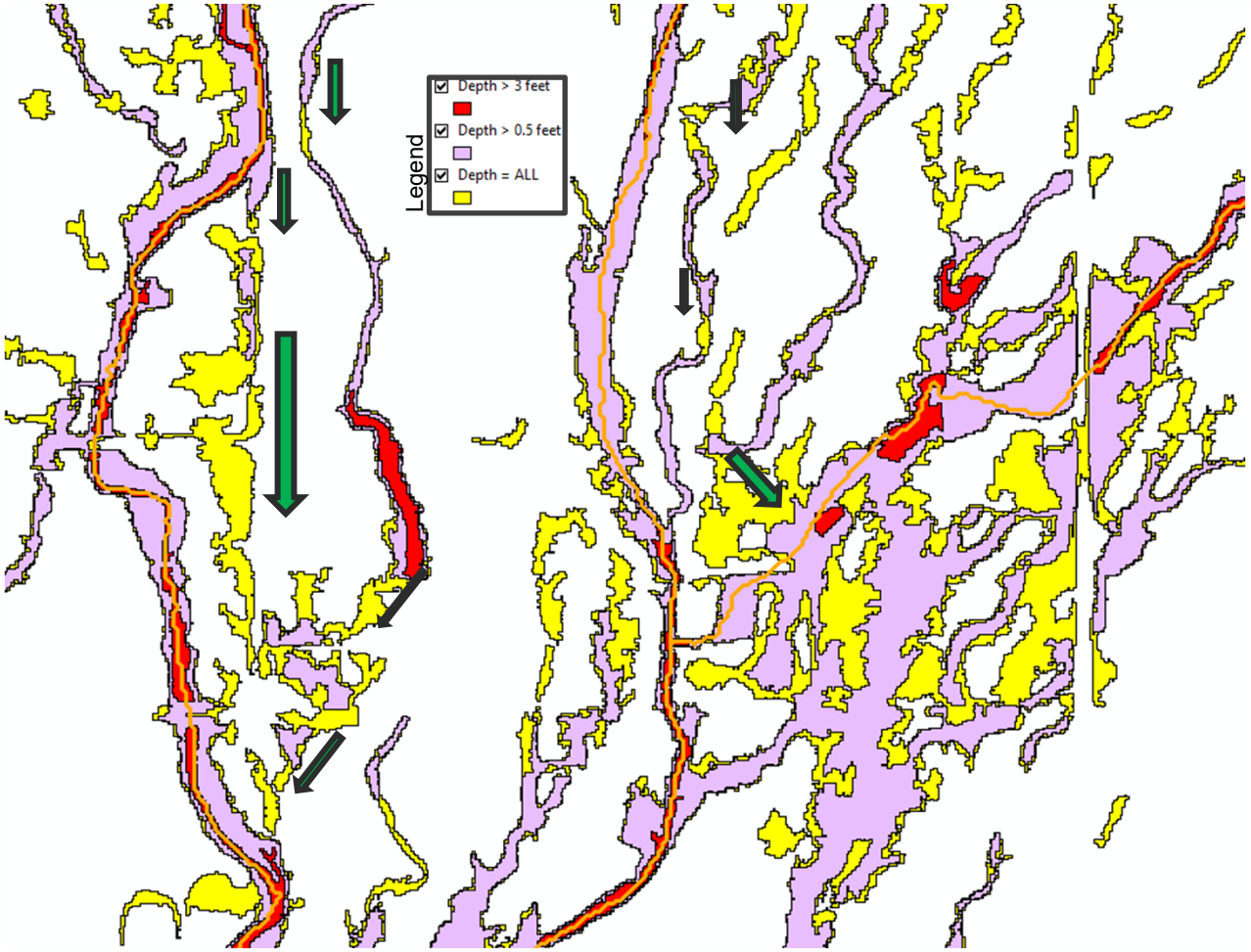
Base Level Engineering (BLE) - Hydraulics

- **HEC-RAS models for every stream for 10%, 4%, 2%, 1%, 1%+, 1%-, and 0.2% annual chance floods**
- **Spatial datasets - Geodatabase**
  - **Stream centerlines** (WTR_LN) attributed with water name & model number
  - **Cross sections** (XS) attributed with water/model name, station, thalweg elevation, water surface elevations and flow rates for all events modeled
  - Backwater processed **floodplain polygons** (FP_##PCT) and corresponding **water surface elevation grids** (WSE_##pct for the 1% and 0.2% flood events
  - **BFE proxy cross sections** (PROXY BFE) with the 1% water surface elevation
  - **Issue Polygon** (AOSI_AR) identifying modeling and mapping challenges



