**CRS Users Group/Elected Officials Floodplain Seminar & CHARM Policy Workshop**

**July 18, 2019**

Earl Anthony Room, International Bowling Museum & Hall of Fame
621 Six Flags Drive, Arlington, TX 76011

**AGENDA**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00a-9:10a</td>
<td>Welcome and Introductions</td>
<td>Mia Brown, CFM NCTCOG</td>
</tr>
<tr>
<td>9:10a-9:40a</td>
<td>The Future of Flood Planning in Texas</td>
<td>Wes Birdwell, P.E. Halff Associates</td>
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<tr>
<td>9:40a-10:10a</td>
<td>Base Level Engineering (BLE)</td>
<td>Jarred Overbey, PE, CFM Halff Associates</td>
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<td>10:10a-10:40a</td>
<td>Floodplain Benchmarking</td>
<td>Ben Pylant, PE, CFM Halff Associates</td>
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<td>10:40a-10:50a</td>
<td>Break</td>
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<td>10:50a-11:10a</td>
<td>Community Health and Resource Management (CHARM) Tool</td>
<td>Steven Mikulencak, AICP Texas A&amp;M AgriLife Extension Service</td>
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<td>11:10a-12:20p</td>
<td>CHARM Demonstration</td>
<td>Steven Mikulencak, AICP Timothy Little Md Yousuf Reja Texas A&amp;M AgriLife Extension Service</td>
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<tr>
<td>12:20p-1:30p</td>
<td>Meeting Wrap-Up and Networking Lunch</td>
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If you have any questions regarding the meeting or agenda items, please contact
Mia Brown: (817) 695-9227; MBBrown@nctcog.org

If you plan to attend this public meeting and you have a disability that requires special arrangements at the meeting, please contact Barbara Bradford by phone at (817) 695-9231 or by email at BBradford@nctcog.org 72 hours in advance of the meeting. Reasonable accommodations will be made to assist your needs.
NCTCOG CRS USERS GROUP/ELECTED OFFICIALS

LEGISLATIVE UPDATE

ARLINGTON TX

July 18, 2019

Wes Birdwell PE, Halff Associates Inc
Texas is geographically located to be subject to big floods:
- Anywhere
- Anytime
2010 – 2018 U.S. FLOOD FATALITIES
1980 – 2017 BILLION DOLLAR FLOODING DISASTERS BY STATE (CPI ADJUSTED)
1996 - 2016 FLOODING IN TEXAS

Costs of Flooding
The National Flood Insurance Program (NFIP) provides flood insurance to homeowners, renters, and business owners. FEMA’s individuals and households program (IHP) provides financial assistance and direct services to eligible individuals and households who have un insured or underinsured necessary expenses and serious needs. See differences in NFIP claims paid to individuals from 1996-2016 and funding from IHP for flood-related damages from 2006-2016 for your state.

Map Legend
- 1 - 10 Events
- 10 - 20 Events
- 20 - 35 Events
- 35+ Events

Source: www.fema.gov/data-visualization-floods-data-visualization
TEXAS PROJECTED POPULATION

Figure 5.1 - Projected population in Texas
Figure 5.1 - Projected population in Texas

Drought --- Flood --- Drought --- Flood --- Drought --- Flood

$  $  $
TEXAS FLOOD RISK DATA IS OUTDATED:

- FEMA FIRM’s are used as the best available flood risk information in most communities.
- Much of the FEMA information is dated.
- Currently difficult to plan and mitigate.
- We need to start with current information, updated maps.
NOT “ONE SIZE FITS ALL”

A single approach will not work for all of Texas

- Riverine Flood
- Coastal Flood
- Urban Flood
- Residual Risk
  - Dams
  - Levees
INSUFFICIENT FLOOD RISK INFORMATION

- Flood Risk?
  - Damages $$
  - Insurance $$
LIGHT DETECTION AND RANGING (LIDAR)

- Remote sensing system that uses laser light to measure distances
LIDAR STATUS: 2019

Source: TNRIS, 2019
LIDAR STATUS: 2020

Source: TNRIS, 2019
CHANGING RAINFALL DATA FOR TEXAS

1961 TP-40
- Weather Bureau Technical Paper 40
  - Rainfall up to 1958

1998 USGS
- Depth-Duration Frequency of Precipitation for Texas
  - Rainfall up to 1994

2018 Atlas 14
- NOAA Atlas 14, Volume 11 Precipitation Frequency Atlas of the United States, Texas
  - Rainfall up to 2017

24-hour, 100-year Precipitation in Inches
ATLAS 14 RAINFALL

- Released September 27, 2018
- Atlas 14 indicates that the 1% (100-year) annual chance event may be greater than what we previously considered.
- The greatest rainfall changes occur in central Texas and along the Texas coast.
ATLAS 14 RAINFALL

- Atlas 14 compared to TP-40
  - Adds almost 60 years of data
  - Many additional gages
HELP IS ON THE WAY!

