



Breach Analysis Options and EAP Considerations

Texas Association Watershed Sponsors

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Overview

- Why do we need to perform breach analyses?
- How are they related to an Emergency Action Plan (EAP)?
- What options do we have for modeling a breach?
- Cost considerations



Why do we need it?

- History has shown that, on occasion, dams do fail
- To understand the impacts in the event of a breach of the dam
 - Develop Breach Maps for EAPs
- To classify the hazard associated with the dam
 - Determine regulatory requirements including Design Storm



Edenville Dam Breach, *FEMA Incident Response Review 2022*

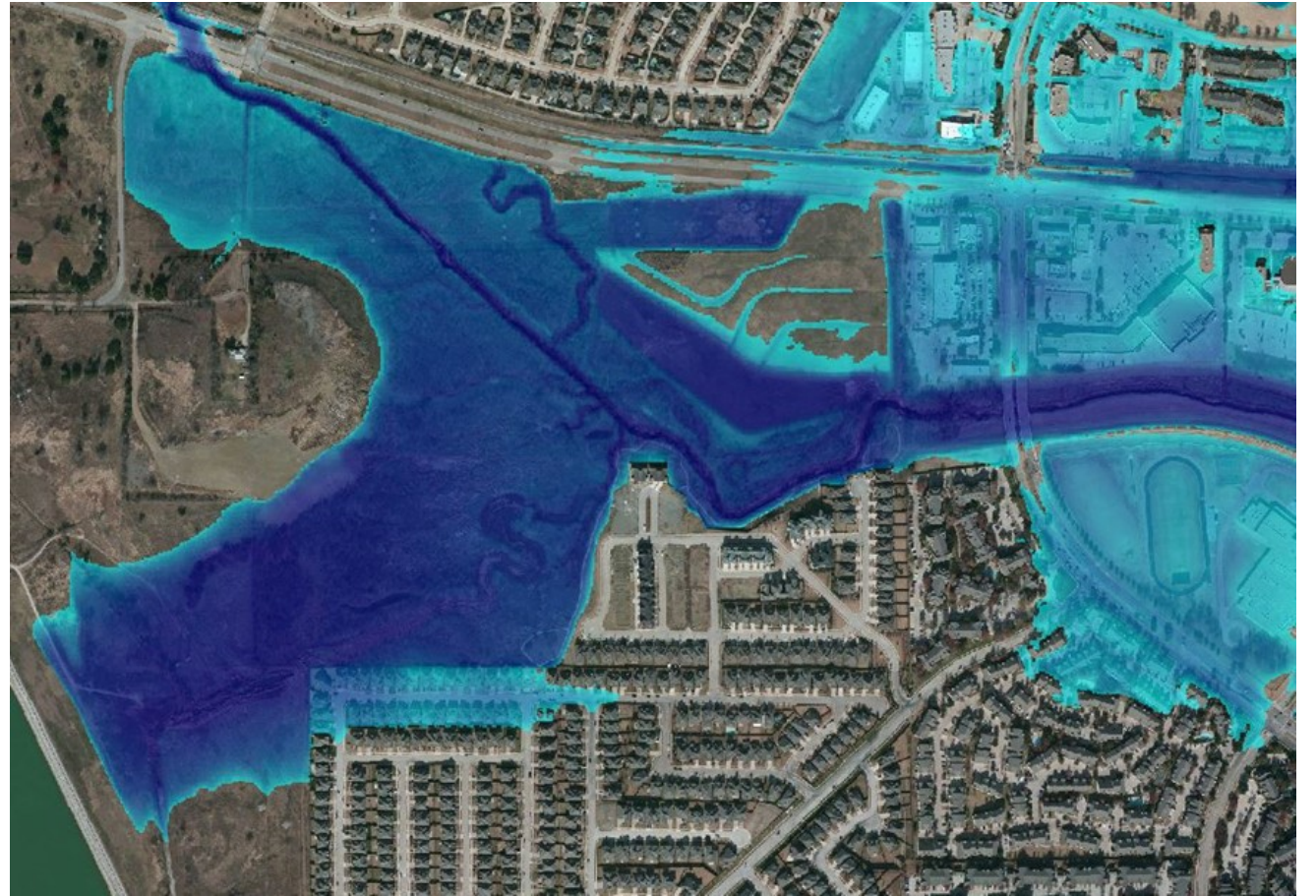


EAP Considerations

- Significant and high hazard dams are required to have an EAP
- Local emergency officials use the inundation maps for evacuation.
- For critical structures, include the time to flood (time from breach to time that structure is flooded) and time to peak flow.

