COLORADO
Department of Transportation

FEMA Base Level Engineering (BLE) Studies

Brian Varrella, PE, CFM
Resident Engineer, CDOT Region 4

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FEMA Base Level Engineering (BLE) Studies

What is "Base Level Engineering" (BLE)?:

- "*High-level understanding of flood hazards*" (FEMA)
  - Good for initial draft of flood risk
  - Typically 2D models (formerly 1D)
  - Terrain + hydraulic model + rainfall = BLE
- For **non-model-backed Zone A (approx.)** areas
  - Also basins > **1.0 square mile** in area or larger
  - FEMA's metric = miles of creeks/rivers mapped
- Generally **non-regulatory** unless **adopted locally** and designated by the state (CWCB)
  - Not on maps published from the NFIP (National Flood Insurance Program)

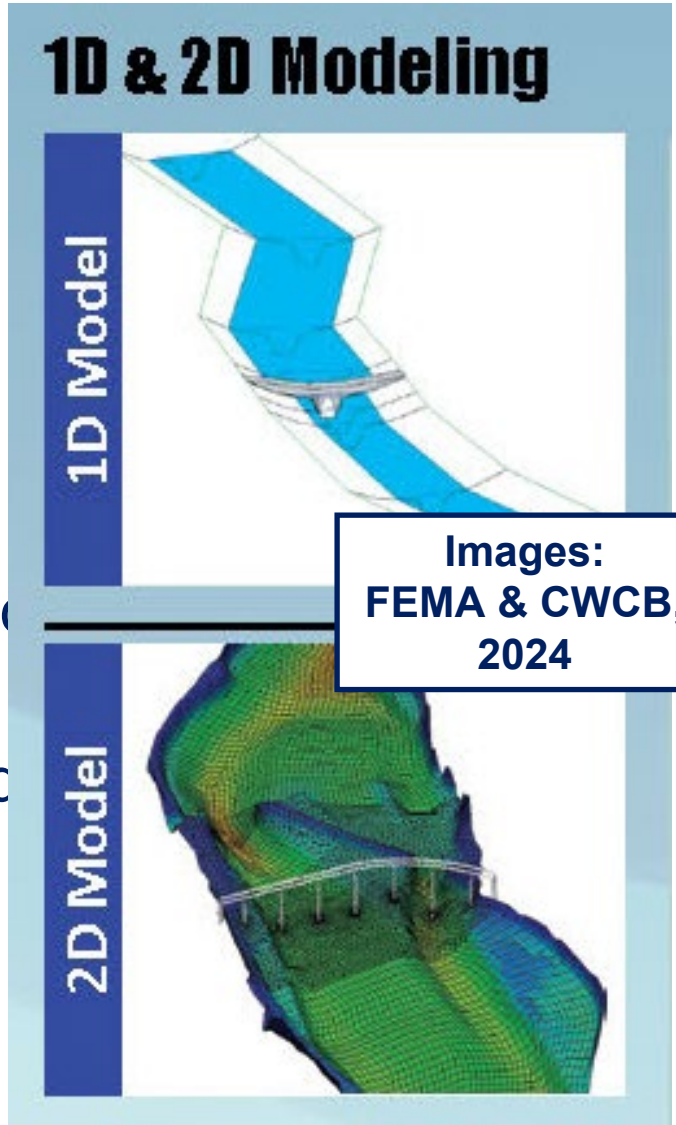
Image of Zone A area ready for BLE (FEMA & CWCB)

Image of detailed Zone AE & floodway; no BLE (FEMA & CWCB)

FEMA Base Level Engineering (BLE) Studies

What is "Base Level Engineering" (BLE)?:

- BLE = best available data if no prior mapping existed
  - Does not supersede regulatory floodplains
  - Only regulatory if adopted into local Code and State designation (CWCB)
- Not considered detailed enough for "*design*" (CWCB)
  - Does not include bridges, culverts, ditches or detailed roadway topography
  - Uses "*hydraulic connectors*" for infrastructure instead of actual infrastructure
  - BLEs are not detailed hydraulic studies (*pay twice?*)



FEMA Base Level Engineering (BLE) Studies

Floodplains in Morgan County:

