

# RIO CHAMABLE FINDINGS MEETING

Alcalde, New Mexico September 17, 2019



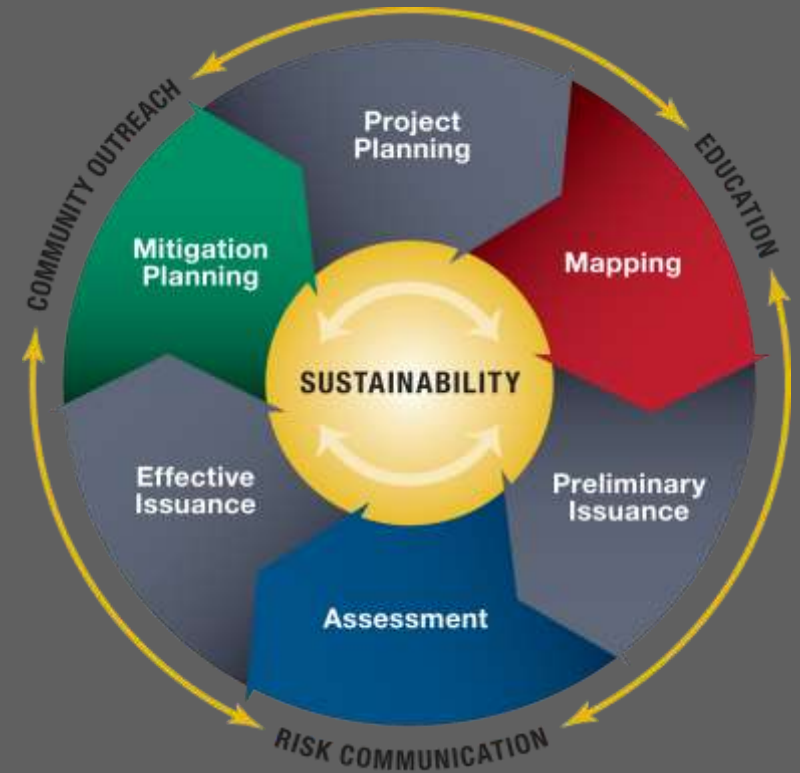
Shawn L. Penman, PhD, CFM

Matthew T. Lepinski, EI

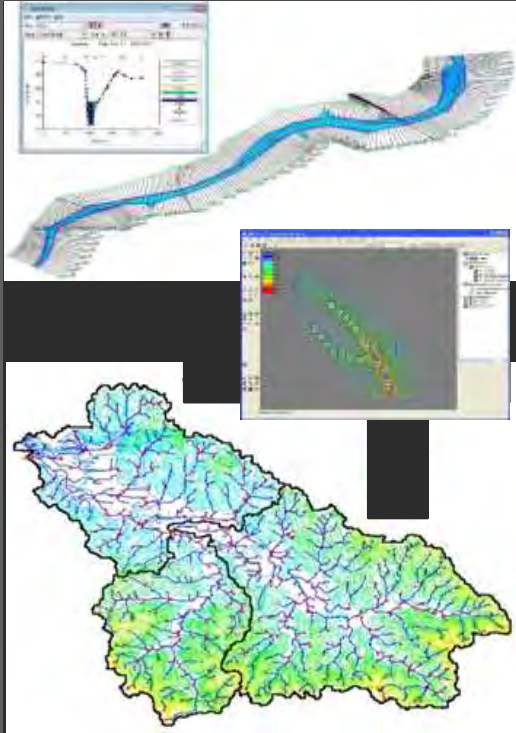
Mathew Hornack, PE

# WHAT IS RISK MAP?

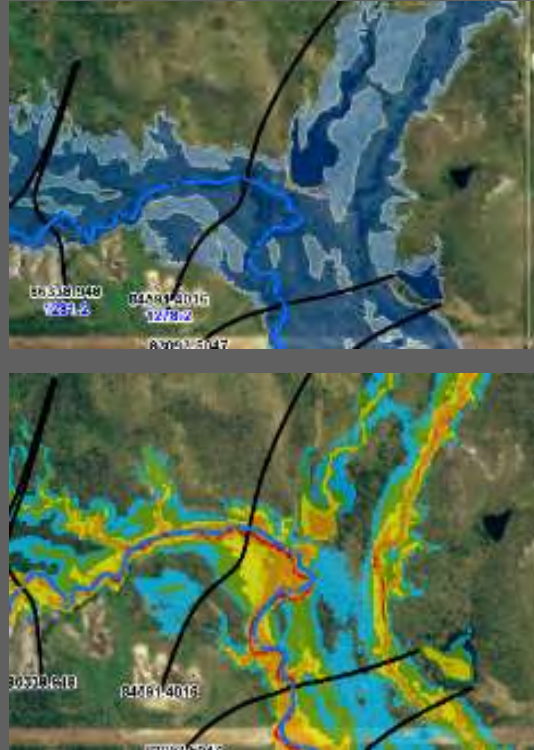
- Mapping – Identification of areas of natural hazard risk
- Assessment – Review and analysis of hazard areas
- Planning – Mitigation activities to reduce risk



# 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.

# RIO CHAMA WATERSHED - BLE ASSESSMENT





**Map Symbology**

- Communities
  - NFIP Community
  - Community
  - Native American Reservation

**Rio Chama & Upper Rio Grande BLE Projects**

0 5 10 Miles

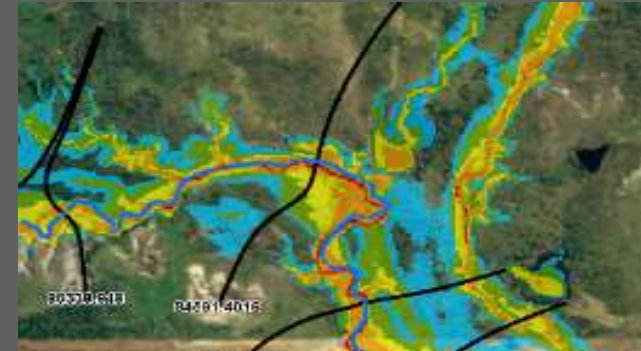
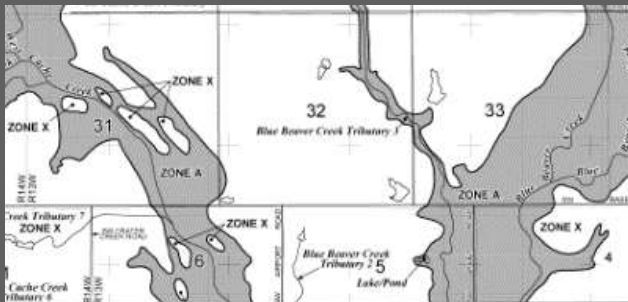
NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE LOCATION  
RIO CHAMA WATERSHED  
NEW MEXICO & COLORADO

EDAC FEMA

NOV 8 2009  
NOV 24 2009

# 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

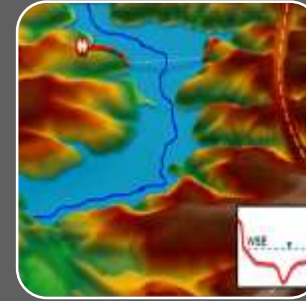
Is ground elevation  
Information readily-  
Available, or must it be  
Collected?



