INTEGRATED TRANSPORTATION AND STORMWATER MANAGEMENT PROJECT

PARTNER DISCUSSION

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March 18, 2019
EXISTING NORTH CENTRAL TEXAS WATERSHED MANAGEMENT TOOL

iSWM Resources
- Technical Manual
- Criteria Manual

iSWM Criteria Manual for Site Development and Construction
EXISTING TRINITY RIVER CORRIDOR PROGRAM

May – June 2015 Flooding

2.3 Million ac-ft stored in the 6 projects

(Source: Jerry Cotter, Chief Water Resources, USACE Ft. Worth District, 11/18)
Flooding continues to be a challenge in North Texas

**Threats:** Increased flooding and safety risks; cost of infrastructure, stormwater, environmental restoration

**Solution:** Innovative partnerships and integrated infrastructure
Perspective: 5 year tally of flood fatalities

Texas far outpaces all of the states in flood related fatalities

(Source: Gregory Waller, Service Coordination Hydrologist, NWS – West Gulf River Forecast Center, http://www.nws.noaa.gov/om/hazstats.shtml, 11/18 TFMA)
Heavy Rains Lead to Sewage Spills in Multiple North Texas Cities

Published Oct 16, 2018 at 9:10 AM – NBC5 DFW


119 million gallons of sewage overflow in DFW, by the numbers

A closer look at sewage overflows here and across Texas.

In 2018, more than 119 million gallons of sewage overflowed onto the streets and lakes of Dallas-Fort Worth. That’s 119,090,756 gallons, to be exact, over more than 1,700 overflow incidents.

Parts of North Texas see flooding overnight

CARROLLTON, Texas - Heavy rain flooded parts of Collin, Dallas, Denton and Tarrant counties Wednesday night.

There was a flash flood warning for those parts of the Metroplex until just after midnight. Those living in low-lying areas were encouraged to move to higher ground.

Several cars got stuck in high water in the Dallas suburb of Carrollton. Firefighters were called out to rescue people in the heavily-flooded intersections near North Denton Drive and Jeanette Way as well as Countryside and North Josey Lane.

The service road on Central Expressway in Allen in Collin County was closed by flooding south of Bethany Drive. High water and debris covered the road. Highway officials had to set up barricades to keep people away.

Rain flooded an apartment complex in suburban Coppell. Viewers submitted pictures of standing water in the parking lot of the Wellington Place Apartments on MacArthur Boulevard near Sandy Lake Road. The complex has flooded before, including twice in 2015.

Homes in a new development just off Highway 380 in Princeton, east of McKinney, also flooded. Video posted on Facebook showed one family sweeping fast-moving water out of their house. A creek behind the house filled with water and flooded at least five homes.

“Look at this. It’s like a river right here in my brother’s side of the house. The landscaping is ruined. The sprinkler system is going to have to be redone. They have brand new furniture in this house. It’s ruined,” said Monica Moncrief, whose brother’s home flooded.

The family just moved into the house in November. They’re upset with the builder and the city of Princeton.

North Texas neighborhoods are flooding more than ever before. Why?

BY BILL HANNA AND LUKE RANKER

OCTOBER 12, 2018 06:00 AM, UPDATED OCTOBER 12, 2018 04:07 PM

## Regionally Recommended Standards in Watershed Management

### For New Development Within County Regulated Areas

<table>
<thead>
<tr>
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<th>Standard</th>
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<tbody>
<tr>
<td>1</td>
<td>Design infrastructure to fully developed conditions with approved land-use maps if data is available</td>
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<td>2</td>
<td>Begin protection at the most upstream end of the watershed above Federal Emergency Management Agency Limit of Detail Study</td>
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<td>3</td>
<td>Maintain unfilled valley storage areas</td>
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<td>4</td>
<td>Protect against and reduce erosive velocities</td>
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<td>5</td>
<td>Match pre-developed site runoffs</td>
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<td>6</td>
<td>Verify/require adequate downstream conveyance</td>
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<td>7</td>
<td>Require freeboard from fully developed (if data is available) and changing watershed conditions</td>
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<tr>
<td>8</td>
<td>Define written operation and maintenance responsibilities</td>
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<td>9</td>
<td>Size conveyance of street and storm systems adequately to safely convey traffic</td>
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<tr>
<td>10</td>
<td>Create stream buffers and preserve open space; limit clearing and grading</td>
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<tr>
<td>11</td>
<td>Consider regional (on or off stream) detention incentives</td>
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<tr>
<td>12</td>
<td>Implement Conservation and/or Cluster Development incentives</td>
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<tr>
<td>13</td>
<td>Encouraging low impact development techniques and/or green infrastructure</td>
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*Developed by the North Central Texas Countywide Watershed Management Roundtable, March 14, 2017*
EXISTING CHALLENGES WITH FLOOD REDUCTION EFFORTS

Local Government Flood Reduction Challenges

- Limited Resources
- Limited Staff Expertise
- Competing Priorities
- Piecemeal Modeling and Reviews

Local Government Flood Reduction Needed Resources

- Development of Tools that Define Waterways
- Stormwater Features (e.g. detention storage)

Benefits to Local Government

- Development Community Avoids Costs
- Communities Don’t Loose Revenues
State Recommendation:
The January 2019 Interim Report to the 86th Texas Legislature from the House Committee on County Affairs contains a recommendation that the Texas Legislature should explore a regional approach to floodplain regulation, allowing counties that share watersheds to adopt similar regulations, as allowed by the Texas State Water Code.