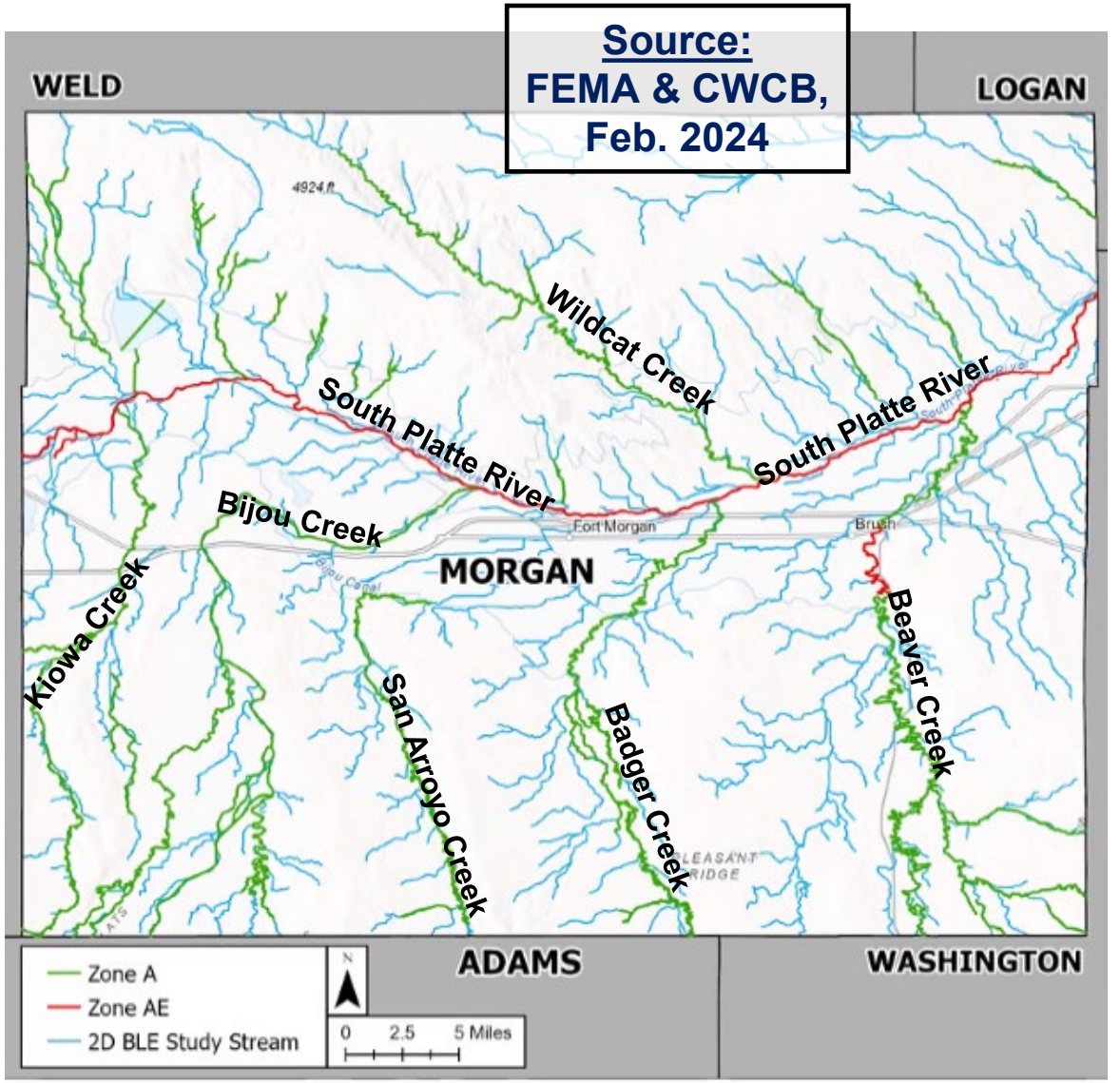
Zone A = 459 miles (*1978-2018*)

Zone AE = 58 miles (*2012 & 2021*)

New BLE Reaches = 874 miles (*late-2025*)

Other Morgan Co. Facts:

- 11% of Morgan Co. is already mapped in a FEMA floodplain
- Adopting BLE areas might double the total floodplain area past 20%
  - Impacts 18 major CDOT structures
  - Impacts 14 minor CDOT structures



