

BUFFALO BAYOU AND TRIBUTARIES RESILIENCY STUDY EARLY SCOPING REPORT

December 2019

INTRODUCTION

The U.S. Army Corps of Engineers (USACE) Galveston District, in partnership with Harris County Flood Control District (HCFCD), initiated the preparation of an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. The EIS is a component of the Buffalo Bayou and Tributaries Resiliency Study (BBTRS) which will develop alternatives that could reduce the risk of flooding along the Buffalo Bayou and its tributaries in Harris and Fort Bend Counties, Texas. The study will also complete a Dam Safety Modification Evaluation (DSME) on the Addicks and Barker Dams.

NEPA requires an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. The process is referred to as scoping. This NEPA Scoping Report outlines the scoping process taken for the feasibility study, provides background information regarding the proposed action and alternatives being considered, and describes the scoping issues identified during the scoping comment period.

The main themes identified during scoping include:

- General agreement and support for the intent of the study; however, commenters are discouraged by the length of the study and the amount of time that will pass before measures are fully functional and flood risk benefits are realized. Many suggested implementing interim projects that could be completed in the next couple of years to afford some protection during this process.
- Strong support for implementing Nature-Based Features (e.g. preserving the Katy Prairie through land acquisition, restoring native habitats and bayous, using green infrastructure, preserving natural features such as oxbows and meanders, etc.) to store water and mitigate flooding risks in lieu of or in concert with traditional engineered solutions. Comments also cite a substantial cost-savings by implementing nature-based features, protection of existing greenspace from future development, and opportunity to provide additional outdoor recreation.
- Lack of support for the Brays Bayou Diversion Channel and the Cypress Creek Levee from residents in the Brays Bayou Watershed and in the Cypress Creek Watershed, respectively, whom indicate implementing these measures would increase the flooding risk within the already overtasked receiving waters.
- General concern for environmental and social impacts as a result of implementing any flood risk reduction measures. Most concerns surround how the measure would impact flooding downstream or in the receiving watershed and the associated cost or loss with a potential

increase in flooding; significant resources such as riparian corridors, wetlands, and wildlife; and recreation and open space.

- Identification of new measures or alternatives to consider including those from existing independent reports/studies and the commenters own knowledge for where and/or how to conduct storage or conveyance of storm waters. Some of the ideas that were not presented to the public during scoping include: pumping floodwaters out of the watersheds; dredging the bayous, tributaries, canals, and reservoirs to increase capacity; removing trees from the reservoirs; constructing a series of detention ponds throughout the system; and preserving and restoring the Katy Prairie and other important wetland, grassland and forested habitat types.
- Identification of measures that regulate commercial and residential development in floodplains, drainage areas and critical watersheds and changes in policy, regulations and codes related to development. *[Comments are considered non-substantive and out of scope of the study because USACE cannot impose floodplain zoning, building standards, or regulations as that is within the local government authority.]*

STUDY DESCRIPTION

The study is being conducted under Section 216 of the Flood Control Act of 1970 (Public Law 91-611) and follows the guidance provided in Engineering Regulation (ER) 1105-2-100 (Planning Guidance Notebook) and ER 1110-2-1156 (Engineering and Design Safety of Dams–Policy and Procedures). Section 216 authorizes USACE to review completed navigation, flood risk reduction, and water supply projects due to significantly changed physical or economic conditions, and to report to Congress with recommendations regarding modification of the project’s structures or operation, and for improving the quality of the environment in the overall public interest.

Attempts to modify drainage and manage storm water have led, over time, to changes in the flows of nearly all bayous in Harris and Fort Bend counties. The first flood damage reduction project began in the 1940s in response to devastating floods that occurred in Houston in 1929 and 1935. The Buffalo Bayou Tributaries, Texas flood risk management system was designed by the USACE to address flooding concerns. The original concept of the Buffalo Bayou Project consisted of a series of floodwater detention dams, levees system to divert flows and canals or channels to carry excess flow around the City. By the mid-1940s, a portion of this plan had been completed when the USACE constructed Addicks and Barker Dams, in far west Harris and east Fort Bend counties, to reduce flood damages downstream in Buffalo Bayou, including downtown Houston. As part of the project, seven miles of Buffalo Bayou below Barker Reservoir were also straightened, deepened, and widened from State Highway 6 to around Rummel Creek. Other efforts by USACE and HCFCD to address flooding on Buffalo Bayou and its tributaries have included stream enlargements, stream clearing, flood water detention, diversion channels, acquisition of flood prone properties, reservoir operational and structural changes, and modification or removal of several obstructive bridge and utility crossings.

