# Economic Resilience from Flooding

## Craig Eissler, GIS Program Manager

Flood Risk Management: Initiative



*Thousands of miles of streams crisscross the CAPCOG region's watersheds creating the potential for flooding almost everywhere!*

*CAPCOG has some expertise in this area!*

# Emergency Management Cycle
# & Risk Mapping Cycle

# What is a Floodplain?

**There is NOT just ONE Floodplain!**

**Floodplains are pervasive, widespread, often inescapable; NOT defined by one single discreet area**

10-yr

100-yr

500-yr

These flood zones are referred to as Probabilistic Scenarios, Return Periods, Recurrence Intervals, or Frequencies

**And the 100-yr Flood is often referred to as the:**

- **1% Annual Chance Flood**
- **Base Flood**
- **Special Flood Hazard Area**
- **A, AE, etc. Zones**
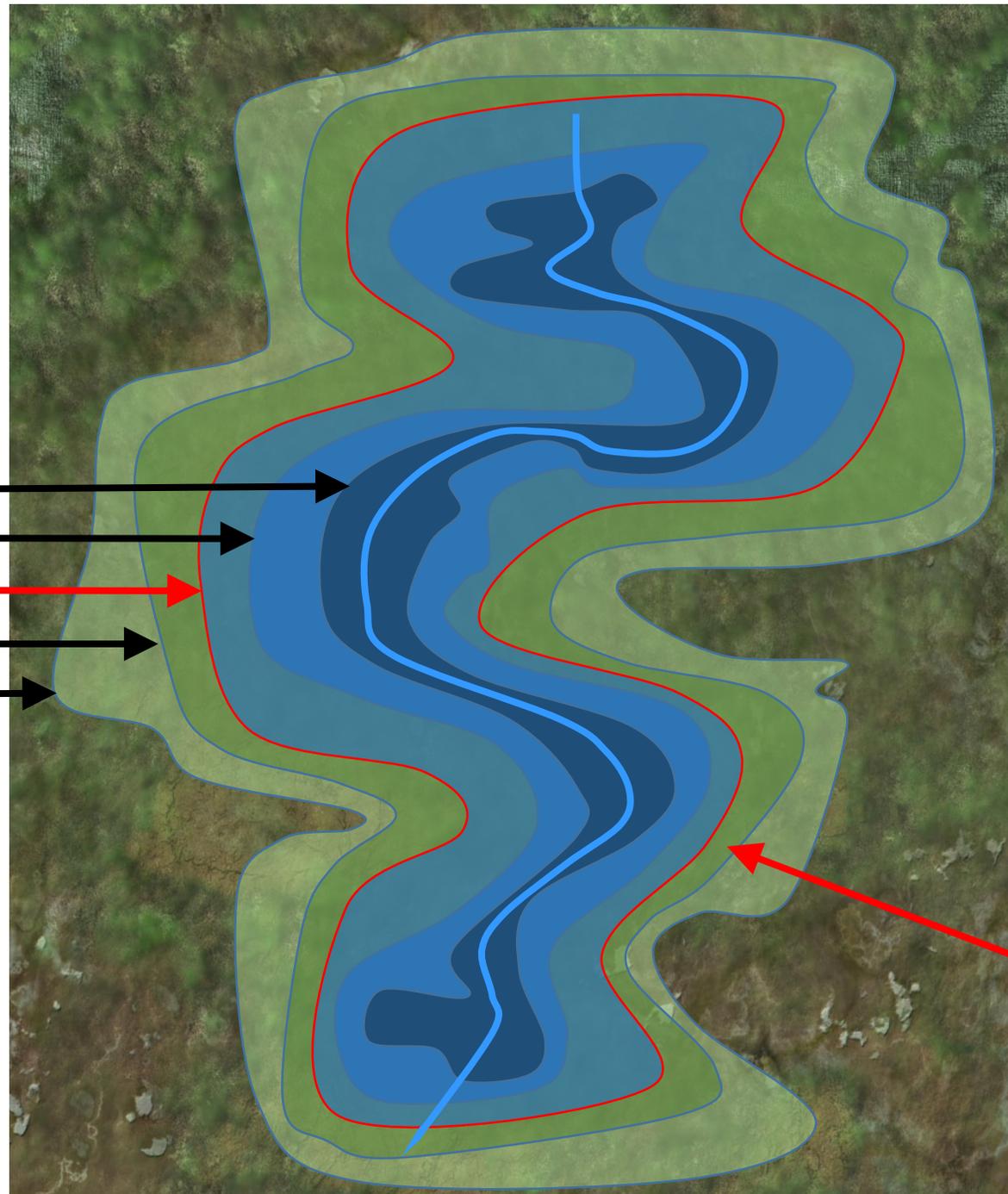