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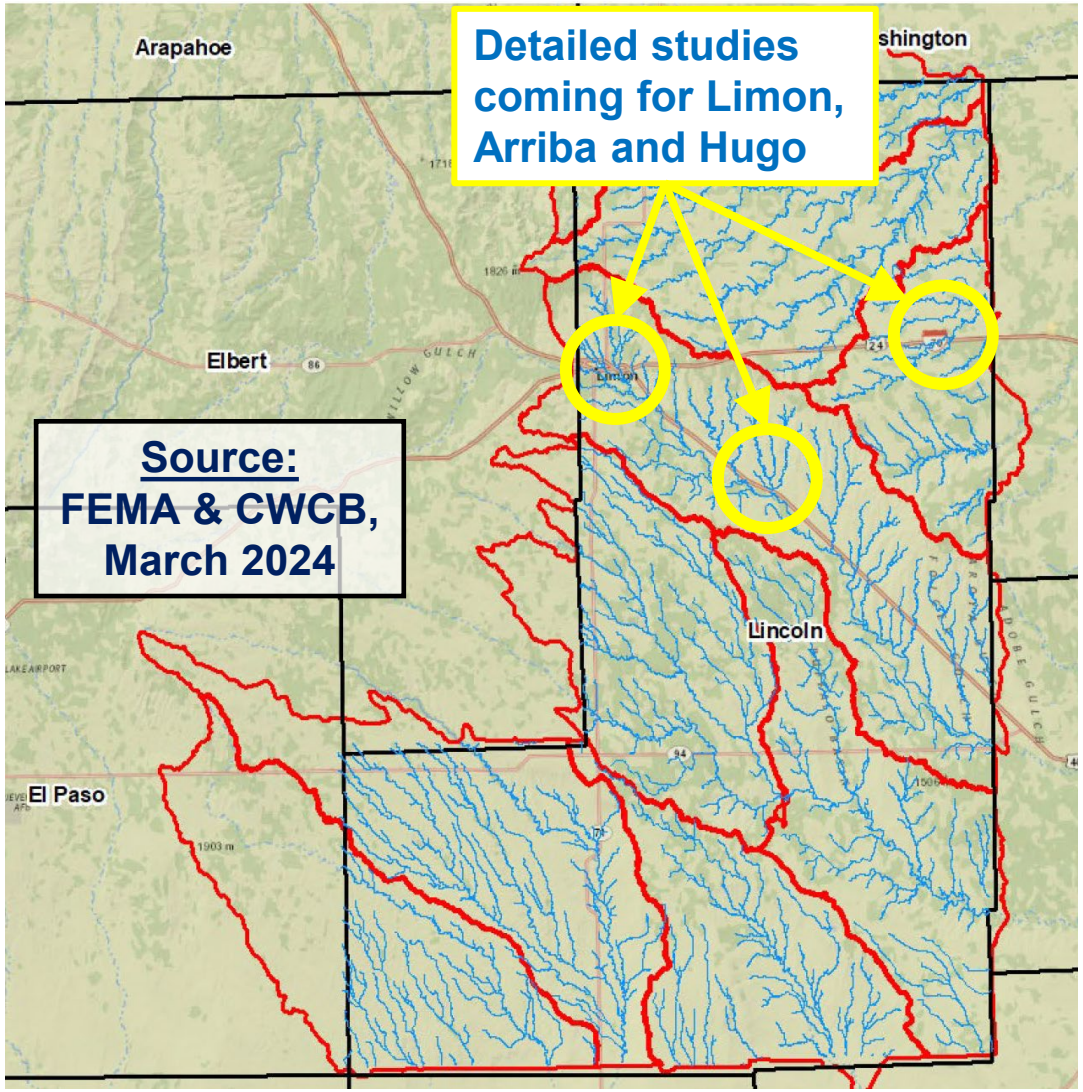


Floodplains in Lincoln County:

Zone AE = 9.7 miles (*1985 & 2022*)

New BLE Area > 2,600 miles (*late-2025*)

Other Lincoln Co. Facts:

