



2022 Dam Safety Workshop

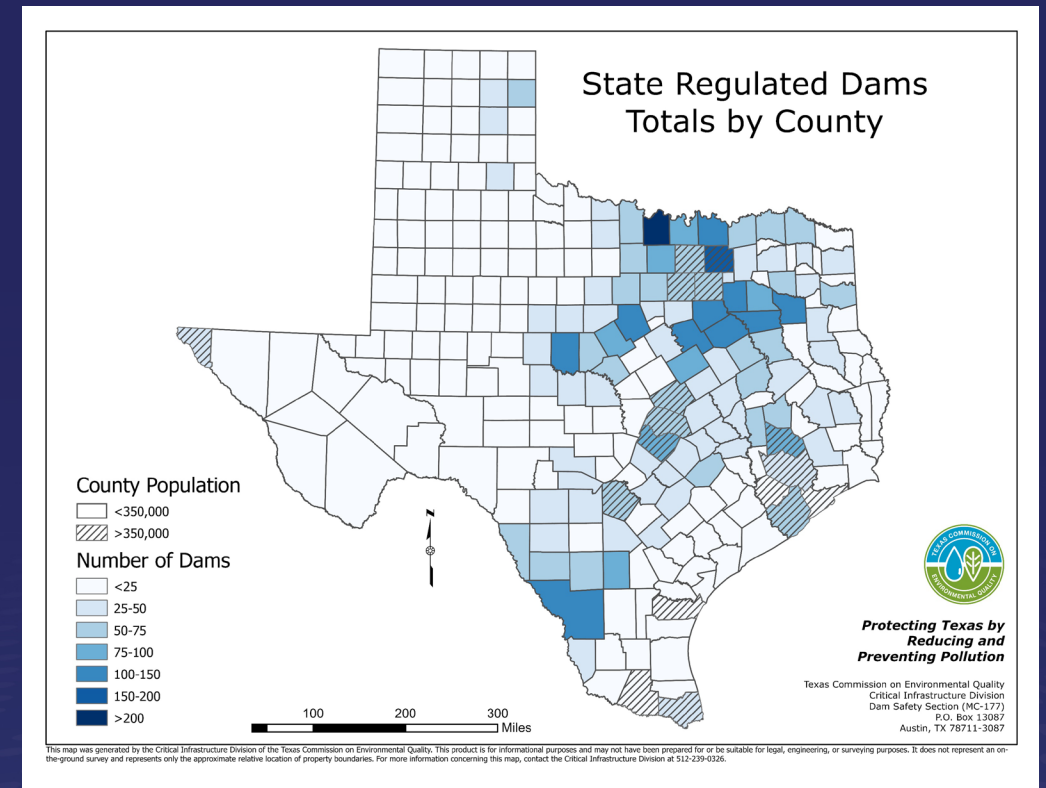
- Session 1

Dam Safety Program Update

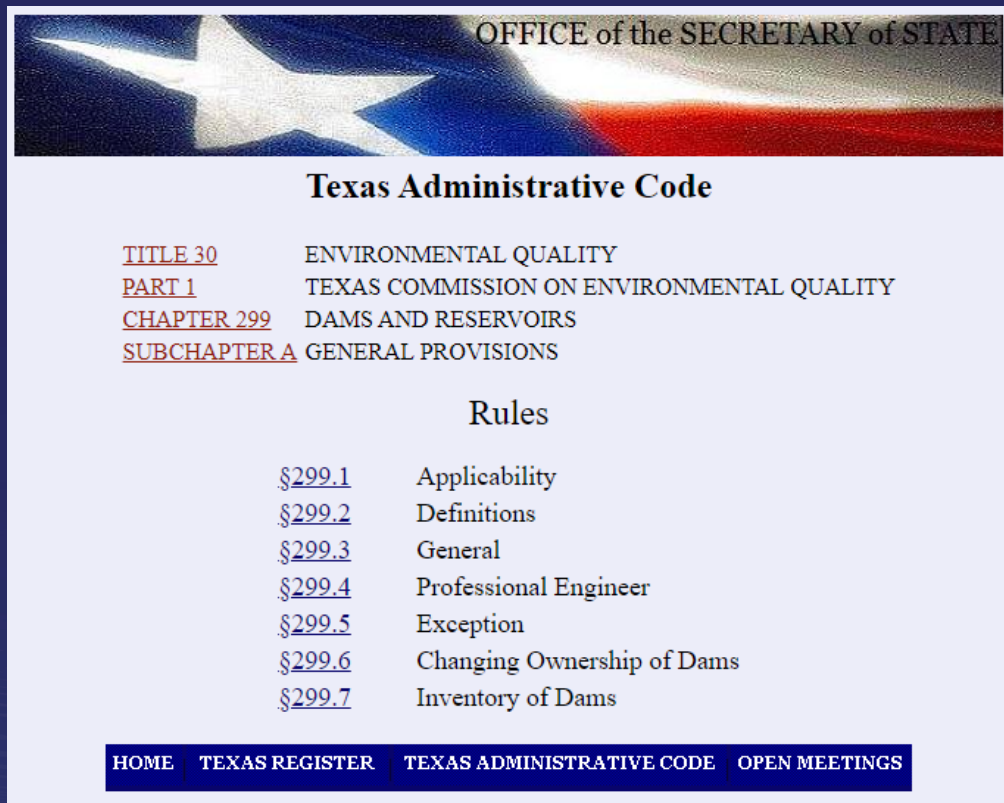
- Hybrid schedule for staff
- Back to normal inspection schedules
- Backlogged

Dam Safety Program Update

- State Regulated Dams: 7,391
 - 4,100 non-exempt
 - 1,522 high hazard
 - 305 significant hazard



299 Rules Update



OFFICE of the SECRETARY of STATE

Texas Administrative Code

[TITLE 30](#) ENVIRONMENTAL QUALITY
[PART 1](#) TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
[CHAPTER 299](#) DAMS AND RESERVOIRS
[SUBCHAPTER A](#) GENERAL PROVISIONS

Rules

§299.1	Applicability
§299.2	Definitions
§299.3	General
§299.4	Professional Engineer
§299.5	Exception
§299.6	Changing Ownership of Dams
§299.7	Inventory of Dams

[HOME](#) [TEXAS REGISTER](#) [TEXAS ADMINISTRATIVE CODE](#) [OPEN MEETINGS](#)

- Comment period ended May 17, 2022
- Anticipated Adoption Date = September 7, 2022

