Huffman Area Drainage Analysis

Matt Zeve, P.E., CFM
Deputy Executive Director
Harris County Flood Control District
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
OUR MISSION

Provide flood damage reduction projects that work, with appropriate regard for community and natural values.
Why Our Area Floods

- Prone to severe rainfall including tropical storms, and hurricanes
- Flat topography
- Impermeable clay soils
1. County/Municipal neighborhood drainage and HCFCD infrastructure pre-dates current criteria. Neighborhood streets are re-graded and re-constructed by the City with more inlets and bigger storm sewers to get the water out of the neighborhood faster.
2. That increased flow is mitigated in a new stormwater detention basin that HCFCD constructs in consultation with the City who then maintains the basin. Water is held in the basin and slowly released through a restricted outfall pipe.
3. The stormwater detention basin also provides greenspace and opportunities for recreation such as public parks, which the City constructs and maintains.
4. Because the increased flows are mitigated in the stormwater detention basin, the water flowing to the HCFCD maintained channel is unchanged and does not increase flooding elsewhere.
Flood Damage Reduction Project Lifecycle

- Identify Problem
- Secure Funding
- Secure Funding
- Secure Funding
- Closeout Project

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

Community and Natural Values
Bond Approved on Aug. 25

- 237 projects across all watersheds
- 38 projects added based on community input ($400M+)

\[
\begin{align*}
$2.5B & \quad \text{Bond funds} \\
+ \quad \sim$2.3B & \quad \text{Partner funds} \\
= \quad \sim$4B+ & \quad \text{Total}
\end{align*}
\]
Huffman Area Drainage Analysis
Jennifer Hundl, P.E., CFM, LEED AP©
Project Manager
EHRA Engineering
Huffman Area Drainage Analysis

PURPOSE:
Investigate multiple alternatives to reduce structural flooding without causing downstream impacts
### Public Input Themes

<table>
<thead>
<tr>
<th>Bayou</th>
<th>Luce Bayou</th>
<th>Cedar Bayou</th>
<th>San Jacinto River</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Channel Maintenance 42.86%</td>
<td>Other Jurisdiction 44.44%</td>
<td>Engineering Study 88.14%</td>
</tr>
<tr>
<td></td>
<td>Other Jurisdiction 42.86%</td>
<td>Channel Maintenance 25.93%</td>
<td>Engineering Study 74.01%</td>
</tr>
<tr>
<td></td>
<td>Channel Modification 21.43%</td>
<td>Channel Modification 14.81%</td>
<td>Channel Modification 3.59%</td>
</tr>
<tr>
<td></td>
<td>Engineering Study 7.14%</td>
<td>Engineering Study 7.41%</td>
<td>Stormwater Detention 3.23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bridge Modification 3.70%</td>
<td>Channel Maintenance 1.92%</td>
</tr>
<tr>
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<td></td>
<td>Transparency 3.70%</td>
<td>Bridge Modification 1.44%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Home Buyouts 1.20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transparency 0.60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Storm Repair 0.12%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Environmental Impacts 0.12%</td>
</tr>
</tbody>
</table>

*The other jurisdiction category cover items in which HCFCD does not have authority to complete or would rely on partnerships.*
Huffman Area Characteristics

Luce Bayou (S100-00-00)
Red Gully (S102-00-00)
Shook Gully (S110-00-00)
Mexican Gully (S114-00-00)
John Young Gully (S115-00-00)
East Fork of San Jacinto (G103-08-00)
Cedar Bayou (Q100-00-00)
Q136-00-00
Q134-00-00
Studied Rainfall Amounts

24 hours

10% 10 YEAR 7.6”

1% 100 YEAR 13.2”

0.2% 500 YEAR 18.9”

Presented on March 26, 2019
East Fork of San Jacinto Watershed

Historical Flooding:

