North Central Texas Council of Governments

Integrating Transportation and Stormwater Infrastructure (TSI) Project Update Meeting

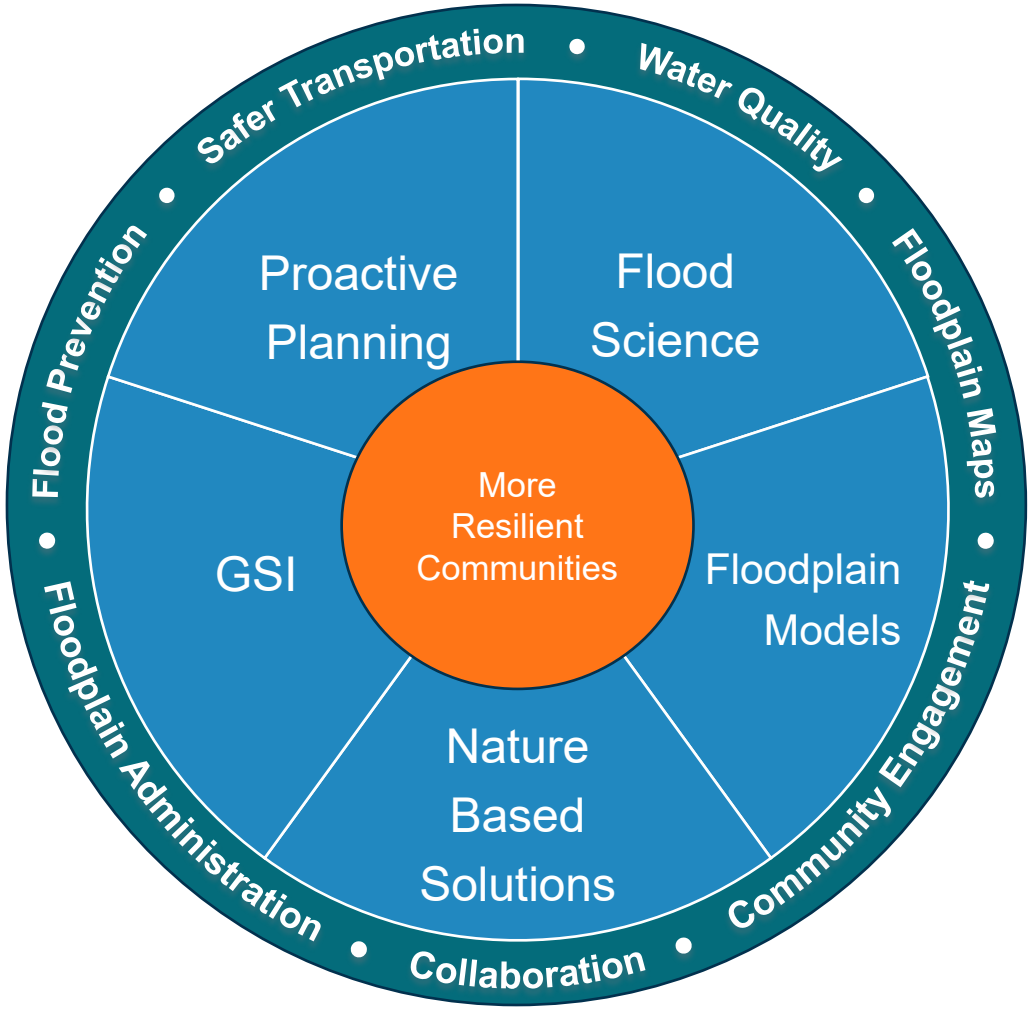
September/October 2025

Funded by the Texas General Land Office, Community Development Block Grant, Disaster Recovery Program.

Also Funded by the Texas Water Development Board and Texas Department of Transportation.

What is integration of Transportation and Stormwater Infrastructure (TSI)?

- Proactive planning (planning level designs)
- Collaborative partnership with stormwater, transportation & environmental infrastructure
- Keeping residents, property and infrastructure safe as well as improving water quality
- State of the art flood hazard area extents with what-if scenarios
- Flood warning system framework
- Nature based solutions, e.g. green stormwater infrastructure, wetlands, urban forests, urban prairies
- Tools & data that could help you with:
  - Administration of floodplains
  - Preserving the character of your community



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TSI Area Makeup

- 85 cities or towns and portions of 8 counties
- Population increases:
  - Texas – 1,100 people per day
  - DFW – 350 people per day
  - TSI area – 130 people per day
- 60% undeveloped (2015)
- 19% growth in impervious surface (2006 – 2016)
- > 7,200 miles of streams and > 274,000 acres of 100-year floodplain
- Many of the floodplains are unmapped
- Runoff flows into greater DFW

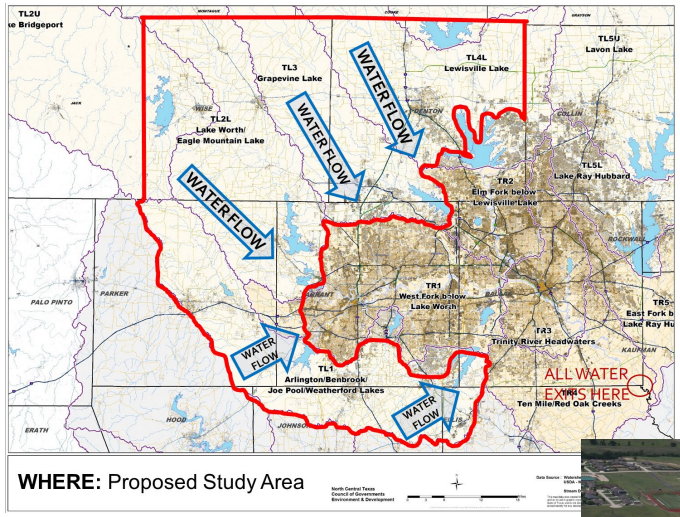

Photo courtesy of City of Newark

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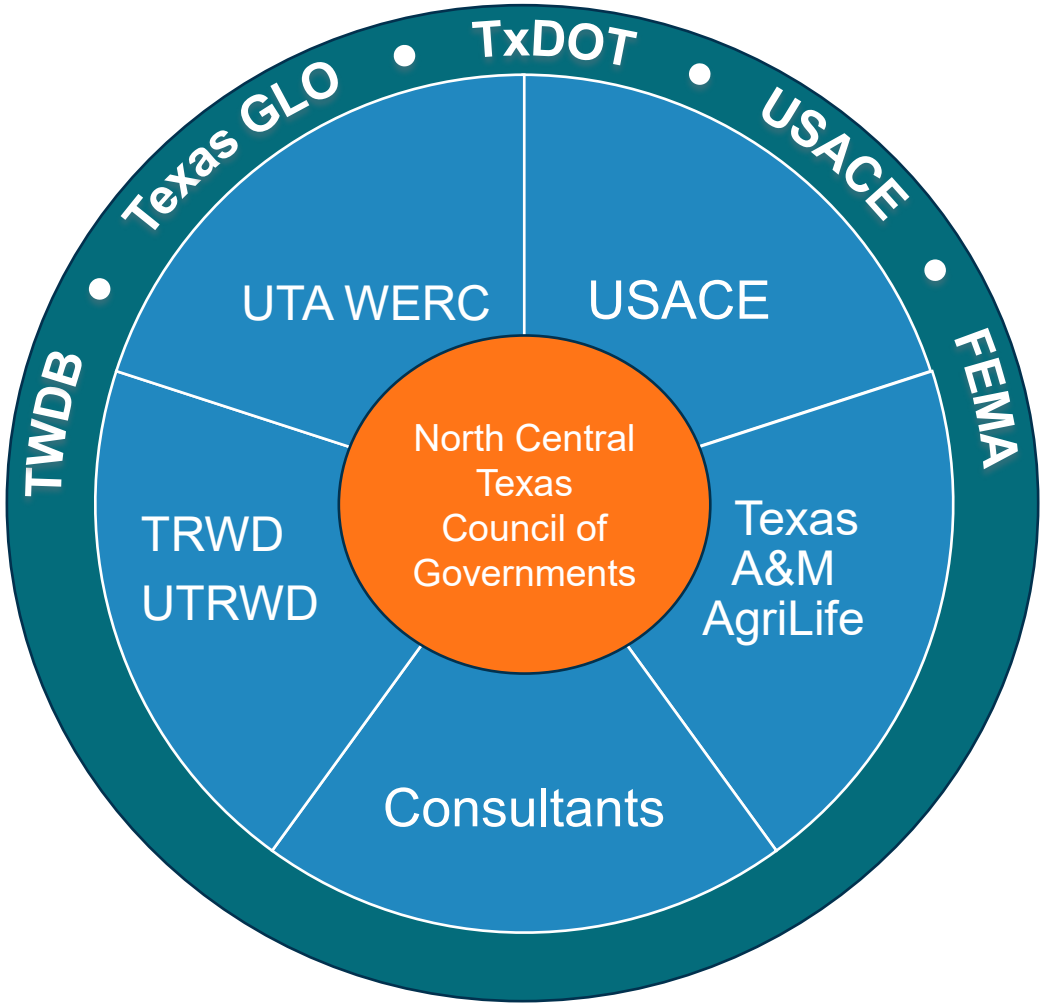
Who is TSI

