

# Plum Creek Dam

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*MOCK*  
EAP TABLETOP EXERCISE



July 24, 2025



# Objectives



EAP familiarity



Responsibilities defined



Notification contacts (When/Who)



Practice; Revise to address gaps

# Introductions

- Dam Owner: Plum Creek Conservation District
- EMC: Hays County
- Dam Safety Engineer: Freese and Nichols
- TCEQ Dam Safety
- National Weather Service
- TDEM
- TxDOT



*Tabletop Exercise*

# Agenda



- EAP Case Studies
- Dam Overview
- EAP Review
- Break
- Scenario and Discussion
- Notification Flowcharts Review
- Next Steps and Closing

# Housekeeping



Emergency Exits



Questions / Discussions are Welcome



Group discussions are the goal; no “wrong” answers



Note taker for after-action report

# Emergency Action Plan (EAP)

Required by TCEQ Dam Safety for significant and high hazard dams:

- To plan for expedited, effective response to prevent failure of the dam
- To protect lives from an uncontrolled release of the reservoir





*Lake Dunlap Dam Spillway Failure*



*Central Michigan Dam Failures*

# EAP Case Studies



# Lake Dunlap Dam Spillway Gate Failure

- May 2019
- Cause determined as “aging structural steel”
- Significant drop in lake levels
- EAP Activation:
  - ✓ Warnings issued for high-velocity flows and rising lake levels downstream
  - ✓ Downstream property owners notified (no evacuations necessary)
  - ✓ Temporary water conservation notices

# Edenville and Sanford Dam Failures

- Central Michigan, May 2020 excessive rainfall
- Edenville Dam failed; flood wave overtopped Sanford Dam
- Pre-failure erosion mitigation efforts at Edenville Dam
- Early initiation of evacuation of 11,000 people
  - **No** reported fatalities or serious injuries
- Damages
  - 3,000 homes affected, 150 lost
  - \$190 million for residents
  - \$55 million to public infrastructure



# EAP Activation

*“The success of the emergency response can be principally attributed to a prudent, proactive, and cautious decision by the Midland County emergency manager (EM) to initiate early evacuations.”*



*“The evacuations were reportedly well organized and orderly. The EMs attributed this, at least in part, to an EAP exercise conducted in 2019 and evacuations plans developed as a result of that exercise.”*

*[Independent Forensic Team]*

# Plum Creek Dam Overview

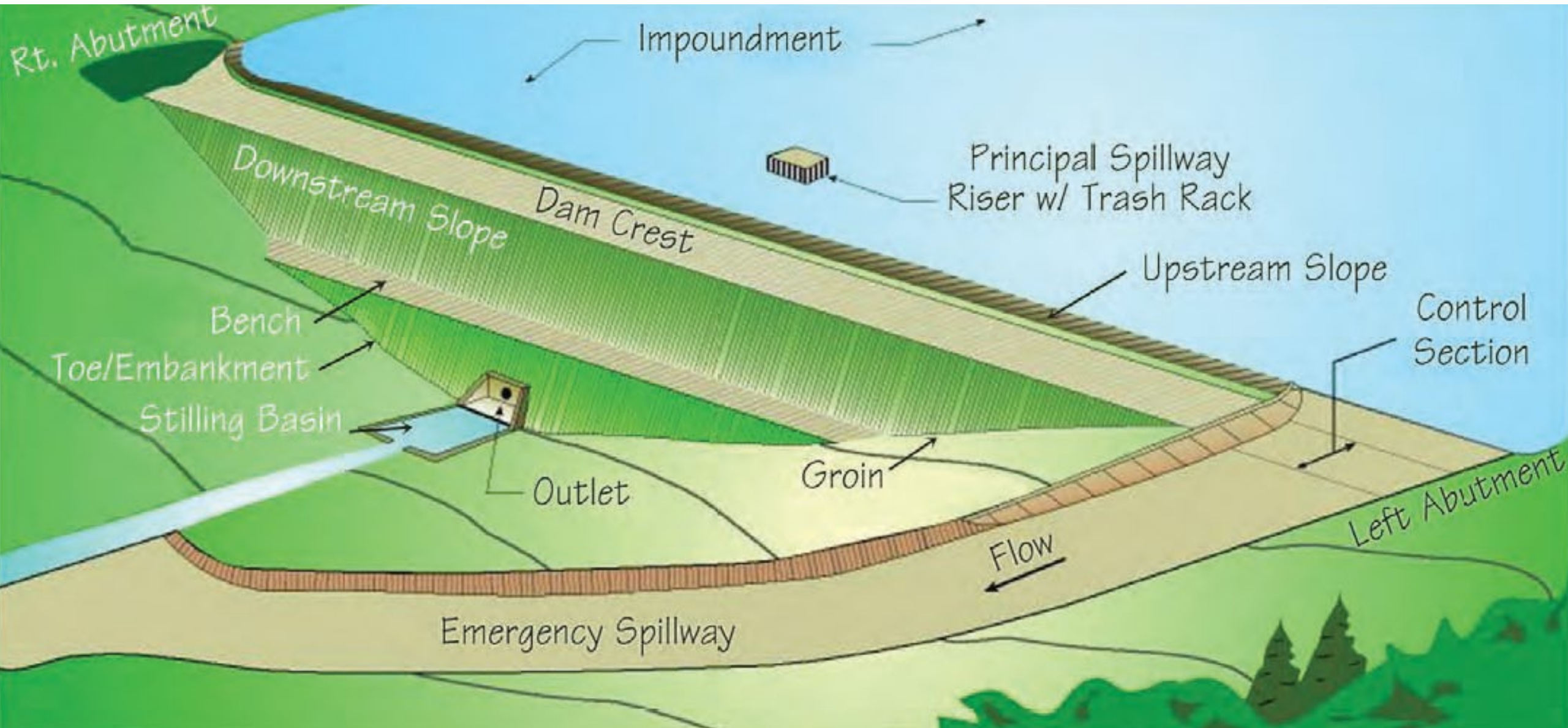
TX12345

# Dam Overview

- Constructed in 1960
- Modification in 2010
- Hazard Classification: **High Hazard**
- Size Classification: Intermediate
- Drainage Area: ~2,800 square miles
- Reservoir Surface Area: 500 acres



