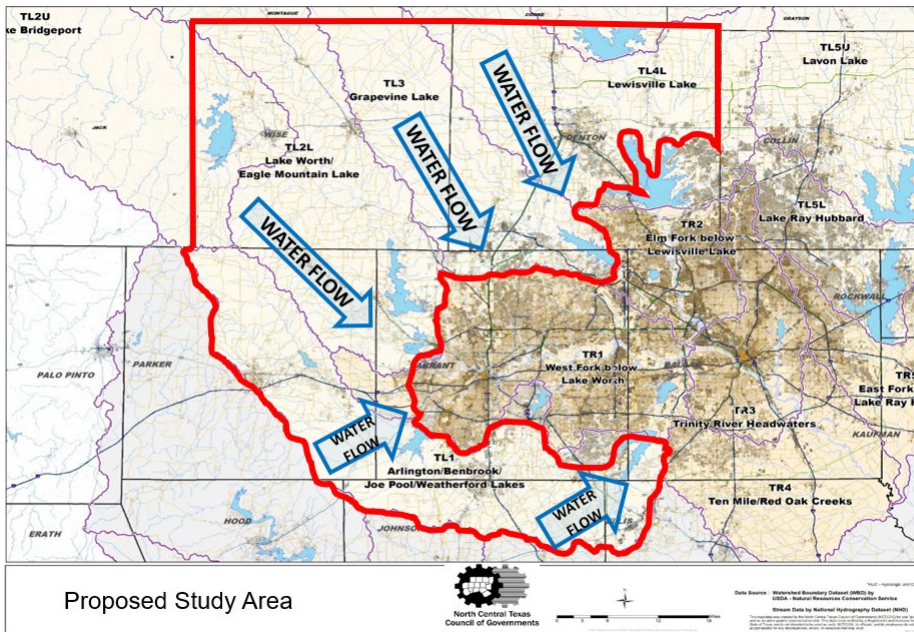


INTEGRATED PLANNING OF REGIONAL TRANSPORTATION AND STORMWATER MANAGEMENT TOGETHER AS A SYSTEM OF IMPROVEMENTS: PREVENTION VS. RESPONSE

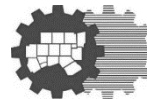
Michael Morris, P.E., Director of Transportation, NCTCOG

Edith Marvin, P.E., Director of Environment and Development, NCTCOG

Jerry Cotter P.E., Chief Water Resources, USACE, Fort Worth District



August 2022

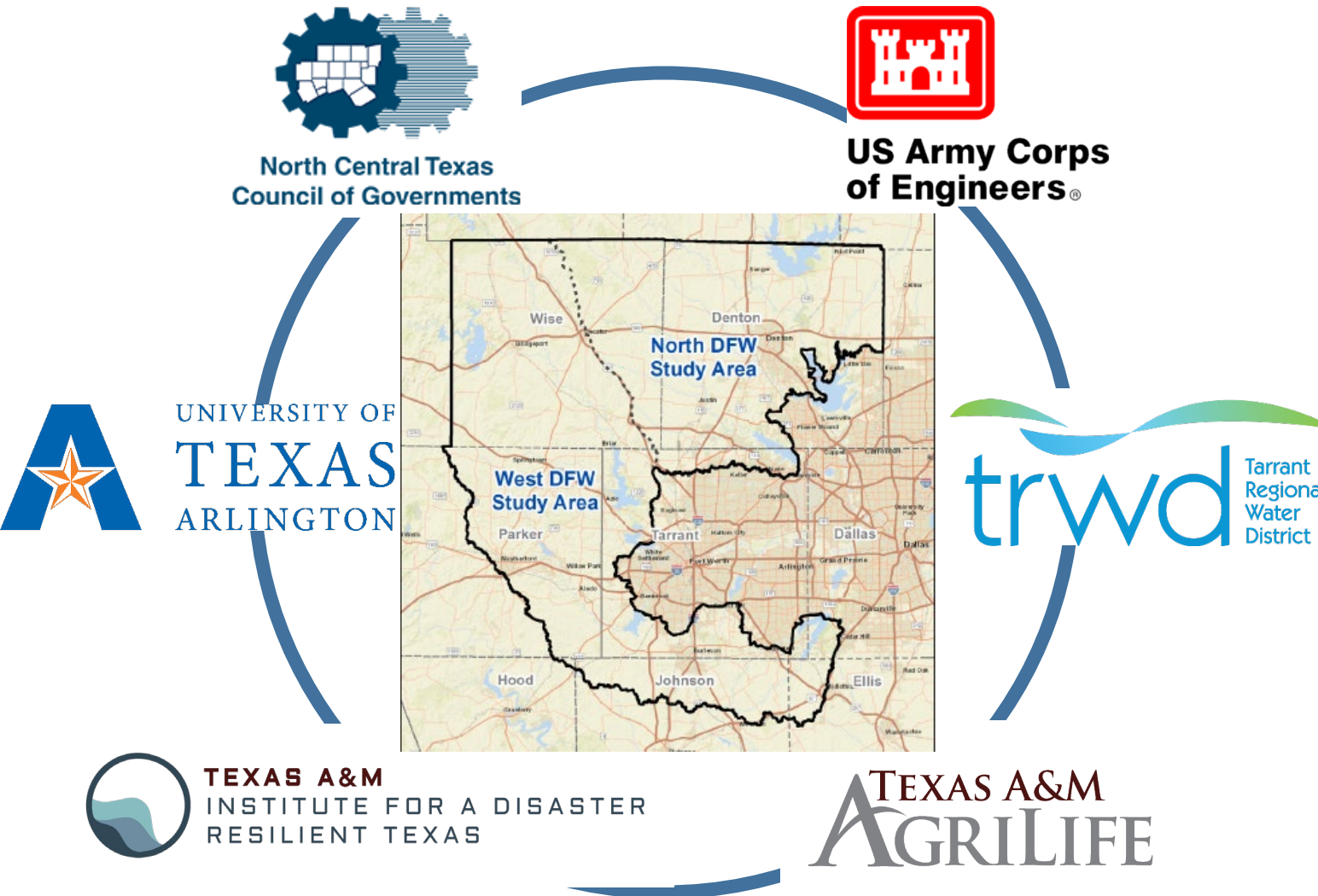


Integrated Transportation and Stormwater Management Initiative

North Central Texas Council of Governments

WHO: Project Team Members

A working group of partners and stakeholders to carry out a comprehensive planning effort in Wise County and portions of Dallas, Denton, Ellis, Johnson, Parker, and Tarrant counties