## 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



# MOVING BASE LEVEL ENGINEERING TO FIRMS

## Modernized FIRMs, Countywide Format

- County and all Cities/Towns are participating in the NFIP
- Animas Watershed, NM is modernized and can proceed forward to production of FIRM panels
- Zone Ds may be removed and replaced with BLE findings

## Unmodernized FIRMs, Incomplete Study Coverage

- X Counties have partial study coverage (BLE Assessment)
- X requires updated study for any detailed stream
- Additional study areas are necessary to modernize FIRMs

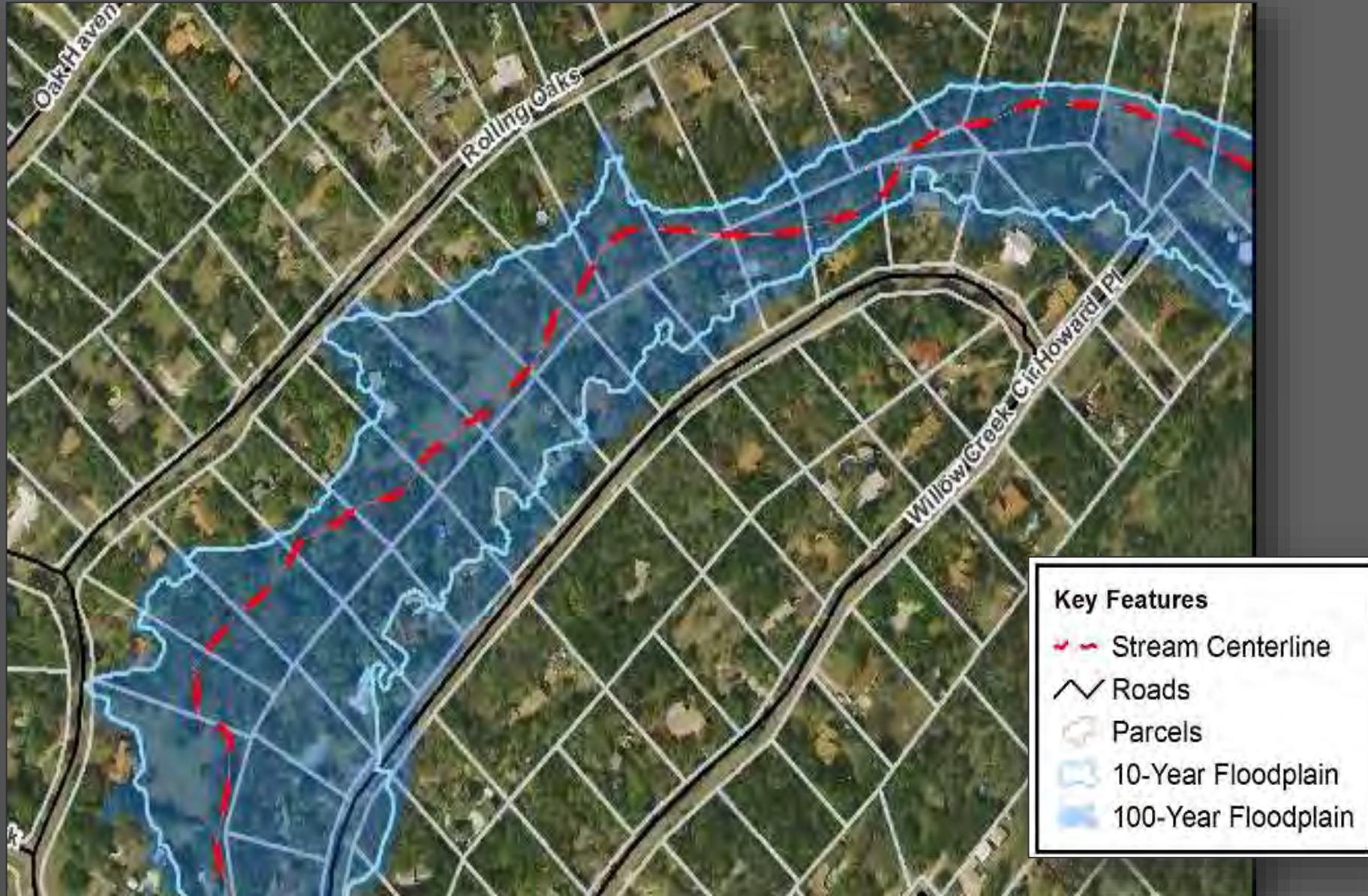
## Unstudied Communities, Incomplete Study Coverage

- Additional study is required to prepare analysis to update FIRMs in your vicinity

## Numerous Communities Not Participating in the NFIP

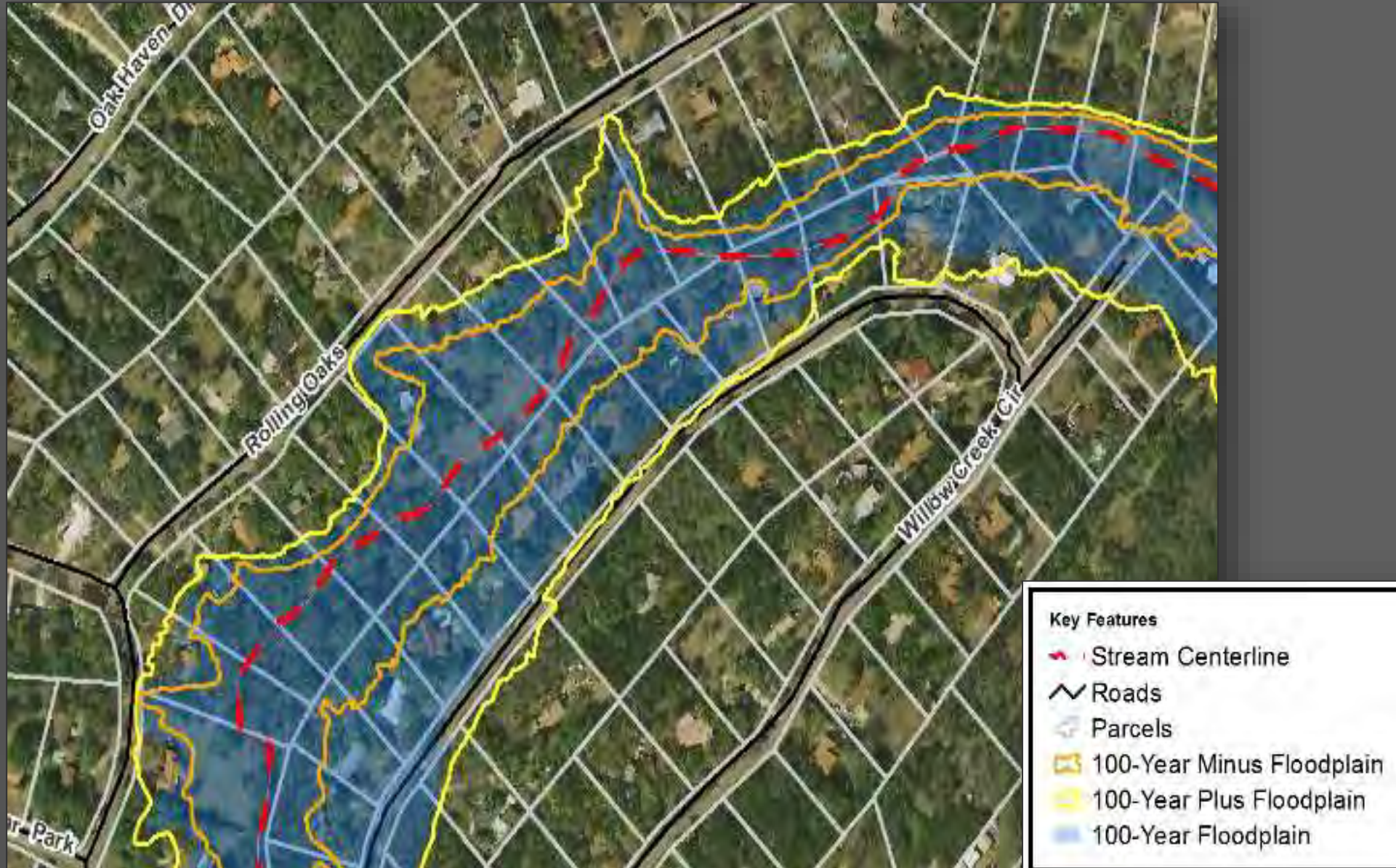
- FEMA will only expend additional funds to create FIRMs were communities are participating

