Base Level Engineering 101

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Texas Water Development Board

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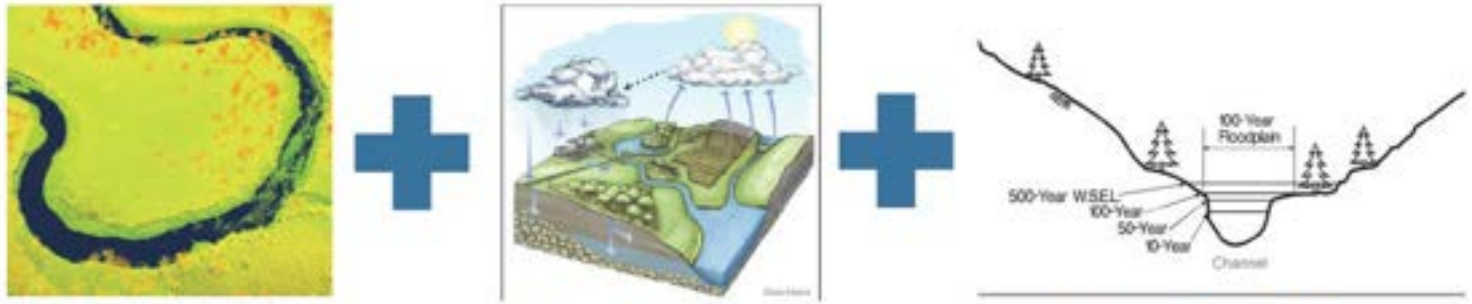
*Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

Objectives

- What is Base Level Engineering?
- BLE Benefits
- BLE product overview
- How do we use it?

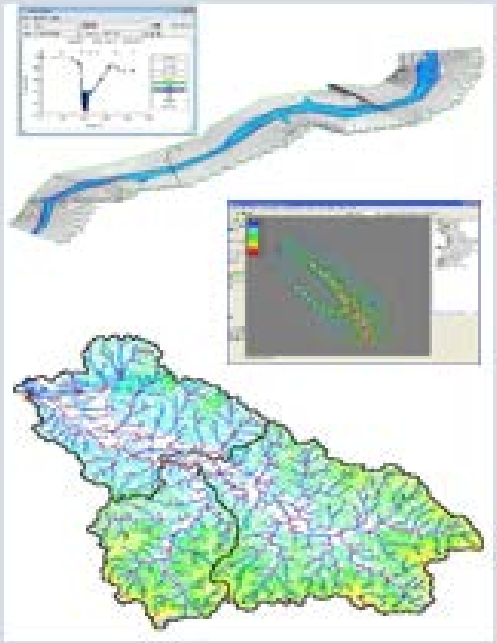
What is Base Level Engineering?



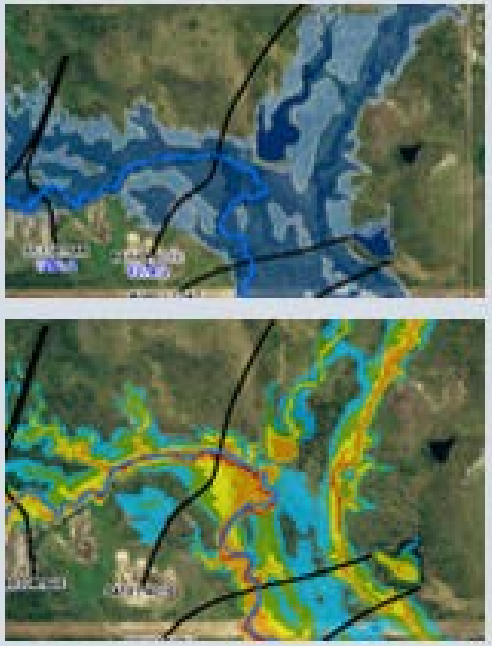
Lidar + Hydrology + Hydraulics

= Base Level Engineering

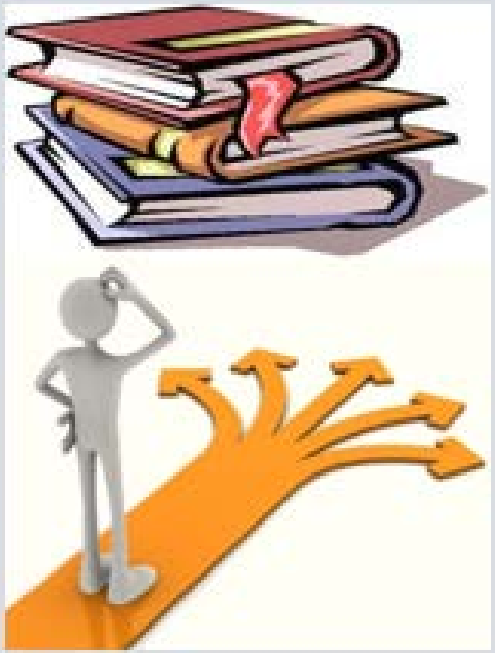
Base Level Engineering is a programmatic evolutionary step which provides:



Credible engineering analysis and modeling for local communities and developers.