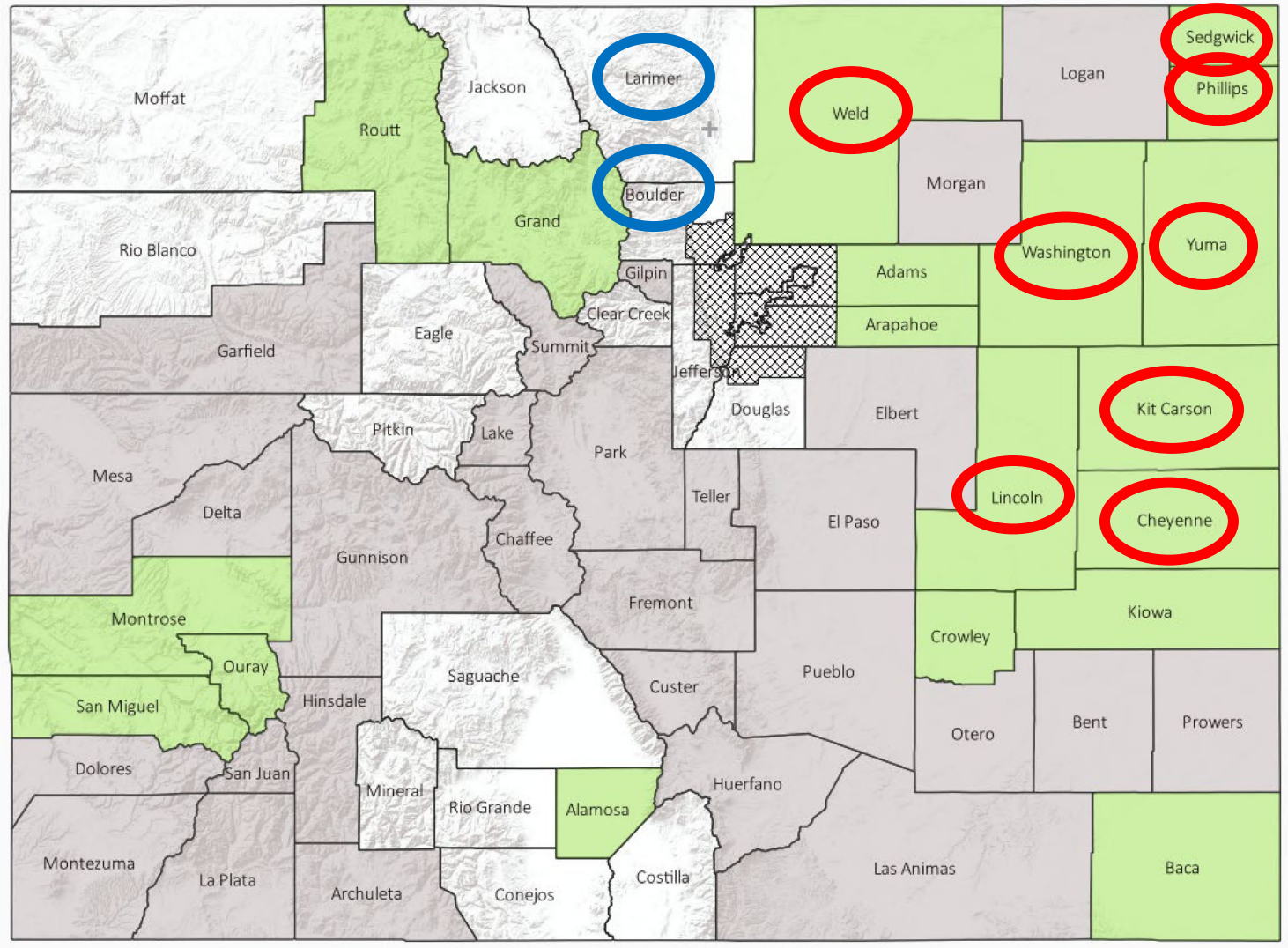
- Limon detailed study areas will not be affected by BLEs
- Hugo currently suspended from the NFIP
- Arriba & Hugo & Genoa have no current flood risk areas mapped by FEMA
- Impacts 52 major CDOT structures
- Impacts 32 minor CDOT structures

FEMA Base Level Engineering (BLE) Studies

Statewide Plan for Current & Future BLEs (FEMA & CWCB):

BLE Coverage

- Complete
- In progress
- Future



FEMA Base Level Engineering (BLE) Studies

Other BLE Facts & Opportunities:

- BLE is not regulatory, unless adopted & designated
  - **Local agencies have 30 days** to review data
  - CDOT does not receive review referrals
- **CWCB concedes BLEs may have significant impacts on CDOT projects if adopted**
- CWCB will not include road, culvert or bridge data into BLEs from other agencies
  - CWCB **not scoped to include infrastructure**
  - Future projects may be "*considered*"
    - CDOT providing impacted structure list & as-built
    - Using interns to share data in real-time