**These are various Flood Scenarios!**

**...based on various statistical analyses**

**...defined by Flood Zones on a map**

**...which change over time**

**Most hydrologists suggest we would need at least 400 years of data to even begin narrowing down the margin of error (uncertainty) of these flood scenarios**

Note that these map examples only reveal flood scenario boundaries; yet other flood data may ALSO reveal **flood depths** w/in those boundaries

**Risk MAP** — Reduce Loss of Life and Property

1. Identify Risk — Map Risk Data
2. Assess Risk — Assess Present and Future Risks — Goal – Measure Quantifiable Risk Reduction
3. Communicate Risk
4. Mitigate Risk — Plan for Risk — Transfer Risk Reduce Risk

**Economic Resilience from Flooding CYCLE**

**Continuous Floodplain**
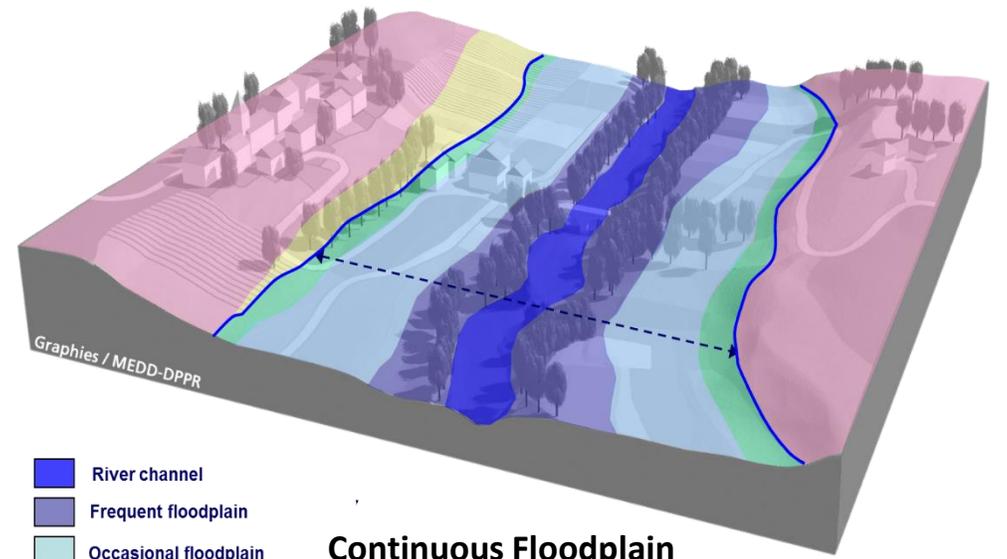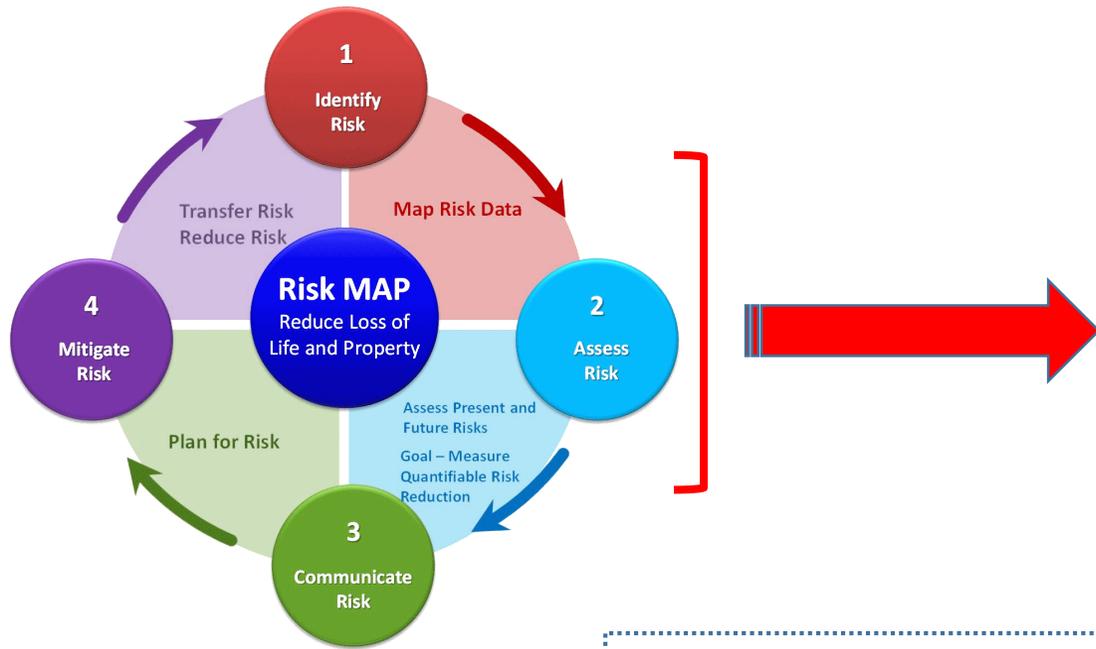
- River channel
- Frequent floodplain
- Occasional floodplain
- Exceptional floodplain

