

Texas Association of Watershed Sponsors

The Lifecycle of Dam Safety

Presented By:

Sunit Deo, PE, CFM

Stephen Crawford, PE, CFM

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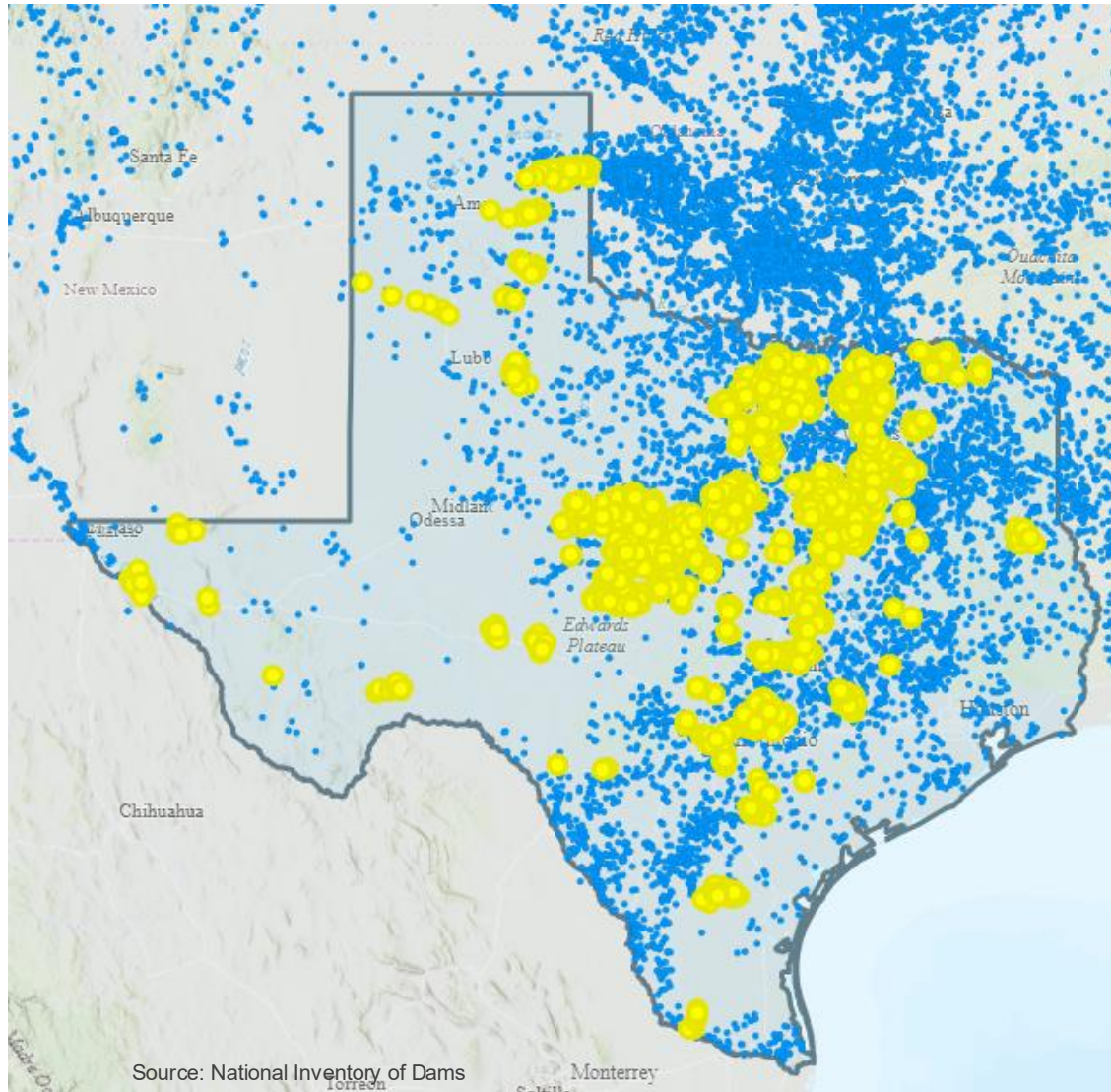


AGENDA

1. Dams Background
2. Dam Safety Lifecycle
3. Example Implementation
for UBCWCID dams
4. Summary

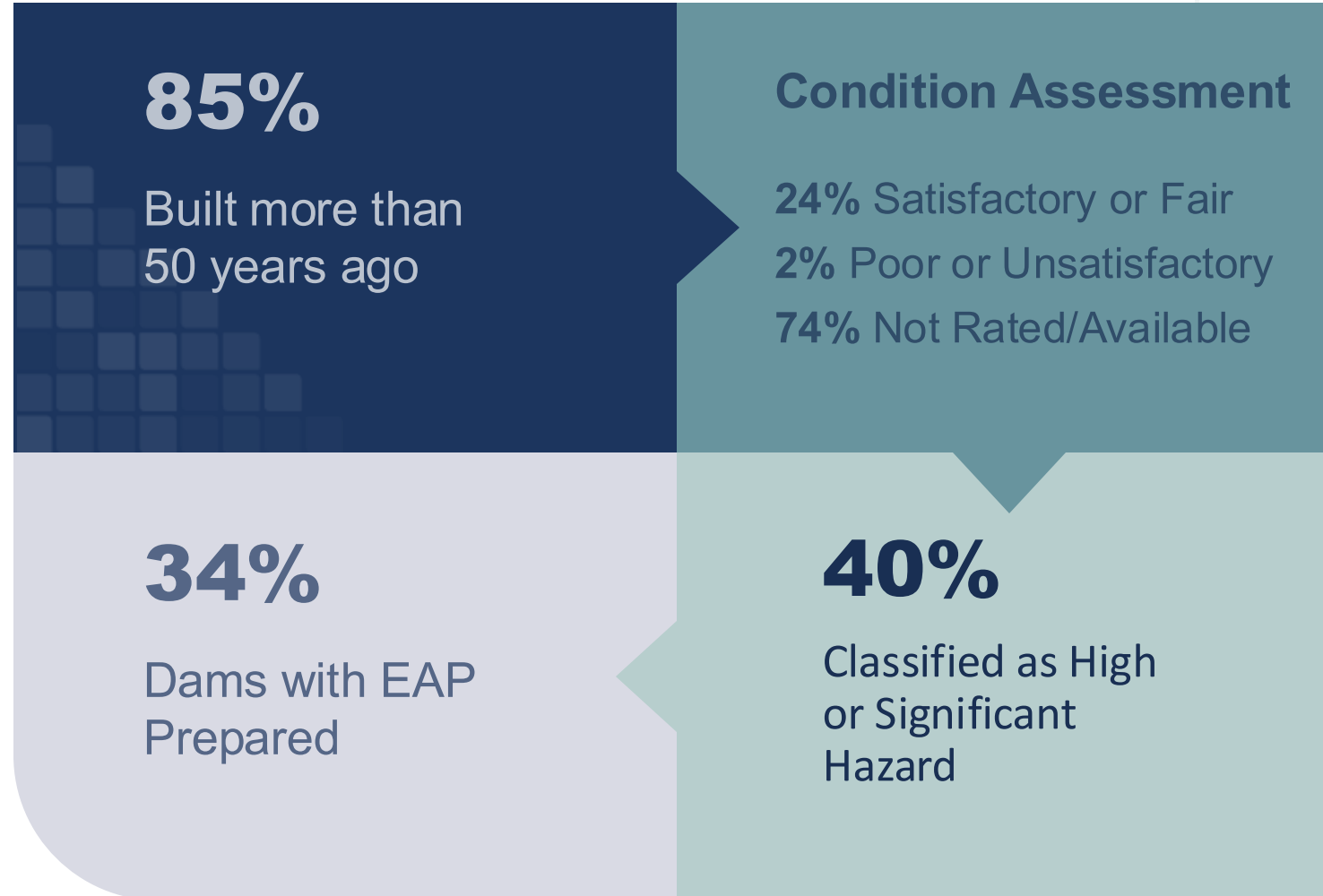
Dams Background

DAMS IN TEXAS



- A structure built across a body of water to hold, divert, or regulate water
- Texas dams regulated by TCEQ Dam Safety Program
 - Height ≥ 25 ft & Storage ≥ 15 ac-ft
 - Height > 6 ft & Storage ≥ 50 ac-ft
- Dam owners include:
 - Federal/State/Local governments
 - Private companies/utilities
 - Individuals
- Total number of dams – 7,402
- NRCS designed/built dams – 2,002

