LOWER CLEAR CREEK & DICKINSON BAYOU WATERSHED STUDY

Fall 2020 Virtual Public Meeting

Clear Creek Watershed

November 4, 2020 – 6:30 p.m. to 7:30 p.m.
1. Key Team Members & Planning Partners
2. Introduction
3. Project Purpose & Background
4. Clear Creek Federal Project
5. Technical Presentation
   a. Hydraulic Modeling
   b. Flood Mitigation Concepts
6. Review of Timeline, Key Milestones, Next Steps
7. Instructions for Follow-Up Questions/Comments
Key Team Members and Planning Partners
Key Team Members

League City

John Baumgartner  City Manager
Anthony Talluto  Project Manager
Chuck Wolf  Project Director
Brian Gettinger  Project Manager
Jim Keith  Technical Lead
Luis Partida  Technical Lead

Hollaway

Rachel Massey  Stakeholder Lead
Connor Stokes  Meeting Facilitator
Lonnie Anderson  Technical Lead

Pape-Dawson Engineers

Georgina Aurelio  Project Engineer
John Grounds  Technical Lead

RPS

LJA Engineering
Introduction

John Baumgartner
City Manager, League City
Project Background
Project Purpose

Develop a comprehensive flood mitigation plan for the Lower Clear Creek and Dickinson Bayou Watersheds, including *identification of vulnerabilities* in the watersheds and *development and refinement* of concepts to reduce flooding.
Project Area

Legend
- Red: Clear Creek Watershed
- Blue: Dickinson Bayou Watershed

Scale: 0 - 2.5 - 5 Miles
Phase 1 Public Meeting Purpose

How to Participate in the Meeting

1. Learn About the Study
2. Talk with Study Representatives and Provide Feedback
3. Complete a Comment Form

What is the purpose of this meeting?

1. Provide information about the Study and how you will be invited to participate in the Study process.
2. Gather public feedback including questions, concerns, and issues relating to flood mitigation in the region.
3. Identify interested parties, significant issues and alternatives to be considered during the Study process.
Project Timeline

**ORIGINAL**
- **Today**: Discovery and Baselining
- **February 2020**: Phase 1 - Discovery and Baselining
- **April 2020**: Phase 1 - Discovery and Baselining
- **October 2020**: Watershed Study
- **May 2021**: Project Identification

**REVISED**
- **Today**: Discovery and Baselining
- **March 2021**: Project Identification
- **December 2020**: Watershed Study
- **March 2021**: Project Identification
- **Phase 1**: Discovery and Baselining
- **Phase 2**: Watershed Study
- **Phase 3**: WE ARE HERE
Project Status Update

- Preliminary concepts developed including incorporation of concepts by others
- Modeling for Clear Creek main stem is complete
- Clear Creek Tributary Hydraulic Modeling Complete – Mary’s, Chigger, Cowart
- Concept Development Workshop held in May
- Preliminary concept evaluation with Rain-On-Mesh models
- Non-Cost Factors Developed for Alignment Evaluation
Other Studies and Projects in the Region

The LCCDB study is one of several ongoing, flood damage reduction studies and projects in the region. The project team is coordinating with the various entities leading these studies and projects. These ongoing studies and projects include:

- The U.S. Army Corps of Engineers (USACE) & Harris County Flood Control District (HCFCD)
- Clear Creek Federal Project (upstream of Dixie Farm Road)
- The Texas General Land Office (GLO) / Galveston County Mainland Flood Study
- The City of League City / LJA League City Master Drainage Plan
Clear Creek Federal Flood Risk Management Project

Tommi Jo Scott & Scott Elmer,
Harris County Flood Control District
Clear Creek Federal Flood Risk Management Project

LEGEND
- Mud Gully Channel Modifications
  (Construction start Dec. 2020; design-bid-build)
- Clear Creek, Turkey Creek & Mary’s Creek
  Channel Modifications
  (Construction start pending; design-build)
Project Status

- Mud Gully construction to begin in December 2020
- H&H analysis submission to U.S. Army Corps of Engineers in 2021
- Solicitations for the design-build contract for Clear Creek, Mary’s Creek and Turkey Creek is expected in 2021
- Ongoing field investigations to collect survey data and conduct environmental assessments
Mitigation Projects Underway

1. Dagg Stormwater Detention Basin
2. Hughes Stormwater Detention Basin
3. South Belt Stormwater Detention Basin
League City Master Drainage Plan

Project Goals

1. Define existing conditions for drainage infrastructure and identify future problems
2. Evaluate severity of problems and potential solutions
3. Develop a watershed improvement strategy for current and future infrastructure
4. Create a master drainage plan to document recommendations for required improvement projects
5. Develop detailed cost and implementation information for immediate/future projects
Hydrologic and Hydraulic (H&H) Modeling

**Hydrology** represents the quantity of water (runoff) generated within a specific area or watershed.

**Hydraulics** deals with calculating the depth of flow in open channels and other methods of transportation.
Example of H&H Modeling

The Federal Emergency Management Agency’s Regional Guidance for Hydrologic and Hydraulic Studies
National Oceanic and Atmospheric Administration (NOAA) Atlas 14


LCCDB General Study Area

Number of data years

Texas Stations
Clear Creek Hydrology

Legend
- Streams
- Galveston County Tributaries
- Clear Creek
- Armand Bayou
2D Modeling Capabilities & Benefits
2D Modeling Simulation
Clear Creek Hydraulic Model Extents
Model Validation

The model validation results show a strong correlation between observed and simulated flow frequencies. The formula used for the prediction is:

\[ y = 1.387x^{0.3771} \]

with an \( R^2 \) of 0.9793, indicating a high level of accuracy in the model predictions.