# Practical Uses for BLE Data



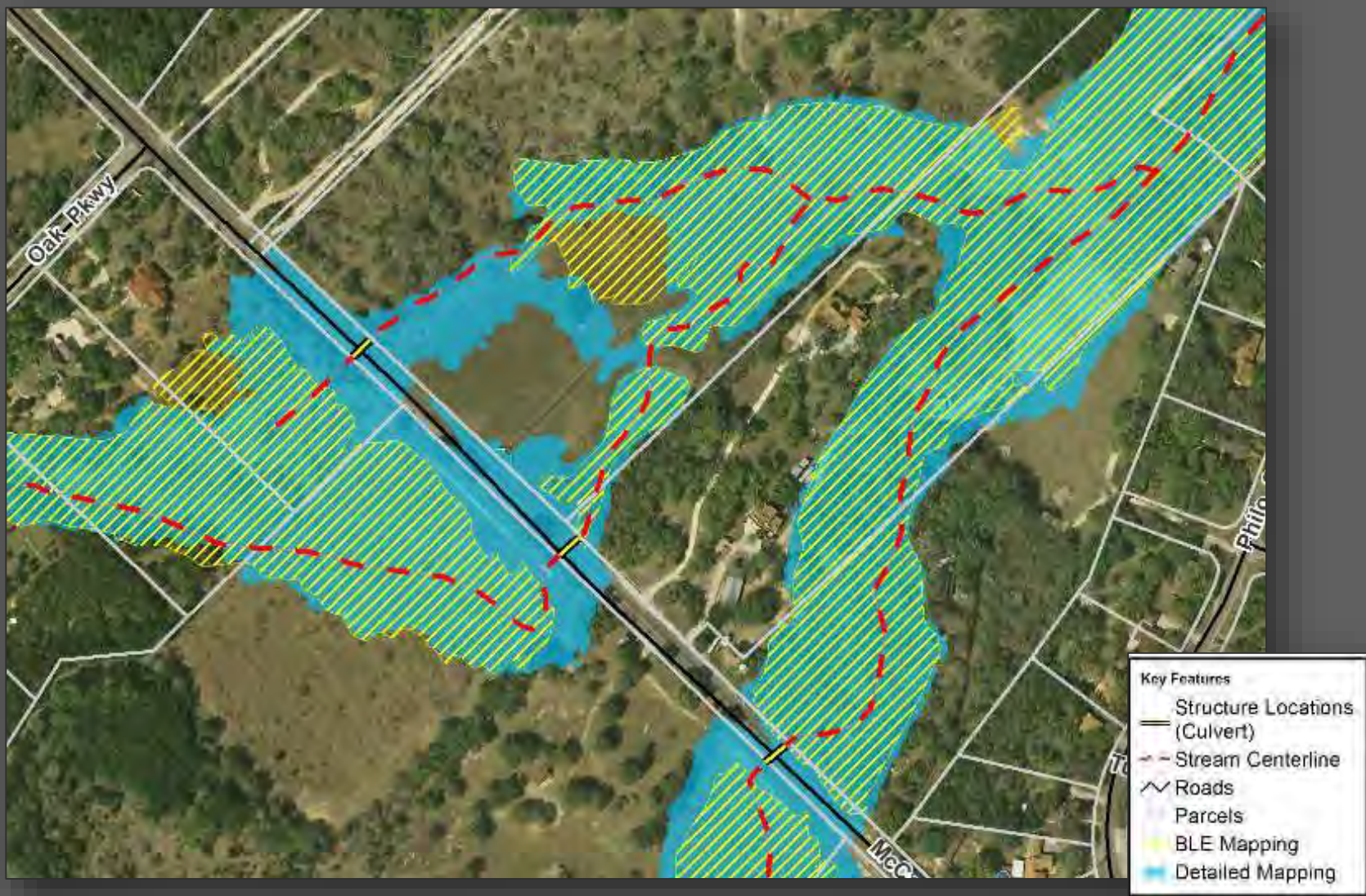


# Practical Uses for BLE Data





# Practical Uses for BLE Data





# HOW CAN I USE BASE LEVEL ENGINEERING DATA?



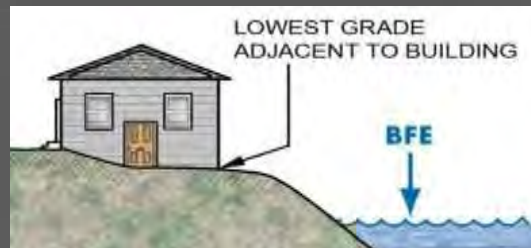
**PERMITTING**



**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](http://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*

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 data 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.



## Estimated Base Flood Elevation Viewer

### 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



Report

Legend

2



Data Layers

Colorado Springs

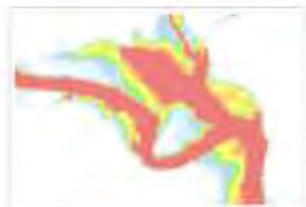
Pueblo

Map View

Base Map

Flood Depth (1%)

