CIMARRON BLE MEETING

Shawn L. Penman, PhD, CFM
Loretta Hatch, CFM
Shelby de Jongh,

New Mexico Centennial Project. August 13 flooding in front of Oxford Hall, Cimarron, New Mexico, 1909. Courtesy of the Palace of the Governors Photo Archives (NMHM/DCA, Negative No. 146899.

EDAC | EARTH DATA ANALYSIS CENTER

FEMA

Cimarron BLE Meeting Protocol

- Please put your name, community, email address and your interest in this meeting in the chat box.
- Please mute your line
- Type questions in the chat box
- Thank you for attending

New Mexico Tourism Bureau. Beaver dam on Cimarron River in northern New Mexico, 1950. Courtesy of the Palace of the Governors Photo Archives (NMHM/DCA), New Mexico Magazine Collection, Album 14, Negative No. HP.2007.20.633.

Agenda

- Introductions
- CTP & Risk MAP
- Base Level Engineering & eBFE Viewer
- Cimarron Areas of Interest
- Resources

What's a Cooperating Technical Partner (CTP)?

- The CTP Program was created in 1999 to help FEMA stretch limited mapping dollars and increase local involvement from sophisticated partners in the creation of FIRMs and DFIRMs.

- The CTP Program is an innovative approach to creating partnerships between FEMA and participating NFIP communities, regional agencies, state agencies, tribes and universities that have the interest and capability to become more active participants in the FEMA flood hazard mapping and Risk MAP programs.

- Earth Data Analysis Center, University of New Mexico, became New Mexico Cooperating Technical Partner in 2014

CTP Partnerships

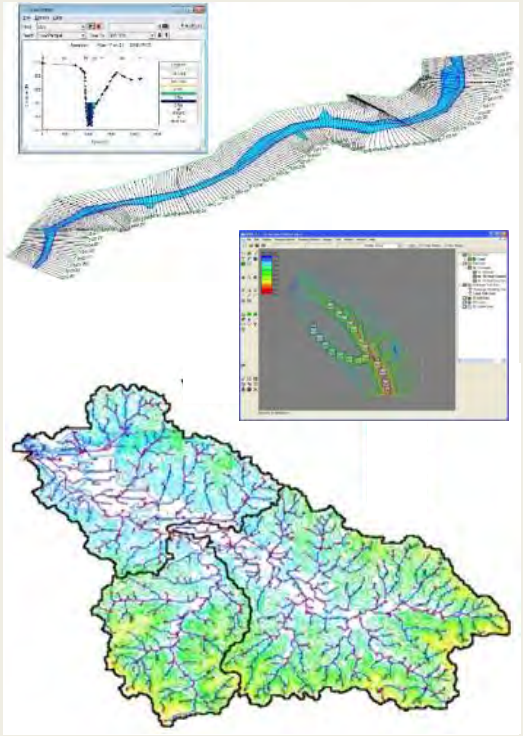
- New Mexico Department of Homeland Security and Emergency Management
  - *Loretta Hatch, New Mexico State Floodplain Coordinator*
    - Loretta.Hatch@state.nm.us
    - (505) 476-0612
- Local Flood Control Authorities
- Local Communities

Parkhurst, T. Harmon. Palisades in Cimarron Canyon, New Mexico, 1909. Courtesy of the Palace of the Governors Photo Archives (NMHM/DCA, T. Harmon Parkhurst Collection, Negative No. 088069.

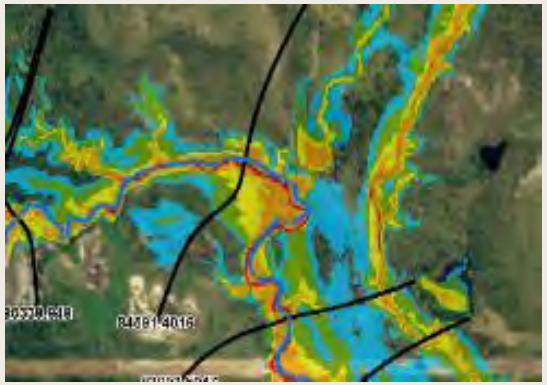
What is Risk MAP?

- Mapping – Identification of areas of natural hazard risk
- Assessment – Review and analysis of hazard areas
- Planning – Mitigation activities to reduce risk

Base Level Engineering is a programmatic evolutionary step which provides:

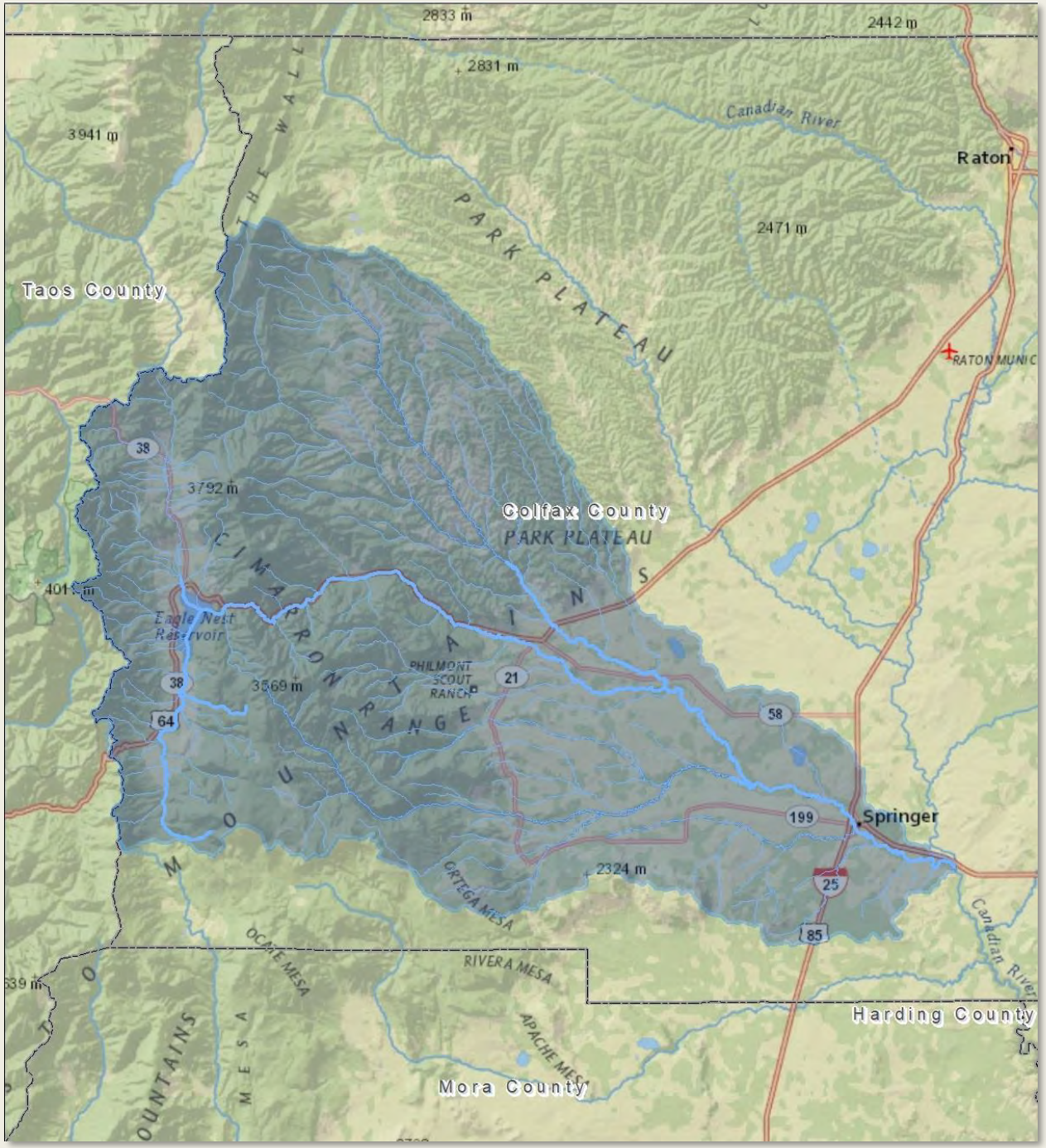


Credible engineering analysis and modeling for local communities and developers.



Estimation of flood extents, water surface elevations and flood depths

May be adopted as Best Available Information (BAI) by communities & inform development decisions.

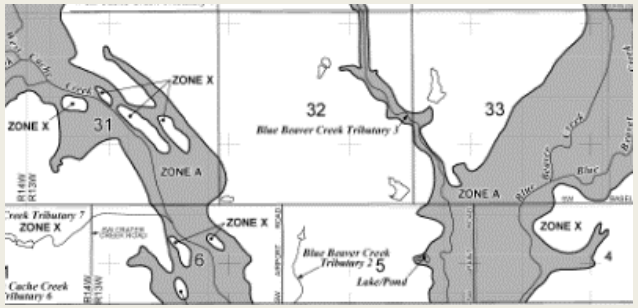

2833 m
2442 m
2831 m
Canadian River
3941 m
Raton
PARK PLATEAU
2471 m
Taos County
RATON MUNIC
38
3792 m
Colfax County
PARK PLATEAU
CIMARRONA
MOUNTAINS
Eagle Nest Reservoir
PHILMONT SCOUT RANCH
21
38
3569 m
64
58
199
Springer
2324 m
25
85
GRTEGA MESA
OCATE MESA
RIVERA MESA
APACHE MESA
Harding County
Mora County

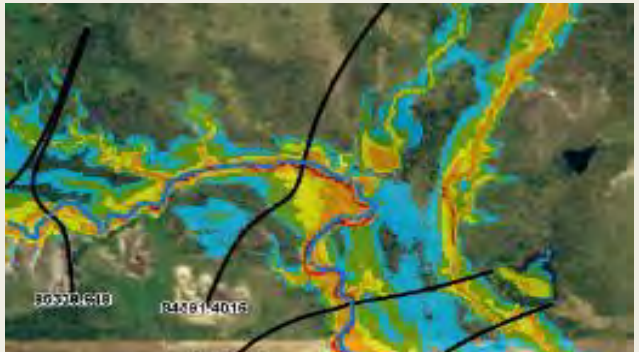
Approach

- FEMA has devised both a 1D and 2D modeling approach
- High Resolution Ground Data required
- Manual revisions to input cross-sections or grids during modeling
- Cross-sections added near structures
- Human Investigation of results prior to FIRM mapping

Deliverables

- Hydraulic Engineering Models (10%, 4%, 2%, 1%, 1%+, 1%-, and 0.2%)
- Estimated Flood Extents (10%, 1% and 0.2%)
- Estimated Water Surface Grids (1% and 0.2%)
- Estimated Flood Depth Grids (1% and 0.2%)
- Optional Layers also possible (Hazus Run, Point file for update potential, freeboard grids)





Creating Base Level Engineering Data

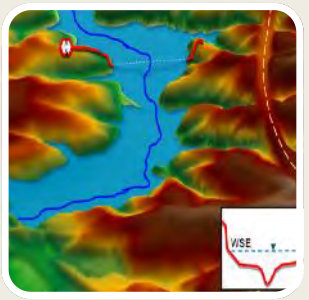
Terrain Data Collection

Is ground elevation Information readily-Available, or must it be Collected?