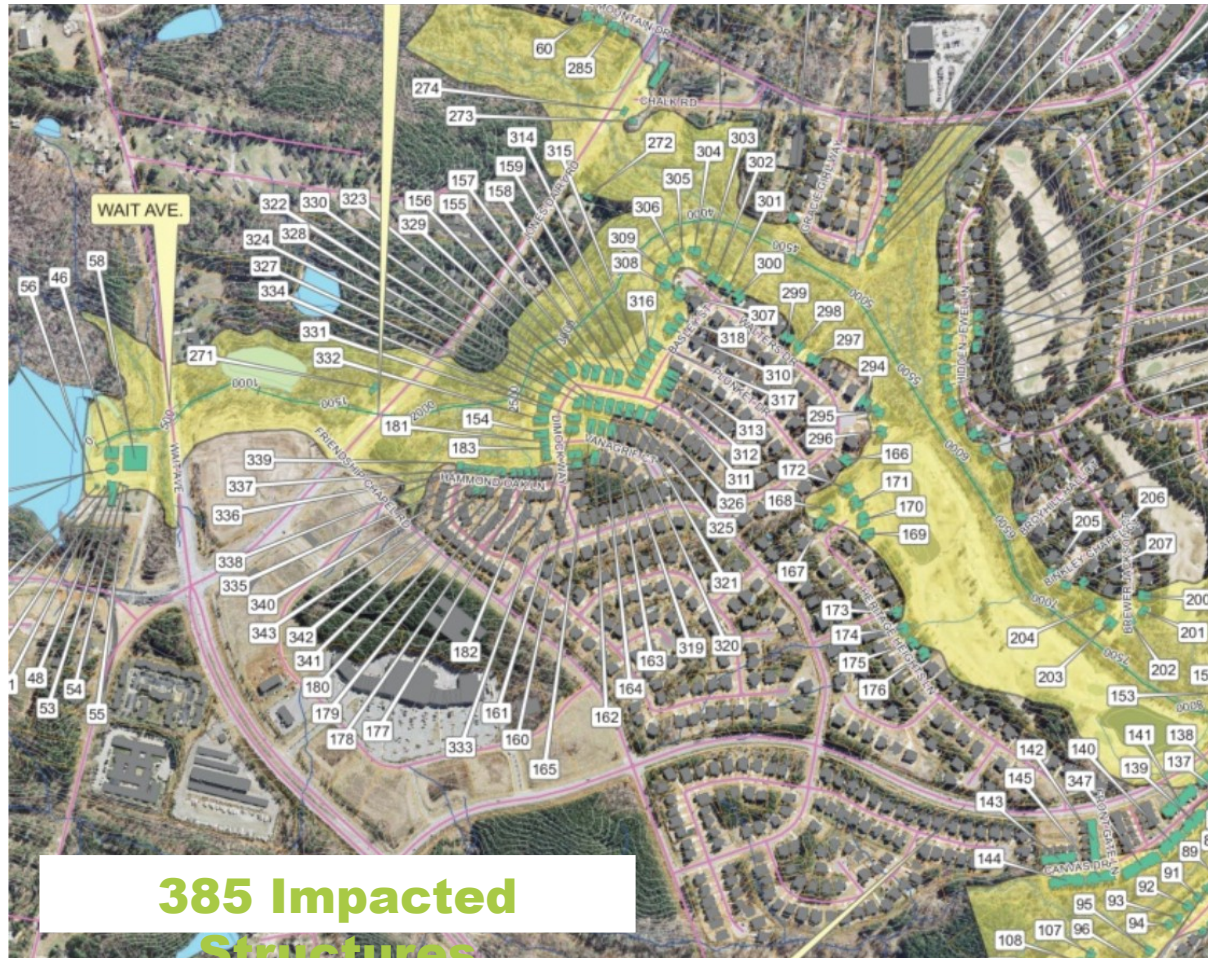
Breach Modeling Options

- Modeling Approach
 - 1D vs 2D
- Breach Method
 - Simplified
 - Full
 - TR-60

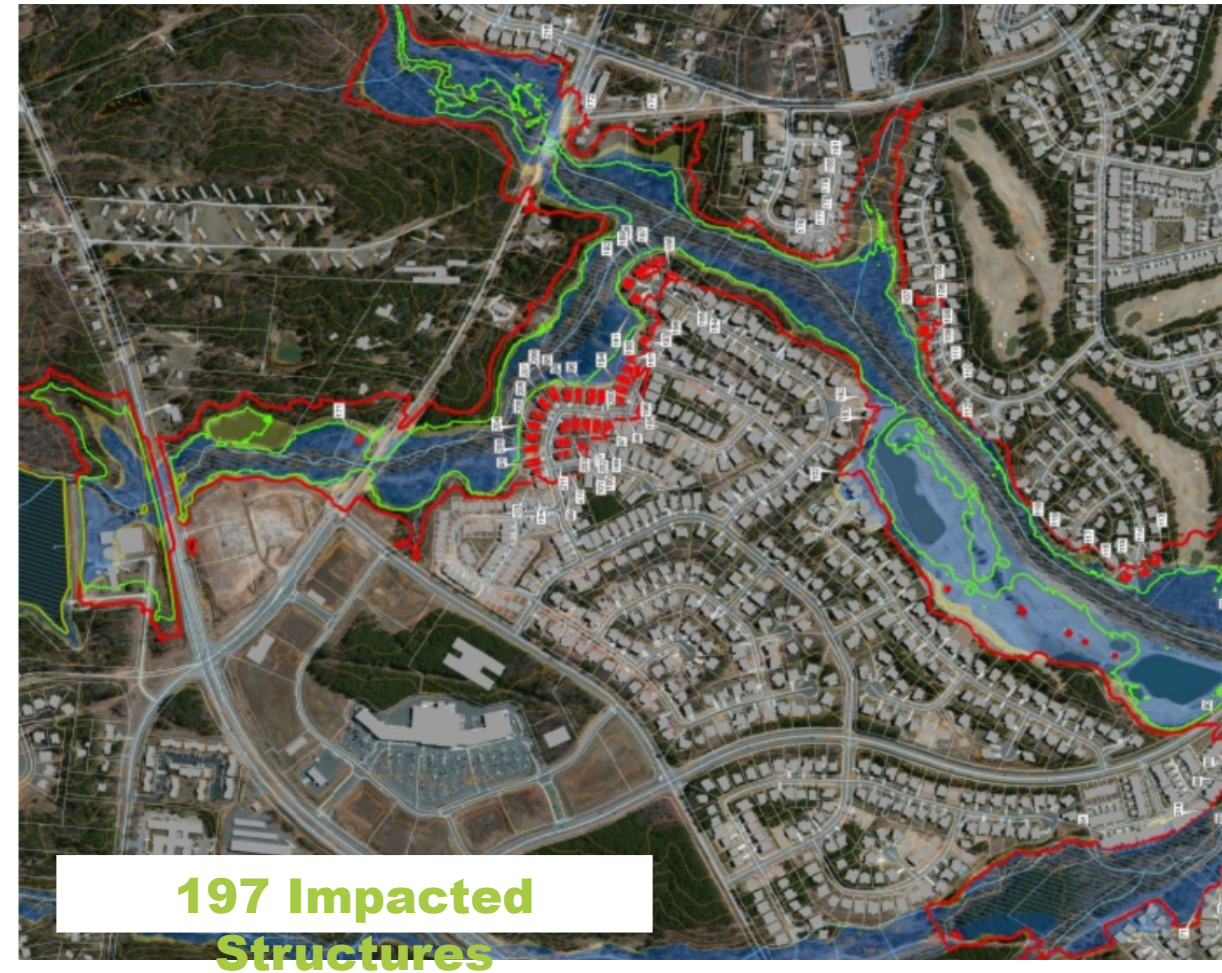


1D vs 2D Modeling

Simplified Breach



HEC-RAS 2D



Which Breach Method should I use?



Simplified

- Must be 1D
- Only valid for small and intermediate sized dams.
- Very limited outputs.
- Due to current computational power, it does not have any advantage vs other methods.
- Produces inundation map with the lowest accuracy



TR-60 (NRCS structures)

- Only for NRCS dams.
- Evaluates a single breach scenario.
- It could be used to meet both TCEQ & NRCS regulations.
- **You may already have it.**



Full Breach Analysis

- Valid for any dam
- Evaluates multiple breach scenarios and rainfall events.
- Provides critical data to Emergency management official (flood timing, velocity, depth, etc.)
- Accepted to verify hazard classification.

Which Breach Method should I use?

NRCS Methodology (TR-60)

