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Buffalo Bayou and Tributaries Resiliency Study Update
Spring Partnering Forum
27 March 2019
Andrew Weber, P.E. – Project Manager
Purpose & Agenda

Purpose: To provide an update on the Buffalo Bayou & Tributaries Resiliency Study to include:

• Background
• Study Update
• Path Forward
Early Houston Floods
31 May 1929, 1-2 June 1929 and 7-10 December 1935
Study: Buffalo Bayou & Tributaries Resiliency Study
Authorization: Section 216 of Flood Control Act of 1970
Purpose: Flood Risk Management (FRM)
Phase: Feasibility
Non-Federal Sponsor: Harris County Flood Control District

**BBA18 Funding:** $6M

Scope: Address residual risks associated with flood risk impacts to structures in the pool area upstream of both reservoirs and downstream along Buffalo Bayou

Potential FRM Measures:
- Additional reservoir/dam
- Increased reservoir storage capacity
- Reservoir water level equalization
- Improved outlet discharge capacity
- Improved inflow and outlet discharge channels
- Acquisition of flowage easements and buyouts
- Changes in dam operation plan
- Harris County may develop ways to better inform residents of their risks

Study Summary
Study Problems

Problems:

Three primary problem areas have been identified.

1. Flooding downstream of the reservoirs on Buffalo Bayou (Dam Surcharge Releases and from other non-impounded rainfall)

2. Flooding upstream of the reservoirs from impoundment of water above government owned land.

3. Performance and risk issues related to flow around and over the uncontrolled spillways.
# Buffalo Bayou

<table>
<thead>
<tr>
<th>Event Date</th>
<th>HWM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvey</td>
<td>71.6</td>
</tr>
<tr>
<td>4/28/09</td>
<td>65.4</td>
</tr>
<tr>
<td>3/4/92</td>
<td>64.5</td>
</tr>
<tr>
<td>4/18/16</td>
<td>65.3</td>
</tr>
<tr>
<td>5/26/15</td>
<td>62.9</td>
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</table>
Addicks Reservoir

Top 5 Pools

<table>
<thead>
<tr>
<th>Date</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvey</td>
<td>109.1</td>
</tr>
<tr>
<td>Apr 2016</td>
<td>102.65</td>
</tr>
<tr>
<td>Mar 1992</td>
<td>97.64</td>
</tr>
<tr>
<td>Apr 2009</td>
<td>97.08</td>
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<tr>
<td>Nov 2002</td>
<td>96.63</td>
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</table>
Barker Reservoir

Top 5 Pools

<table>
<thead>
<tr>
<th>Date</th>
<th>Elevation</th>
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</thead>
<tbody>
<tr>
<td>Harvey</td>
<td>101.6</td>
</tr>
<tr>
<td>Apr 2016</td>
<td>95.22</td>
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<tr>
<td>Mar 1992</td>
<td>93.60</td>
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<tr>
<td>Nov 2002</td>
<td>93.24</td>
</tr>
<tr>
<td>Nov 1998</td>
<td>92.31</td>
</tr>
</tbody>
</table>
Goal: Improve the effectiveness of Addicks and Barker project and reduce the upstream and downstream flood risks along Buffalo Bayou and Tribs.

Objectives

- Reduce damages from river flooding/reservoir pool flooding on channels upstream and downstream
- Optimize the reservoir operations
- Optimize/improve/safely convey detained water
- Reduce sediment and erosion
- Reduce risk of dam failure
- Reduce risk to health and life safety
- Develop flood damage components that enhance or compliment the environment where possible
- Analyze the potential for recreational opportunities
Study Opportunities & Constraints

Opportunities
• Provide increased recreational opportunities
• Engineer with nature and implement nature-based features
• Improve transportation reliability during flood events
• Increase public awareness and education
• Improve flood forecasting and also improve emergency response and coordination

Constraints
• No unmitigated adverse impacts
• Limited open land
• Historic opposition to environmental impacts on Buffalo Bayou
## Potential Measures