Hydrology

How much water are we talking about?

When will it get here?



Hydraulics

How does it react in the stream?

Floodplain Mapping

What areas are impacted?

BLE Increases Collaboration & Transparency

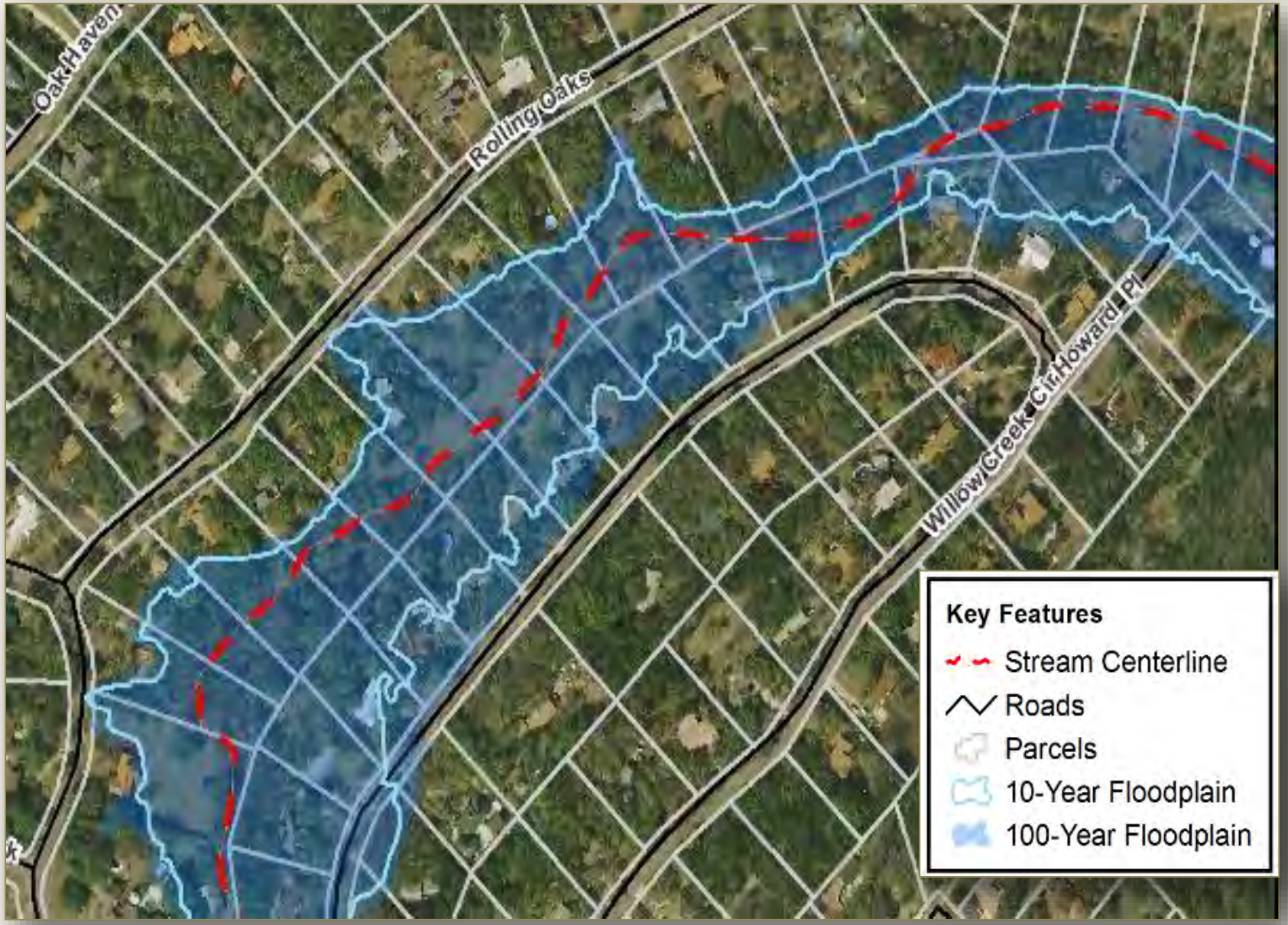
Current Mapping Challenges

- FIRM updates take 3-5 years to update through regulatory process
- FIRMs include a subset of streams within a watershed based on current and historic updates
- FIRMs depict 1% and 0.2% annual chance events
- Insurance and In versus Out discussions
- Detailed study areas require significant resources to prepare a model communities can review

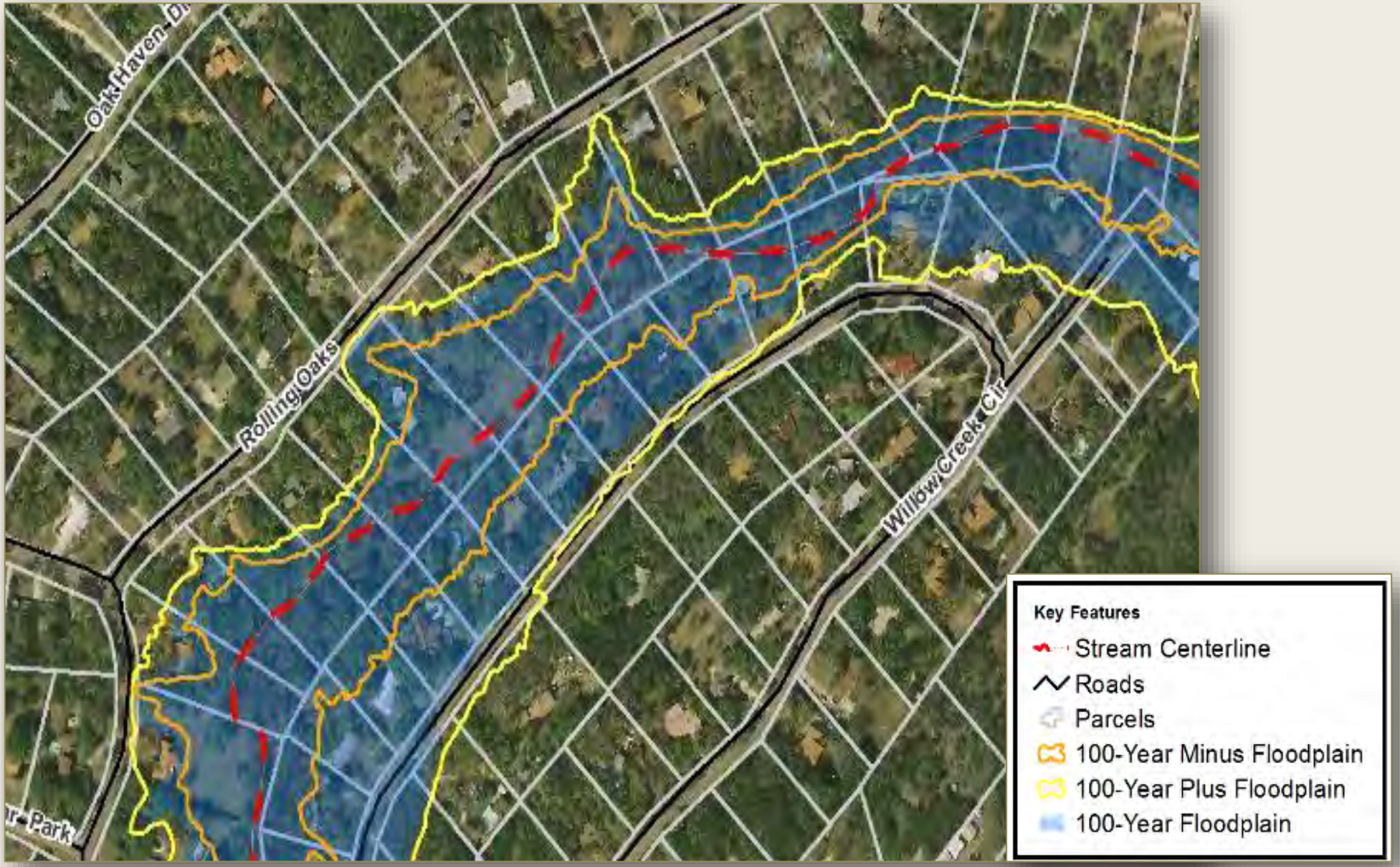
Base Level Engineering Solutions

- BLE data can be produced and delivered to communities within 9-12 months
- BLE assessments performed at a watershed scale producing stream network of data
- Flexibility in how results are exhibited
- Discussions related to flood risks and development decisions
- Community may test drive and refine data prior to moving to a map update

