WESTERN ESTANCIA BLE MEETING

Shawn L. Penman, PhD, CFM
Loretta Hatch, CFM
Mat Hornack, PE, CFM

United States Surveying Corps locating township corner at Progresso, Torrance County, New Mexico, 1903. Courtesy of the Palace of the Governors Photo Archives (NMHM/DCA, Negative No. 035863.

EDAC | EARTH DATA ANALYSIS CENTER

FEMA

Western Estancia BLE Meeting Protocol

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

Riddle, J.R.. Estancia Spring, New Mexico, 1886-1888. Courtesy of the Palace of the Governors Photo Archives, New Mexico History Museum, Santa Fe, New Mexico Negative No. 076095.

Agenda

- Introductions
- CTP & Risk MAP
- Base Level Engineering & eBFE Viewer
- Western Estancia 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

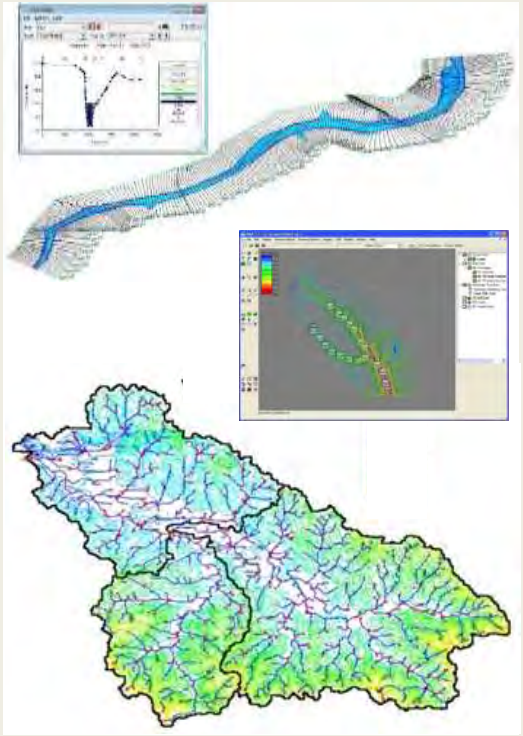
- New Mexico Department of Homeland Security and Emergency Management
  - *Loretta Hatch, New Mexico State Floodplain Coordinator*
    - Loretta.Hatch@state.nm.us
    - (505) 476-0612
- Local Flood Control Authorities
- Local Communities

Jennie Avery Collection. Gateway to the Estancia Valley, New Mexico, 1915. Courtesy of the Palace of the Governors Photo Archives, New Mexico History Museum, Santa Fe, New Mexico , Negative No. 042819.

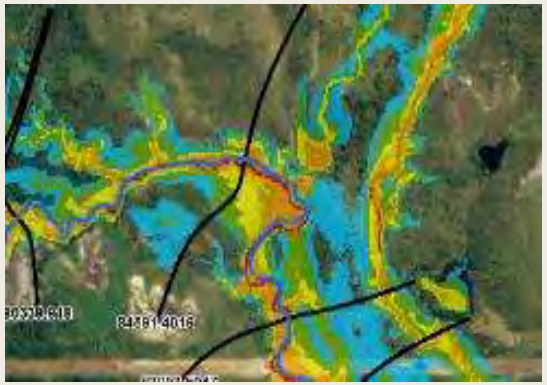
What is Risk MAP?

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

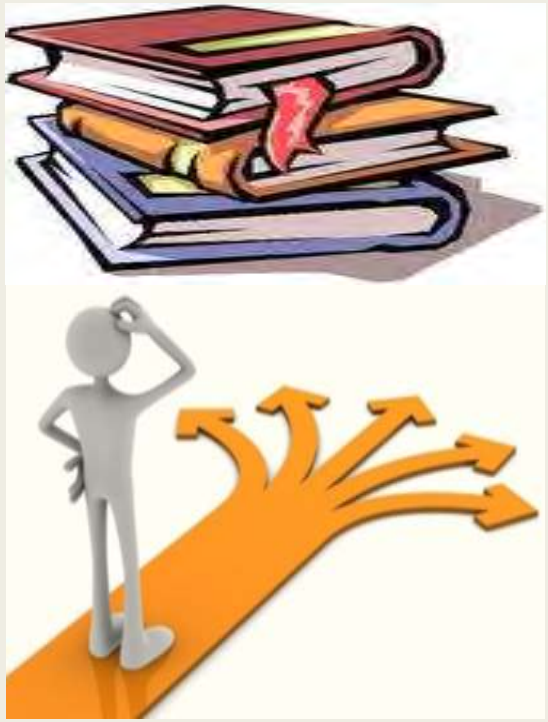
Base Level Engineering is a programmatic evolutionary step which provides:



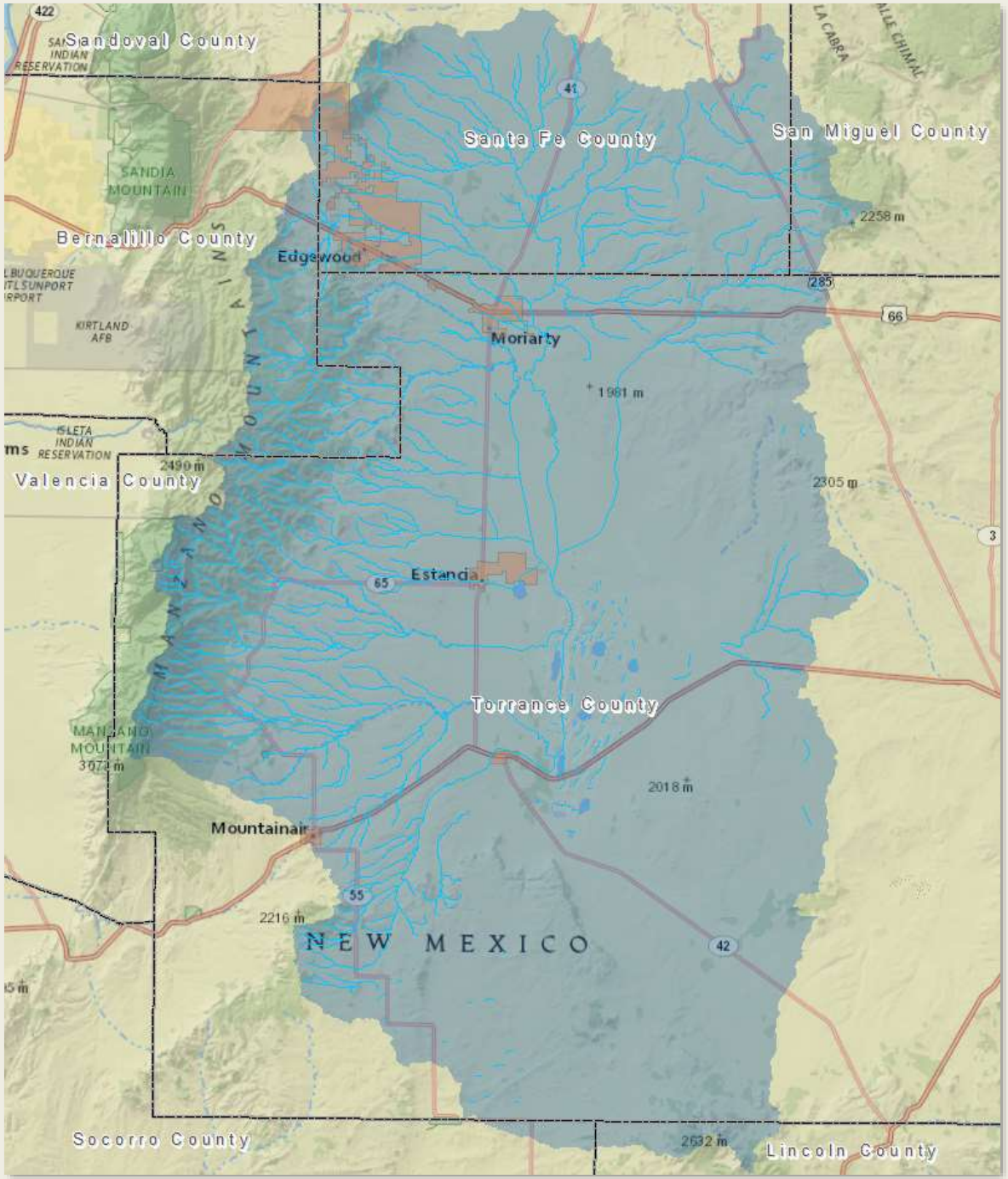
Credible engineering analysis and modeling for local communities and developers.



Estimation of flood extents, water surface elevations and flood depths



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

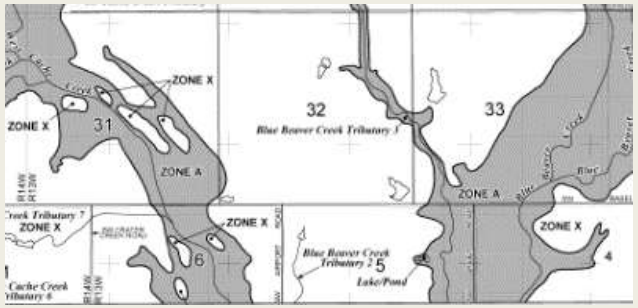

Sandoval County
Santa Fe County
San Miguel County
Bernalillo County
Edgewood
Moriarty
Valencia County
Estancia
Torrance County
Mountainair
NEW MEXICO
Socorro County
Lincoln County
SANDIA MOUNTAIN
MANZANO MOUNTAINS
KIRTLAND AFB
ISLETA INDIAN RESERVATION
2258 m
1981 m
2490 m
2305 m
2018 m
2216 m
2632 m
422
41
285
66
65
55
42
3