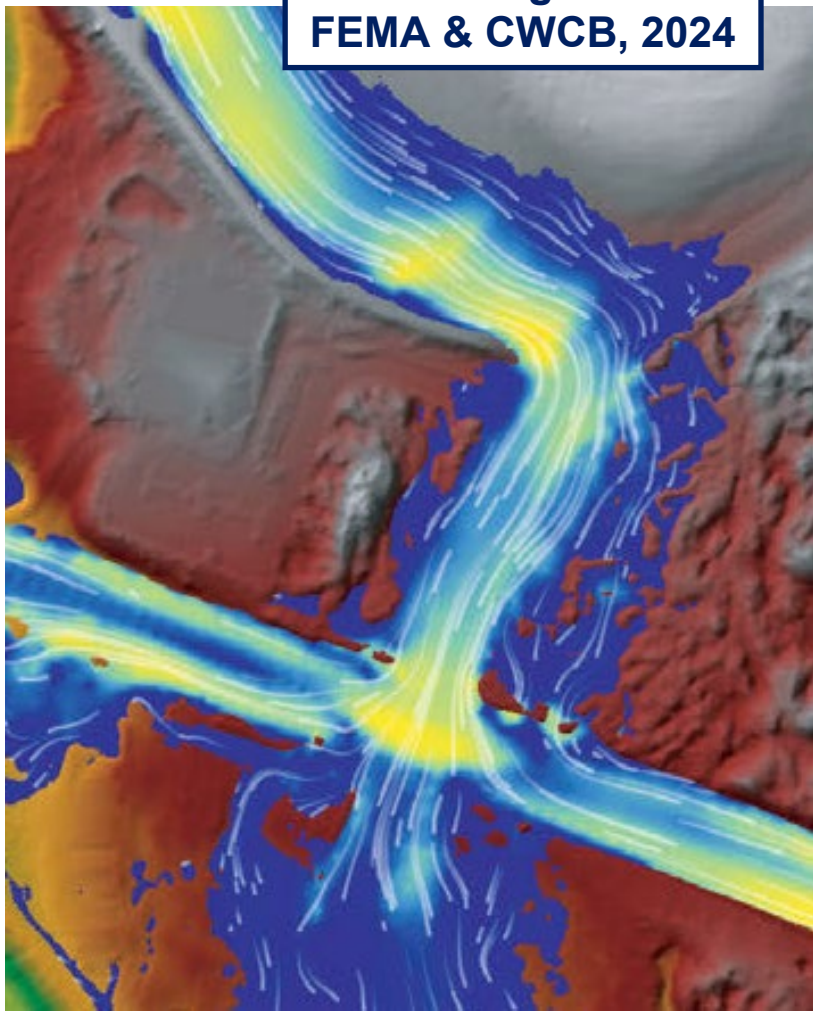
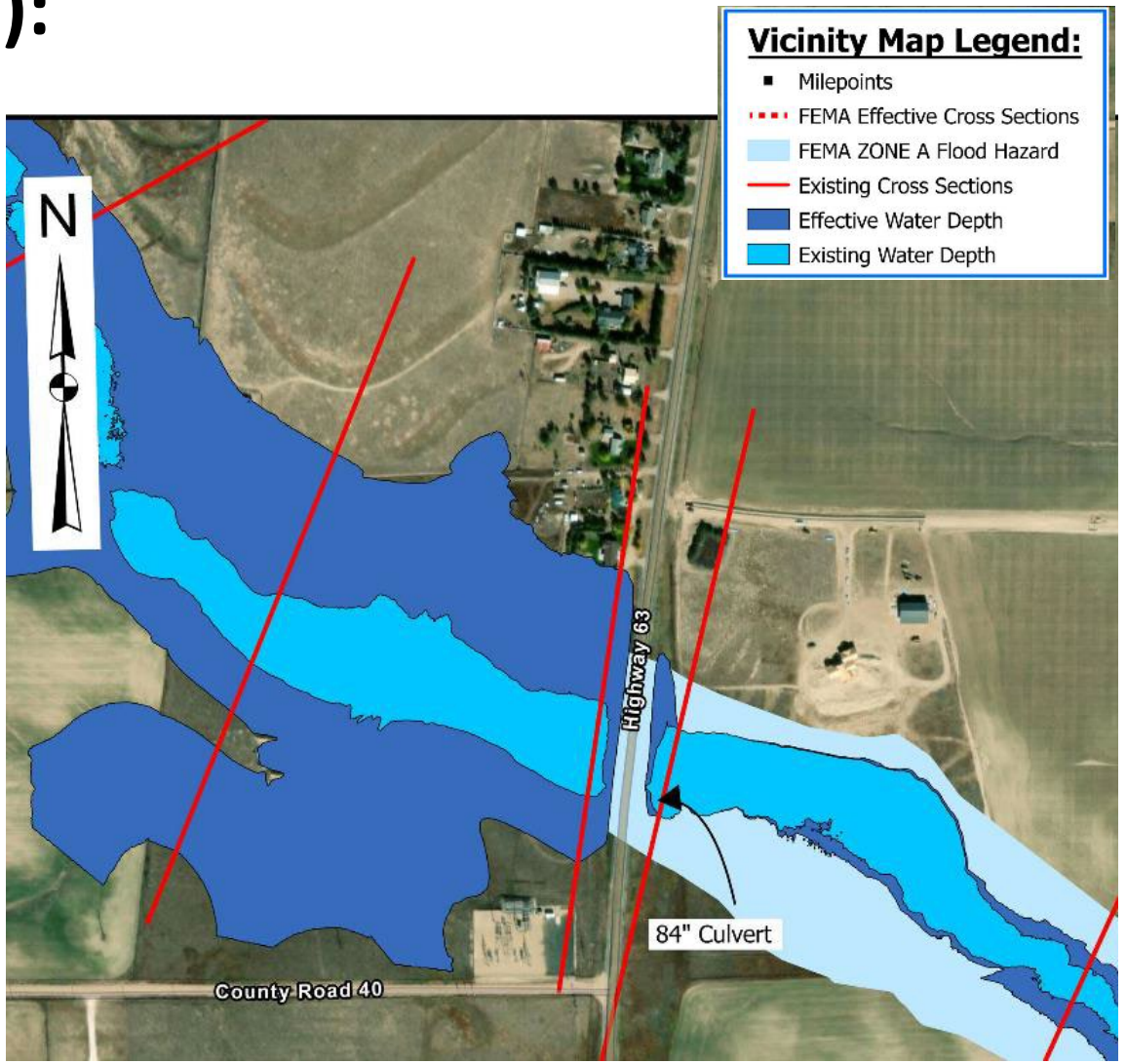