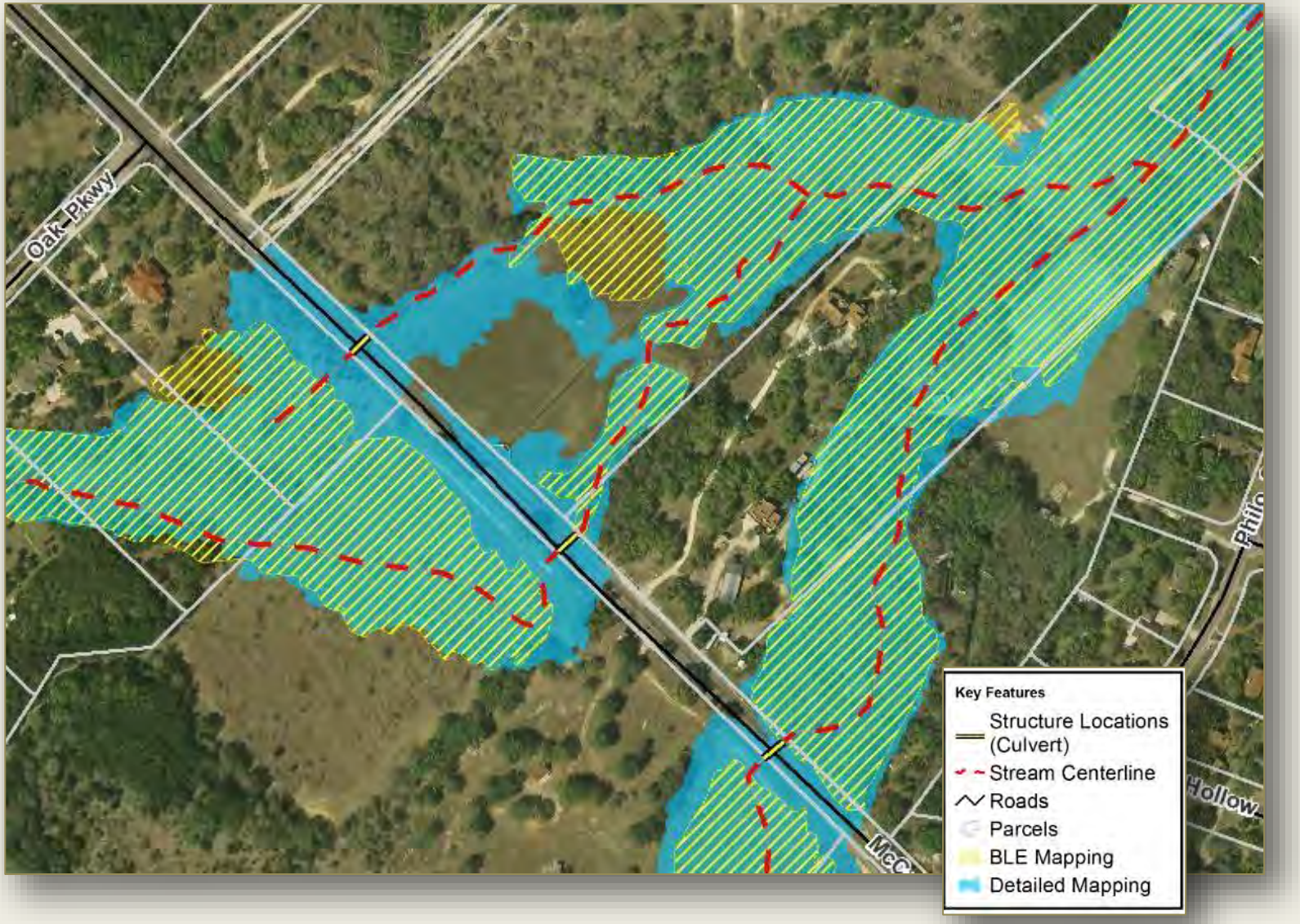
Practical Uses for BLE Data



Practical Uses for BLE Data



Practical Uses for BLE Data

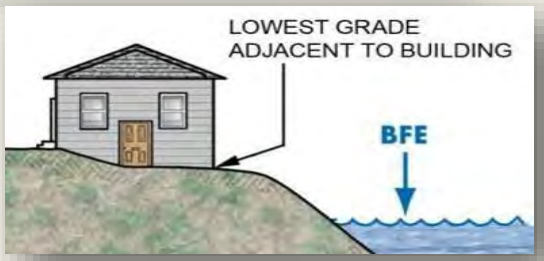


How can I use Base Level Engineering Data?

PERMITTING

MITIGATION
PLANNING

INSURANCE
RATING



LOMAs

Estimated Base Flood Elevation Viewer

Estimated BFE Viewer Purpose:

- Provide engineering data in a format that allows immediate use by public.
- Federal, State and local officials to estimate a Base Flood Elevation consistently.

www.InFRM.us/estBFE

- Engineering Models

- Water Surface Elevation Grid
- Estimated Flood Depth Grid

- GIS features without software
- Public interaction with Results
- Site Specific Reports
- Data & Model Downloads
- Consistent BFE Estimation

Estimated Base Flood Elevation Viewer

Welcome to the **Estimated Base Flood Elevation Viewer**

Base Level Engineering assessments are produced using high resolution ground data to create technically creditable flood hazard information that may be used to expand and modernize FEMA's the current flood hazard inventory.

The Estimated Base Flood Elevation Viewer allows users to:

View Base Level Engineering Data

Access all Base Level Engineering available without GIS software.

Click **LEGEND** tab to view an explanation of all dat shown in the viewer.

Click **MAP VIEW** button to open or close a second viewing window, for side by side comparison.

Click **DATA LAYERS** to add or remove layers from the map.

Download Dataset & Models

Our Data Download feature makes all of our Base Level Engineering data available to you for download.

Click **DATA LAYERS** and add the **DOWNLOADABLE DATA** layer. Once loaded, users can choose which datasets to save.

Property Look Up

Where data is available, users can produce a property specific report with estimated Base Flood Elevation and Flood depth information.

Click **TOOLS** tab to create a property specific flood risk report with details in your vicinity.

Estimated Base Flood Elevation (estBFE) Viewer

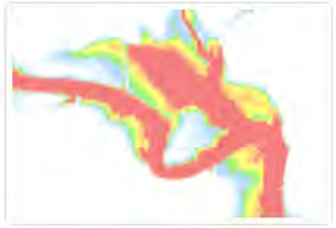
FEMA

Report | Legend 2

Data Layers | 2 Map View | Base Map

Flood Depth (1%)

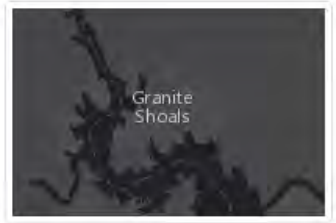
Remove



≤ 1 foot	> 3 to 4 feet
> 1 to 2 feet	> 4 to 5 feet
> 2 to 3 feet	> 5 feet

Comments: Depicts estimated water depths above land surface during a 1% annual chance storm event (a storm that has a 1/100 chance of occurring in any calendar year).

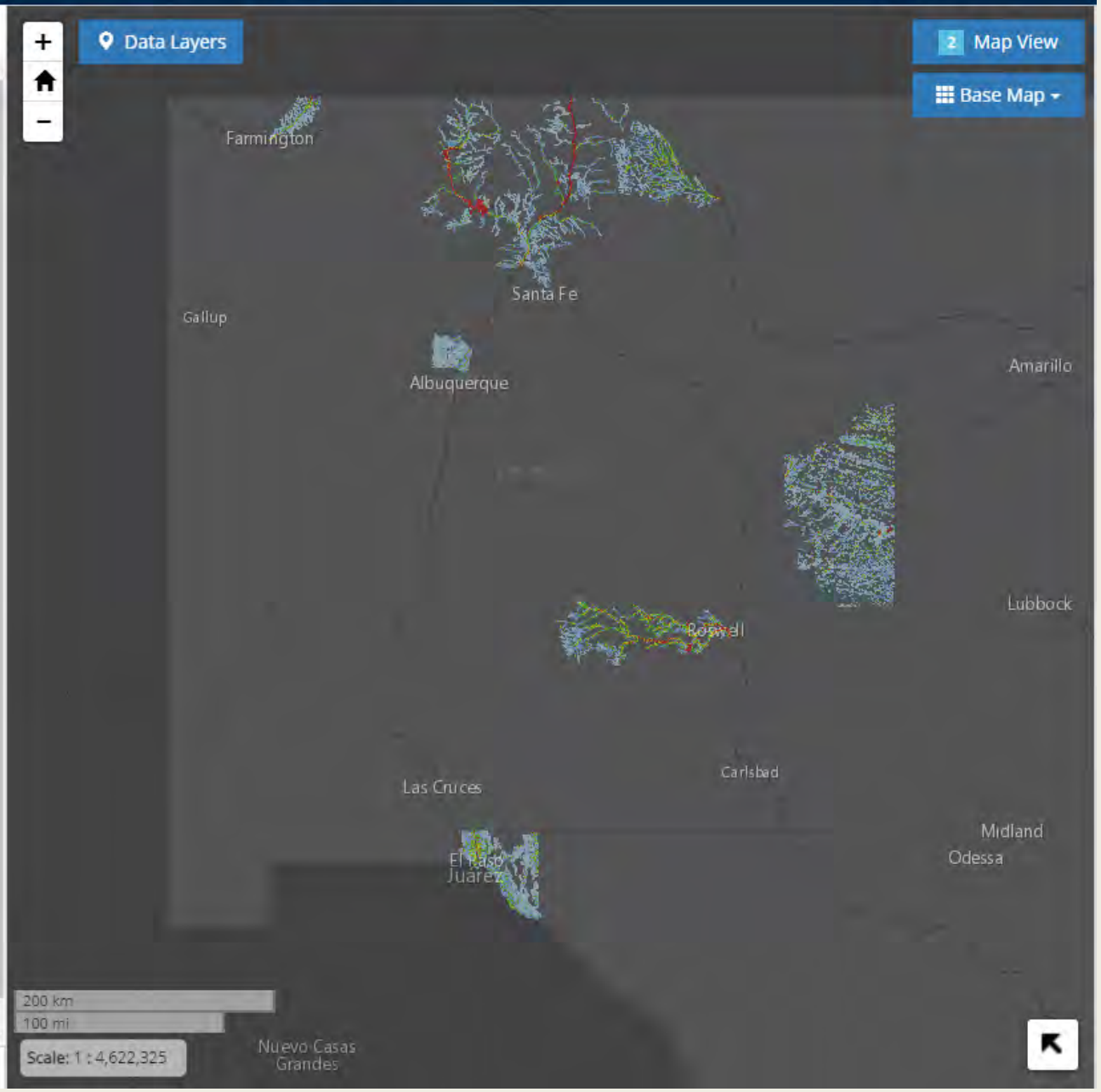
Base Map: Dark



Comments: This base map provides a dark, neutral background with minimal colors, labels, and features to give primary focus to the data layer content.

Data Source: ESRI ArcGIS Online

Quick Start | Glossary | About



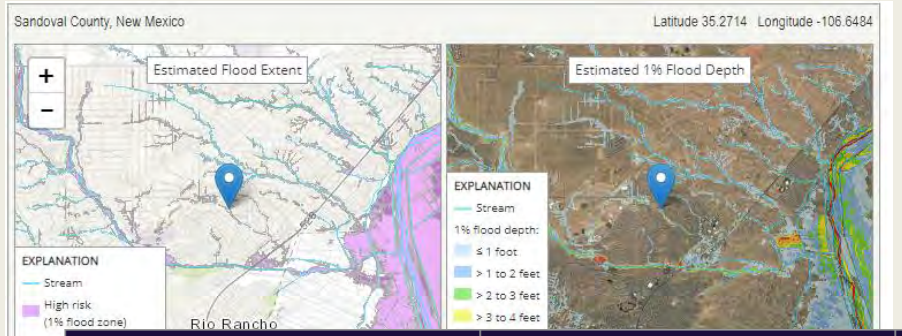
Estimated Base Flood Elevation Viewer

1% and 0.2%
Estimated Flood Extent

1%
Estimated Flood Depth

Estimated Base Flood Elevation Viewer

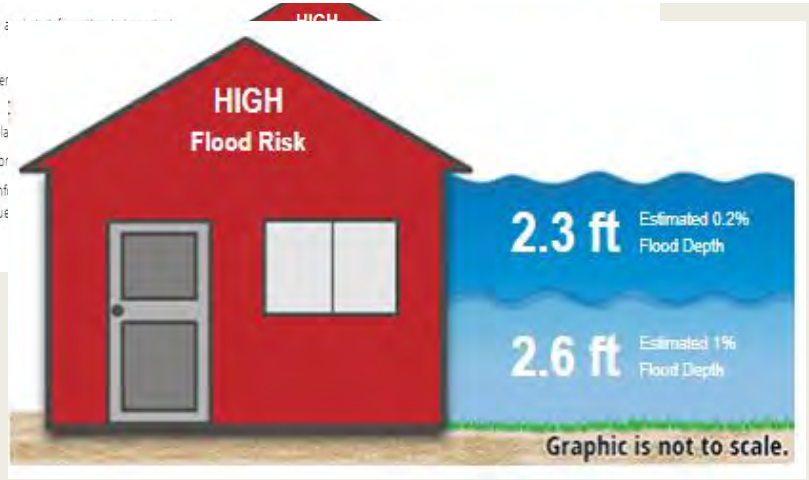
- Floodplains on the Left
- Depth Grid on the Right



Flood Event	Estimated Flood Depth*	Estimated Base Flood Elevation*
1 Percent (100 Year)	2.6 feet above land surface	5320.8 feet NAVD 1988
0.2 Percent (500 Year)	2.3 feet above land surface	5320.8 feet NAVD 1988

* The information included in this report is based on the location marker shown in the map. Results are not considered an official determination.