Estimation of flood extents, water surface elevations and flood depths

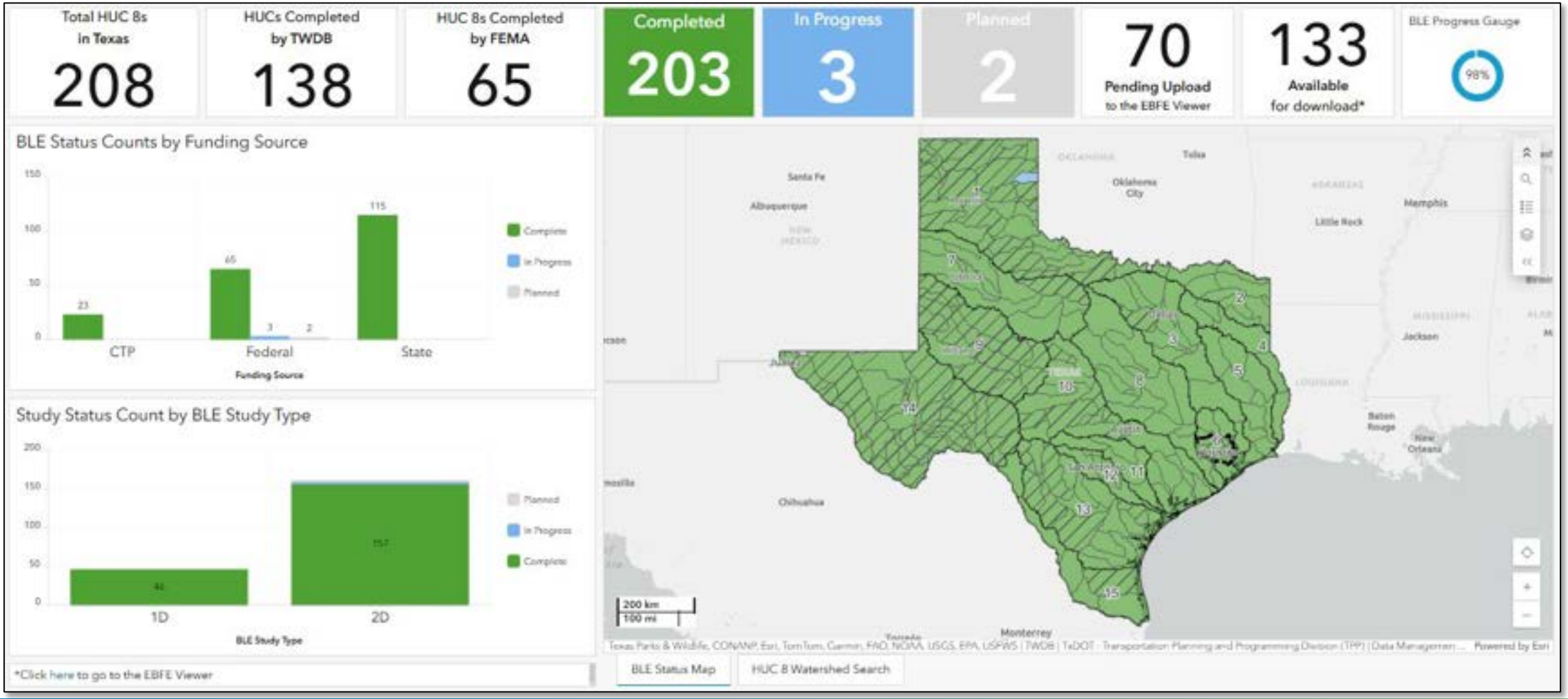


May be adopted as Best Available Information (BAI) by communities & inform development decisions.