- Informed by the TWDB State Flood Assessment
- Tremendous Local Support
- 86th Legislation passed 3 Bills
  - SB 7 (Infrastructure Funding)
  - HJR 4 (Constitution Amend)
  - SB 8 (State Flood Plan)
TWDB STATE FLOOD ASSESSMENT

Charts a path to flood resilience:

1. Mapping
2. Planning
3. Mitigation

SENATE BILL (SB) 7

- Infrastructure funding for planning, design, and construction
- Recovery and Resiliency
- Structural and non-structural flood projects
- Will be managed by the TWDB
- Loans, low interest (down to “zero”), and grants
- TWDB will develop rules for this fund
- Encourages federal involvement
- Looks for water supply
- Complicated, ask a banker
Amend the Constitution to set up infrastructure fund
Public vote this fall
Get out the vote
SENATE BILL (SB) 8

- Requires TWDB to develop rules by Sep 2021
- Requires regional watershed based plans be developed for each river basin by cities, counties, river authorities, special districts, utilities, etc. by Sep 2023
- Requires development of a statewide flood plan by Sep 2024
- To be updated every subsequent five years
Designate flood planning regions corresponding to each river basin

Provide financial and technical assistance to flood planning groups

Designate representatives from each flood planning region

Regional flood planning groups can then add additional members

Evaluate condition and adequacy of existing flood infrastructure

Ranked statewide list of ongoing and proposed flood control and mitigation projects and strategies
STATEWIDE FLOOD PLAN FUNDING

- **Requested State Funding**
  - FY 2020-2021: $47 Million
  - FY 2022-2023: $87 Million
  - FY 2024-2025: $43 Million
Watershed Flood Plans

- Local flood plans roll up to a...
- Regional (watershed) flood plans roll up to a ...
- Statewide flood plan!
IMPROVED FLOOD RISK INFORMATION

- **Hydrology**
  - How much water enters our systems
  - When does the water enter the systems
  - Integrate new rainfall
  - Combined impacts

- **Hydraulics**
  - How high does the water get
  - How fast is it moving
  - What is the impact
SIMILARITY TO STATE WATER PLANNING?

- LEGISLATURE
- TWDB
- REGIONAL LEAD (political subdivision)
- REGIONAL PLANNING GROUP
- TECHNICAL CONSULTANT
- REGIONAL STAKEHOLDERS

Contracts
STATE FLOOD PLAN OBJECTIVES (SB 8)

- Initial 5-years, then 5-year cycle

- **IDENTIFY FLOOD PRONE AREAS**

- **SCIENTIFIC DATA AND UPDATED MAPPING**

- **REGIONAL WATERSHED FLOOD PLAN**

- **EVALUATE EXISTING AND PLANNED FLOOD INFRASTRUCTURE**

- **SUBMIT PLAN FOR TWDB REVIEW** modify as needed

- **OTHER BENEFITS**
  - Emergency need?
  - Federal interest?
  - Water supply?

- **PUBLIC MEETINGS**
  - collect and use local data
Dear friends,

As you may already know, Governor Abbott recently signed legislation creating new flood financing programs and a state flood planning process to be administered by the Texas Water Development Board (TWDB). These programs will greatly expand the State’s efforts to plan for and mitigate flood as well as provide funding for drainage and flood projects.

For more information on the programs, please view our newly released frequently asked questions.

To ensure we create programs that meet the needs of our diverse state, we will be asking for comments from the public and as many stakeholders as possible. Later this summer we will be holding meetings around the state and will have a process in place to receive comments as we develop our administrative rules for the programs.

To receive all our information on that process, please sign up for our email updates. The link will take you to a sign-up page that allows you to choose various topics for which you would like to receive our emails. Be sure to check the box for TWDB Flood Information.

For more information, please email flood@twdb.texas.gov or call 512-463-8725.

We hope you will join us in this critical effort.