Funding Partners

- Federal Emergency Management Agency
- Texas Water Development Board
- Texas Department of Transportation / Federal Highway Administration
- Texas General Land Office

WHAT: Integration of Transportation and Stormwater Infrastructure

- **Purpose:** Integration of regional planning for transportation, stormwater management, urban development, and environmental features in order to decrease flood risk, minimize overall life cycle costs of infrastructure, and reduce impacts to the natural environment in the rapidly developing study area.
- **Timeline & Budget:** 3+ years and \$10 million
- **Benefits:** Study Area as well as downstream
 - Promotes sound flood risk management decisions
 - Enables actionable local flood risk awareness and resiliency opportunities



WHAT: Integration of Transportation and Stormwater Infrastructure

GOALS AND OUTCOMES

Proactive Planning

- Reimagine transportation design to integrate stormwater, environmental, and flood reduction benefits
- Protect current and future infrastructure
- Develop model for replication

Reduce Flooding

- Reduce flooding downstream of rapidly growing upstream communities
- Increase resiliency to flooding disasters
- Inform decision-making
- Implement stormwater infrastructure with transportation infrastructure

Tools/ Resources

- Empower communities to adopt higher floodplain management standards
- Develop GIS based tools and resources



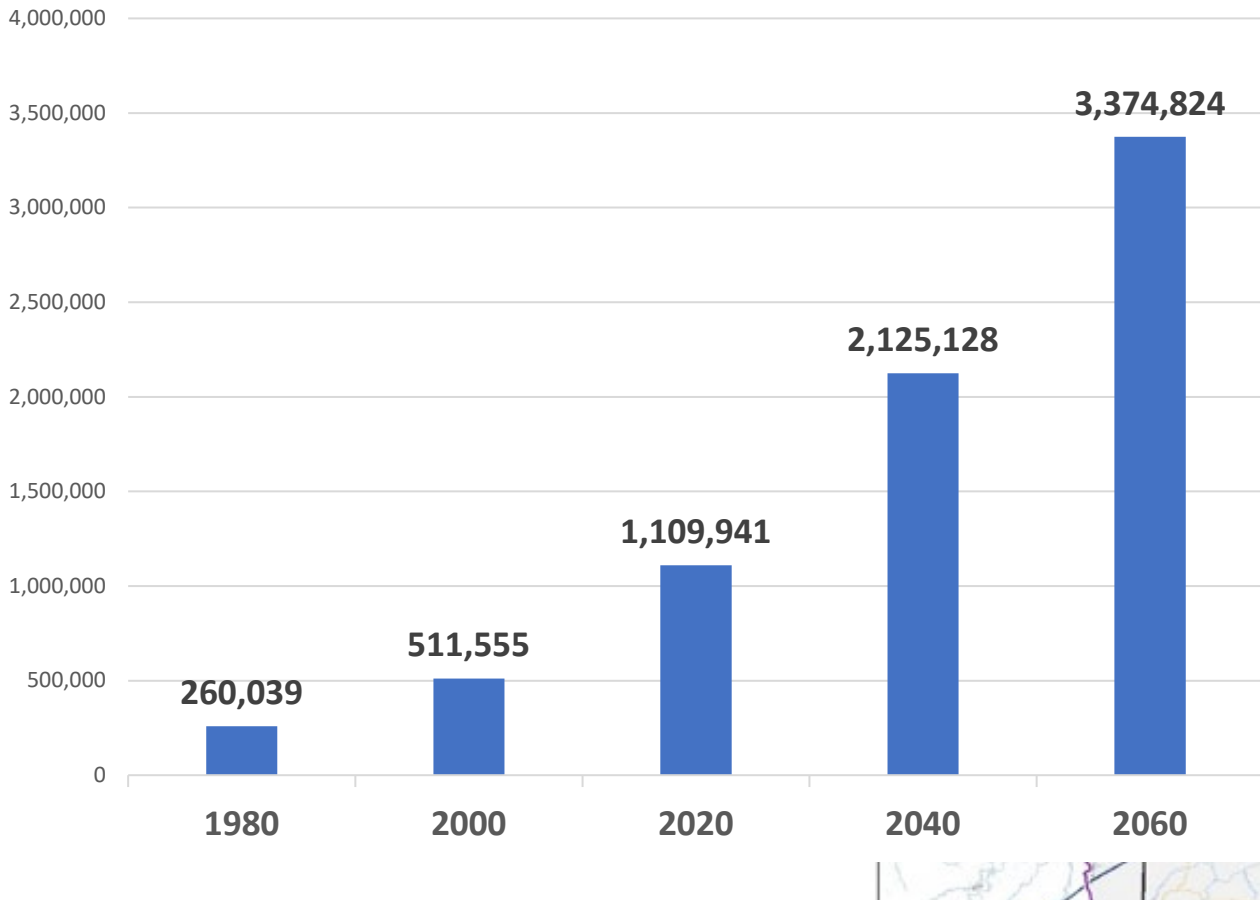
Local-Scale Innovation

- Enhance Trinity River Watershed Hydrology Assessment
- Enhance existing hydraulic models such as BLE
- Emergency management modeling tool
- Optimization study for drainage/flood control structures