# Typical Embankment Dam



# Embankment

Downstream Toe

Upstream Toe



# Spillways

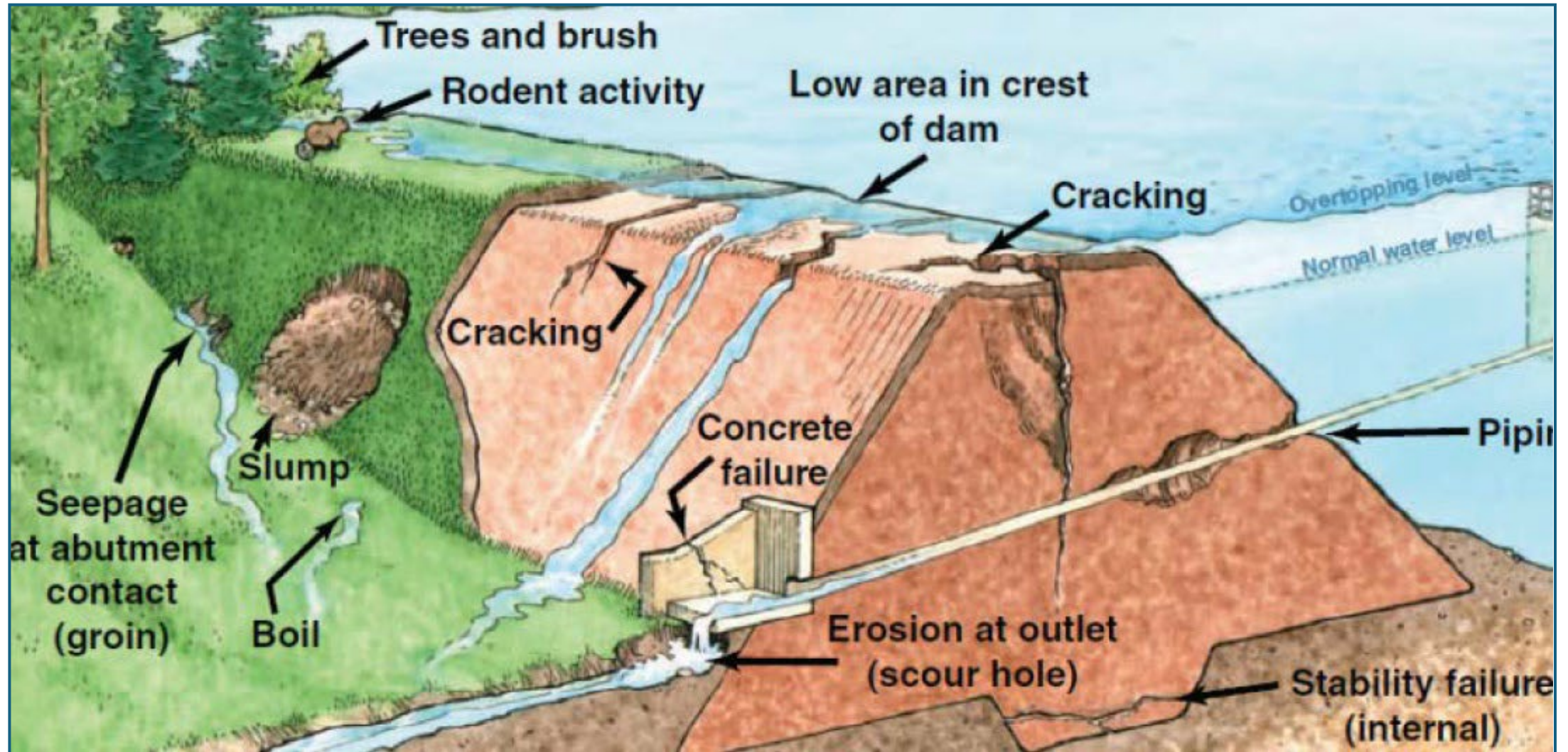
Principal Spillway  
Outlets

Auxiliary  
(Emergency)  
Spillway



# Embankment Failure Modes

20% of U.S. dam failures have been caused by **piping** (internal erosion caused by seepage)



# Piping Case Study – Teton Dam



10:30 am 6/5/76



11:57 am 6/5/76



Within minutes!