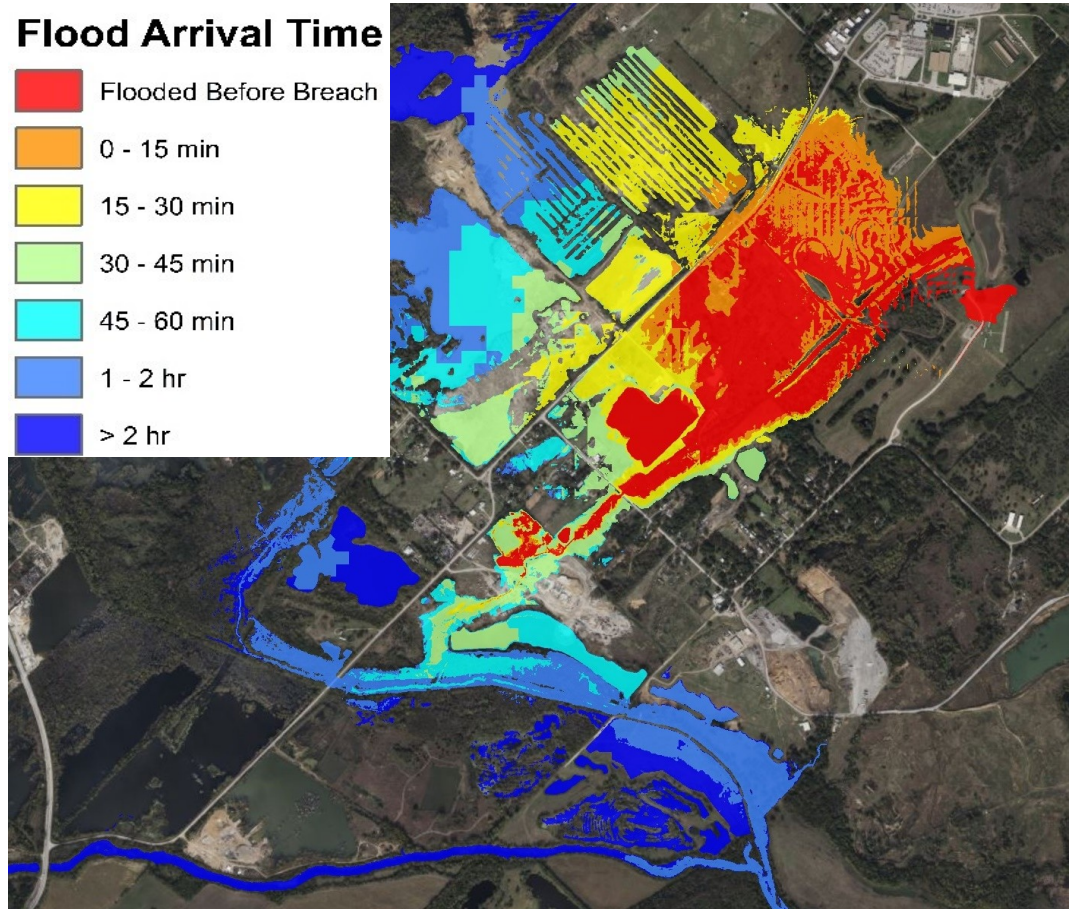
- If the dam is in and anticipated to remain in the federal program.

TCEQ Methodology (Full Breach)

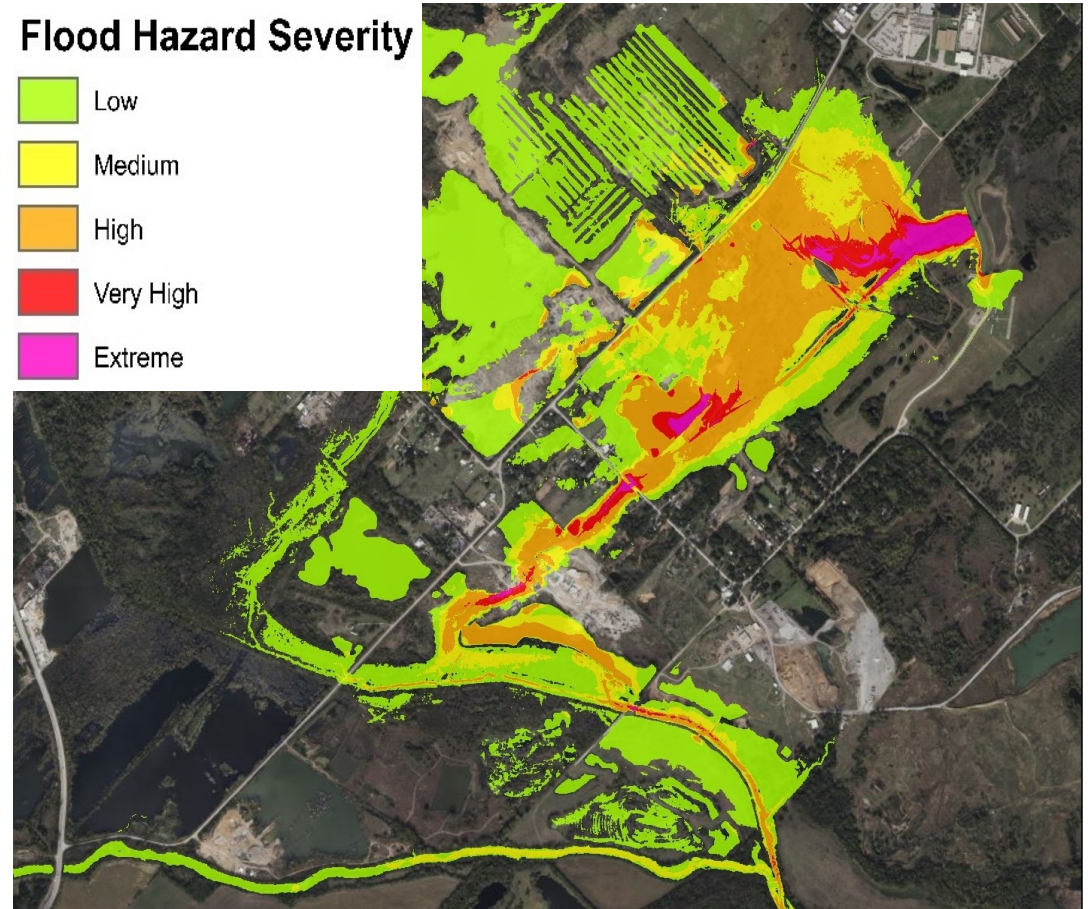
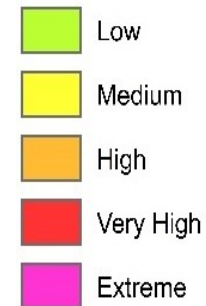
- If the dam is not anticipated to remain in the federal program (and will only fall under TCEQ jurisdiction).
- Need detailed breach inundation data for emergency management or floodplain development purposes.
- Interested in a hydrologic assessment to determine whether or not the dam meets PMF design flood criteria.