Remove



**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

Tucson

Las Cruces

El Paso

McGuire

Farmington

Santa Fe

Albuquerque

Amarillo

Lubbock

Carlsbad

Midland

Odessa

San Angelo



# Estimated Base Flood Elevation Viewer



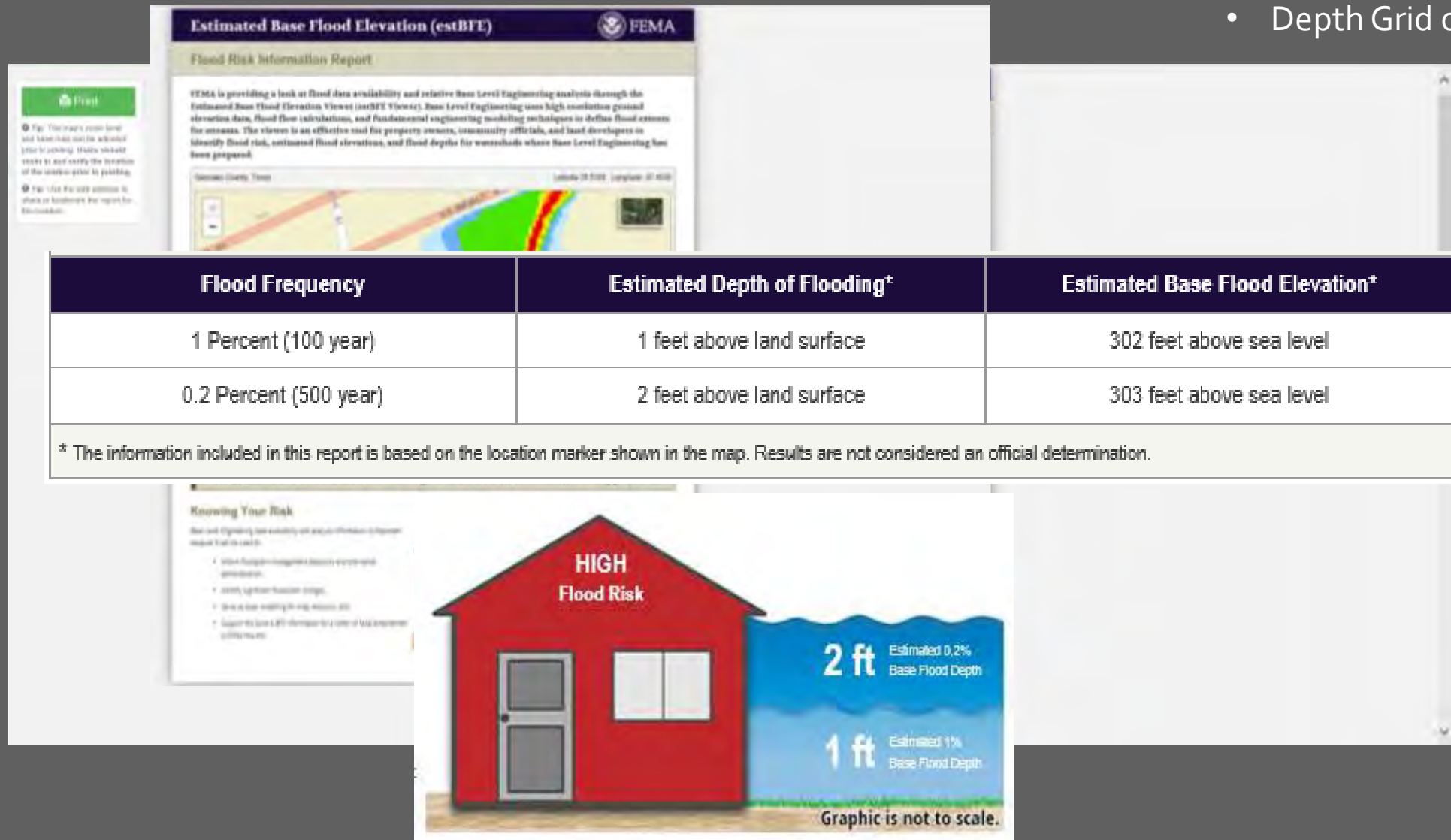
1% and 0.2%  
Estimated Flood Extent

1%  
Estimated Flood Depth

# Estimated Base Flood Elevation Viewer

Report is being updated to include a side by side map:

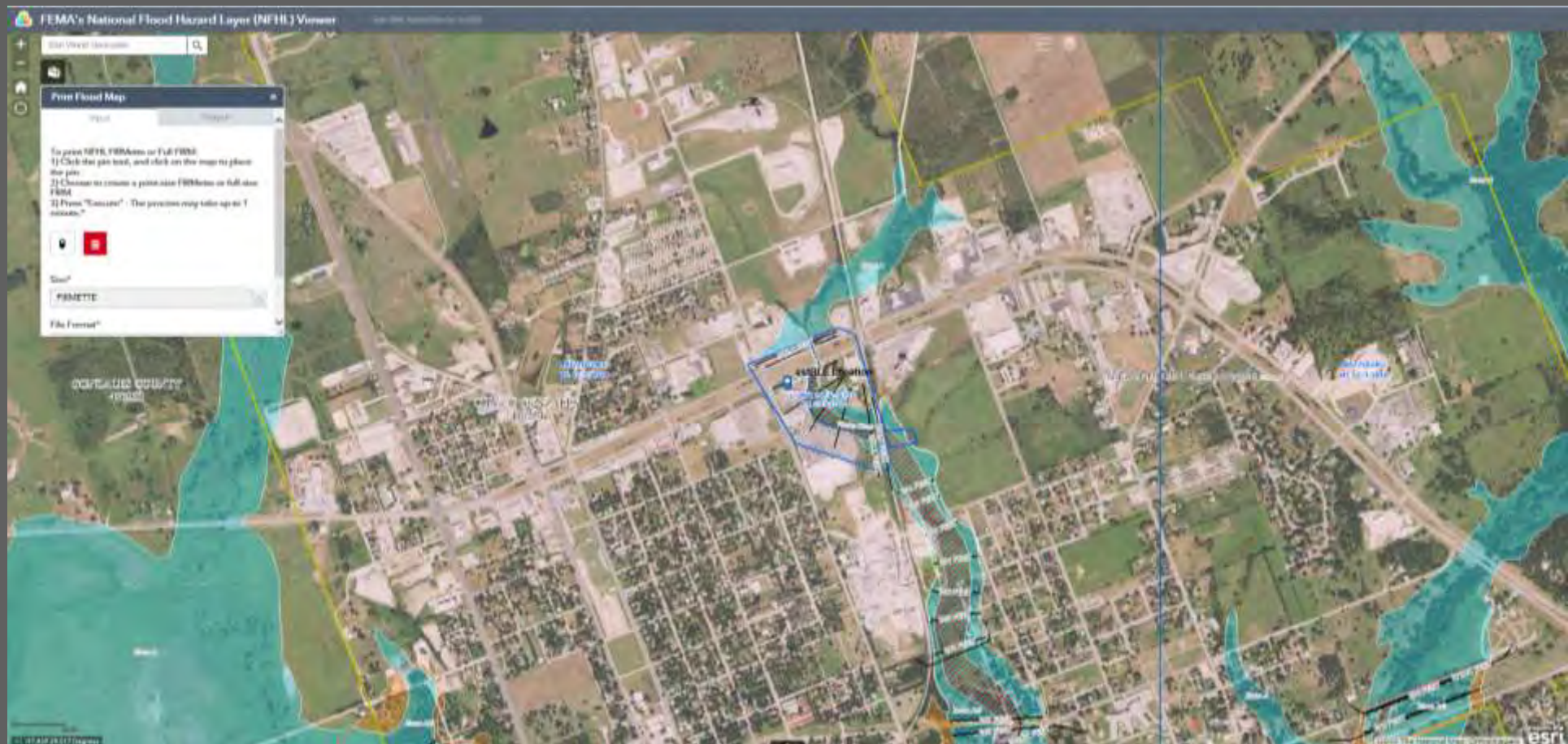
- Floodplains on the Left
- Depth Grid on the Right





# Estimated Base Flood Elevation Viewer

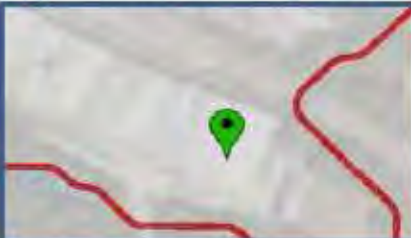

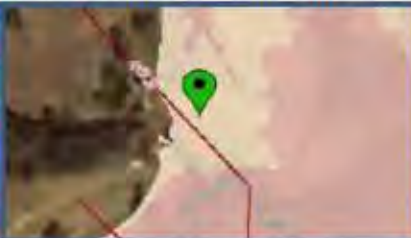
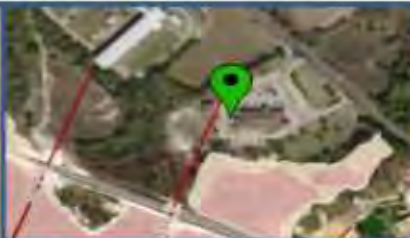
If detailed information is available on the current effective FIRM,  
The viewer will alert you and offer you the option to open the National Flood Hazard Layer (NFHL)