Sincerely,
Jeff Walker
Executive Administrator
Texas Water Development Board
NCTCOG CRS USERS GROUP/ELECTED OFFICIALS

BASE LEVEL ENGINEERING (BLE)
OVERVIEW & BENEFITS

JULY 18, 2019
PRESENTATION TOPICS

1. Description of BLE
2. BLE Process and Development
3. Purpose
4. Deployment
5. Benefits and Uses
6. BFE Viewer Tutorial
“BLE is an automated riverine hydrologic and hydraulic modeling approach, usually generated for large scale watersheds (HUC 8) with high-resolution topography to create and determine flood hazard data.

Engineering models are created during a Base Level Engineering assessment, producing information that meets the mapping Standards for Flood Risk Projects (FEMA Policy Memo FP 204-078-1) to produce Zone A (1-percent-annual-chance flood) information. BLE data is intended to represent the base level of investment needed for all flood study efforts FEMA will undertake.”
HYDROLOGY (1D)

- Utilizes 1996 and 2009 Regional Regression Equations to calculate peak discharges
- Results are adjusted based on existing stream gage and dam storage data if available
- Drainage areas are autogenerated and peak discharges calculated for the 10-, 25-, 50-, 100-, and 500-year storm events

![Image showing hydrology regions of Texas](image-url)
HYDRAULIC MODELING (1D)

- For the North Texas region automated hydraulic building tools are used to generate HEC-RAS models based on high-resolution topographic data and incorporate the regional regression peak discharges.
- Models do not contain infrastructure (dams, levees, culverts, bridges, diversions, etc.) or survey data.
- Mapping and water surface elevation grids are autogenerated for the 10-, 100-, 500-year storm events.
NON-REGULATORY PRODUCTS

- Depth and Analysis Grids for the 100- and 500-year storm events
- Areas of Expanded Flood Risk
- Flood Risk Assessment – Hazus
BLE OVERVIEW | PURPOSE

GOALS OF BLE

- Quickly generate model backed mapping with base flood information at a HUC-8 or countywide scale
- Identify flood risk based on current topographic conditions
- Provide quality data for local planning and decision making
- Aid in Discovery process
- Provide base models for future conversion to detailed studies (Zone AE with and w/o floodways)
- Increase public awareness
BLE OVERVIEW | PURPOSE

BLE DOES NOT

- Replace existing limited or detailed studies
- Account for effects of routing storage within a stream or detention from dams
- Include hydraulic impacts of creek/stream crossings such as bridges and culverts
BLE OVERVIEW | DEPLOYMENT

**PHASE 0**
- Investment
- LiDAR Acquisition
- Base Level Engineering

**PHASE 1**
- Discovery
- Watershed Needs Coordination

**PHASE 2**
- Risk ID & Assessment
- Engineering Studies

**PHASE 3**
- Regulatory Product Update
- FEMA Region 6
- Map Maintenance
- Continued Community Update of Models and Maps
BLE OVERVIEW | DEPLOYMENT

BLE - FOCUS AREAS

UNKNOWN & UNVERIFIED MILES

UNMODERNIZED COMMUNITIES

UNMAPPED MILES

Source: FEMA R6 BLE for Community’s Local Officials And Decision Makers
NORTH CENTRAL TEXAS GROWTH 1950-2040
BLE OVERVIEW | BENEFITS

COMMUNITY OFFICIALS AND DECISION MAKERS

COMMUNICATION & PERMITTING

MITIGATION PLANNING

INSURANCE RATING

LOMAS

Source: FEMA R6 BLE for Community's Local Officials And Decision Makers
COMMUNICATION AND PERMITTING

- Communication of Updated Risk
  - Community Staff
  - Stakeholders (Public & Industry)
- Permitting
  - Identify updated floodplain limits
  - Provide starting model to meet local criteria
BLE OVERVIEW | BENEFITS

MITIGATION PLANNING

- Prioritize Capital Improvement Projects
- Update models to detailed studies
- Utilize modeling to scale projects
- Planning for future development
- Identify populations at risk
- Identify possible voluntary buyout properties
**INSURANCE RATING AND LOMAS**

- Generate BFE’s from FEMA’s BFE Viewer
- Determine 100-year WSEL at a property
- Supply BFE back up data to be submitted with LOMAs
https://webapps.usgs.gov/infrm/estBFE/
Estimated Base Flood Elevation Viewer

Welcome to the

Base Level Engineering assessments are produced using high resolution ground data to create technically creditable flood hazard information that may be used to expand and modernize FEMA's current flood hazard inventory.

I Want to
Download Datasets & Models

Download the Base Level Engineering data presented in the viewer.