Since construction of the flood reduction projects, much of Buffalo Bayou and surrounding watersheds have been significantly altered over the years by urbanization. As a result, these urban areas move rainfall runoff to the bayous very quickly and have limited natural floodplain storage and soil saturation, which can lead to more water entering the bayou than they are capable of receiving. Along with this changed condition, modeling indicates increases in precipitation patterns and the potential for more

flooding events in the future leading and an increase in damages to residential, commercial, and public structures during future severe flooding events. This has been evident during recent severe weather events, including Hurricane Harvey in 2017, Tropical Storm Allison in 2001, and severe storms in April 2009. The change in flow has also affected the Addicks and Barker Reservoirs, which were originally designed and constructed to temporarily hold water runoff gathered upstream of Houston so that water in Buffalo Bayou would stay within its banks and protect Houston from flooding. At the time of construction, the surrounding area was agricultural farm land, but now the dams are surrounded on all sides by residential and commercial development, resulting in a much reduced opportunity for absorption into soil, which increases the volume of water that needs to be held in the reservoirs.

The bayous of Houston are some of its most treasured environmental assets. Due to the limited slope and comparatively slow capacity to drain, they are also a major source of flooding as waters overtop the banks. Developers have been attracted to building close to the bayous for the unique environment they provide, but when homes and businesses are constructed too close, the natural flooding process is negatively affected. As a result, localized flooding affects many structures that are built in low-lying areas when the bayous overflow its banks. Wide spread flooding upstream and downstream of Addicks and Barker Dams also occurs during severe rainfall events, affecting thousands of homes and businesses, despite the mitigating effect these dams have during flooding conditions. This happens when the capacity of the bayous and reservoirs are exceeded. Flooding along the lower portion of Buffalo Bayou is also exacerbated when high flows from the White Oak watershed enter the bayou.

The study will examine all of Addicks, Barker, and Buffalo Bayou Watersheds and a portion of Cypress Creek Watershed and identify and recommend the most feasible and economically justified plan that modifies and/or adds to the existing project to further reduce flooding impacts, particularly during extreme rainfall events. The study area includes Buffalo Bayou, which flows 32 miles from Barker Reservoir in far west Harris County to the Turning Basin of the Houston Ship Channel. The bayou provides the main drainage conduit for central Houston as it winds through the heart of Houston, past neighborhoods, parks, office towers, and industrial areas, before it joins with White Oak Bayou just north of Houston's central business district. Additionally, several major tributaries including South Mayde, Bear, and Langham Creeks will also be assessed. Together, the waterways drain a portion of Harris and Fort Bend Counties and contain some of the most exquisite remaining natural and man-made park areas in Houston.

This study will simultaneously evaluate dam safety concerns at Addicks and Barker Dams and examine alternatives to address the concerns. The dams have been previously evaluated through the Dam Safety Program and both have been assigned a Dam Safety Action Classification (DSAC) I rating. The DSAC I rating means the combination of life or economic consequences with probability of failure is extremely high. In response to this rating, a Dam Safety Modification Study (DSMS) was undertaken. Phase 1 of the DSMS, which addressed the highest risk concerns, was analyzed in a report completed in 2013. Modifications recommended by that report are currently under construction with an anticipated completion date in February 2020. This study will complete Phase 2 of the DSMS, and address remaining concerns identified in Phase 1.

SCOPING PROCESS

Scoping is generally defined as "early public consultation," and is one of the first steps in the NEPA process. The purpose of scoping is to involve the public, stakeholders, Indian tribes, and other interested

agencies early on in the environmental compliance process to help determine the range of alternatives, the environmental effects, and the mitigation measures to be considered in an environmental document. The results of scoping help to guide an agency's environmental review of a project.

As part of the NEPA scoping process, the lead agency may hold scoping meeting(s) especially when the potential impacts of a particular action are confined to specific sites. During scoping meetings the lead agency generally outlines the proposed project, defines the area of analysis, identifies issues to be addressed in the environmental compliance document, and solicits public comments. Agencies also establish a scoping comment period to accept scoping comments submitted in writing. Scoping comments are considered by the agency during the formulation of alternatives and are used to determine the scope of the environmental issues to be addressed in the environmental document.

The scoping process for this study varied some from the typical process (i.e. publication of Notice of Intent (NOI), public meetings, comments accepted for 30-days). The study team conducted early scoping to help define the study scope, stakeholders' interests and concerns, and resources of significance. From the early public scoping it was determined that an EIS was warranted due to the potential for significant impacts and public controversy. This decision triggered the need for publication of an NOI and soliciting public feedback for an additional 30-days after the NOI is published in the Federal Register. The NOI was published in the Federal Register on 27 December 2019. The 30-day scoping period will be held between 27 December and 27 January 2020. All comments received during the scoping period will be incorporated into a separate scoping report.