# 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
<div><div>Flood Information For This Location</div><div><a href="#">View Detailed Flood Report</a></div><p>At the chosen location a more detailed study is available on the current effective FIRM panel, 48139CD19CF. Please review the current effective FIRM to identify the BFE your structure will be rated against.</p><p><small>(Note: Currently the FEMA Map Service Center is unable to retrieve the current effective FIRM for this location.)</small></p><div>Zoom to</div></div>	<div><div>Flood Information For This Location</div><div><a href="#">View Detailed Flood Report</a></div><p>At the chosen location (-96.839457,32.192638) the Estimated Base Flood Elevation is 447.4 ft (NAVD 88).</p><p><small>(Note: A flood depth of 1.5 feet or greater will increase the probability of the map location.)</small></p><div>Zoom to</div></div>	<div><div>Flood Information For This Location</div><div><a href="#">View Detailed Flood Report</a></div><p>At the chosen location (-96.841923,32.193003) the Estimated Base Flood Elevation is Not Applicable.</p><p><small>(Note: A flood depth of 1.5 feet or greater will increase the probability of the map location.)</small></p><div>Zoom to</div></div>	<div><div>Flood Information For This Location</div><div><a href="#">View Detailed Flood Report</a></div><p>At the chosen location (-96.824539,32.371995) the Estimated Base Flood Elevation is Not Applicable.</p><p><small>(Note: A flood depth of 1.5 feet or greater will increase the probability of the map location.)</small></p><div>Zoom to</div></div>
<div><b>Flood Risk Report Details:</b><ul style="list-style-type: none"><li>- Effective FIRM panel that should be reviewed to determine current Base Flood Elevation</li><li>- Longitude/Latitude</li><li>- Model Location</li></ul></div>	<div><b>Flood Risk Report Details:</b><ul style="list-style-type: none"><li>- Estimated Flood Elevation</li><li>- Estimated Flood Depth</li><li>- Longitude/Latitude</li><li>- Model Location</li></ul></div>	<div><b>Flood Risk Report does not include Flood Elevations at this time.</b><p>Land and structures in the lighter shaded areas may experience flooding during an event that exceeds the 1% annual chance.</p></div>	<div><b>Flood Risk Report does not include Flood Elevations at this time.</b><p>Land and structures outside of any indicated flood extent may experience flooding during an event that exceeds the 0.2% annual chance.</p></div>

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



# DOWNLOAD THE DATA

The screenshot shows the FEMA InFRM.us interface for the 'Estimated Base Flood Elevation' tool. A 'Download Data' modal is open for the location 'San Marcos'. The modal contains a table with the following data:

Data Set	File Name	Size	Description	Download
HECRAS models	12100203_Models.zip	57.32 MB	Description	Download
1% event depths, raster	12100203_Depth01.zip	56.12 MB	Description	Download
0.2% event depths, raster	12100203_Depth002.zip	66.42 MB	Description	Download
1% event elevations, raster	12100203_Elev01.zip	18.68 MB	Description	Download
0.2% event elevations, raster	12100203_Elev002.zip	20.15 MB	Description	Download
Vector spatial data, file geodatabase	12100203_VectorData.zip	46.18 MB	Description	Download
Reports and documents	12100203_Documents.zip	2.60 MB	Description	Download

The modal also includes a 'Download this table' link and a 'Close' button. The background shows a map of the San Marcos area with flood elevation data.

[www.InFRM.us/estBFE](http://www.InFRM.us/estBFE)

# DOWNLOAD THE DATA

Download Data

San Marcos

Data Set	File Name	Size	<a href="#">Download this table</a>
HECRAS models	12100203_Models.zip	57.32 MB	<a href="#">Description</a> <a href="#">Download</a>
1% event depths, raster	12100203_Depth01.zip	56.12 MB	<a href="#">Description</a> <a href="#">Download</a>
0.2% event depths, raster	12100203_Depth002.zip	66.42 MB	<a href="#">Description</a> <a href="#">Download</a>
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Reports and documents	12100203_Documents.zip	2.60 MB	<a href="#">Description</a> <a href="#">Download</a>

[Close](#)

# DOWNLOAD THE DATA

12100203\_SanMarcos.xlsx [Protected View] - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER ACROBAT

PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing

A1 : Download

	A	B	C	D	E
9	Download	FileName	FileSize	DataSet	Description
10	<a href="#">Download</a>	12100203_Models.zip	57.32 MB	HECRAS models	A folder containing HECRAS models for streams.
11	<a href="#">Download</a>	12100203_Depth01.zip	56.12 MB	1% event depths, raster	A raster representing the estimated depth of floodwaters from a 1% event.
12	<a href="#">Download</a>	12100203_Depth002.zip	66.42 MB	0.2% event depths, raster	A raster representing the estimated depth of floodwaters from a 0.2% event.
13	<a href="#">Download</a>	12100203_Elev01.zip	18.68 MB	1% event elevations, raster	A raster representing the estimated elevation of floodwaters from a 1% event.
14	<a href="#">Download</a>	12100203_Elev002.zip	20.15 MB	0.2% event elevations, raster	A raster representing the estimated elevation of floodwaters from a 0.2% event.
15	<a href="#">Download</a>	12100203_VectorData.zip	46.18 MB	Vector spatial data, file geodatabase	A file geodatabase containing vector spatial data representing stream centerlines, study areas, cross sections, fl
16	<a href="#">Download</a>	12100203_Documents.zip	2.60 MB	Reports and documents	A folder containing the Base Level Engineering report, and other documents.
17					
18					
19					
20					
21					
22					
23					

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.

AvailableData

READY SCROLL LOCK

# 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

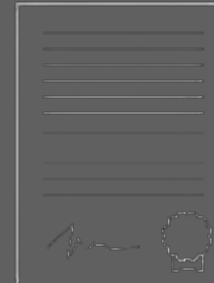
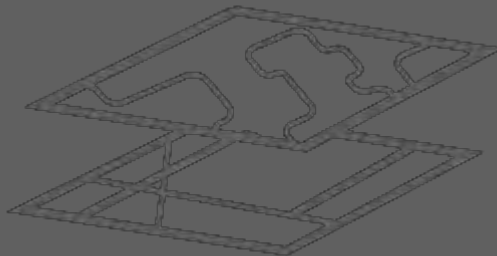