299.1 Applicability



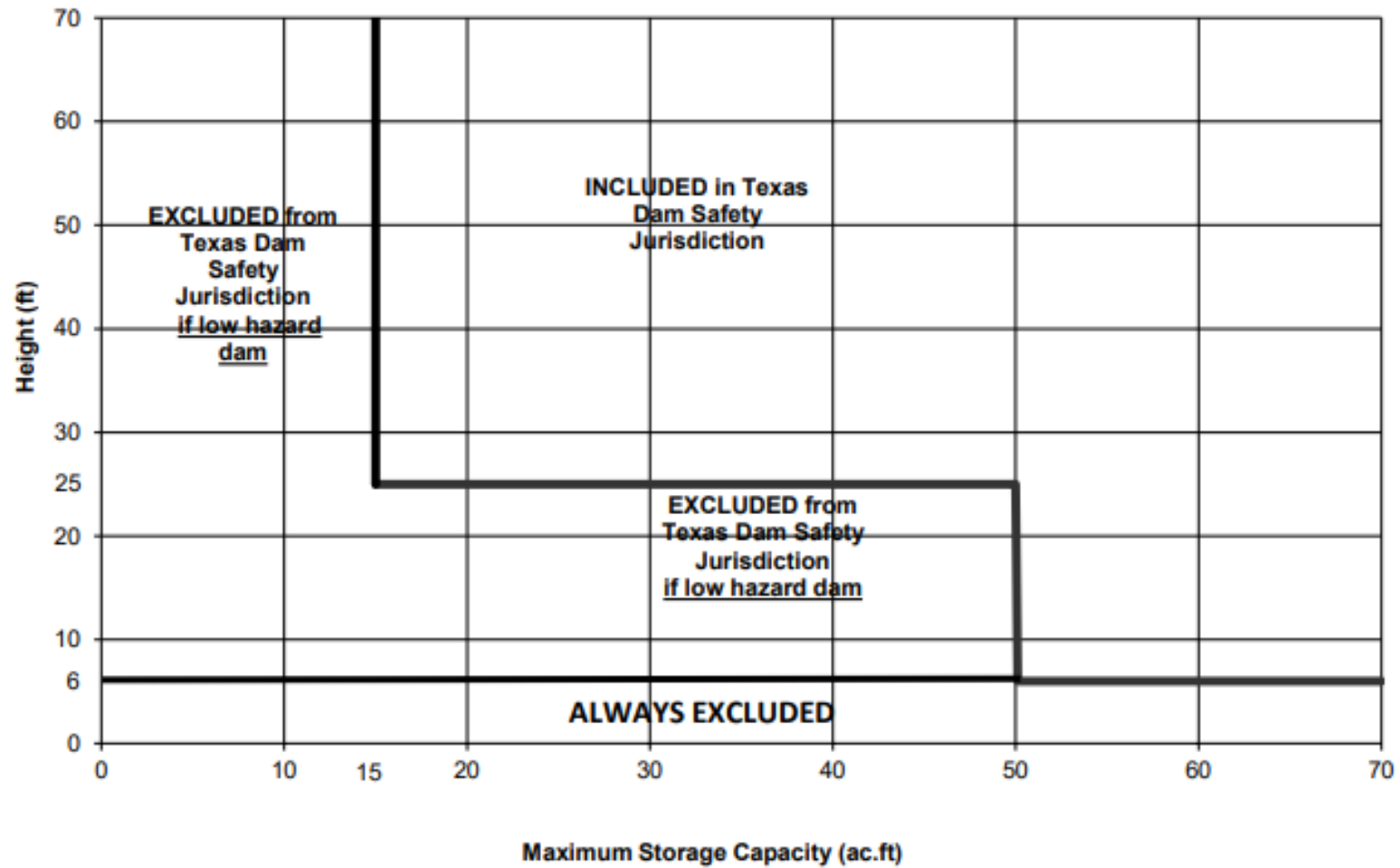
299.1(a)(3) – Current

- Are a high or significant hazard dam as defined in 299.14 of this title regardless of height or maximum storage capacity

299.1(a)(3) – Pending

- Are a high or significant hazard dam as defined in 299.14 of this title if over 6 feet high regardless of maximum storage capacity