*Photos of Teton Dam failure by Eunice Olson and BuREC*

# Preventative actions



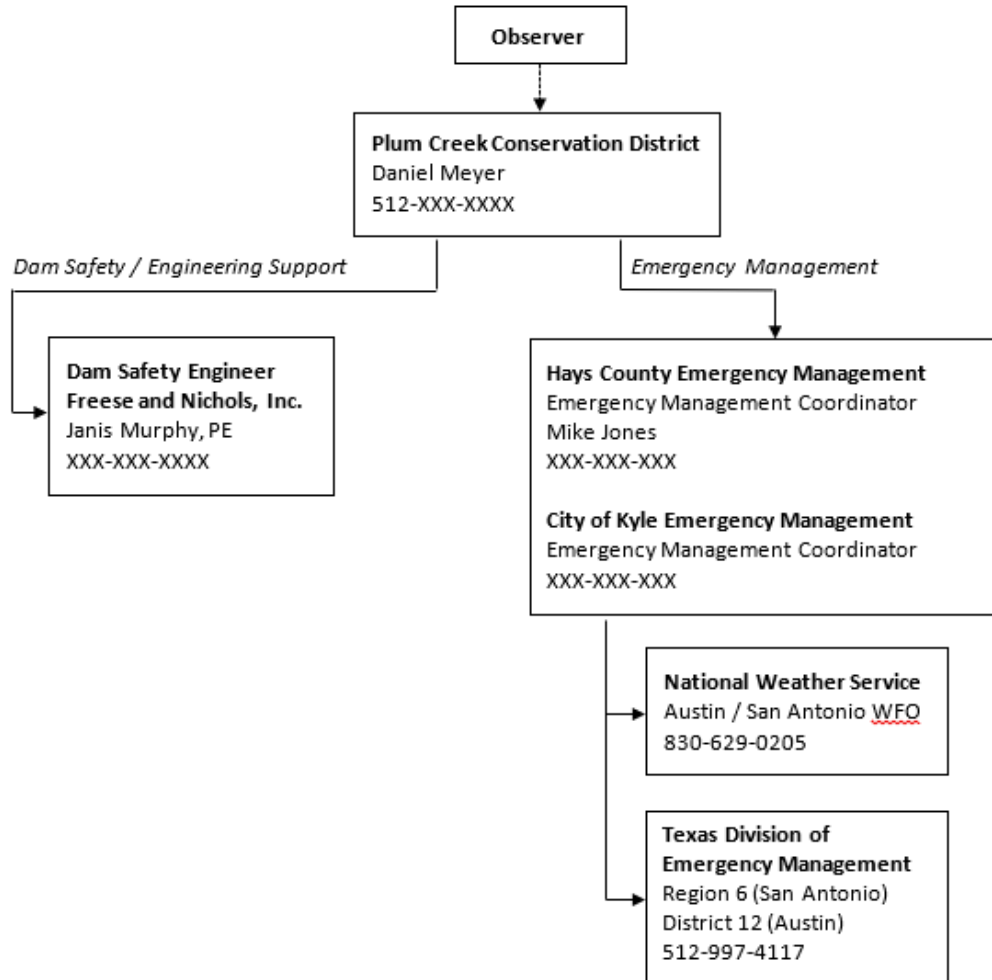
**Regular Observation**

✓ First Line of Defense

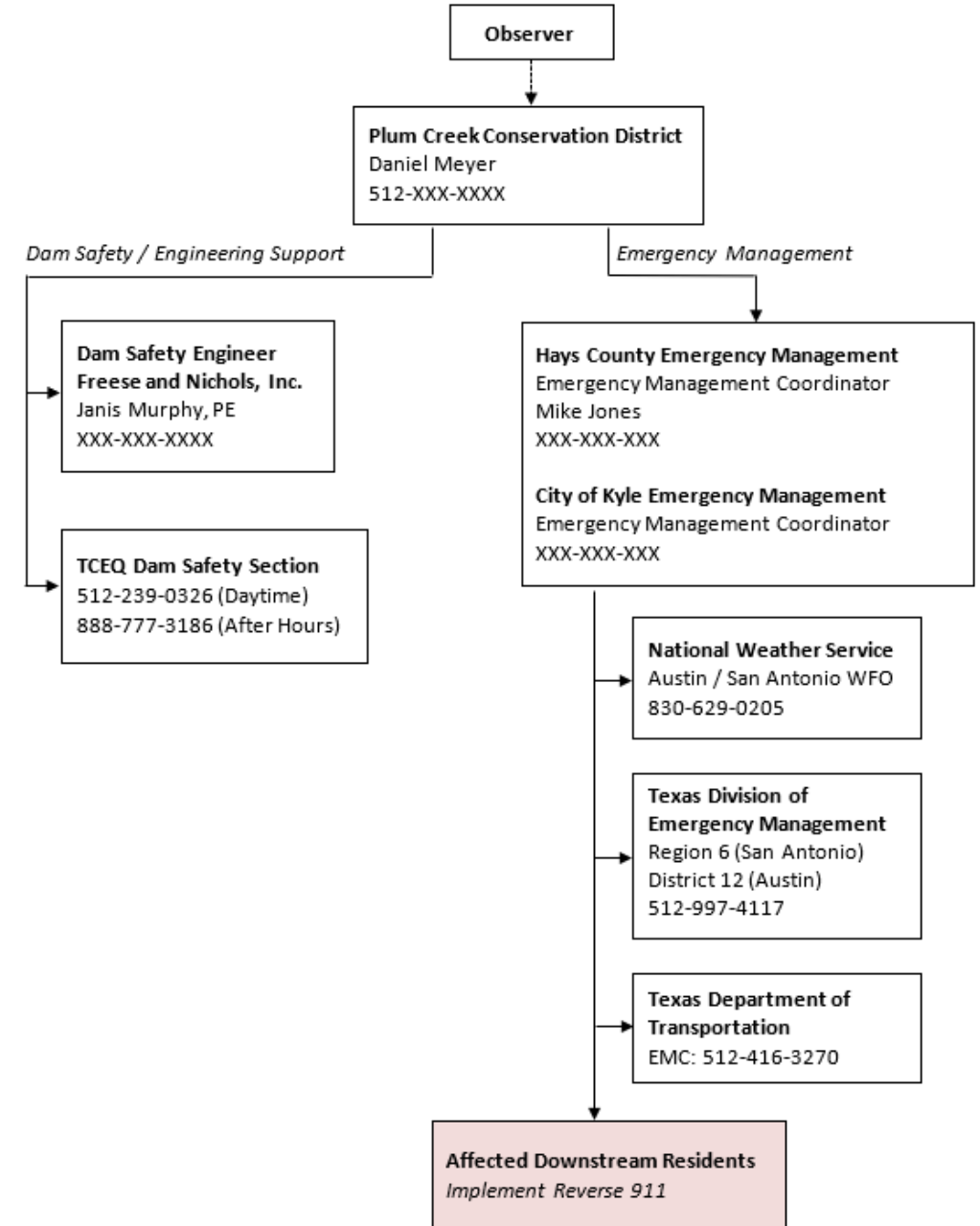
# EAP Overview

# Notification Flowcharts

## WATCH CONDITION



## POSSIBLE, IMMINENT, OR DAM FAILURE



# Inundation Area



**Who / what  
is impacted if  
the dam  
fails?**

Where does the water go?

What structures and bridges  
are impacted?

Who needs to be evacuated?

# Breach Analysis

## Breach Analysis based on:

- Dam Height
- Reservoir Storage
- Discharge Flow from Breach
- Inundation Length