# What can I do with BLE?

## *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 ...



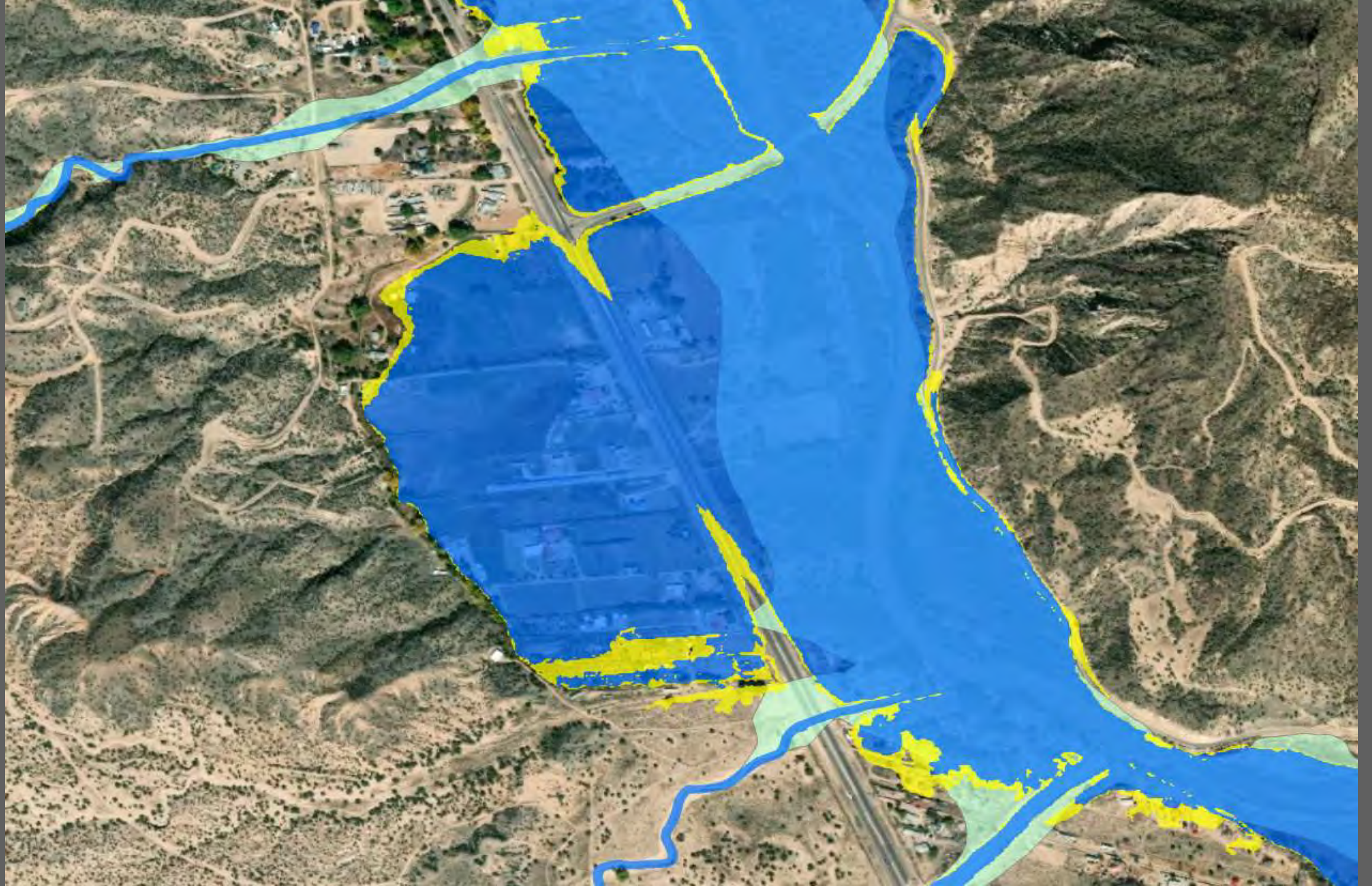
# RIO CHAMA

BLE Areas of Interest



# RIO CHAMA AREAS OF INTEREST

- Area north of Hernandez, where 285 and 84 come together
- BLE Floodplains have some significant differences to effective Zone A. Since most of the areas around here match fairly well, this is mostly due to the updated terrain.





# RIO CHAMA AREAS OF INTEREST

- North of Ojo Caliente, up 111 near La Madera
- 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.