Figure 1. Minimum Dam Heights

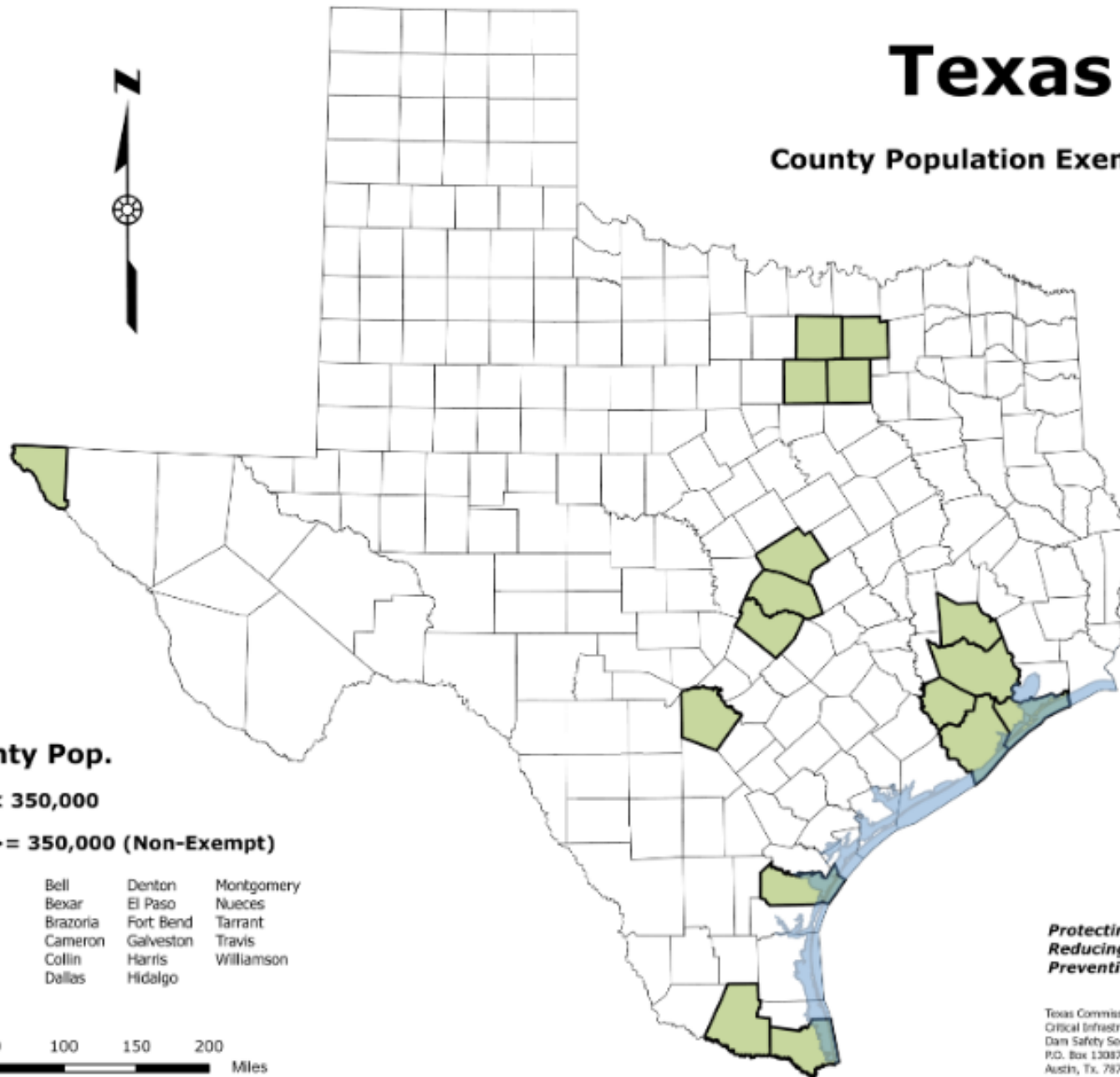


299.1(c)(6)


- Updated to include the exemption criteria
 - A dam is exempt from this chapter if it meets all of the following:
 - Is located on private property
 - Has a maximum capacity of less than 500 ac-ft
 - Has a hazard classification of low or significant
 - Is located in a county with a population of less than 350,000 based on the most current US Census numbers, and
 - Is not located inside the corporate limits of a municipality

Texas

County Population Exemptions



County Pop.

 < 350,000

 ≥ 350,000 (Non-Exempt)

Bell	Denton	Montgomery
Bexar	El Paso	Nueces
Brazoria	Fort Bend	Tarrant
Cameron	Galveston	Travis
Collin	Harris	Williamson
Dallas	Hidalgo	

0 25 50 100 150 200
Miles

*Protecting Texas by
Reducing and
Preventing Pollution*



Texas Commission on Environmental Quality
Critical Infrastructure Division
Dam Safety Section (MC-177)
P.O. Box 13087
Austin, Tx. 78711-3087

299.2 Definitions Updates



- Main Highway
 - Roads classified by TXDOT as interstate or as principal or minor arterials
- Secondary Highway
 - Roads classified by TXDOT as major or minor collector roads
- Minor Highway
 - Roads not classified as a main or secondary highway

299.2 Definitions Updates

- Removal
 - The complete elimination of a dam, the appurtenant structures, and the reservoir to its natural channel by removing enough of the dam to the extent that no water can be either permanently impounded, nor temporarily detained, by the dam (no significant differential between the upstream and downstream water surface elevations) during normal conditions, as well as during the design flood of the dam.

299.7 Inventory of Dams

- (a) Discusses the inventory of dams maintained by Texas Dam Safety which includes:
 - Ownership information
 - Physical dimensions of the dam
 - Hazard classification
 - Normal and maximum storage capacity
 - Hydraulic data
 - Inspection date
 - Location
 - Condition of the dam
 - Emergency action plan status
 - Design Dates
 - Use of Reservoir including Water Rights permit (removed from list)

299.7 Inventory of Dams

- (b) Added from SB600 during the 2021 Legislative Session
 - Requires that River Authorities provide operation and maintenance information to Dam Safety annually.
 - The data is posted to our public website.

