

# UPPER RIO GRANDE BLE FINDINGS MEETING

Alcalde, March 6 and Taos, March 7, 2019

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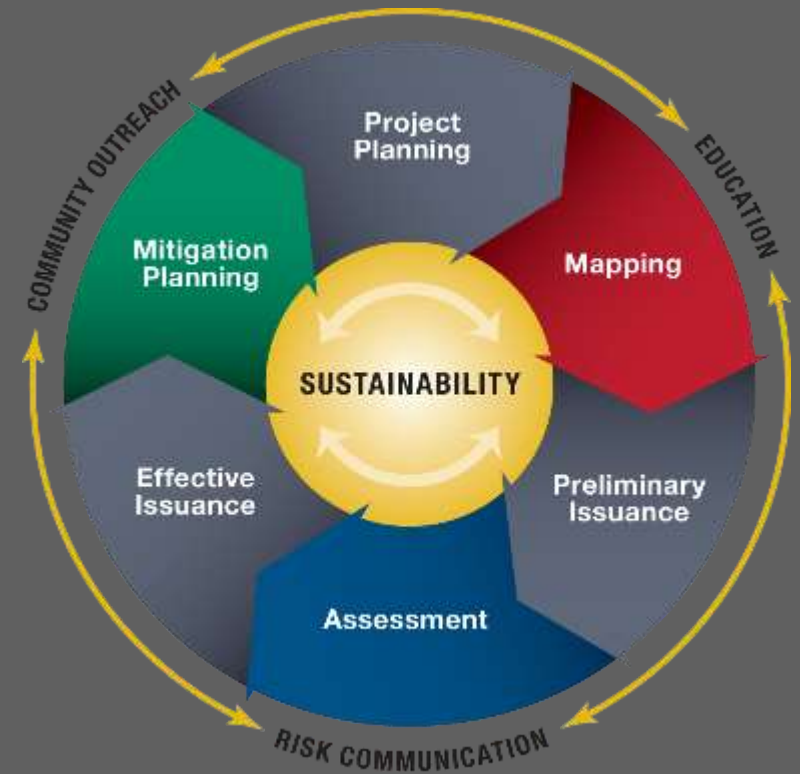
Mathew Hornack, PE



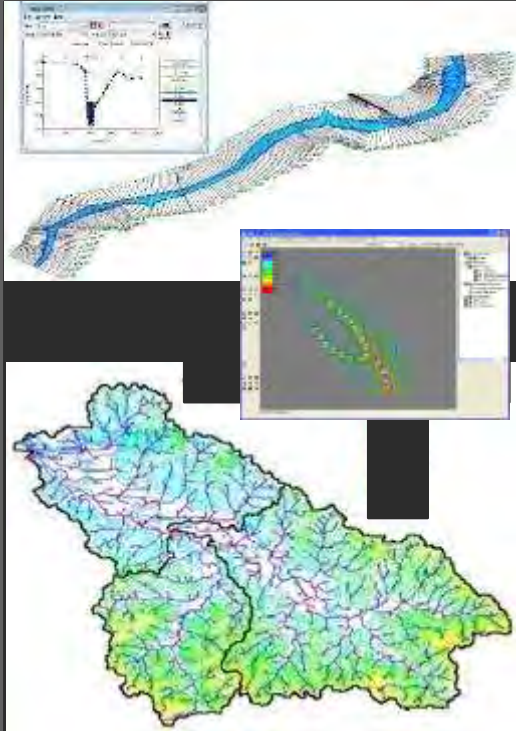
FEMA

# WHAT IS RISK MAP?

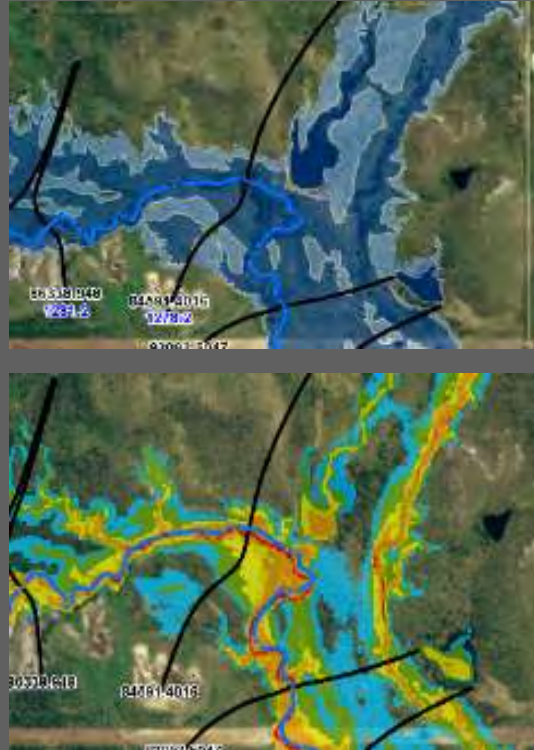
- Mapping – Identification of areas of natural hazard risk
- Assessment – Review and analysis of hazard areas
- Planning – Mitigation activities to reduce risk



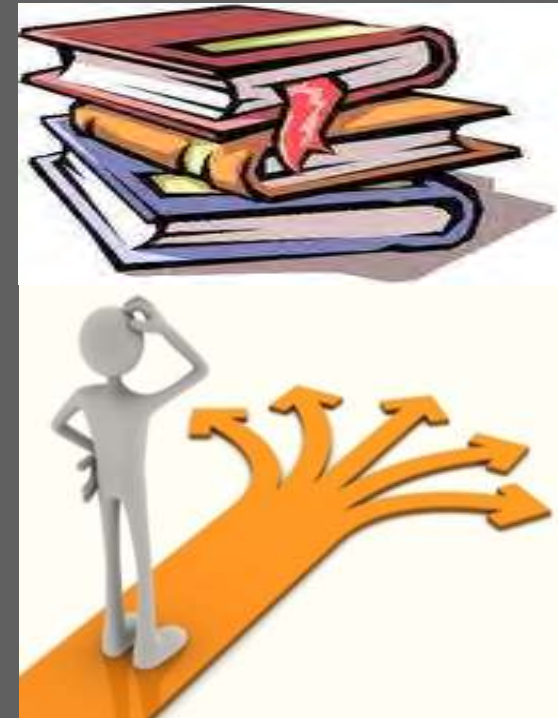
# BASE LEVEL ENGINEERING IS A PROGRAMMATIC EVOLUTIONARY STEP WHICH PROVIDES:



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.