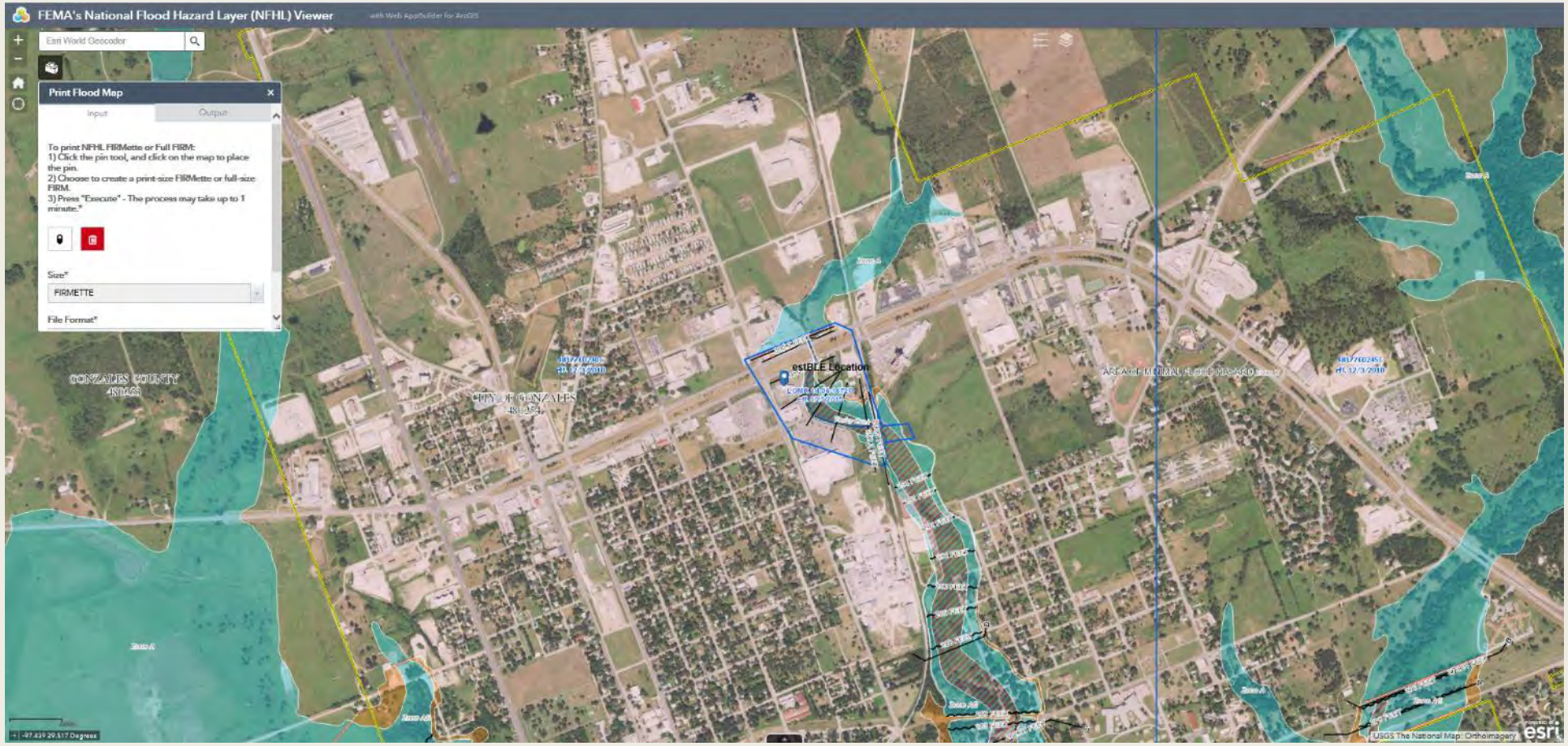
Information made available from the Estimated BFE Viewer needs to be accepted by local community officials to be used for insurance rating purposes.



The web address of the report can be used to share or bookmark a specific location.

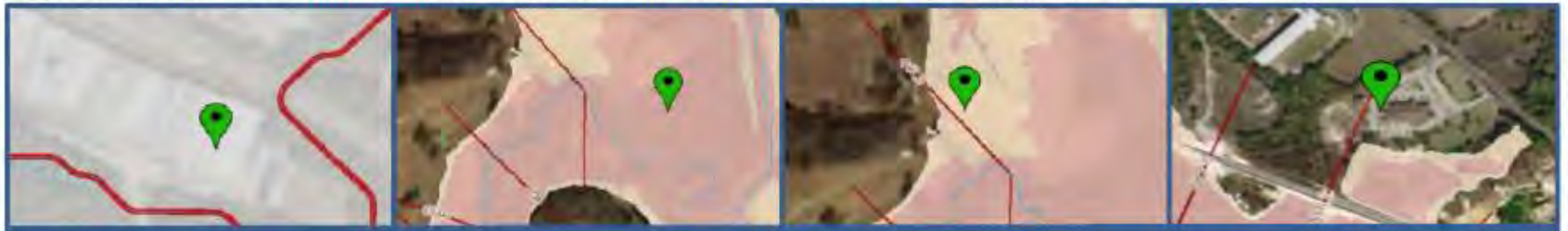
Estimated Base Flood Elevation Viewer

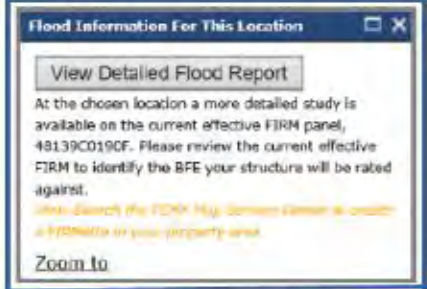
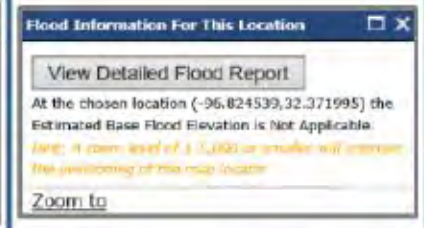
If detailed information is available on the current effective FIRM,
The viewer will alert you and offer you the option to open the National Flood Hazard Layer (NFHL)



Region 6 eBFE Viewer

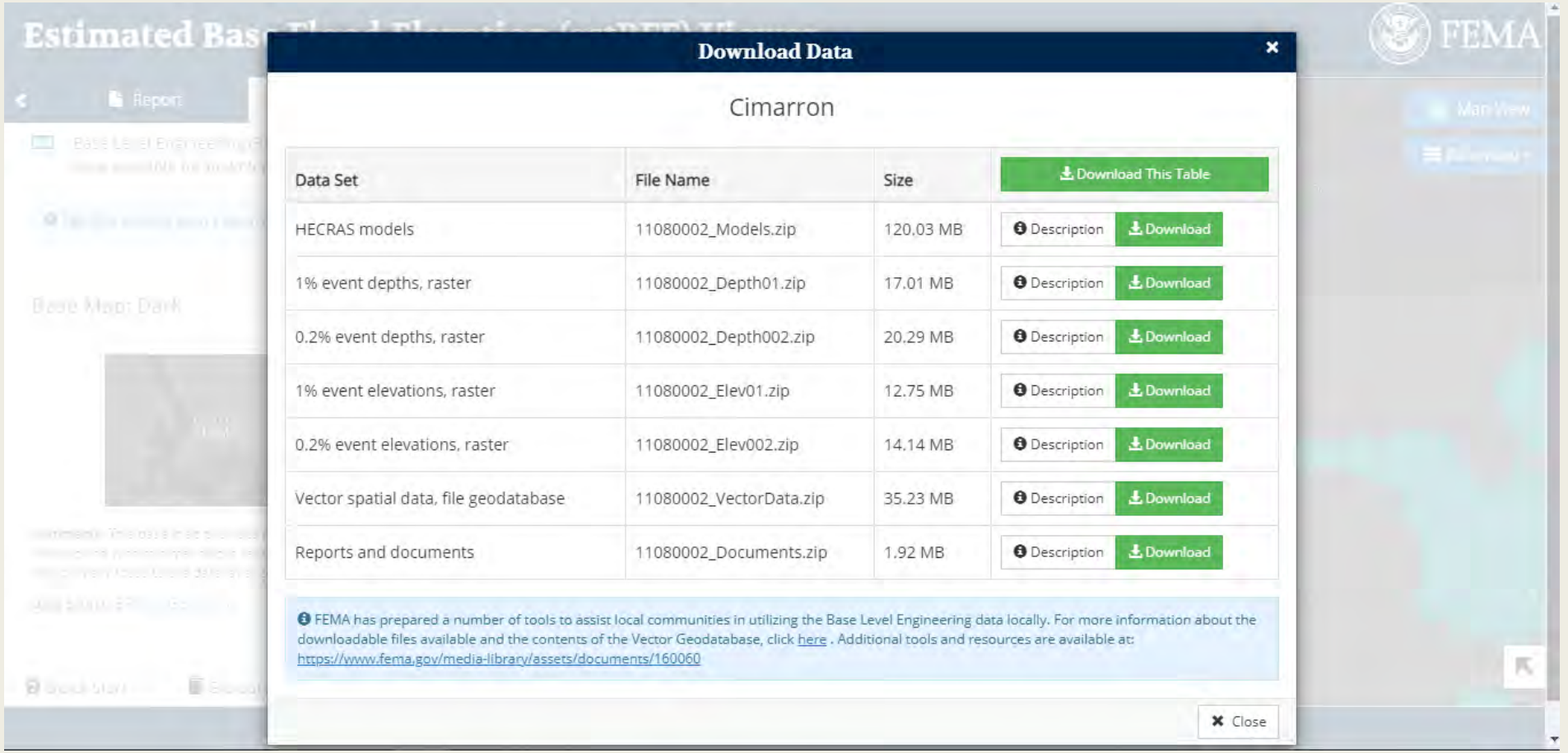
There are four possible outcomes dependent upon where the **Drop Pin** is placed: Detailed Study Available, High Risk, Low to Moderate Risk and Low Risk. More information is available in Table below.



Detailed Study	High Flood Risk	Moderate Flood Risk	Low Flood Risk
			
Flood Risk Report Details: - Effective FIRM panel that should be reviewed to determine current Base Flood Elevation - Longitude/Latitude - Model Location	**Flood Risk Report Details:** - Estimated Flood Elevation - Estimated Flood Depth - Longitude/Latitude - Model Location	**Flood Risk Report Details:** (**does not include info for 1%**): -Estimated Flood Elevation -Estimated Flood Depth -Longitude/Latitude -Model Location	**Flood Risk Report does not include Flood Elevations at this time.** Land and structures outside of any indicated flood extent may experience flooding during an event that exceeds the 0.2% annual chance.