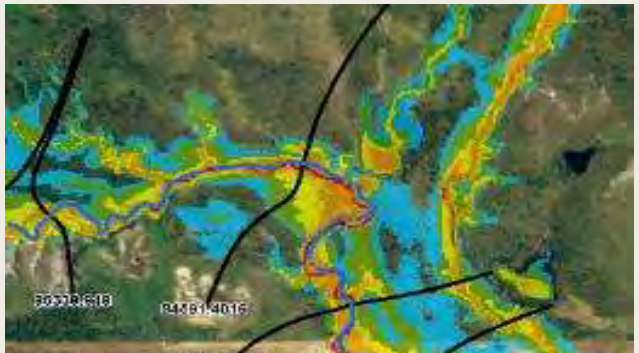
Approach

- 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

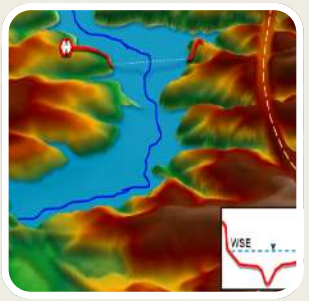
Terrain Data Collection

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

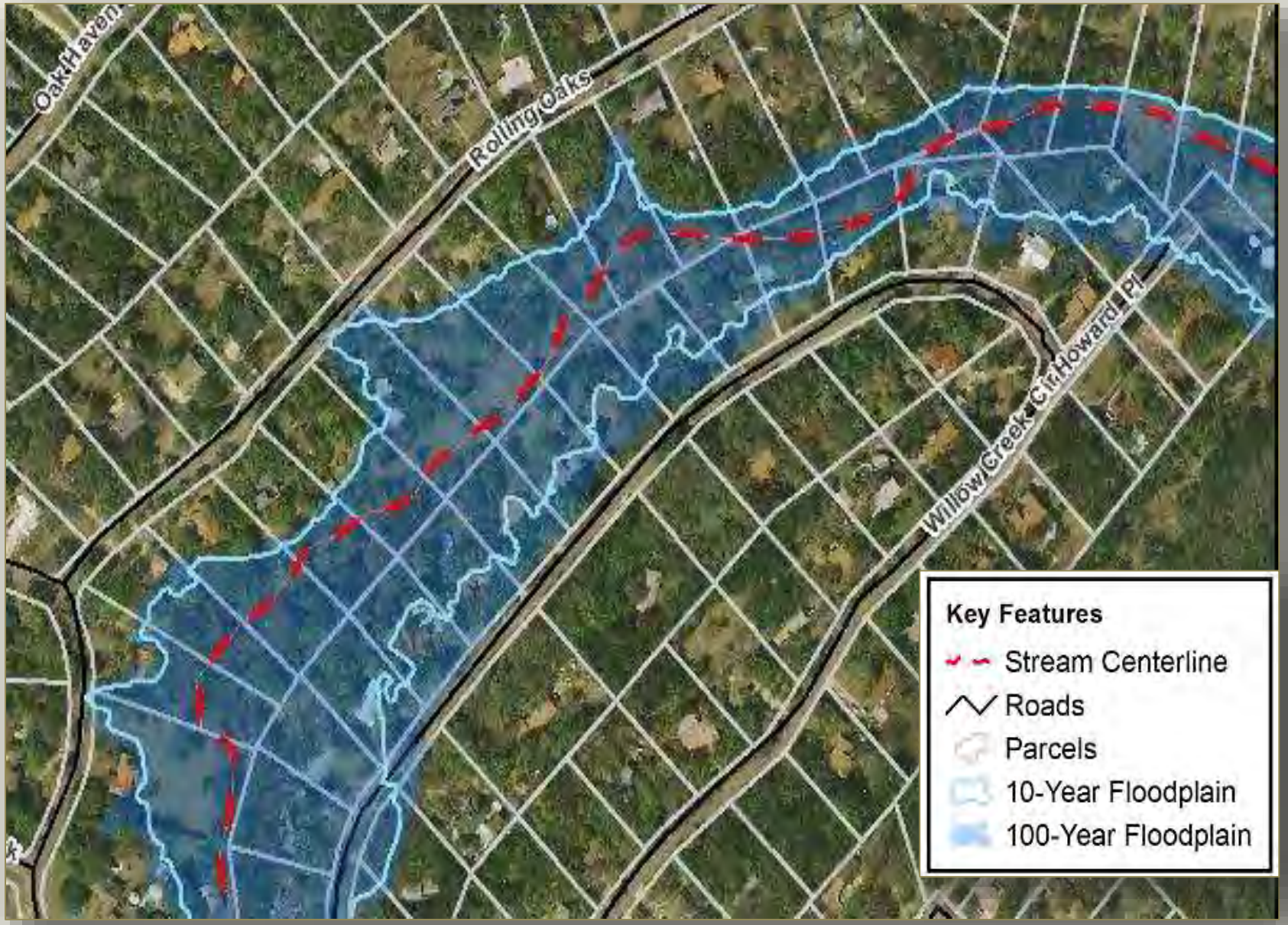
Current Mapping Challenges

- 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

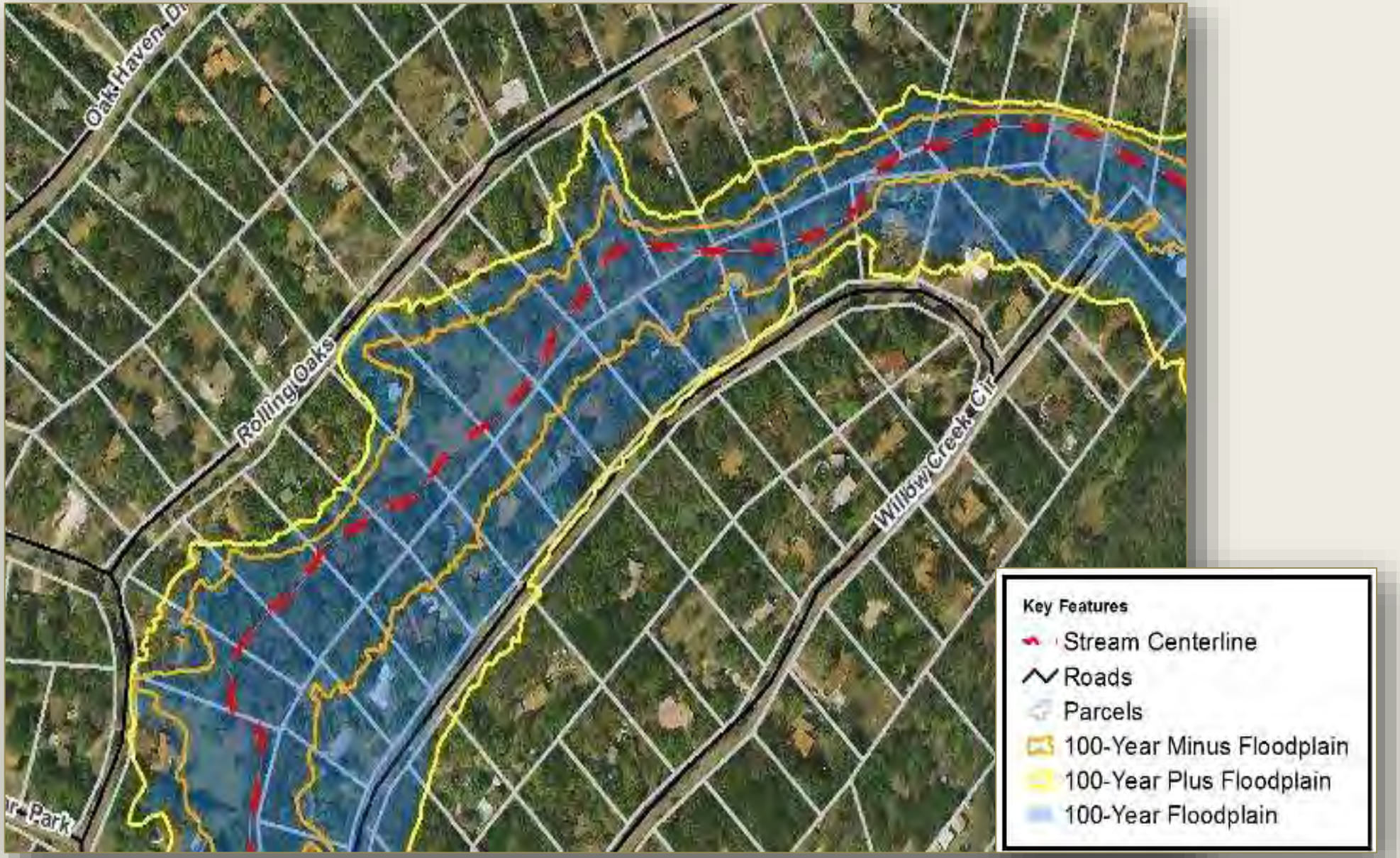
Base Level Engineering Solutions

- 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



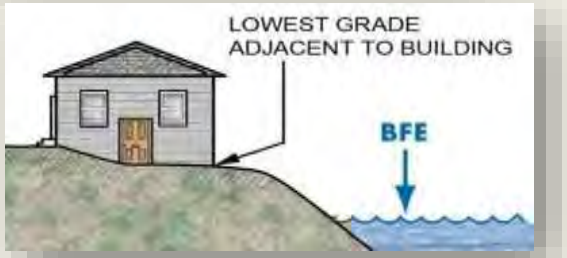
Practical Uses for BLE Data

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

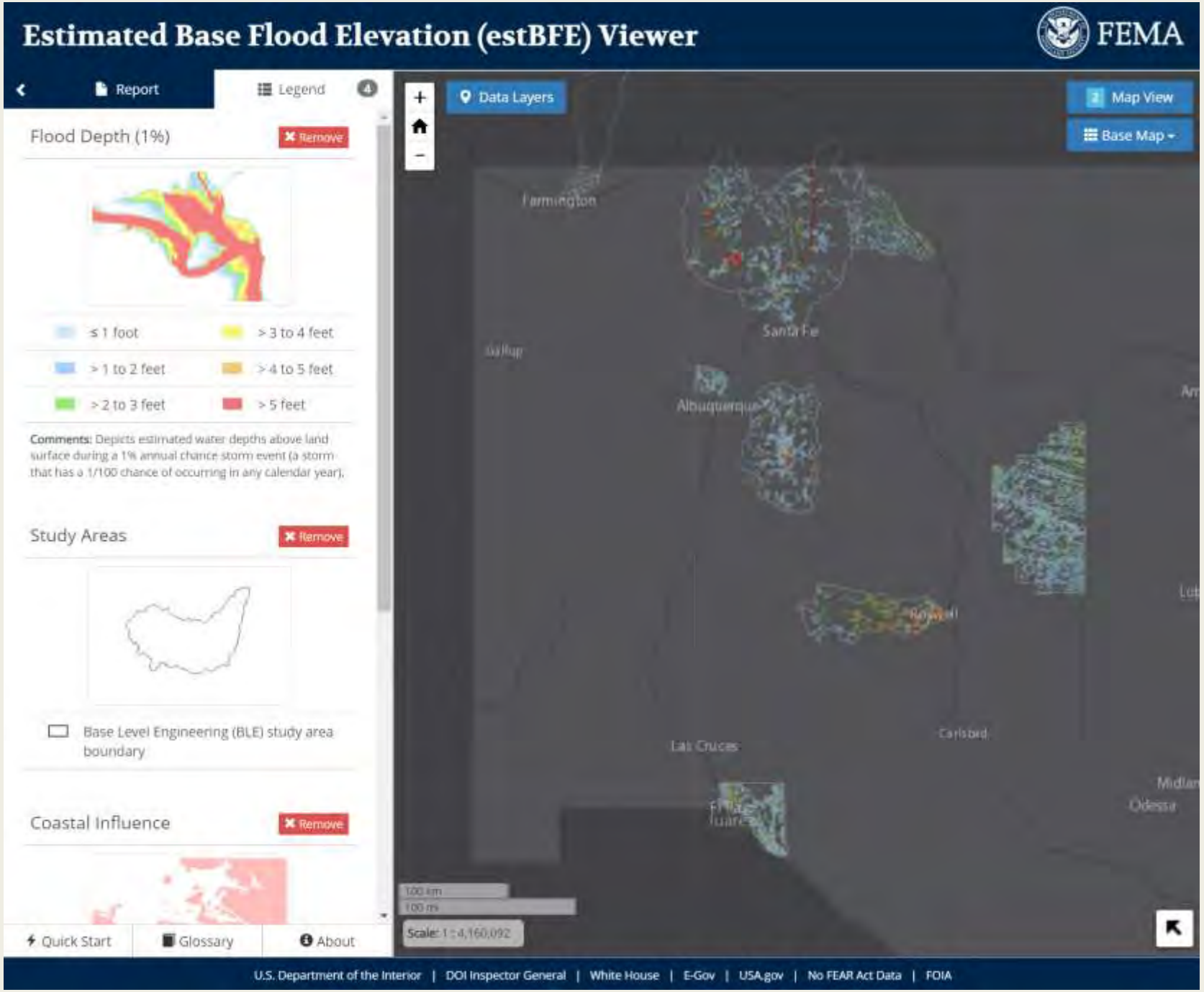
Our Data Download feature makes all of our Base Level Engineering data available to you for download.

