

North Central Texas
Council of Governments

Breakout Station: Transportation Integration – Outcomes & Next Steps

May 2026 – TSI Study Subarea Meeting Series #5



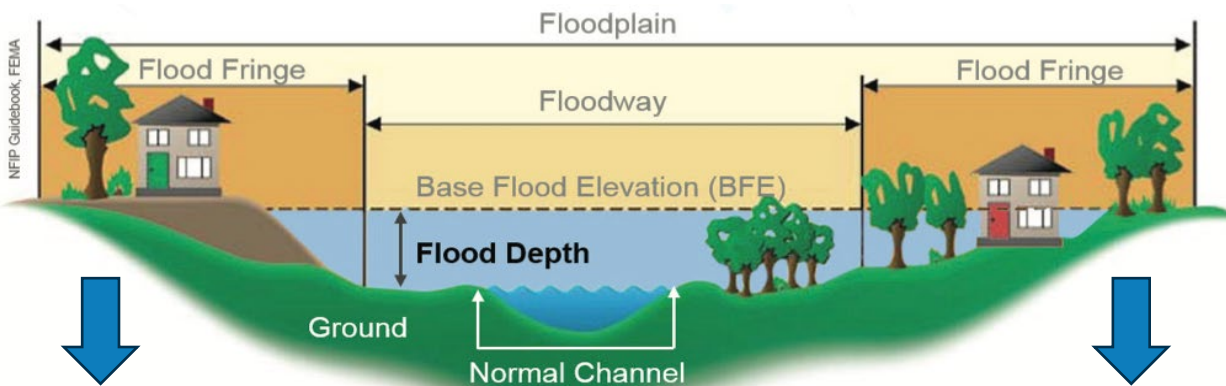
Funded by the Texas General Land Office,
Community Development Block Grant,
Disaster Recovery Program.



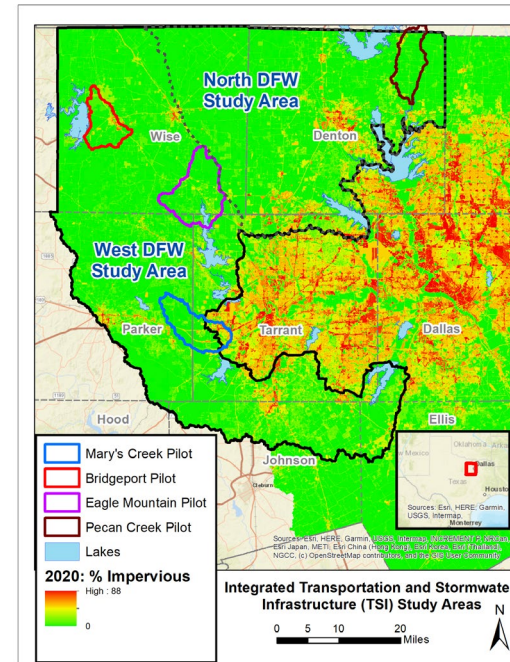
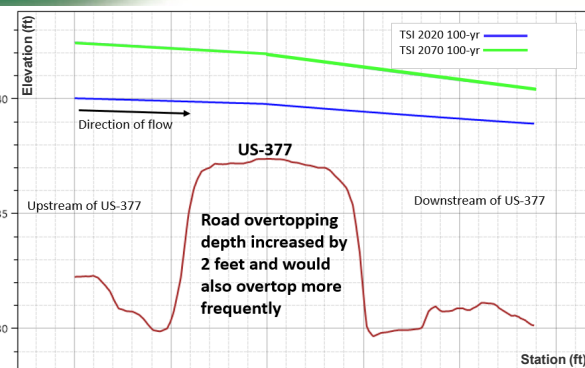
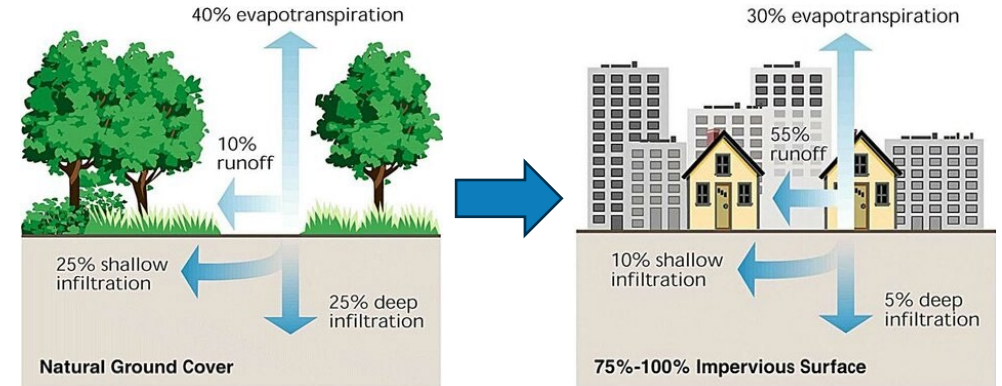
Also Funded by the Texas Water Development Board
and Texas Department of Transportation.

Urbanization – Increased Flood Risk

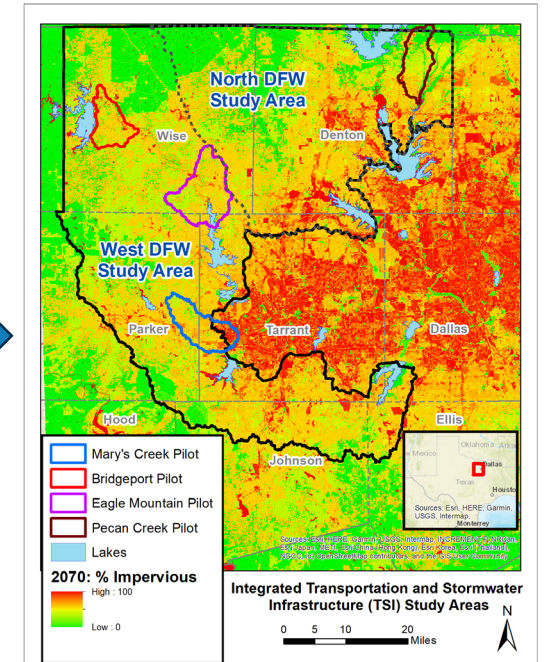
- Floodplains are among Earth’s most valuable ecosystems, but also among the most threatened
- Effects of urbanization on floodplains:
 - Adds imperious cover (see right; **runoff \leq 10% more**)
 - Depletes valley storage (see below; **runoff \leq 30% more**)