## Scenarios

- Sunny Day Breach
- PMF Breach

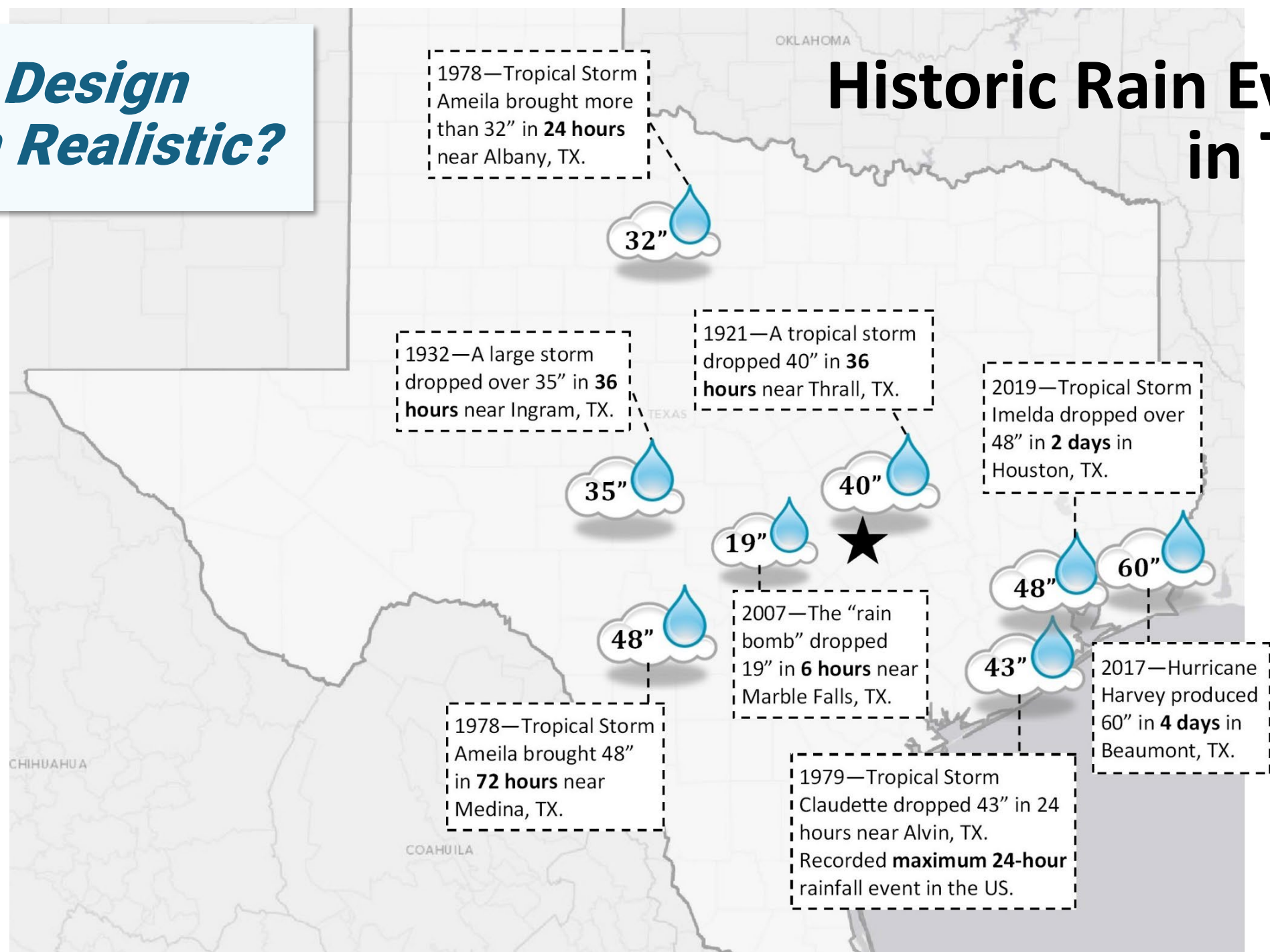
- High hazard dam must pass 75% of the PMF without overtopping

- 75% PMF for Dam = **30" rain in 24 hours**

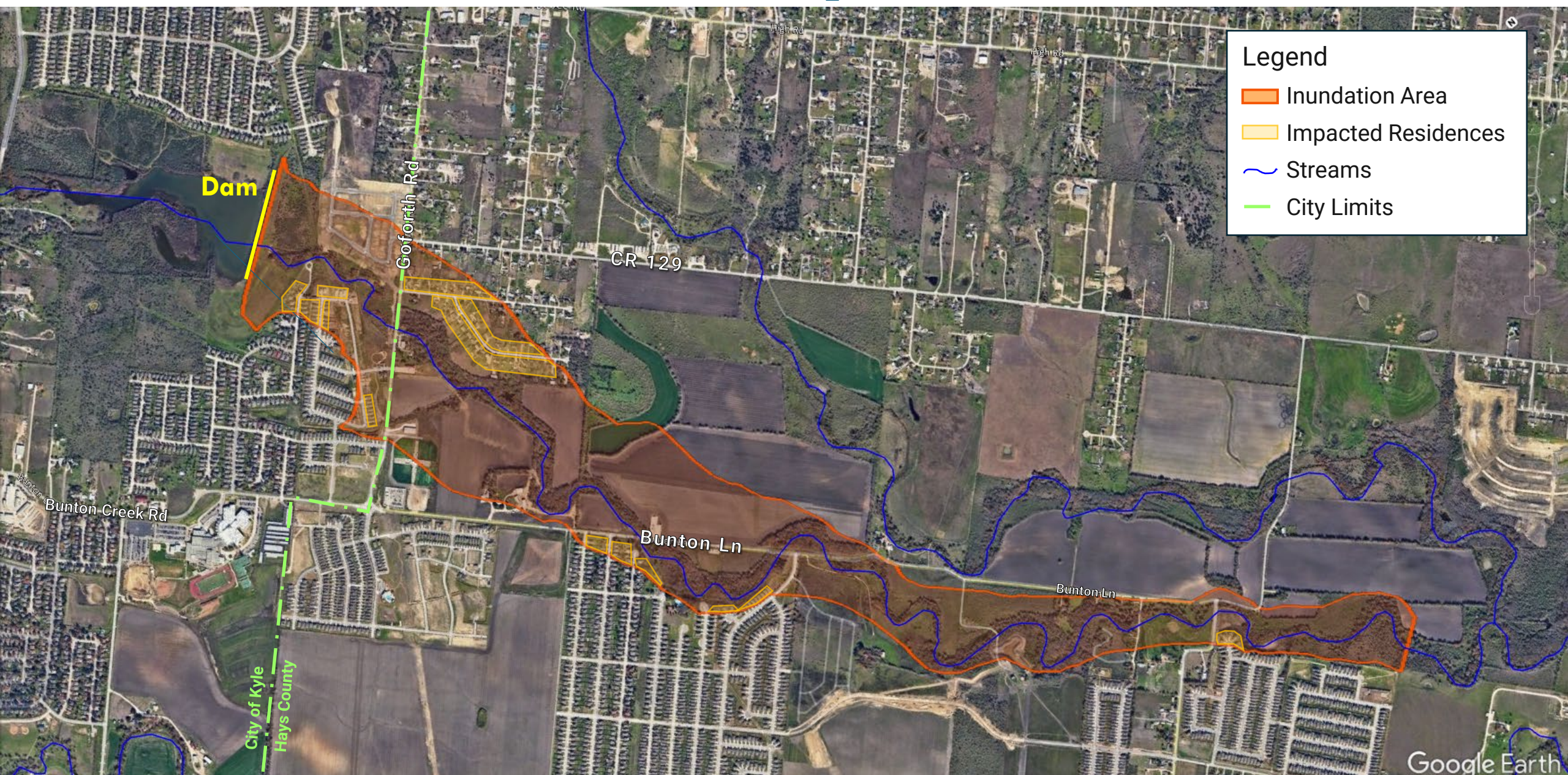
- Analysis provides water elevations and time to impact