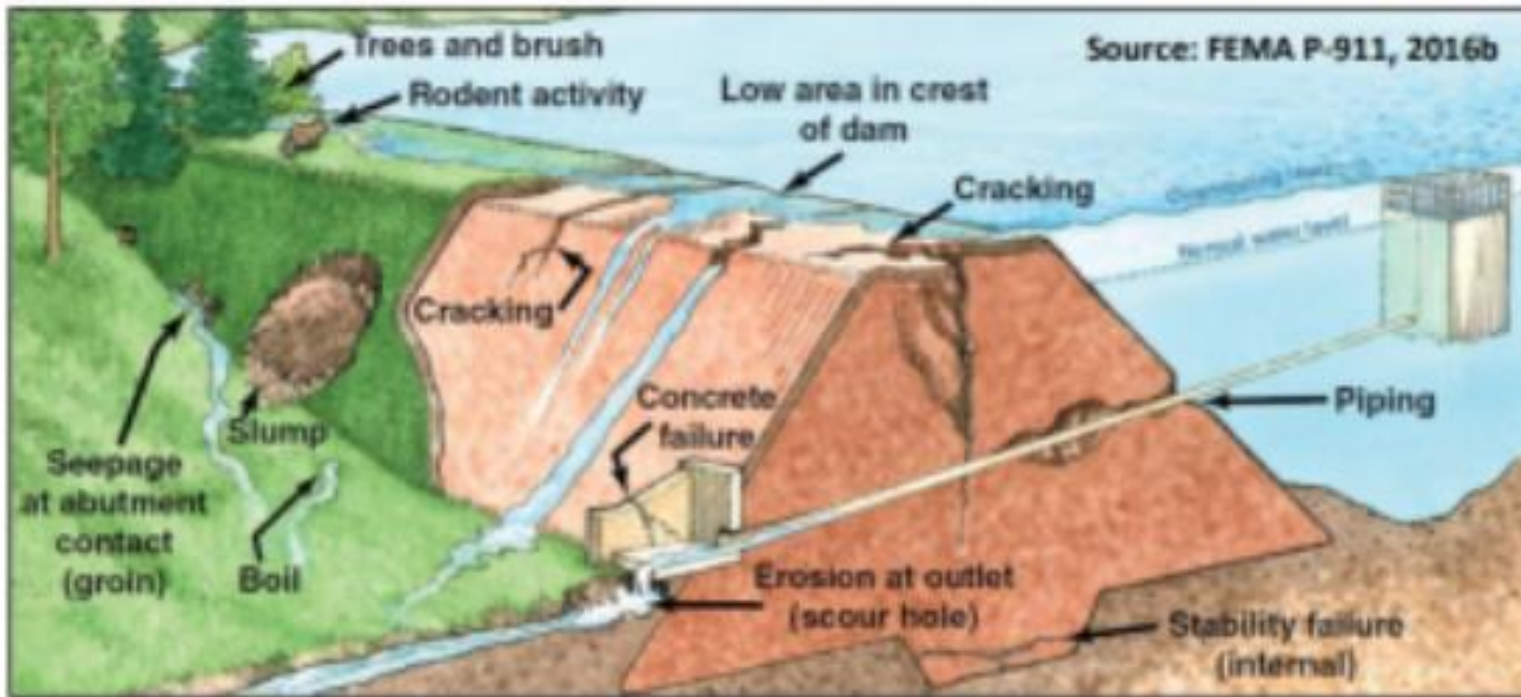
TEXAS NRCS DESIGNED/BUILT DAMS IN NUMBERS



Source: National Inventory of Dams

Dams Safety

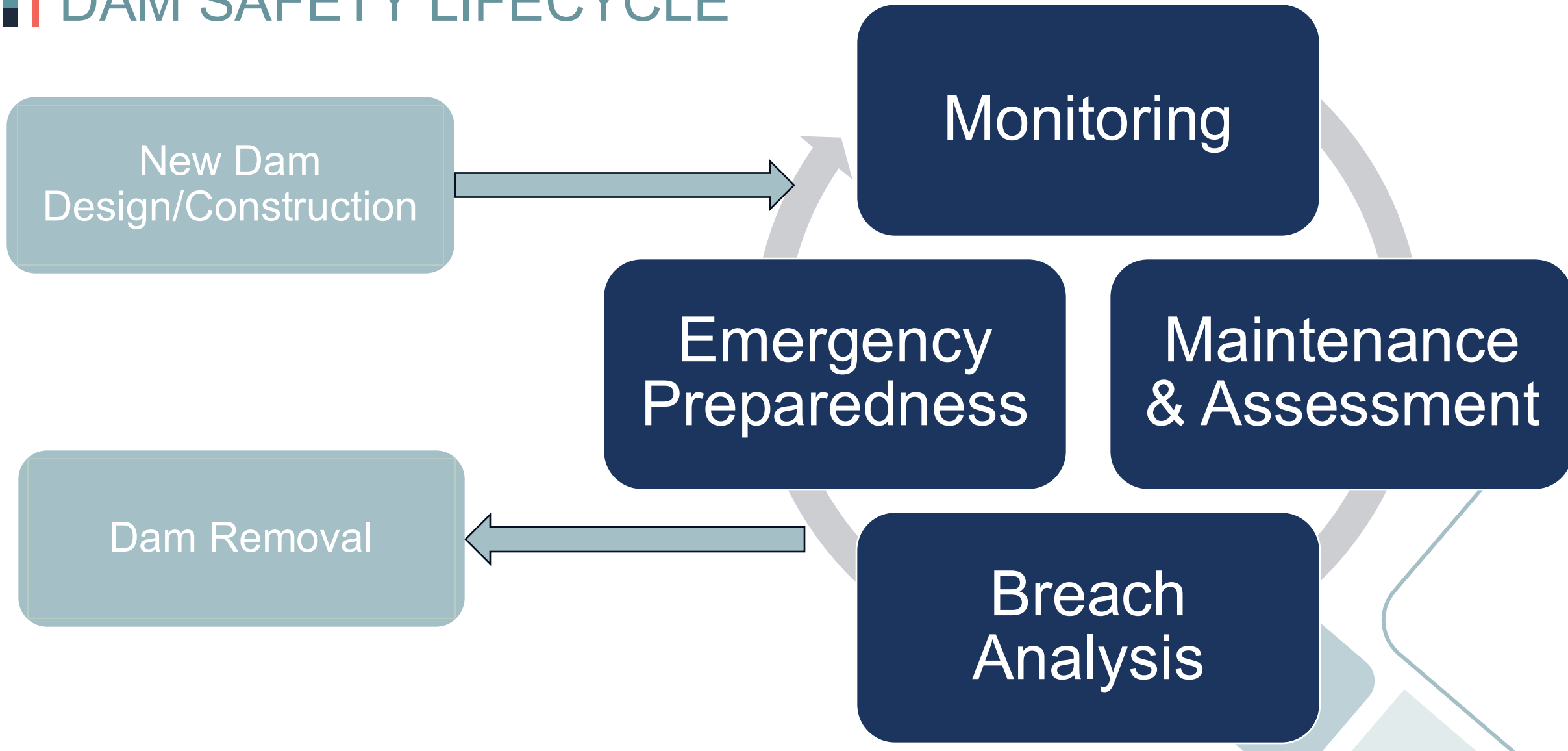
DEFINING DAM SAFETY



Dual –Focus Protection

- Structural Integrity
- Upstream Impacts
- Downstream Safety

DAM SAFETY LIFECYCLE



DAM SAFETY LIFECYCLE

Monitoring: Physical Health



INSTRUMENTATION

- Gages for rain, reservoir levels
- Piezometers for pore pressure
- Inclinometers for slope movement
- Weir for seepage volume

VISUAL OBS.