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
4
Data Layers
Map View
Base Map
Flood Depth (1%)
Remove
≤ 1 foot
> 1 to 2 feet
> 2 to 3 feet
> 3 to 4 feet
> 4 to 5 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).
Study Areas
Remove
Base Level Engineering (BLE) study area boundary
Coastal Influence
Remove
Quick Start
Glossary
About
Farmington
Santa Fe
Albuquerque
Las Cruces
Carlsbad
Odessa
Scale: 1:4,160,092
U.S. Department of the Interior | DOI Inspector General | White House | E-Gov | USA.gov | No FEAR Act Data | FOIA

Estimated Base Flood Elevation Viewer

1% and 0.2%
Estimated Flood Extent

1%
Estimated Flood Depth

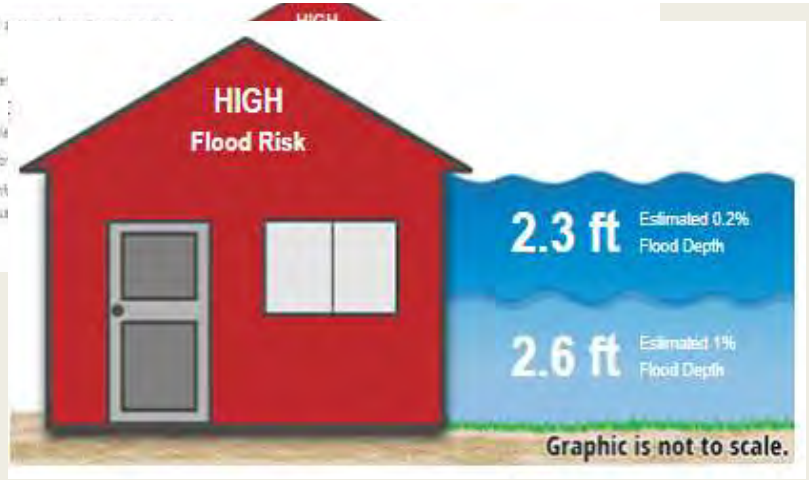
Estimated Base Flood Elevation Viewer

- 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.

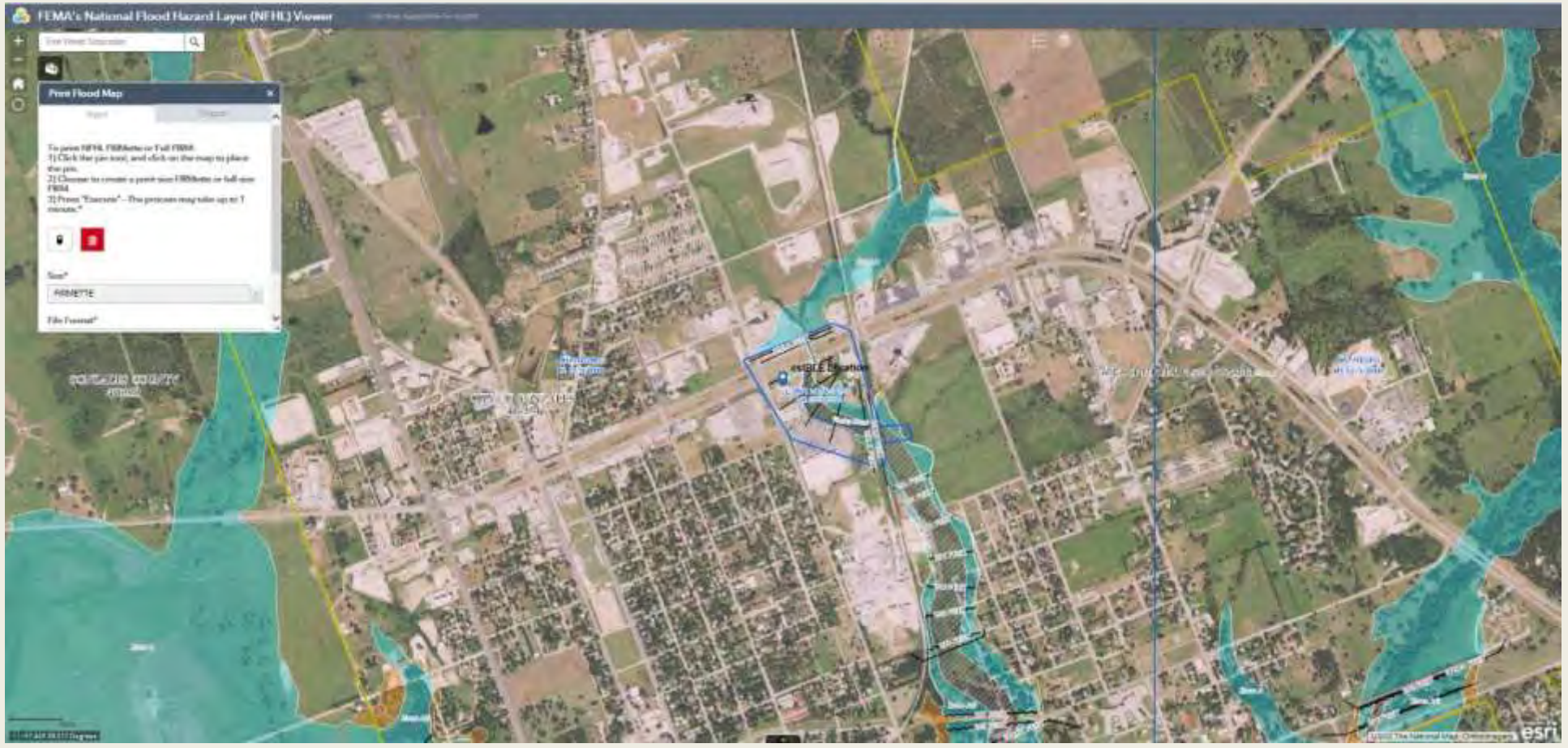
Information made available from the Estimated BFE Viewer needs to be accepted by local community officials to be used for insurance rating purposes.



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

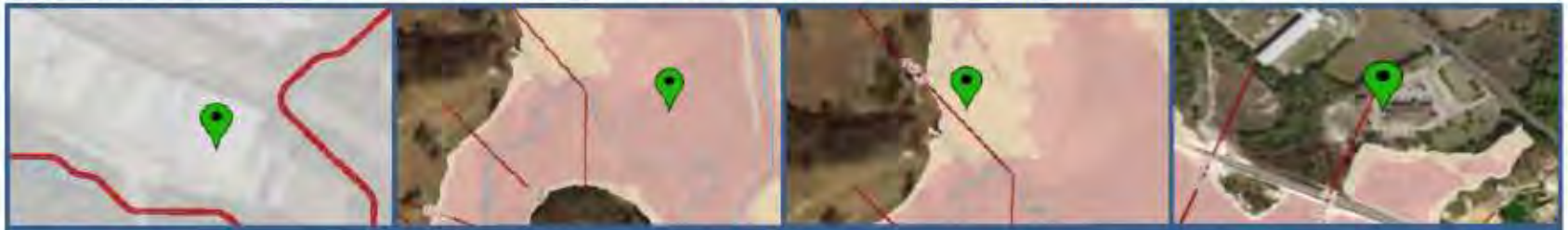
Estimated Base Flood Elevation Viewer

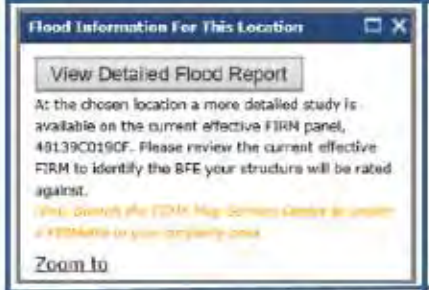
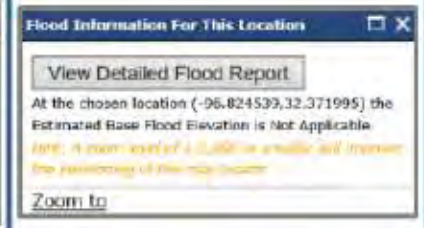
If detailed information is available on the current effective FIRM,
The viewer will alert you and offer you the option to open the National Flood Hazard Layer (NFHL)



Region 6 eBFE Viewer

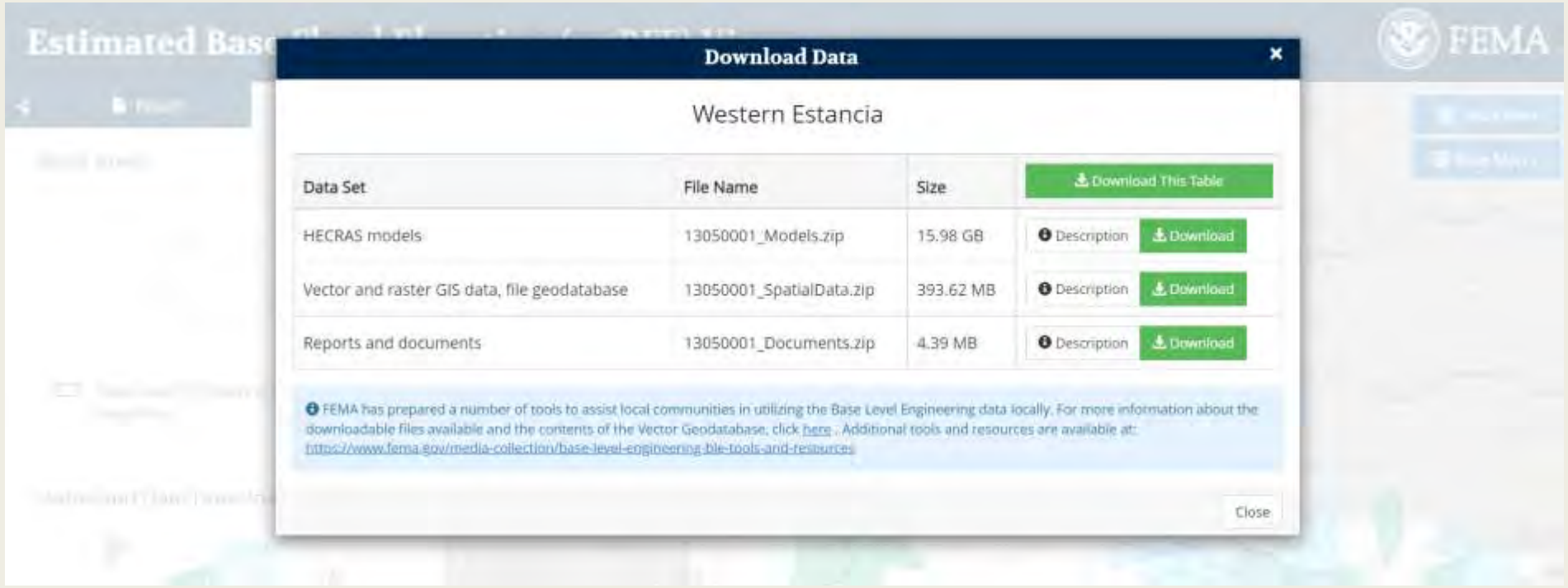
There are four possible outcomes dependent upon where the **Drop Pin** is placed: Detailed Study Available, High Risk, Low to Moderate Risk and Low Risk. More information is available in Table below.



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.