Image:
FEMA & CWCB, 2024

FEMA Base Level Engineering (BLE) Studies

BLE Case Study (CO63 @ Akron, CO):

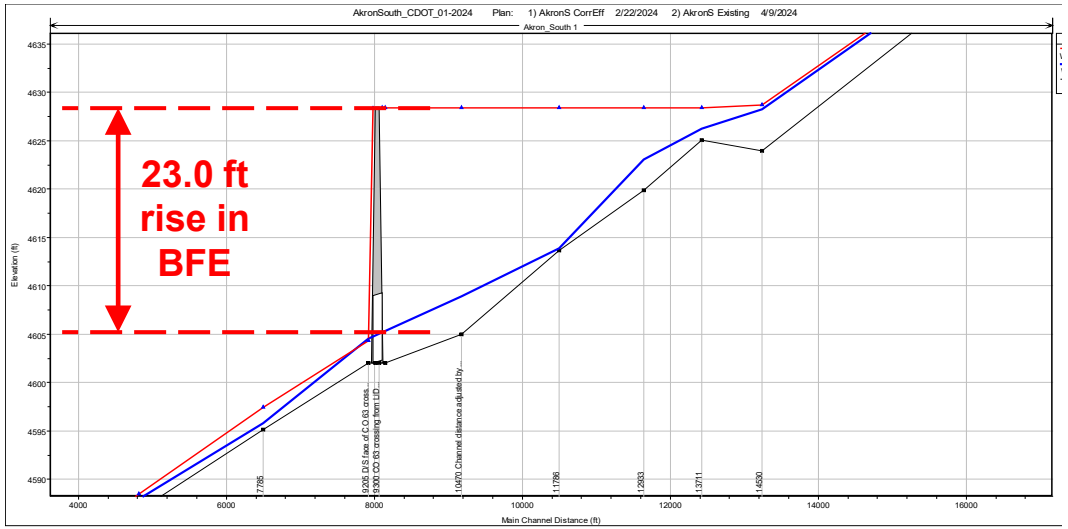
- **CO63 repaving** project south of **Akron** (Washington Co., Project 25942)
  - Unnamed 1-mile long watershed
  - Mapped by FEMA in the 1980's
  - Remapped with **1D BLE in 2018**
- Used 1D hydraulic model
- **Not scoped for highway elements**
  - Missed a 28-ft high embankment
  - Missed a 7-ft diameter culvert
  - Under-estimated flood risk