Routine inspections to spot

- Cloudy seepage (piping)
- Surface cracks
- Sinkholes or erosion
- Excessive woody vegetation

POST-EVENT

Mandatory inspections following extreme storm event involving

- Rapid rise or fall in reservoir level
- Spillway engagement
- Dam overtopping

DAM SAFETY LIFECYCLE

Maintenance & Assessments: Safety Reviews



PHYSICAL CHANGES

- Repairs & maintenance
- Dam upgrades
- Loss of volume



COMPLIANCE

- Hydrologic changes
- Meet H&H criteria
- Pass design flood



REGULATORY UPDATES

- Utilizing new methods
- Incorporating new data



DOWNSTREAM ENCROACHMENT

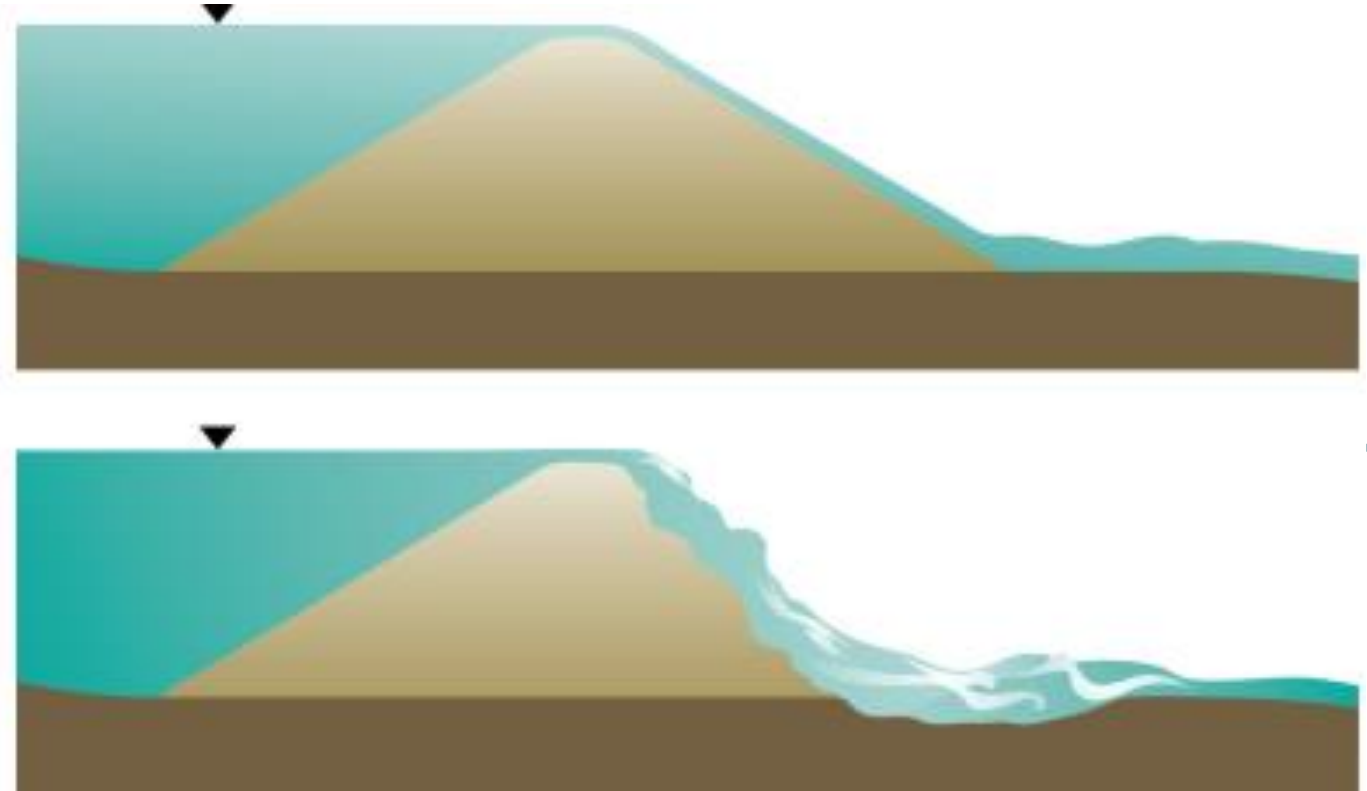
- New development
- Changes to land-use
- Changes in topography

DAM SAFETY LIFECYCLE

Breach Analysis: Vulnerability

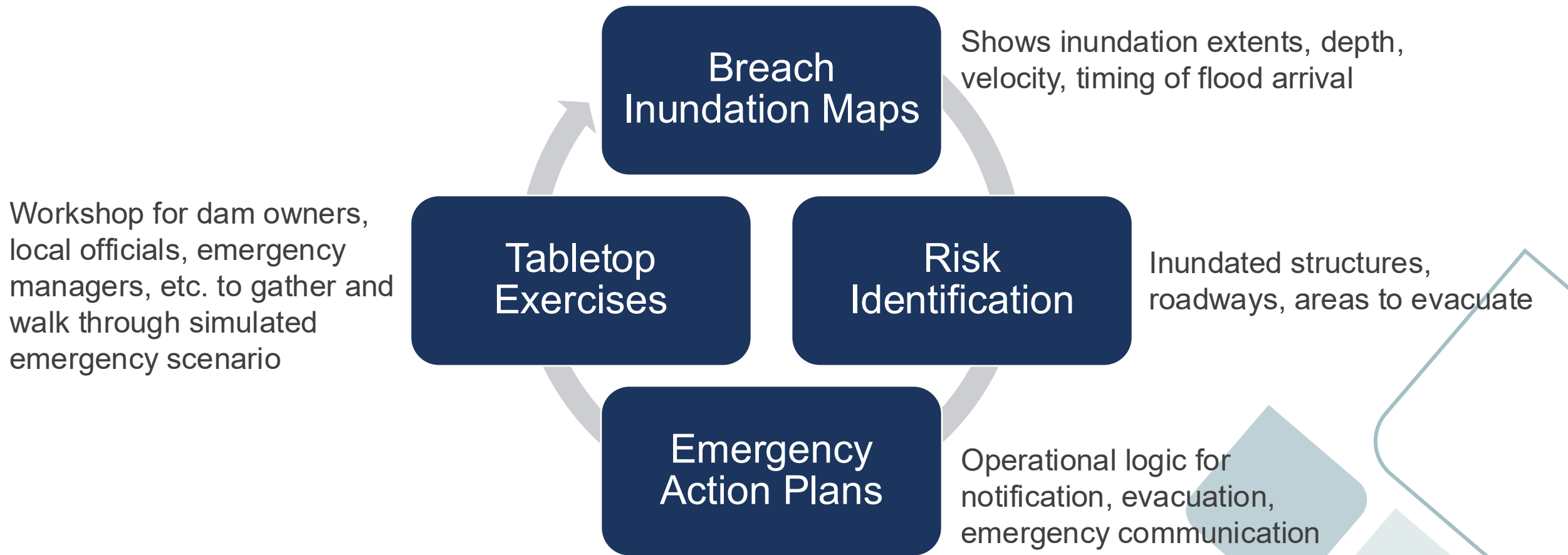
Simulates failure at various points along the dam to identify “worst-case” consequences