Public Meetings

The study team determined five public meetings would be beneficial for the early scoping process and provide more opportunities for the public to attend given the large study area and significant public interest in the project. The five public meetings were held between 30 April 2019 and 09 May 2019 (Table 1). Two meetings (30 Apr and 09 May) were held upstream of Barker and Addicks Reservoirs in their respective watersheds, while the three remaining locations were spread throughout the Buffalo Bayou watershed along the Buffalo Bayou from the dams to downtown Houston near the study area boundary.

The meetings followed an open house style format in which attendees could arrive and leave at their leisure. Upon arrival, attendees were asked to complete an attendance card that requested basic contact information as well as how they heard about the meeting, whether or not they had been flooded in the last five years and, if so, to what depth. They were also provided an Informational Study Handout and comment card. Attendees were informed they could fill out the comment card during the meeting or they could provide written comments by e-mail or mail.

Attendees were encouraged to walk around to various display boards and engage in discussion with USACE and HCFCD staff. At each meeting two identical sets of 13 display boards were available for review throughout the meeting. The display boards provided information on the study problems and opportunities, potential measures to address the problems, and the NEPA and feasibility study process. Display boards were staffed with technical specialists knowledgeable of the topic on the board.

On the half-hour, an approximately 20-minute presentation was given by the Project Manager. The presentation went over many of the same topics covered by the display boards but provided more detail in a different format. There was no formal open-mic forum during the presentation.

The same meeting materials, display boards and presentation were used for all five meetings. A copy of the attendance card, informational study handout, comment card, display boards, and presentation are provided in Attachment A. Each of the meeting materials was also available on the USACE Project Website.

Table 1. Buffalo Bayou and Tributaries Resiliency Study Public Scoping Meetings

Date	Location	Meeting Time	Presentation Times	Attendees
4/30	Kingsland Baptist Church Activity Center 20555 Kingsland Blvd Katy, TX 77450	5 – 8 pm	5:30, 6:30, and 7:30	Total = 152 Individuals = 149 Elected Officials = 0 Media Outlets = 4
5/02	Saint John Vianney Catholic Church Activity Center 625 Nottingham Oaks Trail Houston, TX 77079	5 – 8 pm	5:30, 6:30, and 7:30	Total = 184 Individuals = 178 Elected Officials = 2 Media Outlets = 4
5/07	Trini Mendenhall Community Center 1414 Wirt Rd Houston, TX 77055	5 – 8 pm	5:30, 6:30, and 7:30	Total = 58 Individuals = 56 Elected Officials = 1 Media Outlets = 1
5/08	University of Houston Downtown Wilhelmina Cullen Robertson Auditorium 1 Main St., A350 Houston, TX 77002	5 – 8 pm	5:30, 6:30, and 7:30	Total = 23 Individuals = 22 Elected Officials = 0 Media Outlets = 1
5/09	Cypress Ridge High School 9 th Grade Cafeteria 7900 N Eldridge Parkway Houston, TX 77041	6 – 9 pm	6:30 and 7:30	Total = 56 Individuals = 55 Elected Officials = 0 Media Outlets = 1

Attendance

A total of 473 individuals filled out an attendance card during the scoping meetings (Table 1), although it is believed that this number could be as much as 25% higher. After the first meeting, it was recognized that the number of attendance cards was not accurate with the actual number of people who sat through the presentations. The check-in staff was instructed to have attendees fill out one card per household; however, there was no account for those who brought additional household members with

them. It was also noted that a number of individuals opted to not fill out an attendance card or bi-passed the check-in table altogether. At the subsequent meetings, the check-in staff attempted to note how many individuals were attending, but acknowledged at times it was still difficult to capture the information. Additionally, if the check-in staff saw someone who bi-passed the table or refused to fill out an attendance card, they noted their attendance on a blank attendance card. Informal presentation meeting counts were performed for some of the presentations and meetings, but not all. For future meetings, this would be a valuable method to more accurately account for attendance.

The attendance for the second week of meetings was significantly lower than anticipated, although still well attended given the circumstances. A strong line of storms moved through Houston Tuesday through Friday of that week. Tuesday evening resulted in numerous parts of the metropolitan area being flooded due to heavy rainfall in a very short period of time. Forecasters were calling for similar weather on Wednesday and Thursday. It was decided that the Wednesday and Thursday meetings would continue despite the weather. Wednesday was not nearly as bad, but officials were recommending residents not leave their homes if they did not need to. Thursday was substantially worse than Tuesday with additional heavy rainfall beginning around 6:00 pm. A number of severe thunderstorm and flash flood warnings were issued throughout the metropolitan area and specifically for the public meeting area. Public officials began strongly recommending residents to not leave their home unless absolutely necessary mid-day on Thursday before the storms hit.