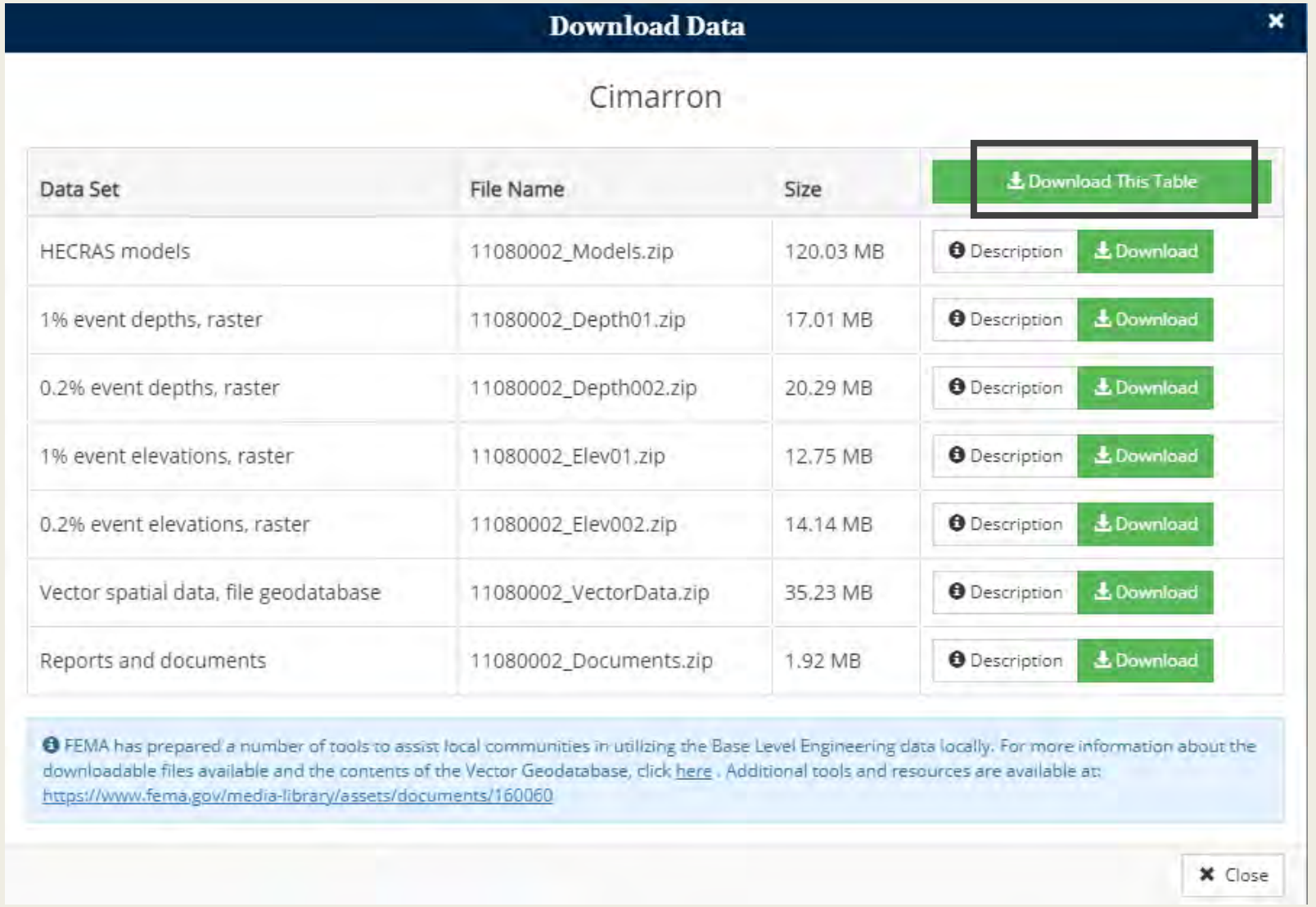
Note: At this time, flood elevations are only available in the High Flood Risk flood extent area.

Download the Data

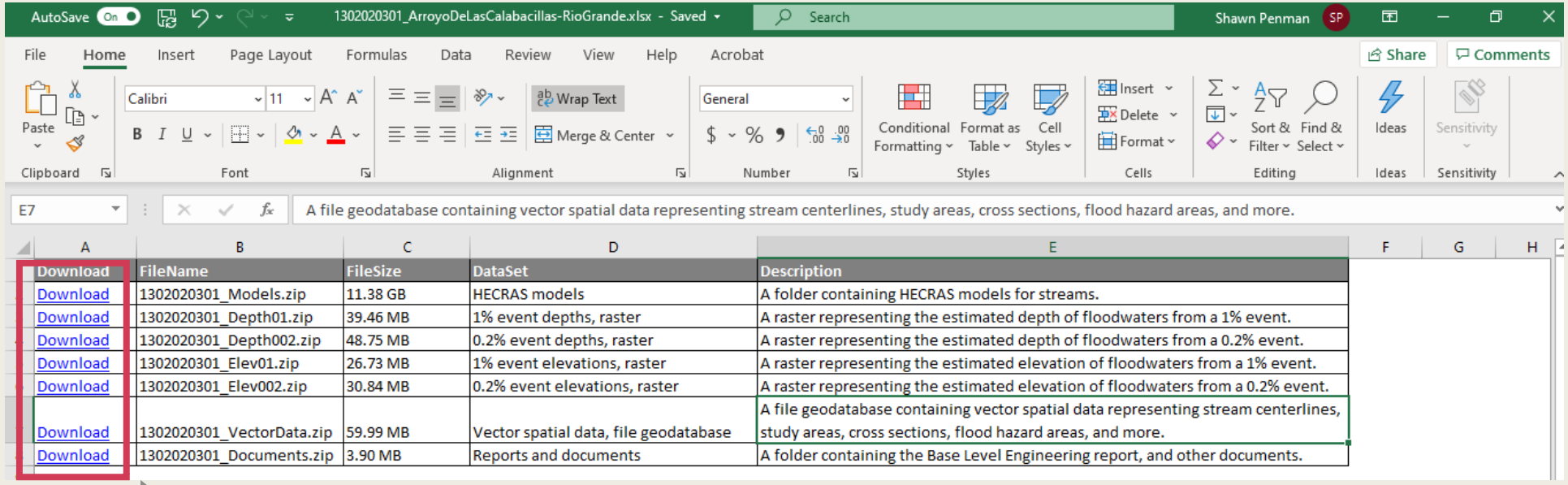


www.InFRM.us/estBFE

Download the Data



Download the Data



Download	FileName	FileSize	DataSet	Description
Download	1302020301_Models.zip	11.38 GB	HECRAS models	A folder containing HECRAS models for streams.
Download	1302020301_Depth01.zip	39.46 MB	1% event depths, raster	A raster representing the estimated depth of floodwaters from a 1% event.
Download	1302020301_Depth002.zip	48.75 MB	0.2% event depths, raster	A raster representing the estimated depth of floodwaters from a 0.2% event.
Download	1302020301_Elev01.zip	26.73 MB	1% event elevations, raster	A raster representing the estimated elevation of floodwaters from a 1% event.
Download	1302020301_Elev002.zip	30.84 MB	0.2% event elevations, raster	A raster representing the estimated elevation of floodwaters from a 0.2% event.
Download	1302020301_VectorData.zip	59.99 MB	Vector spatial data, file geodatabase	A file geodatabase containing vector spatial data representing stream centerlines, study areas, cross sections, flood hazard areas, and more.
Download	1302020301_Documents.zip	3.90 MB	Reports and documents	A folder containing the Base Level Engineering report, and other documents.

Hyperlinks for each of the dataset available are included in the excel file. Excel file can be sent ahead of any meeting you are going to have in the watershed areas.

TSDN Report

Base Level Engineering Report

Cimarron Watershed (HUC8 11080002)

FEMA

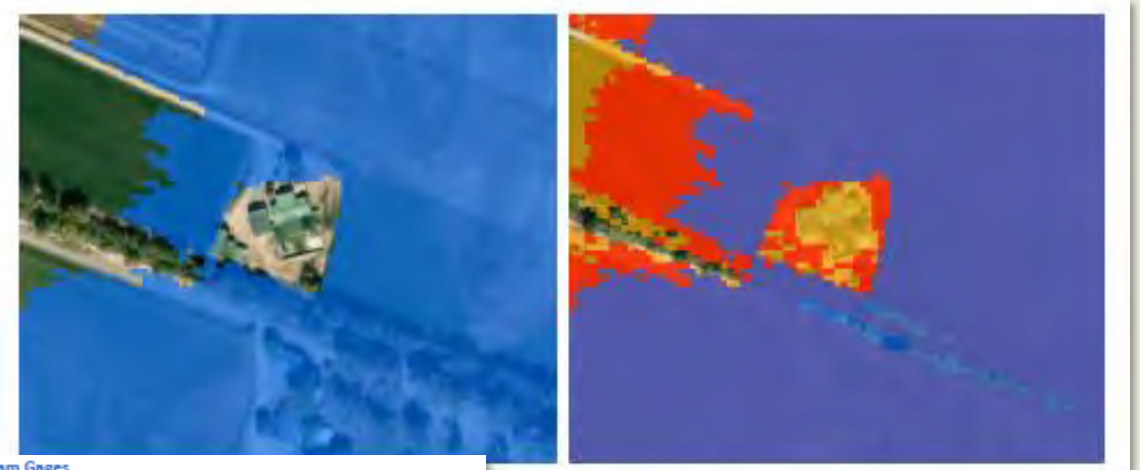
November 2, 2

Version 1.0

Table 5: Delineation Drainage Area Comparison with USGS Stream Gages

Gage No.	Station Name	Published USGS DA (sq. miles)	BLE DA (sq. miles)
07204000	MORENO CREEK AT EAGLE NEST, N. MEX.	73.8	79.3
07204500 (i)	CIENEGUILLA CR NR EAGLE NEST, NM	74.9	73.1
07205000	SIXMILE CREEK NEAR EAGLE NEST, NM	10.5	10.9
07206000	CIMARRON RIVER BELOW EAGLE NEST DAM, NM	167	184
07206300 (i)	TOLBY C NR EAGLE NEST, NM	8.50	8.62
07206400 (i)	CLEAR C NR UTE PARK, NM	7.44	210
07206500 (i)	CIMARRON RIVER AT UTE PARK, NM	260	246
07207000	CIMARRON RIVER NEAR CIMARRON, NM	294	273
07207500	PONIL CREEK NEAR CIMARRON, NM	171	186
07208500	RAYADO CREEK NEAR CIMARRON, NM	65	58.6
07211000 (i)	CIMARRON RIVER AT SPRINGER, NM	1030	950

(i) inactive gage



Freeboard Raster Example

HAZUS ANALYSIS

Hazus

A Hazus analysis was prepared using the 1- and 0.2-percent-annual-chance depth grids. Hazus version 4.0 was used to run the analysis. The Hazus output file (.hpr) has been exported and provided as part of this deliverable along with the census blocks used in the analysis. The loss analysis results are summarized in Table 11. Values under $100,000 have been rounded to $10,000, and all other values are rounded to $100,000.