*Flood zones HGM*

Graphies / MEDD-DPPR

**Building Use**
- Commercial : 67%
- Residential : 22%
- Social : 11%

Farming & Playing Fields | Residential Areas | Critical Infrastructure

10%  1%  PMF
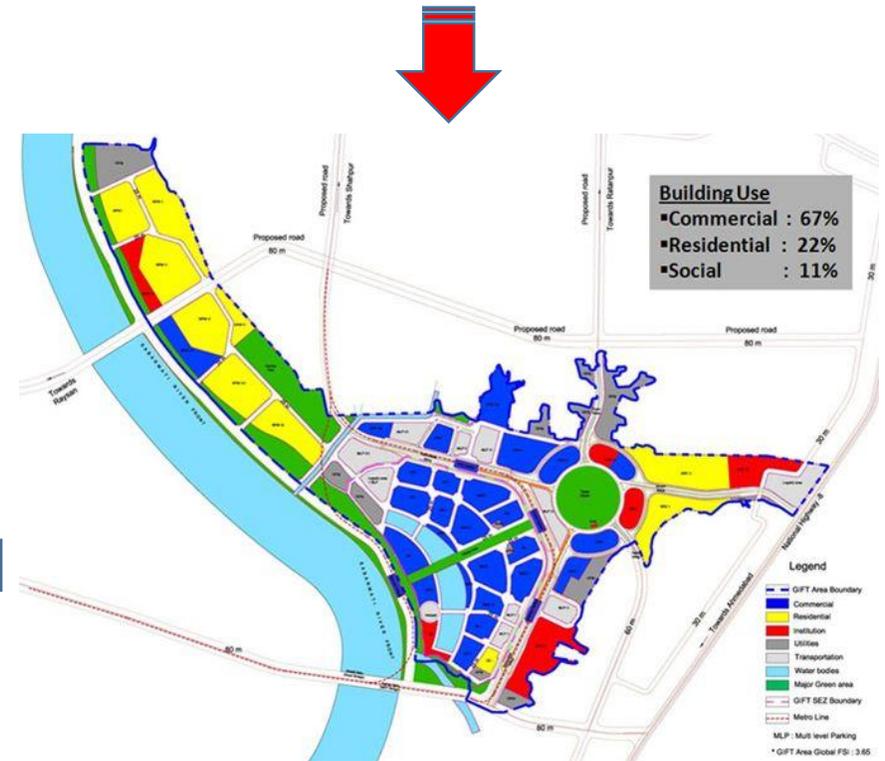
# CAPCOG Regional Map of Watersheds (Sub-basins; HUC 8) and some Additional/Best Available Flood Data
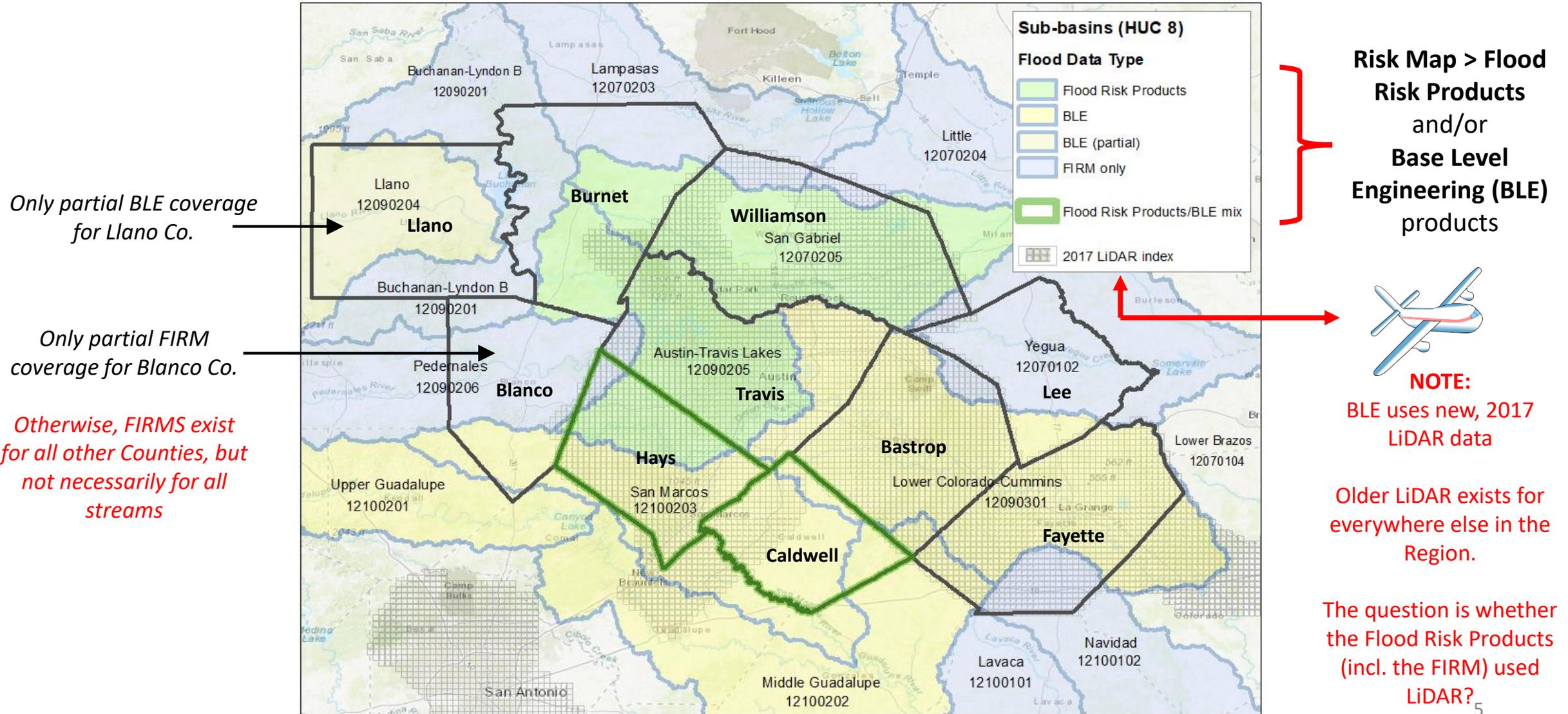


*Only partial BLE coverage for Llano Co.*

*Only partial FIRM coverage for Blanco Co.*

*Otherwise, FIRMS exist for all other Counties, but not necessarily for all streams*

**Risk Map > Flood Risk Products** and/or **Base Level Engineering (BLE)** products

**NOTE:**
BLE uses new, 2017 LiDAR data

Older LiDAR exists for everywhere else in the Region.

The question is whether the Flood Risk Products (incl. the FIRM) used LiDAR?