Which Breach Method should I use?

Flood Arrival Time

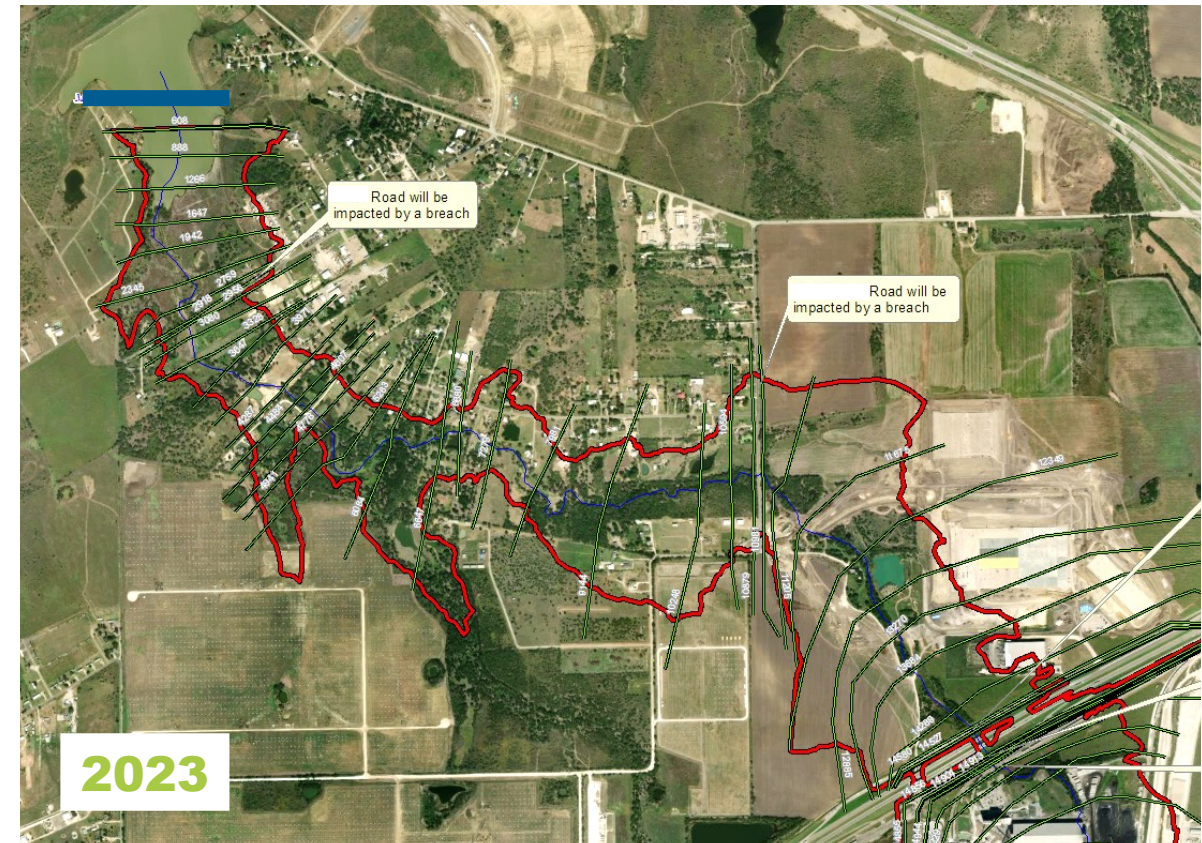
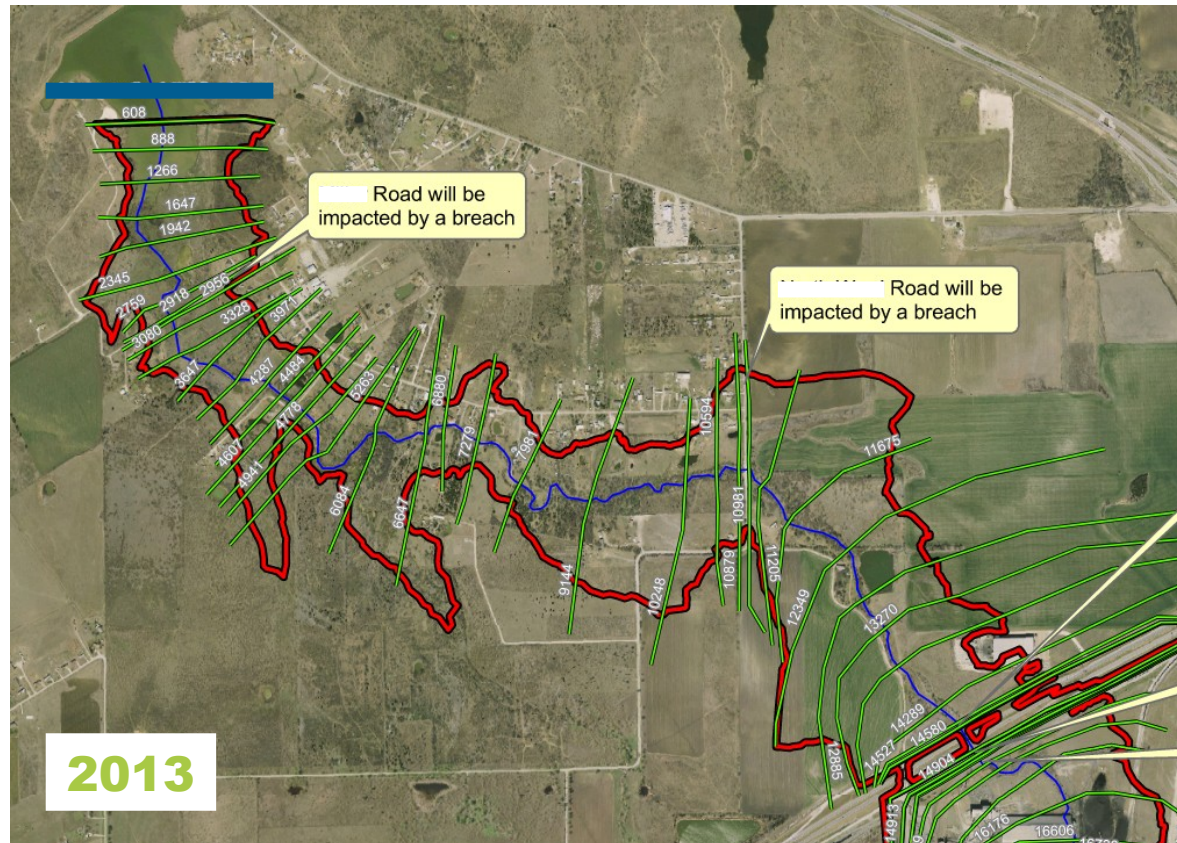