BLE Benefits

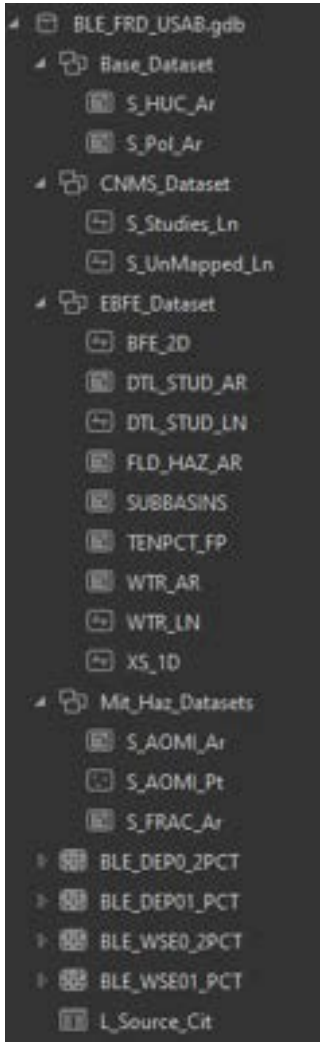
- Comprehensive picture of flood risk for entire watershed (Zone A's)
- Provides modeling to support local flood mitigation strategies, projects, and initiatives
- Information to support local planning and development decisions for multiple community departments.
- Less time intensive than detailed study/FIRM update

Base Level Engineering (BLE) Status



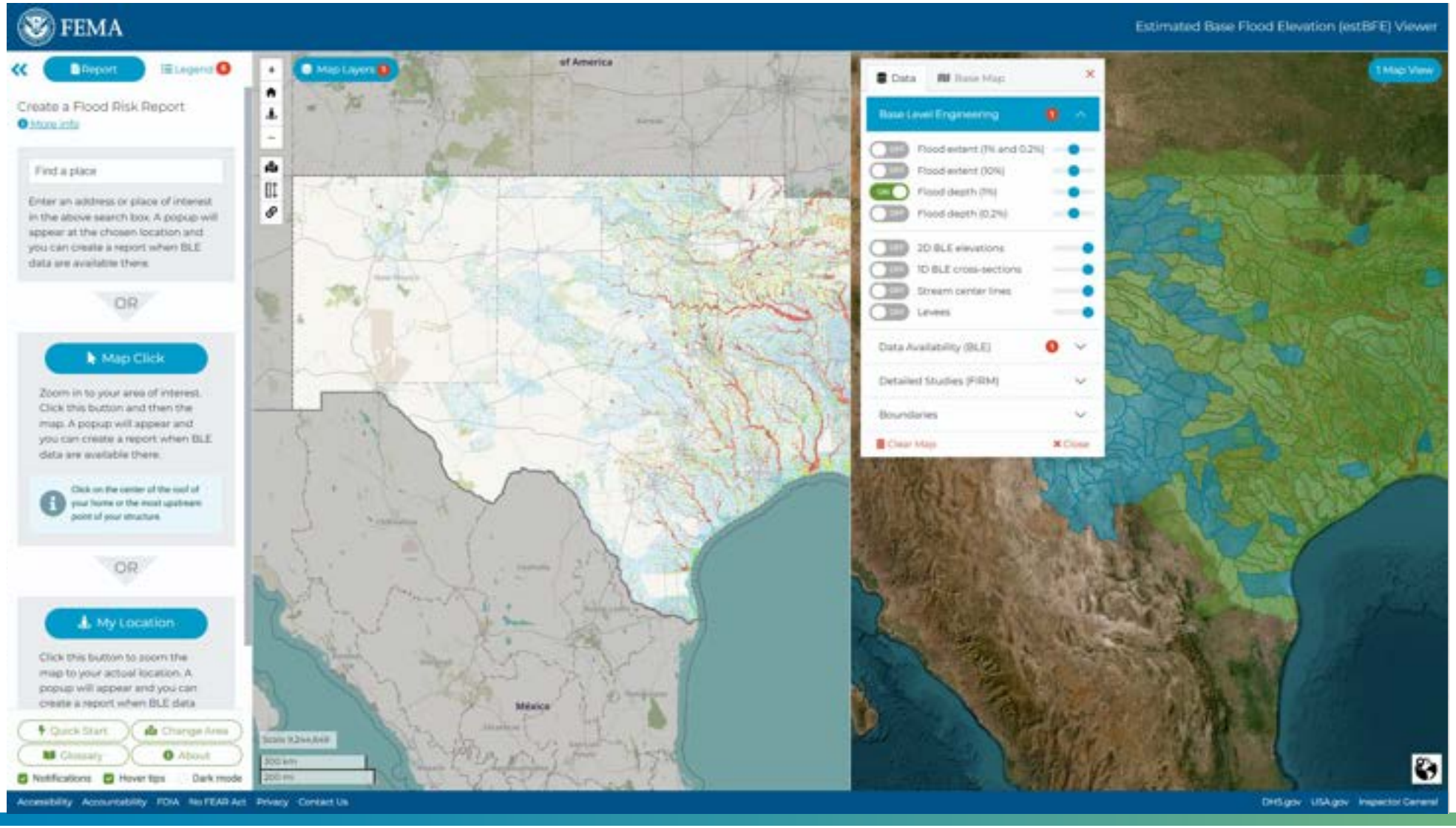
What do I get with BLE?