Community Roadmap

- Produce planning-level designs for transportation, stormwater detention, and environmental
- Integrate these layers to identify what needs to be built and achieved benefits
- Establish ways to fund planned infrastructure

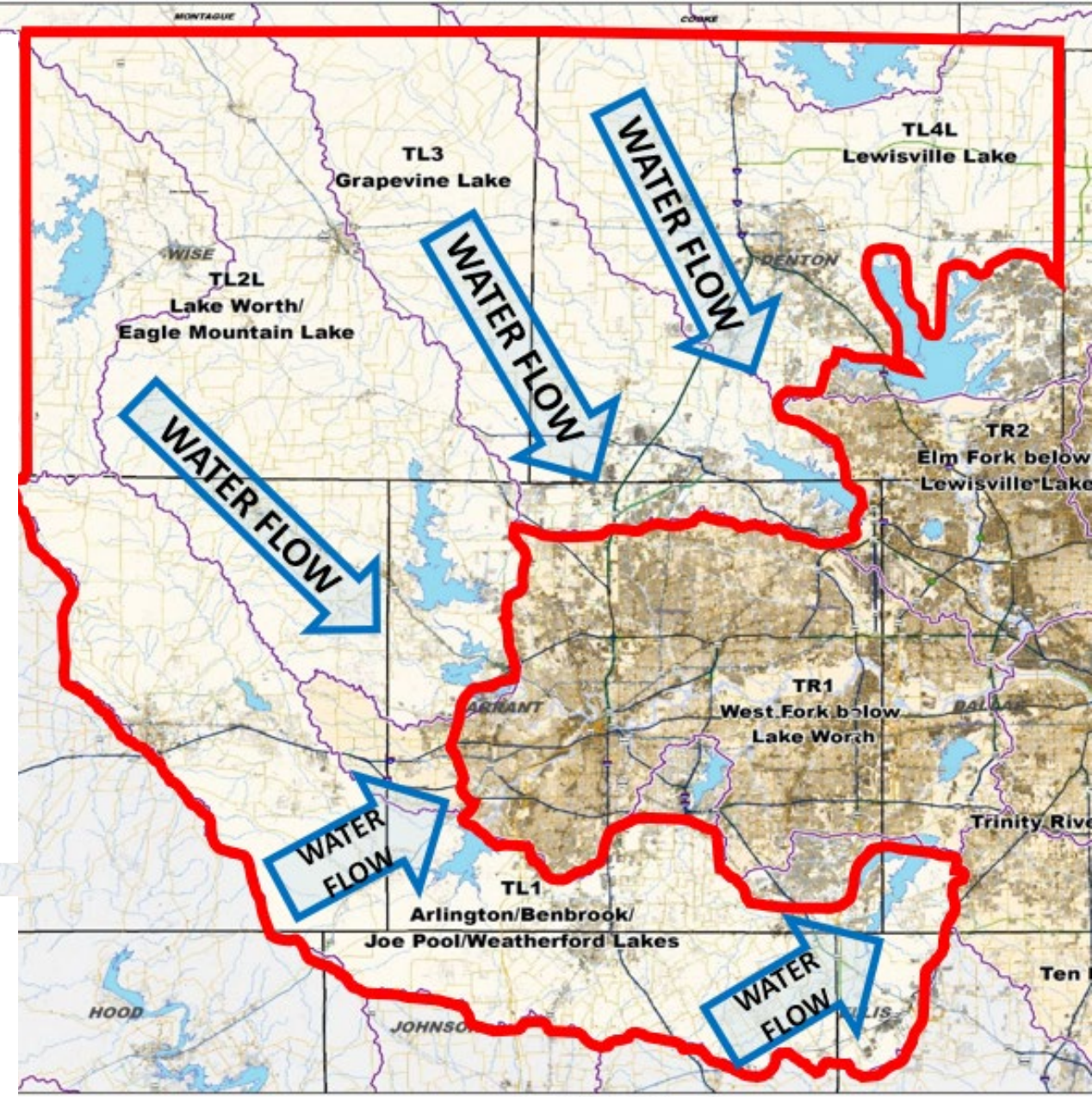
Study Area Household Population Increase



Sources:

- 2000 & 2020 - NCTCOG using US Census data normalized to 2010 geographies
- 2040 & 2060 - NCTCOG with 2040 controlled to Perryman county control totals and 2060 using a regional control total without feedback loops