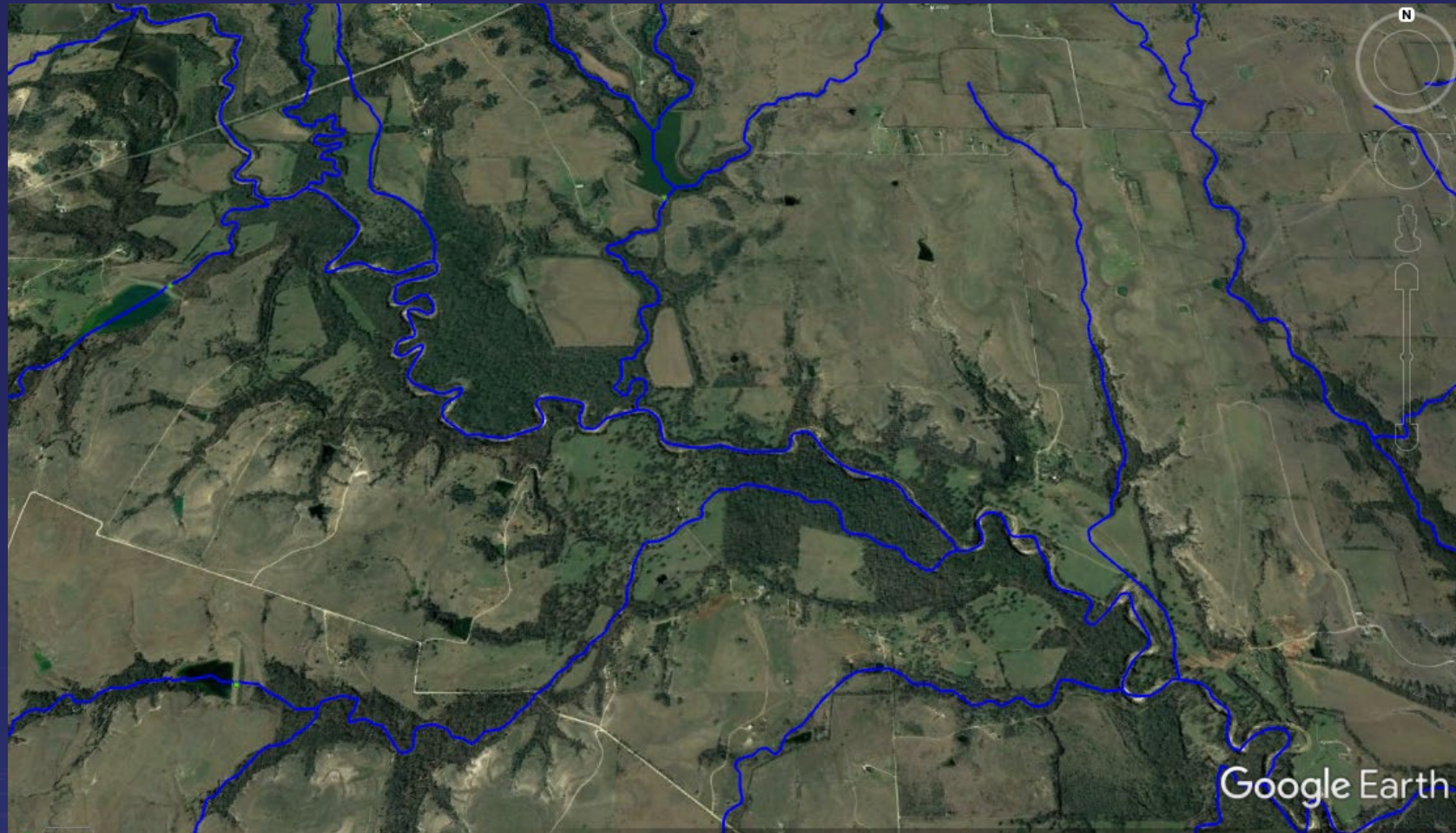
River Authority Inventory

- Brazos River Authority (BRA)
 - **Dam Information**
- Guadalupe-Blanco River Authority (GBRA)
 - **Dam Information**
 - **Guadalupe Valley Hydroelectric Department**
 - **Diversion Justifications**
 - **Coleto Creek Reservoir**
- Lower Colorado River Authority (LCRA)
 - **Dam Information**
- Lavaca-Navidad River Authority (LNRA)
 - **Dam Operations and Maintenance Report**
- San Antonio River Authority (SARA)
 - **Dam Information**
- San Jacinto River Authority (SJRA)
 - **Dam Information**
- Sabine River Authority (SRA)
 - **Dam Information**
- Trinity River Authority (TRA)
 - **Dam Information**
 - **Maintenance Schedule**