More Impervious Surface = More Runoff

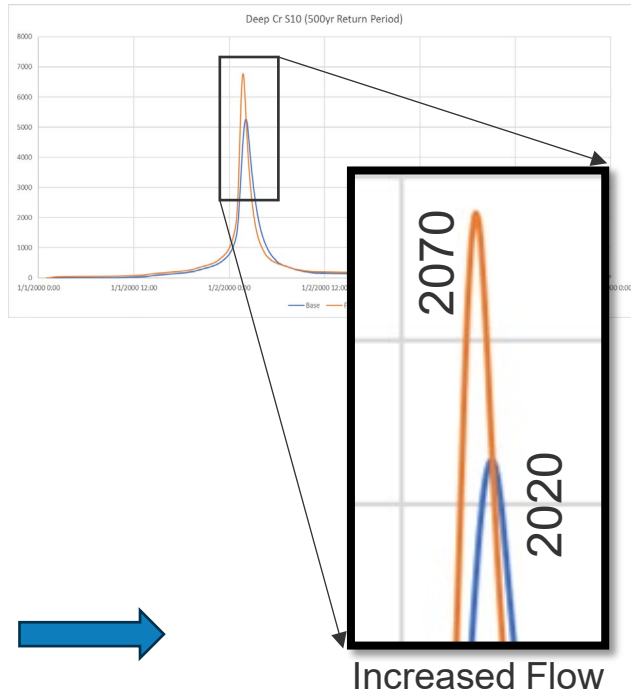
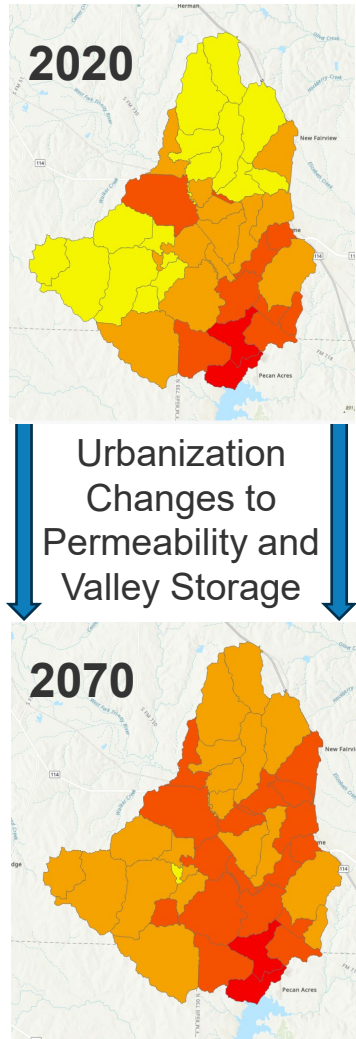


6.4% Impervious (2020)



35.2% Impervious (2070)

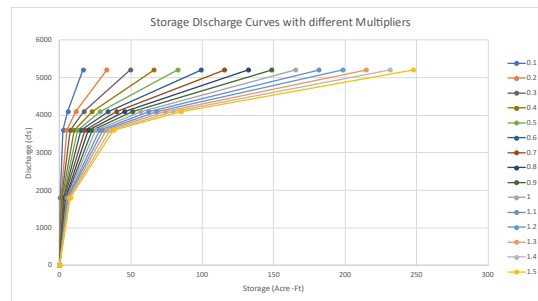
Enhanced Model to Optimize Flow/Storage Options



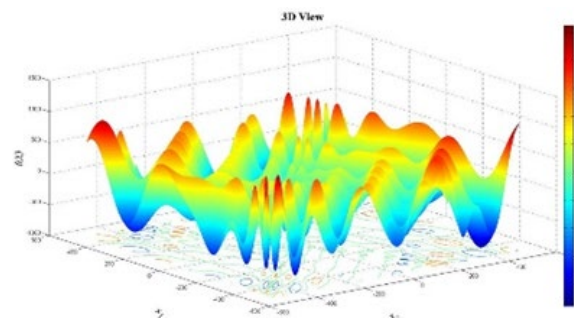
Set Up Hydrologic and Hydraulic (H&H) Model w/ Reservoirs at each Subbasin



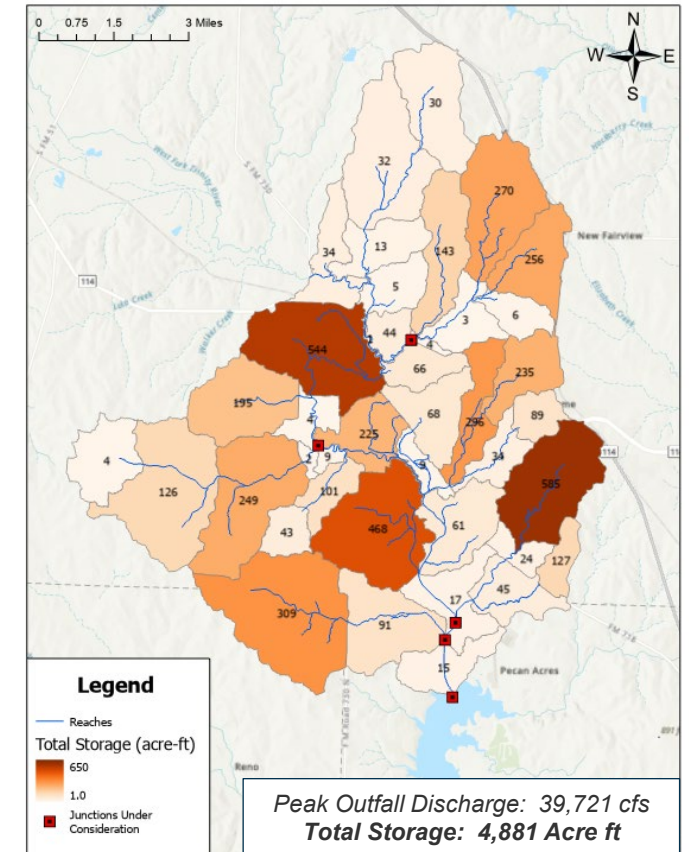
Optimize Flow Resistance and Storage Values Generated from H&H Model Runs



Vary Storage Values to Best Reduce the Peak Flow



Distributed Detention Optimization Example – Eagle Mountain Pilot

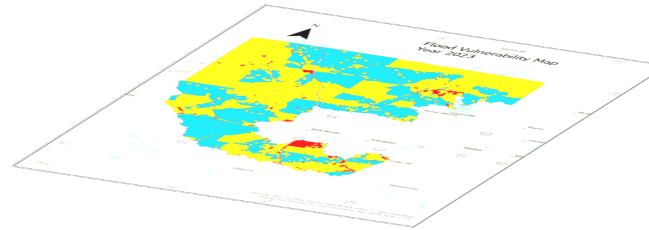


Focus on Critical Reaches and Transportation Junctions for Reducing Flow to 2020 Conditions

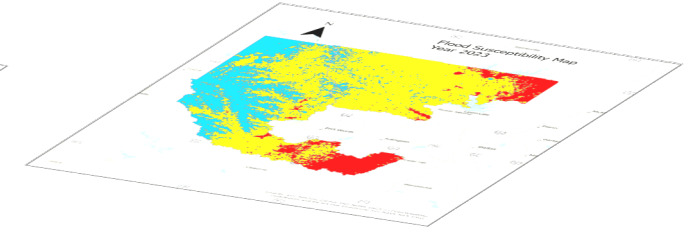
GIS Stacking – Flood Vulnerability/Susceptibility