# Additional/Best available sources
## Flood Data source = Base Level Engineering (BLE)



Roads-Floodplain Intersect Analysis
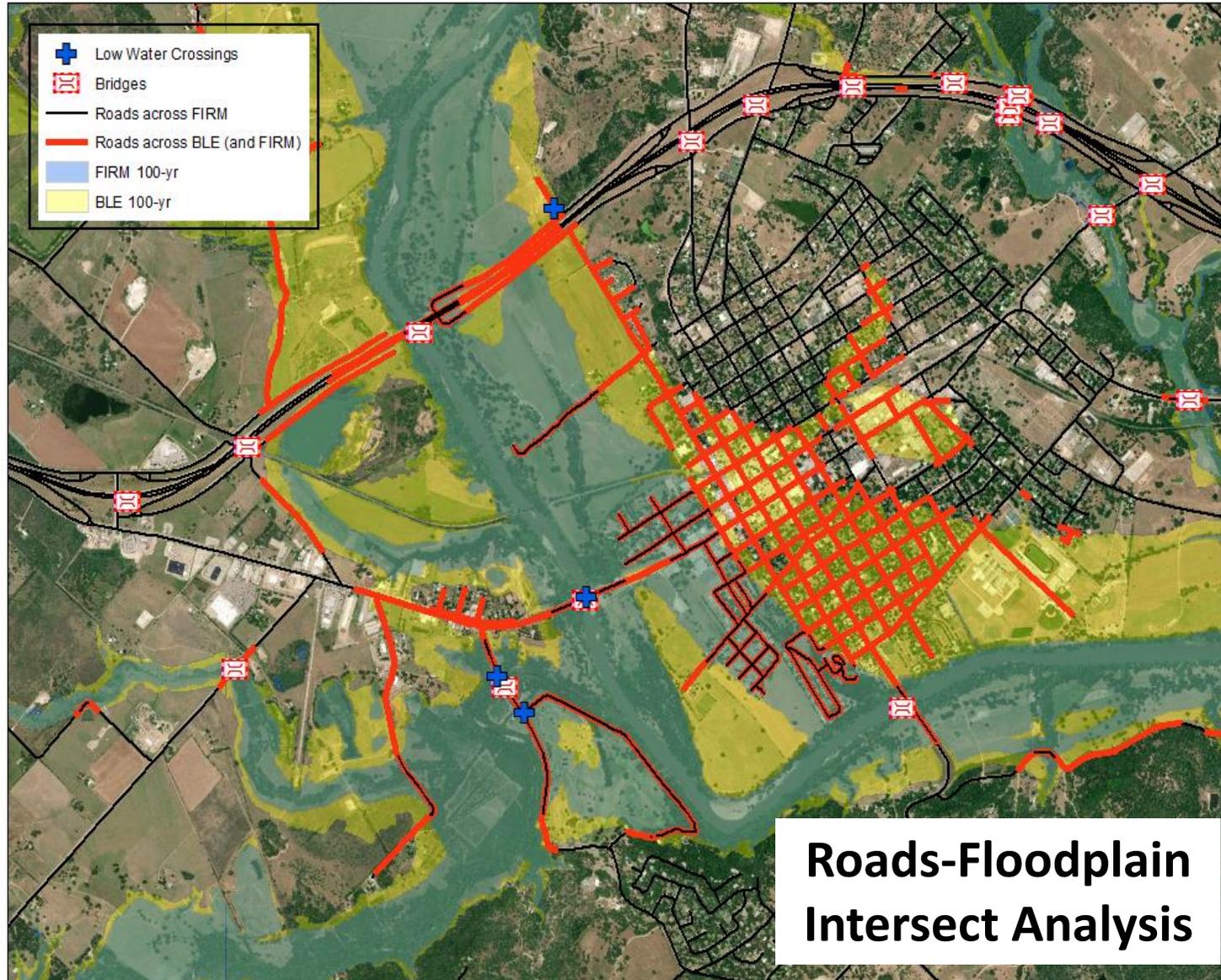
# Flood Depth data
# from Additional/Best available sources
Flood Data source = Base Level Engineering (BLE)



