



A4-REDUCING FLOOD RISK UNCERTAINTY USING 2D BLE DATA: MINERAL WELLS COMMUNITY FLOOD ASSESSMENT (CFA)

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Water Resources
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"Cornerstone of the Southwest"





OVERVIEW


What? USACE collaboratively leveraged & enhanced available hazard information to help the City of Mineral Wells better understand their flood risk through a Community Flood Assessment (CFA)
Why? Aligns with USACE mission and vision of collaborative engineering solutions


USACE MISSION: Deliver vital engineering solutions, in collaboration with our partners, to secure our Nation, energize our economy, and reduce disaster risk.

USACE VISION: Engineering solutions for our Nation's toughest challenges

Outcome:

- Innovative resources, data, and support to enable community awareness and resiliency against flooding
- **Enables taking action and setting policy**
- Encourages continued collaboration and reduces overall uncertainty in flood risk management






MINERAL WELLS CFA SCOPED TASKS

Scoped Tasks

- Coordination, including communication with the City of Mineral Wells throughout the duration of the study.
- Obtain existing data.
- Complete Hydrologic, Hydraulic, and Storm Shifting analysis and modeling to better understand the source and extent (inundation mapping) of flooding.
- Consider modeling alternatives that can help alleviate flooding and provide planning-level analysis of these alternatives.
- Generate a Community Flood Assessment report of findings and factsheet to share with the City of Mineral Wells.



MINERAL WELLS COMMUNITY FLOOD ASSESSMENT

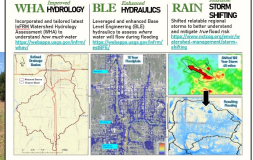
LEVERAGE & ENHANCE AVAILABLE HAZARD INFORMATION TO BETTER UNDERSTAND COMMUNITY FLOOD RISK



COLLABORATIVE & INNOVATIVE FLOOD RISK MANAGEMENT

The Mineral Wells Community Flood Assessment (CFA) leverages community leaders' hazard information to empower the decision-making process. It identifies hazard information and resources vulnerability related to flood risk. See complete study results at: <https://www.usace.army.mil/cfa>

WHA HYDROLOGY | **HE HYDRAULICS** | **RAIN STORM SHIFTING**

Hydrologic and hydraulic model development and analysis for the Mineral Wells community flood risk assessment. See <https://www.usace.army.mil/cfa> for more information.




HYDRAULICS: BASE LEVEL ENGINEERING (BLE)




What?
 Watershed-wide engineering modeling method that leverages high resolution ground elevation, automated model building techniques, and manual model review to prepare broad and accurate flood risk information.

Why?
 Centralized and available flood hazard analysis to support floodplain management activities and development review, while increasing risk awareness for individuals.



Outcomes:

- Quickly determine the flood risk for various events throughout multiple watersheds at various recurrence intervals (i.e., 10yr, 100yr, 500yr).
- Allows Federal, State, and local governments, as well as individuals, to access and use flood risk information.


<https://webapps.usace.gov/infrm/estBFE/>


BLE MODEL OVERVIEW


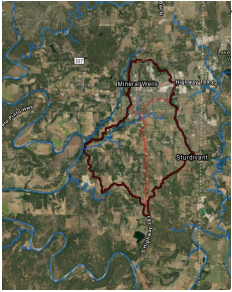
Set cell size 40,000 sq. ft (200 ft x 200 ft)
 Refinement regions set cell size to 2,500 sq. ft. (50 ft x 50 ft)
 USACE reduced model average cell size 4,902 sq. ft.
 Full BLE model average cell size 22,199 sq. ft.



THE PROBLEM


- Steep elevation change leading to highly populated flat areas
- Out of date master drainage plan

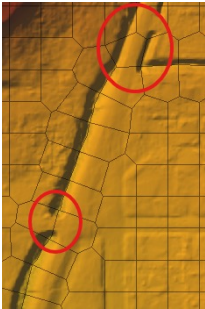

HYDROLOGY


This BLE model came with hydrology using the NRCS method which could be used if using the entire model.
 We downsized the BLE model, so we had to do new hydrology but to save time we used the Watershed Hydrology Assessment (WHA) HMS model and downsized it.
 Everything had to be recalculated but needed data and raster sets were already gathered.