- Click the DATA LAYERS button and add the DOWNLOADABLE DATA layer.
- Click shaded areas in the map to open a dialog for choosing datasets to download.

View Base Level Engineering Data

Access all available Base Level Engineering data without GIS software.

- Click the DATA LAYERS button to add or remove map layers.
- Click the LEGEND tab to view an explanation of all data shown.
- Click the MAP VIEW button to open or close a second viewing window for side-by-side comparisons.

Property Look Up

Where data is available, produce a property-specific report with estimated base flood information.

- Click the REPORT tab to create a flood risk report for a specific location.

Click a topic to get started!
https://webapps.usgs.gov/infrm/estBFE/
https://webapps.usgs.gov/infrm/estBFE/
BLE OVERVIEW | BFE VIEWER

https://webapps.usgs.gov/infrm/estBFE/
https://webapps.usgs.gov/infrm/estBFE/

Enter address or city, stream, watershed

Click my location to enable GPS from mobile device

Once Zoomed, use Map Click to place the locator and run a report
https://webapps.usgs.gov/infrm/estBFE/
https://webapps.usgs.gov/infrm/estBFE/
https://webapps.usgs.gov/infrm/estBFE/
https://webapps.usgs.gov/infrm/estBFE/
**BLE OVERVIEW | BFE VIEWER**

**https://webapps.usgs.gov/infrm/estBFE/**

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<th>File Size</th>
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<th>Notes</th>
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**HALFF**

North Central Texas Council of Governments
QUESTIONS?
THE CHALLENGE

■ Approximately 370k flood insurance claims in Texas since 1978
■ Almost $16 billion paid flood insurance claims in Texas since 1978
■ Texas ranks No. 2 behind Louisiana for most flood claims in the nation
■ Over 33k repetitive loss properties in Texas (2+ claims)
THE CHALLENGE

- Over 5,700 severe repetitive loss properties in Texas (4+ claims – $5,000 each)
- Since 1980, 70 major hurricanes
- Hurricane Harvey (2017) caused $125 billion in damages and ranks as the No. 2 most costly hurricane to hit U.S. mainland since 1900
- Texas 2019 population is 29.1 million and increasing more than 140 persons/day
Texas is still recovering from Hurricane Harvey (2017). In January 2019, the TWDB released the State Flood Assessment Report to the 86th Texas Legislature summarizing:

- Texas floods
- Flood risk
- Floodplain management and mapping
- Planning for floods
- Flood mitigation in Texas
- Blueprint of recommendations to make Texas more resilient
Updated Texas rainfall frequency values

In Austin, 100-year rainfall amounts for 24 hours increased as much as three inches up to 13 inches.

100-year estimates around Houston increased from 13 inches to 18 inches and values previously classified as 100-year events are now similar to 25-year events.
Flood damages frequently occur outside of FEMA floodplains
  — Outdated maps
  — Hydrologic changes
  — Local/urban flooding

Minimum NFIP standards should not be the only consideration
LOCAL / URBAN FLOODING

RECOGNIZED NATIONAL ISSUE

Significant flood losses and repetitive loss properties across the U.S. in unmapped areas.

- ASFPM Stormwater Committee
- THE 6TH GILBERT F. WHITE NATIONAL FLOOD POLICY FORUM - Increasing Our Resiliency to Urban Flooding - March 2019
LOCAL / URBAN FLOODING

NATIONAL ACADEMY OF SCIENCE

FRAMING THE CHALLENGE OF URBAN FLOODING IN THE UNITED STATES – MARCH 2019
<table>
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<tr>
<th>Year</th>
<th>Population (million)</th>
<th>Growth rate</th>
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<tr>
<td>2011</td>
<td>25.65</td>
<td>n/a</td>
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<tr>
<td>2012</td>
<td>26.07</td>
<td>1.64%</td>
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<tr>
<td>2013</td>
<td>26.47</td>
<td>1.53%</td>
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<tr>
<td>2014</td>
<td>26.94</td>
<td>1.78%</td>
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<tr>
<td>2015</td>
<td>27.43</td>
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<td>2016</td>
<td>27.86</td>
<td>1.57%</td>
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<tr>
<td>2017</td>
<td>28.45</td>
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<tr>
<td>2018</td>
<td>28.95</td>
<td>1.72%</td>
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<tr>
<td>2019</td>
<td>29.1</td>
<td>1.80%</td>
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+140 persons/day
ENOUGH ABOUT THE CHALLENGE. WHAT CAN WE DO ABOUT IT?