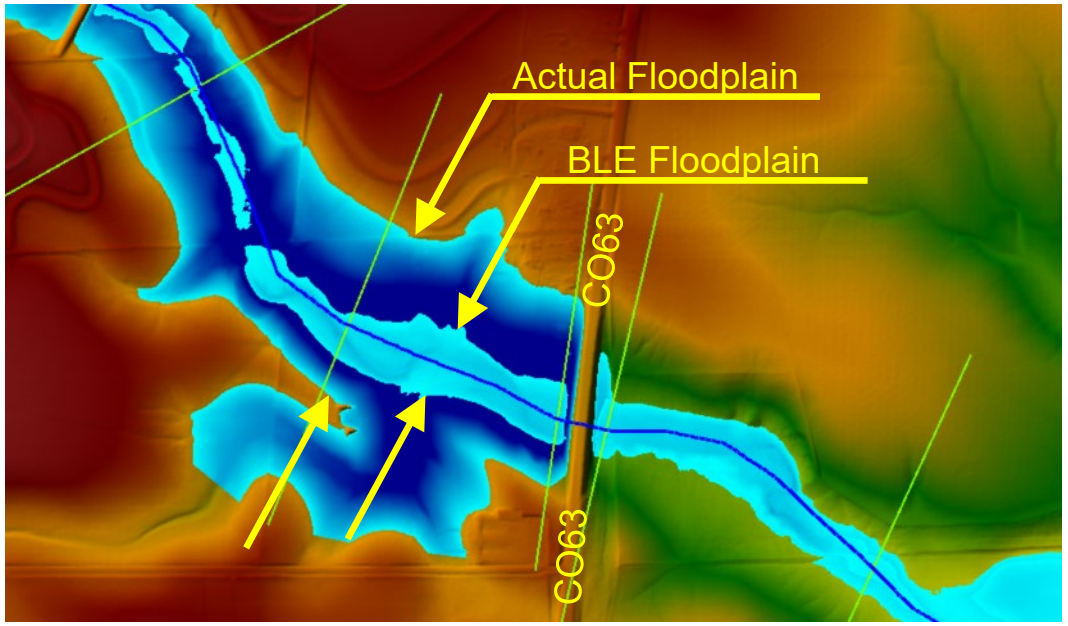


FEMA Base Level Engineering (BLE) Studies

BLE Case Study (CO63 @ Akron, CO):

- Hydraulic analysis corrected by CDOT
  - BFE = **23 ft rise** over 2018 mapping
  - **FP width** increased by **3-fold**
- CDOT design targets & costs change
  - Moves from 25-year to 100-year
  - Requires **3** x 7-ft culverts ($12M)
  - New bridge or box culvert ($Lots)
- Could still trigger a C/LOMR
- CDOT could provide as-builts & technical support if involved
  - **Working to collaborate with CWCB**





FEMA Base Level Engineering (BLE) Studies

"Benefits" of BLE Studies (*FEMA*):