Table 11: Hazus Results Summary

Community	Total Inventory ($)	1% Total Losses ($)	0.2% Total Losses ($)
Unincorporated Areas of Colfax County	$312,200,000	$1,400,000	$3,500,000
Cimarron, Village of	$165,100,000	$40,000	$100,000
Springer, Town of	$199,700,000	$1,300,000	$2,000,000
Angel Fire, Village of	$790,500,000	$600,000	$800,000
Eagle Nest, Village of	$82,800,000	$60,000	$90,000

Products Support Local Decision Making

Educate your Community and Make a Plan

- Public awareness campaigns
- Map and publicize potential inundation areas
- Training for local staff
- Community Emergency Response Teams
- Community preparedness exercises
- Evacuation signage

Encourage Smart Land Use and Development Decisions

- Determine and enforce acceptable land uses in downstream areas
- Increase permeability and infiltration
- Maintain open space downstream
- Encourage stream and wetland restoration

Enact Management Best Practices

- Develop a dam failure study and emergency action plan
- Manage stormwater regionally
- Implement an inspection, maintenance, and enforcement program to ensure structural integrity

Conduct Mitigation Projects Downstream

- Acquisition
- Elevation
- Detention and/or drainage projects

Strengthen Local Codes

- Local inspection and enforcement
- Enact higher floodplain management standards
- Require green infrastructure

What can I do with BLE?

BLE and Your Community Resolution Structure

Your community is structured in a way that dictates HOW and WHEN you can use Base Level Engineering information

- For Example:
  - *Storm County bylaws dictate that new flood hazard information can only be adopted when FEMA publishes it on a new FIRM.*
  - *The Town of Seiche has an ordinance that requires public presentation of new data at a Town Council meeting and a vote on it's official usage.*
  - *Hazard County requires an update to it's zoning overlay districts (which comes with it's own public review and community approval process) before any new flood hazard information can be used.*

Base Level Engineering as Best Available Information

- Communities are required to reasonably utilize BFE information when available
  - *60.3(b)*
- FEMA's Best Available Information Policy:
  - *FEMA Policy #104-008-02*
- BLE MAY be considered Best Available Information (BAI) and adopted by communities

44 CFR 60.3(b) *When the Administrator has designated areas of special flood hazards (A zones) by the publication of a community's FHBM or FIRM, but has neither produced water surface elevation data nor identified a floodway or coastal high hazard area, the community shall:…*

(3) *Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;*

(4) *Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBM or FIRM meet the standards …*

CIMARRON

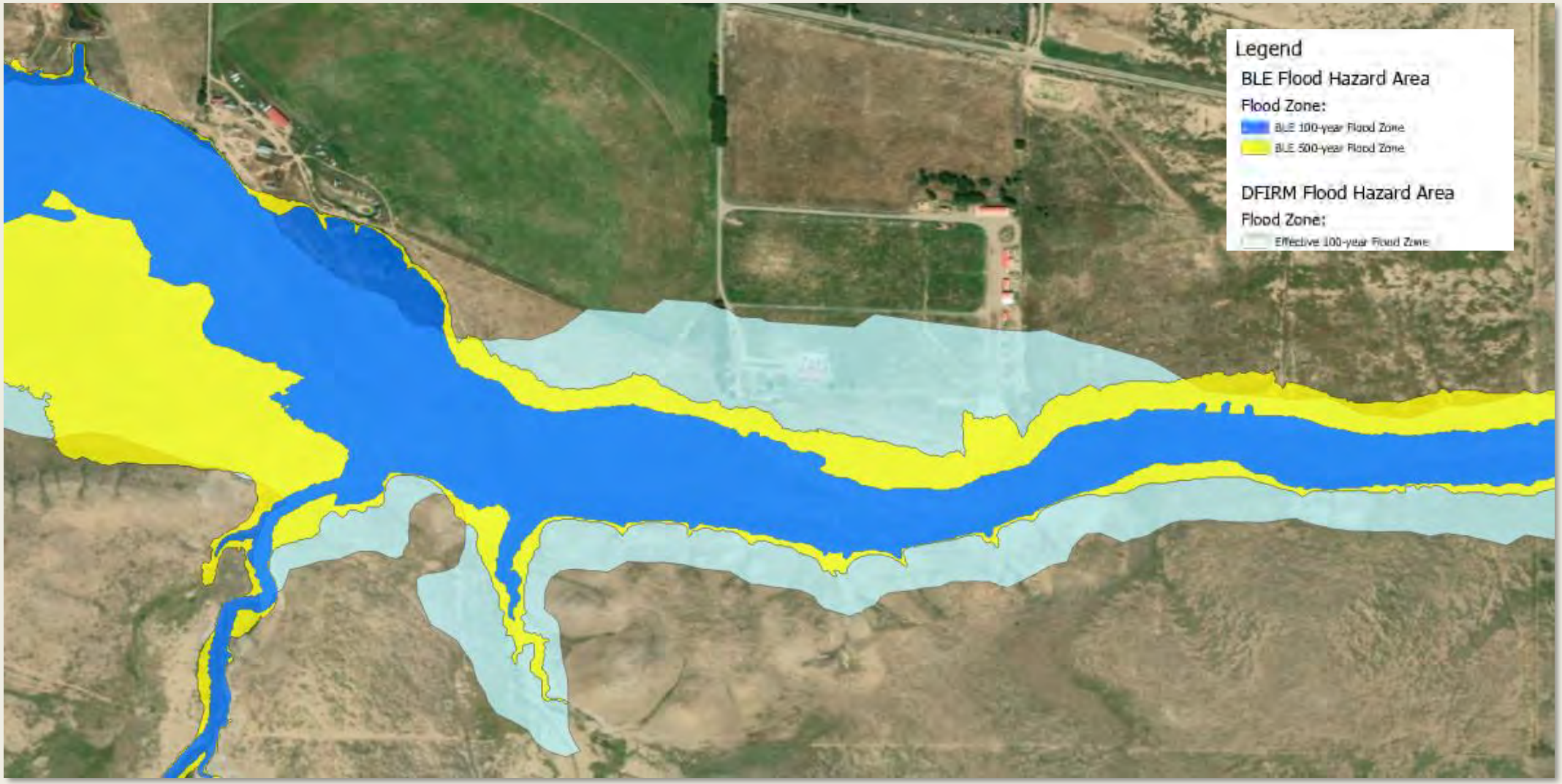
BLE Areas of Interest

Shelby de Jongh, ESP & Associates

Cimarron Areas of Interest –BLE vs Effective Example

- Area southeast of Springer, just south of US 412
- Some areas of BLE Floodplains will have significant differences to effective Zone A. These discrepancies can be due to updated terrain, modeling methods, etc.

Cimarron Areas of Interest –BLE vs Effective Example



Cimarron Areas of Interest –Updated Terrain Example

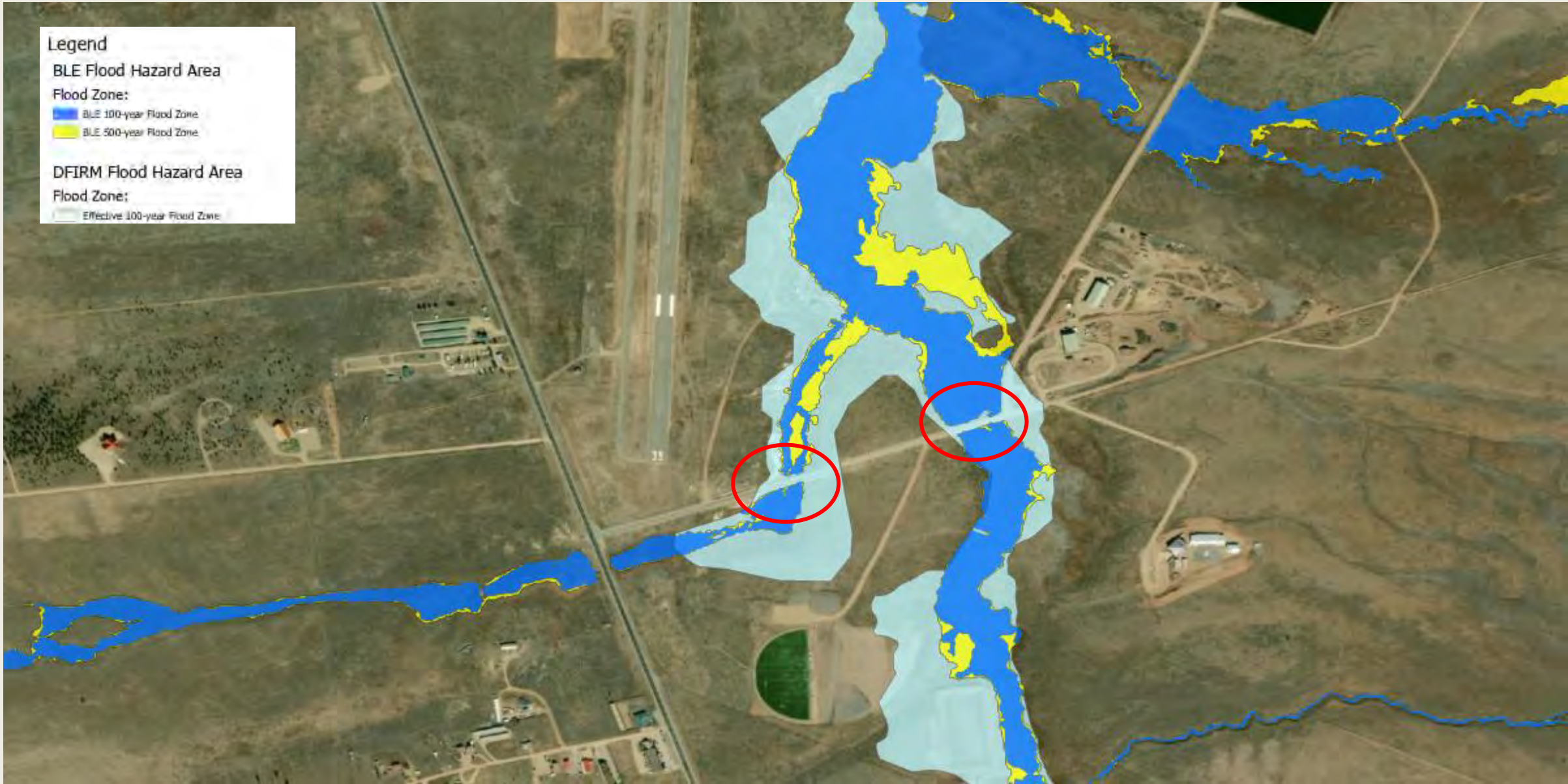
- Cieneguilla Creek: Area in southeast Angel Fire, NM
- Shows where effective Zone A mapping does not reflect current terrain. This area has been updated by this BLE with new lidar data and better reflects the extent of the channel and potential flooding.

Cimarron Areas of Interest –Updated Terrain Example

Cimarron Areas of Interest –Structures Example

- Angel Fire Airport area at the intersection of Mountain View Blvd and Camino Grande
- Several structures not included… good reminder that structures are not modeled in BLE. Models are set up in such a way that adding a structure should be a simple process for any future user.