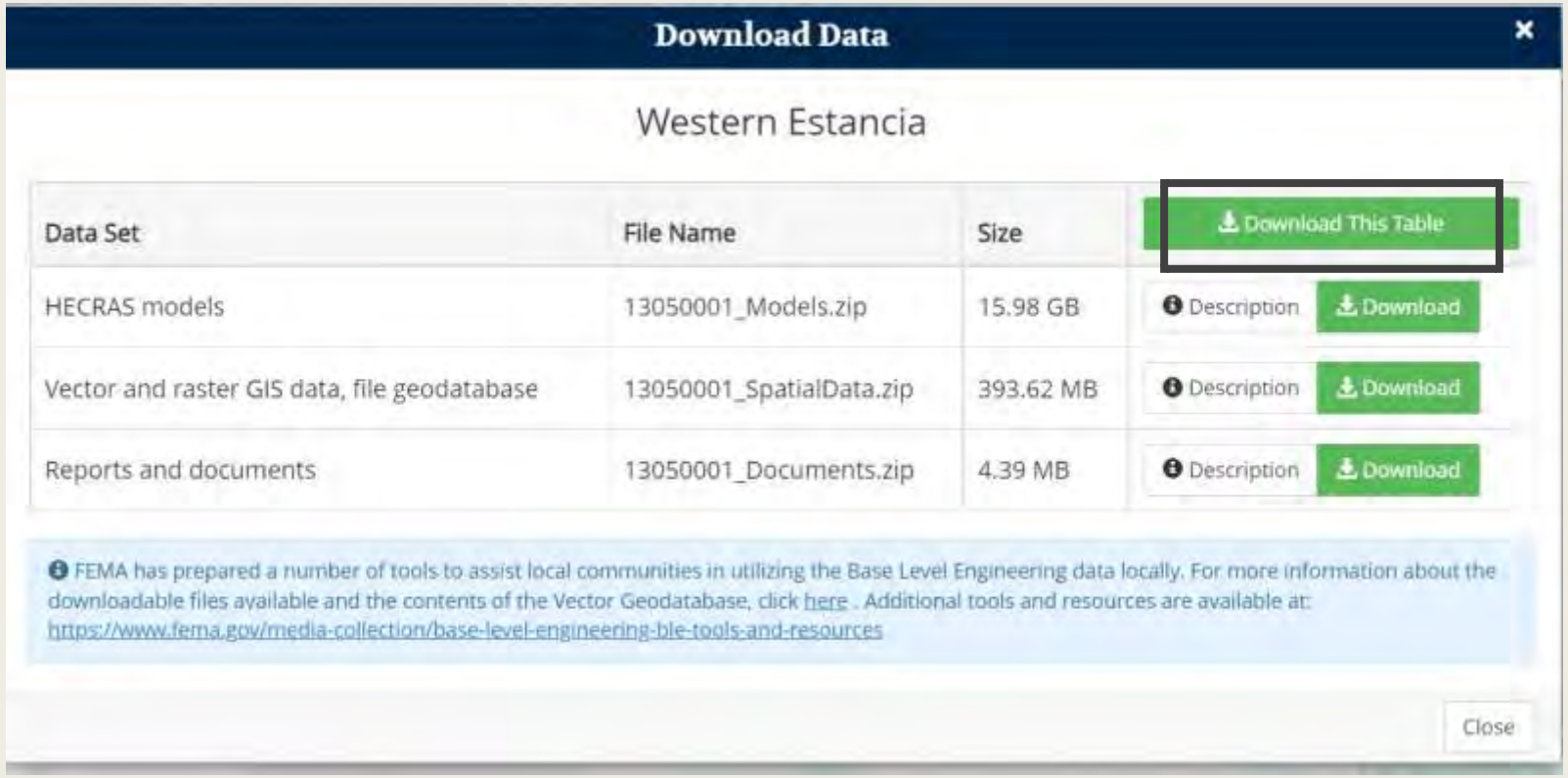
Note: At this time, flood elevations are only available in the High Flood Risk flood extent area.

Download the Data

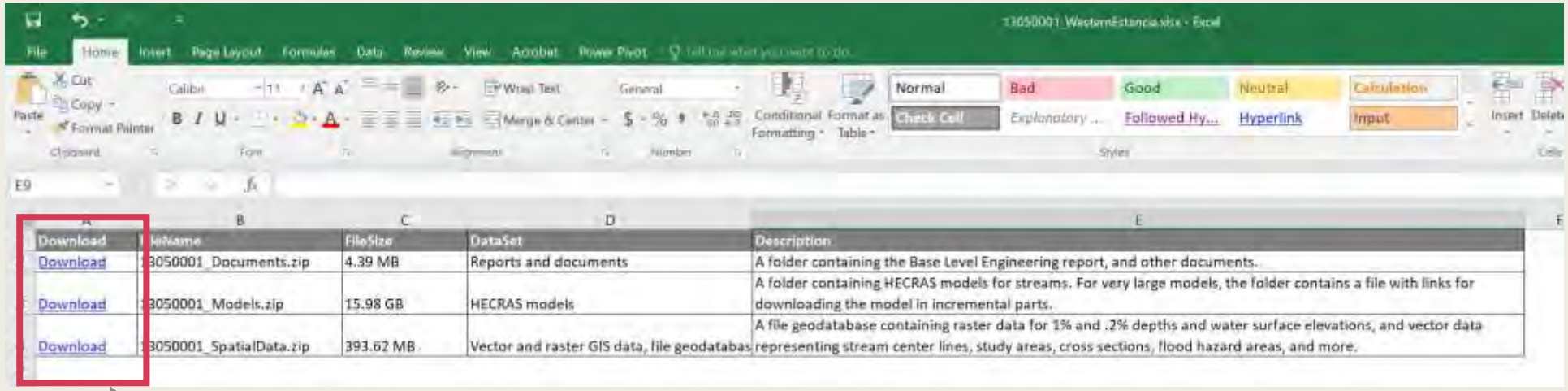


www.InFRM.us/estBFE

Download the Data



Download the Data



Download	FileName	FileSize	DataSet	Description
Download	13050001_Documents.zip	4.39 MB	Reports and documents	A folder containing the Base Level Engineering report, and other documents.
Download	13050001_Models.zip	15.98 GB	HECRAS models	A folder containing HECRAS models for streams. For very large models, the folder contains a file with links for downloading the model in incremental parts.
Download	13050001_SpatialData.zip	393.62 MB	Vector and raster GIS data, file geodatabas	A file geodatabase containing raster data for 1% and .2% depths and water surface elevations, and vector data representing stream center lines, study areas, cross sections, flood hazard areas, and more.

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 Repo

Western Estancia (HUC8#13050001)

FEMA

Augu

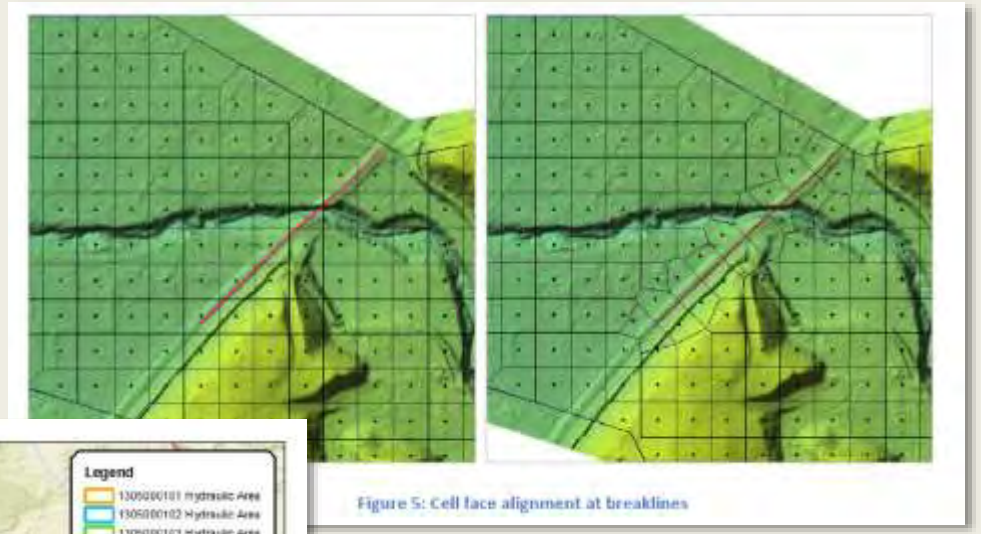


Figure 5: Cell face alignment at breaklines

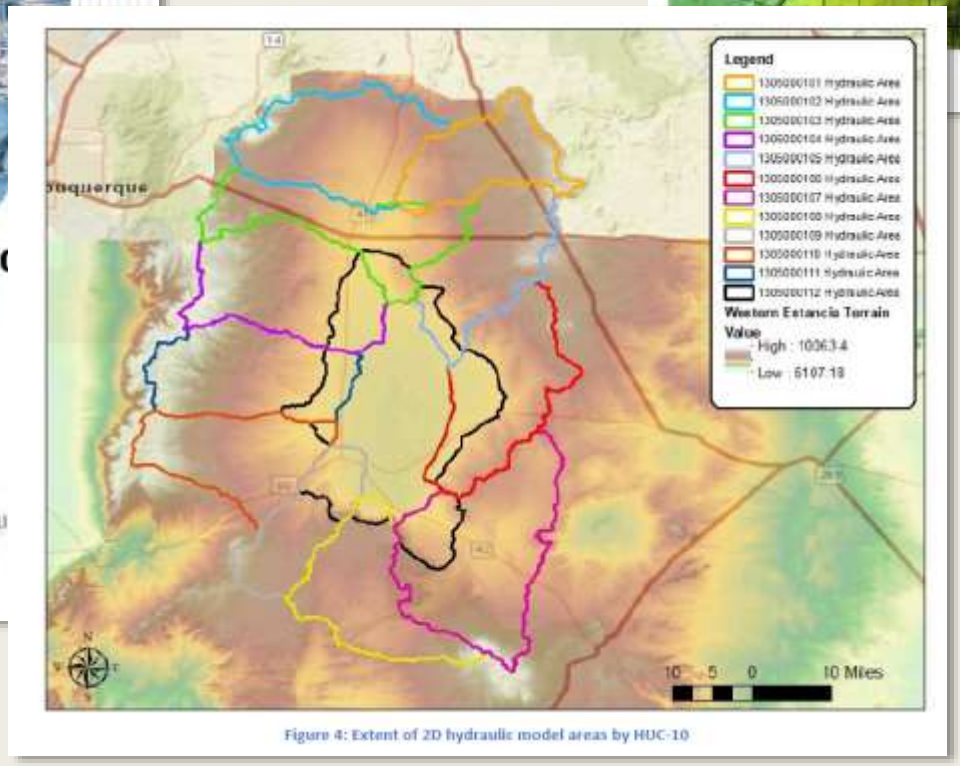


Figure 4: Extent of 2D hydraulic model areas by HUC-10

HAZUS ANALYSIS

A Hazus analysis was prepared using the 1- and 0.2-percent-annual-chance depth grids. Hazus version 4.2 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.

Values under $100,000 have been rounded to $10,000 and all other values are rounded to $100,000. Losses and replacement values are determined based on the census blocks that were associated with the study area and may not be all-encompassing of the listed county or community.