During this second week, staff heard from several individuals that neighbors or family members elected to not attend because of the weather, but requested the individual who did attend bring back any information they could. Multiple complete sign-in packets were given to a number of individuals, including two HOA members (from different HOAs) who took 30 copies each to hand out at their respective HOA meetings.

The attendance cards included questions for which neighborhood they live in, whether or not they flooded in the last 5 years and how they heard about the meetings. These interesting facts will help us to focus our understanding of where the effects are being seen and to focus our efforts for future public meetings. A total of 391 attendance cards were turned in and the following percentages were captured from attendance cards:

- 40.66% (159 households) flooded in the last 5 years
 - 49 households had less than 12" of water in their home
 - 44 households had between 1 and 3 feet of water in their home
 - 35 households had more than 3 feet of water in their home, with the greatest depth being 6'
 - 31 did not specify a depth but marked they had been flooded.
- The most prominent way households found out about the meeting was through social media.
 - Social Media (Facebook, Twitter, etc.) = 29.4%
 - Other (Congressional Staff, Friends, Phone Apps, etc.) = 26%
 - Organization (HOA, Special Interest Group, Church, Community Group, etc.) = 24.8%
 - Newspaper = 12.8%
 - E-mail = 3%
 - Radio = 2%

- Unspecified = 2%

A copy of the attendance list is included in Attachment A. A copy of the physical attendance cards is available for review in the Administrative Record; however, all information included in the attendance database was copied directly from the attendance cards.

Public Notice

Study Start

A news release was published on the USACE Galveston and HCFCFCD websites on 10 October 2018, notifying the public that Harris County Flood Control District and the USACE entered into an agreement to complete a 3-year, \$6 million study to evaluate and recommend projects and operational changes that would improve the effectiveness of the Addicks and Barker Reservoirs. It is uncertain if any media outlets ran the article. A copy of the news release is included in Attachment A.

Public Meetings and Early Scoping Period

A public notice was published 25 April 2019 in the Houston Chronicle in the Legal Notices section of the newspaper notifying the public of the public meetings. Additionally, a news release announcing the scoping meeting locations, time, format, and purpose was published to the USACE Galveston District website and Facebook on 16 April 2019 and provided to media outlets. The USACE Galveston District created an event on Eventbrite, a website which promotes events and is a common source for the public to find out information about events happening in their area, and Facebook. Facebook reminders were posted prior to most of the meetings.

A total of 14 articles were ran in local media outlets and posted to stakeholder websites notifying the public of the upcoming public meetings (Table 2). In addition to media outlets, notification of the meetings were posted to special interest groups’ Facebook pages and shared several times from the USACE Facebook posts. To date, specific data on the number of times the posts were viewed, liked, or shared has been unavailable.

One article was published by the Houston Chronicle on 03 Jun 2019 after the comment period closed. The article provided a summary of the attendance at the public meetings and the comments received just prior to the scoping period closing.

A copy of all the media outreach is in Attachment A.

Table 2. Media Coverage Related to the Public Scoping Meetings

Media Outlet	Author	Date Ran	Media Type	Service Area
City of Houston – Council Member Greg Travis,	Staff	17 Apr 19	Online/ Newsletter	City of Houston, District G
Memorial Super Neighborhood	Staff	20 Apr 19	Online	West Memorial Residents

Media Outlet	Author	Date Ran	Media Type	Service Area
Houston Chronicle	Karen Zurawski	22 Apr 19	Print/Online	Harris, Trinity, Walker, Grimes, Polk, San Jacinto, Washington, Montgomery, Liberty, Austin, Waller, Chambers, Colorado, Brazoria, Fort Bend, Galveston, Wharton, Jackson, and Matagorda counties
City of Houston – Council Member Greg Travis,	Staff	25 Apr 19	Online/ Newsletter	City of Houston, District G
Coastal News Today	Peter Ravella and Tyler Buckingham	25 Apr 19	Podcast	The American Shoreline Podcast Network
The Waterways Journal Weekly	Staff	27 Apr 19	Online	News Journal of Record for the Towing and Barge Industry mainly for the Mississippi River Watershed and its tributaries and the GIWW.
Houston Chronicle	Roy Kent	28 Apr 19	Online	See above
Houston Chronicle	Staff	28 Apr 19	Online	See above
The Katy News	George Slaughter	30 Apr 19	Online	Katy and surrounding areas
Community Impact Newspaper	Jen Para	01 May 2019	Print/Online	Houston Metropolitan Area
Citizen’s Environmental Coalition	Stacy Giang	01 May 2019	Online	Special Interest Group in Houston Metropolitan Area
Houston Chronicle	Karen Zurawski	07 May 19	Print/Online	See above
Save Buffalo Bayou	Staff	No Date	Online	Special Interest Group in Houston Metropolitan Area
Houston Canoe Club	Staff	No Date	Online	Special Interest Group in Houston Metropolitan Area

SCOPING COMMENT ANALYSIS

USACE accepted written comments through mail and e-mail throughout the early scoping period which formally ran from 29 April 2019 through 31 May 2019. However, informal scoping continues throughout the preparation of an EIS and USACE will accept and consider all comments regardless of when they are submitted.