**Identify**

Identify from: <Top-most layer>

Fayette_911AP_BLE_100yr_floodplain_P
  11027AP@FAYETTE.CAPCOG911

Location: -96.879968  29.902916 Decimal Degrees

| Field | Value |
|---|---|
| BLE_WSE01PCT | 265.9 |
| BLE_100yr_Depths_1 | 12 |
| PROP_ID | 37759 |
| legal_acre | 0 |
| land_val | 0 |
| imprv_val | 338940 |

Identified 1 feature
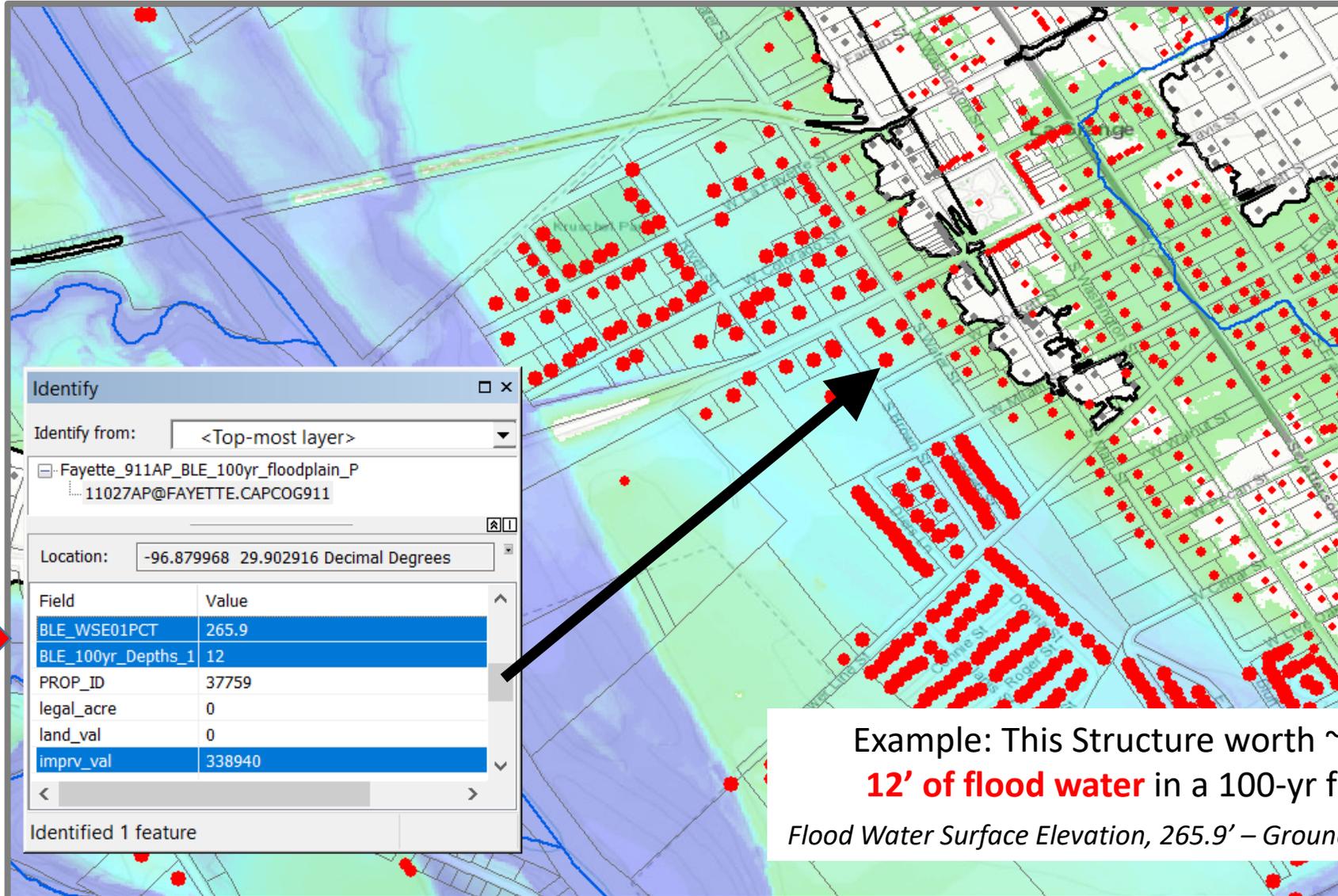
Example: This Structure worth ~$338,000 is in
**12' of flood water** in a 100-yr flood scenario