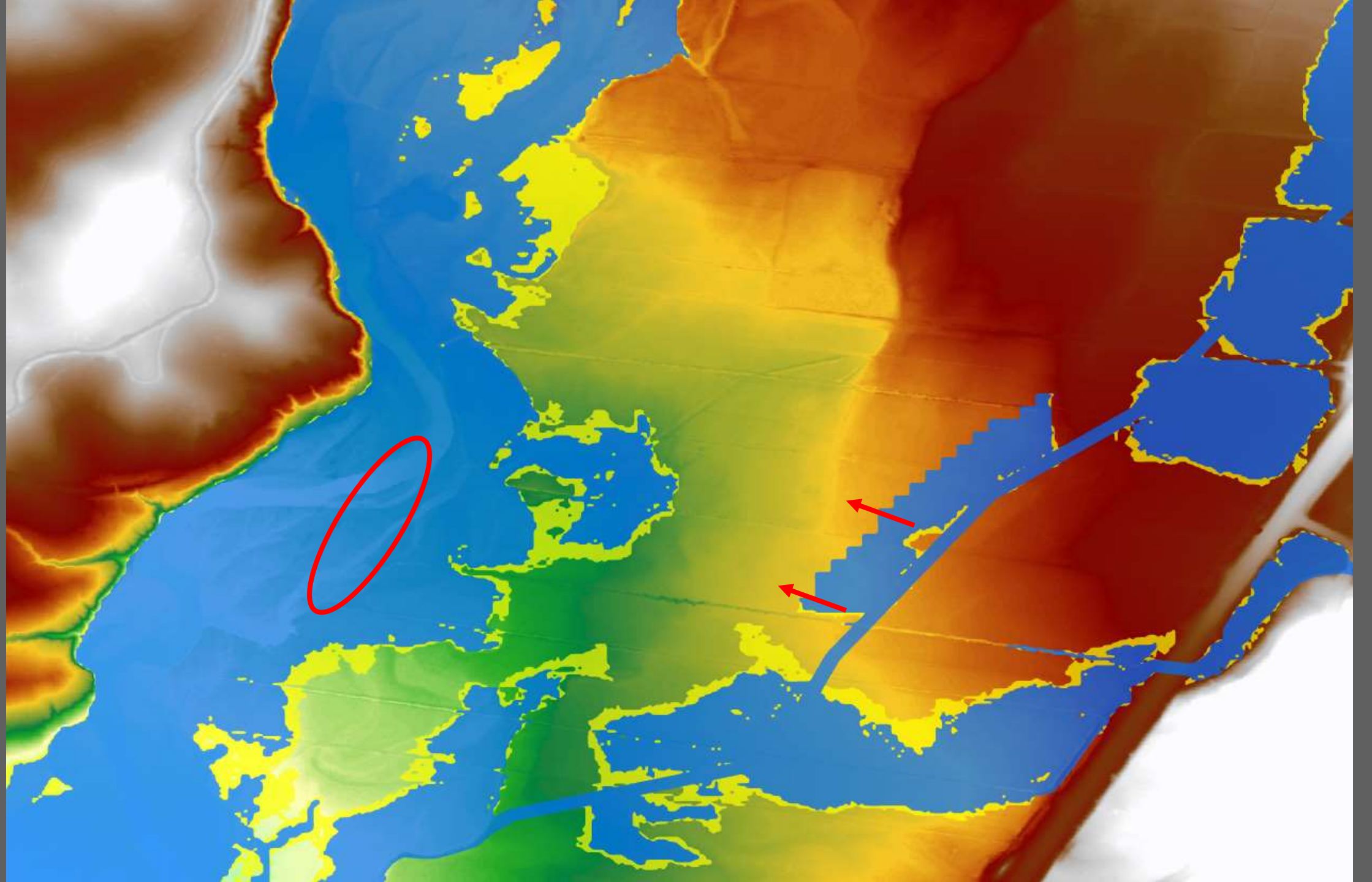






# RIO CHAMA AREAS OF INTEREST

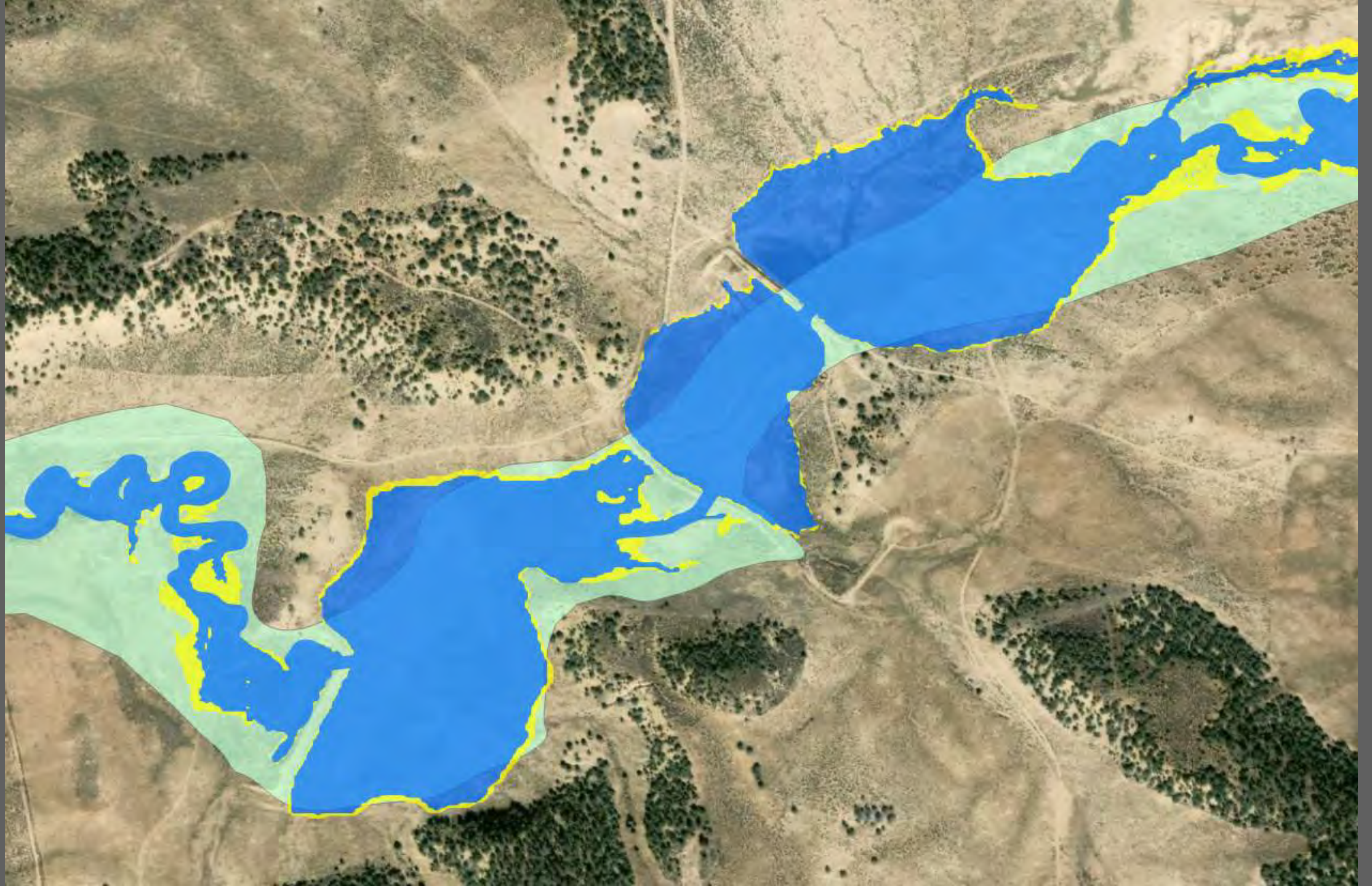
- Near Brazos at HWY 64
- Weird area with no structures modeled. You can see there is no retention behind roadway.
- Also, showing an area where mapping was truncated at watershed boundaries. Typically in valleys where water may flow in multiple directions





# RIO CHAMA AREAS OF INTEREST

- 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.
- West of HWY 84, north of Cebolla



# RIO CHAMA AREAS OF INTEREST

- Area near Canones, NM
- Shows where effective Zone A mapping does not reflect current terrain. This area has been updated by this BLE with new LiDAR and better reflects the extent of the channel and potential flooding.





# RIO CHAMA AREAS OF INTEREST

- Abiquiu Lake has significantly larger flooding from effective Zone A whereas Heron Lake and El Vado Reservoir have less flooding. A major portion of this is due to the large flows that do not reflect any upstream detention. Any regulatory study update should include a detailed analysis of the flooding in Lake Abiquiu as well as all outlet structures to potentially improve the analysis. Additionally, this may impact the flooding extents downstream of Lake Abiquiu.
- Seems like new mapping is 30+ feet higher than existing.
- Need to be aware of impacts to anyone near this lake before advancing towards a regulatory study

