Lower South Mayde Creek Flood Risk Reduction Effort

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Project Manager

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Overview

1. Overview of Harris County Flood Control District (HCFCD)
2. Current conditions
3. What we found (Feasibility Study)
4. Proposed improvements (Preliminary Engineering Report)
5. Goals
6. Summary
Harris County Flood Control District

• A special purpose district created in 1937 by the Texas legislature

• In response to floods that devastated the Houston-area in 1929 and 1935

• Serves as a local partner to leverage federal tax dollars for flood damage reduction

• Harris County Commissioners Court serves as our board of directors or governing body
The Flood Control District

Harris County Open Channel Network

2,500 Miles of Bayous and Creeks

Area = 1,756 Square Miles
± 1,500 Channels
± 2,500 Miles of Channels
Population = 4.1 Million (County)
2.1 Million (Houston)
Harris County Open Channel Network

From Los Angeles to New York City

2,500 miles of channel
OUR MISSION

Provide flood damage reduction projects that work, with appropriate regard for community and natural values.
• We do **not** regulate land development
• We do **not** adopt Flood Insurance Rate Maps (FIRMs), which are used to set flood insurance rates and to regulate land development.
• We do **not** have jurisdiction over drainage for highways and streets, including roadside ditches and storm sewers.
Why Our Area Floods

- Prone to severe rainfall, tropical storms, and hurricanes
- Flat topography
- Impermeable clay soils

“The surface of the entire region is very level and even, with a descent to the coast so gradual as to afford no drainage to the soils, and, as a natural consequence, water remains in pools upon prairies... until removed by evaporation.

R.H. Loughridge (1836) “Report on the Cotton Production of the State of Texas”
Understanding Our Flooding

HARRIS COUNTY’S 4 TYPES OF FLOODPLAINS

- Valley Floodplain
- Major River Floodplain
- Shallow Floodplain
- Coastal Floodplain
The "5th" Scenario

PONDING/OVERLAND FLOW

5
What is a watershed?

- A geographical region of land or "drainage area" that drains to a common channel or outlet, mostly creeks and bayous in Harris County.
Harris County’s Watersheds
(General Flow Direction)

Streams and Reservoirs:
- Spring Creek
- Willow Creek
- Little Cypress Creek
- Cypress Creek
- Addicks Reservoir
- Barker Reservoir
- Buffalo Bayou
- White Oak Bayou
- Greens Bayou
- Hunting Bayou
- Carpenters Bayou
- Spring Gully & Goose Creek
- San Jacinto River
- Luce Bayou
- Jackson Bayou
- Cedar Bayou
- Galveston Bay

Flow Directions:
- Drains to Galveston Bay through San Jacinto River
- Drains to Galveston Bay through Houston Ship Channel (Buffalo Bayou)
- Drains to Galveston Bay
- Natural Overflow, Cypress Creek to Addicks/Barker (occasional)
- Reservoirs Flood Storage
Creeks that drain into Addicks Reservoir Watershed

- Horsepen Creek
- Langham Creek
- Bear Creek
- South Mayde Creek
## Addicks Reservoir Watershed

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Drainage area</strong> (Harris County)</td>
<td>136 square miles</td>
</tr>
<tr>
<td><strong>Watershed population</strong> (Harris County)</td>
<td>295,694</td>
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<tr>
<td><strong>Miles of open stream</strong></td>
<td>159 miles</td>
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<tr>
<td><strong>Primary streams</strong></td>
<td>Bear Creek, Horsepen Creek, Langham Creek, South Mayde Creek</td>
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<tr>
<td><strong>Watershed location</strong></td>
<td>West Harris County</td>
</tr>
<tr>
<td><strong>Land use &amp; development conditions</strong></td>
<td>Largely rural and agricultural</td>
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<tr>
<td><strong>Environmentally sensitive areas</strong></td>
<td>Area within reservoir boundaries</td>
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<td><strong>Other notable information</strong></td>
<td>Addicks Reservoir, along with Barker Reservoir, was built as a federal project in the 1940s to reduce flooding risks along Buffalo Bayou.</td>
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South Mayde Creek

Insufficient channel and roadway capacity resulting in shallow and overland flow flooding
Channel - Current Conditions
Roadway - Current Conditions
Flood Damage Reduction Project Lifecycle