- Sunny Day
- Barely Overtopping
- Design Storm



Source: FEMA P-946 / July 2013

Emergency Preparedness



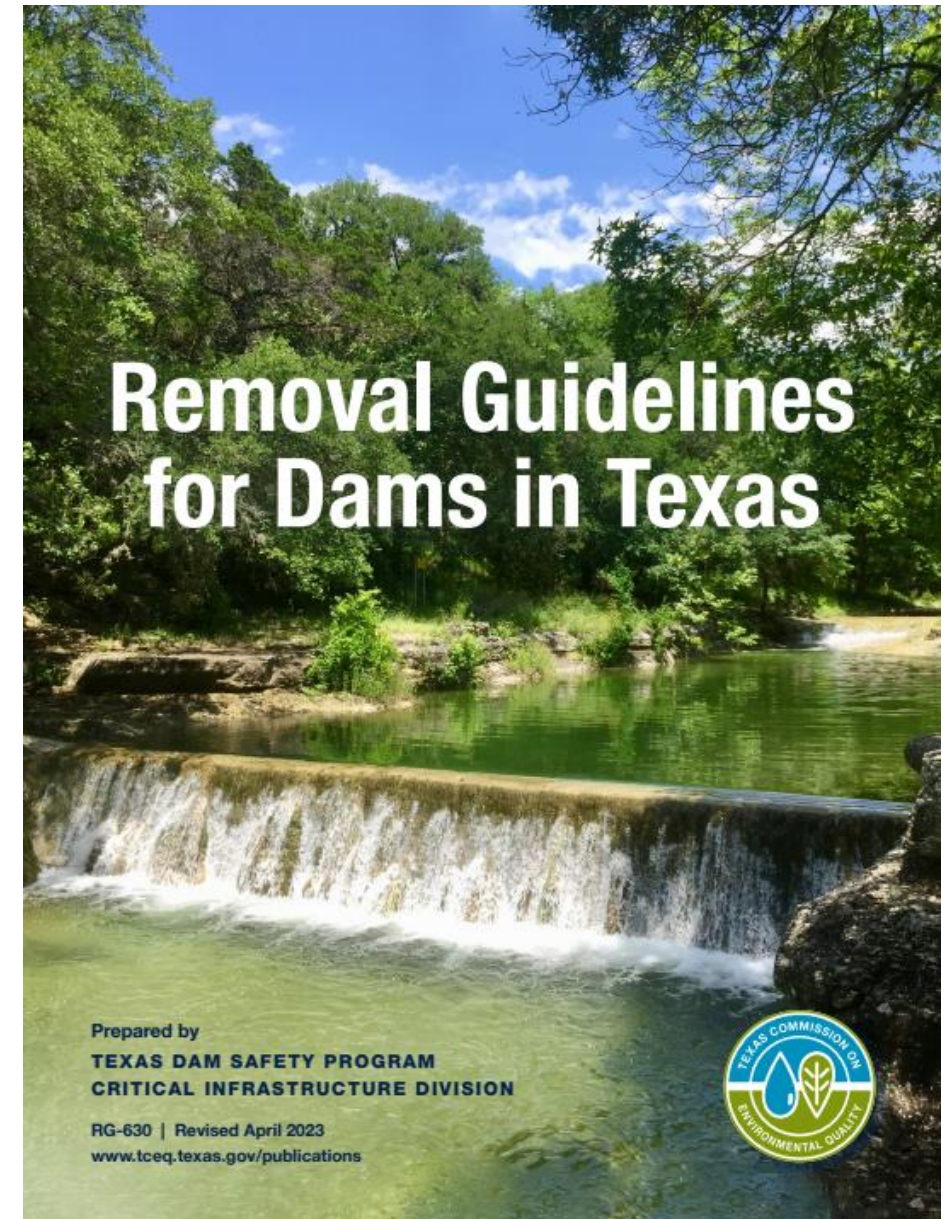
DAM REMOVAL

■ Dam Removal Factors

- Deterioration and risk of failure
- Financial concerns
- Liability
- Return waterway to original condition

■ Other Considerations

- Floodplain impacts
- Water rights permit
- Ecological issues
- Edwards aquifer protection program
- Multiple owners/property easements

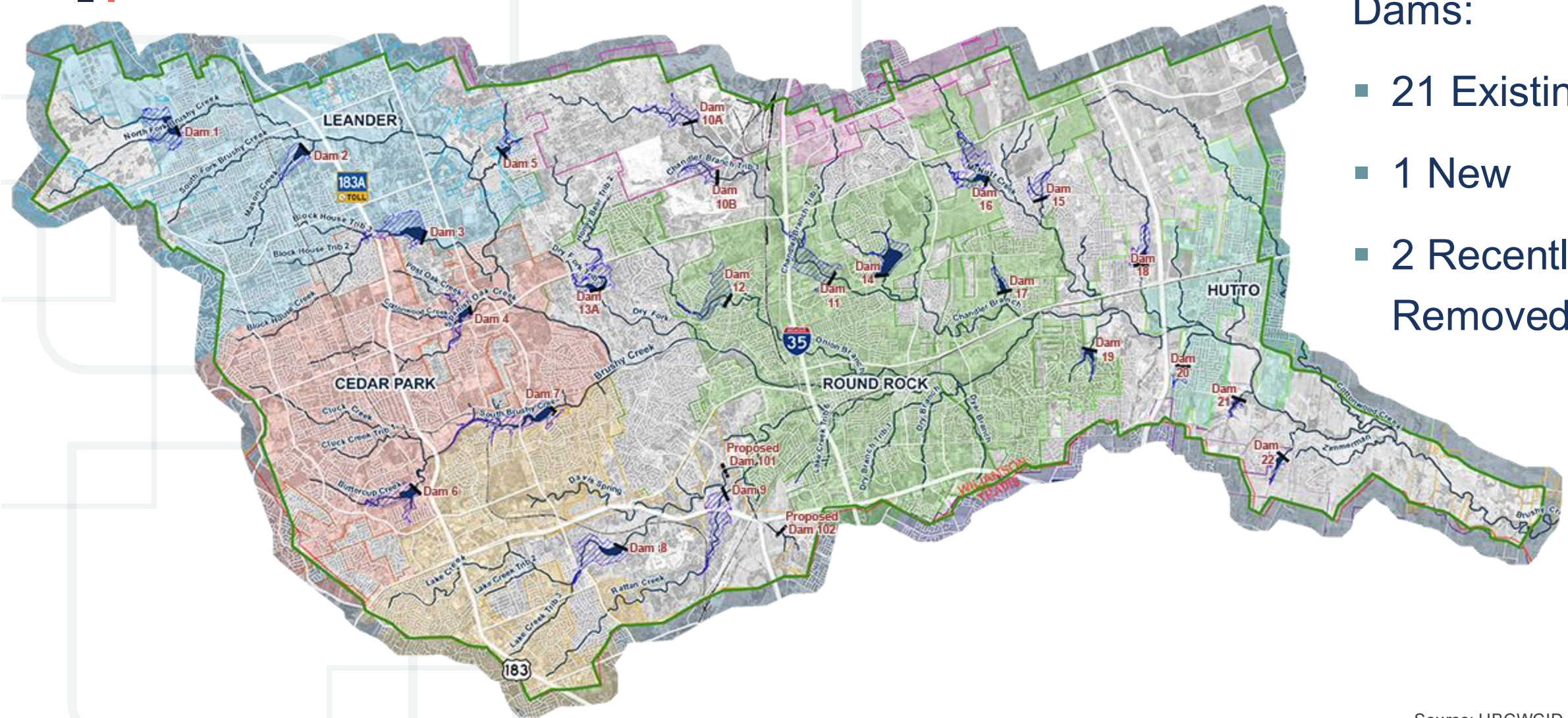


Example: UBCWCID Dams

UBCWCID DAMS PORTFOLIO

Dams:

- 21 Existing
- 1 New
- 2 Recently Removed

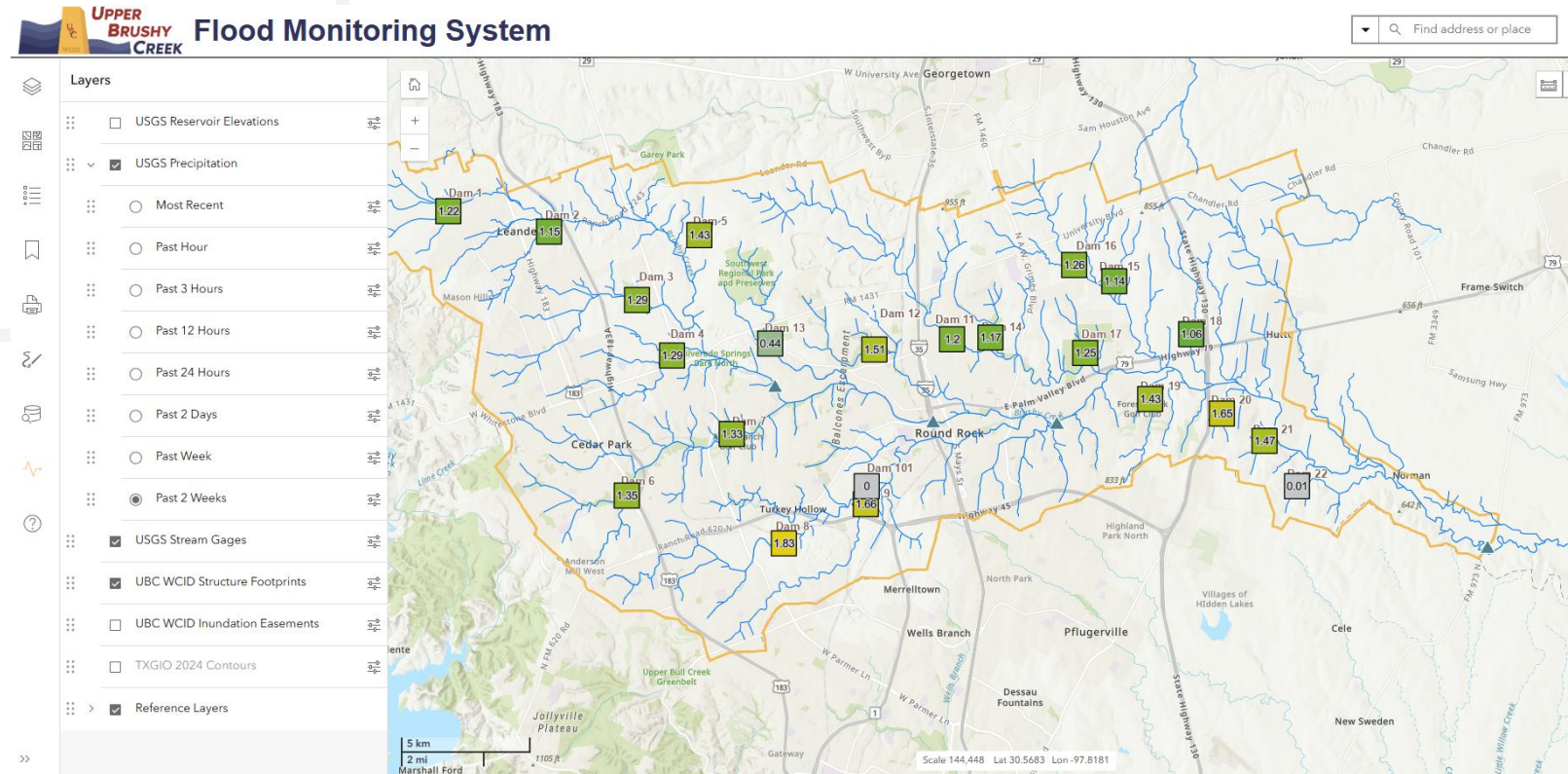


Source: UBCWCID Website

DAM SAFETY LIFECYCLE FOR UBCWCID

Monitoring

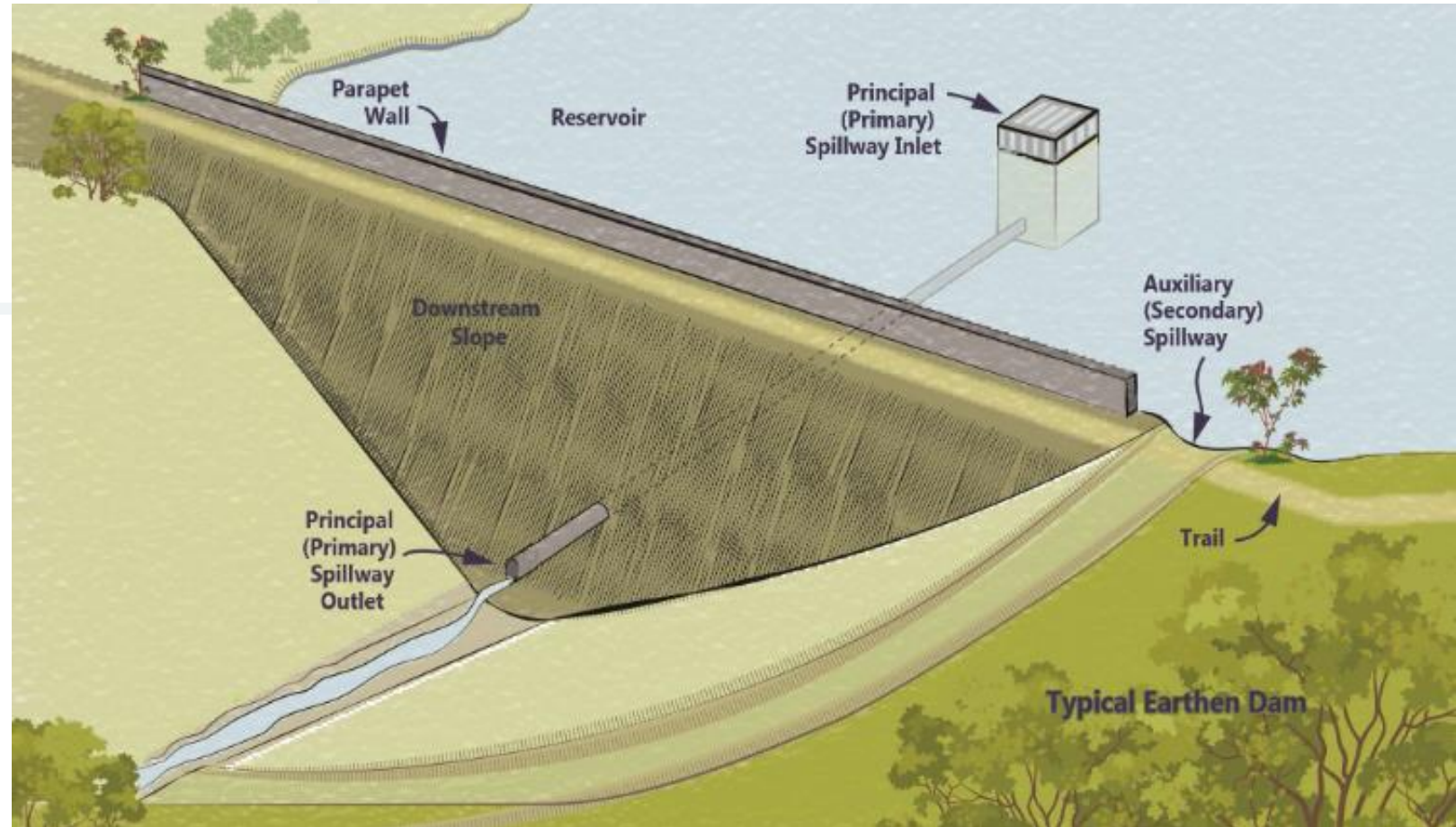
- Rain gages, stream gages, reservoir level gages in collaboration with USGS
- Live web monitoring of all gages
- Other instrumentation of piezometers for some dams
- Principal spillway inspections