Base Level Engineering (BLE) – Complex Areas Mapping



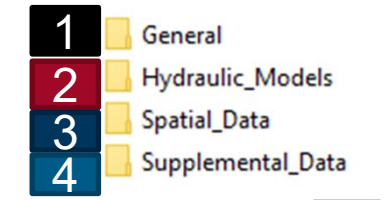
Floodplain Challenges:

- Recommended Solution - Inundation depth (0.5 Feet) and add “ALL (0 feet)” depth to follow the flow path (see Arrows)

BLE – DELIVERABLES ORGANIZATION

Base Level Engineering (BLE) - Deliverables

- **Organized by County**
- **Folder Organization**



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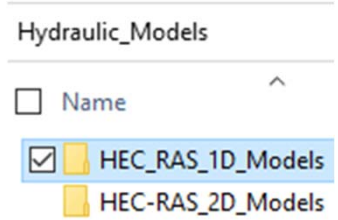

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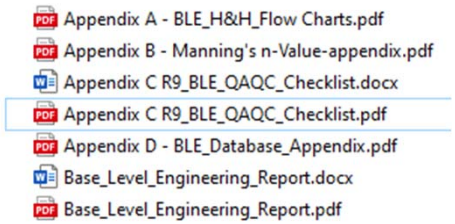

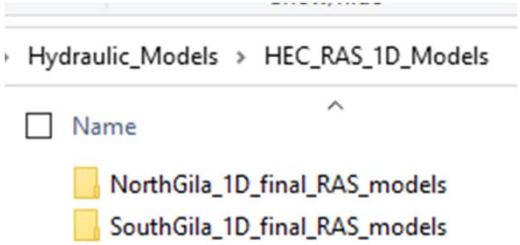

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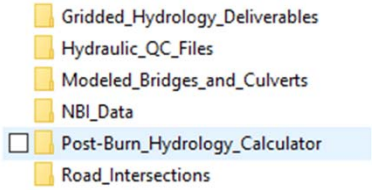

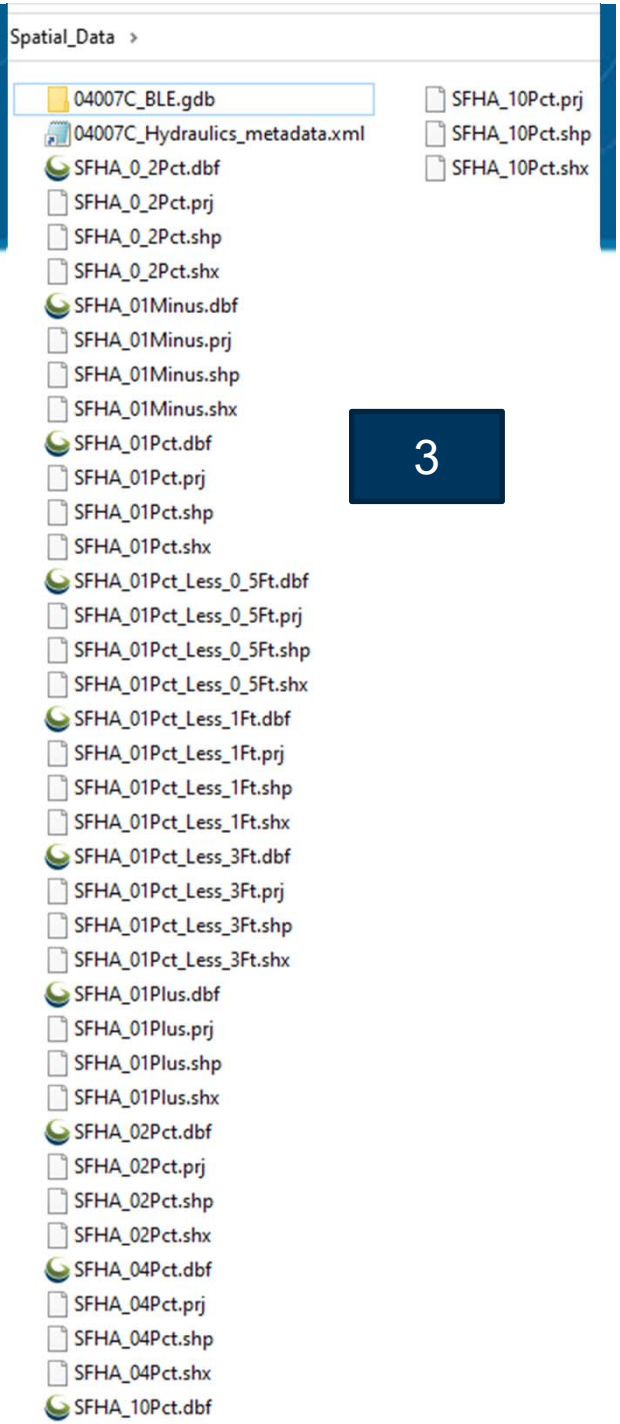

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HOW TO USE BLE DATA NOW?