*Flood Water Surface Elevation, 265.9' – Ground Elevation, 253.9' = 12'*

# Asset Exposure & Estimated Economic Loss Analysis

**Parcel ID: 1234**

❏ **Improvement (Structure) Value** ┈┈┈▶ **Asset Exposure**

[**$338,000**] *Technically, the 'Replacement' Value would be more meaningful*

*Not Actual Data*

**HAZUS**
EARTHQUAKE · WIND · FLOOD · TSUNAMI
**FEMA**

❏ **Economic Loss Estimation**
[**$220,000**]

❏ **Flood Depth**
[**12 Ft.**]

*Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters.*

*Other information about this Parcel-Structure could be useful like previous Claims/Losses, etc.*

# Estimated Economic Losses (Flood Impact)
## [Using HAZUS]
in various **business-economic** categories by various **building-occupancy** types

**Level 1 Results: Aggregated by <span style="color:red">Census Blocks</span>**

HAZUS comes packaged with aggregated inventory (buildings, and more) at the Census Block level…



**Table 6: Building-Related Economic Loss Estimates**
**(Millions of dollars)**

| Category | Area | Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|
| **Building Loss** | | | | | | |
| | Building | 8.04 | 1.30 | 0.19 | 0.44 | 9.97 |
| | Content | 5.23 | 4.15 | 0.46 | 1.82 | 11.66 |
| | Inventory | 0.00 | 0.08 | 0.10 | 0.01 | 0.19 |
| | **Subtotal** | **13.27** | **5.53** | **0.75** | **2.27** | **21.82** |
| **Business Interruption** | | | | | | |
| | Income | 0.00 | 0.02 | 0.00 | 0.00 | 0.02 |
| | Relocation | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| | Rental Income | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Wage | 0.00 | 0.02 | 0.00 | 0.17 | 0.19 |
| | **Subtotal** | **0.01** | **0.03** | **0.00** | **0.17** | **0.22** |
| **ALL** | **Total** | **13.28** | **5.56** | **0.75** | **2.45** | **22.04** |

<span style="background:yellow">**NOTE:** And of course there are **map** results as well!
(see next Slide for example)</span>

...HAZUS comes packaged with aggregated inventory (buildings, and more) at the Census Block level. ...However, using better 'local inventory data' [AND/OR] better 'flood data', you may improve the results!

And you can do this by updating the aggregated data at the Census Block level [AND/OR] by adding Site-specific data directly for those locations (i.e. Address Points)