Category	Feature Name	Description
Base	S_POL_AR or S_FRD_POL_AR	Political Boundaries for Counties/Parishes, Towns/Cities, etc. within the study area.
Base	S_HUC_AR	Watershed (or other) boundary to define the extent of the study area.
CNMS	S_Studies_LN S_Unmapped_LN	Studies provides stream centerlines for study streams, also includes information about current FIRM flood zone. Unmapped includes streamlines beyond the Base Level Engineering study limits.
EBFE	DET_STUD_LN and DET_STUD_AR	Features provide an understanding of detailed (Zone AE/VE) study areas shown on the current effective FIRM. In these areas users should consult and review Base Level Engineering (BLE) results against the Base Flood Elevations (BFEs) shown on FIRMs prior to use of the BLE data alone.
EBFE	Subbasins	Drainage areas used for hydrologic analysis in BLE assessment.
EBFE	S_WTR_LN S_WTR_AR	The line file (LN) includes stream centerlines and the polygon (AR) file includes ponds and lakes that are within the study area.
EBFE	S_FLD_HAZ_AR	Polygon file with floodplain extents determined in the BLE study. The file includes estimated floodplain extents for 1% and 0.2% annual chance floodplains. In GIS these can be categorized using the EST_AR_ID field/column (1% is denoted with "HIGH" and 0.2% is denoted with "MODERATE" in the field). All other areas (not included) should be understood to be "LOW" flood risk during the 1% and 0.2% events.
EBFE	TENPCT_FP	Estimated flood extents expected during the 10% annual chance storm event. A 10% event should occur more frequently than the 1% and is associated with a smaller rainfall event.
EBFE	XS_1D	Location and orientation of all analysis cross-sections (XS) that were used in the BLE assessment, available for all 1D analysis areas prepared. If file is not available, analysis was performed with 2D.
EBFE	BFE_2D	BFE lines prepared from the Water Surface Elevation grid, intended to assist users to determine flow direction and provide information for estBFE Viewer.
Mitigation	S_AOMI_PT S_AOMI_AR	Files indicate areas where additional information could refine the BLE results – identifies where structure/survey would be beneficial
Mitigation	S_FRAC_AR or S_CenBlk_AR	This polygon feature class is the spatial foundation for all census blockbased flood risk assessment data. Damage estimates for flood risk assessments performed at the Census Block are stored in this dataset.
Depth Raster	BLE_DEP0_2PCT BLE_DEP01_PCT	Rasters that give the depth of flooding for the 1% and 0.2% annual chance events.
WSEL Raster	BLE_WSE0_2PCT BLE_WSE01_PCT	Rasters that give the Water Surface Elevation for the 1% and 0.2% annual chance events.