Protocol

Each comment submission was logged in and assigned a unique identifying number based on when it was received. The identifying number allows specific comments to be linked to the original submission. Each submission is labeled in the upper right hand corner as “Comment #: X” where X represents the

Unique Identifying Number. Respondents' names and addresses were then entered into a project-specific database, enabling creation of a complete mailing list of all respondents. The database is also used to track pertinent demographic information such as responses from special interest groups or federal, state, tribal, county, and local governments.

All input is considered and reviewed by a panel of analysts. Each response is first read by one analyst and sorted into substantive or non-substantive comments. Substantive comments are entered verbatim into the database and also noting any general themes/concerns and where in the EIS a response would be likely found. A second analyst reviewed the sorted comments to ensure accuracy and consistency.

This process and this scoping report are not intended to replace comments in their original form. Rather they provide a map or snapshot to the letters and other input that is maintained in the official administrative record.

It is important to note that this process makes no attempt to treat comments as votes. In no way does content analysis attempt to sway decision makers toward the will of any majority. Content analysis ensures that every comment is considered at some point in the decision process.

Assignment of Identifying Numbers

Comments were first assigned a prefix letter of "ES" if the comment was received during the early scoping period or "I" if the comment was received after the early scoping comment period but before the NOI was published on 27 December 2019. Early scoping comments included comments received prior to 29 April and within 5 days of 31 May.

For comments submitted via e-mail, the date and time of the e-mail was used to determine chronology for assigning unique identifying numbers. For mail submissions, if available, the date of the letter was used. If the letter was not dated, the post mark date was used. For forms submitted during public meetings, the date of the public meeting was used. Multiple mail/public meeting submissions with the same date was cataloged in alphabetical order. For example, if two e-mail and three mail submissions are received on 30 May 19. The two e-mail submissions will be assigned sequential comment numbers based on date and time received. The three mail submissions will continue the sequential numbering following alphabetical order of the last name of the submitter.

Analyzing Comments

Organized Responses

Often times during particularly controversial or significant studies, organized response by the public will occur. These are known as form responses. Forms are defined as five or more responses, received separately, but containing identical text or nearly identical text where the additional text does not provide any substantive comments. Once a form was identified, a "Form Master" was entered into the database with all of the substantive comments. All submissions with matching text were then linked to the appropriate Form Master and labeled in the upper left hand corner with "Form Letter #X", where the X represents the Form Master Number. Within the database, all forms were recorded. If a response did not contain all of the text presented in a given form, it was entered as an individual letter. Duplicate responses from four or fewer respondents were also entered as individual letters.

All forms were still assigned a unique identifying number for the purpose of tracking submissions.

Substantive Comments

A substantive comment provides new information about an alternative or the analysis; identifies a different way to meet the need; points out a specific flaw in the analysis; suggests alternate methodologies and the reason(s) why they should be used; makes factual corrections; or identifies a different source of credible research which, if used in the analysis, could result in different effects.

The following criteria was used for the BBTRS to determine whether a comment was substantive. If a comment was substantive, it will be responded or incorporated into Draft EIS that will be made available for public review.

1. Comments suggesting clarification, modification, or consideration of a measure or alternative.
2. Comments identifying a significant resource to be considered during impact analysis.
3. Comments identifying a specific methodology for alternative or impact analysis.
4. Comments presenting new information relevant to the analysis.
5. Comments that are out of the scope of the study.
 - a. Although comments that are out of the scope of the study cannot be addressed through plan formulation or impacts analysis, a response/justification is provided in this report stating why the comment is out of the scope of the study.
6. Comments relating to the NEPA or Planning process.
 - a. Procedural type comments that are not specific to the scope of the study (e.g. measures, alternatives, impacts).