- **Vulnerability** – Degree of flood event exposure resulting in physical harm or loss of life, economic loss, and/or service disruption
- **Susceptibility** – Likelihood of adverse flood event impacts based on upstream watershed & infrastructure conditions
- **Includes four conditioning factors** (*social, environmental, institutional, & transportation*)
- **Aids development of mitigation suitability index for Green Stormwater Infrastructure (GSI) & Nature-Based Solutions (NBS):**
 - Priority GIS/NBS areas to reduce flood risk?
 - GSI/NBS design/model for target performance?
 - GSI/NBS efficiency – local vs. watershed scale?
- **Informs flood control prioritization of junctions/reaches within each watershed** (*now available for entire TSI Study Area*)

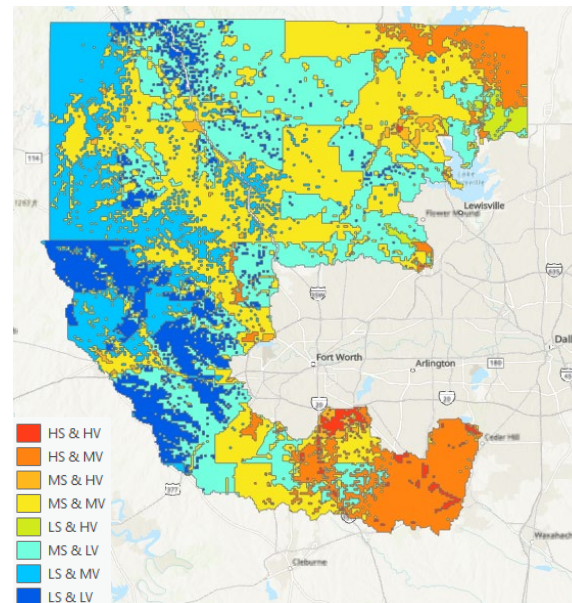
Flood Vulnerability Map



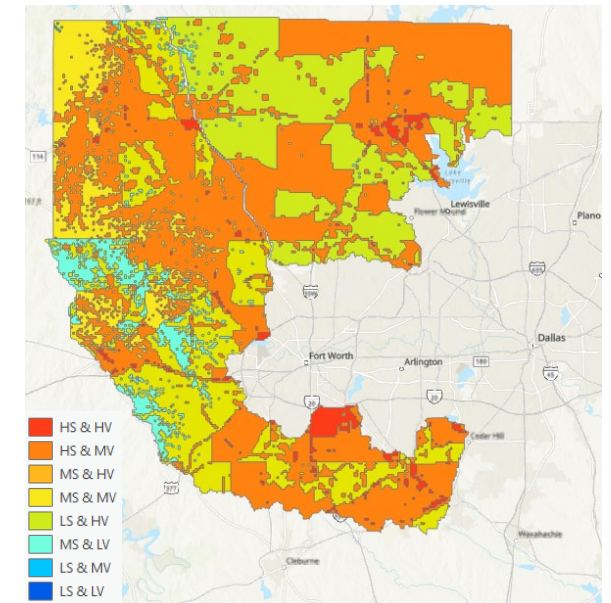
Flood Susceptibility Map



2023



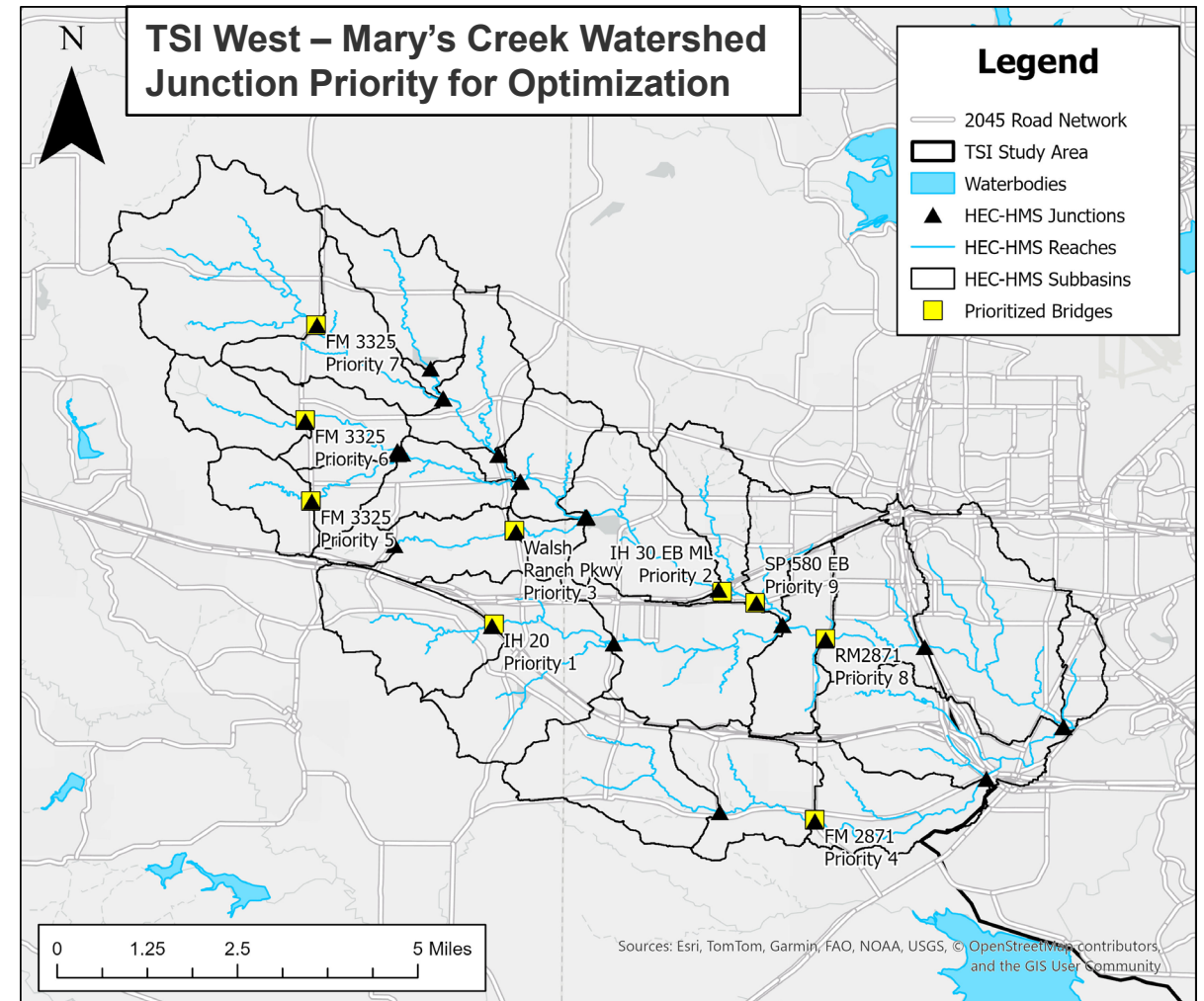
2045



TSI Optimization – Selecting Bridges/Culverts

ATTRIBUTES FOR PRIORITIZATION:

- “Scour-Critical” Bridges – Bridge piers/abutments already unstable due to flood scouring (*via inspection*)
- Average Daily Traffic (ADT) –
 - Current (*National Bridge Inventory – Inspection Year*)
 - Future (*see below*)
 - Federal Highway Administration (*FHWA*) requires future ADT projected between 17-22 years from inspection date (*variable*)
 - If available, year 2050 NCTCOG Travel Model volumes used for more robust planning horizon & improved H&H consistency
- Inventory Route Functional Classification (*FC*)
- Detour Length
- Historical Significance
- Other factors depending on watershed relevance:
 - Intersecting Routes (*ADT, FC, & Detour Length*)
 - Critical Facility & Navigational Control Indicators