## *Is the Design Storm Realistic?*

# Historic Rain Events in Texas



# Breach Inundation Map





# Tabletop Exercise

# Goals



Verify communication protocol, including Notification Flowchart



Confirm ability to evacuate inundation zone

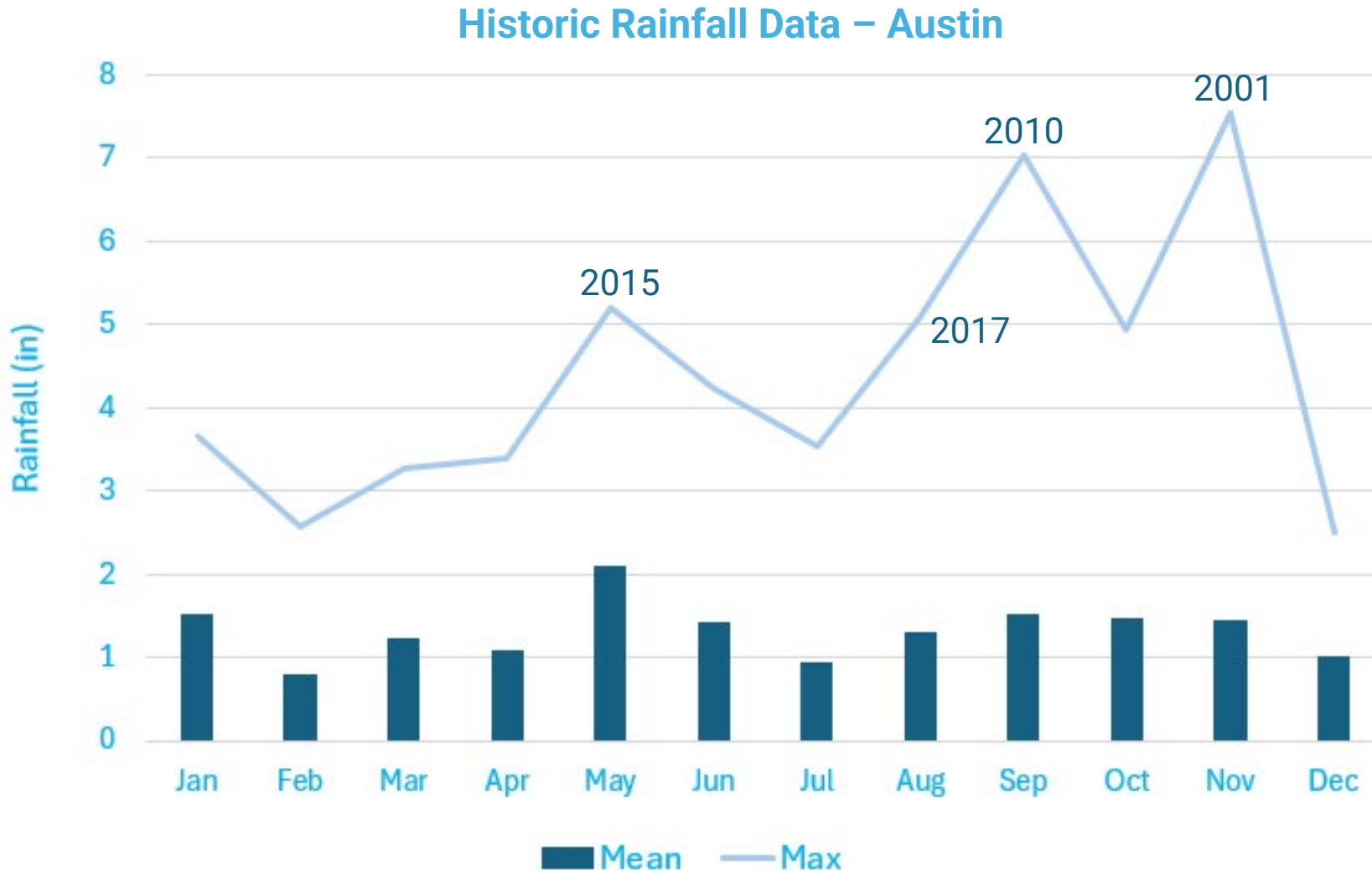


Confirm ability to warn people at risk



Review key takeaways and revise EAP as needed

# Background



# Scenario



# Conditions

Thursday

It is raining

It has been a wet week: 5 inches of rain

Lake is 1 foot above normal pool

# Updated Conditions

Friday 10 am

Seepage Near Service Outlet

Seepage is Clear



**Seepage Area**

**Principal  
Spillway  
Outlets**

# Seepage



# What Now?

TAB 4: EVIDENCE OF DISTRESS

| General Observation | Specific Observation                                                               | Condition        | Emergency Action                                                                                                                                                                                                              | Equipment, Material and Supplies    | Data to Record                        |
|---------------------|------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------|
| Seepage             | Minor seepage of clear water at toe, on slope of embankment, or at the abutments   | Abnormal         | Closely check entire embankment for other seepage areas. Use wood stakes or flagging to delineate seepage area. Try to channelize and measure flow. Look for upstream whirlpools.                                             | Wood stakes, flagging               | Site, location, and approximate flow. |
|                     | Additional seepage areas observed flowing clear water and/or increasing flow rate. | Watch            | Initiate 24-hour surveillance. Monitor as described above. Construct measuring weir and channelize all seepage through weir. Attempt to determine source of seepage.                                                          | Dozer and shovels                   | Site, location, and approximate flow. |
|                     | Seriously or rapidly increasing seepage, underseepage, or drain flow.              | Possible Failure | Continue 24-hour monitoring and remedial action as described above. Initiate emergency lowering of the reservoir. Construct a large ring dike around the seepage area. Advise EMC to issue a warning to downstream residents. | Dozer, shovels, source of earthfill | Site, location, and approximate flow. |
|                     | Additional seepage areas with rapid increase in flow and muddy water.              | Imminent Failure | Downstream evacuation. Utilize all available equipment to attempt to construct a large ring dike around the seepage area.                                                                                                     | Dozer, shovels, source of earthfill | Site, location, and approximate flow. |

See Notification Flowchart for contact information

# Updated Conditions

Friday 4 pm

Rain continues

Seepage has increased in size.

Seepage is still clear.