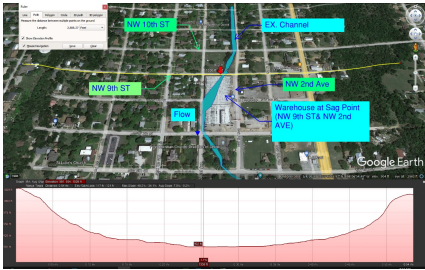



BRIDGES AND CULVERTS



Bridges and culverts not in the focus area had cells positioned to not stop flow.
 Bridges in the focus area channel terrain where edited but more detail to come.




DEFINING THE PROBLEM
 Current Situation Based On Geometry





• NW 9th Street Profile




MITIGATION STRATEGIES


Model Construction

- USACE proposed six detention ponds to mitigate the flood issues
- Analyze the maximum inflow and estimate proposed detention volume
- Modified and exported 1D XS Geometry from Gauge Engineering to create detention ponds as terrains
- Created a new proposed terrain layer
- Optimized detention ponds sizes and outlet pipes and ensured the proposed condition mitigated flooding

• Existing VS Proposed Geometry at Warehouse




MITIGATION STRATEGIES


Model Results

The inundation from existing condition (10-yr)

Remove existing box outlet at NW 9th ST

Proposed Detention Pond at NW 9th ST
280'Wx110'L, Base Elevation=845



New 10x4' Box Culvert outlet at NW 9th ST

Remain EX. Box culvert under Warehouse

NW 9th ST

The inundation from proposed condition (10-yr)

• Existing Inundation Map VS Proposed Inundation Map(10-YR Event) at Warehouse




Mitigation Strategies


Model Results

The inundation from existing condition (10-yr)

South Oak Ave (Hwy 261)

Proposed detention Pond 2
190'x107', Base Ele=842

SW 17th ST

Crystal Creek

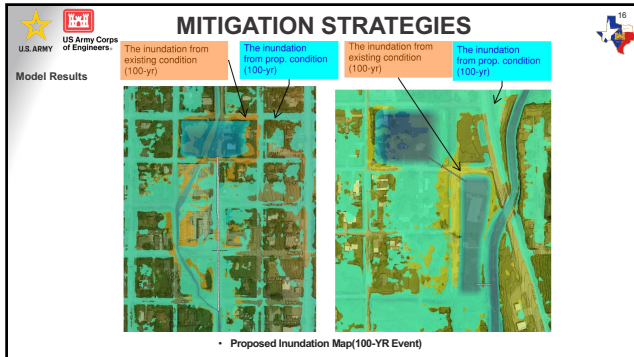
Prop. RCP 48"

Prop. RCP 72"

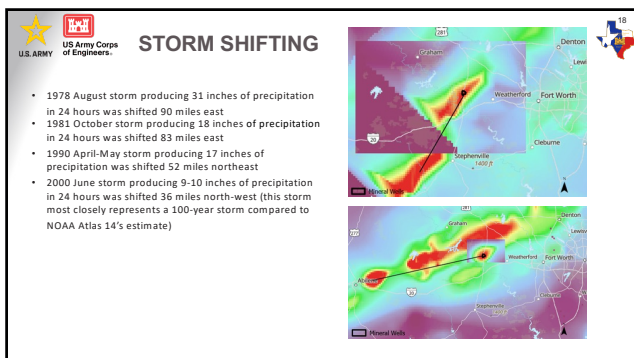
Proposed detention Pond 3
92'x515', Base Ele=844

The inundation from prop. condition (10-yr)

• Existing Inundation Map VS Proposed Inundation Map(10-YR Event)









QUESTIONS?



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