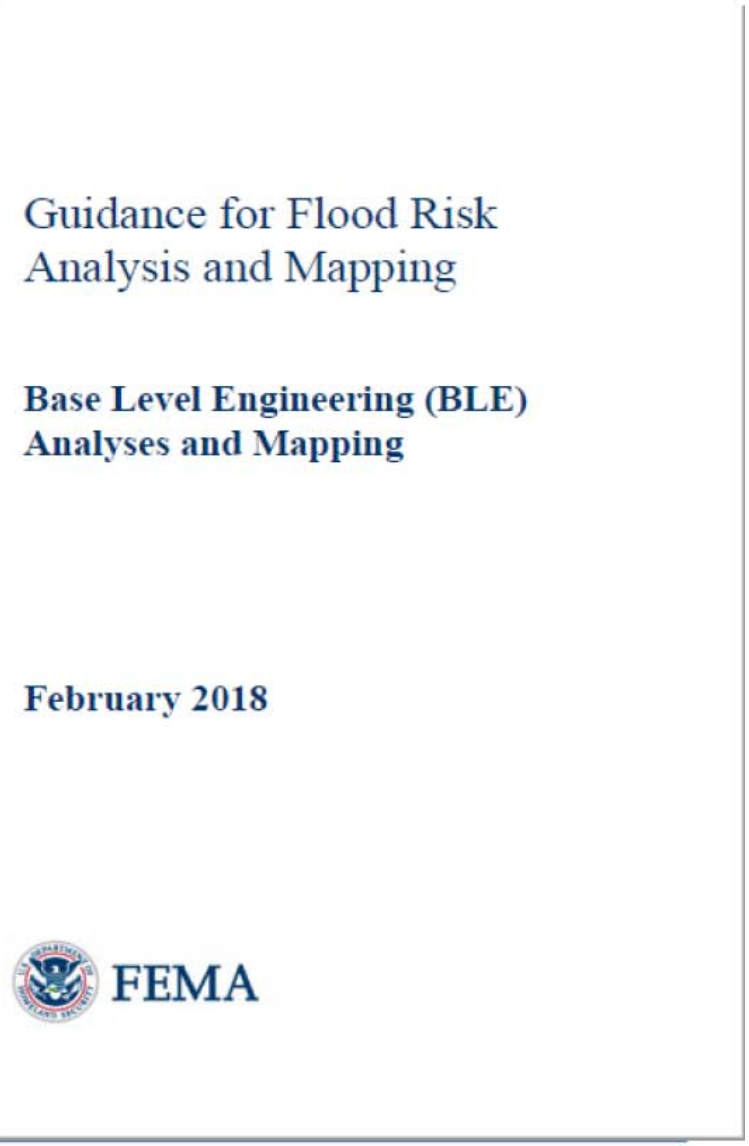
BLE For Amendment Requests

- **1% annual chance flood elevations from BLE can be used for LOMA and LOMR-F applications**
  - Applicable in Zone A areas (unnumbered)

- **Current effective SFHA boundary has to be used to determine whether structure is in/out of SFHA for flood insurance purposes**

BLE For Floodplain Management

- WSELs produced exceed the FEMA 265 requirements
- Best available data for unnumbered Zone As
- Can be used to regulate unmapped areas
- Communities encouraged to adopt the data
- To be used in lieu of FEMA 265 where available
- 1-98 is currently under revision and will incorporate BLE information



BLE Benefits for Mitigation

Creates data for conversations about existing flood risk and ways to reduce future losses

- Assist in understanding that the current FIRM does not adequately identify flood hazards
- Provides engineering data and initial review of expected flood hazards before a more detailed study is initiated
- Insights into how modifications of the built environment may change risk and future flood losses

DATA FOR REVIEW

COLLABORATIVE

FASTER

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Frequently Asked Questions

1. How can I view the Base Level Engineering (BLE) results in my community?
2. Does BLE replace the Flood Insurance Rate Map for my community?
3. Can BLE be used to update the FIRMs in my community?
4. Will all BLE streams studied be included in a Flood Insurance Rate Map update?
5. Why is BLE data being provided so early in the process before FEMA updates FIRM Panels?
6. How can my community use this data?
7. Can BLE results be used to determine Base Flood Elevations in my community?
8. How can I use the BLE information to inform future building and development in my community?
9. Can my community adopt the BLE information through my Local Floodplain Management Ordinance?

Questions? Comments?

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