Source: UBCWCID Website

DAM SAFETY LIFECYCLE FOR UBCWCID

Maintenance

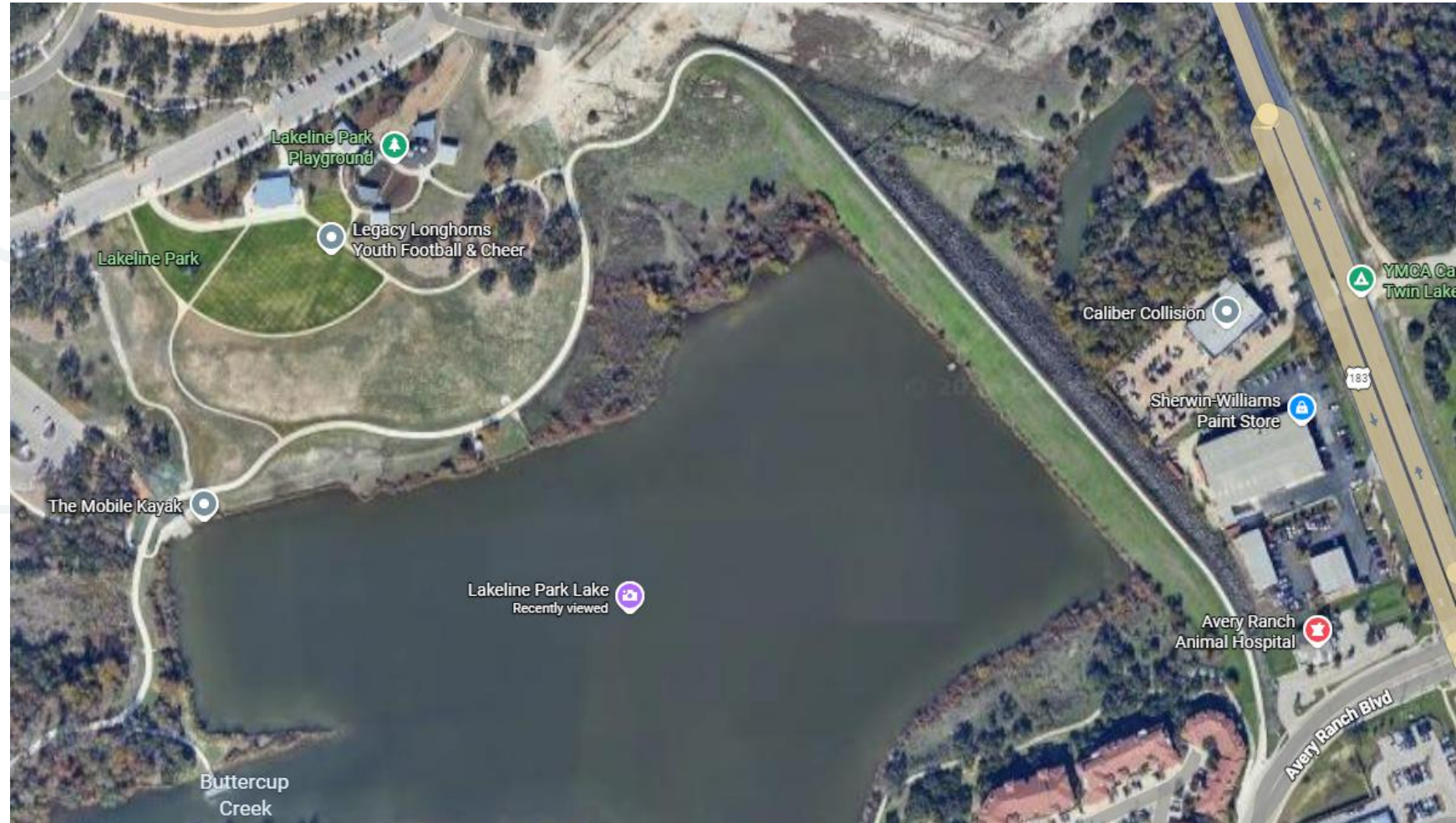


Source: UBCWCID Website

DAM SAFETY LIFECYCLE FOR UBCWCID

Maintenance

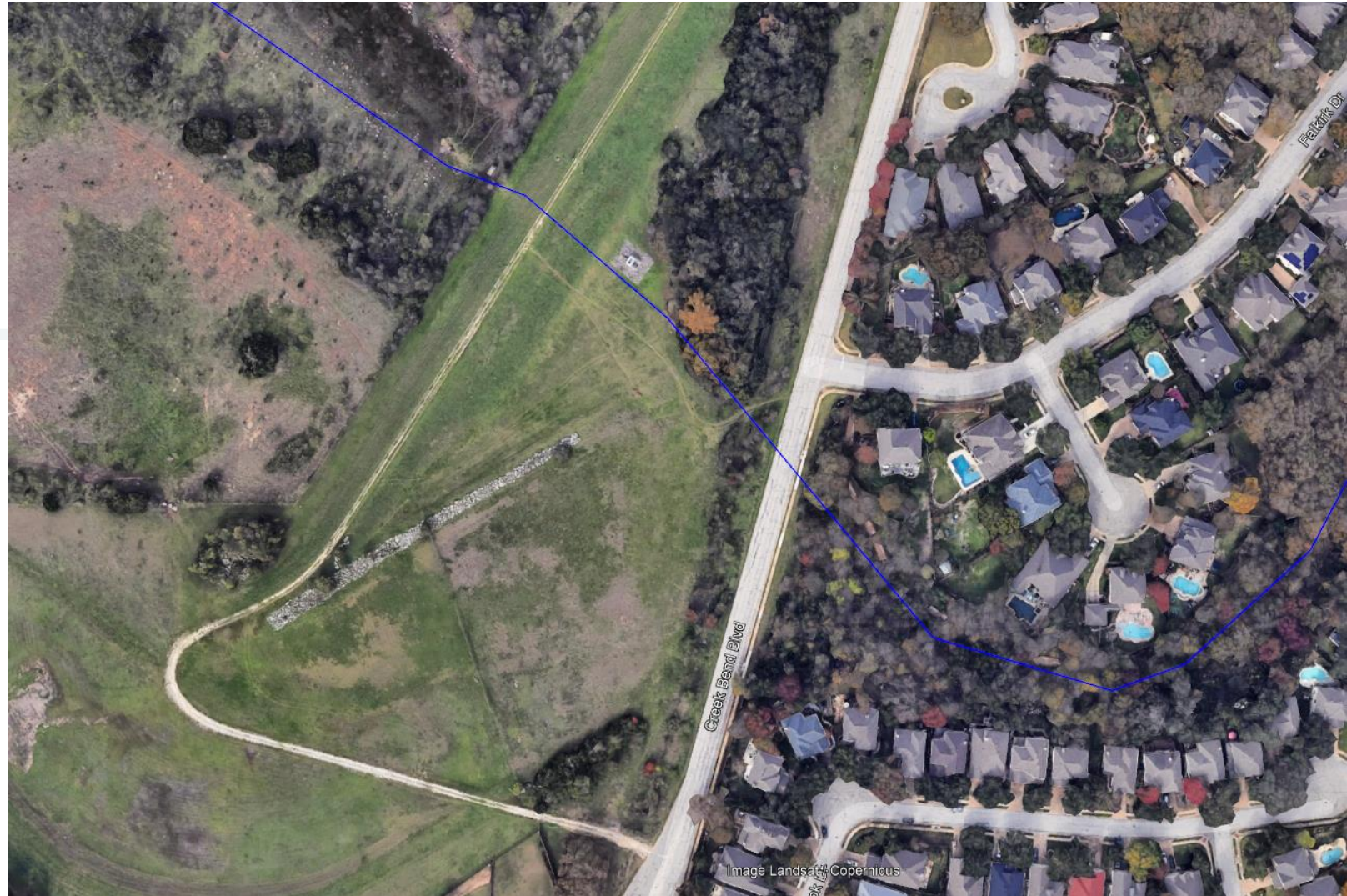
- Challenges due to urbanization/parks



DAM SAFETY LIFECYCLE FOR UBCWCID

Maintenance

- Challenges due to urbanization/parks
- Safety issues /unauthorized access
- Repairing fences



DAM SAFETY LIFECYCLE FOR UBCWCID

Maintenance

- Challenges due to urbanization/parks
- Safety issues /unauthorized access
- Repairing fences
- Mowing
- Exercising valves



DAM SAFETY LIFECYCLE FOR UBCWCID

Assessments

Dam modernization
program to meet
state criteria

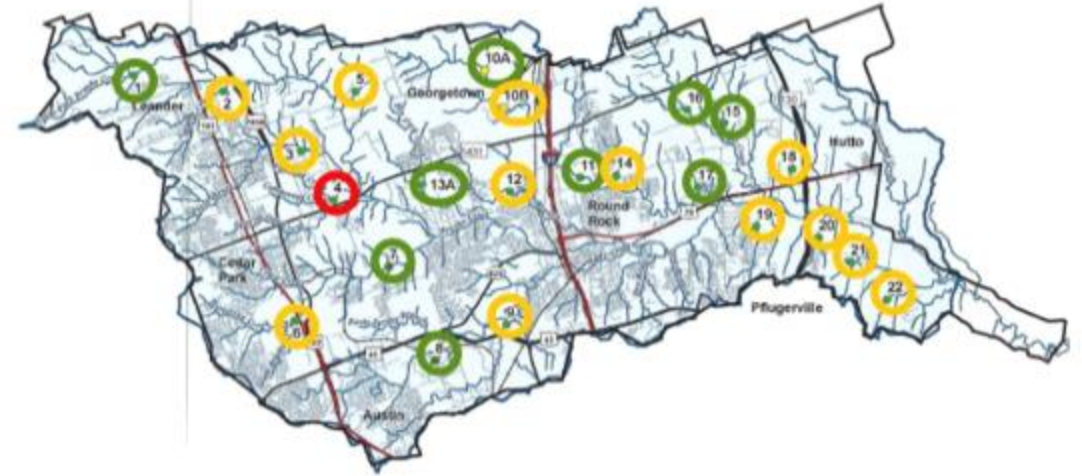
(~2008-2016)