Flood Mitigation Options – Transportation (*ongoing*)

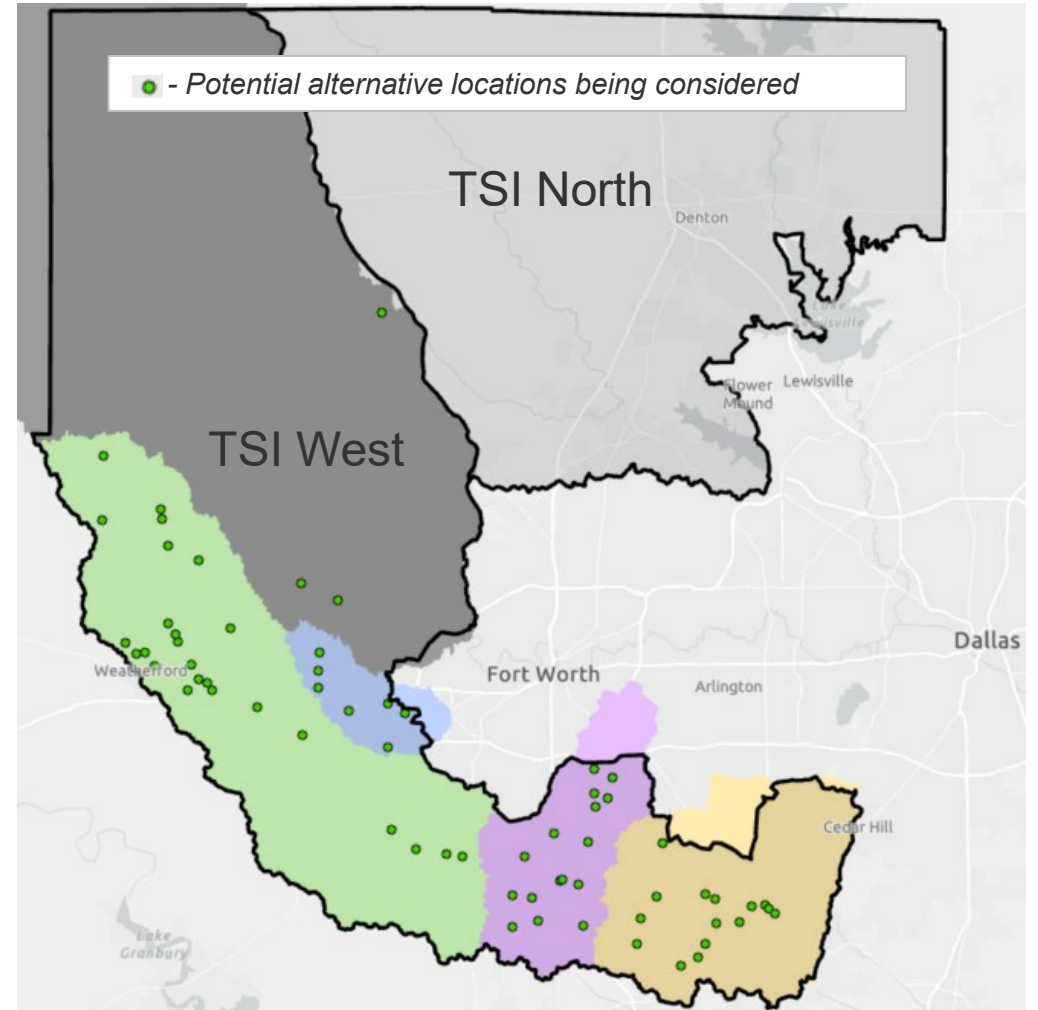
- **GOAL** – Reduce current/future flows & add storage
- **Considerations:**
 - Effective flood reduction?
 - Avoids negative impacts (*NEPA/ROW acquisition*)?
 - Upstream/downstream flooding?
 - Economic & environmental benefits?
 - Future transportation improvements?
 - Design/maintenance implications?