Table 12: Hazus Results Summary

Community	Total Replacement Value ($)	1% Total Losses ($)	0.2% Total Losses ($)
Unincorporated Areas of Bernalillo County	$800,900,000	$400,000	$500,000
Unincorporated Areas of Lincoln County	$500,000	$0	$0
Unincorporated Areas of San Miguel County	$2,200,000	$0	$0
Unincorporated Areas of Santa Fe County	$851,500,000	$2,000,000	$3,600,000
Unincorporated Areas of Socorro County	$500,000	$0	$0
Unincorporated Areas of Torrance County	$1,209,700,000	$15,600,000	$24,400,000
Edgewood, Town of	$503,800,000	$200,000	$500,000
Estancia, Town of	$124,500,000	$6,600,000	$10,500,000
Moriarty, City of	$213,800,000	$400,000	$1,100,000
Mountainair, Town of	$118,800,000	$0	$0
Willard, Village of	$25,500,000	$300,000	$700,000

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 …*

WESTERN ESTANCIA

BLE Areas of Interest

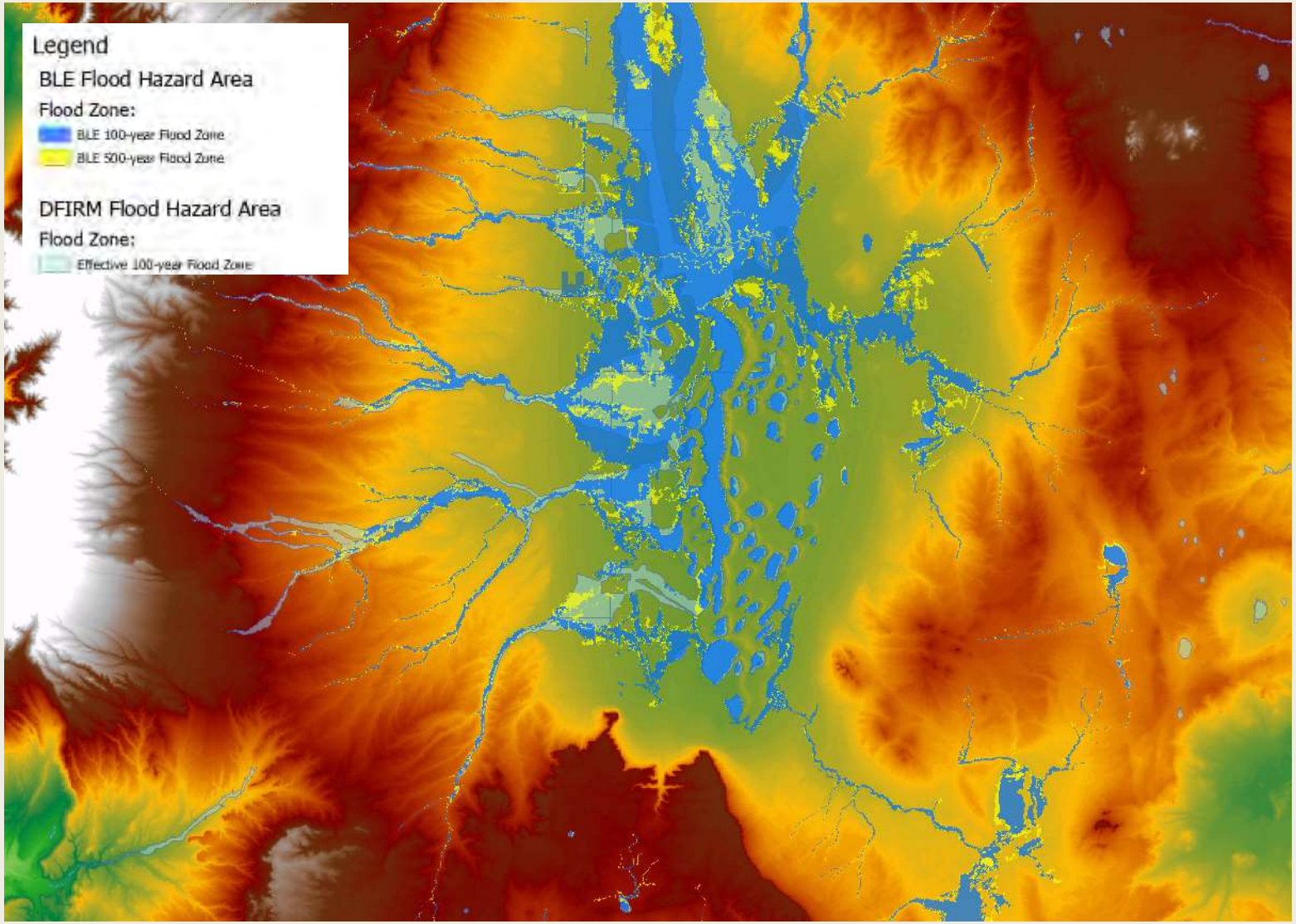
Mat Hornack, ESP & Associates

Western Estancia Areas of Interest
Overall Modeling Approach

- Western Estancia HUC-8 is a self-contained basin.
- 2D modeling approach used to capture the variety of flow paths within this basin.

Western Estancia Areas of Interest

Overall Modeling Approach

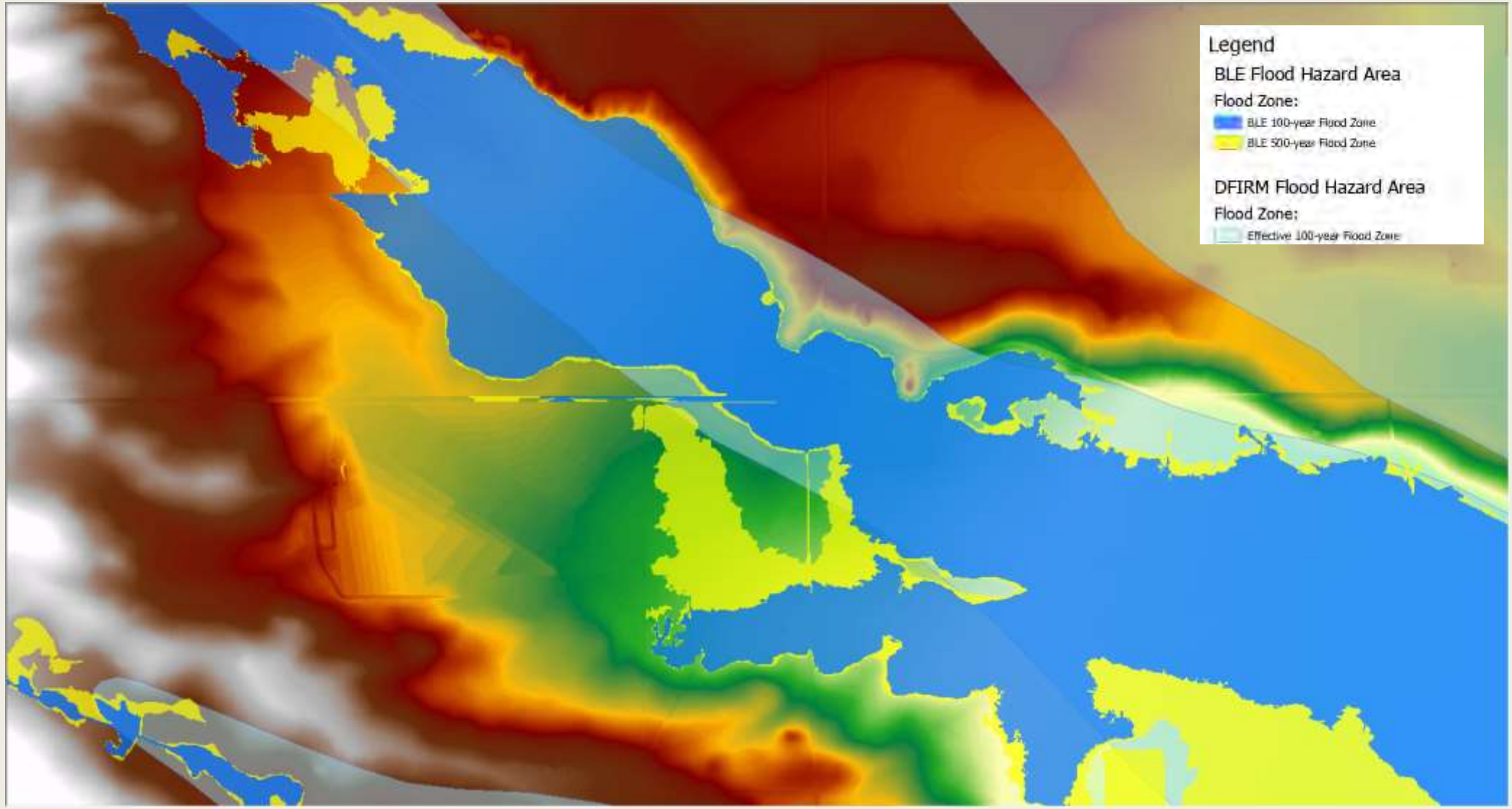


Western Estancia Areas of Interest
BLE vs Effective Example

- Area southwest of Moriarty
- Effective floodplain limits are inconsistent with terrain in this area.
- BLE Floodplains have greater detail than effective Zone A.

Western Estancia Areas of Interest

BLE vs Effective Example



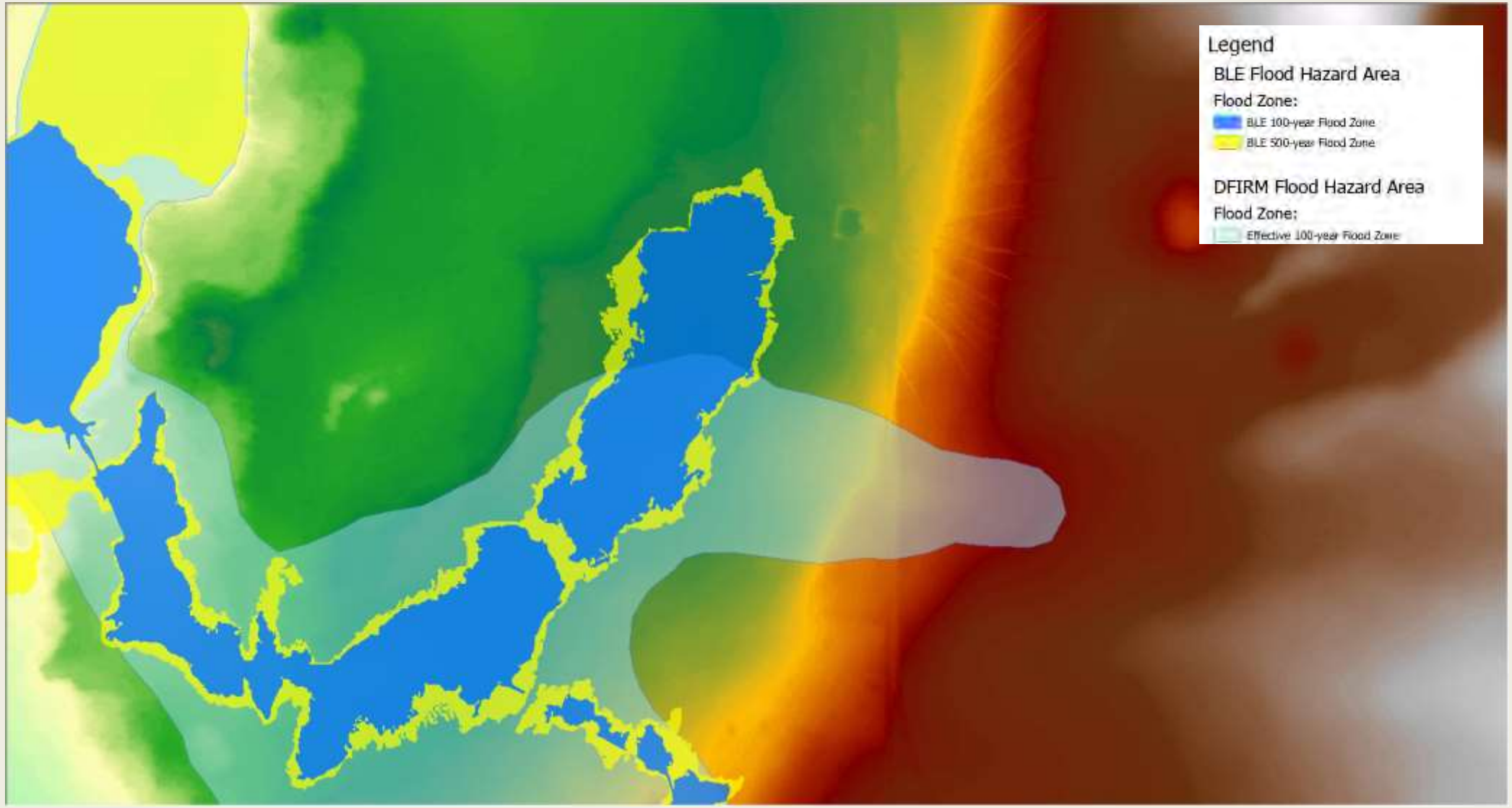
Western Estancia Areas of Interest

BLE vs Effective Example

- Along US 285 near White Lakes
- Effective floodplain limits are not tied to an elevation.
- BLE Floodplains match modeled elevation for these lake areas.