- NCTCOG (Lead) – DFW regional planning
- USACE – Authority on flood science
- UTA Water Engineering Research Center – Flood science research
- Texas A&M AgriLife – Green stormwater infrastructure research
- Tarrant Regional Water District
- Upper Trinity Regional Water District
- Consultant Teams
  - Highland Economics
  - Freese & Nichols
  - Halff
- Funding
  - TWDB, GLO, TXDOT, USACE, FEMA



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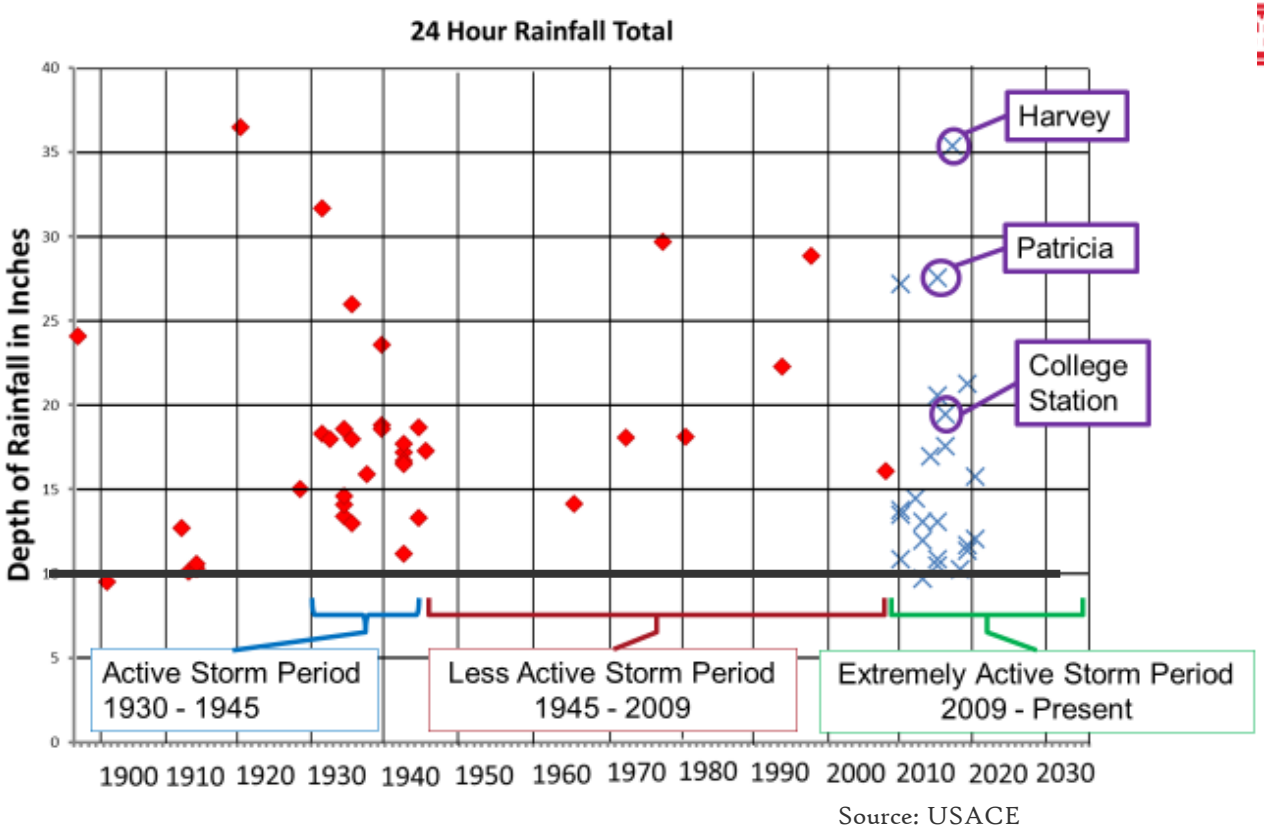
Why TSI – the Precipitation Threat

- Significant increase in extreme precipitation events during past 15 yrs
- Most decades see 1-2 storms exceeding design standards
- 2009 to present have seen more than 20 storm that exceed design standards
- Events can exceed 35” in 24 hours
- Most common are < 20” in 24 hours
- DFW standard is 10” in 24 hours
- Coastal storms are not a threat to DFW
- Patricia, College Station and other storms could have hit DFW