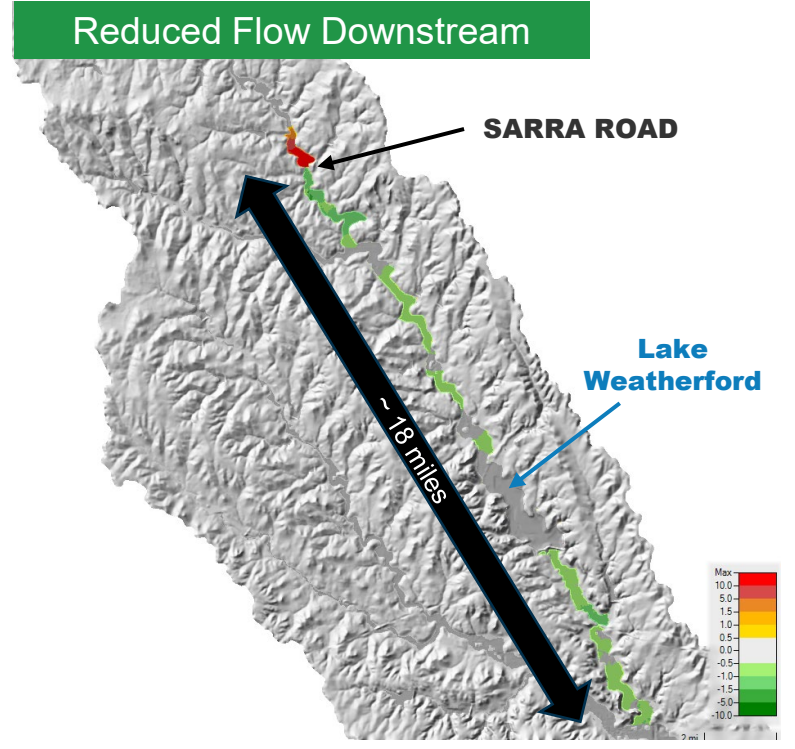
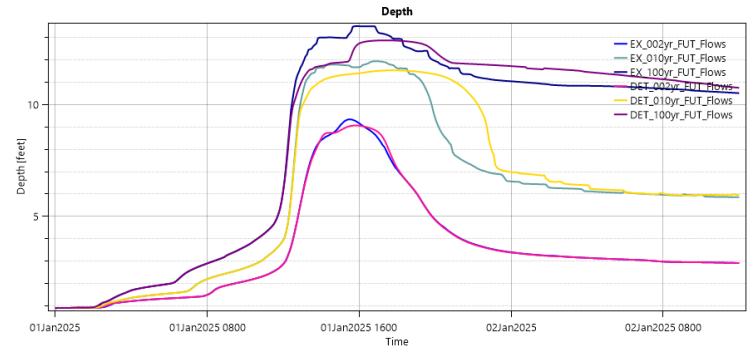
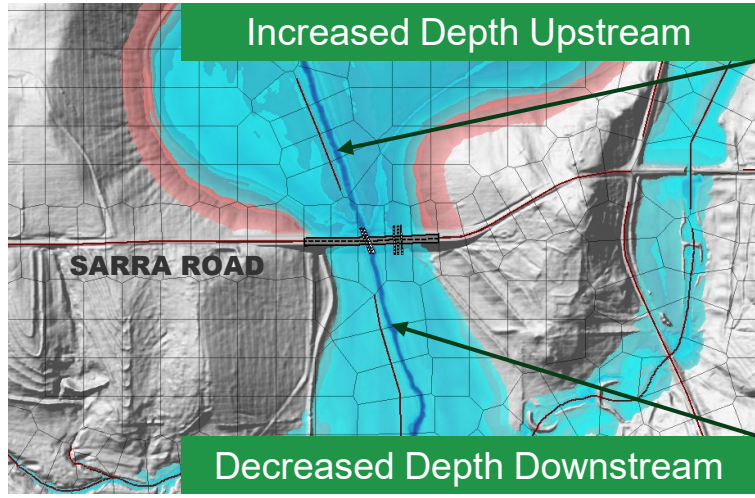
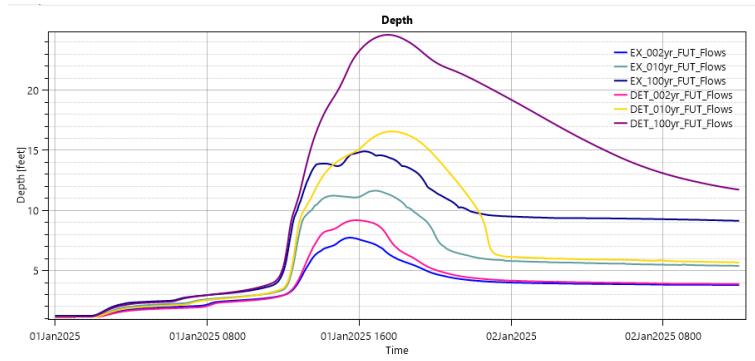
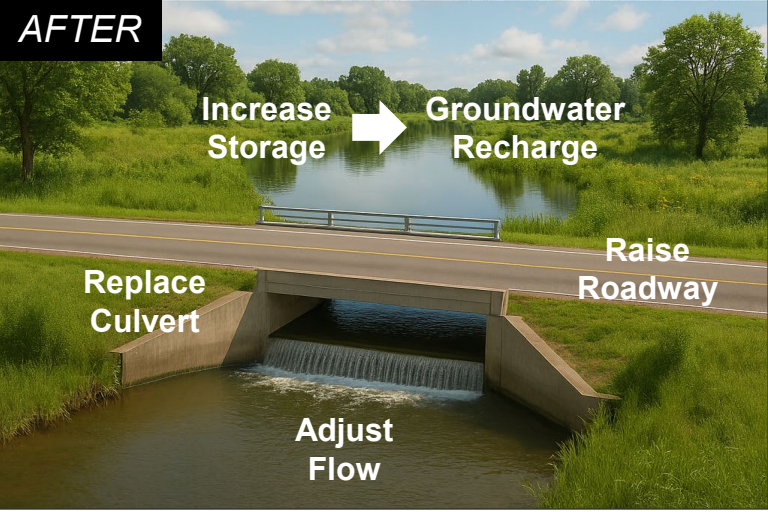
Increased Storage

Raised Embankment

Culvert Opening



Example – Sarra Road (Parker County)