Extreme Weather and Weather Anomalies
Hurricane Harvey Storm

- Rainfall totals up to 60”
- Approaching or exceeding maximum rainfall possible
- 23,000 + mi² (CT, RI, DE, NJ)
- One of the largest storms in continental US history
- Blocking factors
- OFF THE CHARTS!
Growing trend toward extreme weather and weather anomalies
Brenham Storm, May 26-27, 2016 (Not Tropical)
Storms Exceeding Infrastructure and NFIP Standards

- Regional observed storms
  - USACE extreme storm database
- 24-hour rainfall for 10 mi²
- Plotted in descending order
- Grey band is current design standard (100-year) for all of TX
- Blue X’s points are 2010-2017 storms that exceed 100-year
- 18 events exceeded the 100-yr design standard
Storms Exceeding Infrastructure and NFIP Standards
Uncertainty

- Many techniques to estimate flood and rainfall frequencies rely on observations.
- Need record length 3-4 times estimated return interval.
- Short Observation Periods - On average TX has 50 years of stream record and 70 years of precipitation records.
- Significant non-stationarity observed in flood flow and rainfall frequency estimates.
USACE Dallas-Fort Worth - Flood Reduction and Water Supply System

- Devastating floods, 1908, 1942, 1949
- 6 multi-purpose reservoirs (1952-1987)
- 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**

Where is the 7th reservoir?
Tropical Storm Hermine – Arlington, Texas September 2010

- Extreme drought
- 2010 Tropical Storm Hermine
- Extensive flooding
- No fatalities
- Buy-outs for 150 residences
- $17+ M
What Flooding Disasters Do

- Destroy property (homes, automobiles, belongings)
- Take lives
- Destroy Infrastructure, transportation, waste water, water, human services
- Disconnect people - friends, schools, work, and familiar places
- Ruin family photos and heirlooms
- Alter relationships
- Permanent harm to culture and way of life
- Impact the most socially and financially marginal people
- Long-term consequences to the health (mental) and collective well-being of those effected
- Loss of pets
- Destroy natural ecosystems that are integral parts of communities
- Disrupt populations in ways that are difficult to articulate, let alone assign monetary worth

I'm safe
I thought I was safe
Matrix of Flood Risk Related Products

Meteorology
- How much rain

Watershed Hydrology
- How much runoff

River Hydraulics
- How deep will the water get

Consequences
- Critical infrastructure
- Homes, Businesses, Hospitals

Emergency Response/Recovery
- Observed & Future Rainfall
- Real-time Runoff
- Real-time Inundations
- Real-time Impacts

Emergency Preparedness
- Historical Events W/in Region
- What-if Runoff Scenarios
- What-if Inundations
- Preparedness Impacts

Regulatory and Infrastructure Planning Products
- Design Standard “100yr Rainfall”
- 100-year Runoff
- 100-year Inundations
- Planning Infrastructure

Stormwater Infrastructure
- Design Storms
- Extreme Storm Runoff
- Extents
- Planning SW Infrastructure
Flood Risk Products and Uses

- Numerical models
  - Existing conditions
  - Future land use conditions
  - Climate change
- Regulatory
  - Update technical basis for NFIP mapping (100-yr flood)
- Stormwater infrastructure planning
- Emergency preparedness
  - What-if scenarios
- Emergency response
  - Basis for real-time inundation mapping
PROPOSAL FOR INTEGRATED PLANNING OF REGIONAL TRANSPORTATION AND STORMWATER MANAGEMENT TOGETHER AS A SYSTEM OF IMPROVEMENTS: PREVENTION VS. RESPONSE

POTENTIAL PARTNERS:
United States Federal Agencies
State Agencies
Regional Planning Agencies
Water Districts
Local Governments

Michael Morris, P.E.
Director of Transportation
North Central Texas Council of Governments
2017 “Natural Hazard Mitigation Saves” report by: National Institute of Building Sciences Institute, Multi-hazard Mitigation Council (MMC), 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

**HOW:** Integrate regional transportation planning, regional stormwater management planning, and environmental planning to develop consolidated, adaptive infrastructure.
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.
WHERE: Proposed Study Area
WHY: Comprehensive, collaborative planning will dissolve silos and improve delivery of consolidated, adaptive infrastructure before expected population growth makes addressing these issues more difficult and costly.
PREVENTION VS. RESPONSE

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
PREVENTION VS. RESPONSE CON’T.

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
CONTRIBUTIONS:
Partners are critical to making this possible

US Congress | US Housing and Urban Development (HUD) | US Army Corps of Engineers (USACE) | Federal Emergency Management Agency (FEMA) | Texas Department of Transportation (TxDOT) | Texas Water Development Board (TWDB) | Regional Transportation Council (RTC) |
---|---|---|---|---|---|---|
$ | $ | $ | $ | $ | $ | $ |

Project Funding Goal: $10 Million

*Project Has Begun With Getting the Money*
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