Source: USACE

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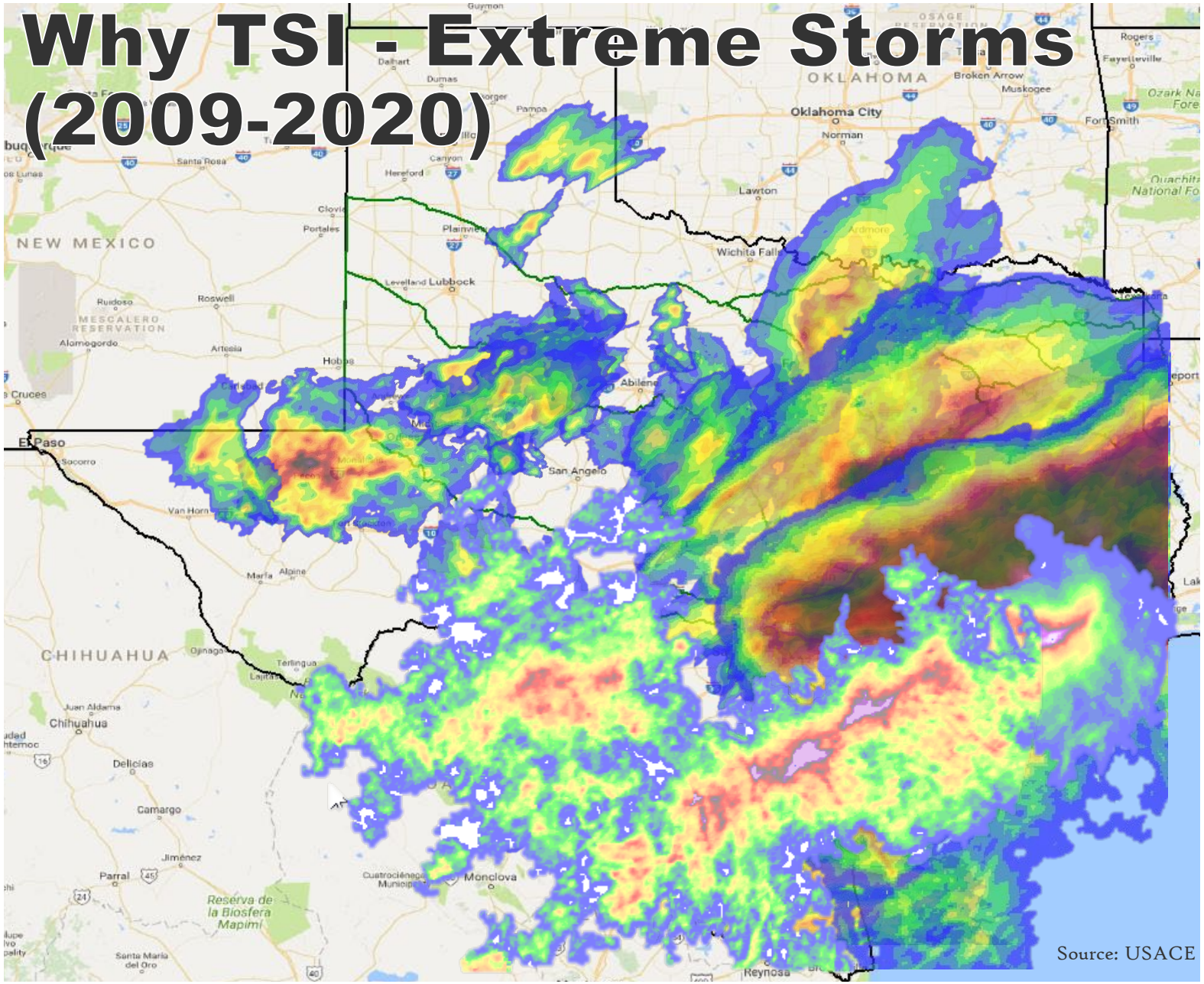
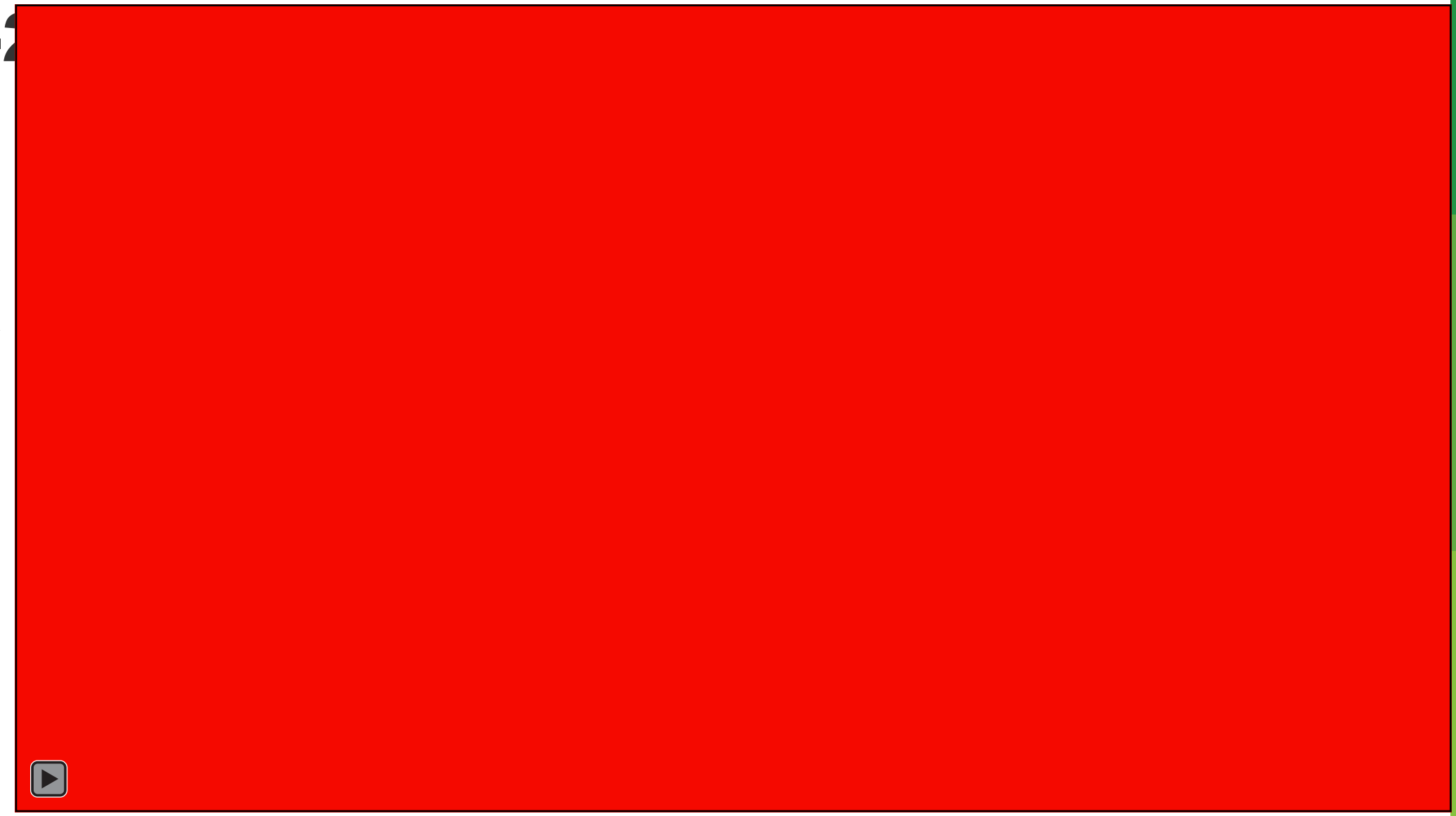
Why TSI - Extreme Storms (2009-2020)



Why TSI – Intense Storms (2015-2

- Radar Rainfall (MRMS)

  > 3 in/hr



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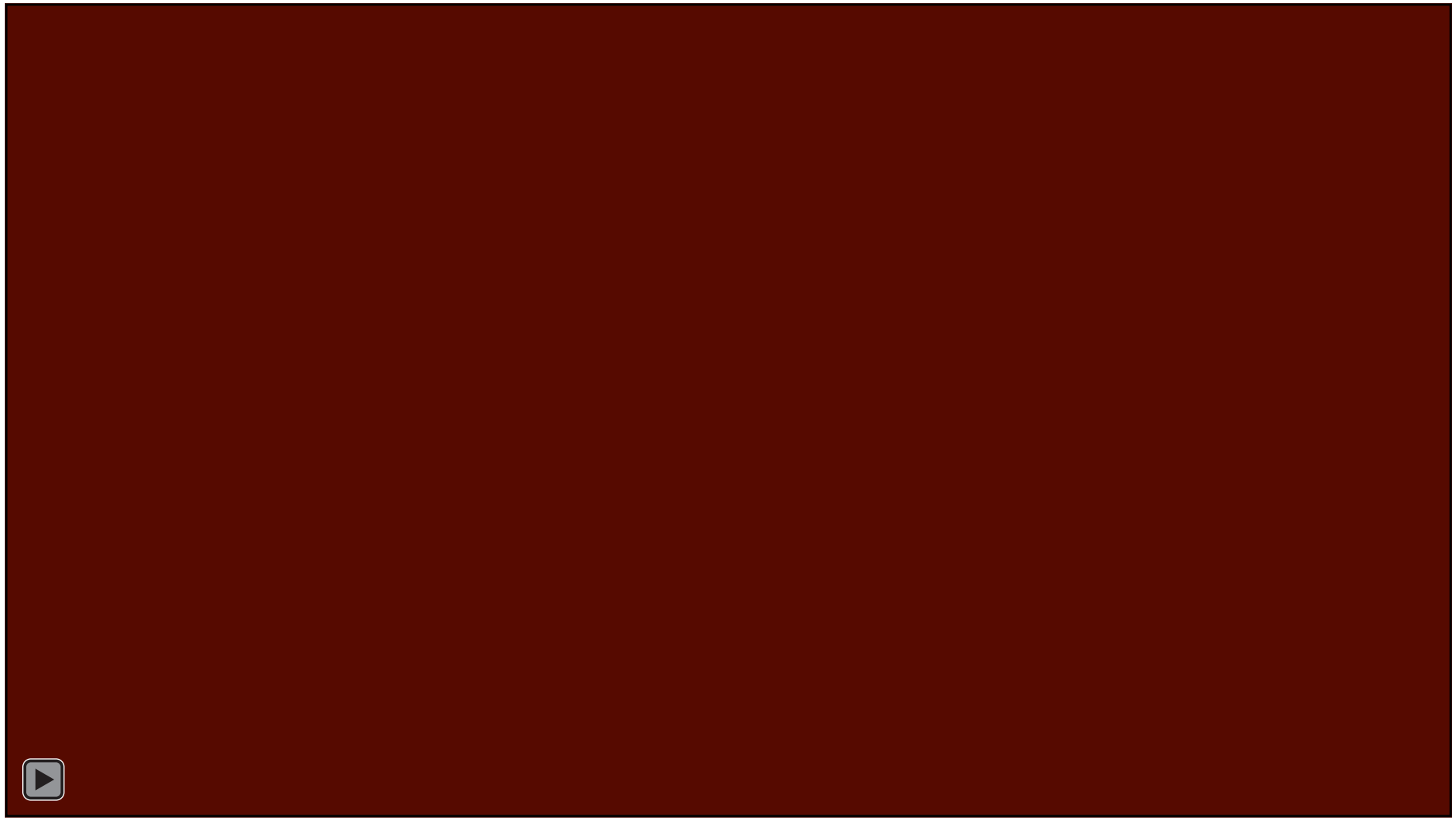
Why TSI - Texas Statewide Flooding (2009-2020)