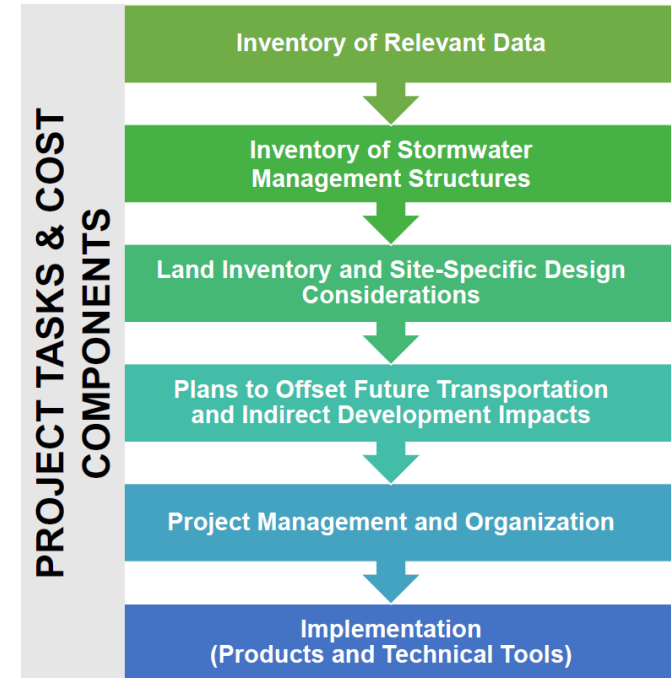
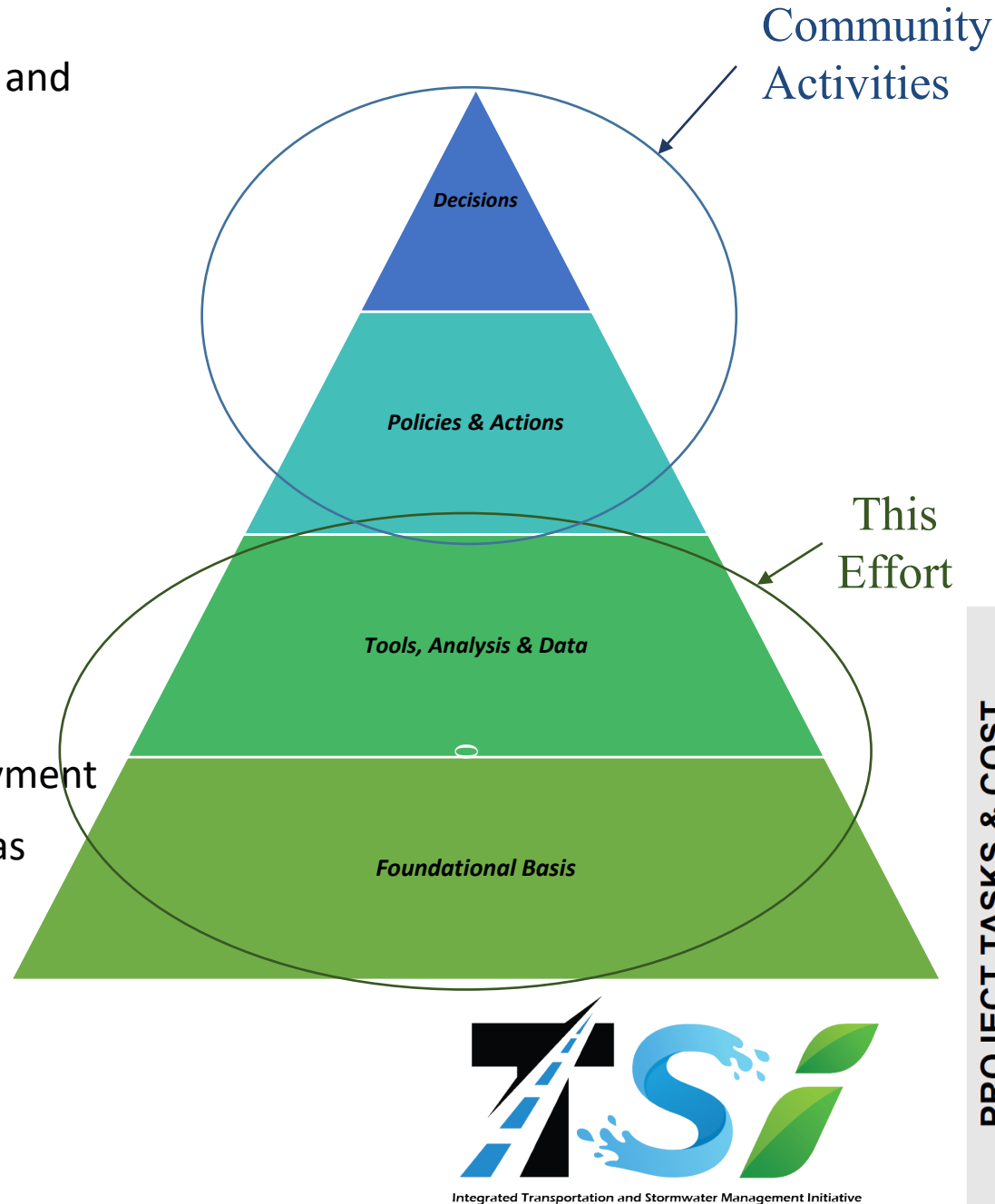
*Excludes group quarters (dormitories, senior living facilities, prisons, and other non-household institutional living facilities)



Proposed Study Area

HOW:

- Inventory of existing data, information and structures
- Develop state-of-the-art data, tools & analysis for:
 - Modeling
 - Emergency response
 - Emergency preparedness
 - Planning for infrastructure and neighborhoods
 - Regulating the flood prone areas
- Develop planning level storm water infrastructure options
- Develop environmental areas for enjoyment
- Develop environmental mitigation areas
- Groundwater recharge
- Open space connectivity opportunities
- Roadmap or documentation to allow duplication of this effort elsewhere



PREVENTION VS. RESPONSE: BRAINSTORMING

Transportation Infrastructure

Structure Elevation / Culverts / Model Growth
Mechanical Culverts?
Transportation “LEED” Certified (Ray Roberts / Lewisville)
Green Parkway Widths / Detention