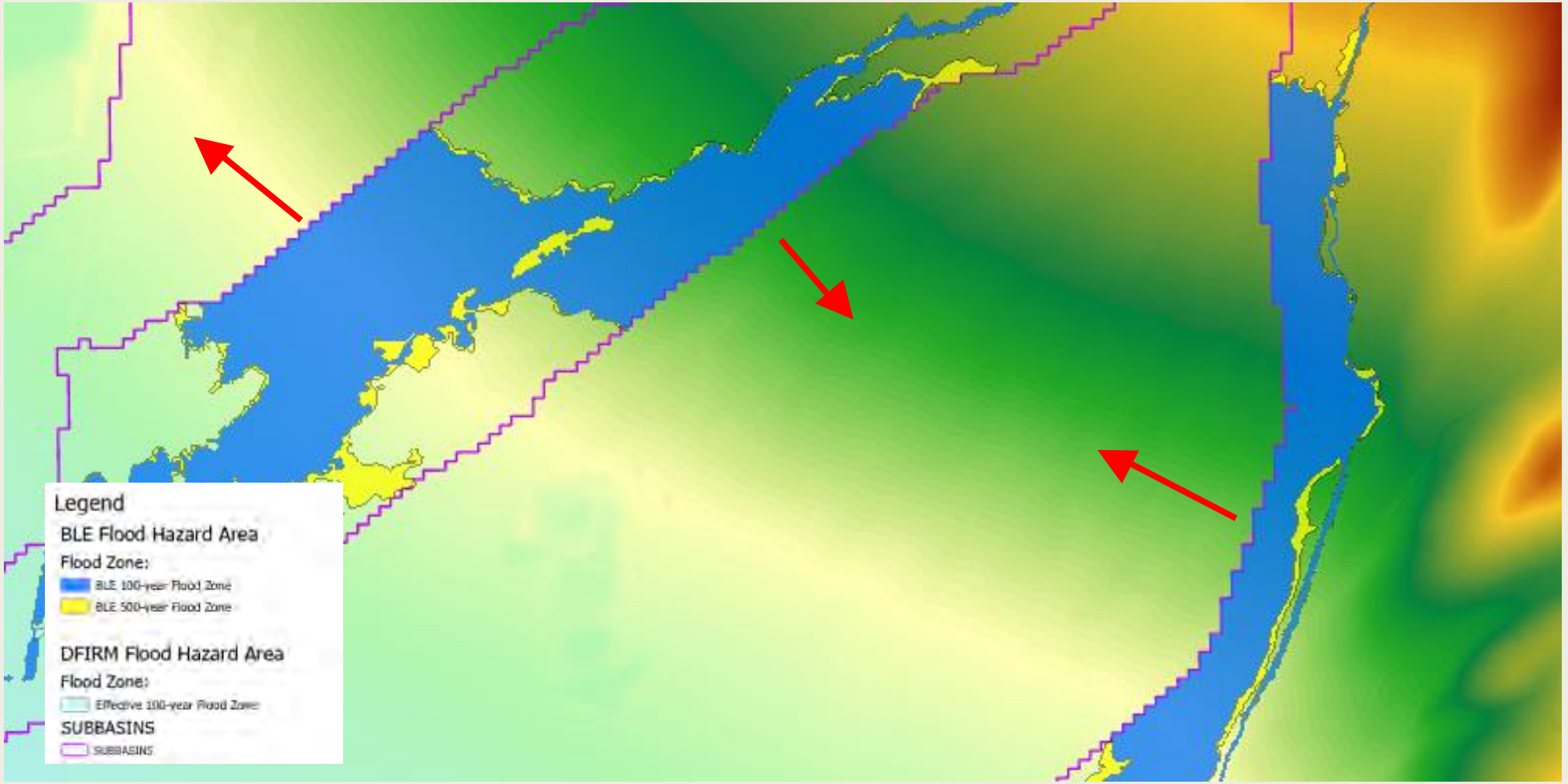
Cimarron Areas of Interest –Structures Example



Cimarron Areas of Interest –Unconfined Flow Example

- Eagle Nest, just north of Eagle Nest Lake.
- An area where mapping was truncated at watershed boundaries. This typically occurs in valleys where water may flow in multiple directions.

Cimarron Areas of Interest –Unconfined Flow Example



Cimarron Areas of Interest –Dam Example

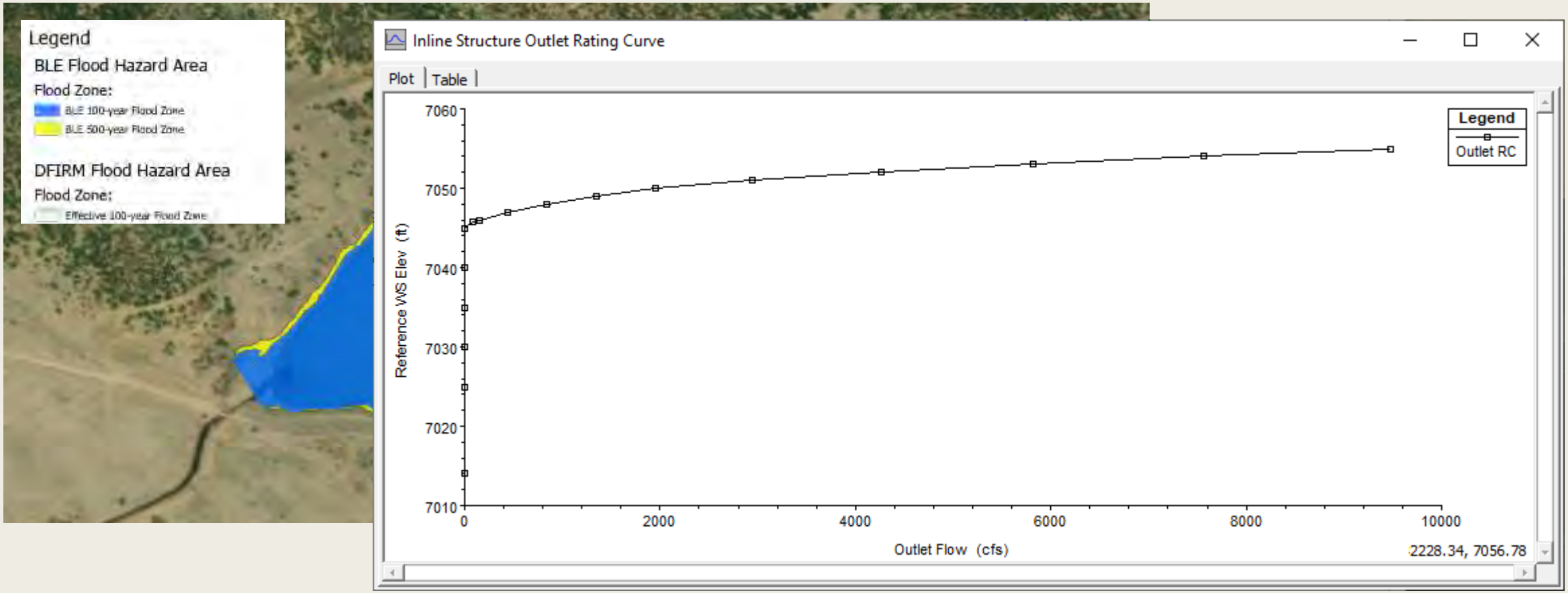
- Larger BLE floodplains at dams, these are represented in BLE models as just a weir with no other outlet. Can be modified for future studies, but important to note that if any of these have additional discharge outlets, then this would overestimate flooding impacts. Similarly, no flood detention is represented downstream.
- Springer Lake, northwest of I-25.

Cimarron Areas of Interest – Dam Example

Cimarron Areas of Interest –Rating Curve Dam Example

- One dam on Cimarron Tributary 8 was modeled with an outlet rating curve obtained from USACE's study of the Ute Park fire.
- Just northeast of the intersection of Cito Rd and Harlan Rd.

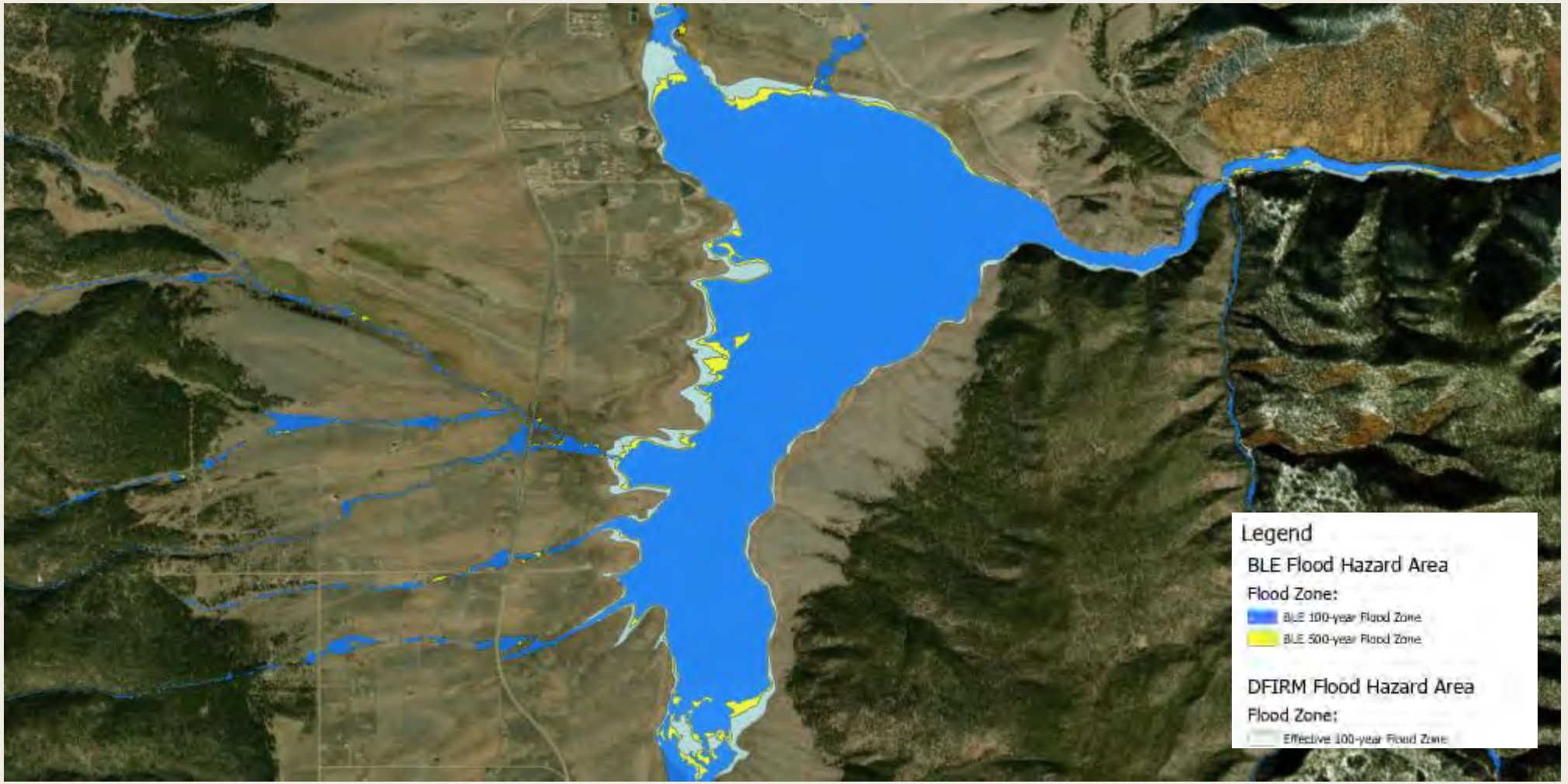
Cimarron Areas of Interest –Rating Curve Dam Example