DAM SAFETY LIFECYCLE FOR UBCWCID

Assessments

- Dam assessment & prioritization study (2020), utilizing new methods



Dam Portfolio Prioritization Summary Report

Dam Portfolio Assessment & Prioritization Study

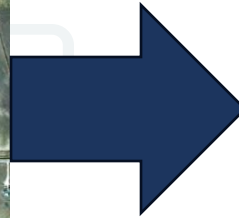
Williamson County, Texas

Source: UBCWCID Website

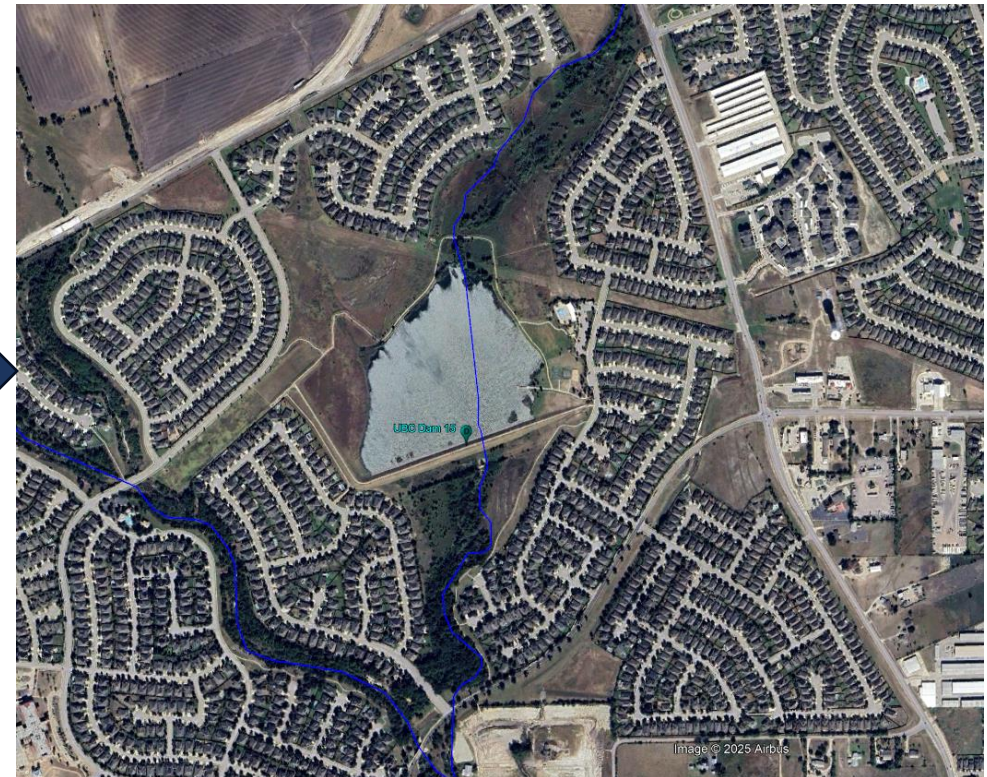
DAM SAFETY LIFECYCLE FOR UBCWCID

Assessments - Changes in Land-use

Year 2006



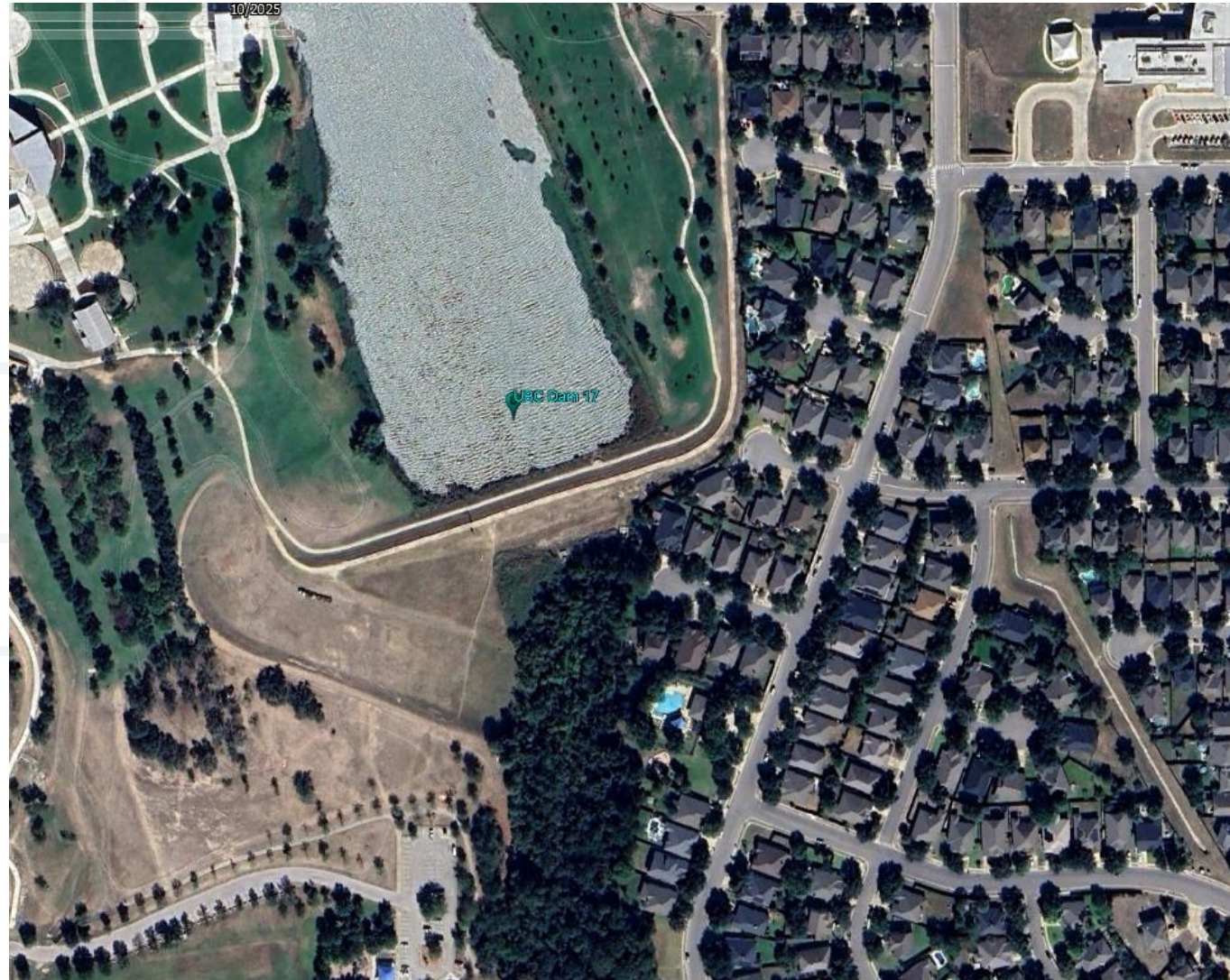
Year 2026



DAM SAFETY LIFECYCLE FOR UBCWCID

Assessments

Downstream Encroachments



DAM SAFETY LIFECYCLE FOR UBCWCID

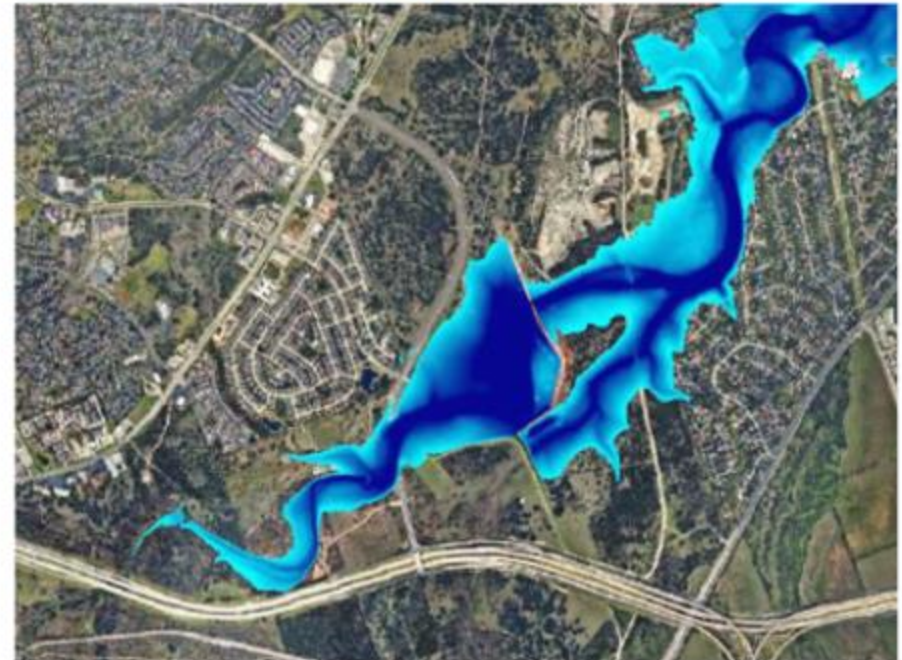
Breach Analysis

- Breach Analysis using new TCEQ guidelines completed in 2019
- Breach mapping updated for 10 dams in 2026
 - New Topography
 - Current land use and developments
 - Correct design flood
- Breach Analysis & mapping revised for 3 dams
 - New dam
 - Dam upgrades to existing dams