# Seepage



# What Now?

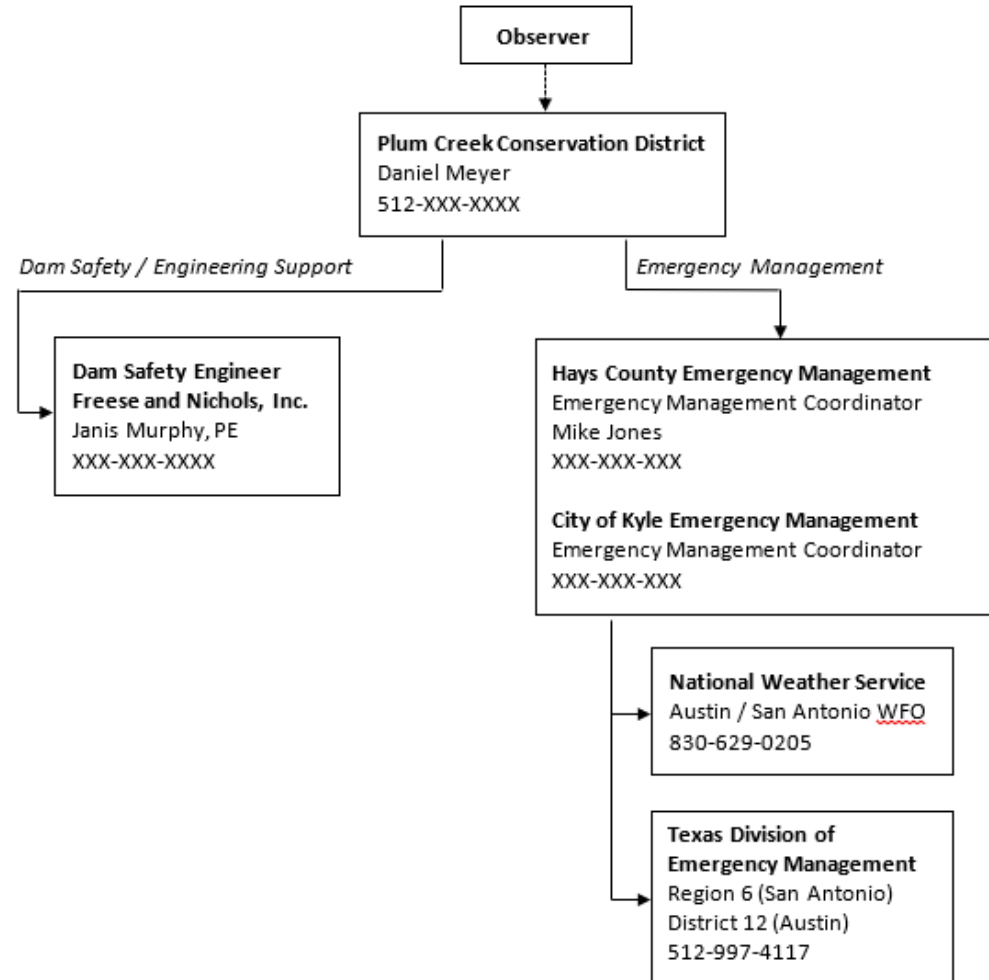
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See Notification Flowchart for contact information

# Notification Flowchart

## WATCH CONDITION



# Updated Conditions

Saturday 10 am

Heavy rain overnight

Lake level is 3 feet over normal pool

Seepage has increased and is now  
**cloudy.**

# Seepage



# What Now?

TAB 4: EVIDENCE OF DISTRESS

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See Notification Flowchart for contact information

# Construct Ring Dike



# Equipment and Supplies

| EQUIPMENT/SUPPLIES                                                                                                          | LOCATION                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Backhoes<br>Dump trucks<br>Portable welding equipment<br>Generators<br>Bulldozers<br>Excavators<br>Loaders<br>Motor graders | United Rentals<br>4542 IH 35 South<br>San Marcos, TX 78666<br>(512) 353-1111<br><br>Hays County Road Department<br>Jerry Borcharding<br>(512) 393-7385<br><br>Caldwell County Road Department<br>Dwight Jeffrey<br>(512) 398-7269 Office<br>(512) 738-2178 Cell |
| Crane                                                                                                                       | United Rentals<br>4542 IH 35 South<br>San Marcos, TX 78666<br>(512) 353-1111                                                                                                                                                                                    |
| Sandbags                                                                                                                    | L and M Supply Company Texas<br>126 Texas Ave. Building #2<br>San Marcos TX. 78666<br>512-667-6635<br><a href="http://www.landmsupplytx.com">www.landmsupplytx.com</a>                                                                                          |
| Rock riprap                                                                                                                 | Yarrington Materials<br>1401 Yarrington Rd.<br>San Marcos, TX 78666<br>(512) 754-3573                                                                                                                                                                           |
| Fill Material                                                                                                               | Yarrington Materials<br>1401 Yarrington Rd.<br>San Marcos, TX 78666<br>(512) 754-3573                                                                                                                                                                           |
| Other - Ready-Mix                                                                                                           | Home Depot<br>3730 Dry Hole dr.<br>Kyle, TX 78640<br>(512) 295-8170                                                                                                                                                                                             |
| Water Pumps                                                                                                                 | Bruce Frank Rental<br>Lockhart, TX 78644                                                                                                                                                                                                                        |

# Emergency Contractor Support

| Contractor                      | Title/ Responsibility                  | Contact                                                                                                    |
|---------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------|
| Austin Engineering Co.          | Central Texas Civil and Dam Contractor | Austin Keller<br>512-XXX-XXX<br><a href="mailto:xxx@aecoi.net">xxx@aecoi.net</a>                           |
| Austin Filter Systems           | Central Texas Civil and Dam Contractor | Craig Bond<br>512-XXX-XXXX<br><a href="mailto:xxx@austinfiltersystems.com">xxx@austinfiltersystems.com</a> |
| Jay-Reese Contractors, Inc.     | Central Texas Civil and Dam Contractor | <a href="mailto:xxx@jayreese.net">xxx@jayreese.net</a><br>512-XXX-XXXX                                     |
| Jerdon <u>Enterprise</u> , LLC. | Central Texas Civil and Dam Contractor | 281-XXX-XXXX<br><a href="mailto:xxx@jerdonlp.com">xxx@jerdonlp.com</a>                                     |