# FOCUS AREAS FOR BLE ASSESSMENTS

## Unverified Miles

- Stream miles currently on FIRM panel
- Historic information used to determine flood data not readily available or based on other approaches (soils mapping)



## Unmapped Miles

- Natural streams or drainage systems not included in FIRM panel
- FIRMs only included 1.3M of the 4+M stream miles shown in the National Hydrography dataset



## Unmodernized Communities

- Currently shown on community based FIRM panel(s)
- Communities not previously modernized



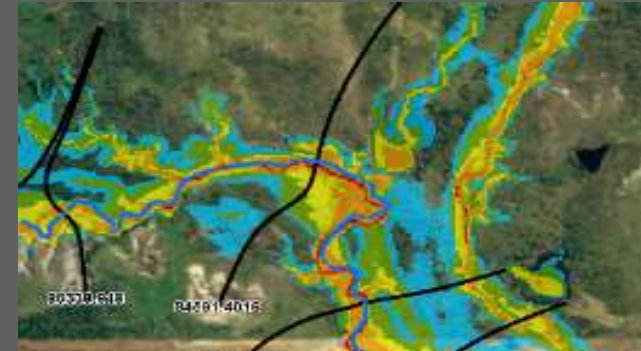
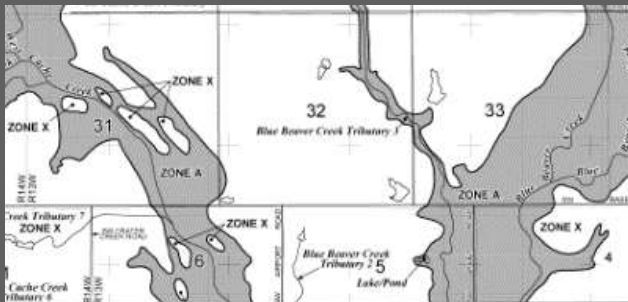


# UPPER RIO GRANDE WATERSHED - BLE ASSESSMENT



# 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

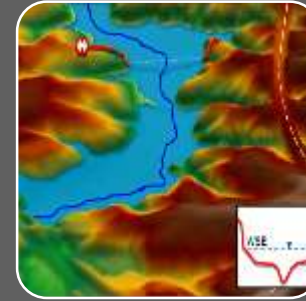
Is ground elevation  
Information readily-  
Available, or must it be  
Collected?



## 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

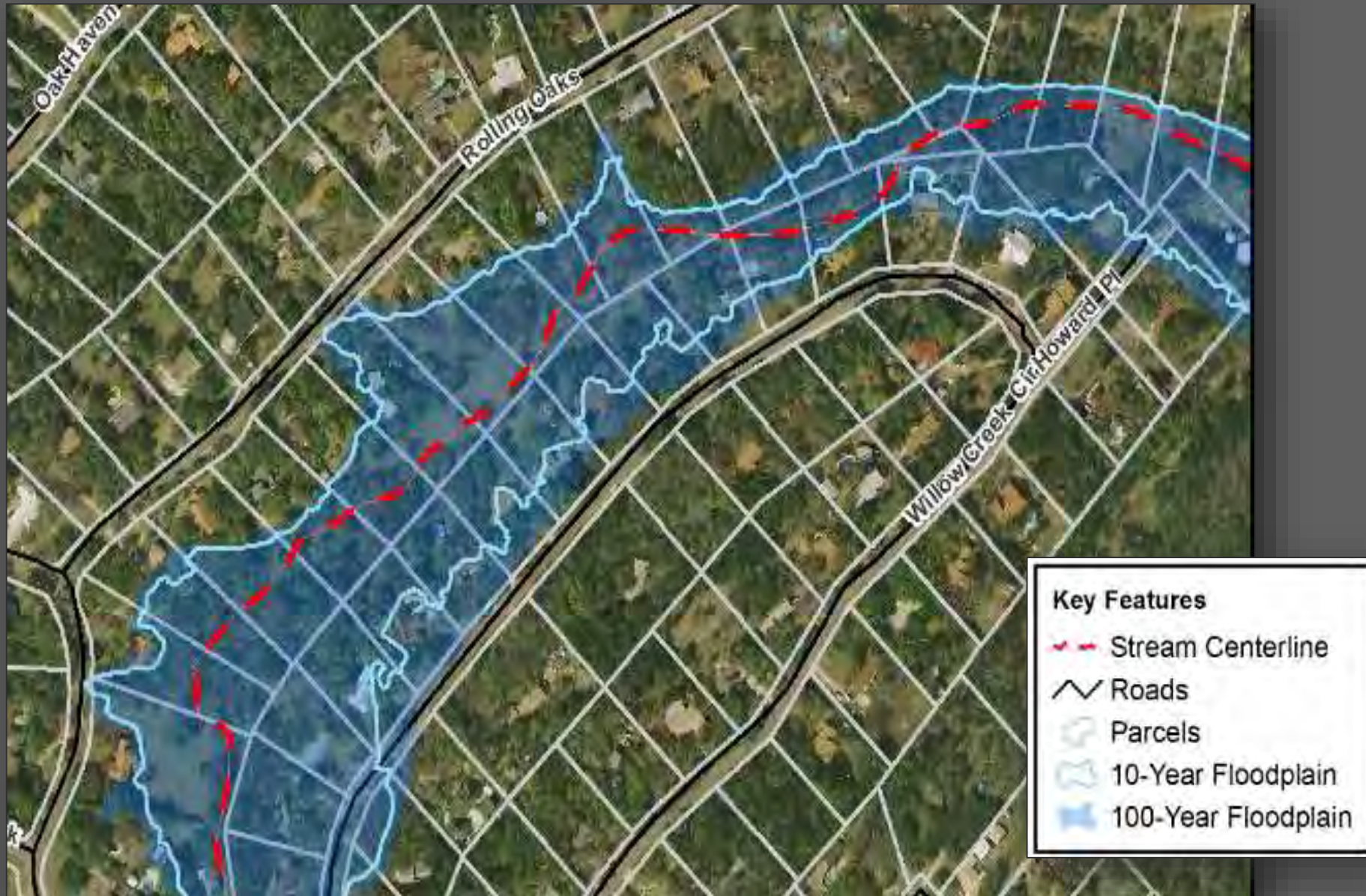
## Unstudied Communities, Incomplete Study Coverage