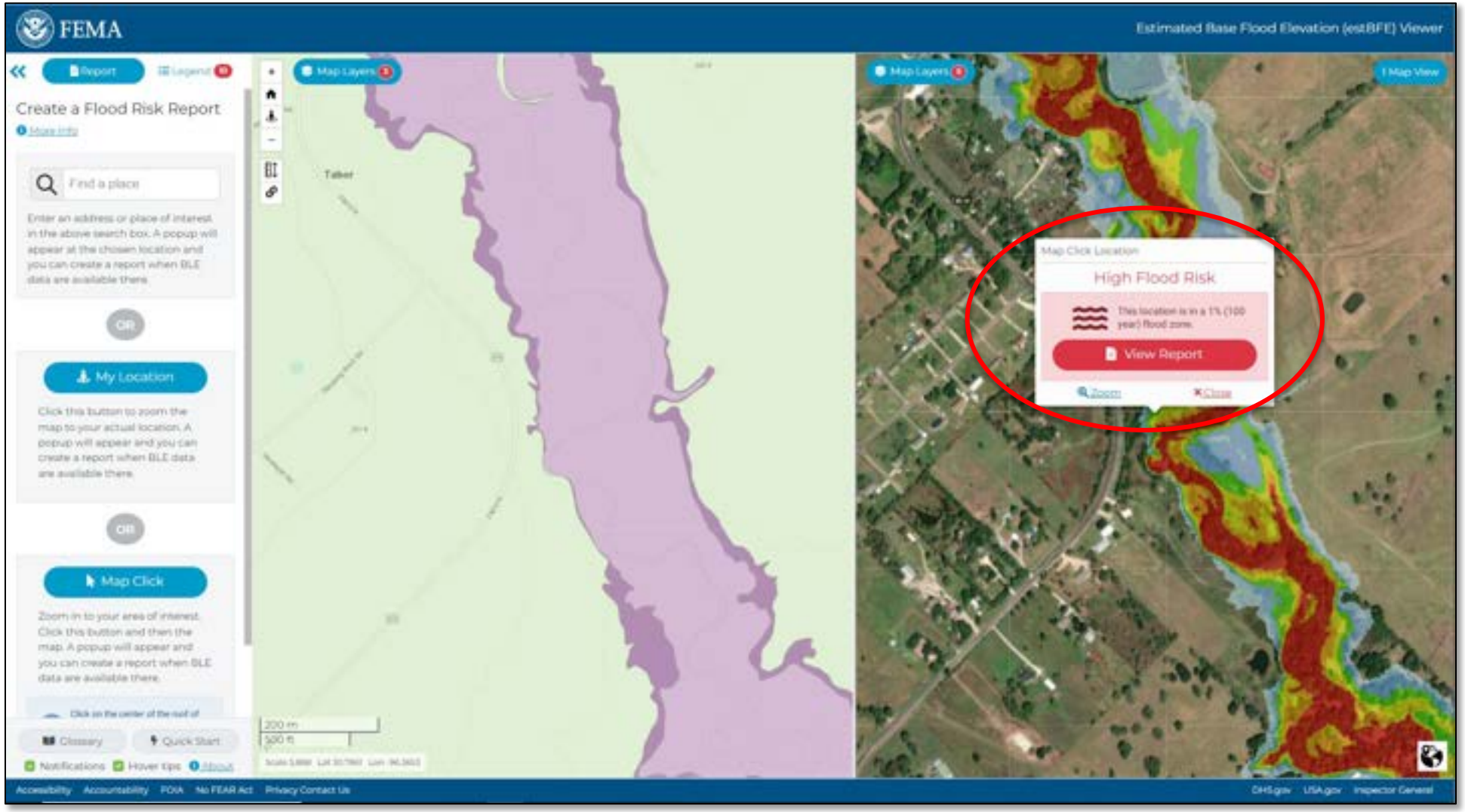


Using the viewer

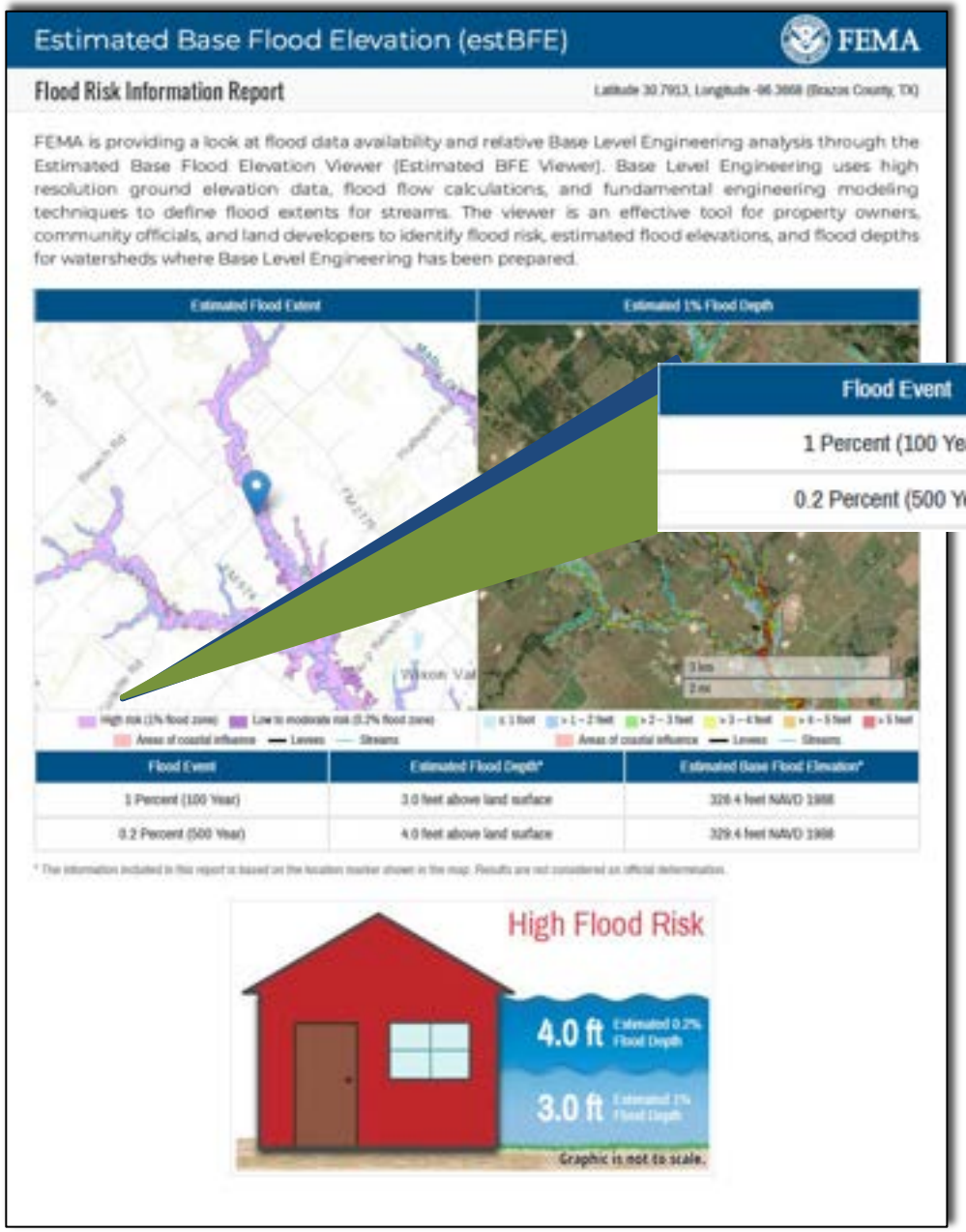
https://webapps.usgs.gov/infrm/estBFE/



Run a Site-Specific Report



Report Features


Estimated Base Flood Elevation (estBFE)

FEMA

Flood Risk Information Report

Latitude 30.7913, Longitude -96.3668 (Brazos County, TX)

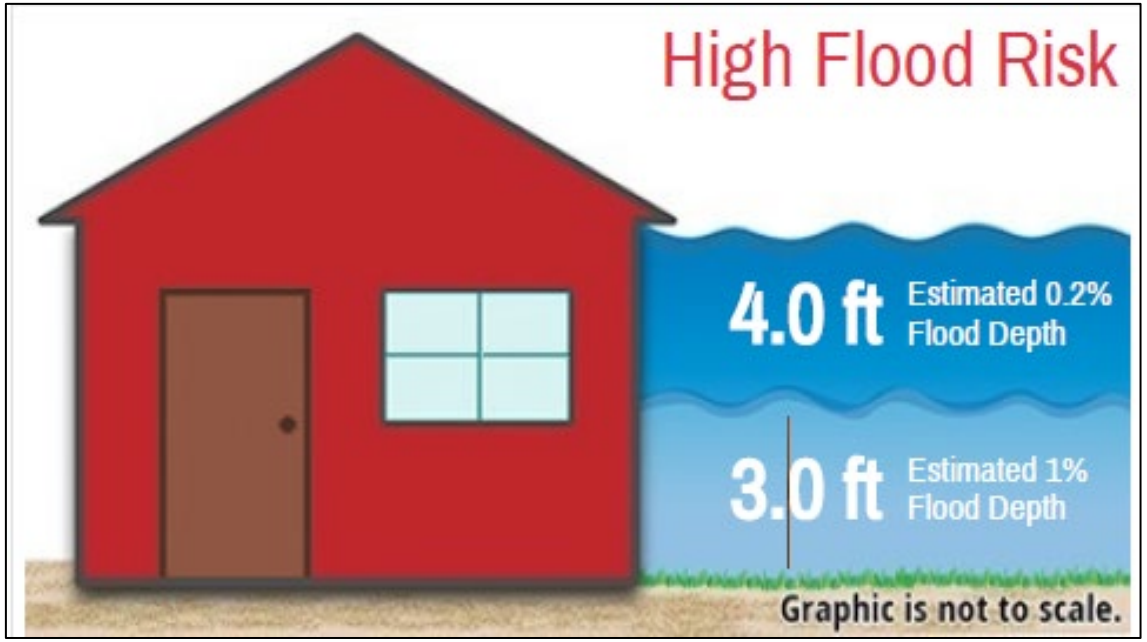
FEMA is providing a look at flood data availability and relative Base Level Engineering analysis through the Estimated Base Flood Elevation Viewer (Estimated BFE Viewer). Base Level Engineering uses high resolution ground elevation data, flood flow calculations, and fundamental engineering modeling techniques to define flood extents for streams. The viewer is an effective tool for property owners, community officials, and land developers to identify flood risk, estimated flood elevations, and flood depths for watersheds where Base Level Engineering has been prepared.