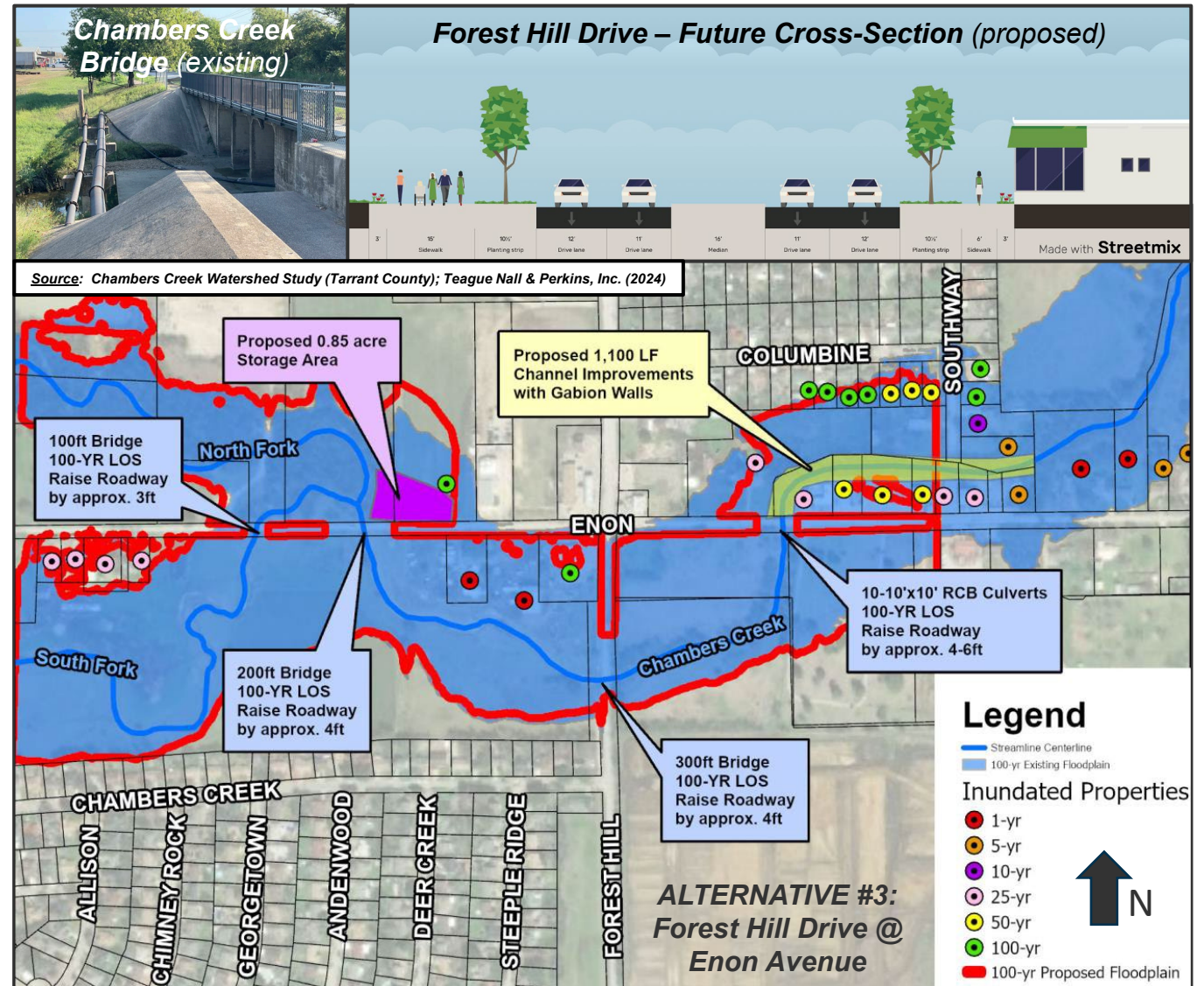


Key Summary Statistics – 2070

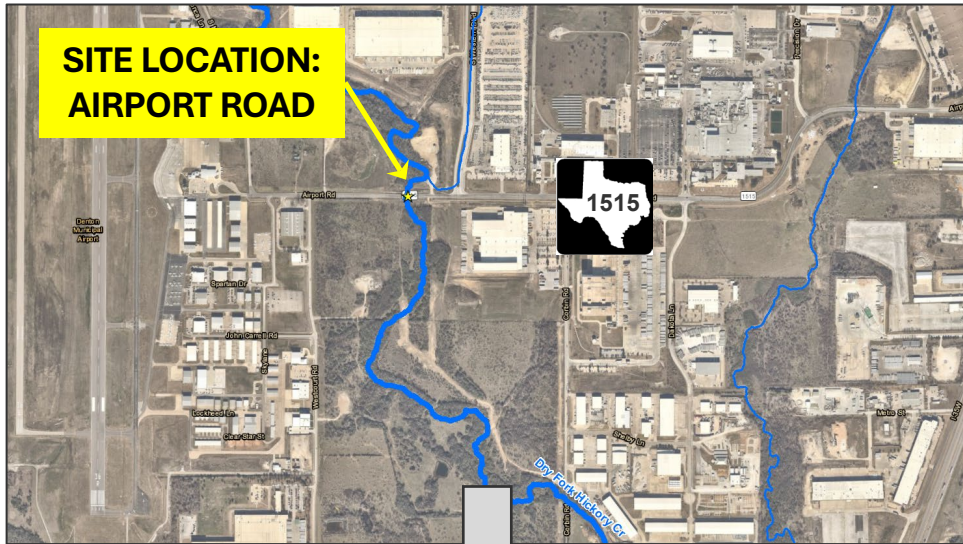
- **100-year Conditions (upstream):**
 - Valley Storage: + 2,000 acre-ft
 - Flow Rate: - 3,000 ft³/sec
- **10-year Conditions (downstream):**
 - Flow Rate: - 1,000 ft³/sec
 - Elevation Reduction: 0.5-1.0 ft

Example – Forest Hill Drive (*Tarrant County*)

- **Forest Hill Drive Study (2023-24)** identified future alignment, configuration, & capacity recommendations in Everman, Forest Hill, & Fort Worth
 - Lon Stephenson Rd – Shelby Rd (1.5 miles)
 - Major flood events in 2015, 2018, & 2022
 - Expecting substantial cost share related to integrating thoroughfare/stormwater needs
 - Proximity of Chambers Creek crossings require Enon Ave reconstruction/raising as part of Forest Hill Dr widening (see map at right)
 - “Land banking” options for detention already considered in initial stakeholder discussions
 - **TSI Study** feedback vital to identify/optimize “land banking” uses, locations, & policies
 - Existing precedents for NCTCOG “land banking” in other transportation projects (e.g., Arlington, Irving, NRH, & White Settlement)



Example – FM 1515 Airport Road (*Denton County*)



Stream:
Dry Fork Hickory Creek

2020 LOS:
50% ACE

2070 LOS:
<50% ACE

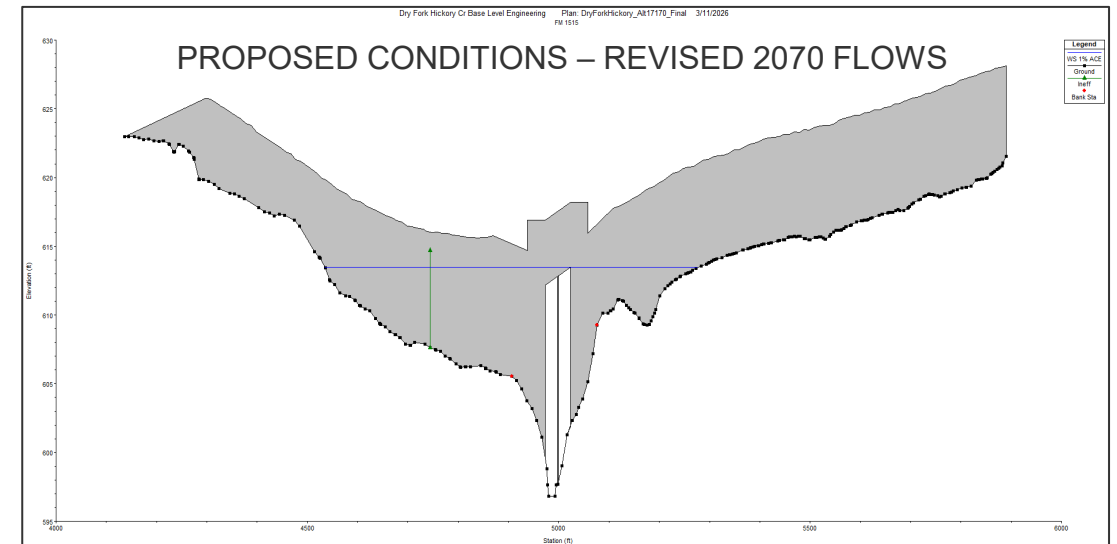
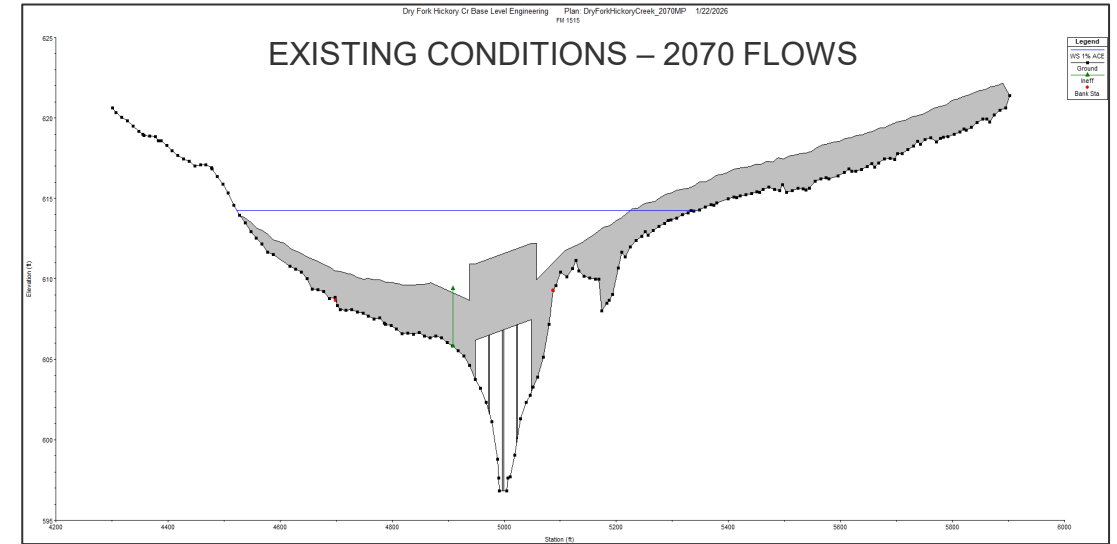
Proposed LOS:
1% ACE