Hazard Classification Review

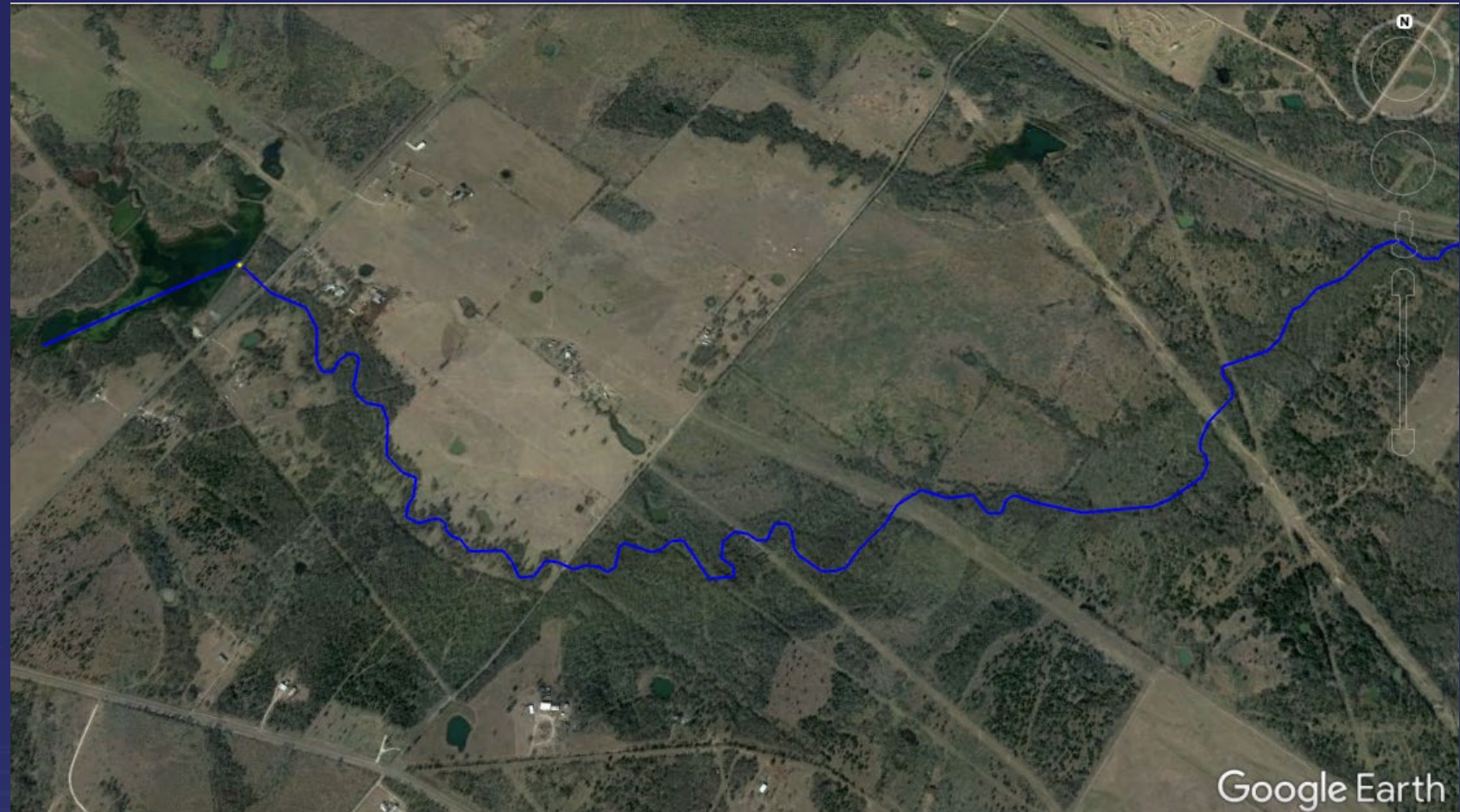
Hazard Classification Review

- Low hazard
 - No loss of life expected
 - Minimal economic loss



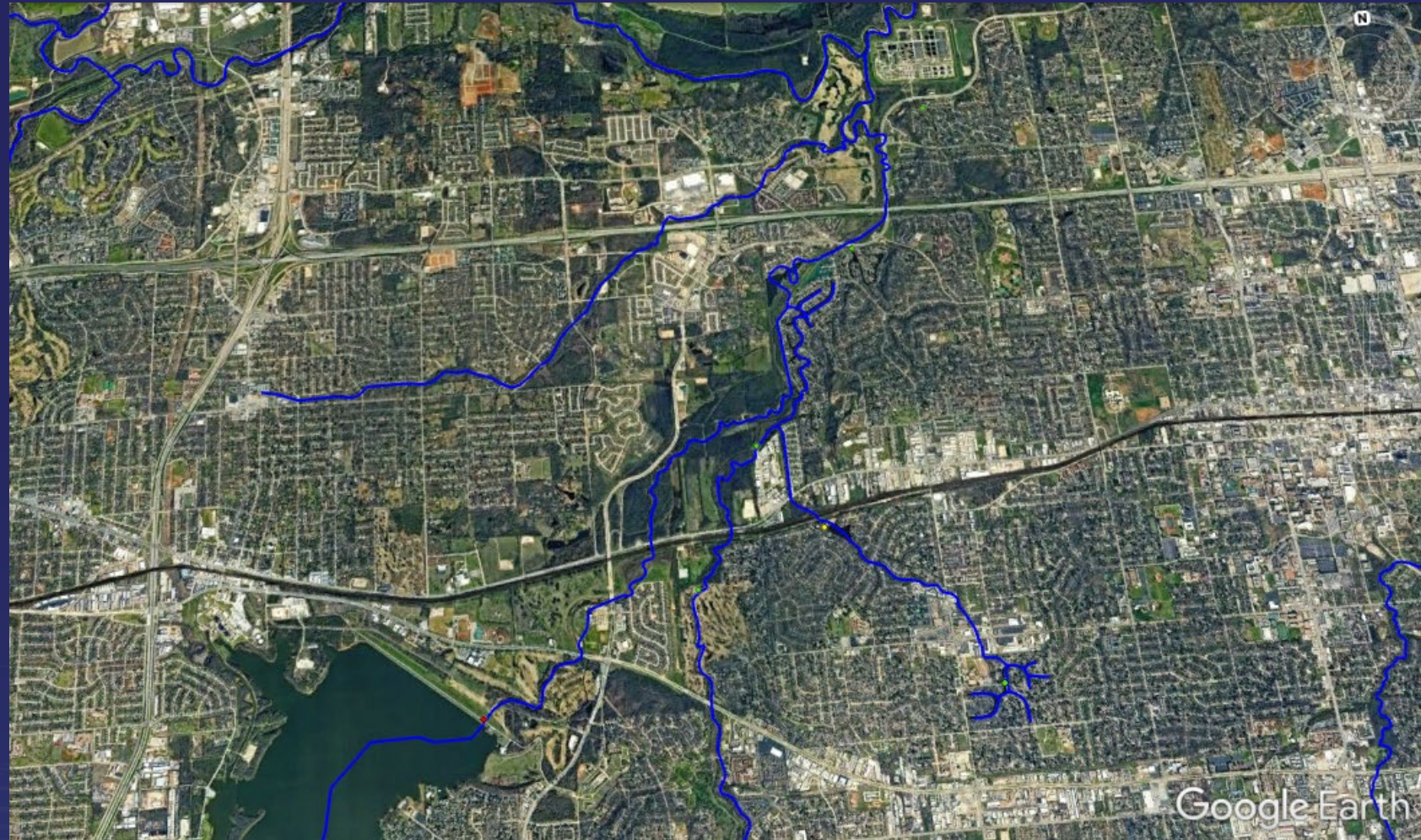
Hazard Classification Review

- Significant hazard
 - Loss of life possible (1-2 homes)
 - Appreciable economic loss



Hazard Classification Review

- High hazard
 - Loss of life expected (≥ 3 homes)
 - Excessive economic loss



Emergency Action Plans & Tabletop Exercises

Emergency Action Plans

- EAPs required for:
 - High hazard dams
 - Non-exempt significant hazard dams
- EAPs recommended for:
 - Exempt significant hazard dams

Emergency Action Plans

- EAP guidelines and templates available
 - Updated in 2019
- https://www.tceq.texas.gov/compliance/investigation/damsafety_prog.html



Guidelines for Developing Emergency Action Plans for Dams in Texas

**Dam Safety Program
Critical Infrastructure Division
Texas Commission on Environmental Quality**

**GI-394
Revised December 2019**

Emergency Action Plans

- EAPs must be reviewed annually
- Update as often as needed
- Don't forget:
 - Log Sheet of Changes
 - Annual Review Checklist
 - Plan Review & Update page
 - Training Records
- Approval & Implementation page

Emergency Action Plans

- EAPs should be the go-to document in an emergency
 - Ensure everyone is familiar with the contents
 - Use the information during an event
 - Update anything that isn't working
 - Ensure inundation maps have enough details
 - Ensure notification flowcharts include a note about downstream residents

Tabletop Exercises

- Required every 5 years
- Facilitator guide available
- Notify TCEQ before the event
- Complete an after-action report and submit to TCEQ to document the exercise



Example Exercise Agenda

Participant
introductions

Discuss the
dam

Facilitator
describes the
incident

Participants
work through
the emergency

Facilitator aids
as needed

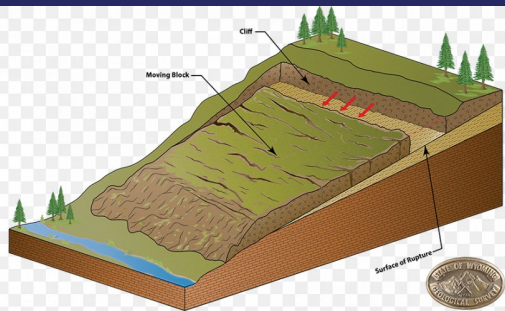
Example Scenarios



- Seepage observed during a rain event
- Whirlpool is observed in the reservoir



- Lake level rising, cloudy seepage, muddy conditions



- Slide erosion on the upstream slope, low area on the crest

Tabletop Exercises

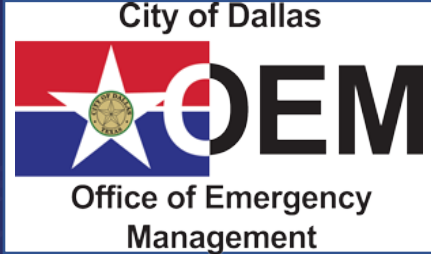
- Facilitator should keep participants on task
- Remember to refer to your EAP on what steps to take
- What if your engineer is unavailable?
- What if your main dam contact is unavailable?