**Level 2 Results: by Site-specific location**



Figure 10-1: Hazus Comprehensive Data Management System

Local Data Input Module
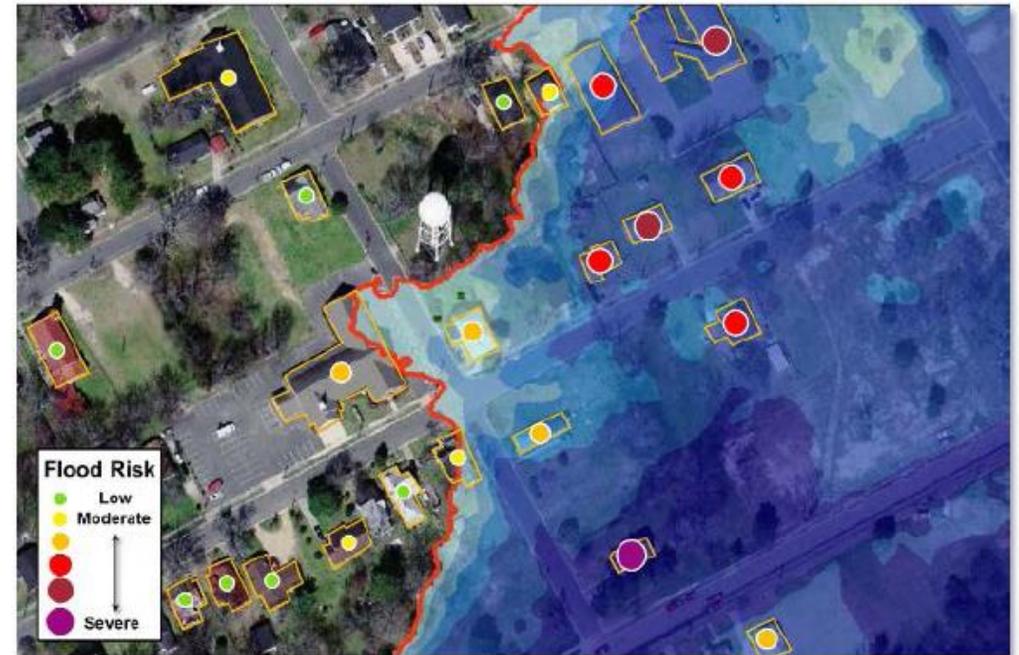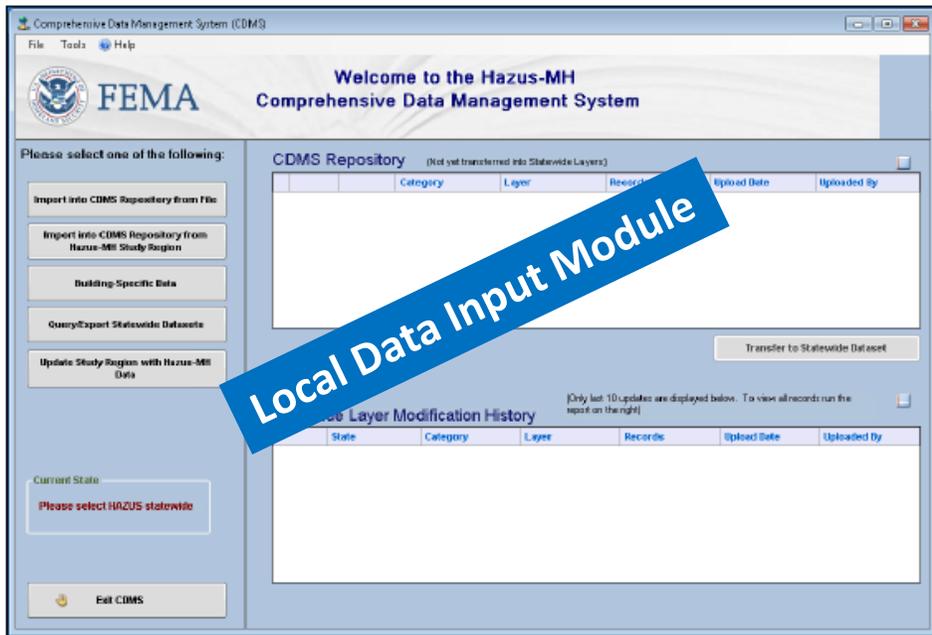
**NOTE:** And of course there are **table** and **report** results as well! (see previous Slide for example)

Unfortunately, one in four flooded businesses stays this way.

**CLOSED**

Protect your business with flood insurance.
Did you know that just a couple inches of floodwater can cause tens of thousands of dollars in damages to your business? Are you prepared?

Only Flood Insurance Covers Floods

**The key to avoided loses and economic resiliency is mitigation!**

**Don't be this business**
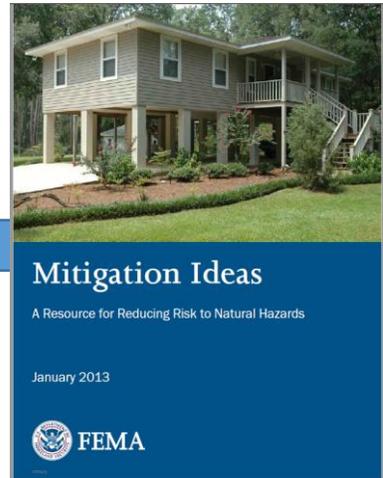
Mitigation Ideas
A Resource for Reducing Risk to Natural Hazards

January 2013

FEMA

**Be this instead!**

**Economic Resilience
from Flooding**

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512-916-6184
ceissler@capcog.org