Flood Hazard Severity

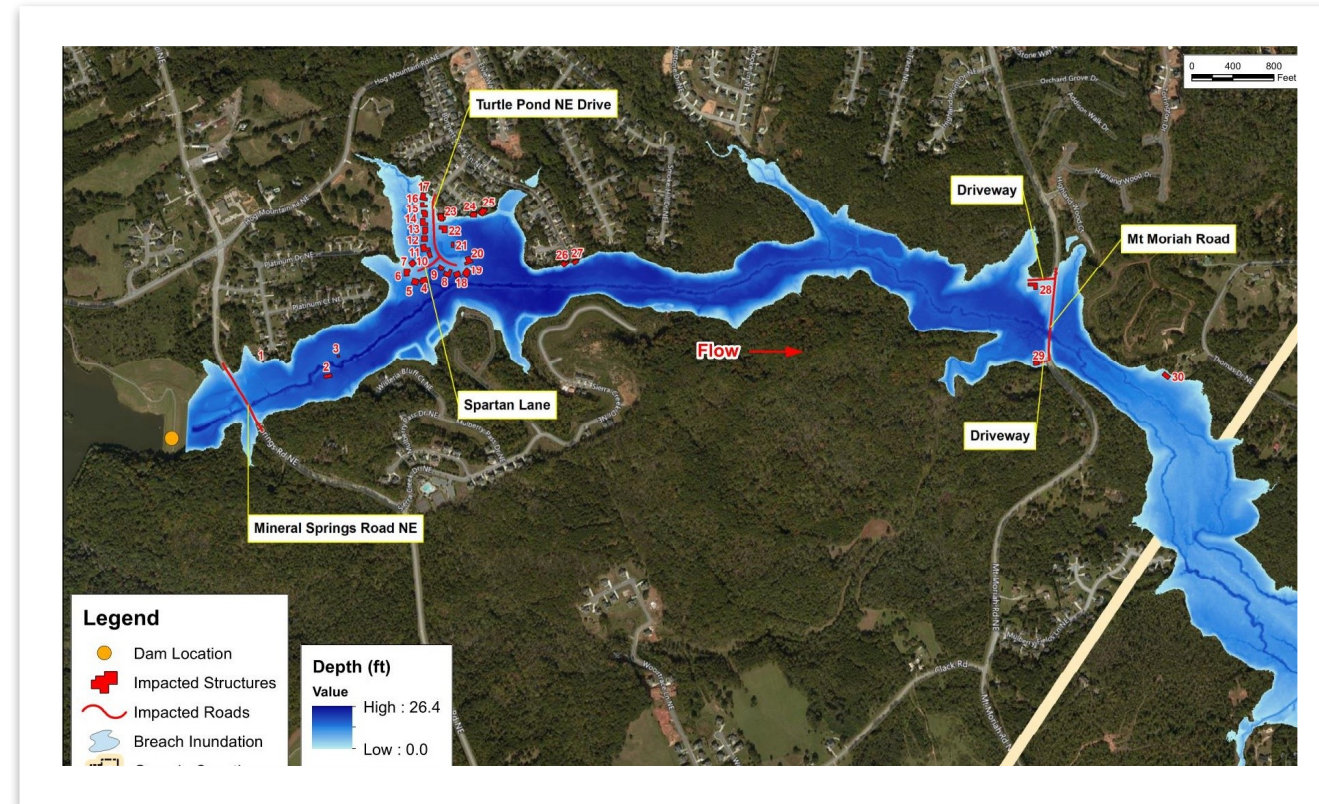