EAP & Tabletop Takeaway

Get to know your local Emergency Management Coordinator



TDEM
THE TEXAS A&M UNIVERSITY SYSTEM



Real-Life Scenario

- Edenville Dam & Sanford Dam Failures
 - May 19, 2020
 - Central Michigan

Data & Figures from:
Investigation of Failures of Edenville and Sanford Dams

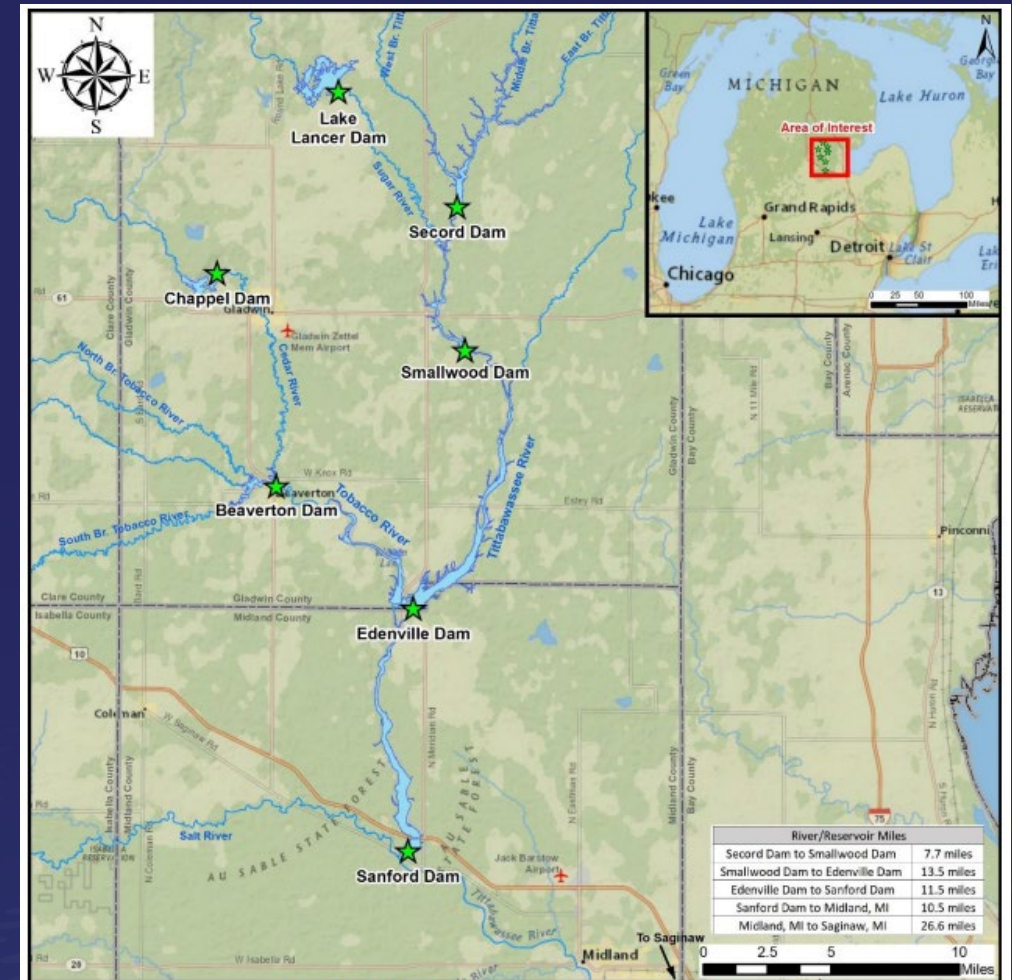


Figure 2-1: Dam Locations in Central Michigan

Real-Life Scenario

Daily Rainfall Totals, inches				
Date	Sanford	Edenville	Smallwood	Secord
Total 5/17 through 5/19	2.95	3.76	3.69	5.90
Total for May 1 through May 19	4.18	4.78	4.29	6.95

- Saturday May 16, 2020 – four dams slightly below normal operating levels
- Most rainfall fell Monday May 18 between 5 am and 11 pm
- Gates at all four dams opened throughout the day
- Lake levels continued to rise
- Tuesday May 19, 1 am – Edenville reached the pool of record

Real-Life Scenario



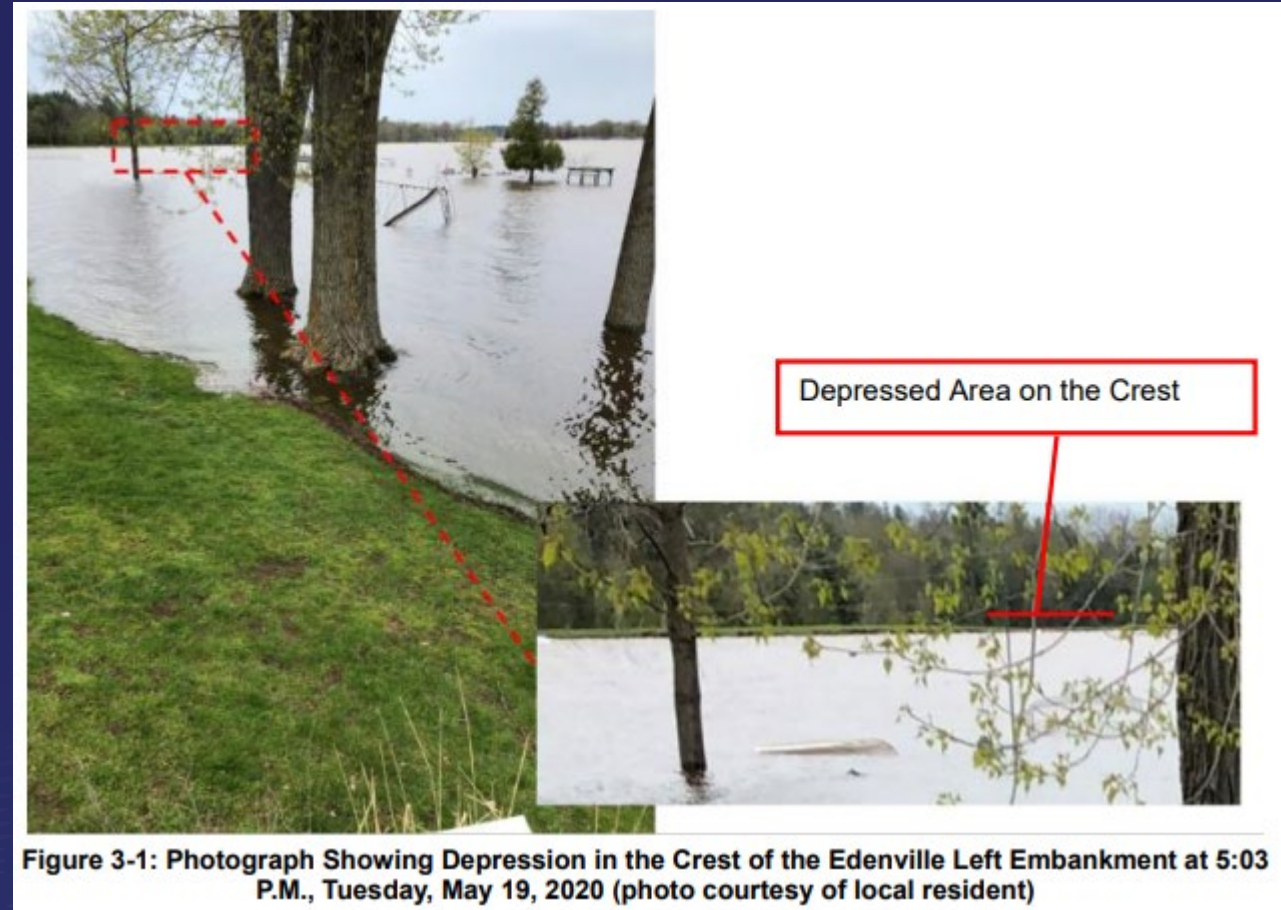
Source of aerial image: Google Earth

Figure 2-2: Edenville Dam Configuration

- Tuesday May 19 – operators reported erosion and sloughing
- Parties were concerned of continued erosion
- Worried about possible overtopping