Western Estancia Areas of Interest

BLE vs Effective Example

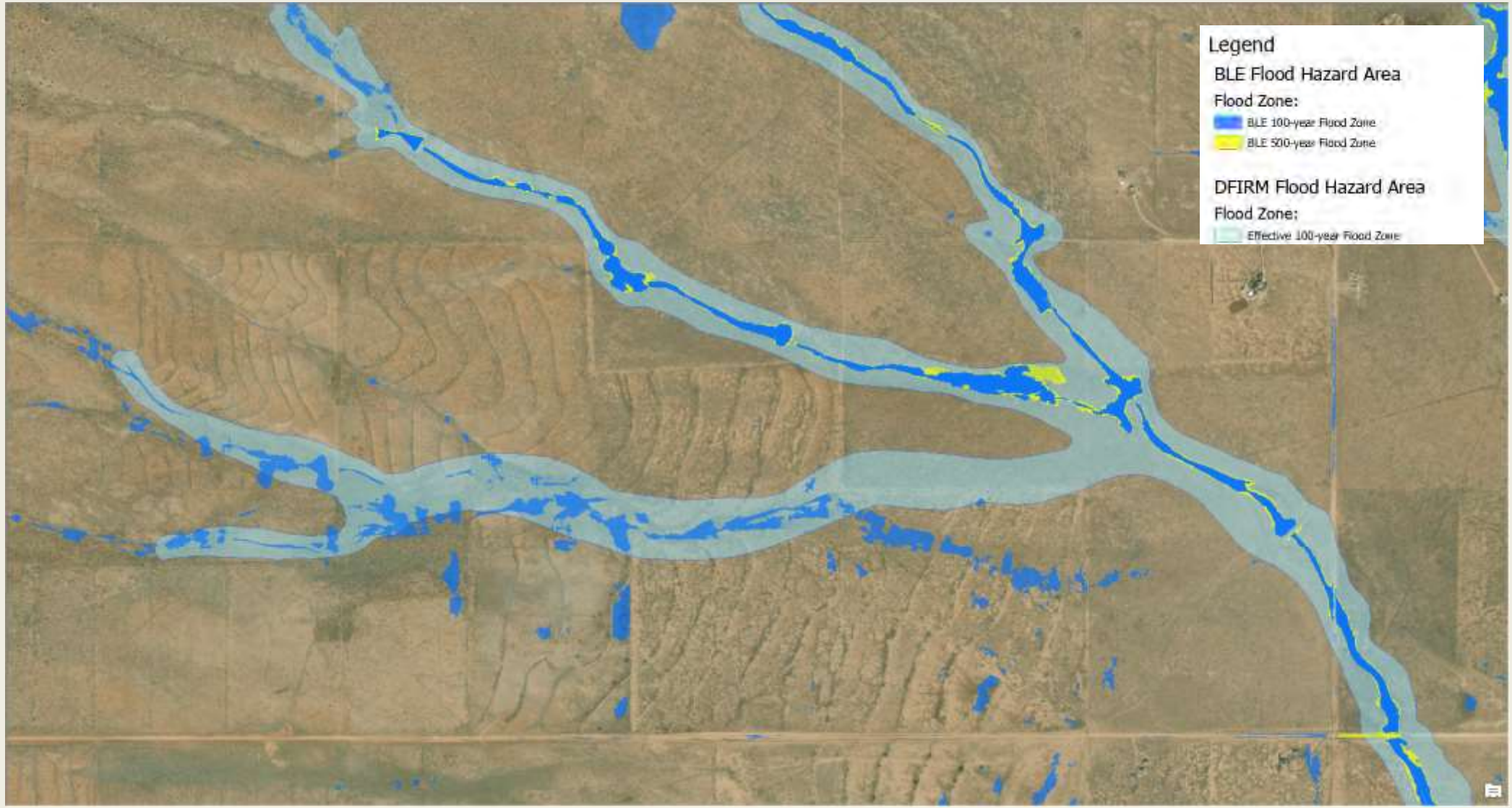


Western Estancia Areas of Interest
Removed Mapping

- 7.5 miles northwest of Stanley, NM
- Modeling showed disconnected flooding with depths around 0.5 feet and lower.

Western Estancia Areas of Interest

Removed Mapping



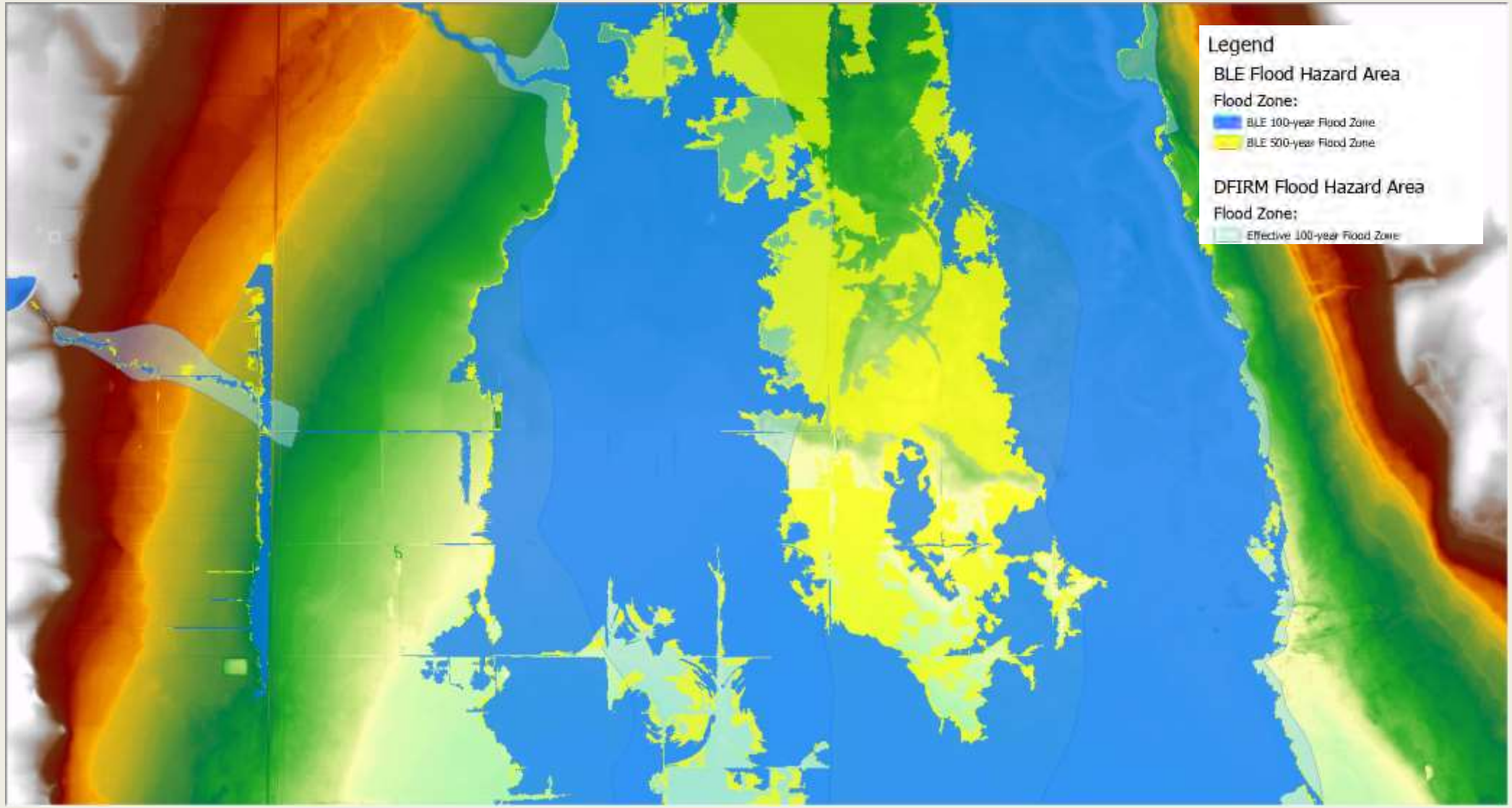
Western Estancia Areas of Interest

BLE vs Effective Example

- Near McIntosh, NM
- 2D modeling approach allows for seamless flow transfer between flooding sources.