Estimated Flood Extent

Estimated 1% Flood Depth

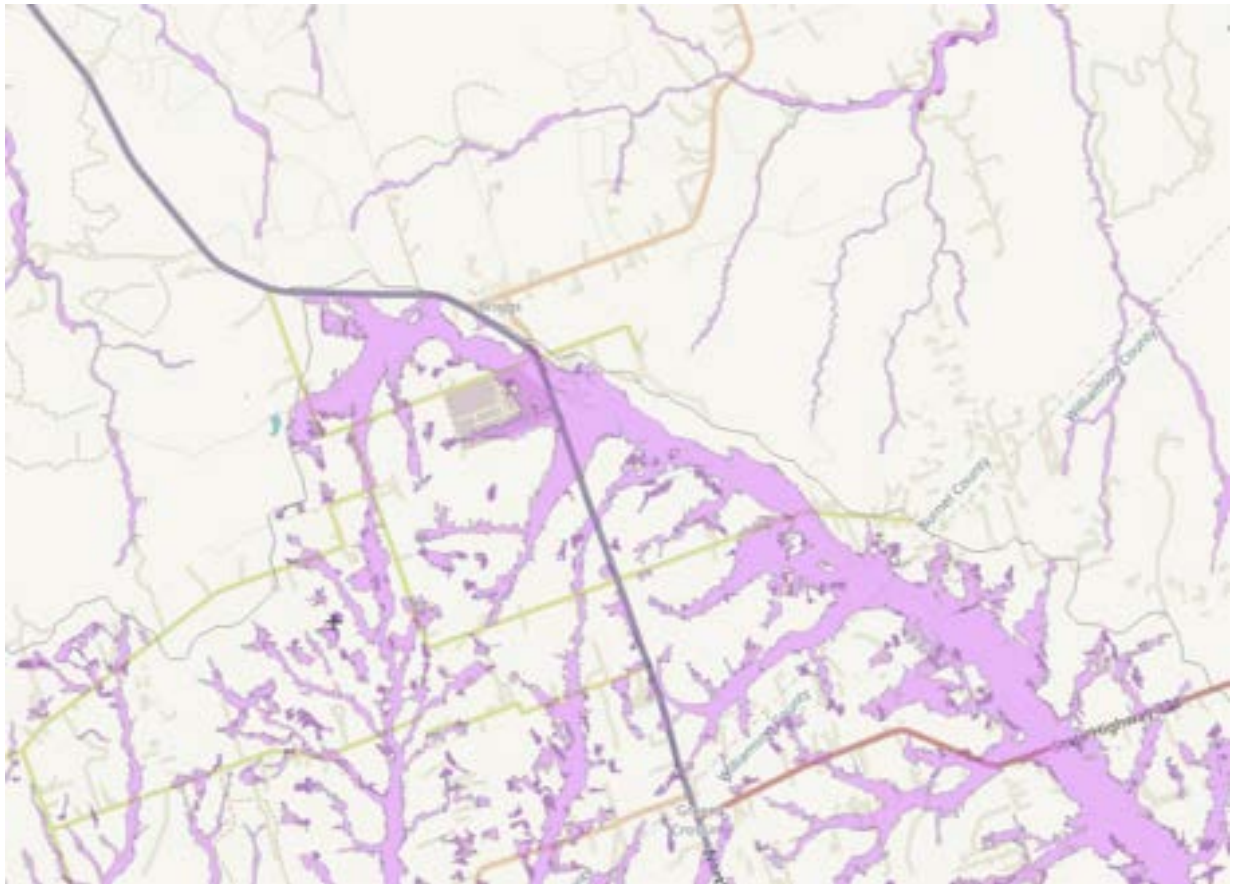
Flood Event	Estimated Flood Depth*	Estimated Base Flood Elevation*
1 Percent (100 Year)	3.0 feet above land surface	328.4 feet NAVD 1988
0.2 Percent (500 Year)	4.0 feet above land surface	329.4 feet NAVD 1988