<table>
<thead>
<tr>
<th>STRUCTURAL</th>
<th>NON-STRUCTURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunnels</td>
<td>Change Release Schedules in the Addicks and Barker Water</td>
</tr>
<tr>
<td>Bypass</td>
<td>Water Control Manual</td>
</tr>
<tr>
<td>Diversion</td>
<td>Buyout/Acquisition</td>
</tr>
<tr>
<td>Levees</td>
<td>Dry/Wet Flood Proofing</td>
</tr>
<tr>
<td>New Reservoir/Dam</td>
<td>Flood Warning Systems</td>
</tr>
<tr>
<td>Detention</td>
<td>Signage</td>
</tr>
<tr>
<td>Channel Improvements</td>
<td>Public Education/Outreach about Risk</td>
</tr>
<tr>
<td>Sedimentation Basin</td>
<td>Update Emergency Action Plan/Hazard maps</td>
</tr>
<tr>
<td>Increase Reservoir Storage</td>
<td></td>
</tr>
<tr>
<td>Auxiliary Spillway Improvements</td>
<td></td>
</tr>
<tr>
<td>Remove Dams</td>
<td></td>
</tr>
<tr>
<td>Modify Existing Discharge Capacity</td>
<td></td>
</tr>
<tr>
<td>Relocation of Auxiliary Spillway</td>
<td></td>
</tr>
</tbody>
</table>
Alternatives Development

Strategies for combining measures into alternatives

- Storage –
  - Detention
  - Levees/Floodwalls
  - Increase Reservoir Storage
  - New Reservoir/Dam
  - Sediment Sump

- Conveyance – to effectively move water
  - Tunnels
  - Bypass
  - Diversion
  - Channel Improvements

- Dam Safety –
  - Additional Spillway
  - Auxiliary Spillway Improvements
  - Relocate Auxiliary Spillway
  - Remove the dams
Disclaimers:
1. Graphic shows multiple concepts. Not all illustrated concepts will be recommended for implementation.
2. Concepts shown are generalized and subject to further development/refinement.
Conveyance Strategies

Disclaimers:
1. Graphic shows multiple concepts. Not all illustrated concepts will be recommended for implementation.
2. Concepts shown are generalized and subject to further development/refinement.
### Array of Alternatives to be Carried Forward

<table>
<thead>
<tr>
<th>Storage</th>
<th>Conveyance</th>
<th>Dam Safety</th>
<th>Comprehensive</th>
<th>Nonstructural</th>
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<tbody>
<tr>
<td>Alt #1</td>
<td>Alt #2 S1</td>
<td>Alt #3 S2</td>
<td>Alt #4 C1</td>
<td>Alt #5 C2</td>
</tr>
<tr>
<td>No Action</td>
<td>New Reservoir/Dam</td>
<td>Increase Reservoir Storage</td>
<td>Tunnels</td>
<td>Diversion</td>
</tr>
</tbody>
</table>
The Feasibility Study Process: Approximate Times to Reach Key Decision & Product Milestones in a 3-Year, $3M Study

Scoping & Alt. Formulation
- Alternatives Milestone
- >3 months $150k-$300k

Alternative Evaluation & Analysis
- Tentatively Selected Plan Milestone
- >9 months >$900k

Feasibility Analysis of Selected Plan
- Agency Decision Milestone
- ~ 6 months ~$1M

Washington-level Review
- District Final Report Package Transmittal
- Draft Chief’s Report Released
- Chief’s Report Signed
- ~ 6 months

Key
- ★ We are here
- Decision Milestone
- Product Milestone

We are here
Upcoming Activities

- Continued Concept Development
  - Engineering
  - Economics
  - Environmental & Cultural
  - Real Estate
  - Cost
- Resource Agency Coordination – Kickoff 27 March
- Public Scoping Meetings (April/May 2019 details tbd)
- Evaluation & Comparison of Alternatives
- Tentatively Selected Plan Milestone – April 2020
- Chiefs Report – October 2021
Follow the study:
email: BBTRS@usace.army.mil
https://www.swg.usace.army.mil