Why TSI - Transportation Infrastructure

- Transportation cost are some of the most significant
- Flooding events damaged transportation infrastructure
- Transportation failure impact access
- Long rebuild schedules
- Most flooding fatalities occur at crossings
- Upstream development has rendered DS roads inadequate

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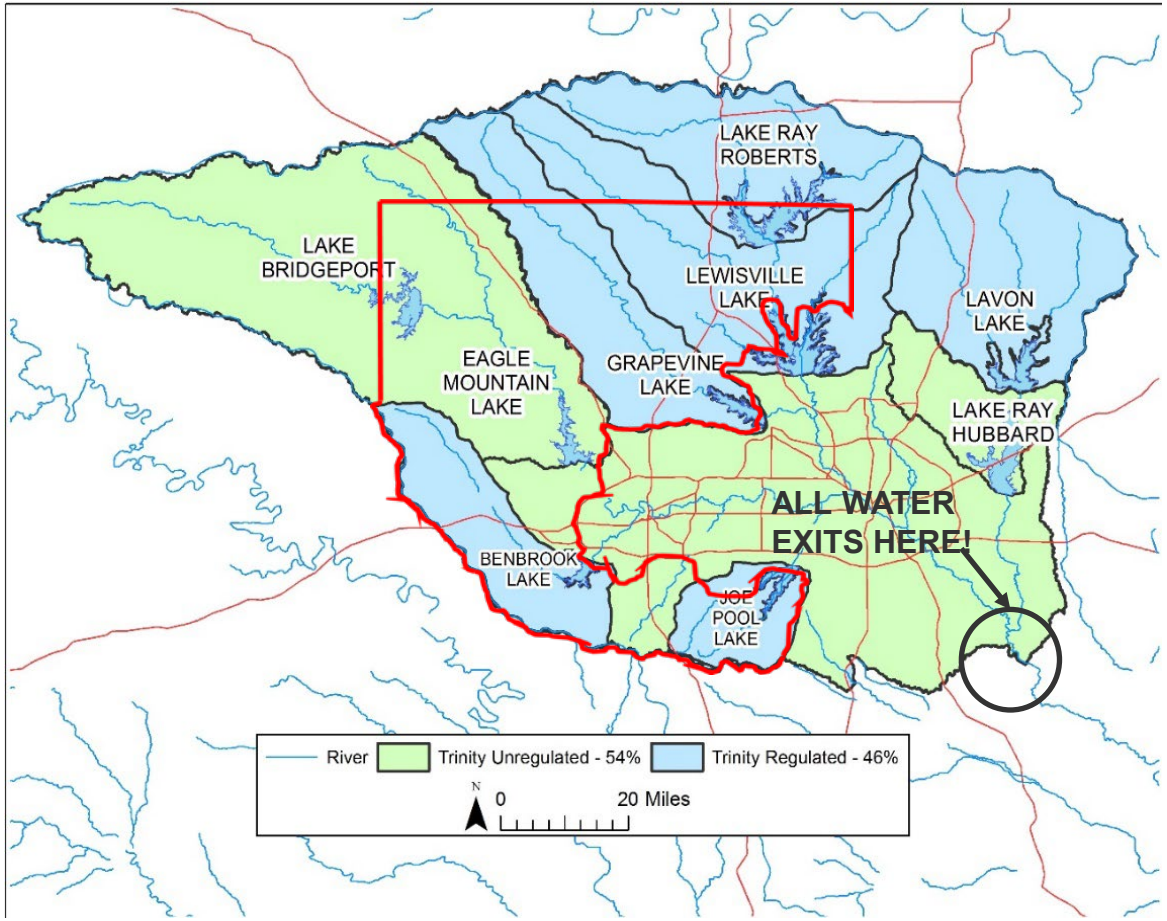
Why TSI – the Importance of Storage

- Flooding is about storage
- Single exit point for water
- 6 multi-purpose reservoirs, 2 levee systems
  - 2015 flooding – Reservoirs filled to capacity, 4 months to empty
- TSI is about storage
- Unregulated area
- Regulated area



Source: USACE

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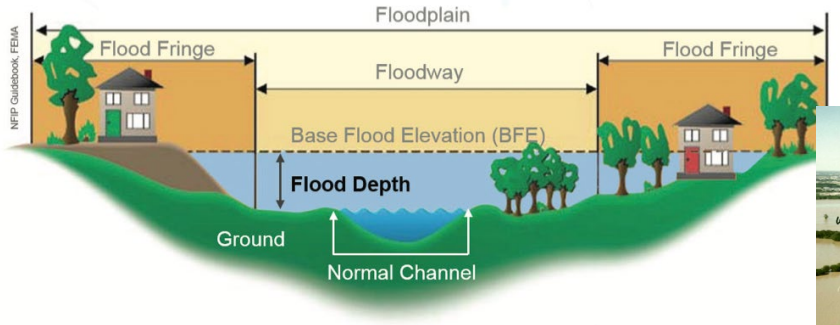
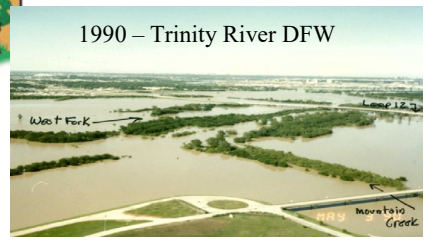
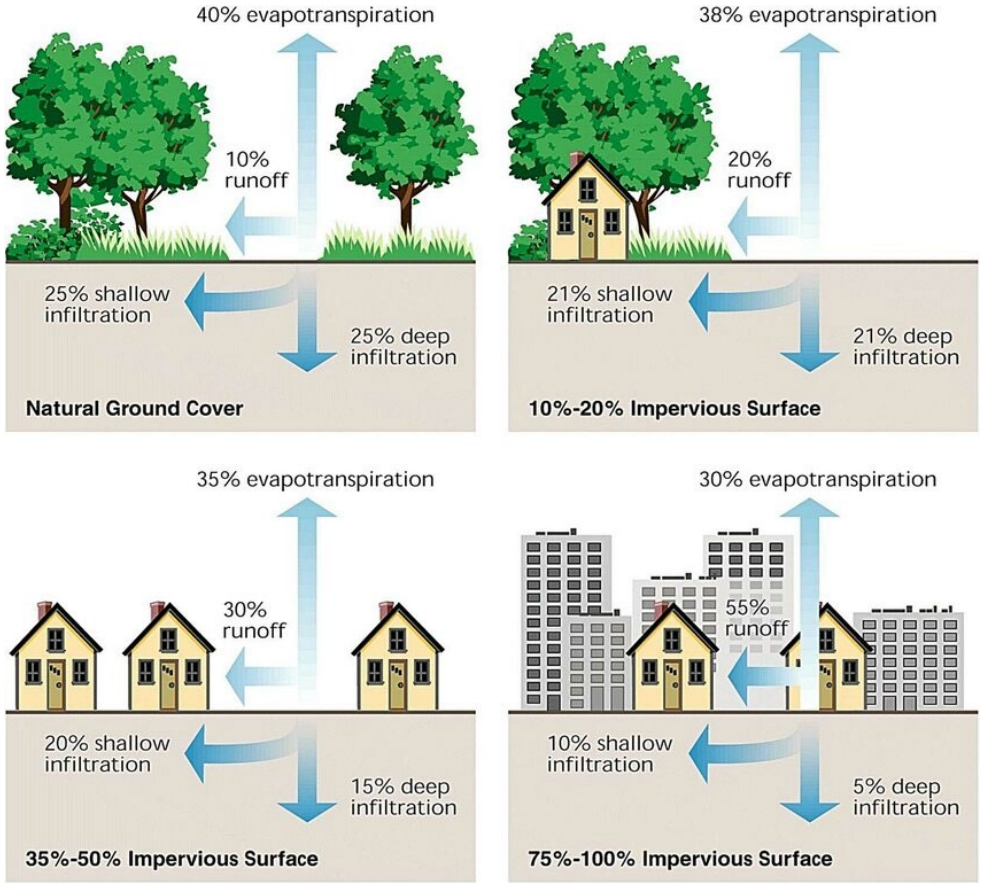
Why TSI - Growth and Development Increases Flooding