REPORT

Upper Brushy Creek WCID

Dam 101 Breach Analysis

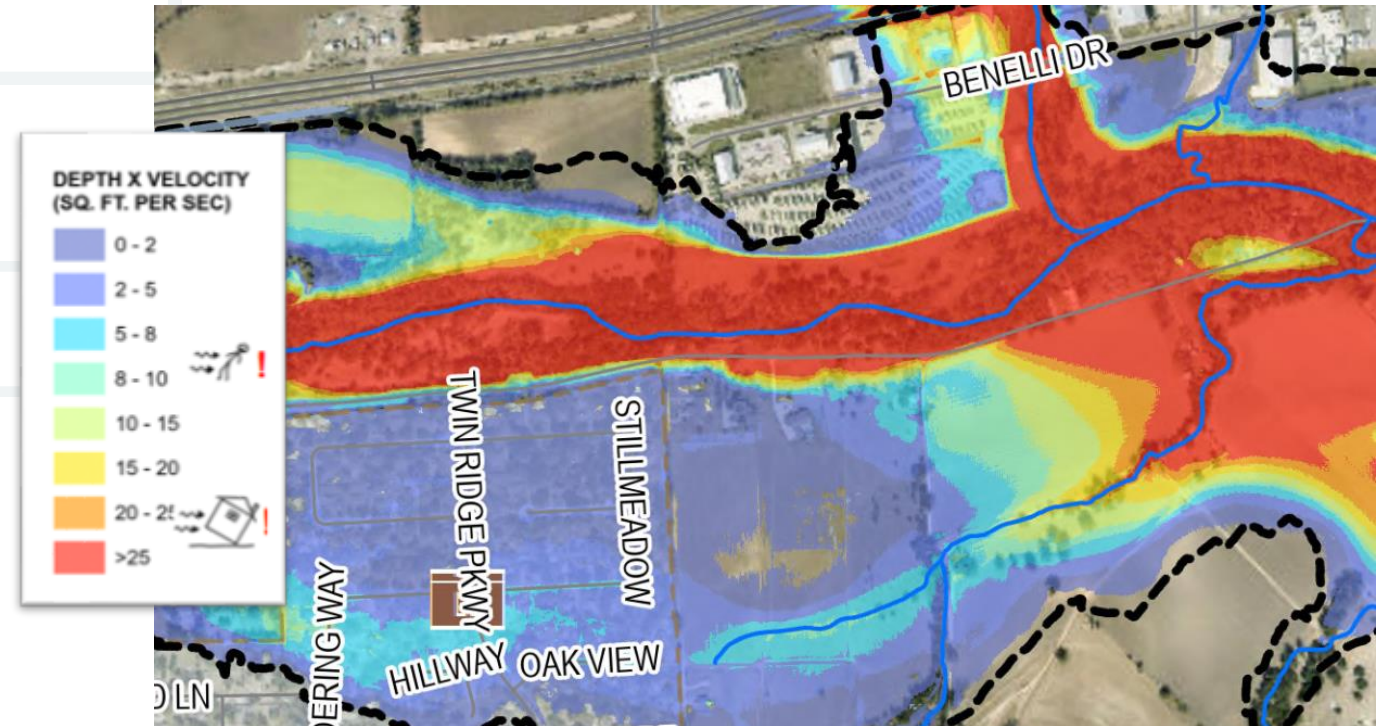
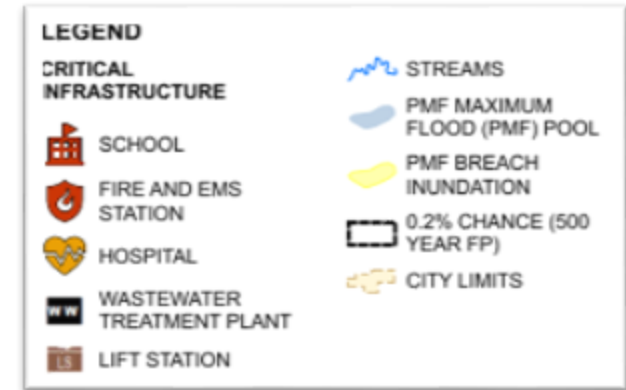


Source: UBCWCID

DAM SAFETY LIFECYCLE FOR UBCWCID

Breach Inundation Maps & EAP

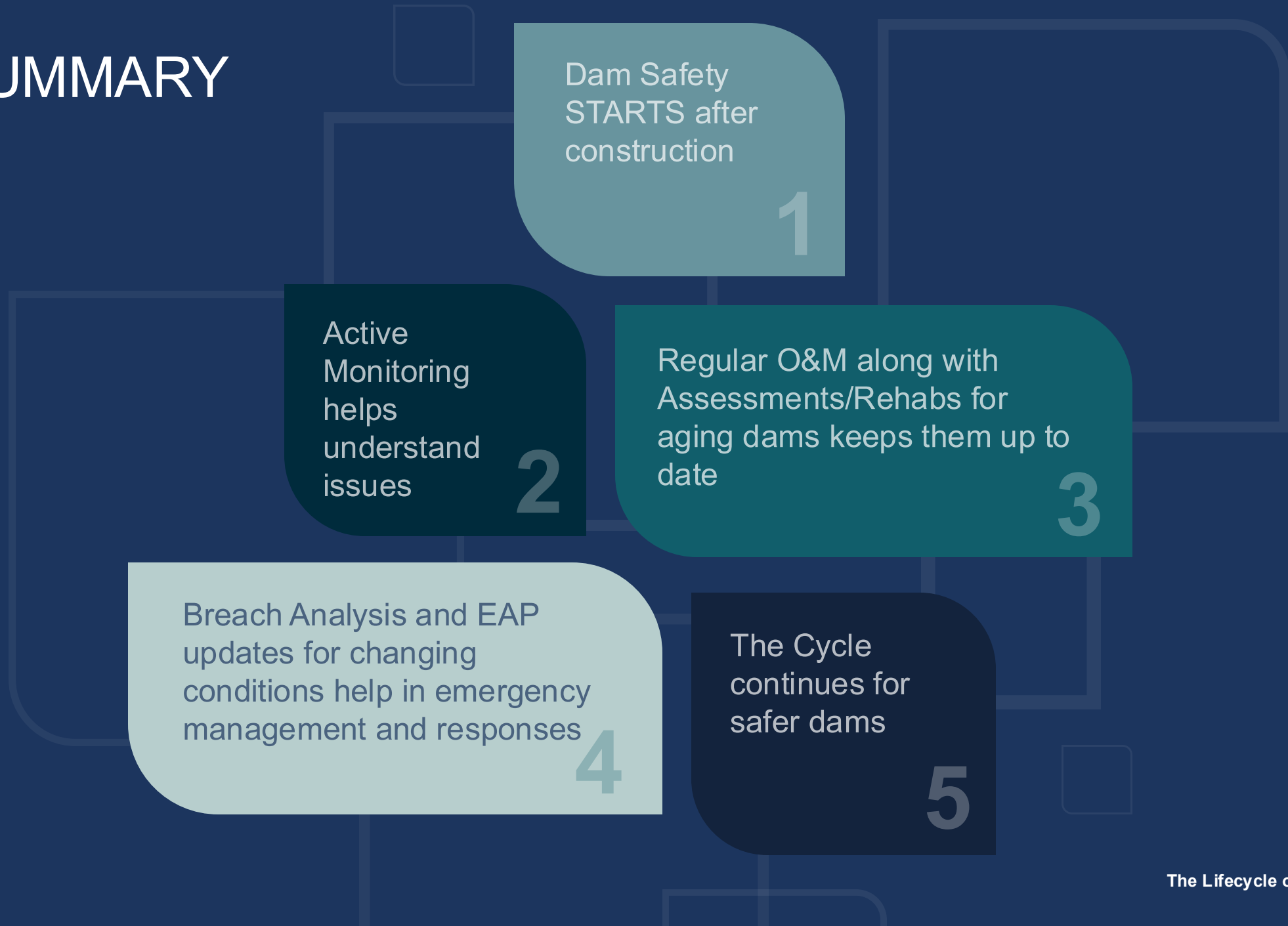
- Breach maps include
 - Inundation limits
 - Critical infrastructure locations
 - Time to peak
 - Structure overtopping depth
 - Depth * Velocity
- EAP Update to include revised maps



Source: UBCWCID

Summary

SUMMARY



Q&A

Sunit Deo, PE, CFM
Sdeo@halff.com



Stephen Crawford, PE, CFM
Scrawford@halff.com