2070 Flow:
13100 cfs

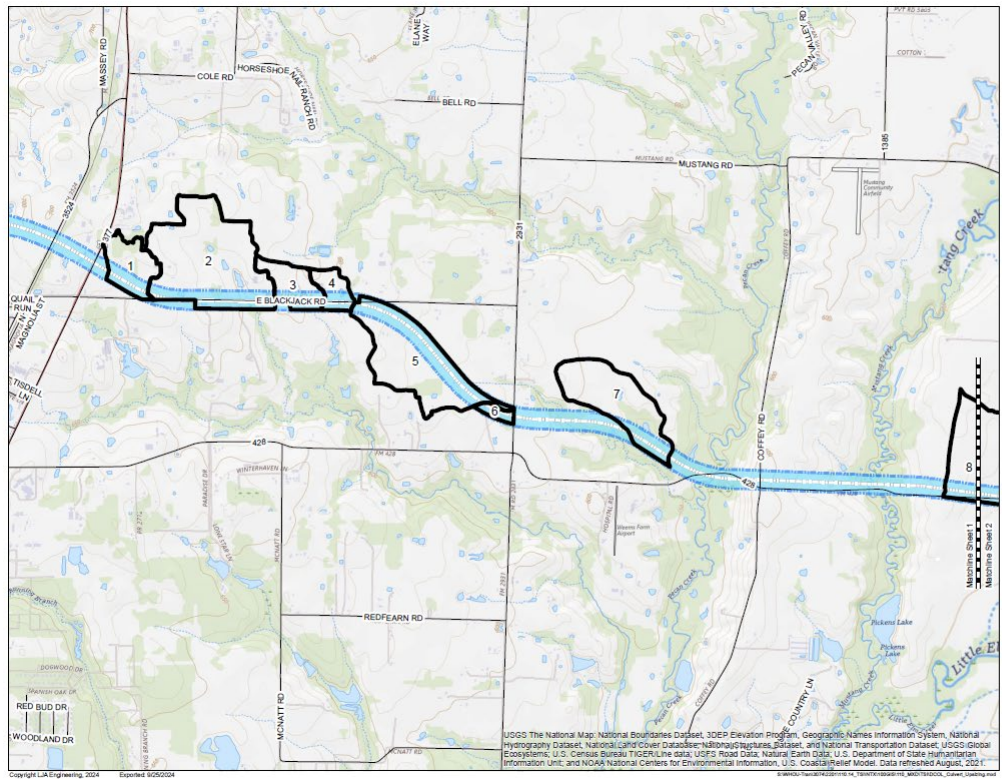
Proposed Flow:
11350 cfs

Storage:
361 ac-ft

- Structural Changes:**
- Bridge opening decreased to 50 ft (via 2 spans)
 - Road raised 6 ft



Example – Outer Loop (Denton/Collin County)



DCOL: Cross-Drainage Methodologies and Approach

Denton County, Texas

Exhibit 1 - Proposed DCOL Blue Alignment Culvert Drainage Areas (US 377 to the DNT)

Sheet 1 of 2

Key to Features

- Drainage Area
- DCOL Centerline
- DCOL ROW
- Regional Roadways

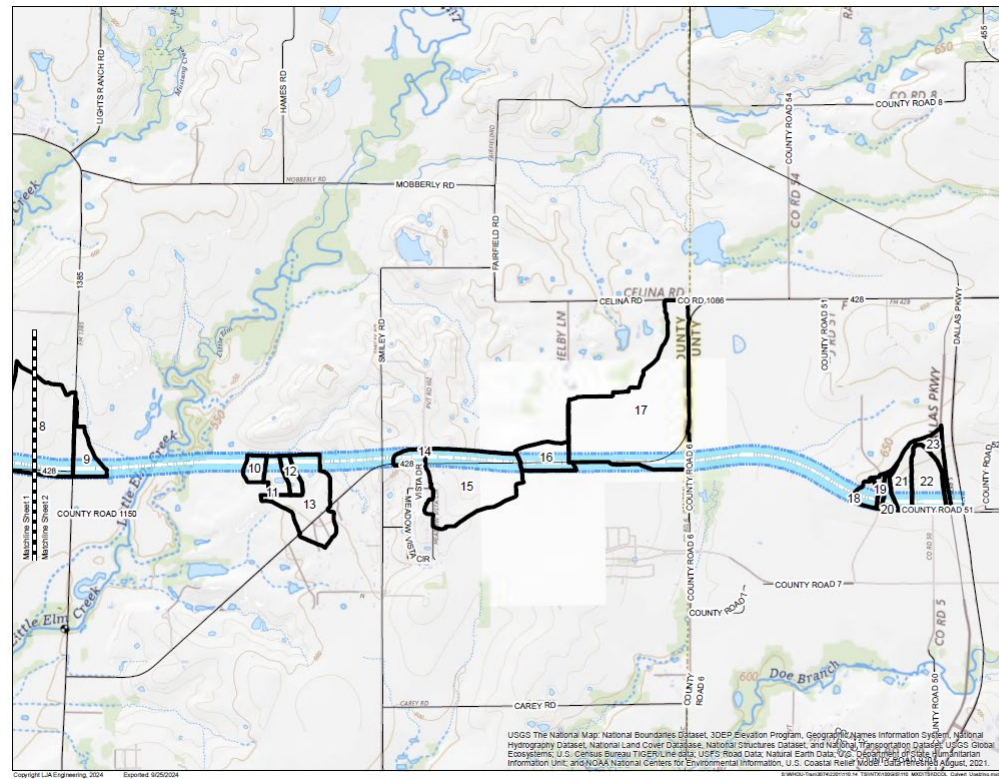
Sources: FEMA, TxDOT

0 2,000 4,000 Feet
1 inch = 2,000 feet

LJA Project No. 3074-2201
TxDOT CSJ 0918-46-341

LJA

FRN - F - 1386



DCOL: Cross-Drainage Methodologies and Approach

Denton County, Texas

Exhibit 1 - Proposed DCOL Blue Alignment Culvert Drainage Areas (US 377 to the DNT)

Sheet 2 of 2

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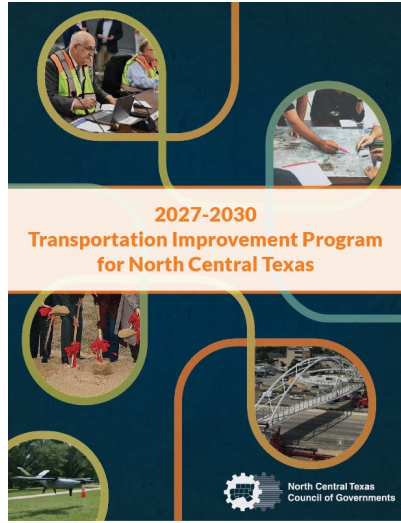
FRN - F - 1386

- Comparing preliminary construction costs between standard & TSI-based cross-drainage design runoff methodologies
- TSI culvert cost increases 10.9%; overall cost increases 0.1%
- Comprehensive benefits?