Safety

Technology / Routing
Prioritization / Low Lying Facilities

Stormwater

Minimize / Reduce Downstream Detention
Tools, Data, Experts

Environmental Features

Tree Farms / Intentional Saturation
Filtration / Recharge

Wetland and Stream Bed Mitigation Banking

Environmental Stewardship as a Revenue Element

Mitigation Banking
Horse Farms
Eco-Tourism

To provide a menu of options and the location(s) where they make sense

NEW ROADWAY / MECHANICAL CULVERT / TEMPORARY STORAGE BEHIND BRIDGE



GETTY

E.G. FILTER AND RECHARGE AQUIFER

EMERGENCY MANAGEMENT

**GOVERNMENT
INITIATED**

**TRANSPORTATION
SOLUTION**



NCTCOG

E.G. NAVIGATIONAL SYSTEM PREDICTION

FLOOD MANAGEMENT WITHIN STREAM BED



GETTY

E.G. DEVELOPMENT SETBACKS AT ROBERTS-LEWISVILLE

GREENSPACE / VALLEY STORAGE

**GOVERNMENT
INITIATED**

**NATURE-BASED
SOLUTION**



GETTY

E.G. WATER STORAGE IN ABANDONED QUARRIES

WATER RETENTION ON PROPERTY

*DEVELOPER
INITIATED*

*NATURE-BASED
SOLUTION*

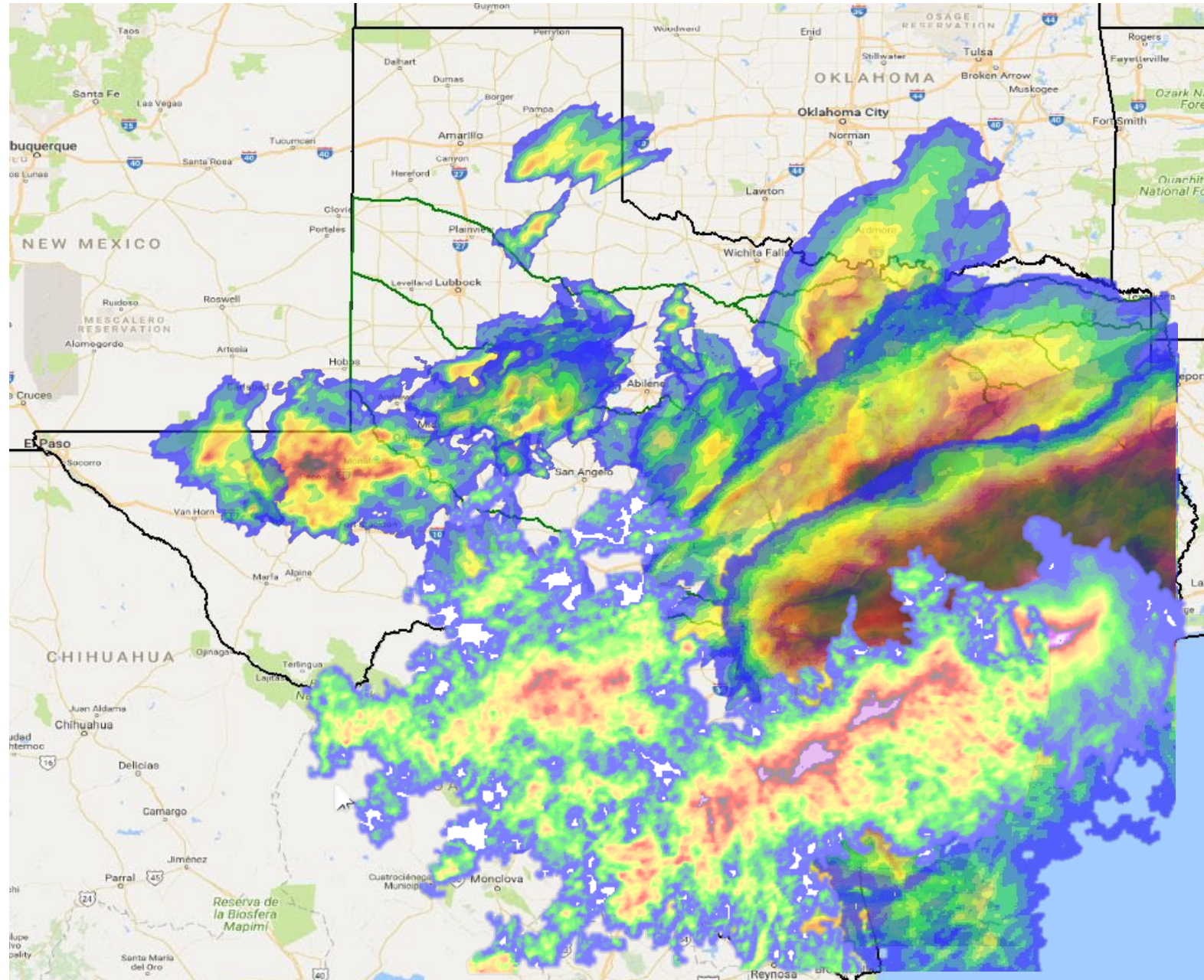


GETTY

E.G. POCKET PARK ALONG STREAM BED IN HOUSING DEVELOPMENT

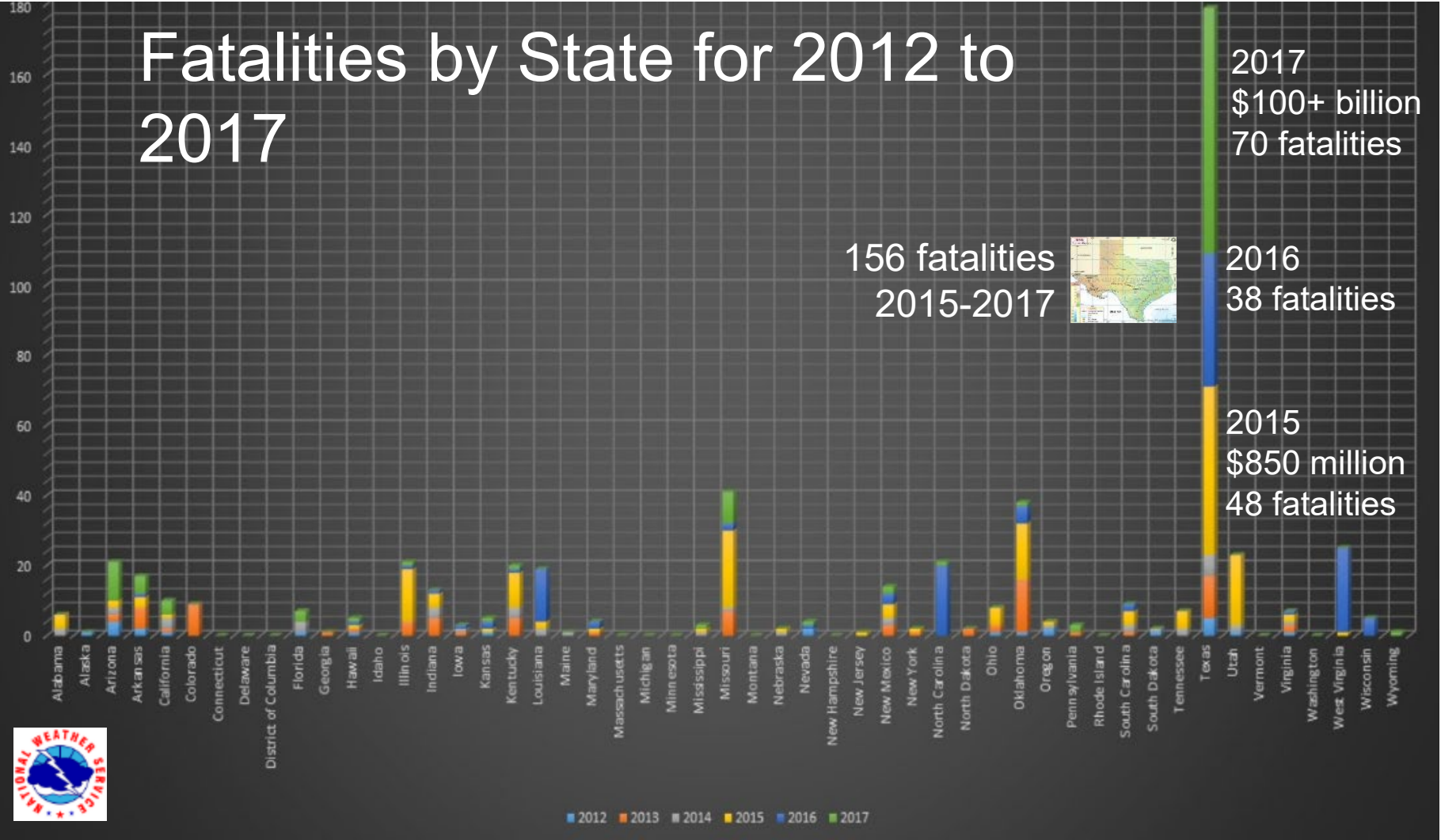
WHY: Extreme Storms (2010-2019)

- The DFW area can experience extreme precipitation events
- The region transitions from periods of drought to wet periods
- These events exceed infrastructure and neighborhood design levels



WHY: Flooding Fatalities and Damages

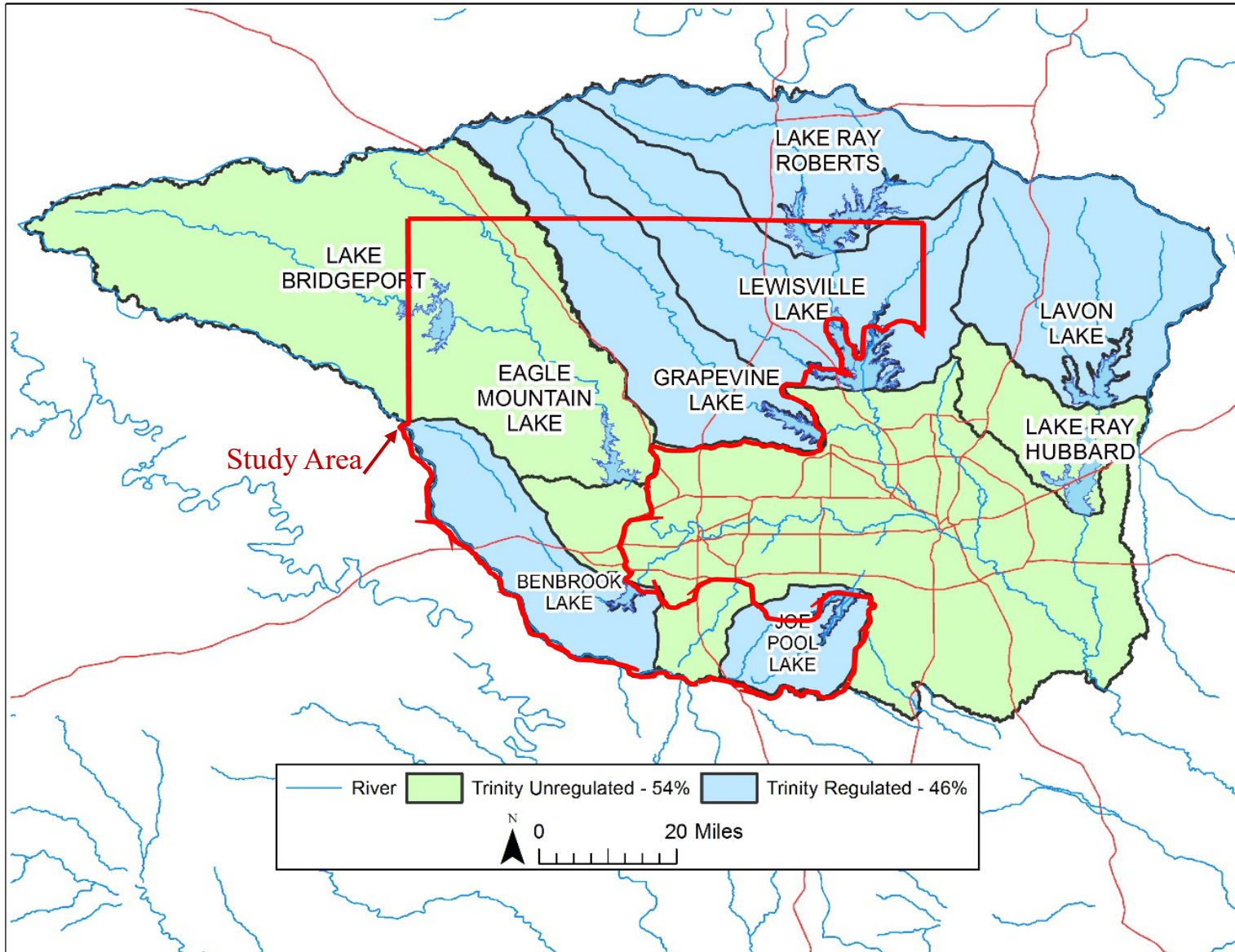
Texas far outpaces other states in flood related fatalities & flood related damages