- Feasibility Study
- Project Development
- Right-of-way Acquisition/Utility Relocation
- Design
- Construction
- Operation & Maintenance
- Project Closeout
- Reassess Performance

Community and Natural Values

Project Modernization
Feasibility Study Goals

1. Investigate riverine flooding along South Mayde Creek; quantify flood risks

2. Reduce depth/duration/frequency of flooding

3. Identify recommended plan including:
   • Number of structures estimated to benefit
   • Cost (Rights-of-way, construction, environmental)
   • Roadways and parcels of land estimated to benefit
Recommendations
Determine and provide engineering recommendations for:
1. Conveyance improvements – Fry Road to Greenhouse Road
2. Configuration/alignment for a bypass channel
3. Environmental permitting and coordination with USACE

Scope Includes:
1. Survey Services
2. Geotechnical Investigation and Recommendations
3. Environmental Site Assessment
4. Hydrologic and Hydraulic Impact Analysis
5. Subsurface Utility Engineering (SUE)
6. Project Management and Coordination
7. Natural Stable Channel Design Concept
8. Report
1. Within HCFCD-owned 300’ right-of-way
2. Widening channel with benched section
3. Existing low-flow section remains
4. Side slopes pending geotechnical
5. Impact to trails not expected
6. Heathergold pedestrian bridge may require modification
Bypass Channel

1. In lieu of channel improvements within Addicks
2. Bypass channel just downstream of Greenhouse Rd., parallel to South Mayde Creek
3. Natural channel cross-section
4. USACE coordination
Benefits

<table>
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<tr>
<th>Location</th>
<th>Reduction in Flood Levels (ft)</th>
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<tr>
<td></td>
<td>10-Year</td>
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<tr>
<td>Stockdick School Rd.</td>
<td>0.00</td>
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<tr>
<td>78&quot; Culvert</td>
<td>0.00</td>
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<tr>
<td>Clay Road</td>
<td>-0.01</td>
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<tr>
<td>Lakes of Bridgewater</td>
<td>-0.05</td>
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<tr>
<td>Morton Road</td>
<td>-0.09</td>
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<tr>
<td>Raintree Village</td>
<td>-0.23</td>
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<tr>
<td>Fry Road</td>
<td>-1.60</td>
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<tr>
<td>Heathergold Pedestrian Bridge</td>
<td>-0.81</td>
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<tr>
<td>Greenhouse Rd.</td>
<td>-0.58</td>
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Reduction in Roadway Flood Levels along South Mayde Creek
Benefits

LOWER SOUTH MAYDE CREEK DRAINAGE FEASIBILITY STUDY
100-YEAR FLOODPLAIN - ALTERNATIVE 1 VS. EXISTING CONDITIONS
## Benefits - Structures

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Existing Condition</th>
<th>Bypass Channel + Channel Improvements</th>
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<tbody>
<tr>
<td>2-Year</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5-Year</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10-Year</td>
<td>1</td>
<td>0</td>
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<tr>
<td>25-Year</td>
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<td>5</td>
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<tr>
<td>50-Year</td>
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<td>5</td>
</tr>
<tr>
<td>100-Year</td>
<td>79</td>
<td>14</td>
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## Benefits - Roadway

<table>
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<th>Return Period</th>
<th>Existing Condition</th>
<th>Bypass Channel + Channel improvements</th>
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<tbody>
<tr>
<td>10-Year</td>
<td>10.8</td>
<td>7.8</td>
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<tr>
<td>50-Year</td>
<td>28.6</td>
<td>22.5</td>
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<tr>
<td>100-Year</td>
<td>39.2</td>
<td>33.8</td>
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Flood Damage Reduction Project Lifecycle

1. Problem Identification
   - Feasibility Study

2. Project Development
   - Secure Funding
   - Project Development
   - Right-of-way Acquisition/Utility Relocation

3. Design
   - Secure Funding
   - Design

4. Construction
   - Secure Funding
   - Construction

5. Operation & Maintenance
   - Project Closeout
   - Reassess Performance

6. Community and Natural Values
   - Project Modernization

7. Reassess Performance
   - Secure Funding
   - Reassess Performance

8. Project Modernization
   - Community and Natural Values
   - Project Modernization