Design Feature	Systemwide Methodology	
	Dallas District	TSI Initiatives
Largest Drainage Area (Ac)	196	
Runoff Model	Rational (Q=CIA)	
Time of Concentration (Tc) Method	Natural Resources Conservation Service (NRCS)	
Rainfall Design Event	50 year (2%)	
Rainfall Intensity (in/hour)	National Oceanic and Atmospheric Administration (NOAA) Atlas 14	
Runoff Coefficient (C)*	Undeveloped: 0.50 Single Family (SF): 0.50 Commercial: 0.90 Streets: 0.90	Undeveloped: 0.65 SF (> 1.0 ac): 0.45 SF (0.5 to 1.0 ac): 0.55 SF (0.25 to 0.50 ac): 0.60 SF (0.125 to 0.25 ac): 0.65 Commercial: 0.80 Streets: 0.90
C-Value Basis	Existing conditions	Fully developed conditions based on regional land use plans
Assumed Culvert Length (ft.)	500	500

*C-values for the Dallas District were based on TxDOT's Hydraulic Design Manual and the District's use of 0.50 for undeveloped conditions. C-values for the TSI initiatives were based on Denton County's Subdivision Rules and Regulations and the NCTCOG ISWM Technical Manual.

Linking TSI, Planning, & Programming Processes

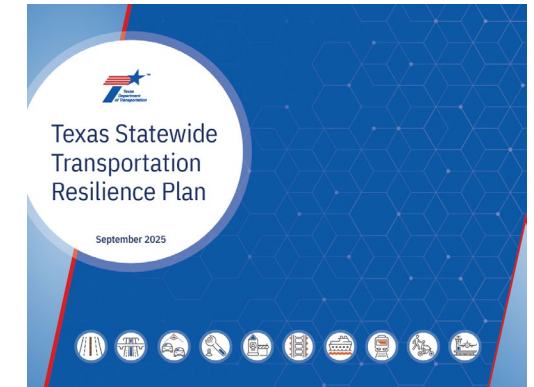


Using new data, analysis, & tools from TSI Study

Opportunities for linking transportation & flood mitigation

Increase use of nature-based solutions in road designs

Technical, administrative, & policy support



Questions for TxDOT & Local Providers

For TSI Study data, tools, & methodologies to be the most useful/beneficial for TxDOT & other transportation providers (*including local governments*)...we need to understand how/when this information can best be considered & integrated into project development...

- Within the design/environmental phases of building new roads or reconstructing existing ones?
- During the lifecycle maintenance/inspection process?

Are there constraints against incorporating H&H modeling that accounts for future land use & imperviousness assumptions?

Can the TSI Study partners access & determine linkages with critical assets from the Statewide Transportation Resiliency Plan (STRP) & local hazard mitigation plans?

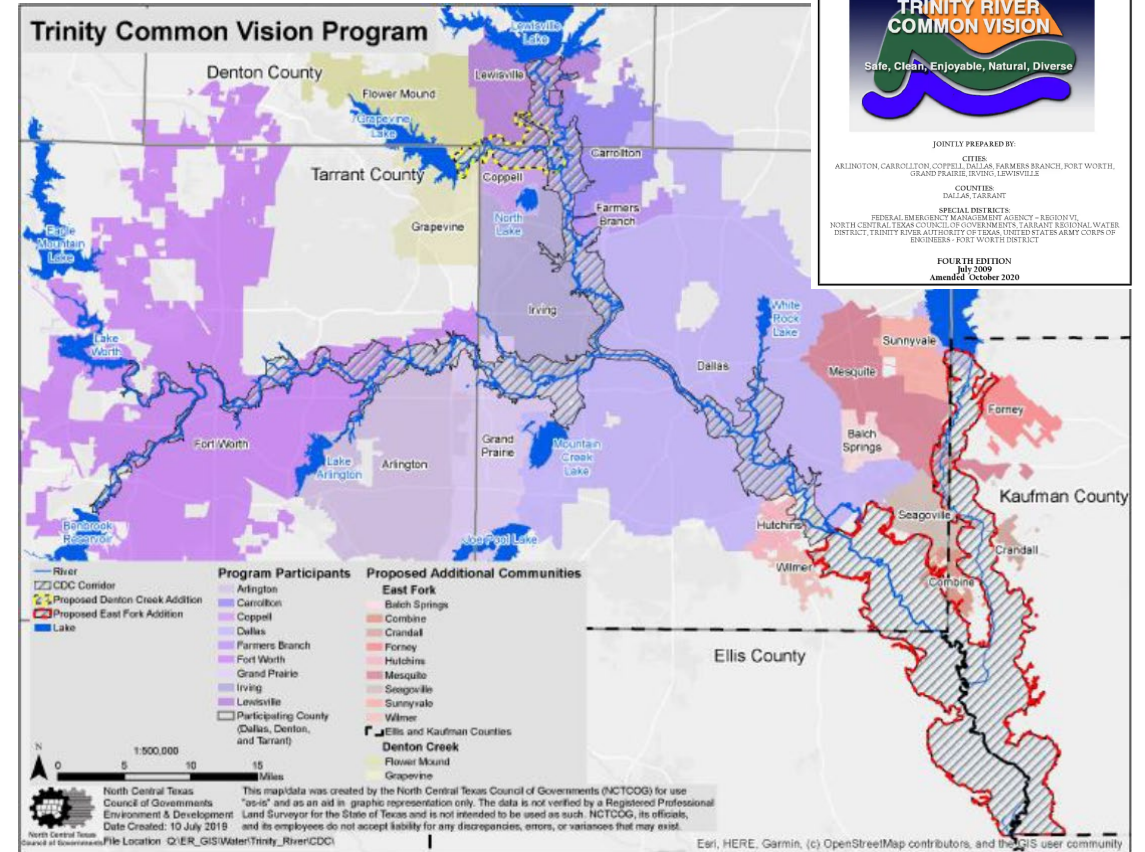
How effective are local development codes, floodplain ordinances, & other instruments in facilitating integration of higher standards?

Stakeholder questions/concerns? – PLEASE PROVIDE FEEDBACK

Considering Regional Governance/Regulations

Trinity River COMMON VISION – Corridor Development Certificate (CDC) Program

- **Communities & counties along Trinity River:**
 - Consistent & transparent development criteria
 - Allows development, but not adverse impacts
 - Preserves storage & water surface elevations
- **Models are dynamic living models:**
 - Check-in, check-out
 - Fee structure
- **3rd party reviews (USACE)**
- **Could duplicate program within the TSI region**
- **Drive future collaboration across communities, developers, & infrastructure providers**



CORRIDOR DEVELOPMENT CERTIFICATE MANUAL

TRINITY RIVER CORRIDOR – NORTH CENTRAL TEXAS

TRINITY RIVER COMMON VISION
Safe, Clean, Enjoyable, Natural, Diverse

JOINTLY PREPARED BY:

CITIES: ARLINGTON, CARROLLTON, COPPELL, DALLAS, FARMERS BRANCH, FORT WORTH, GRAND PRAIRIE, IRVING, LEWISVILLE

COUNTIES: DALLAS, TARRANT

SPECIAL DISTRICTS: FEDERAL INFERRMENT MANAGEMENT AGENCY - REGION VI, NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS, TARRANT REGIONAL WATER DISTRICT, TRINITY RIVER AUTHORITY OF TEXAS, TARRANT COUNTY WATER DISTRICT, FORT WORTH DISTRICT

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