Western Estancia Areas of Interest

BLE vs Effective Example



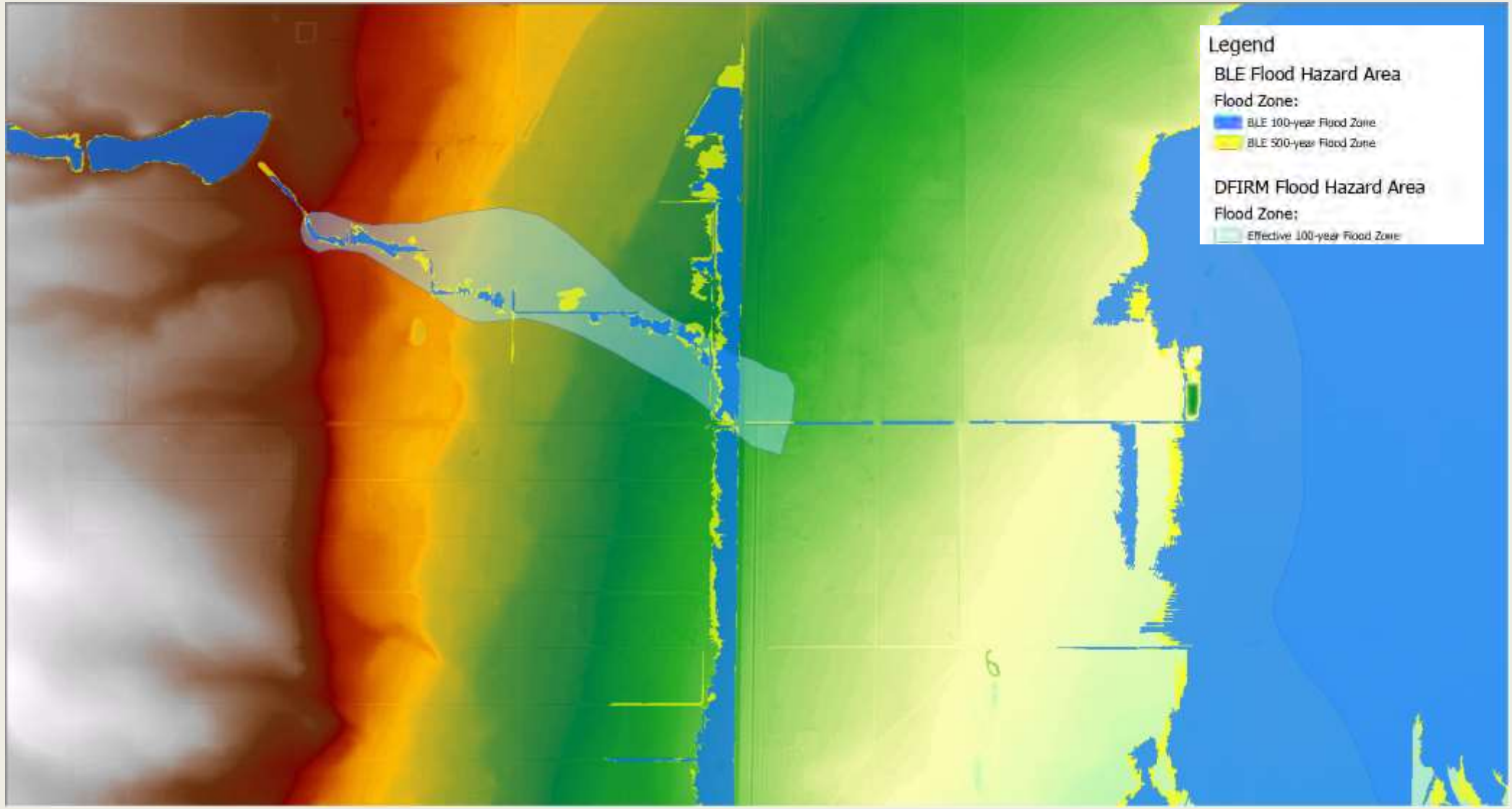
Western Estancia Areas of Interest

Structures Example

- West of McIntosh, NM
- Effective mapping ends for an unknown reason
- BLE mapping reflects impact of embankment but may overestimate flooding due to not explicitly modeling structures.
- BLE models are set up to simplify adding structures in the future.

Western Estancia Areas of Interest

Structures Example



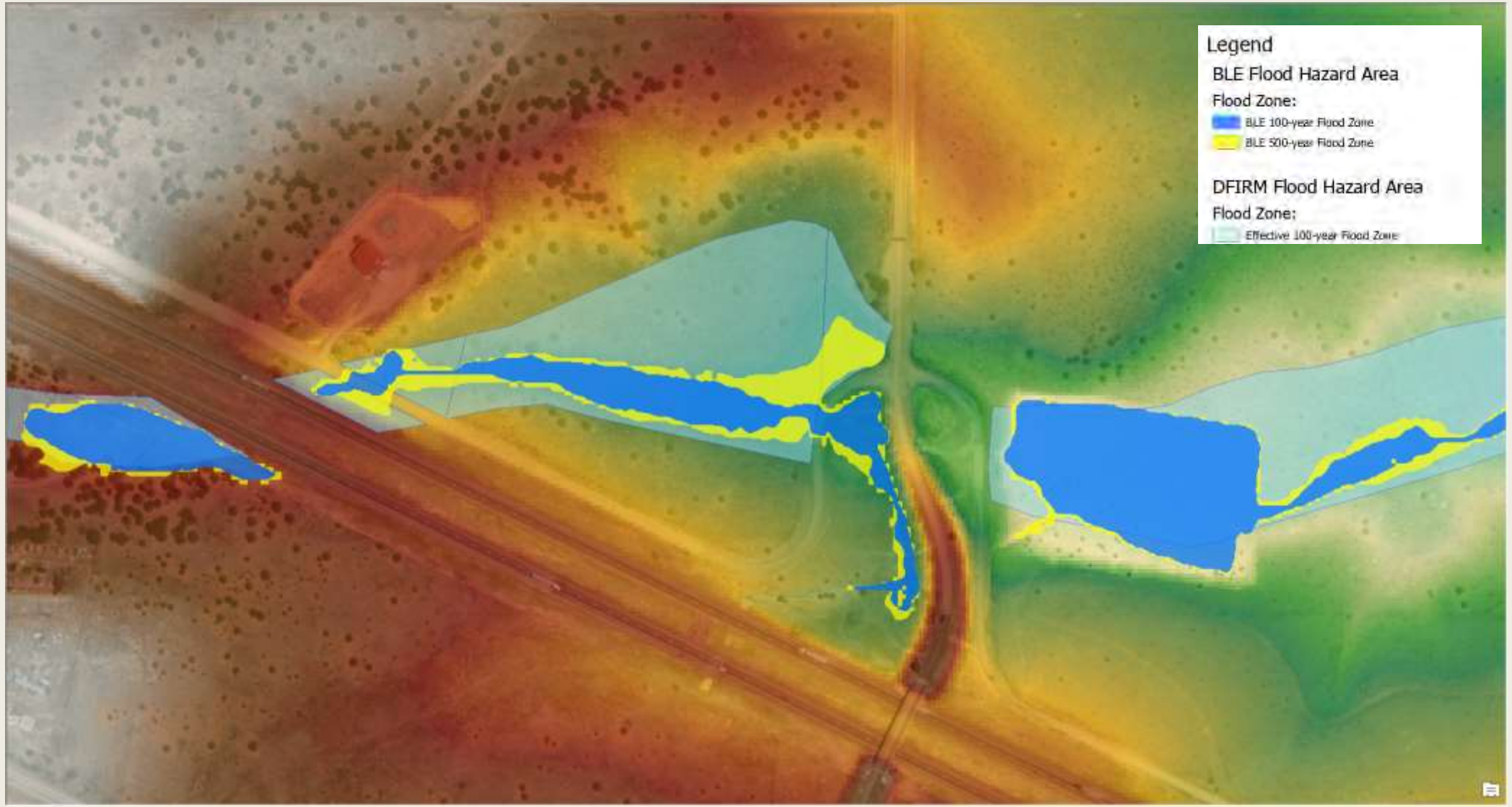
Western Estancia Areas of Interest

Structures Example

- Southeast Edgewood
- Several structures and embankments here
- For 2D BLE, we permit flow across structures and sometimes have to force the mesh to allow flow through.

Western Estancia Areas of Interest

Structures Example



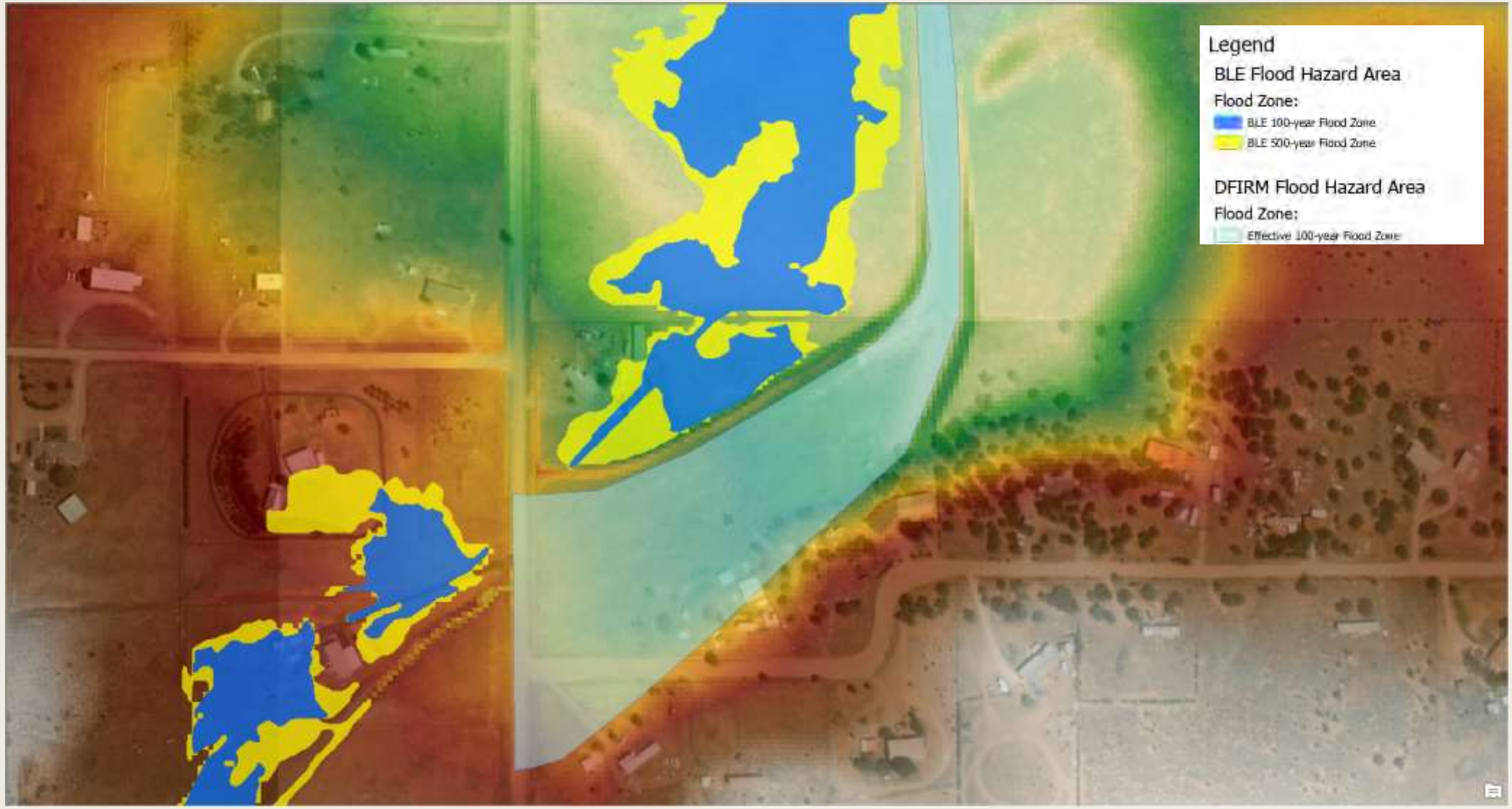
Western Estancia Areas of Interest

Structures Example

- Barton Road (Bernalillo and Santa Fe County Boundary)
- Survey or field investigation would help to understand structures and flow patterns here.
- This level of detail is outside of the scope of a BLE analysis.
- Flow depths are very shallow in this area.