<table>
<thead>
<tr>
<th>Flood Frequency</th>
<th>Elevation</th>
<th>Date</th>
<th>Elevation</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% (10-year)</td>
<td>63.30</td>
<td>8/27/2017</td>
<td>81.20</td>
<td>Harvey</td>
</tr>
<tr>
<td>2% (50-year)</td>
<td>68.50</td>
<td>10/18/1994</td>
<td>76.20</td>
<td>-</td>
</tr>
<tr>
<td>1% (100-year)</td>
<td>70.60</td>
<td>11/4/1998</td>
<td>71.60</td>
<td>-</td>
</tr>
<tr>
<td>0.20% (500-year)</td>
<td>75.90</td>
<td>5/27/2016</td>
<td>69.70</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3/12/2016</td>
<td>67.01</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4/18/2016</td>
<td>63.70</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/18/1998</td>
<td>63.50</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9/13/2008</td>
<td>56.90</td>
<td>Ike</td>
</tr>
</tbody>
</table>
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<thead>
<tr>
<th>Flood Frequency</th>
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<th>Elevation</th>
<th>Event</th>
</tr>
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<tr>
<td>10% (10-year)</td>
<td>50.30</td>
<td>8/27/2017</td>
<td>60.00</td>
<td>Harvey</td>
</tr>
<tr>
<td>2% (50-year)</td>
<td>56.70</td>
<td>10/18/1994</td>
<td>56.80</td>
<td>-</td>
</tr>
<tr>
<td>1% (100-year)</td>
<td>58.80</td>
<td>5/27/2016</td>
<td>50.90</td>
<td>-</td>
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<tr>
<td>0.20% (500-year)</td>
<td>64.80</td>
<td>9/13/2008</td>
<td>46.40</td>
<td>Ike</td>
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</table>
### Historical Flooding:

<table>
<thead>
<tr>
<th>Flood Frequency</th>
<th>Elevation</th>
<th>Date</th>
<th>Elevation</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% (10-year)</td>
<td>52.6</td>
<td>8/27/2017</td>
<td>59.00</td>
<td>Harvey</td>
</tr>
<tr>
<td>2% (50-year)</td>
<td>54.3</td>
<td>10/18/1994</td>
<td>56.08</td>
<td>-</td>
</tr>
<tr>
<td>1% (100-year)</td>
<td>54.9</td>
<td>10/31/2015</td>
<td>55.10</td>
<td>-</td>
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<tr>
<td>0.20% (500-year)</td>
<td>56.8</td>
<td>9/13/2008</td>
<td>53.70</td>
<td>Ike</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6/4/2016</td>
<td>50.40</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5/20/2000</td>
<td>50.08</td>
<td>-</td>
</tr>
</tbody>
</table>
### Huffman Area Drainage Analysis

**Existing Conditions:**

- Updated H&H models for studied streams
- Creation of H&H models for unstudied streams
- Flooding information based on flood claims
- Stream gages
- **Results: Riverine flooding**
  - Definition: Flooding that is caused from water levels rising above the banks exceeding channel capacity.
Stream Level of Service

Definition:
Rainfall event the stream is capable of containing within HCFCD right-of-way.
INUNDATION
Inundation Metrics

[Image showing a schematic diagram with percentages and areas labeled: 10% ROW, 0.2% ROAD, and 1% HOUSES.]
Huffman Area Inundation Boundaries
### Existing Conditions Metrics:

**HUFFMAN AREA TOTAL**

<table>
<thead>
<tr>
<th>24 HOURS</th>
<th>AREA</th>
<th>STRUCTURES</th>
<th>ROADS</th>
<th>PARCELS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0.2%</strong></td>
<td>13,585 Acres</td>
<td>823 Homes</td>
<td>44.24 Miles</td>
<td>3,878 Parcels</td>
</tr>
<tr>
<td>500 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(18.9&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1%</strong></td>
<td>10,709 Acres</td>
<td>444 Homes</td>
<td>28.20 Miles</td>
<td>3,150 Parcels</td>
</tr>
<tr>
<td>100 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13.2&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10%</strong></td>
<td>7,073 Acres</td>
<td>97 Homes</td>
<td>9.15 Miles</td>
<td>2,089 Parcels</td>
</tr>
<tr>
<td>10 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7.6&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These values only represent inundation in Harris County.*

**Cedar Bayou values came from previous HCFCD study completed in 2018.*
Huffman Area Drainage Analysis
Project Outlook & Next Steps
Next Steps

Investigate Alternatives

**Stormwater Detention Basins**
Areas of land, usually adjacent to channels that are designed to receive and hold above-normal stormwater volumes.

**Channel Maintenance**
 Including mowing, selective clearing, hazardous tree removal, herbicide application, tree pruning, and removing sediment and foreign materials that build up in channels, potentially affecting their ability to convey stormwater.

**Channel Modifications**
Including widening and/or deepening, reducing the friction by removing woody vegetation, or by lining the channel with various materials.

**Voluntary Home Buyouts**
Purchase and demolishing of structures that were built deep in flood-prone areas, where structural projects to reduce flood levels are impractical.
Project Outlook

- Prepare recommendations
- Next Public Meeting – Summer 2019
- Incorporate public input
- Finalize Feasibility Phase – Fall 2019
We want to hear from you.

Please visit HCFCD.org/F110 to learn more about the HUFFMAN AREA DRAINAGE ANALYSIS, ask questions and sign up for our mailing list.
PROJECT PROGRESS & COMMUNITY ENGAGEMENT

2018 | BOND PROGRAM

HCFCD.org/2018bondprogram