- Floodplains are among the most valuable ecosystems on earth, they are also one of the most threatened
- Growth and development increases impervious cover and runoff
- Growth and development depletes storage
- Flooding is increased with negative societal impacts



25%-30% increase in runoff



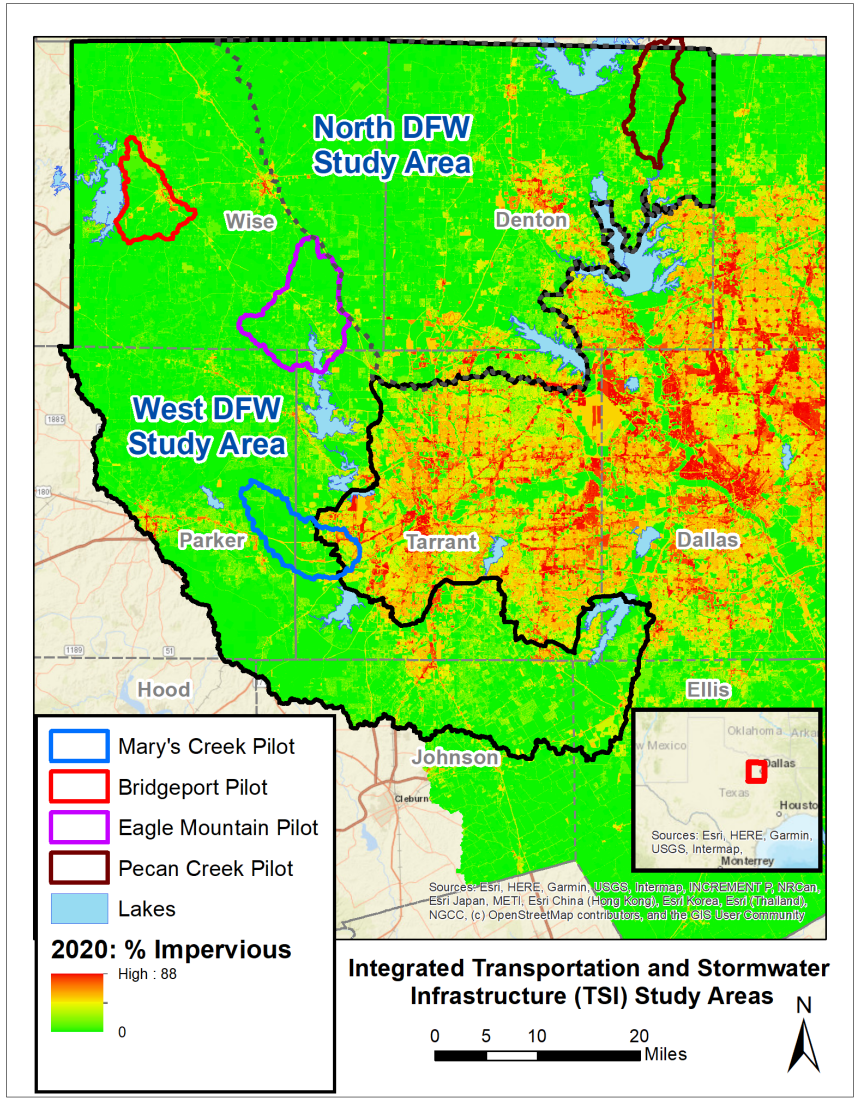


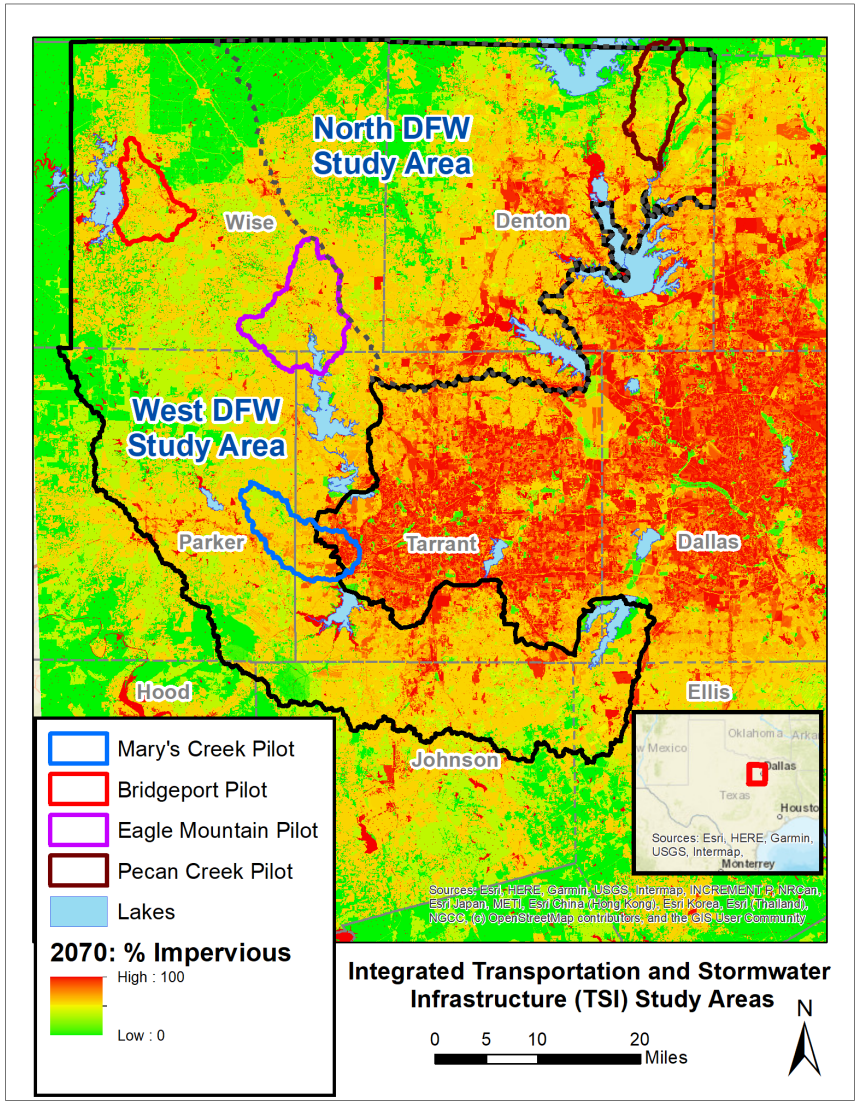
Fan, Tong & Lee (2017).

5%-10% increase in runoff

TSI – Growth & Development Increase in Impervious Surfaces

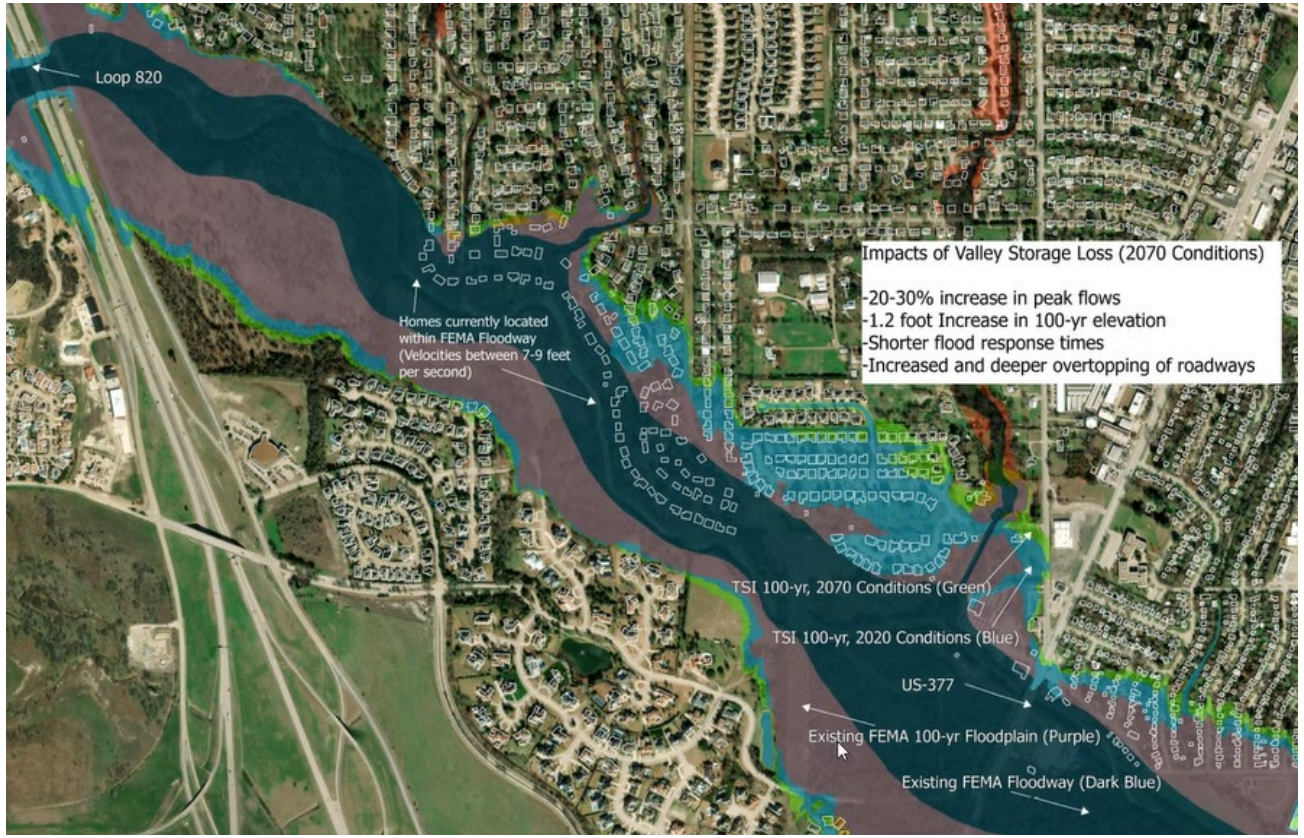
2020 (6.4% Impervious) → **2070 (35.2% Impervious)**