Non-substantive Comments

Comments do not require a response in the EIS or individualized attention if they are not considered substantive. Some non-substantive comments were identified as out of scope in the comment matrix if there were other substantive comments within the submission. Submissions where no substantive comments were identified were recorded and marked in the upper left hand corner of the submission with "No Substantive Comments Identified." Criteria for non-substantive are as follows:

1. Value-type comments that don't include justification or facts to back up the statement.
Examples of this type of comment that were received include:
 - This is absolutely absurd. This whole area after having flooded several times and the biggie with Harvey we'll most likely have a mass exodus. The Corps of Engineers is not interested in the future of our friends and neighbors.
 - There are two things missing from this program: sustained visible leadership and alignment of all the shareholders.
2. Comments in favor of or against measures, the proposed action or alternatives without reasoning that meet the criteria for a substantive comment. Examples of this type of comment that were received include:

- I am in favor of tunnels.
 - I am adamantly against a Cypress Creek Levee.
 - Do not increase the Barker Reservoir flood pool by extending the spillways.
3. Comments that only agree or disagree with policy or decisions without justification or supporting data that meet the criteria for a substantive comment. None of this category was received.
 4. Comments that do not pertain to the project area or project. Examples of this type of comment that were received include:
 - Please address the bottleneck at I-45 near Spring, TX.
 - I hope you are watching the North Houston Project by TxDOT to see how they are about to destroy the evacuation routes by submerging all three interstates.
 - Houston flooded in Hurricane Harvey due to rainfall and not storm surge. The Ike Dike cannot prevent rainfall floods.
 5. Comments that take the form of vague, open-ended questions. Examples of this type of comment that were received include:
 - Since during Harvey the people who flooded would probably say lessen the discharge, while the martyrs in the flood pool would say increase the discharge. You cannot win that coin toss. Who is more important?
 - Is there a place to send water where it can be stored and used during the next draught?
 6. Comments that reiterate measures or alternatives that were presented to the public without any new information or considerations. Examples of this type of comment that were received include:
 - Levees should be raised at the Barker and Addicks Reservoirs.
 - Buyouts of homes below the spillway levees might be considered as well.

Early Scoping Comment Results

A total of 279 submissions were received through comment cards submitted during the public meetings, by e-mail and mail (Attachment B). Each submission was reviewed initially for their technical content, comprehensiveness, and redundancy.

Two submissions were assigned unique identifying numbers but were removed from further analysis because each was a duplicate of another submission submitted by the same person. For both duplicates, the commenters submitted the comment by e-mail and by mail, so the version that was received first was assessed.

Two Master Form Letters were identified. Master Form Letter #1 came from the Barker Flood Prevention organization. The form letter was identified in 17 additional submissions. Master Form Letter #2 came from an individual that was submitted 6 additional times by others.

The remaining 254 submissions were reviewed line by line for substantive comments, as well as comments outside the scope of the study. Thirty submission letters did not provide any substantive comments, leaving 224 submissions with substantive comments. A total of 619 comments were recorded in the submissions with substantive comments.

A total of 76 comments were identified as outside the scope of the study and not considered substantive, but were recorded to identify areas where the USACE could work to improve public understanding by providing additional information on the scope of the study. Over 50% of the out of scope comments (41 comments) pertained to restricting residential and commercial development, implementing modified local building and development codes for developing in the floodplains, or implementing programs which modified how development was planned for or regulated. Other out of scope comments included: recommendations for flood risk reduction measures that are outside the study area such as within the Cypress Creek Watershed, near Spring, TX, or along Brays or Sims Bayou (11 comments); recommendations to implement interim risk reduction projects on the Buffalo Bayou (5 comments), or actions that are outside the USACE authority (8 comments). The remaining 11 out of scope comments were not repeated in multiple submissions and therefore could not be specifically categorized. Comments that were considered outside the scope of the study are provided in Attachment C with the rationale for why the substantive comment was considered out of scope.

A total of 541 substantive comments were received and recorded during the scoping comment period (Appendix C). The substantive comments were then separated into areas of concern to focus on specific issues raised. Areas of concern were grouped into one of four categories based on where they may be addressed in the feasibility study (Table 4).

Table 3. Categorization of Scoping Comments

Plan Formulation	Environmental Consequences	Process	Dam Safety	Total
384	72	83	2	541

Plan Formulation

A total of 384 comments were received that fell into the “Plan Formulation” category. Plan formulation is “the process of building plans that meet planning objectives and avoid planning constraints” (Planning Manual). Comments in this category addressed five areas of concern including: new alternatives, modifications to alternatives or measures presented to the public, clarification of alternatives, assumptions, and supported or unsupported alternatives. Within each area of concern, the comments were further categorized. Table 6 lists a summary of all the plan formulation comments received during the scoping period.