5 Year Tally of Flood Fatalities

(Source: Gregory Waller, Service Coordination Hydrologist, NWS – West Gulf River Forecast Center, <http://www.nws.noaa.gov/om/hazstats.shtml>, 11/18 TFMA)

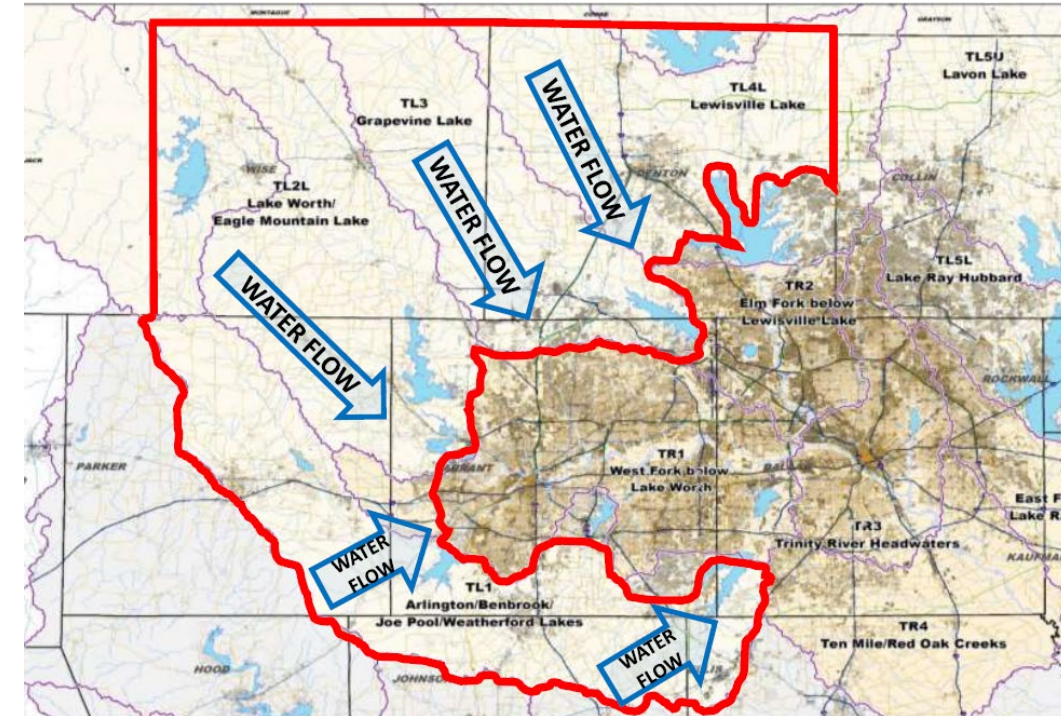
WHY:



- Devastating floods, 1908, 1942, 1949
- 6 multi-purpose reservoirs
- 2 federal levee systems
- DFW Flood Control System
 - ▶ 7.4 million people
 - ▶ \$100 billion in damages prevented
 - ▶ \$2 - \$3 billion annually
- Water supply system
- Total cost \$2.5 billion
- ***Must be operated as a system***

PROBLEM SOLVED OR A WORK IN PROGRESS?

- **Recent flood events in Texas have highlighted the need for more comprehensive stormwater planning**
 - Development of Texas's first-ever state flood plan is underway through the efforts of 15 Regional Flood Planning Groups
 - The regional flood plans will be due in January 2023, and state flood plan is due September 1, 2024
- **Lack of regulation outside floodplains (i.e., outside CDC footprint and FEMA 100-year boundary) leads to a “in or out” mindset about flooding**
 - Flooding doesn't stop at lines on a map.
 - FEMA Future of Flood Risk Data (FFRD) and other initiatives are helping provide a more comprehensive picture of the country's flood hazards and risk by leveraging new technologies
- **Rapidly developing study area drains into densely populated DFW-metroplex and there is currently no comprehensive regional plan to address this**
 - 85 Cities and portions of 8 counties within study area
 - Population expected to increase 126% by 2045
 - 60% undeveloped as of 2015
- **Questionable historic records & lack of safety factors**



The TSI initiative intends to learn from mistaken approaches that have resulted in flooded roadways, neighborhoods, and critical infrastructure, and can assist communities with an improved approach to efficiently minimize these impacts before they occur.

WHY:

- With technology advances we:
 - Better understand the threat of flooding
 - Can better warn residents of impending danger
 - Understand the relationships between types of infrastructure, e.g. transportation, electrical transmission, water, wastewater
 - Can more easily answer direct questions relating to resiliency and sustainability