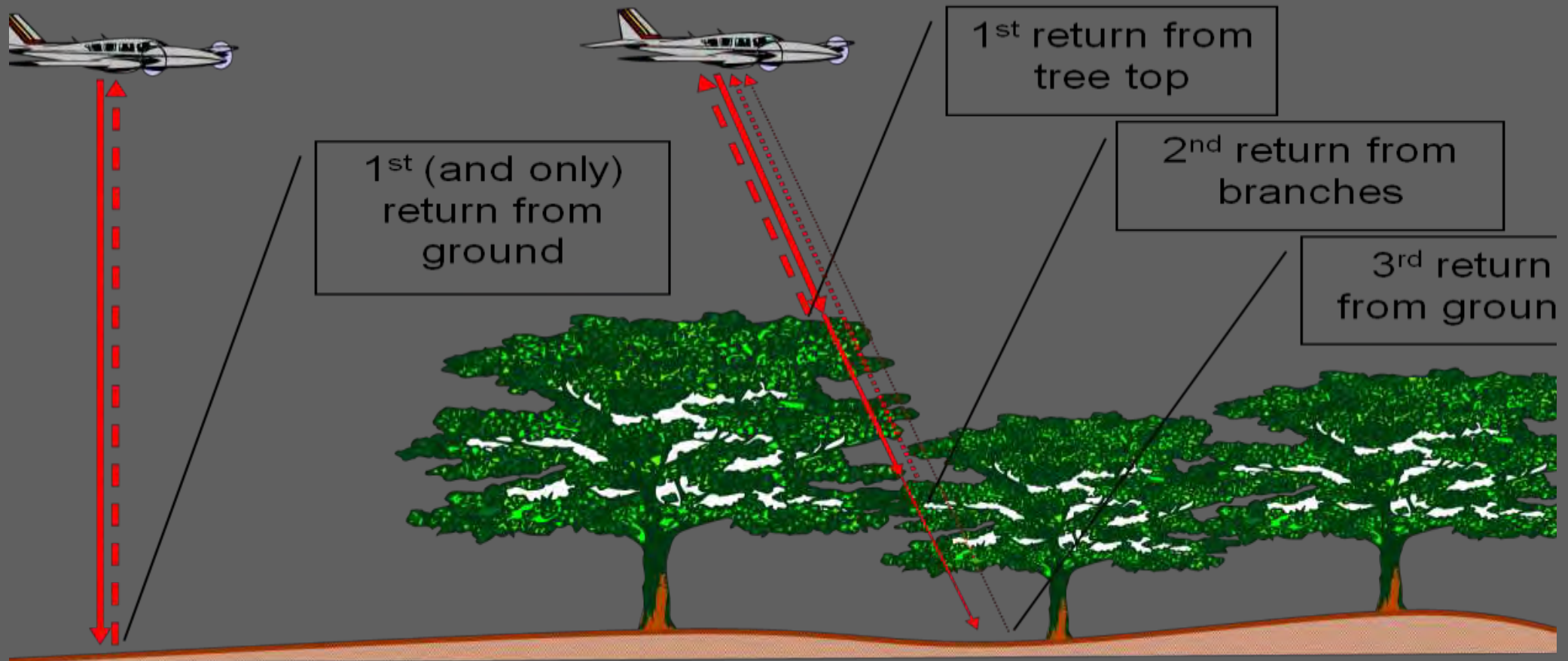






LIDAR

# LIDAR RETURNS

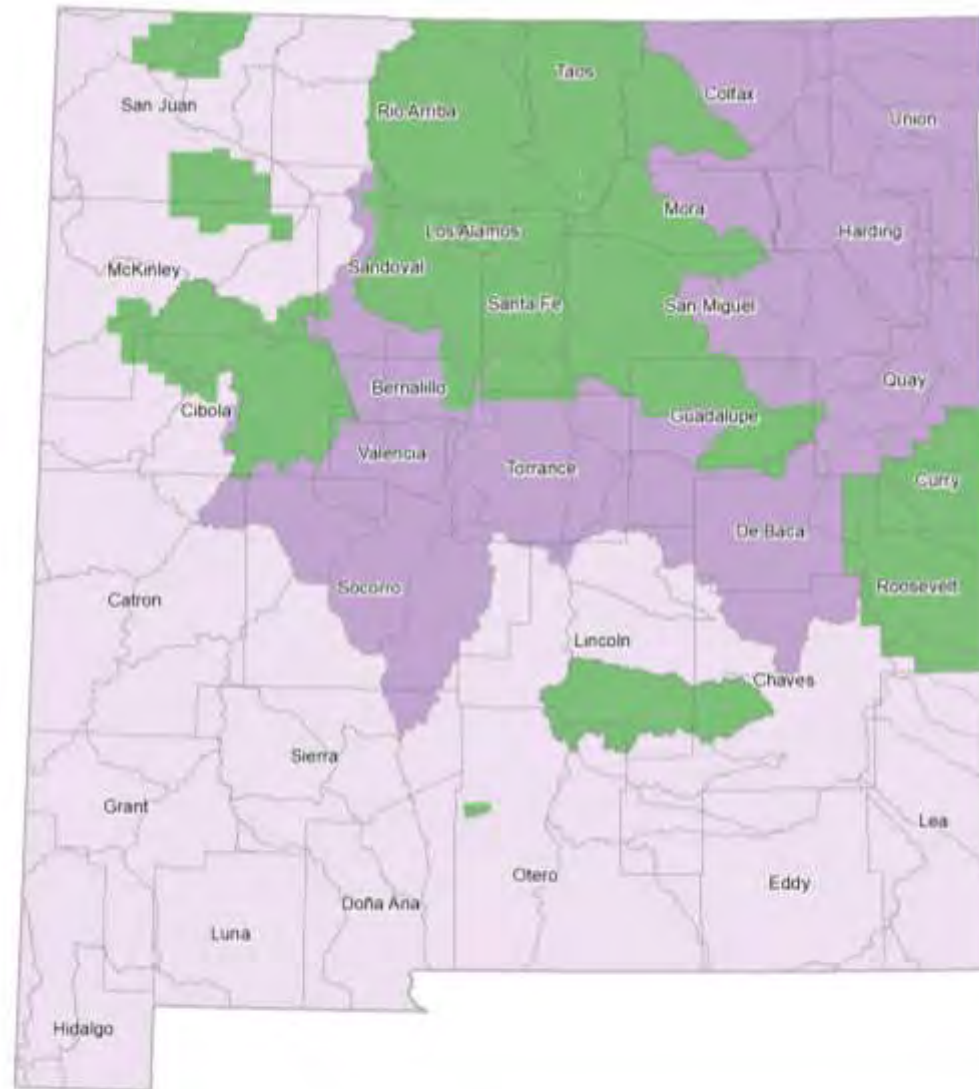


# CURRENT 10 METER DEM VS USGS QL2 LIDAR





# LIDAR STATUS



# LIDAR PRODUCTS

# LIDAR PRODUCTS

## Delivered Elevation Products

- DEM
- Classified LAS Files
- Break lines
- Intensity Image

## EDAC Produced

### Elevation Products

- DSM
- DTM
- Hillshade
- Contours
- Slope
- Aspect

### Feature Extraction

- Building Footprints
- Streams
- Acequias



# LIDAR DERIVED PRODUCTS




# RGIS.UNM.EDU



**RGIS** [Hide Map](#) Search:  Formats: ☒ Rasters ☒ Vectors ☒ Files ☒ All [Clear Search](#)

Your search in: /RGIS/FEMA Risk Map Products for any description with a format of all and at location anywhere found 10 results.

**Spatial Search**



**Left Panel (Tree View):**


- RGIS
  - Agriculture
  - Boundaries
  - Cadastral and PLSS
  - Census and Demography
  - Climatology
  - Elevation and Terrain
  - Environment
    - FEMA Risk Map Products**
      - Animas Watershed
      - Curry and Roosevelt Counties
      - Rio Chama Watershed
      - Rio Hondo Watershed
      - Upper Rio Grande Watershed
  - Geosciences
  - Hazards
  - Health
  - Imagery
  - Location
  - Public Safety
  - State Agencies
  - Structures
  - Topographic Maps
  - Transportation
  - Utilities and Communication
  - Water

**Search Results Table:**

Animas Watershed Building Footprints	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Chama Watershed Building Footprints	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Upper Rio Grande Watershed Building Footprints	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Curry Roosevelt Counties Building Footprints	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Hondo Defensible Space	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Hondo Impervious	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Hondo Overall Perimeter	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Hondo Reduced Fuel Zone	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Hondo Sinkholes	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>
Rio Hondo Watershed Buildings	<a href="#">Add to map</a>	<a href="#">Go to extent</a>	<a href="#">Download +</a>

First Previous **1** Next Last

# NMFLOOD.ORG



**NMFLOOD.ORG**  
A collaborative resource to promote New Mexico flood risk awareness and resiliency

<b>Watershed Projects</b> <i>Discovery Project Areas</i> <ul style="list-style-type: none"><li>• Valencia County</li><li>• Curry and Roosevelt Counties</li></ul> <i>Base Level Engineering Project Areas</i> <ul style="list-style-type: none"><li>• Anchoas Watershed</li><li>• Rio Hondo Watershed</li><li>• Upper Rio Grande Watershed</li><li>• Curry &amp; Roosevelt Counties</li><li>• Rio Chama Watershed</li></ul> <i>Base Level Engineering Information</i> <ul style="list-style-type: none"><li>• Estimated BFE Viewer Fact Sheet</li><li>• Base Level Engineering Fact Sheet</li></ul>	<b>Special Projects</b> <i>Lidar Building Footprint Toolset</i> <ul style="list-style-type: none"><li>• The LIDAR Building Extraction Toolbox for LIDAR LAS 1.4 files works with ESRI ArcGIS version 10.4, 10.5 and ArcGIS Pro.</li><li>• LIDAR Building Footprint Extraction Tool User Guide</li><li>• LIDAR Building Footprint Extraction Tool Video Playlist</li><li>• LIDAR Building Footprint Tool Download</li></ul>	<b>Statewide Projects</b> <i>New Mexico Multi-Hazard Risk Portfolio</i> <ul style="list-style-type: none"><li>• Risk Portfolio Landslide Risk</li><li>• Risk Portfolio Wildfire Risk</li><li>• Risk Portfolio Flood Risk</li></ul> <i>Other Statewide Projects</i> <ul style="list-style-type: none"><li>• Stream Gage Analysis</li></ul>	<b>Interactive Maps</b> <i>Statewide Flood Data</i> <ul style="list-style-type: none"><li>• FEMA's National Flood Hazard Layer (NFHL)</li></ul> <i>Region VI Viewers</i> <ul style="list-style-type: none"><li>• Estimated Base Flood Elevation (EBFE) Viewer</li></ul> <i>CTP Interactive Maps</i> <ul style="list-style-type: none"><li>• Lidar Status for New Mexico</li></ul> <b>Story Maps</b> <ul style="list-style-type: none"><li>• Impacts of September 2013 Flooding in New Mexico</li><li>• Turn Around Don't Drown New Mexico</li></ul>
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# Opportunities for More BLE Information

## Monthly Virtual Brown Bag Sessions

<https://r6virtualbrownbag.eventbrite.com>

09/24/2019     Resilient Communities using Base Level Engineering: Ideas for Floodplain Administrators

# QUESTIONS

Shawn L. Penman, PhD, CFM, GISP

[spenman@edac.unm.edu](mailto:spenman@edac.unm.edu)

(505) 277-3622 ext 227