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

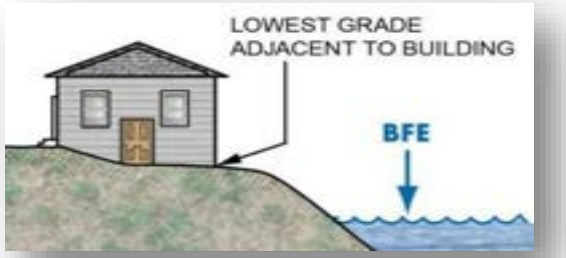


Site Specific Reports

1D BLE vs 2D BLE vs FIRM



Base Level Engineering Uses



PERMITTING

MITIGATION
PLANNING

LOMCs

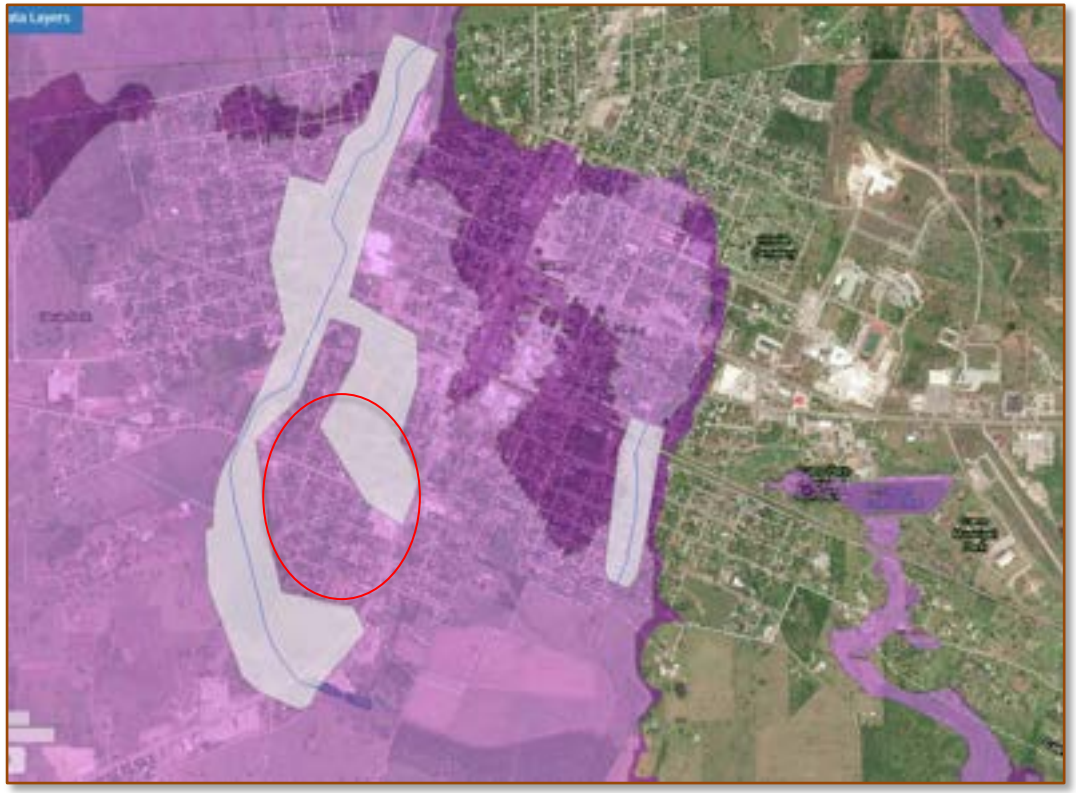
FIRM vs BLE

- BLE information does not replace your current Flood Insurance Rate Map (FIRM)
- BLE is NOT a FIRM, but data/modeling produced can support future FIRM update
- BLE data is meant to compliment FIRMs
- BLE arms communities with data to assist regulation and development decisions, WITHOUT mandatory purchase of flood insurance and other requirements that are unearthed by creation/update of a FIRM

When should you use the information on the BFE viewer?

Example

BLE Data (BFE Viewer)



Map Service Center (FIRM)

If BLE is less conservative, must use FIRM

BLE Data (BFE Viewer)

Map Service Center (FIRM)

Mitigation Planning

- Risk Assessment
- Mitigation Strategy development
- Identifying and prioritizing mitigation projects
- Community planning, land use, and zoning
- Emergency response/recovery planning

Elevation Certificate

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/ Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ★ Other/Source: *Base Level Engineering (Estimated BFE report attached)*

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ★ NAVD 1988 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No

Designation Date: ☐ CBRS ☐ OPA

FEMA Form 086-0-33 (7/15) Replaces all previous editions. Form Page 1 of 6

Elevation Certificate (EC) should be used:

- Section B10 - Check "OTHER"
- Indicate "Base Level Engineering"
- Submit Estimated BFE Viewer Report with EC for LOMA submittal or insurance rating

FEMA BLE Guidance and Resources

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

- BLE Vector Geodatabase Flash Card
- BLE and Letters of Map Amendment
- LOMA Documentation and Submittal Process
- BLE Data Download Reference Flash Card
- How to Use BLE Data for Local Permitting
- State Quick Guide
- Water Surface Elevation Grids
- Flood Depth Grids
- BLE, Social Media, and Flood Risk Awareness
- How to Use the Estimated BFE Viewer
- How to Find the Right Spatial Data Files
- Base Level Engineering Overview
- Using the Estimated BFE Viewer
- How to Find the Right HEC-RAS Model

Additional Questions?

- FEMA Region 6
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  Office: (940) 898-5419

Or

- Contact your State NFIP Coordinator Office
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