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

## Numerous Communities Not Participating in the NFIP

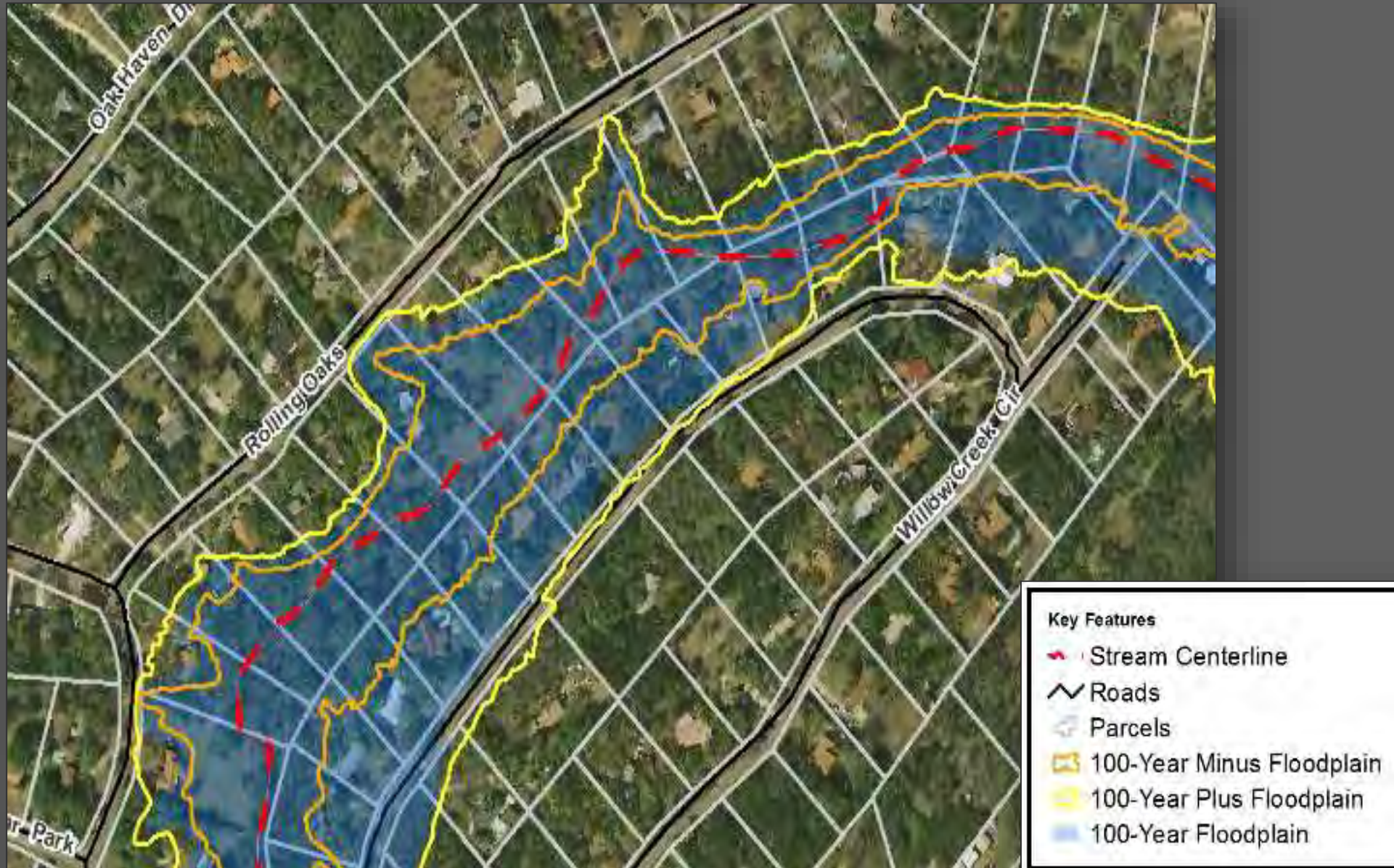
- FEMA will only expend additional funds to create FIRMs were communities are participating