Real-Life Scenario

- Tuesday May 19, 5pm
- Residents observed a depression at left embankment
- There were no other reports of distress in this area



Real-Life Scenario



Figure 3-4: Photograph Showing the Downstream Side of the Edenville Left Embankment at 5:31 P.M., Tuesday, May 19, 2020



Figure 3-11: Enlarged Still Image from Dam Failure Video at 10 Seconds

Real-Life Scenario



Figure 3-18: Edenville Left Embankment Breach at 9:04 P.M. on Tuesday, May 19, 2020

Real-Life Scenario

- Sanford Dam
- Tuesday May 19, 7:46 pm
- Water level reached a low spot on the crest and continued to rise
- Overtopping occurred



Source: Michigan Drone Services

Figure 3-24: Still Image from Drone Video at Approximately 8:11 P.M. (Note almost complete washout of fuse plug and entire embankment being overtopped.)

Real-Life Scenario

- Emergency Response
 - All four dams had Emergency Action Plans
 - The local EMCs coordinated the response
 - The Dam Owner and EMC communicated throughout the event

Real-Life Scenario

- The EMC decided to start evacuations during the evening of May 18.
- 11,000 people were evacuated
- No reported fatalities or serious injuries



WDIV

Floodwaters flow through a part of downtown Midland on Wednesday morning, close to a farmers' market with a green roof.

Real-Life Scenario



Jake May | MLive.com

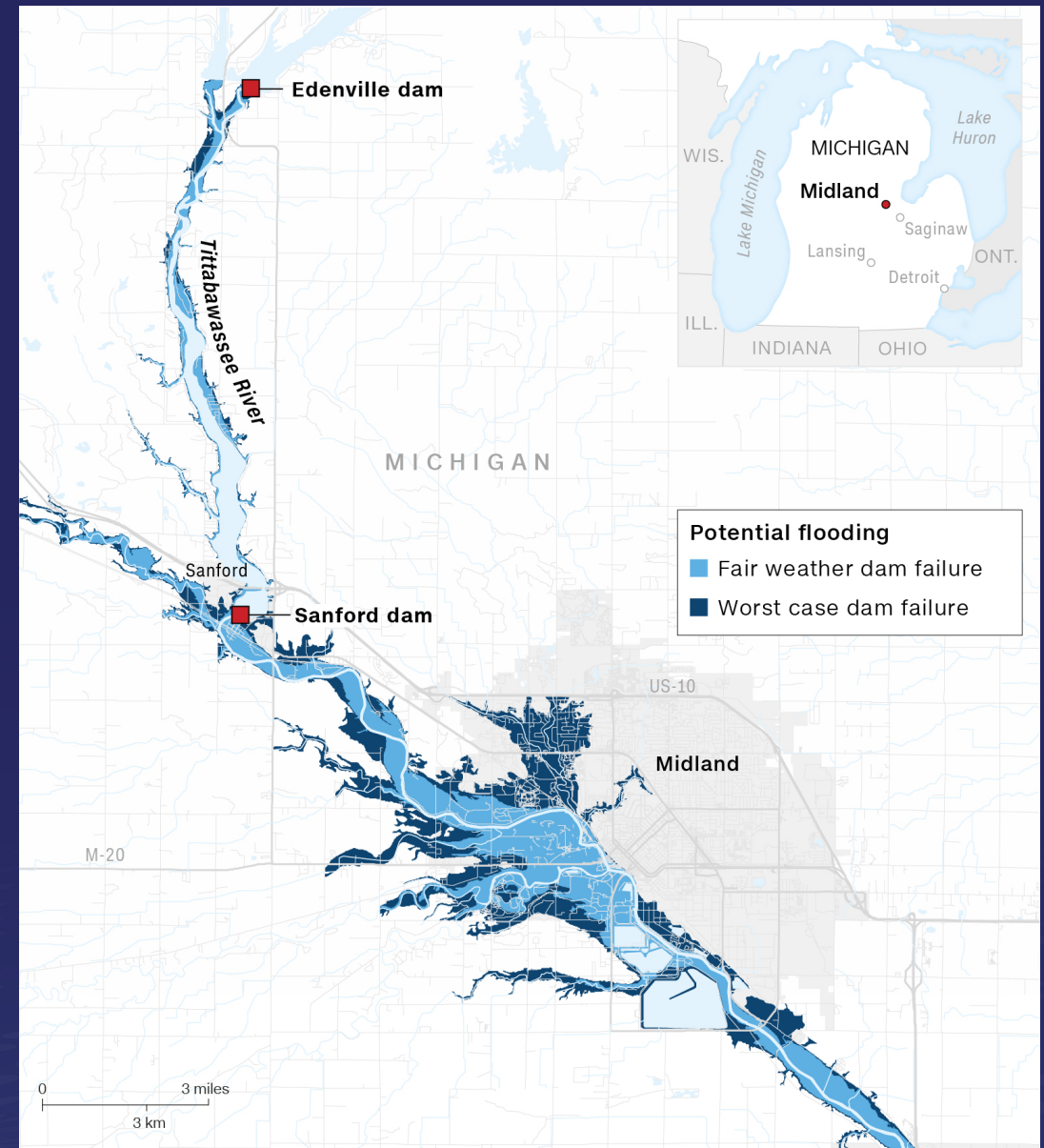
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Michigan dam break leaves trail of destruction with severe flooding

- Widespread flooding from the rain event paired with the two dam failures
 - Damage across 5 counties up to \$190 million in losses
 - 3,000 homes affected
 - \$55 million in damage to public infrastructure

Real-Life Scenario

- What led to the successful evacuations?
 - Recent tabletop exercise
 - EMCs understood magnitude of flooding from a breach
 - Local first responders developed an evacuation plan
 - Timing of evacuations discussed



Real-Life Scenario

- Lessons Learned
 - Inconsistencies in the EAPs between the four dams
 - Ambiguous descriptions of failure scenarios in each EAP
 - EAPs should be clear and allow for judgement