- The solution is sitting in this room
- Community representatives can initiate grass roots, community-initiated solutions to flood problems in Texas
TFMA established a Certified Floodplain Manager (CFM) Program in 1996, three years before the National CFM Program was established by ASFPM.

TFMA is an accredited chapter of ASFPM and manages the National CFM Program in Texas.

TFMA has trained and certified more than 3,000 CFM’s in Texas.
In 1998, TFMA prepared the first Texas Quick Guide as a layman’s floodplain management handbook.

In 2015, TWDB updated the Texas Quick Guide and posted it on the TWDB website.

FEMA, TWDB AND TFMA STATEWIDE FLOODPLAIN MANAGEMENT TRAINING EFFORT

- FEMA’s four-day course, “Managing Floodplain Development through the NFIP”
- TWDB one-day course, Floodplain Management 101
- TWDB online webinars
- TFMA’s one-day course, “Federal, State and NFIP Programs”
- TFMA’s three-day Floodplain Management Course (2019)
- TFMA’s “Ethics in Floodplain Management” shared with the Texas Board of Professional Engineers
- TFMA’s short course, “FEMA’s Elevation Certificate”, approved by the Texas Board of Professional Land Surveying
- TFMA conducts two annual conferences in Texas, which average more than 1,200 attendees
TFMA HIGHER STANDARDS AND WHITE PAPERS


- TFMA Higher Standards Guide developed in 2015 and updated in 2018

- In 1999, TFMA submitted a white paper to the Governor’s Office, *How to Improve Floodplain Management in Texas*. Wes Birdwell updated the white paper in 2018
Dallas, Austin and several others regulate development to floodway (no rise) standards.

Houston area communities follow the higher standards outlined in the Houston-Galveston Area Council Floodplain Management Handbook.

Harris County and City of Houston adopted the most stringent flood regulations in the nation.

NCTCOG cities and counties regulate development in the Trinity River corridor following Common Vision standards to the 500-year level.

NCTCOG communities have adopted higher stormwater standards, including No Adverse Impacts.
Other States have adopted higher standards
- CRS Participation (Florida)
- Corridor Preservation and Permitting (Vermont)
- State-mandated freeboard (New York, Oregon, Montana, and others)
- Floodway encroachment requirement less than one foot (New York, Oregon, Montana, and others)

There are no higher floodplain management standards mandated by state law in Texas

TFMA’s annual Higher Standards Survey documents 334 out of 1255 NFIP communities in Texas have adopted and enforce higher FPM standards
334 (26 percent) Texas communities submitted surveys. Of those respondents:

- 288 (86 percent) require Freeboard for new development
- 141 (42 percent) require Freeboard based on fully developed watersheds
- 180 (54 percent) require detention or mitigation of downstream impacts
- 249 (75 percent) require an engineering study to define the floodway and BFE’s
HARRIS COUNTY’S JAN. 1, 2018 FLOODPLAIN REGULATIONS AMONG “BEST FLOODPLAIN REGULATIONS IN THE NATION”

- **Zones A and V** – Lowest floor elevated more than two feet above 0.2 percent (500-year) flood

- **Zone X (shaded)** – In cases where the structure is located geographically in the 0.2 percent or 500-year flood plain and the ground is lower than the 0.2 percent or 500-year level but higher than the one percent or 100-year level, the finished floor elevation shall be elevated at or above the 0.2 percent or 500-year level.

- **Zone X (unshaded)** – The finished floor shall be a minimum of 12 inches above the highest adjacent natural grade when measured 10 feet from the edge of the slab, or 12 inches above the crown of the adjacent street which ever results in the highest elevation (whichever is higher).

- Critical facilities must be elevated more than three feet above 0.2% (500-year) flood
NCTCOG iSWM

Stormwater Criteria Community Inventory

MAY 23, 2019
WHAT IS THIS INVENTORY?

• Ordinances and Drainage Criteria Manuals of fifty-three (53) communities were reviewed and compared to eight (8) iSWM Design Criteria:
  - Fully-developed land use conditions
  - Detention structure discharge
  - Streambank protection
  - Flood mitigation/downstream assessments
  - Operations and maintenance
  - Spread
  - Finished floor elevations
  - Water quality protection

• Data was also collected from an NCTCOG email survey completed in December 2018 asking if use of fully-developed land use conditions was required in drainage criteria.