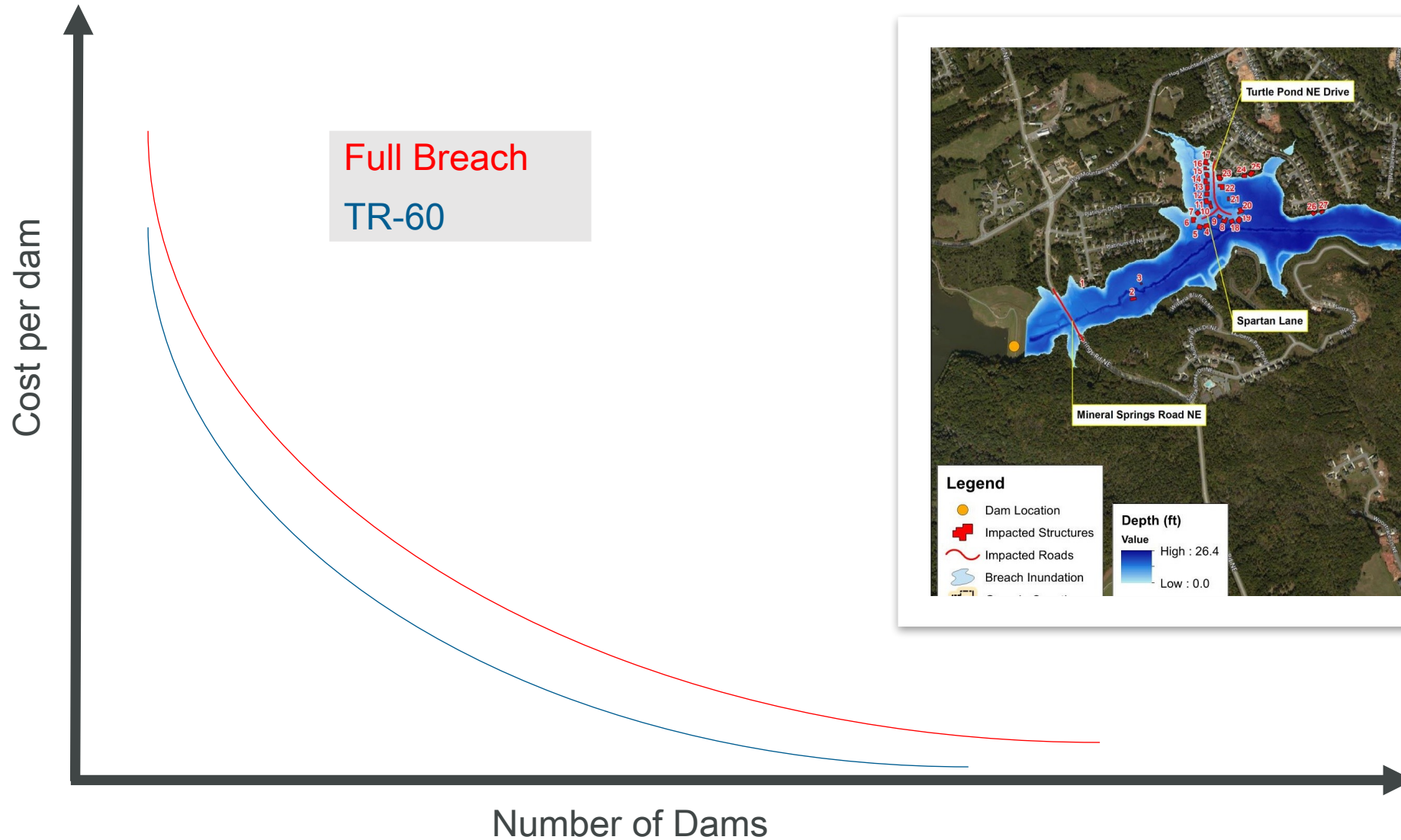