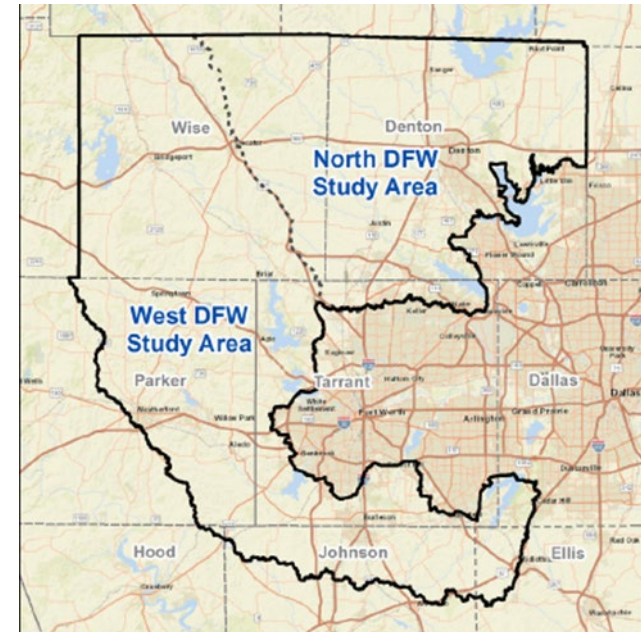
HOW MUCH:

\$10 Million

No funding is being requested of our local governments; only your engagement, participation, and follow-through with the tools and resources that we develop for your use.

Thank you to our Funding Partners:

- Federal Emergency Management Agency
- Texas Water Development Board
- Texas Department of Transportation / Federal Highway Administration
- Texas General Land Office



INTEGRATED PLANNING OF REGIONAL TRANSPORTATION AND STORMWATER MANAGEMENT TOGETHER AS A SYSTEM OF IMPROVEMENTS: PREVENTION VS. RESPONSE



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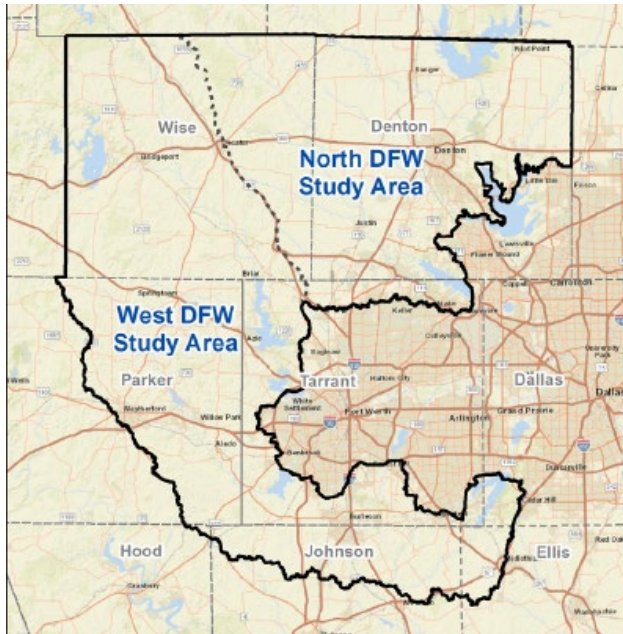
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**US Army Corps
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UNIVERSITY OF
TEXAS
ARLINGTON



TEXAS A&M
INSTITUTE FOR A DISASTER
RESILIENT TEXAS

TEXAS A&M
AGRI LIFE

Community Participation: Local Data



GROW. Future land use plans; thoroughfare plans; data on hotspots for population and employment growth.



PRESERVE. Areas to preserve for parks, open space and environmental conservation; culturally important sites that do not have state or national historic designation.



PROTECT. Low-water crossings and areas that flood repeatedly; existing detention ponds or constructed wetlands.

Community Participation: Technical Advisory Groups



To volunteer to participate in the TSI project, please sign up on the form or contact eblackman@nctcog.org



Community Input With:



Feedback on Overall Project

Impressions:

Interactive Poll of our Participants

Perceptions, expectations, potential successes
and shortcomings of goals and deliverables

How to Use the Keypads

Press the number or letter on the keypad that corresponds to your answer choice.

Press with the pad of your finger—not your fingernail.

A green light will illuminate briefly when the answer is received.

The answer will show briefly on the LCD screen.

Do not push the **Channel** button in the bottom left.



How would you describe your overall perception of the project?

- A. Very positive
- B. Somewhat positive
- C. Neutral
- D. Somewhat negative
- E. Very negative

How likely are you to participate in the project?

- A. Very likely
- B. Somewhat likely
- C. Neutral
- D. Somewhat unlikely
- E. Not likely

Select the project goal you think is *most likely* to be accomplished. Select one from:

- A. Proactive Planning
- B. Reduce Flooding
- C. Tools/Resources
- D. Local-Scale Innovation
- E. Community Roadmap

Select the project goal you think is *second most likely* to be accomplished. Select one from:

- A. Proactive Planning
- B. Reduce Flooding
- C. Tools/Resources
- D. Local-Scale Innovation
- E. Community Roadmap

Select the project goal you think will be *most challenging* to accomplish. Select one from:

- A. Proactive Planning
- B. Reduce Flooding
- C. Tools/Resources
- D. Local-Scale Innovation
- E. Community Roadmap

Select the project goal you think will provide the *greatest benefit* for your community.

Select one from:

- A. Proactive Planning
- B. Reduce Flooding
- C. Tools/Resources
- D. Local-Scale Innovation
- E. Community Roadmap

Select the project goal you think will provide the *second greatest benefit* for your community.

Select one from:

- A. Proactive Planning
- B. Reduce Flooding
- C. Tools/Resources
- D. Local-Scale Innovation
- E. Community Roadmap

Select the project goal you think will provide the *least benefit* for your community. Select one from:

- A. Proactive Planning
- B. Reduce Flooding
- C. Tools/Resources
- D. Local-Scale Innovation
- E. Community Roadmap

Community Input With:

Map Your Watershed!



Map Your Watershed! allows users to identify infrastructure and environmental features that face frequent flooding or whose presence could mitigate flooding. These features could include roads that are covered with water during heavy rain; green infrastructure, such as detention ponds that retain stormwater; or open space planned for enhancement, such as recreation trails. Please identify any other features you believe are relevant to the Integrated Transportation and Stormwater Infrastructure Initiative.



Please return your keypad before leaving
Thank you