# Practical Uses for BLE Data



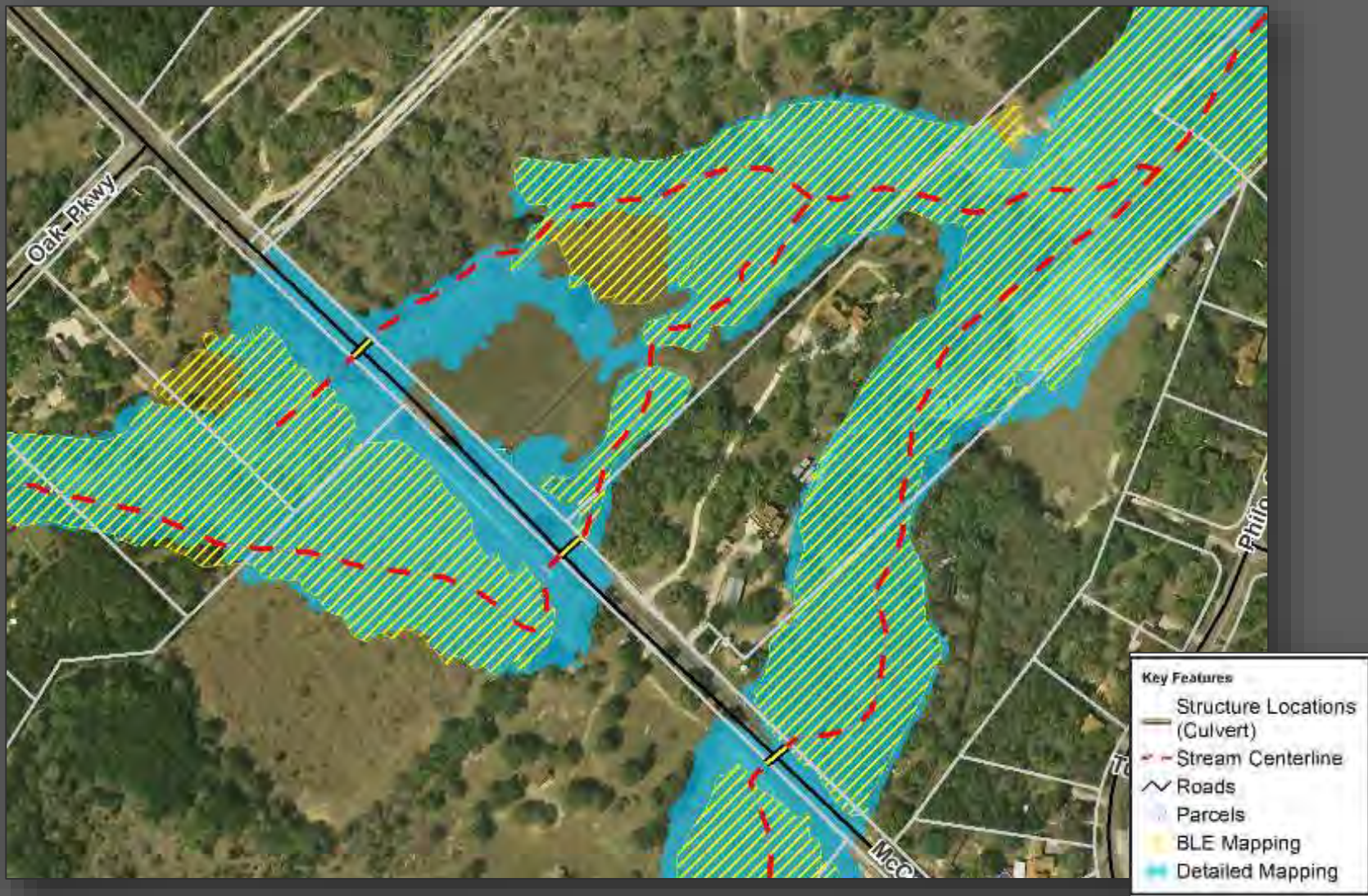


# Practical Uses for BLE Data





# Practical Uses for BLE Data



# HOW CAN I USE BASE LEVEL ENGINEERING DATA?



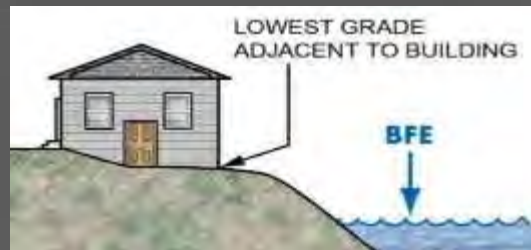
**PERMITTING**



**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*

## 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 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.



### 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 Viewer



1% and 0.2%  
Estimated Flood Extent

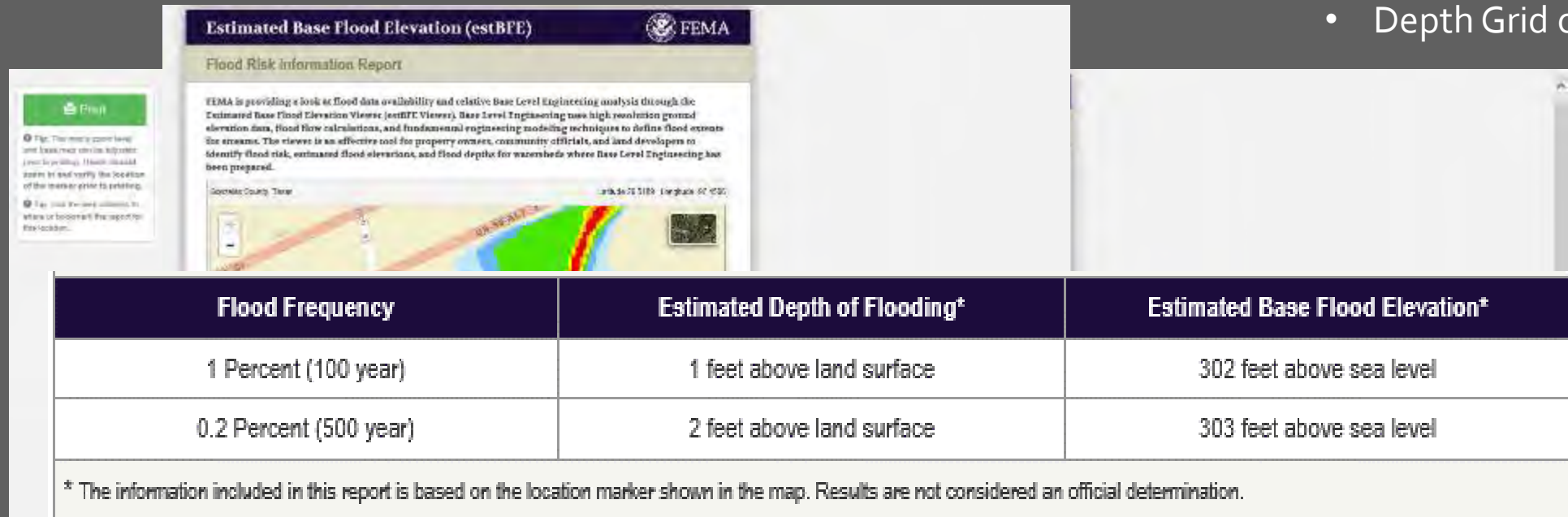
1%  
Estimated Flood Depth



# Estimated Base Flood Elevation Viewer

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

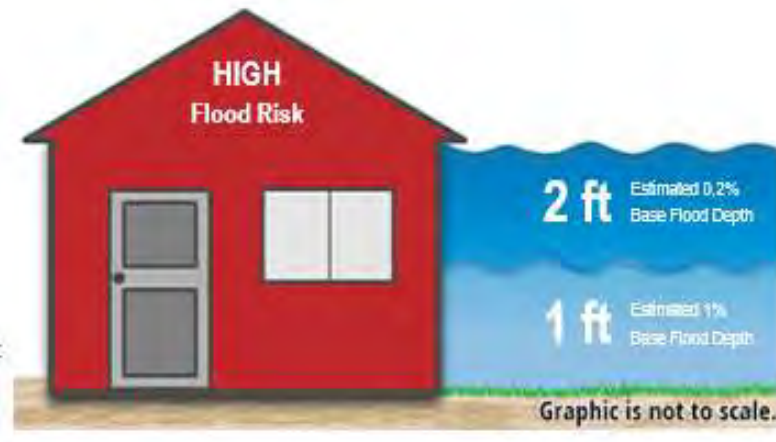
- Floodplains on the Left
- Depth Grid on the Right



## Knowing Your Risk

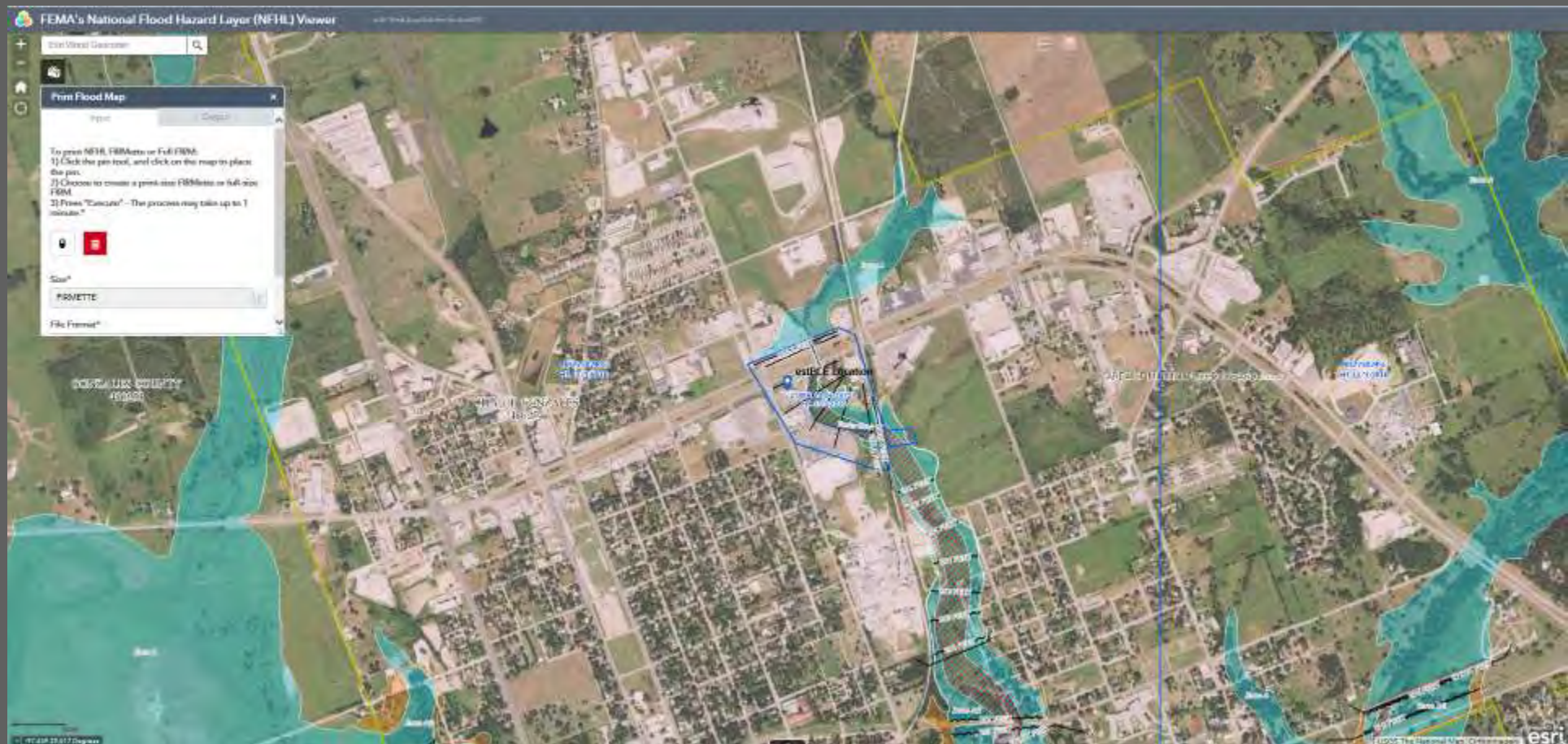
Base Level Engineering has analyzed the data and information to provide the following information:

- Whether floodable management decisions and strategies are appropriate.
- Identify appropriate floodplain changes.
- Assess flood potential for restoration, and
- Support the FEMA BFE information for a range of flood risk reduction.



# Estimated Base Flood Elevation Viewer

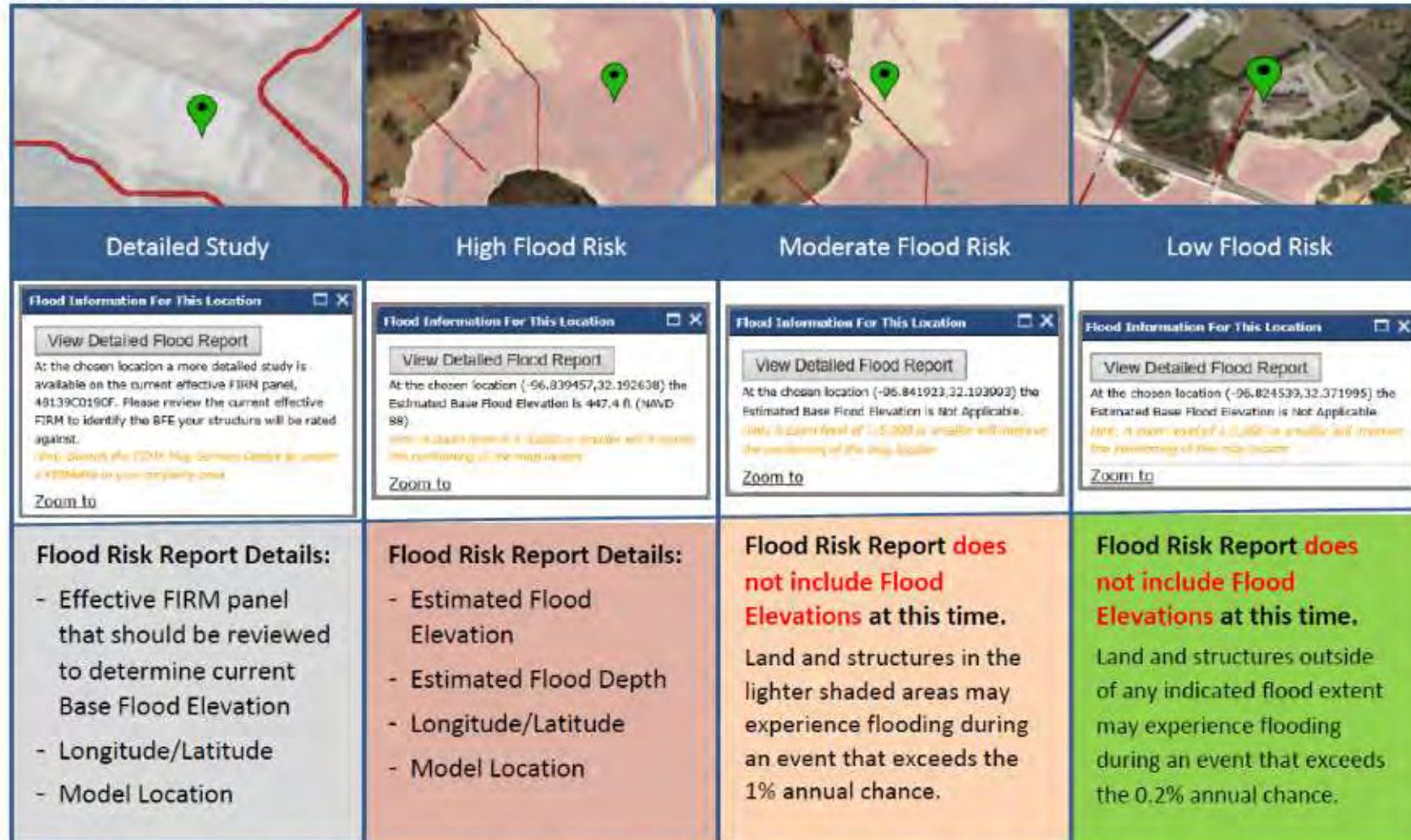
If detailed information is available on the current effective FIRM,  
The viewer will alert you and offer you the option to open the National Flood Hazard Layer (NFHL)