• The iSWM criteria review was based off of the NCTCOG Tiered Measurement Form: http://iswm.nctcog.org/Documents/iSWM_Implementation_Tiered_Measurement.pdf

• Upon review, each criteria reviewed for each community was placed in one of the three categories:
  - Follows iSWM criteria
  - Partially follows iSWM criteria
  - No coordinating criteria found

PLEASE NOTE

• This will always be a working inventory, there may have been a separate document that was not initially reviewed and these criteria and ordinances are ever changing. If any changes or updates need to be made, please contact the NCTCOG Department of Environment & Development.
iSWM Criteria
Community Inventory
Fully-developed conditions
land use criteria

LEGEND
Silver Certified
Follows iSWM criteria
Partially follows iSWM criteria
No coordinating criteria found
Not reviewed
iSWM Criteria
Community Inventory
Finished floor elevation criteria

LEGEND
- Silver Certified
- Follows iSWM criteria
- Partially follows iSWM criteria
- No coordinating criteria found
- Not reviewed
Flood mitigation downstream assessment criteria

LEGEND
- Silver Certified
- Follows iSWM criteria
- Partially follows iSWM criteria
- No coordinating criteria found
- Not reviewed
iSWM Criteria
Community Inventory
Detention structure
discharge criteria

LEGEND
Silver Certified
Follows iSWM criteria
Partially follows iSWM criteria
No coordinating criteria found
Not reviewed
iSWM Criteria
Community Inventory
Spread criteria

LEGEND
- Silver Certified
- Follows iSWM criteria
- Partially follows iSWM criteria
- No coordinating criteria found
- Not reviewed
iSWM Criteria
Community Inventory
Streambank protection
downstream assessment criteria

LEGEND
Silver Certified
Follows iSWM criteria
Partially follows iSWM criteria
No coordinating criteria found
Not reviewed
iSWM Criteria
Community Inventory
Operation and maintenance criteria
HOW TO SOLVE THE PROBLEM

■ Working together, Texas can reduce flood risks, reduce loss of life from flooding and minimize flood damages, but it will take a joint effort from:

■ State agencies, such as TWDB, TDEM, TxDOT, TGLO and TDI

■ Federal agencies, such as FEMA, USACE, NOAA/NWS, USGS, NRCS and HUD;

■ Associations such as TFMA; Building Professional Institute, Bayou Preservation, Texas Water Conservation Association and others

■ River authorities and water districts

■ Special districts, such as HCFCD

■ Regional planning commissions, such as NCTCOG and HGAC

■ Taking advantage of mitigation grants administered by FEMA, TWDB, TxDEM and TxDGLO
Benchmarking and Higher Standards

NCTCOG CRS Users Group / Elected Officials
Arlington, Texas

July 18, 2019

PRESENTERS:
Ben Pylant, PE, CFM
John P. Ivey, PE, CFM
“The land grant university system is being built on behalf of the people, who have invested in these public universities their hopes, their support, and their confidence.”

Abraham Lincoln, upon signing the Morrill Act, July 2, 1862

Serving you today

Trusted Research
Local Educators...
Extending Knowledge
Providing Solutions
The planning literature is clear:

The best laid plans...

... involve extensive citizen involvement and participation
“The man who wears the shoe knows best that it pinches and where it pinches, even if the expert shoemaker is the best judge of how the trouble is to be remedied.

John Dewey
The Public and Its Problems
Community Health And Resource Management
Critical Facilities Exercise

FEMA Resiliency Workshop
Rockport TX, March 2016
Go/No-Go Exercise
FEMA Resiliency Workshop
Jackson Co, June 2016
Future Land Use Exercise

FEMA Resiliency Workshop
Galveston, September 2016
Buy Out Exercise
FEMA Resiliency Workshop
Hays Co, August 2017
Discovery Workshops
LAN Consulting & HCFCD Cedar, Luce & Jackson Bayous
November 2018
Foster & Facilitate Dialogue
Asking Better Questions
Participant Goals

✓ Facilitate dialogue about values, practical knowledge, and vision

✓ Allow participants to directly participate in scenario analysis and view planning and mitigation impacts in real time

✓ Engage in collaborative problem solving and catalyze action

✓ Advance the conversation about effective planning and mitigation practices
“This has changed my thinking...”
"Ourselves"
“We are talking”
2.5-Acre Grid
Geographic Information System (GIS or Computer Mapping)
CHARM by the numbers

- Up to 10 Participants per tables
- 30+ Map Layers
- 60 Live Updates
- 14 Development Styles
- 20 Analytic Layouts
TCWP offers technical and facilitative support for Texas communities. Please reach out to us to discuss options.