# Updated Conditions



Sunday, 10 am

Slide on downstream slope

Seepage is muddy



**Seepage  
Area**

**Principal  
Spillway  
Outlets**

**Slide Area**

# What Now?

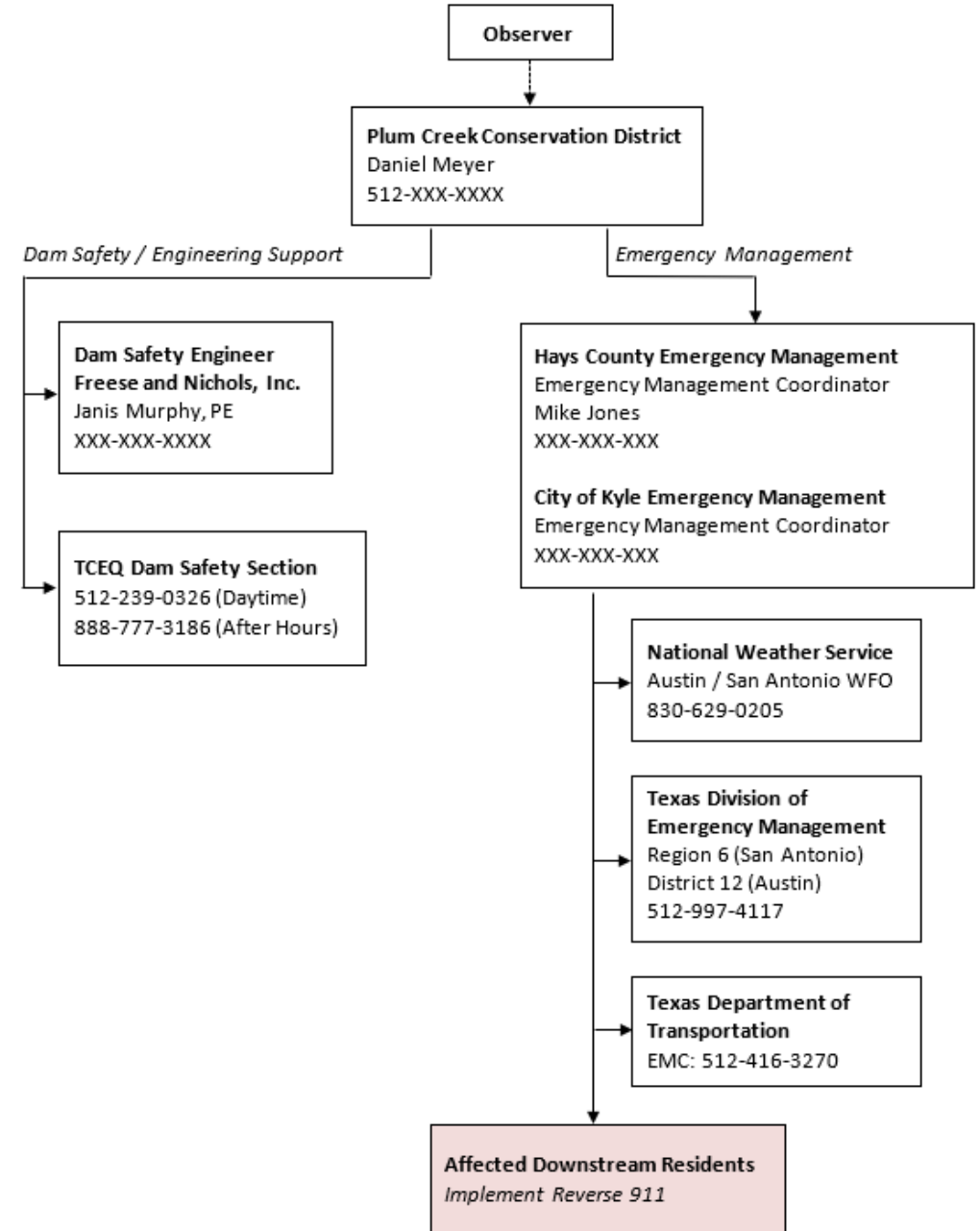
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See Notification Flowchart for contact information