Why TSI – Case Study

- Mary's Creek Drive, Glen Avon Addition, Benbrook
  - Developed 1950's – 1960's
  - Homes are in floodway
  - Subject to velocities > 7 fps



Mary's Creek Drive, Benbrook (construction circa 1960 - 1970)

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TSI Outcomes

Flooding

- Quantifies the effects of development in 3 scenarios
- 2020 conditions
- 2070
  - Current practices
  - With stormwater infrastructure, no loss of valley storage (no adverse impacts)
- Updated floodplain maps that could become NFIP regulatory
- Storm shifting
- Hotspot analysis

Administrative Opportunities

- Collaborative governance
- Economies of scale and scope
- Consistent TSI area standards
- Regional system of models
- Economic information on costs and benefits
- Shot clock mitigation
- 3rd party reviewers
- Lower flood insurance costs through FEMA Community Rating System
- Model ordinances
- Future support for communities

Engagement

- Identification and cataloging of known flooding & environmental issues
- Information and model outputs to inform and support community efforts and provide more consistent messaging for the public
- A foundation to spark future outreach opportunities
- Community concerns and challenges

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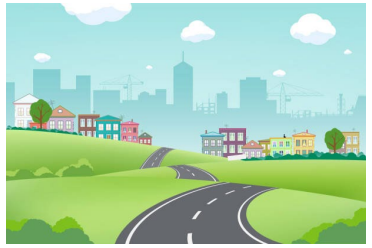
TSI Outcomes



Transportation

- Improved roadway designs
- Information and model outputs identifying crossings at risk of flooding now or in the future
- Improved communication and collaboration with other areas of expertise
- Identification for opportunities to link transportation and flood mitigation planning

Environmental

- Green stormwater infrastructure with return on investment
- Nature based solutions
- Improved water quality
- Green infrastructure guidance
- Economic justification for open space related to flooding and water quality
- Opportunities for regionally connected open space

What Else?

Miscellaneous

- Preservation of natural areas
- Recreation opportunities
- Tree cover
- Connected open space
- Lower erosion
- Groundwater recharge
- Documentation & SOP's
- Collaboration among communities and different levels of government
- Future projects

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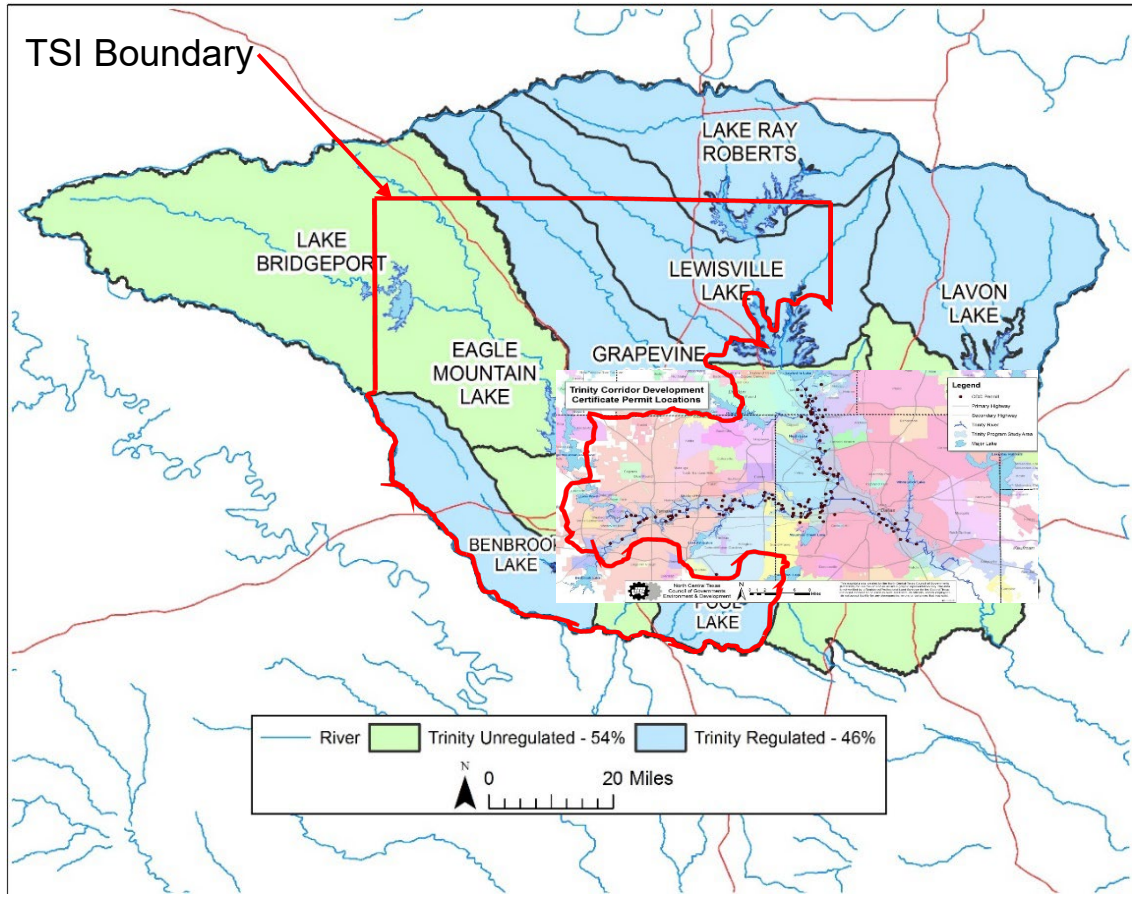
TSI Benefits – Regional Governance and Regulations

Trinity River COMMON VISION / Corridor Development Certificate Program

- 10 cities & 4 counties
- Flood Management Task Force & Steering Committee
- Preserves valley storage & water surface elevations
- Allows development while limiting impacts
- Consistency & transparency across communities
- Models are dynamic living models
  - Check-in, check-out
  - Fee structure
- 3rd Party reviews (USACE)
- Could duplicate this program within the TSI region
- Requires consistent criteria across communities & counties
- Drives future collaboration across communities