Western Estancia Areas of Interest

Structures Example



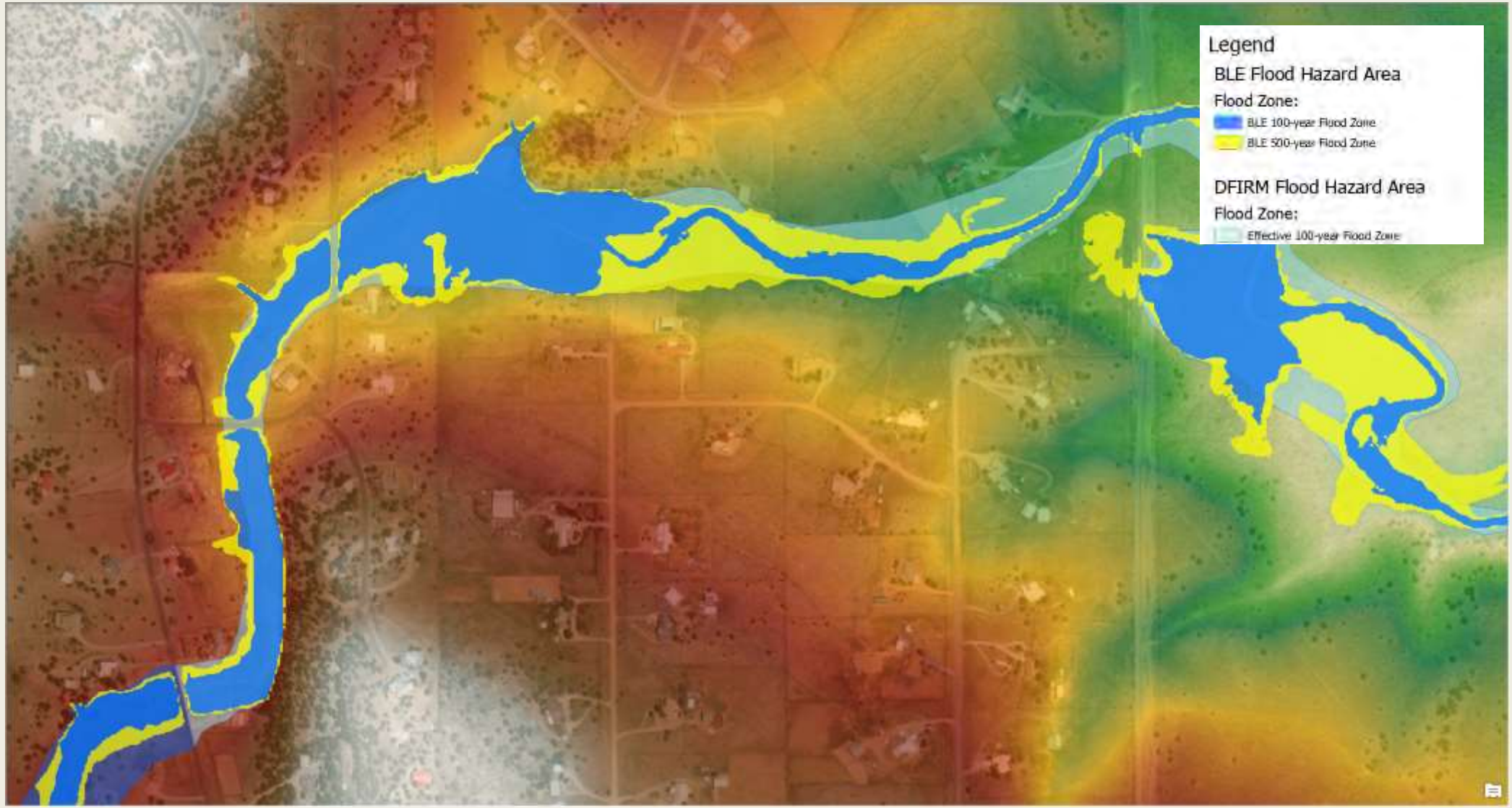
Western Estancia Areas of Interest

BLE vs Effective Example

- Between Barton and Edgewood
- Without gages, no model calibration is possible
- In certain areas, especially closer to the headwaters of a basin, flooding is less than effective mapping.
- Further downstream, modeling is closer to effective mapping.

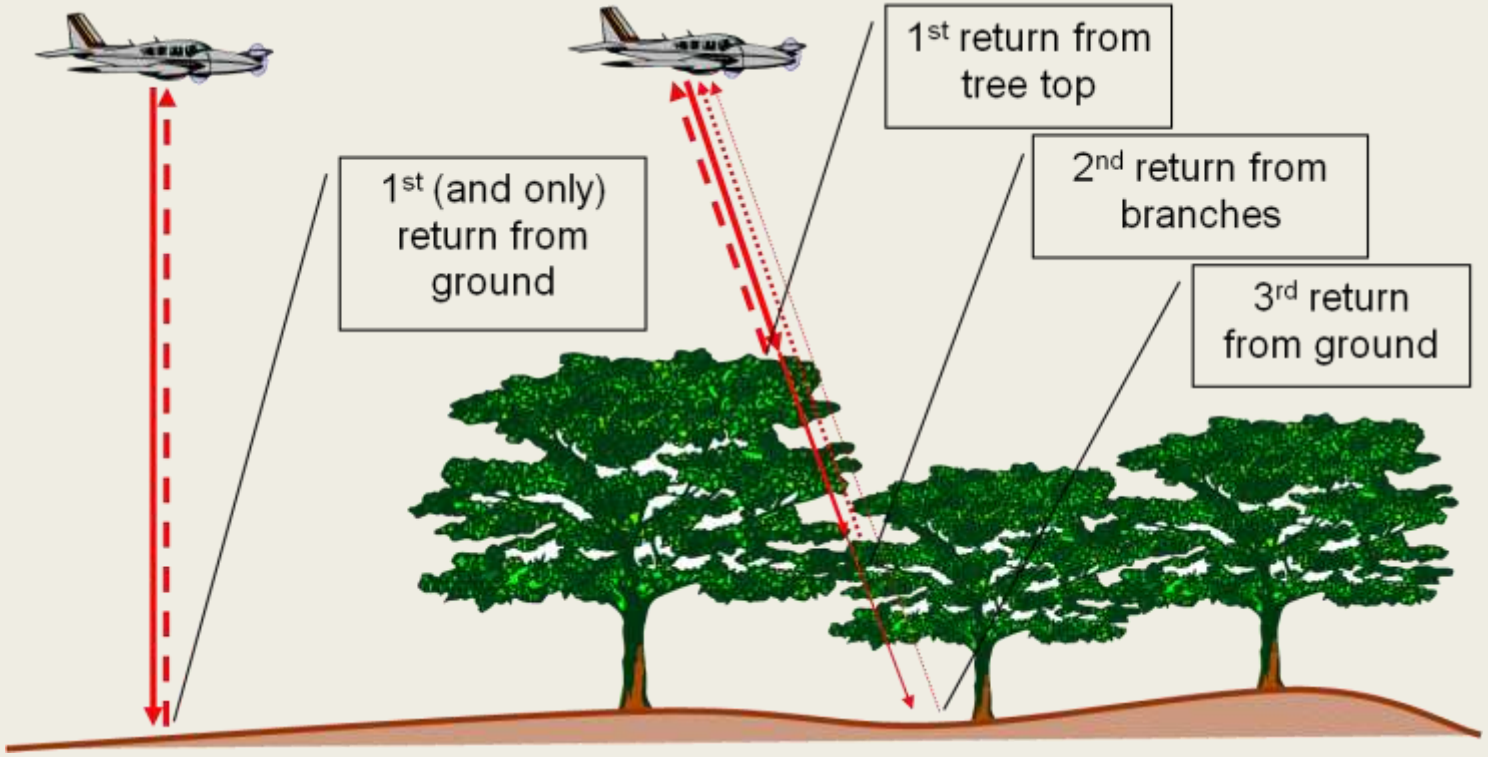
Western Estancia Areas of Interest

BLE vs Effective Example



LIDAR

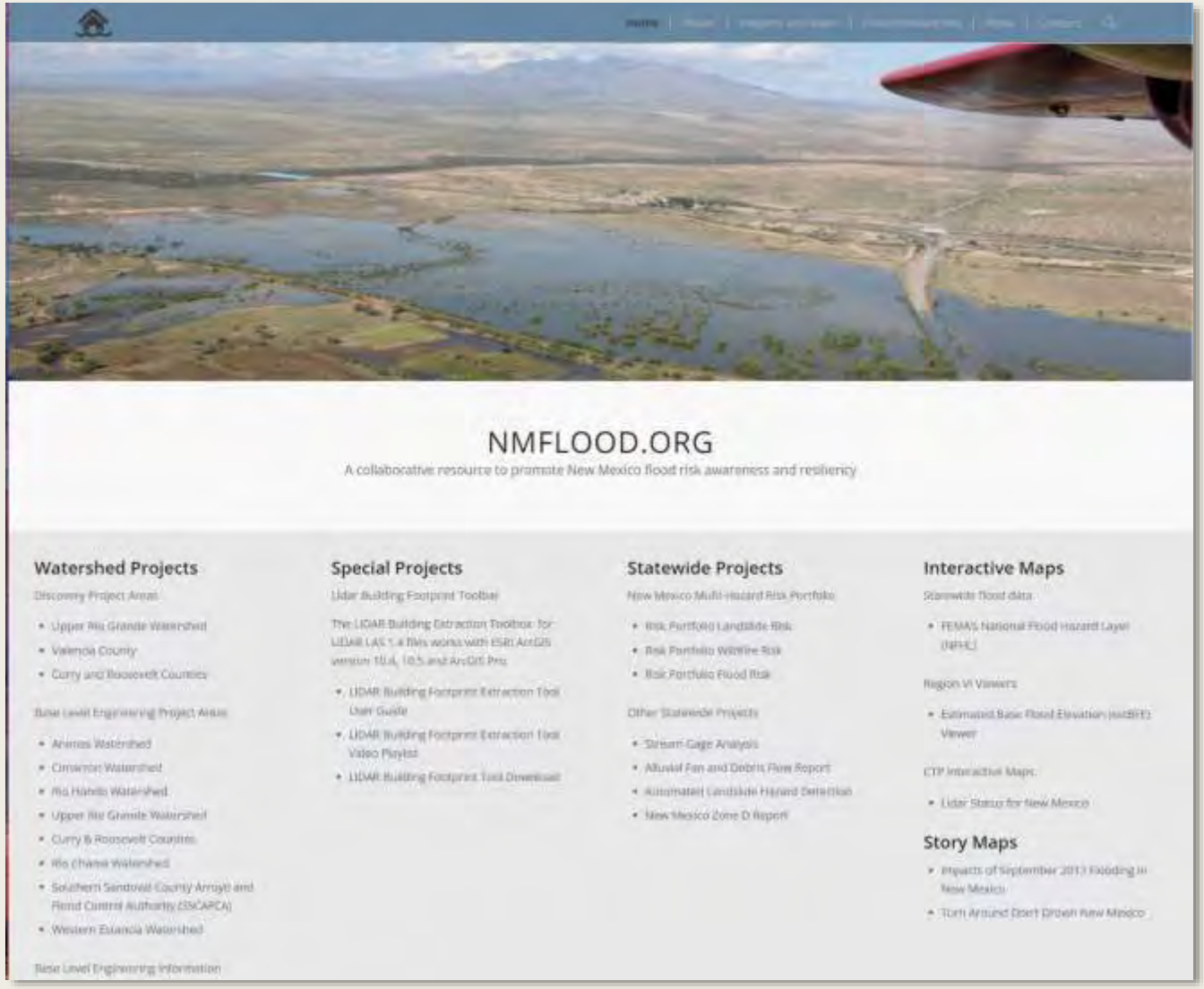
Lidar Returns



Forest Resource Assessment Nepal

Current 10 Meter DEM vs USGS QL2 Lidar

NMFLOOD.org


NMFLOOD.ORG
A collaborative resource to promote New Mexico flood risk awareness and resiliency
Watershed Projects
Discovery Project Areas
Upper Rio Grande Watershed
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 (eBFE) 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

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Riddle, J.R, Cattle in pasture, Estancia Ranch, New Mexico, 1886-1888. Courtesy of the Palace of the Governors Photo Archives, New Mexico History Museum, Santa Fe, New Mexico, Negative No. 076108.