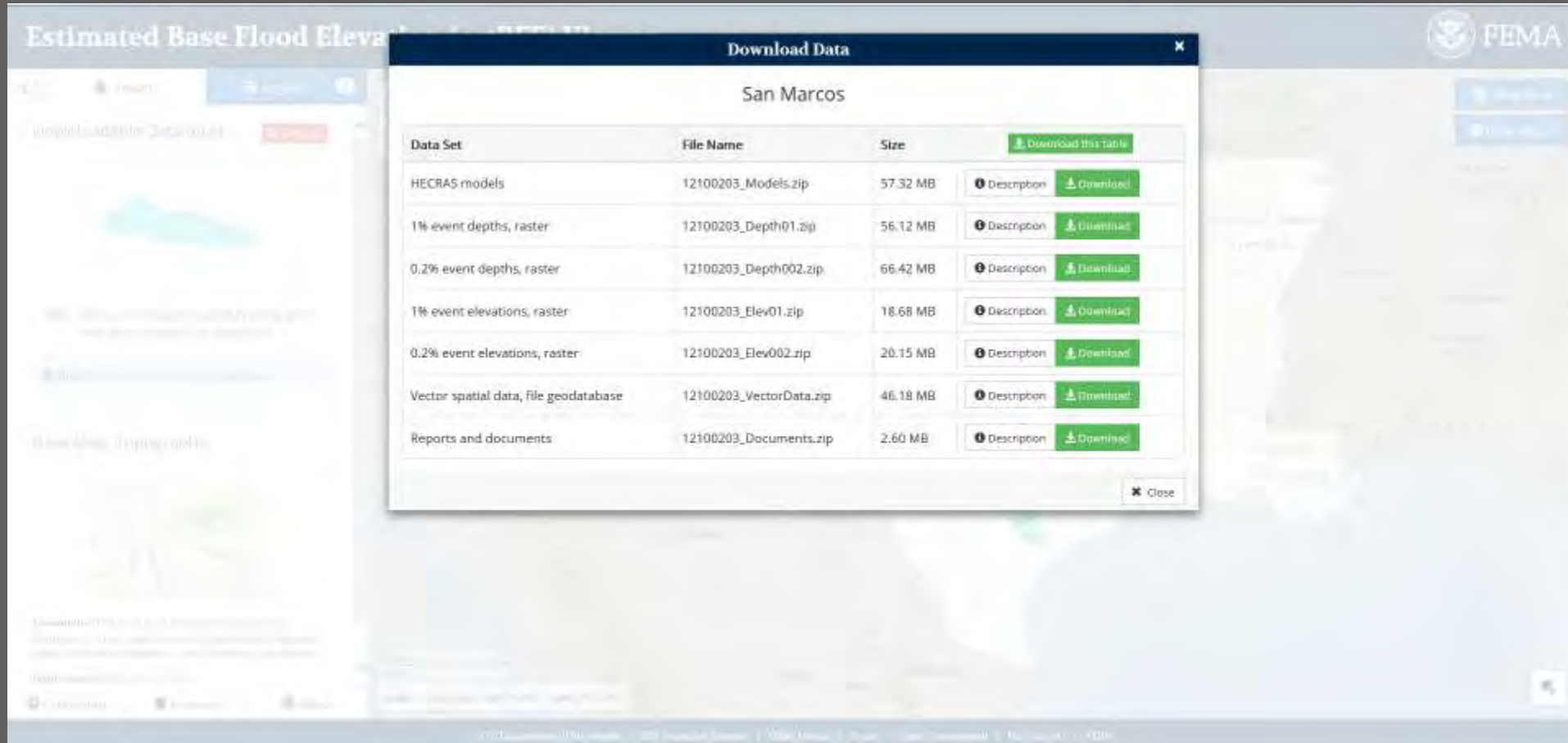
# REGION 6 EBFEE VIEWER

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.



*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	<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>
1% event elevations, raster	12100203_Elev01.zip	18.68 MB	<a href="#">Description</a>	<a href="#">Download</a>
0.2% event elevations, raster	12100203_Elev002.zip	20.15 MB	<a href="#">Description</a>	<a href="#">Download</a>
Vector spatial data, file geodatabase	12100203_VectorData.zip	46.18 MB	<a href="#">Description</a>	<a href="#">Download</a>
Reports and documents	12100203_Documents.zip	2.60 MB	<a href="#">Description</a>	<a href="#">Download</a>

The modal also includes a 'Download this table' link and a 'Close' button. The background shows a map of San Marcos, CA, with a flood elevation overlay.

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

# DOWNLOAD THE DATA

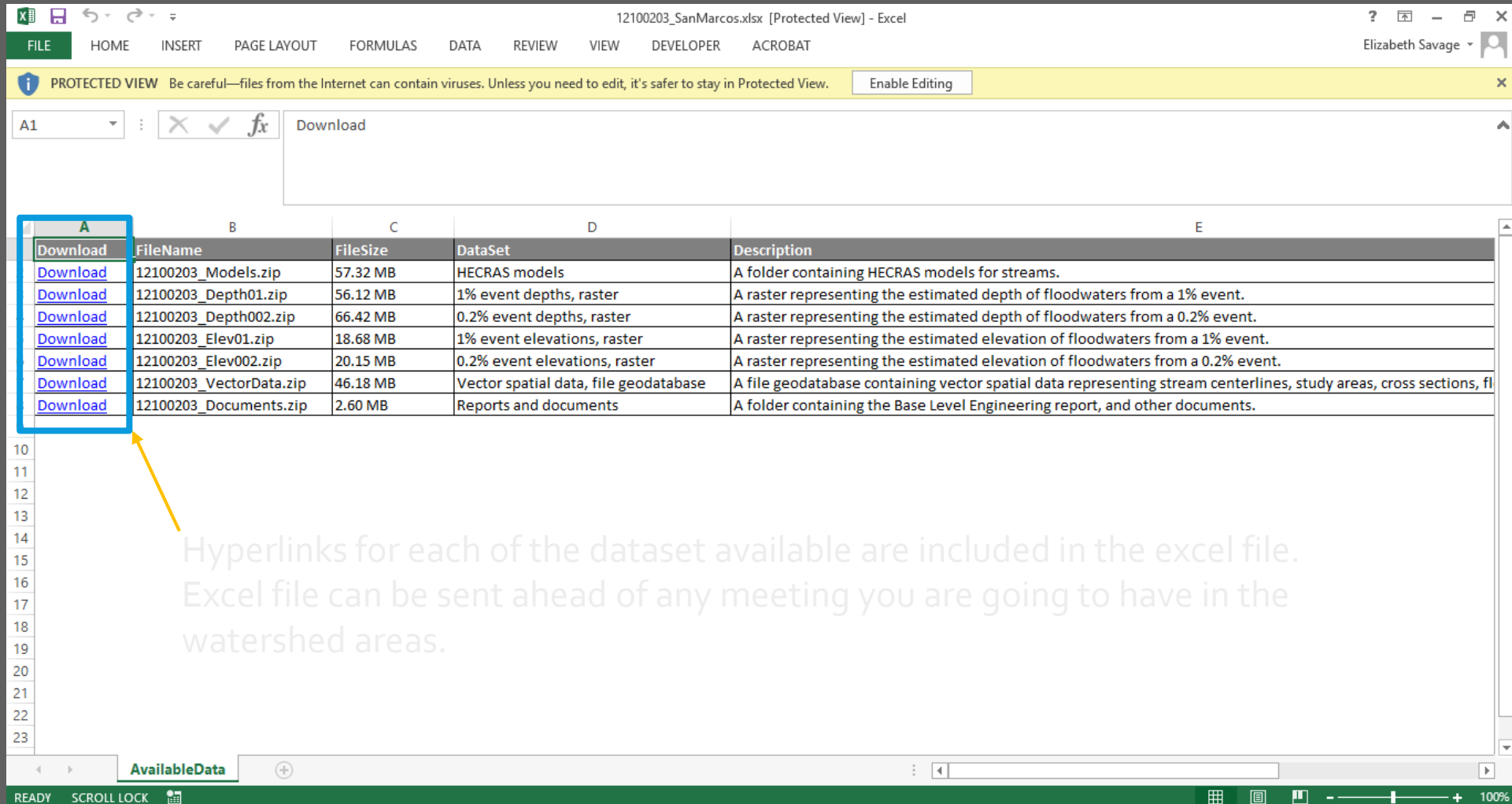
Download Data

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>
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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



The screenshot shows a Microsoft Excel window titled "12100203\_SanMarcos.xlsx [Protected View] - Excel". The ribbon includes FILE, HOME, INSERT, PAGE LAYOUT, FORMULAS, DATA, REVIEW, VIEW, DEVELOPER, and ACROBAT. A yellow banner at the top states "PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View." with an "Enable Editing" button. The formula bar shows "Download". The worksheet contains a table with the following data:

	A	B	C	D	E
	Download	FileName	FileSize	DataSet	Description
	<a href="#">Download</a>	12100203_Models.zip	57.32 MB	HECRAS models	A folder containing HECRAS models for streams.
	<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.
	<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.
	<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.
	<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.
	<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
	<a href="#">Download</a>	12100203_Documents.zip	2.60 MB	Reports and documents	A folder containing the Base Level Engineering report, and other documents.