Rehabilitation of High Hazard Potential Dams Grant



FEMA

HHPD Grant

Objective: Reduce or eliminate risk of eligible high hazard potential dams

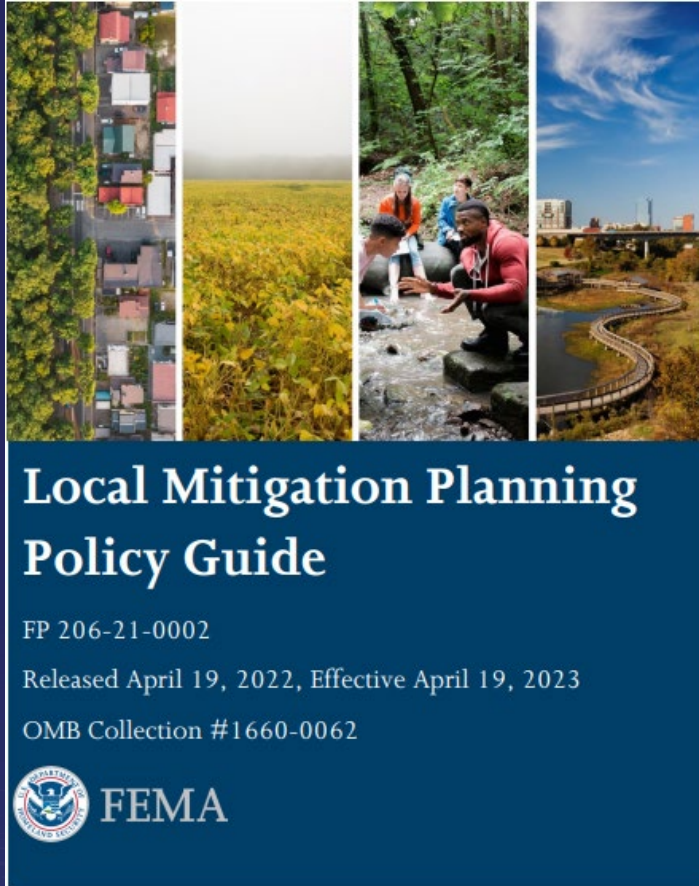
FY22 Priorities: planning, design and construction activities related to the repair, removal, or rehabilitation of eligible high hazard dams.

HHPD Grant

- FY2022 Eligible Dams
 - High hazard structure
 - Has an emergency action plan on file
 - Poor or Unsatisfactory condition

- Funding can only be awarded to:
 - Non-federal government entity
 - Non- profit

HHPD Grant



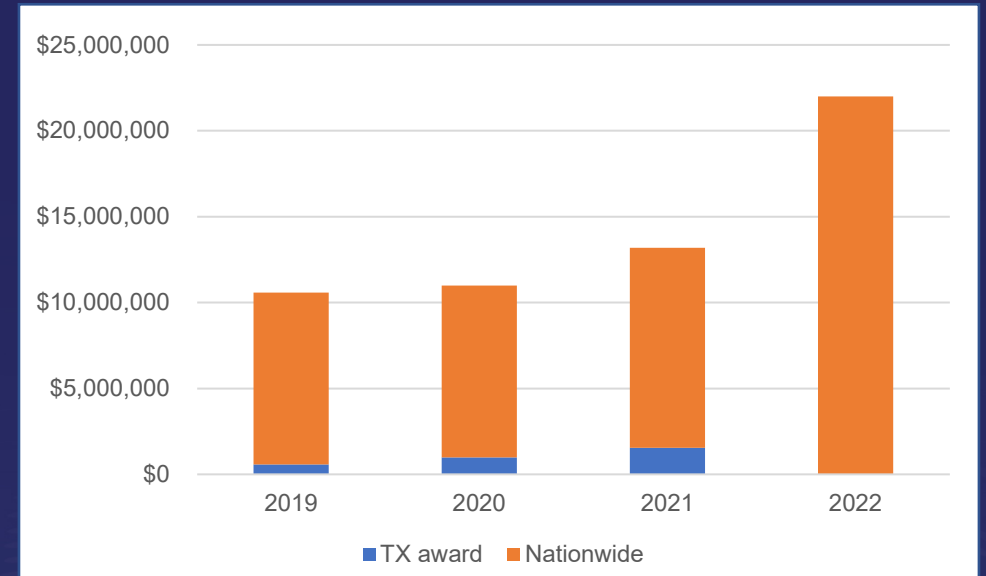
- Other Requirements - Hazard Mitigation Plan
 - Must be updated to include all dam risks:
 - Incorporation of existing plans, studies, reports, and technical information for high hazard dams
 - Addresses high hazard potential dams in the risk assessment
 - Includes mitigation goals to reduce long-term vulnerabilities from high hazard potential dams
 - Actions that address high hazard potential dams and prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams

HHPD Grant

- Other Requirements – Floodplain Management Plan
 - Developed within 2 years of an award
 - Implemented within 2 years of completion of project
- The plan shall address
 - Potential measures to reduce the adverse impacts of flooding
 - Plan for flood fighting and evacuation
 - Public education and awareness of flood risk

HHPD Grant

- FY2019
 - Texas awarded \$574,647 (3 dams)
- FY2020
 - Texas awarded \$987,217 (8 dams)
- FY2021
 - Texas awarded \$1,556,603
 - Accepted \$569,275 (6 dams)
- FY2022
 - Application in progress
 - All eligible owners have been contacted



HHPD Grant

FY2022

- \$22,000,000 available nationwide
 - \$11,640,000 Annual Appropriation
 - \$10,360,000 Infrastructure Investment and Jobs Act Funding

HHPD Grant

FEMA's website

<https://www.fema.gov/emergency-managers/risk-management/dam-safety/rehabilitation-high-hazard-potential-dams/resources>

Email Trina: trina.Lancaster@tceq.texas.gov

Dam Owner Resource

<https://damsafety.org/dam-owners>

Resources for Dam Owners and Operators

Contents

[Being a Responsible Dam Owner](#)

[Dam Owner Academy — ASDSO's Dam Owner Education Video Series](#)

[Find Workshops, Fact Sheets, and Guidance](#)

[Next Steps - Meeting Knowledgeable Dam Owners and Regulators](#)

[External Resources](#)

Dam Owner Resource

<https://damsafety.org/dam-owners>





Dam Ownership
Fact Sheets



Dam Owner Resource

<https://damsafety.org/dam-owners>

ASDSO Dam Owner Academy on YouTube

1		Dam Owner Academy: Dams 101 Association of State Dam Safety Officials (ASDSO) 8:43
2		Dam Owner Academy: Operation & Maintenance Plans Association of State Dam Safety Officials (ASDSO) 9:17
3		Dam Owner Academy: Dam Inspections Association of State Dam Safety Officials (ASDSO) 10:03
4		Dam Owner Academy: Spillways & Outlet Works Association of State Dam Safety Officials (ASDSO) 9:39



Questions???

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