Table 4. Summary of Plan Formulation Comments

Area of Concern		Number of Comments	Summary
Alternatives to Consider	Complete Plan	14	This category is difficult to summarize as it has a number of comments that have multiple facets. The general theme of all is that they recommend incorporating multiple measures together, some of which are already being considered like tunnels and channel improvements, while others incorporate new ideas such as adding alternate drainage channels, a series of detention facilities, and a south canal from the reservoir to the Ship Channel. An additional table (Table X) has been added to address these plans.
	Detention	10	This category addresses additional areas that should be considered for detention beyond those presented to the public. <ul style="list-style-type: none"> • Ruffino Hills property, • Westwood Country Club, • Braeburn County Club, • Hwy 6 and Eldrige, • Areas near Clodine and I-10 and Brittmore (east face of Addicks to Beltway 8) • Upstream utilizing natural prairie features • Northwest section of Cypress Creek Watershed • Within the landscaped parks inside the reservoirs
	Excavation/Dredging	30	This category largely emphasizes work that can be done within the reservoirs and bayous to increase conveyance and capacity beyond what was proposed to the public. <ul style="list-style-type: none"> • Increase the storm water storage capacity in the reservoirs through selective excavations at a greater extent than proposed (e.g. 737-acre project that has been proposed east of the Canyon Gate community in Cinco Ranch; increase capacity by 50-100%; return to 1942 elevations). • Increase conveyance and capacity downstream of and within both reservoirs by dredging, de-silting, and de-snagging. • Routine dredging and clean out of all creeks and bayous. • Widen and deepen all creeks and bayous within the reservoirs, Buffalo Bayou, and Cane Island Branch • Remove all trees and undergrowth within the confines of the reservoir

Area of Concern		Number of Comments	Summary
Alternatives to Consider (continued)	Nature-Based Features	66	<p>All comments in this category emphasize the use of natural features rather than engineered solutions to retain or slow water. Many comments state that nature-based features would likely be just as effective as engineered solutions, but more cost effective.</p> <ul style="list-style-type: none"> • Restore or maintain the natural path and flow of the bayous (e.g. building bankfull benches, establishing riffle/run complexes, maintaining oxbows, swales and meanders) • Preserve and restore Katy Prairie, riparian corridors, wetlands and streams throughout the study area. • Use of Natural Stable Channel Design practices, including the use of native vegetation for bank stabilization.
	New	17	This is another category that is difficult to summarize. A separate table is incorporated below (Table X) to identify the new ideas that should be considered.
	Nonstructural	1	Requirement that rain barrels be added to new and old structures to act as small retention ponds at every structure.
	Provide Water Supply	5	The five comments in this category suggest a series of small reservoirs or detentions that could be used for controlling runoff. Water that was stored could be treated and used for irrigation or municipal use within and outside the watersheds.
	Pumping	8	<p>These comments suggest the use of pumping stations rather than relying on gravity and elevation changes to move water out of the area. Several cite that this option would be more cost effective and be an overall better solution.</p> <ul style="list-style-type: none"> • Install a pumping station that moves water from the Upper Cypress Creek to the Brazos through a short pipeline or canal. • Build a large pump near the ship channel with a closure gate that could be a modular swing gate barge that has some pumps built into the barge. • Construct a pumping station(s) similar to the New Orleans system.

Area of Concern		Number of Comments	Summary
Alternatives to Consider (continued)	Other Studies/Reports	6	<p>All comments in this category reference another study or report that the team should look to for ideas to implement to address the problems. Some of these are USACE projects, while others are private individuals' or engineering firms' reports that have a complete detailed plan referenced by website to visit or an attached report.</p> <ul style="list-style-type: none"> • Consider a similar project along the Buffalo Bayou as was implemented on the Los Angeles and Santa rivers. • Super Bayou – Lower the water level in the watersheds (detailed report is attached to the submission) • Costello Inc. in their study Feasibility Study for Improvements to Addicks and Barker Reservoirs (March 2000) – Allow movement of water through Addicks and Barker with a larger connection between the reservoirs and then draining Barker south to the Brazos. • Sebesta Solution – Adds more detention on the bayou and increases the width of the bayou (reported submitted to HCFCD and others) • Streamside Sediment Collection System -- already approved by ERDC, monitors stream velocity and turns on during storm events to pull sediment out of the waterway. • Dr. Benton Baugh plan – incorporation of a thruster system, designed spillways, identified large retention areas on public lands, some straightening of the bayou, and other improvements (website referenced).
	Recreation	3	<p>These three comments have to do with incorporating recreational opportunities into our design plans.</p> <ul style="list-style-type: none"> • If the spillways are relocated, incorporate at least 10' wide hike and bike trails and bridge crossings over the spillway outlet. • Trail alignment suggestions (specific routes have been suggested)
	Spillway Modifications	2	<p>These comments are related to how the spillways should be addressed, that were not already presented to the public.</p> <ul style="list-style-type: none"> • Rebuild the uncontrolled spillways by turning them into controlled spillways with a substantive plan in place for controlled releases. • Strengthen the walls around the gates to prevent water from flowing around the sides.