An orange arrow points from the text below to the "Download" hyperlinks in column A of the table.

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.

The bottom of the window shows the "AvailableData" sheet tab and the status bar with "READY", "SCROLL LOCK", and a zoom level of "100%".



# 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

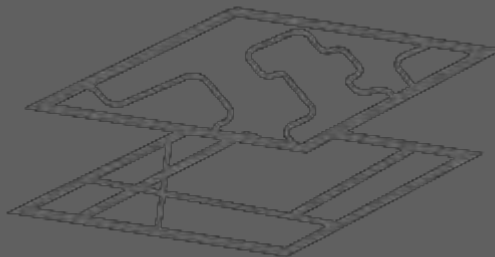


# What can I do with BLE?

## *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:....

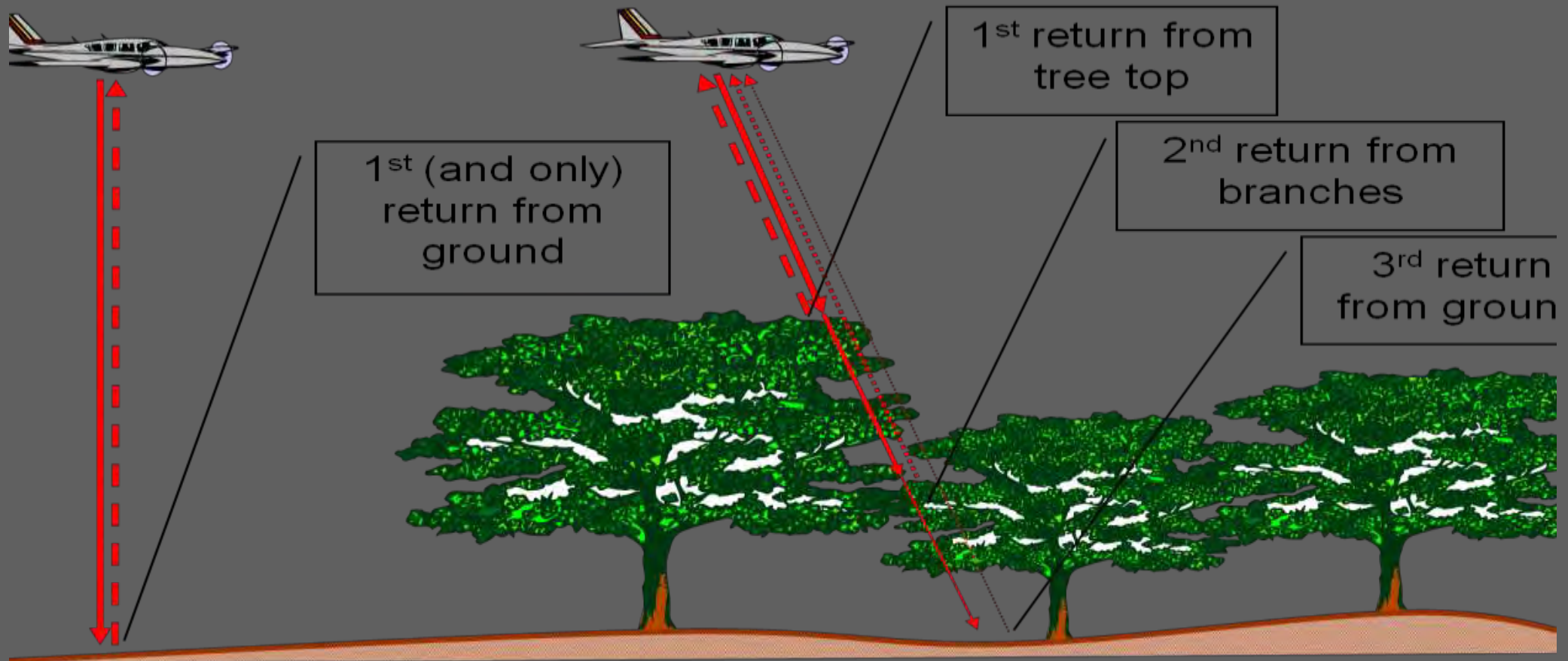
**(3)** Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;