Updating existing Breach Maps

- To capture recent development, latest available aerial images can be replaced in existing maps without additional modeling

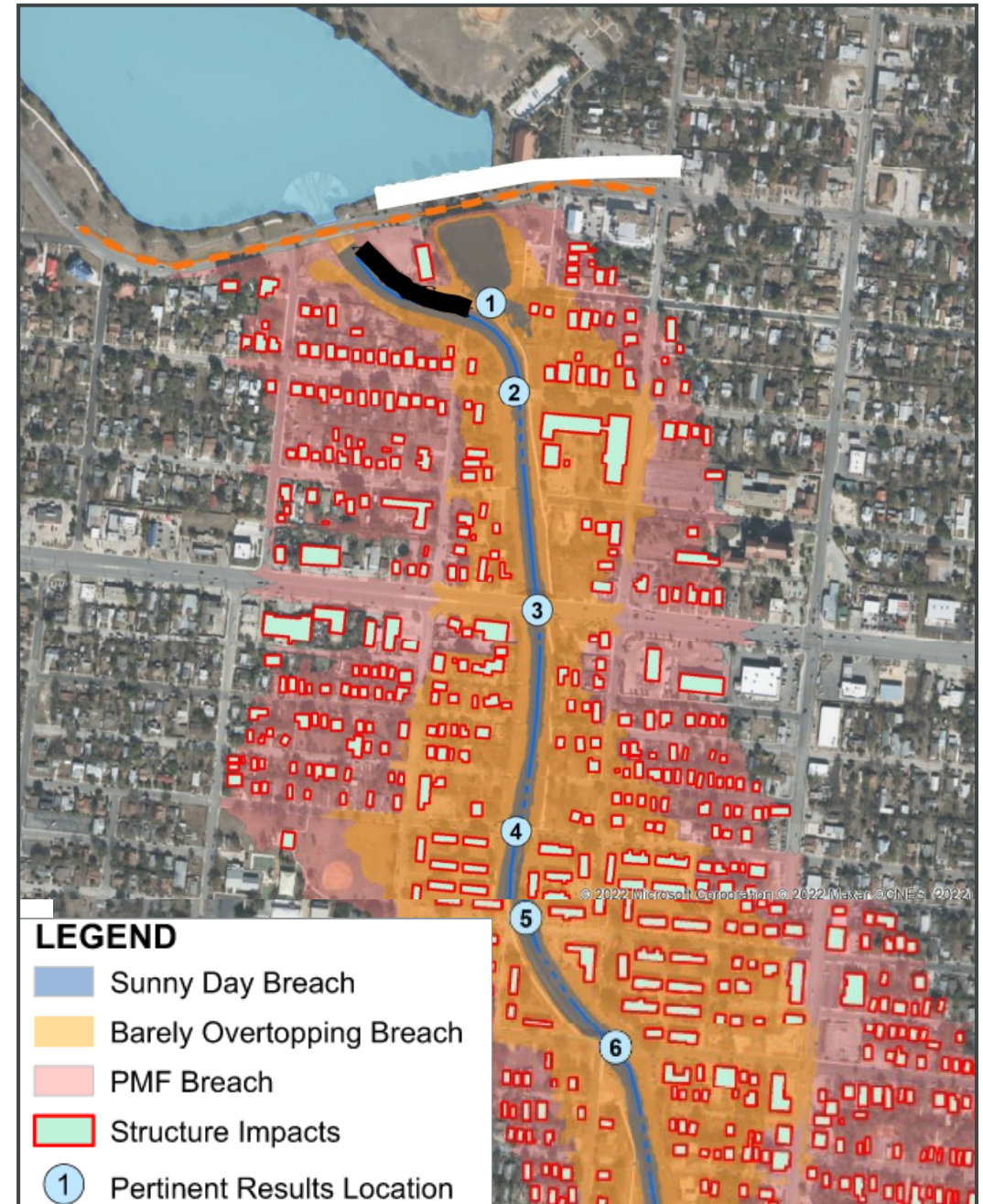


How much does it cost?



Final thoughts

- The breach method will depend on what you want to achieve.
- Cost decreases depending on your reporting needs.
- Cost decreases depending on the modeling methodology (NRCS vs TCEQ).
- Take advantage of economies of scale (performing a single breach scenario is more expensive than assessing a full inventory).



Questions?

Camilo Cristancho, PE

camilo.cristancho@freese.com

817-735-7203