Cimarron Areas of Interest –Lake Example

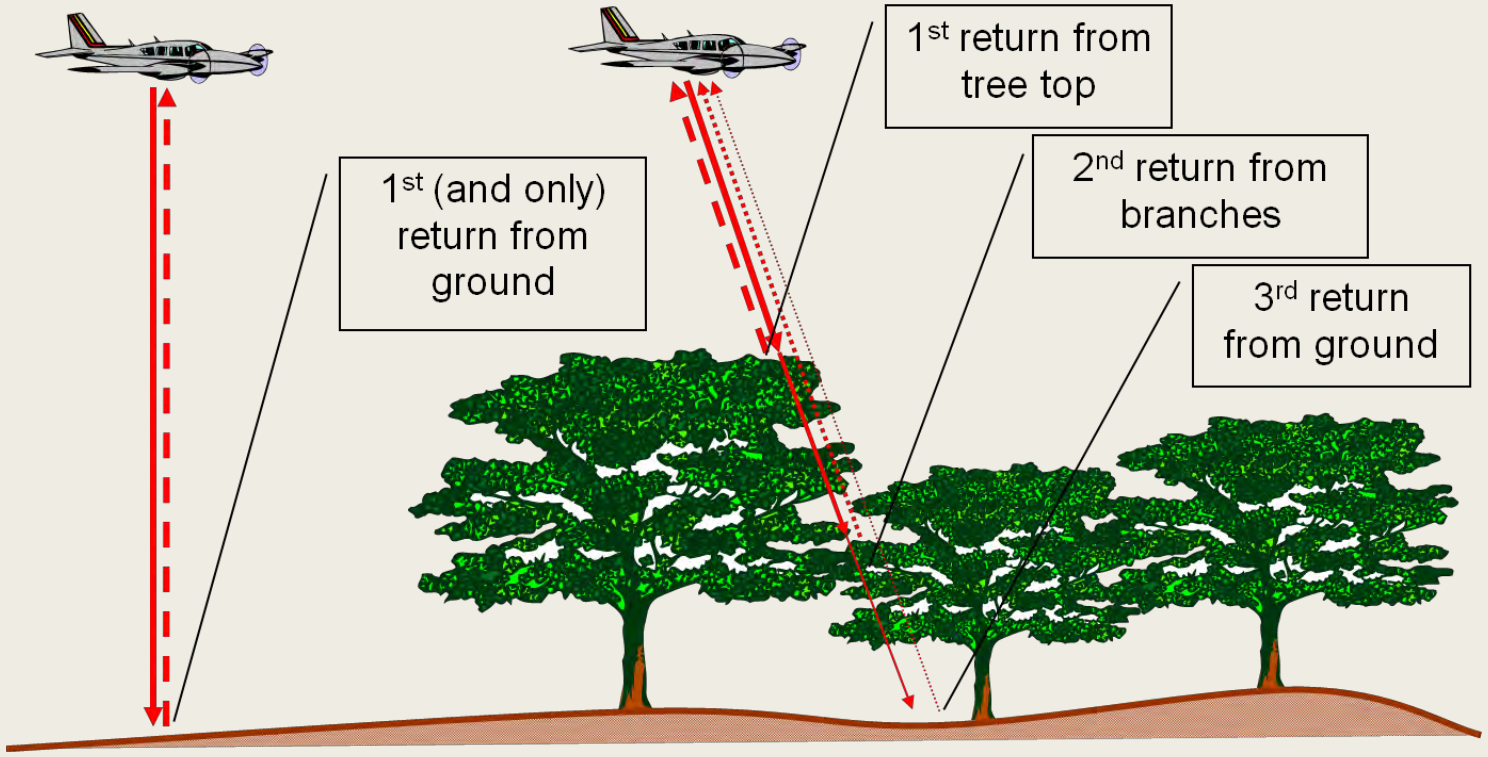
- Eagle Nest Lake: Any regulatory study update should include a detailed analysis of the flooding in the lake as well as all outlet structures to potentially improve the analysis. Obtaining a rating curve should be helpful for future studies.
- Need to be aware of impacts to anyone near this lake before advancing towards a regulatory study

Cimarron Areas of Interest –Lake Example



LIDAR

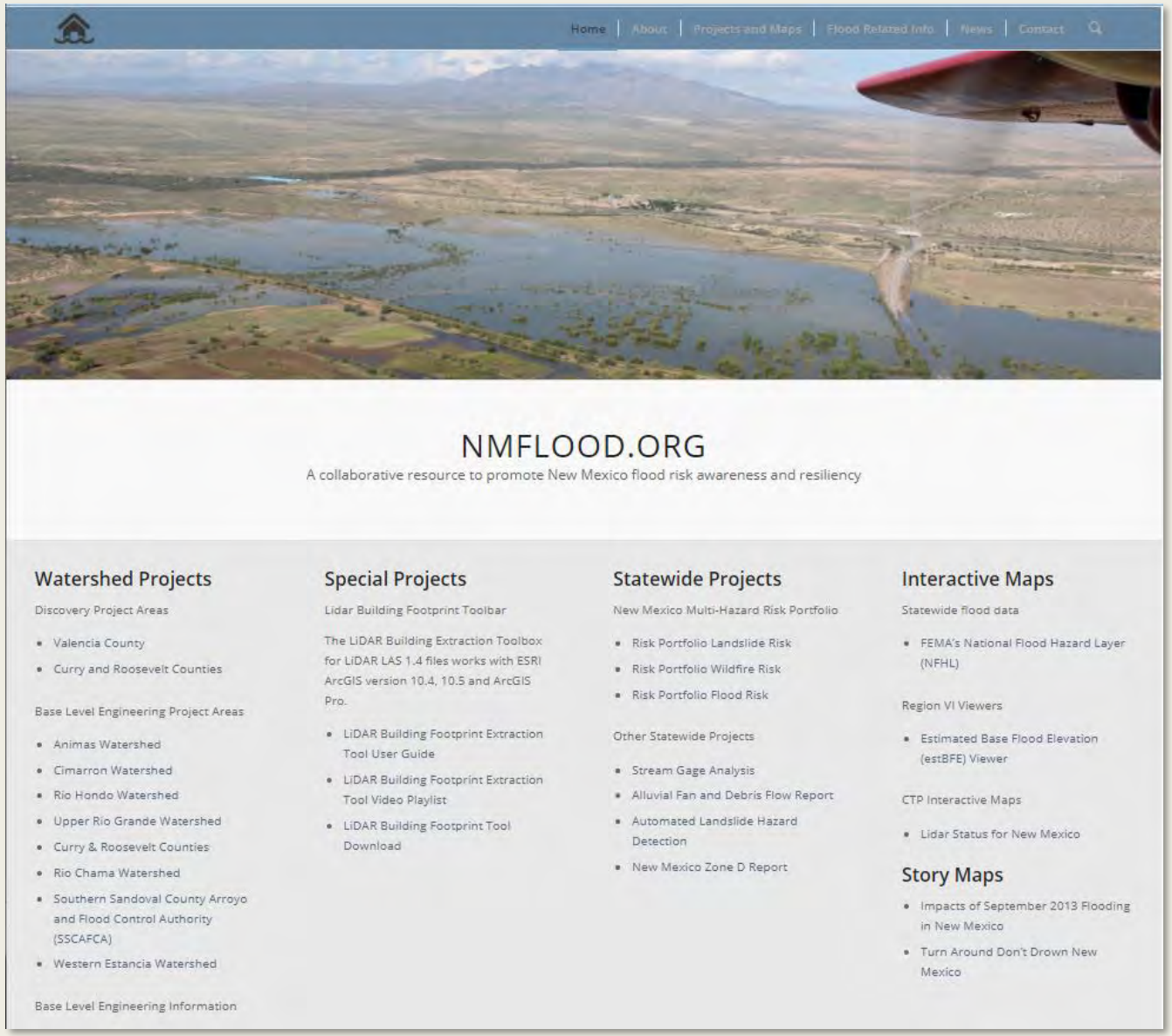
Lidar Returns



Forest Resource Assessment Nepal

Current 10 Meter DEM vs USGS QL2 Lidar

NMFLOOD.org


Home
About
Projects and Maps
Flood Related Info
News
Contact
NMFLOOD.ORG
A collaborative resource to promote New Mexico flood risk awareness and resiliency
Watershed Projects
Discovery Project Areas
Valencia County
Curry and Roosevelt Counties
Base Level Engineering Project Areas
Animas Watershed
Cimarron Watershed
Rio Hondo Watershed
Upper Rio Grande Watershed
Curry & Roosevelt Counties
Rio Chama Watershed
Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)
Western Estancia Watershed
Base Level Engineering Information
Special Projects
Lidar Building Footprint Toolbar
The LiDAR Building Extraction Toolbox for LiDAR LAS 1.4 files works with ESRI ArcGIS version 10.4, 10.5 and ArcGIS Pro.
LiDAR Building Footprint Extraction Tool User Guide
LiDAR Building Footprint Extraction Tool Video Playlist
LiDAR Building Footprint Tool Download
Statewide Projects
New Mexico Multi-Hazard Risk Portfolio
Risk Portfolio Landslide Risk
Risk Portfolio Wildfire Risk
Risk Portfolio Flood Risk
Other Statewide Projects
Stream Gage Analysis
Alluvial Fan and Debris Flow Report
Automated Landslide Hazard Detection
New Mexico Zone D Report
Interactive Maps
Statewide flood data
FEMA's National Flood Hazard Layer (NFHL)
Region VI Viewers
Estimated Base Flood Elevation (estBFE) Viewer
CTP Interactive Maps
Lidar Status for New Mexico
Story Maps
Impacts of September 2013 Flooding in New Mexico
Turn Around Don't Drown New Mexico

EBFE VIEWER DEMO

www.InFRM.us/estBFE

More BLE Information & Resources

FEMA BLE Resources

https://www.fema.gov/media-collection/base-level-engineering-ble-tools-and-resources

- Estimated BFE Viewer
- Overview – What is Base Level Engineering?
- Using the Estimated BFE Viewer
- BLE as Best Available Information
- HOW2 – Find the Right HEC-RAS Model
- Fact Sheet – Flood Depth Grids
- BLE and Letters of Map Revision

Plus many more

QUESTIONS

Shawn L. Penman, PhD, CFM, GISP
spenman@edac.unm.edu

EDAC | EARTH DATA ANALYSIS CENTER

FEMA

Gurnsey, B.H. Horse buggy in canyon near Cimarron, New Mexico, 1872-1880. Courtesy of the Palace of the Governors Photo Archives (NMHM/DCA, St. Augustine Historical Society, Negative No. 008958.