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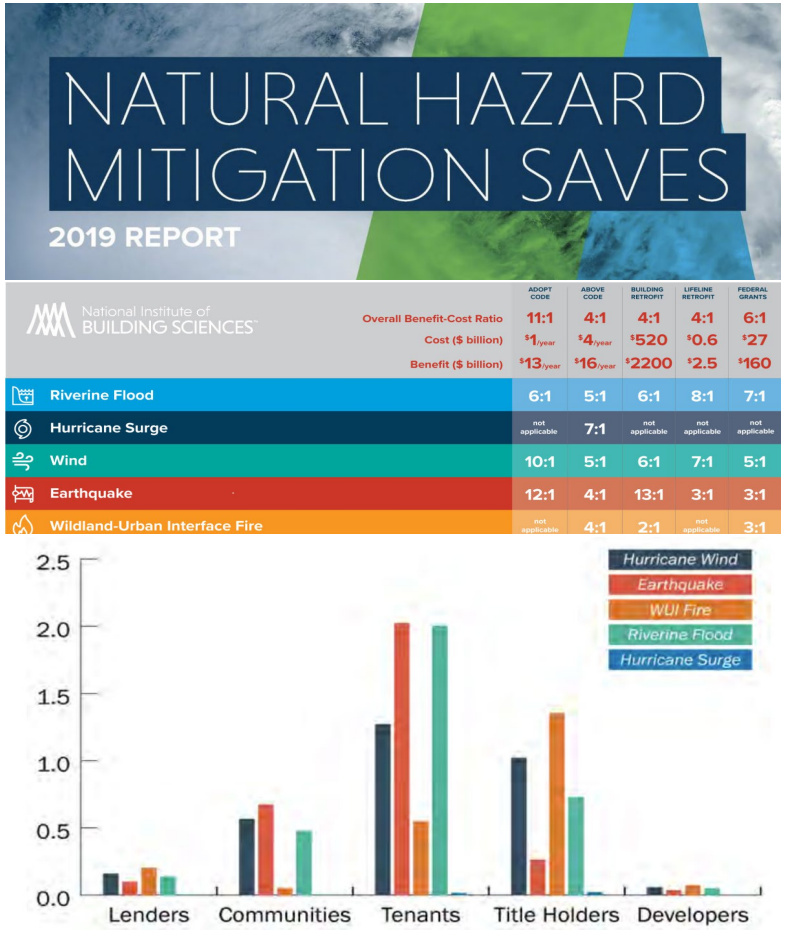
Why TSI – Return on Investment

- **2019 "*Natural Hazard Mitigation Saves*" report by: National Institute of Building Sciences (NIBS), Multi-hazard Mitigation Council (MMC),**
- Prepared at the direction of the U.S. Congress
- Riverine flooding – for $1 invested in mitigation strategies and higher standards (versus recovery from flooding actions), communities save $5-$7



Source:https://nibs.org/wp-content/uploads/2025/04/NIBS_MMC_MitigationSaves_2019.pdf

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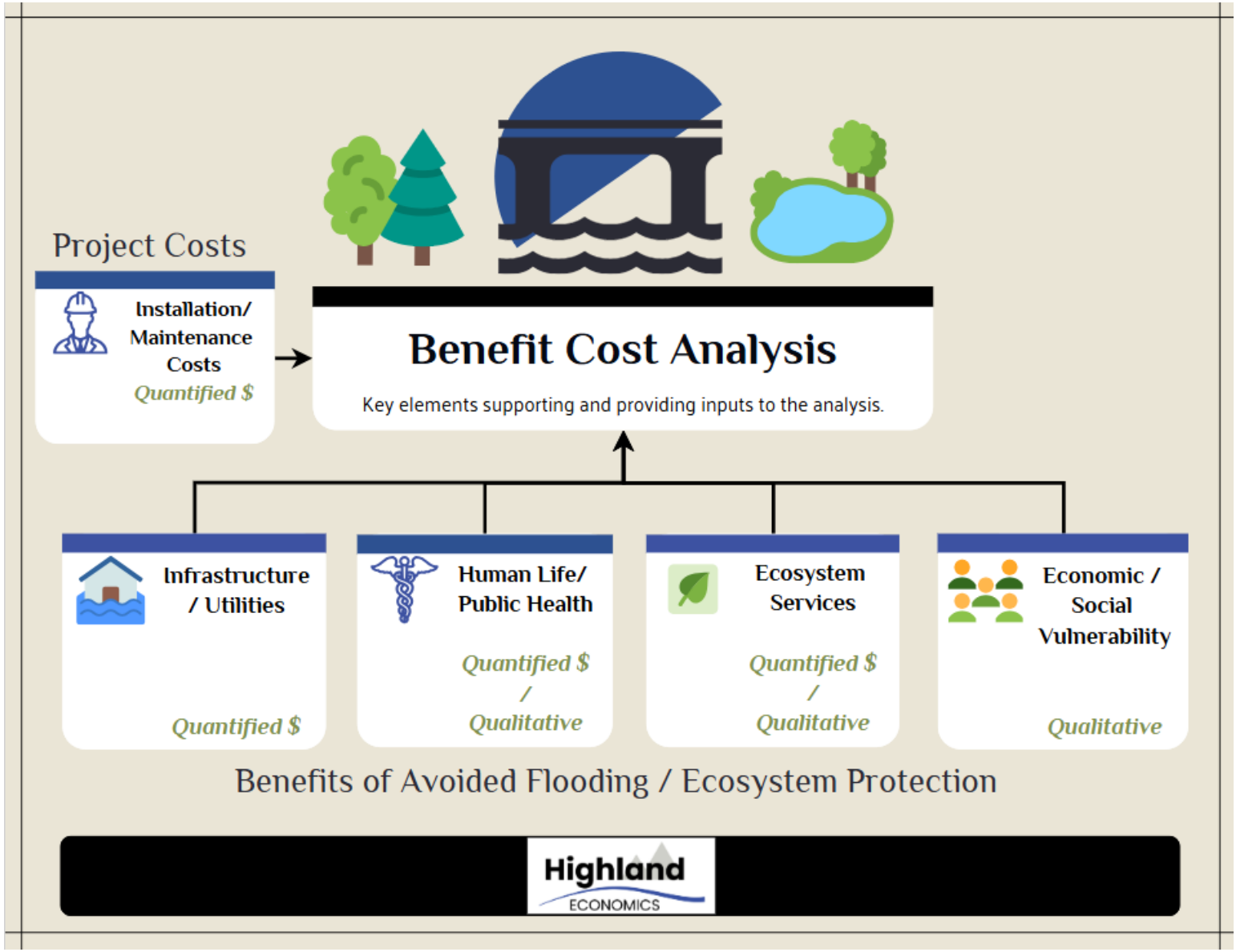
TSI Environmental Economics Analysis

- Benefit Cost Analysis (BCA) of flood mitigation project alternatives (using the flood modeling results)
  - Pilot areas
  - TSI study area
- How-to guide (Standard Operating Procedure) for estimating benefits and costs of flood mitigation projects
- Return on investment Excel-based tool for green stormwater infrastructure
- Fact sheets & decision trees on benefit and cost considerations when selecting stormwater/flood mitigation approaches

Elements of a Flood Mitigation Project Benefit Cost Analysis



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Breakout Sessions

Breakout Station #1:
Hydrology & Hydraulics: Model Enhancements and Future Valley Storage in TSI-West Study Area

Presenter: USACE

Breakout Station #2:
Optimization: Optimized Future Storage Allocation

Presenter: UT-Arlington

Breakout Station #3:
Transportation: Optimization Priority & Silo-Busting Examples

Presenter: NCTCOG

Breakout Station #4:
Green Stormwater Infrastructure (GSI) for Flood Management: Flood Risk Maps and GSI Solutions

Presenter: Texas A&M AgriLife

Breakout Station #5:
Stakeholder Engagement: Help Us Help You

Presenter: NCTCOG

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Breakout Sessions

Breakout Station #1:

Hydrology & Hydraulics: Modeling Existing and Future Conditions in TSI-North Study Area

Presenter: Halff

Breakout Station #2:

Optimization: Optimized Future Storage Allocation

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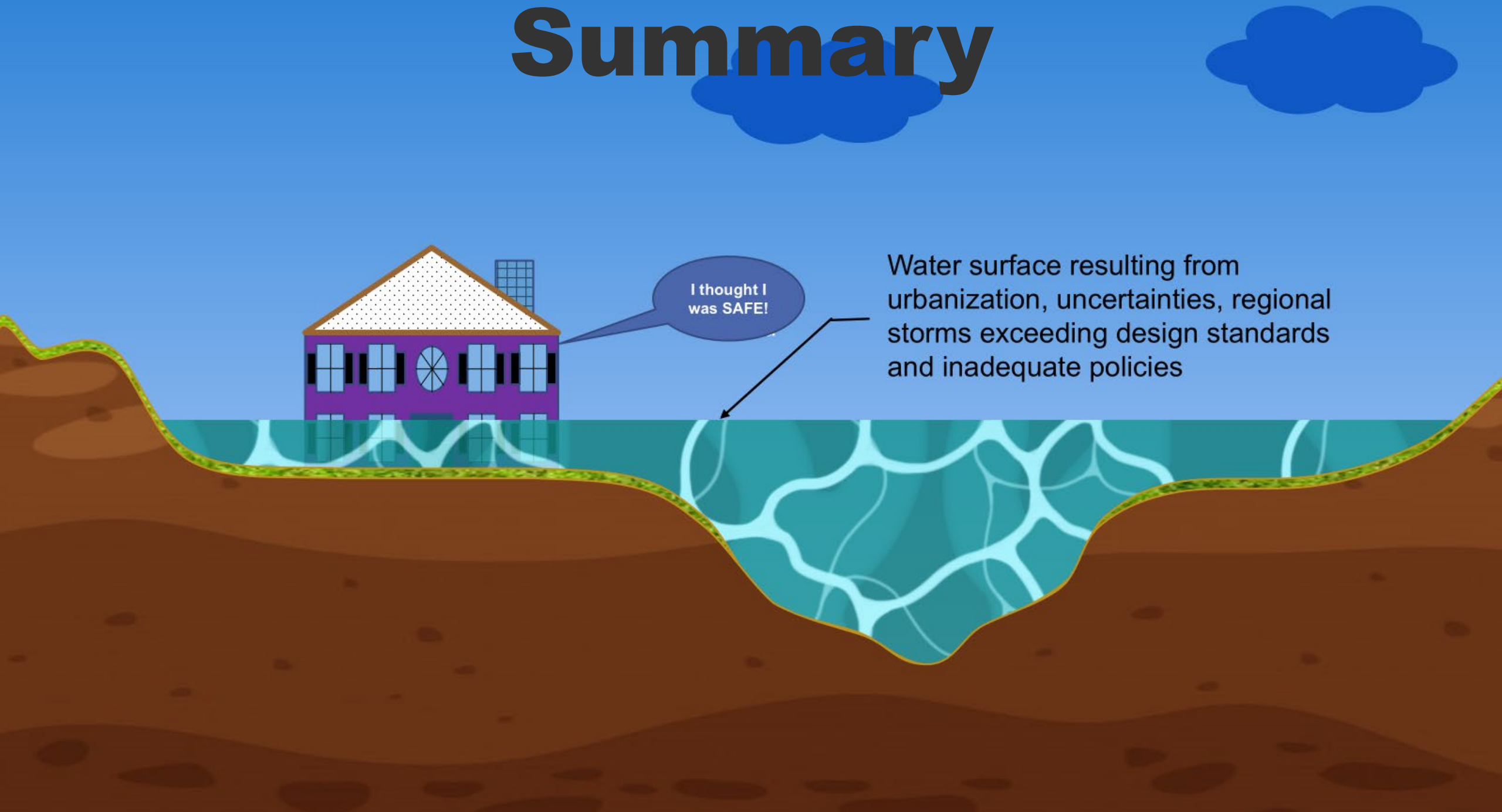
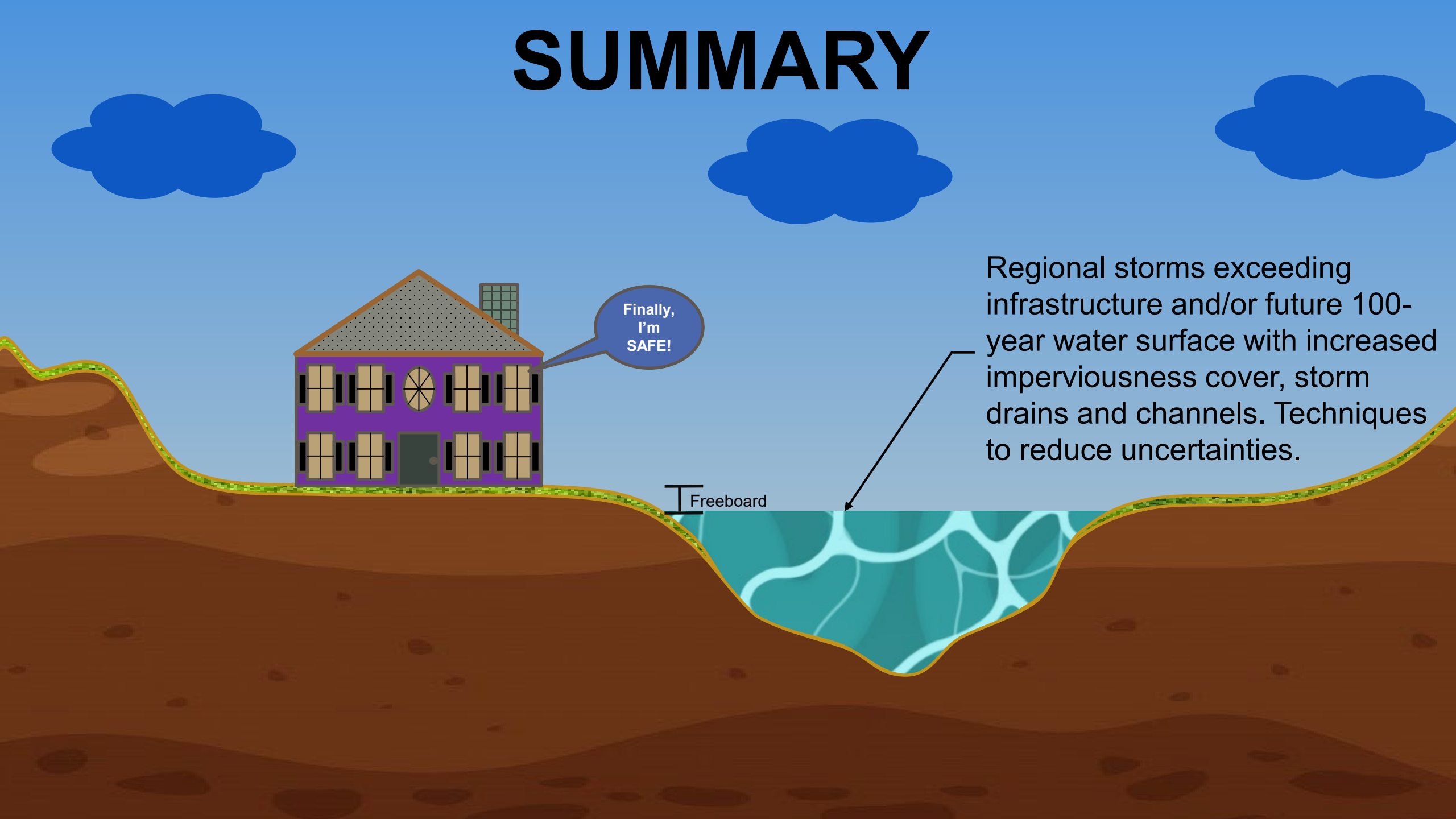
Summary


I thought I was SAFE!
Water surface resulting from urbanization, uncertainties, regional storms exceeding design standards and inadequate policies

SUMMARY



Regional storms exceeding infrastructure and/or future 100-year water surface with increased imperviousness cover, storm drains and channels. Techniques to reduce uncertainties.

TSI Contacts

Susan Alvarez, PE, CFM
Director, Environment & Development
NCTCOG
817-704-2549
salvarez@nctcog.org

Landon Erickson, PE
Lead Hydraulic Engineer, Hydrology and Hydraulics Study Section, USACE
817-886-1692
Charles.Erickson@usace.army.mil

Nick Fang, Ph.D., PE
Director, Water Engineering Research Center (WERC)
University of Texas at Arlington
817.272.5334
Nickfang@uta.edu

Fouad Jaber, Ph.D., PE
Professor and Extension Specialist,
Texas A&M AgriLife Extension
972-952-9672
Fouad.Jaber@ag.tamu.edu

Jeff Neal, PTP
Senior Projects Manager, Transportation
NCTCOG
214.223.0578
JNeal@nctcog.org

Kate Zielke, CFM
Program Manager, Environment & Development
NCTCOG
817.695.9227
kzielke@nctcog.org

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www.nctcog.org/tsi

Presenters

Jerry Cotter P.E.

Program Director, Water Engineering Research Center
University of Texas at Arlington
817.789.2004
Jerry.Cotter@UTA.Edu

Kate Zielke, CFM

Program Manager, Environment & Development
NCTCOG
817.695.9227
kzielke@nctcog.org

Website

Story Map

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Thank you for attending!

Please take the post-meeting survey

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