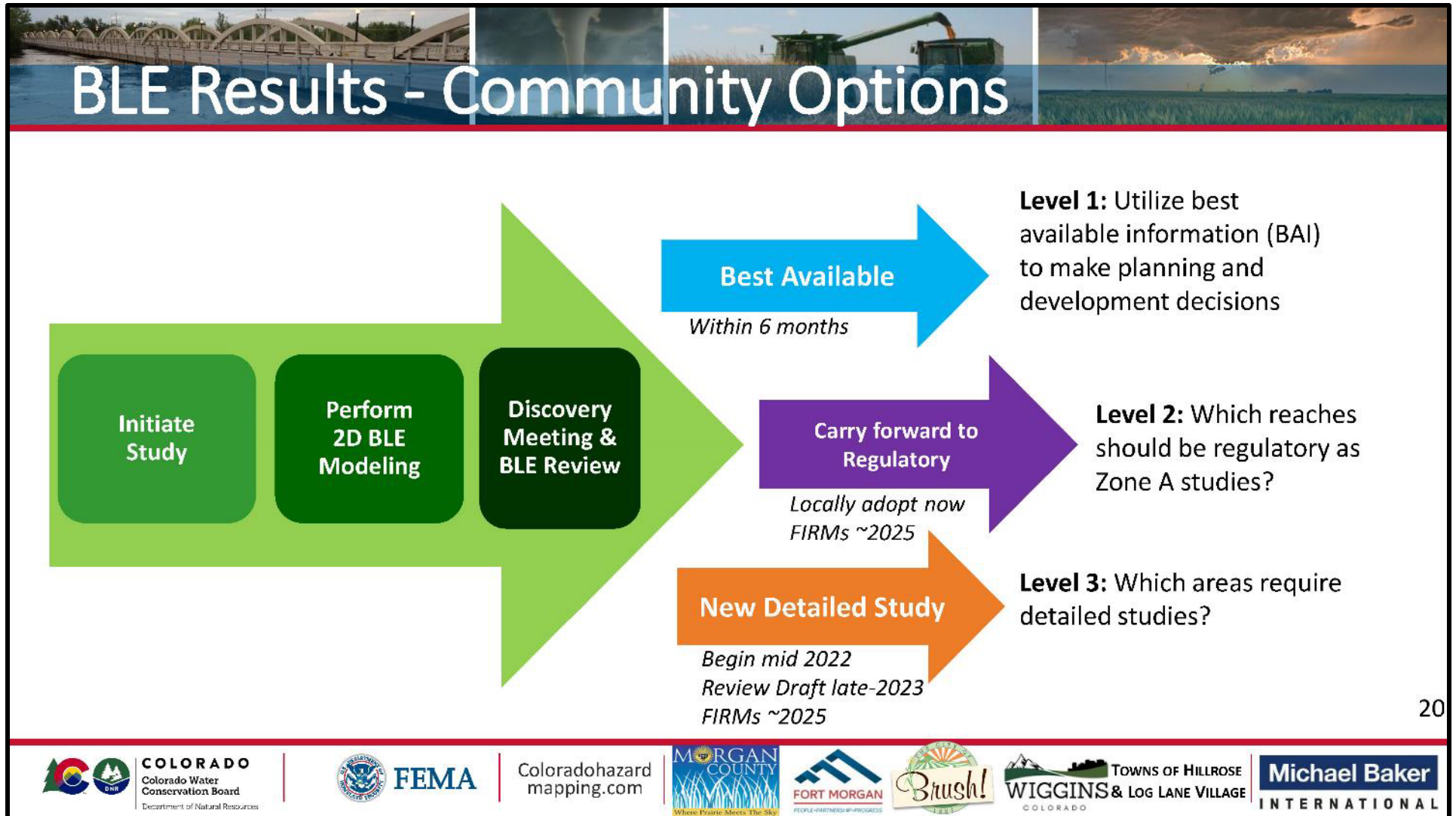
- Shows flood risks that exist, but were not previously mapped
- Shows risk across entire watersheds (*miles of rivers*)
- Models can be used by others (*HEC-RAS 2D*)
- Created from "detailed" topography
- Supports local land use planning & development
- More efficient means to map general flood risk info for entire watersheds than previous

Other Considerations (*experiential*):

- Risk identification and risk accuracy can be two different things
- One change to a BLE study anywhere tends to change results everywhere
- HEC-RAS 2D is still not endorsed for infrastructure projects (*CDOT still learning*)
- Does NOT include roadway prism, bridges or culverts (**hyd. connectors**)
- Approx. floodplains are legally enforceable if adopted into Code (**beware**)
- Still requires others finish FEMA's work
  - You pay to add missing infrastructure data later (**pay twice**)

FEMA Base Level Engineering (BLE) Studies

What do you do with a BLE:



Questions & Discussion

Brian K. Varrella, PE, CFM
Resident Engineer
CDOT Region 4 Hydraulics
970-373-6121 (M)
Brian.Varrella@state.co.us

Kalli Wegren, PE, CFM
Project Manager
CDOT Region 4 Hydraulics
970-652-5855 (M)
Kalli.Wegren@state.co.us