# Notification Flowchart

## POSSIBLE, IMMINENT, OR DAM FAILURE



# Updated Conditions



Sunday, 4 pm

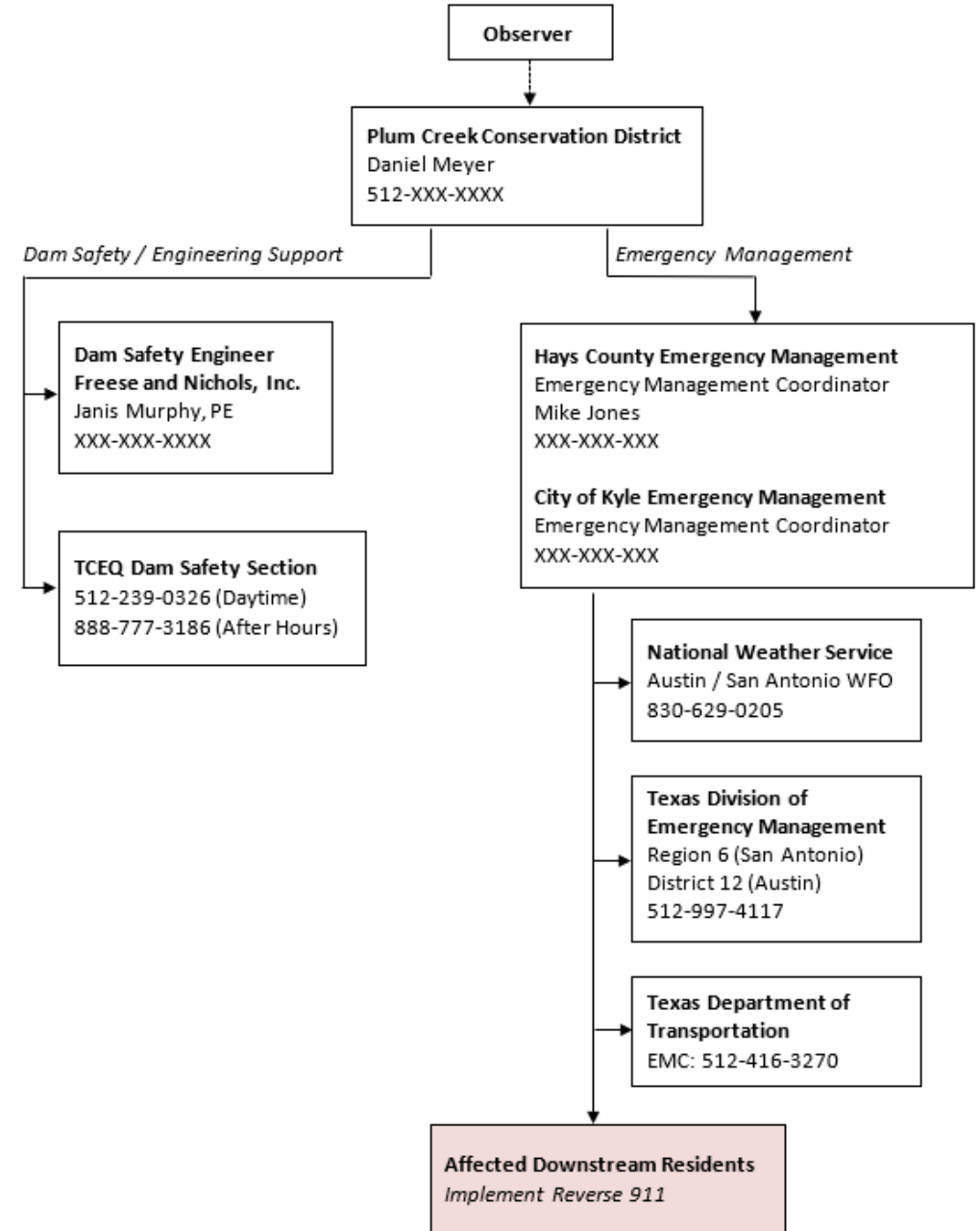
Slide worse and cutting into crest

**Slide**

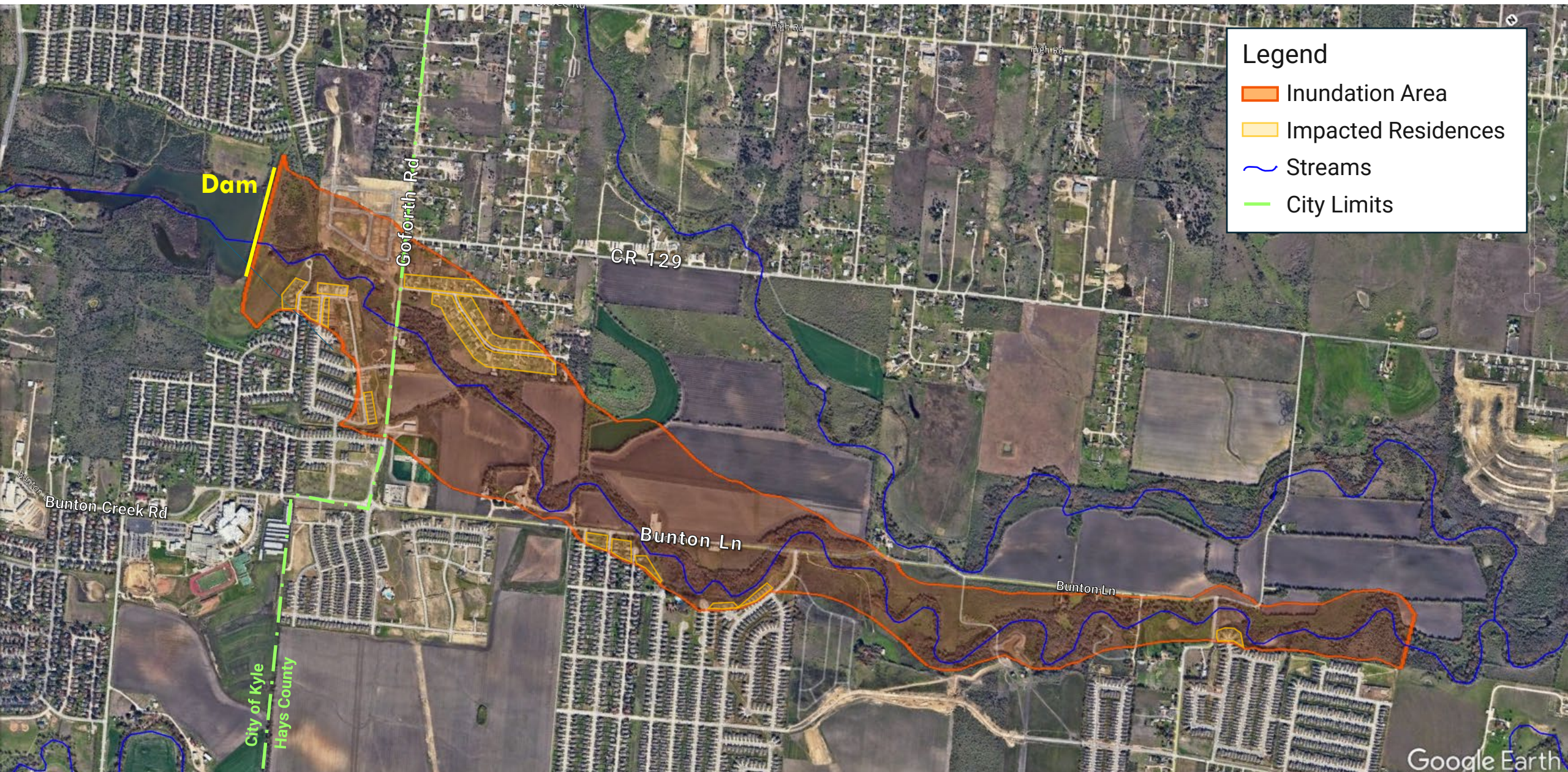


# Notification Flowchart

## POSSIBLE, IMMINENT, OR DAM FAILURE



# Breach Inundation Map



Legend

Inundation Area

Impacted Residences

Streams

City Limits

# Updated Conditions

***BREAKING***  
**NEWS**

**Texas Dam Fails**

Sunday, 9 pm

Erosion cuts through the crest and  
the embankment fails

Flood wave is sent downstream

# Social Media





# Discussion & Review

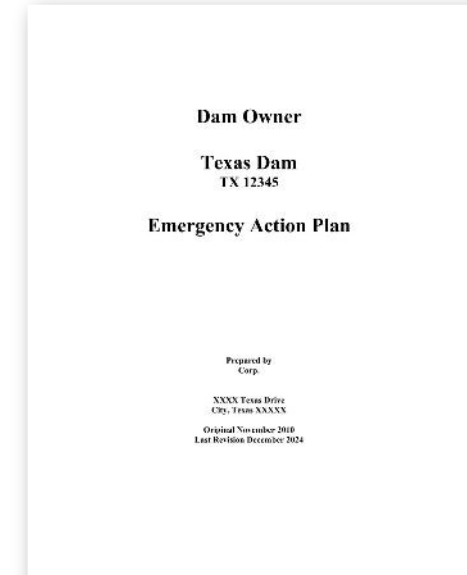
# Overall Plan Review



IDENTIFY SUCCESS



IDENTIFY AREAS  
FOR IMPROVEMENT



MAKE UPDATES &  
SUBMIT TO TCEQ

# What's in the Inundation Area?



# EAP Next Steps



## Testing

- At least every 5 years
  - Follow-up:  
Update the EAP and distribute updates



## Training

- Ongoing with new staff

## Updating

- Every year

# Mock Tabletop Key Takeaways

## Be Prepared

- ✓ Update and stay familiar with your EAP
- ✓ Train personnel
- ✓ Know what's in your inundation area
- ✓ Know your EMC
- ✓ Know what resources are available

## In an Emergency

- ✓ Refer to your EAP during an emergency
- ✓ People are resources
- ✓ Emergency repairs are temporary



# Thank you



Plum Creek Conservation District