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<th>XS</th>
<th>Location</th>
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<td>103118</td>
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The graph represents the frequency flow vs. WSE plot at XS 110826 d/s of Sunset Dr and Mary’s Creek.
Next Steps

- Review and Finalize Hydraulic Models
- Perform Model Calibration
- Evaluate Mitigation Concepts using the Model
Clear Creek Topography
Clear Creek Reaches

Legend
Concept Reaches
- Reach 1
- Reach 2
- Reach 3
Clear Creek Concepts
CC1-B Large Upstream Detention

~400 acre site

Benefits
• Large open area with single property owner – golf course
• Upstream detention reduces downstream impacts
• Located at confluence of Turkey Creek and Clear Creek

Challenges
• Popular well utilized establishment
• Detention shown to only have minimal WSEL impact on main stem due to high flows
CC1-L FM2351 to Clear Lake Tunnel

- 44,000 ft of inverted siphon tunnel + intake structure at Imperial Estates
- Potential for Drop Shafts along route

Benefits
- Minimized improvements required along Clear Creek by diverting flow directly to Clear Lake
- Bypasses flow through flood risk area with minimal surface disruption along route
- Supplements existing channel capacity by providing parallel capacity for high flow event.
- Follows public ROW, minimal property acquisition required

Challenges
- Cost per foot more expensive than other solutions
How a Tunnel Works

San Antonio River Tunnel Inlet Structure

Northeast Boundary Tunnel, DC Water, Washington D.C.

Inlet on Clear Creek

Additional Potential Inlet Locations for Urban Drainage along Route

Outlet: Clear Lake

Tunnel Depth > 75 ft

Tunnel Provides Significant Inline Storage. At 20-30 ft diameter the tunnel provides 35 – 85 acre-ft storage per mile
CC1-J Channel Widening to Bay Area

- Approximately 65,000 ft of channel improvement.
- Benching above high-water mark

Benefits
- Increases channel capacity improving drainage and mitigated flood damages throughout Friendswood

Challenges
- Potential for downstream impacts due to increased channel capacity in this reach
- Significant property acquisition required to create 250-500 ft wide corridor
- Environmental and community challenges to habitat and tree removal

Figure V.6. RAS Cross-section showing terracing implementation at Watchpoint 1
Comprehensive Evaluation

1. Non-Cost Factors
2. Estimated Capital Cost
3. Flood Damage Reduction
## Non-Cost Factors

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Inundated Structures Heat Map
Flood Damages Heat Map
Inundation Damages Assessment

- Total value of structures in FEMA effective 500-year floodplain: $13B

- Models can be used to estimate pre-project and post-project inundation damages based on water depth at each structure

- Example: Preliminary analysis for 100-year storm inundation damages
  - Pre-Project: 50-year NPV is $1.7B
  - Post-Project: 50-year NPV is $1.4B

Project has $300M benefit
Review of Timeline, Key Milestones, Next Steps
Timeline, Key Milestones, Next Steps

- Finish Model QA/QC & Calibration – October
- Evaluate Project Concepts with Model – November/December
- Recommend Funding Mechanisms – January/February
- Present Findings and Recommendations – March
- Final Public Meetings to Present Conclusions - March
STUDY PROCESS

PHASE 1: DISCOVERY & BASELINING
- Data Collection, Review & Baselining
- Planning Partner Engagement
- Evaluate Funding Opportunities for Engineering Services
- Public Feedback: Community Engagement, Public Meetings & Stakeholder Meetings

PHASE 2: WATERSHED STUDY
- Develop Hydrologic Models
- Flood Hazard Assessment
- Future Flood Risk Planning Assessment
- Watershed Study Summary & Project Definition

PHASE 3: PROJECT IDENTIFICATION
- Development of Preliminary Concepts
- Refinement of Alternatives
- Construction Project Funding Opportunities
- Alternative Recommendation & Prioritization
- Public Feedback: Community Engagement, Public Meetings & Stakeholder Meetings
Chat Comments & Questions Instructions
Instructions for Questions/Comments

1. Mail comment form or directly at:
   Attn: LCCDB Study Team c/o Hollaway Environmental + Communications, Inc.
   2500 Summer Street, Suite 1130
   Houston, Texas 77007

2. Email the team:
   • Directly at: LCCDB@leaguecity.com
   • Or fill out and send in the comment form attached to meeting

3. Fill out the online form on the study website
   www.leaguecity.com/LCCDB