**(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 ...



LIDAR

# LIDAR RETURNS



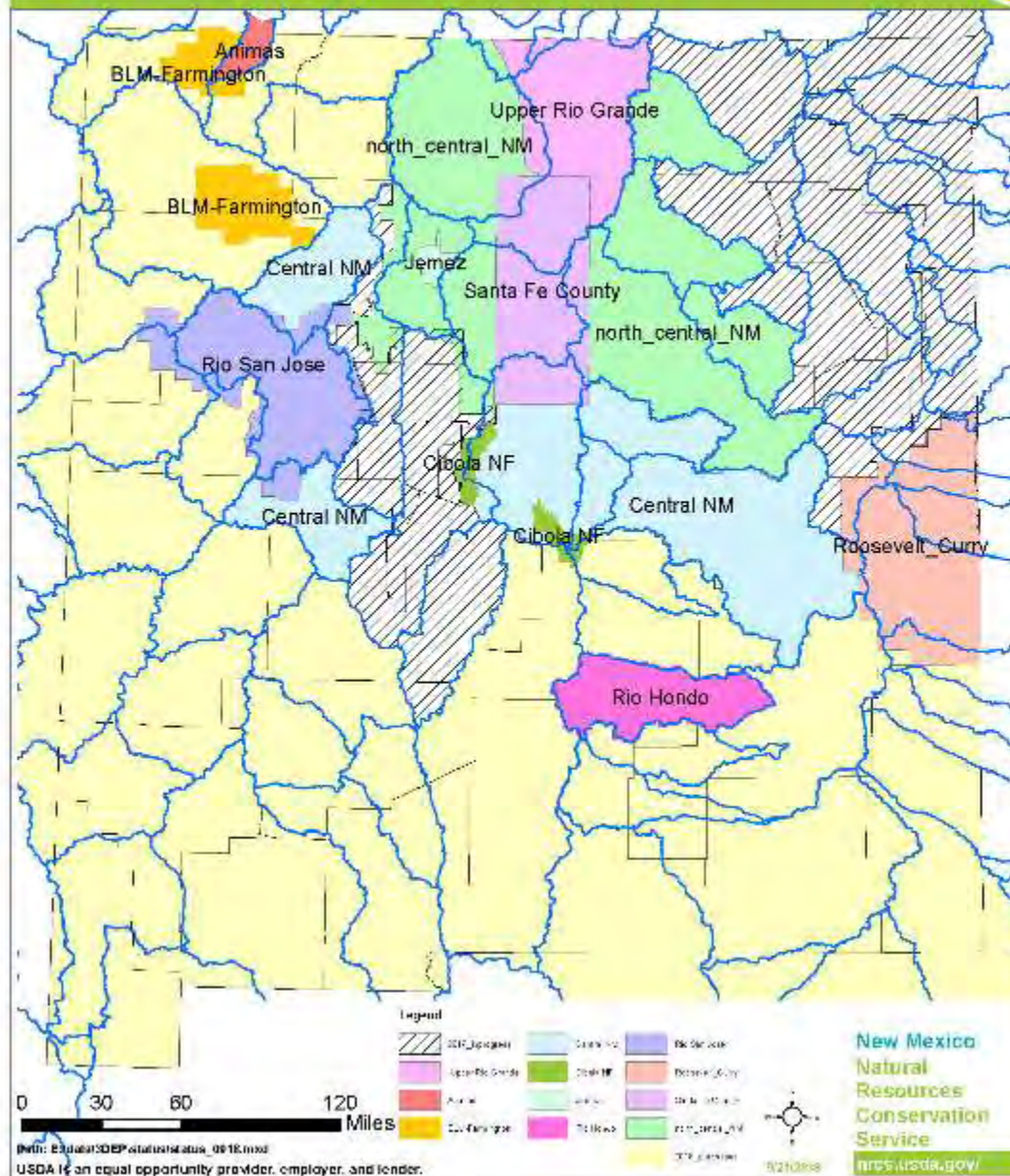
# CURRENT 10 METER DEM VS USGS QL2 LIDAR





## NRCS - New Mexico

### LIDAR Availability - Project Names



# 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

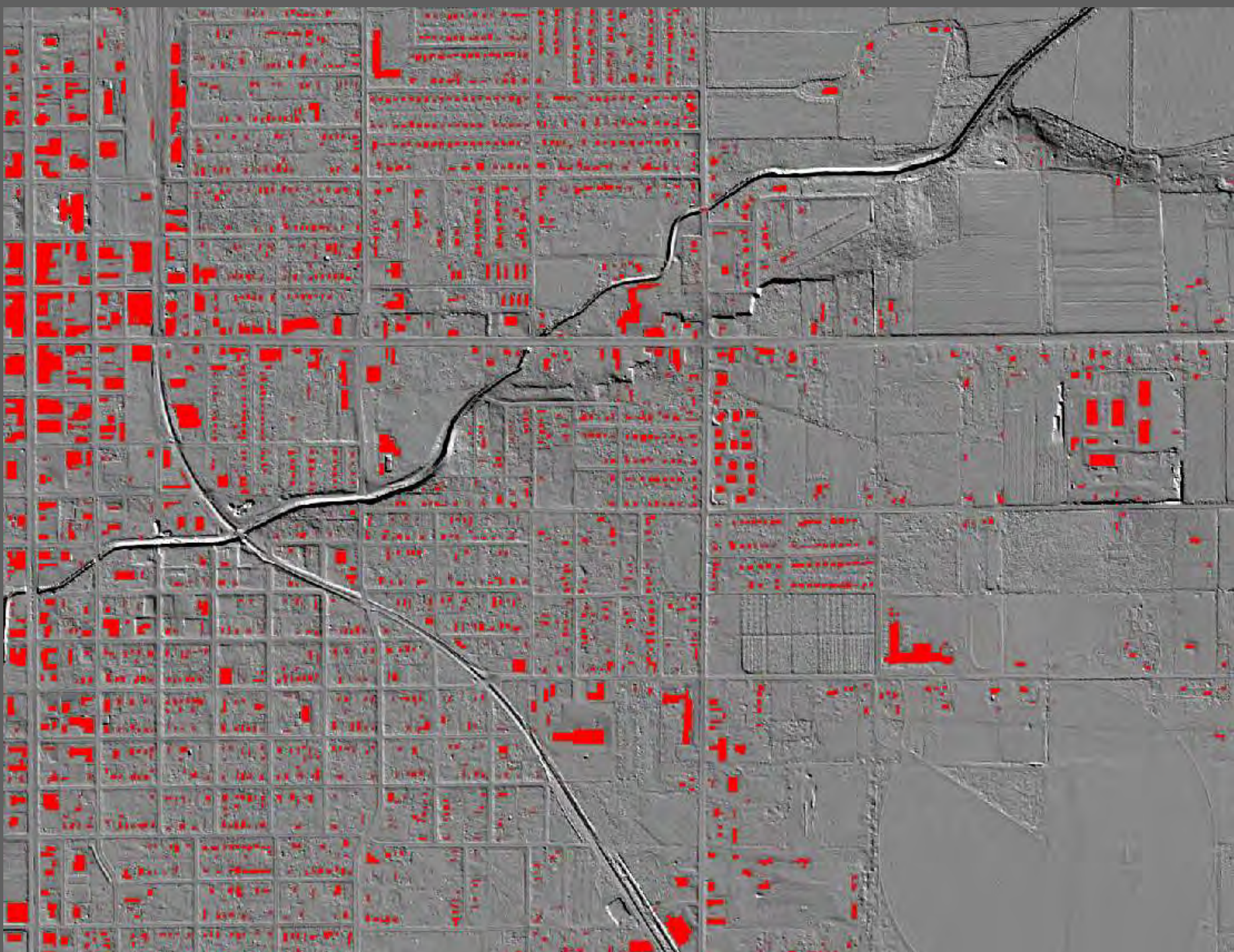
- Building Footprints
- Streams
- Acequias



# LIDAR DERIVED PRODUCTS







# Opportunities for More BLE Information

## Monthly Virtual Brown Bag Sessions

<https://r6virtualbrownbag.eventbrite.com>

<b>03/26/2019</b>	Using Base Level Engineering (BLE) for Insurance Rating
<b>04/30/2019</b>	The Estimated BFE Viewer - Interacting with the Base Level Engineering Data
<b>06/25/2019</b>	Base Level Engineering (BLE) for Local Officials
<b>07/30/2019</b>	Base Level Engineering (BLE) and the Community Rating System (CRS)
<b>08/27/2019</b>	Base Level Engineering (BLE) for Engineering Practitioners
<b>09/27/2019</b>	Resilient Communities using Base Level Engineering: Ideas for Floodplain Administrators



# QUESTIONS

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