Area of Concern		Number of Comments	Summary
Modification of Alternatives	Channel Improvements	6	<p>All of these comments suggest additional locations where channel improvements could be implemented to improve conveyance.</p> <ul style="list-style-type: none"> • Address bottleneck at the confluence of Buffalo Bayou and White Oaks Bayou by creating a by-pass, such as a tunnel, as opposed to widening an area that has significant infrastructure in place. • Widen the bayou inside Beltway 8. Any improvements upstream of Beltway 8 will have negligible effects without opening up the bayou inside the beltway. • Add culverts to Clay Road. Don't count just on bridge widening. • City of Houston Ditch #WI 48-000-00-A drain is above the creek bed level and as a result the ditch stores water rather than moving into the bayou. • Remove constrictions, such as the 20 oxbows and 10 bridges, between Beltway 8 and Shepard. • Between the dams and Beltway 8, remove the number of trees along the banks that resist flow during high water events.
	Conveyance	2	<p>These two comments are generalized in scope but provide ideas that would modify how or where the proposed measures should be implemented.</p> <ul style="list-style-type: none"> • Smaller channeling projects throughout the watersheds. The channels would not have to be concreted and can be complex and innovative. • If a channel must be constructed from upstream to the Gulf, construction should begin upstream so that if the project is abandoned it can be rebuilt and connected to a different tributary. Additionally, any channel will need its own Ike Dike to stop mini storm surge and salt water incursion.
	Levees	7	<p>All but two of the comments in this category are specifically framed around raising/improving the levee system around the current reservoirs. One comment specifically suggests that a new levee system be constructed at or near the government owned lands limits to protect upstream properties. The two additional comments suggest that the proposed Cypress Creek Levee should be farther west into Waller County because the current plan diverts Cypress Creek into Cane Island Creek which makes water issues worse in Katy.</p>
	New Reservoirs	3	<p>All of the comments related to modifying the new reservoir measure have to do with specifications. Two of the three comments suggest the new storage upstream of the Addicks Reservoir should be able to accommodate a minimum of 65,000 to 100,000 acre-feet for 4-6 weeks. The third comment suggests that the new reservoir alternative should go one of two ways: build a single new dam to handle Cypress Creek and development around Cypress Creek and/or a series of 3 smaller dams near other major tributaries.</p>

Area of Concern		Number of Comments	Summary
Modification of Alternatives (continued)	Dam Operations	19	<p>All of these comments suggest modifications to dam operations.</p> <ul style="list-style-type: none"> • Limit the Barker Reservoir flood pool to the current government owned land. • Modify the dam release plan <ul style="list-style-type: none"> ○ Slowly ramp up the release rate but cap at 4,000 cfs ○ Reservoirs should always be at maximum rates, with downstream flooding with current houses and businesses as the only constraint and not based on impacts to recreation features ○ Gradual earlier releases throughout the duration of a storm ○ Higher release rates during rain events and not just at specific reservoir levels. ○ Keep gates open until 2,000 cfs is reached at Piney Point, then partially close to regulate max 4,000 cfs as prescribed by exception ○ Keep reservoirs drained during hurricane/tropical storm season ○ Lowering the normal stored water volume and not lowering during or just before a large rain event • The dams needs a higher discharge capacity than 16,000 cfs. • An overflow system should be added to prevent from filling and backing up into neighborhoods. • New protocols that allow local authorities to veto the decision-making process during emergencies/flood situations. • Reservoir release rates and storage capacity should be sufficient to contain the “Maximum Probable Event” within the limits of the government owned land.
	Nonstructural	15	<p>All of the comments in this category suggest or clarify how, where, and why nonstructural measures should be implemented.</p> <ul style="list-style-type: none"> • Look at areas upstream of the reservoirs and remove structures from the floodplain. Buyouts of properties inside the reservoirs should be considered. • Apply a fair and equitable distribution of buyouts applied both upstream and downstream. • Work toward a total buyout of the 100-year floodplain over the next 50 years and a total buyout of the 500-year floodplain over the next 100 years. • Implement upgrades to the Flood Warning System to alert subdivisions adjacent to a reservoir of any potential flood pool that could exceed 103 feet. • Dams and major reservoirs should be equipped with redundant measurement and release systems and staffing redundancies. Software should aid in early notification of releases. Early warning and release metrics and protocols must be put in place. • Properties within the floodplain should be comprehensively flood-proofed so as to reduce negative impacts on neighboring properties.

Area of Concern		Number of Comments	Summary
Modification of Alternatives (continued)	Sedimentation	1	The one comment in this category recommended that sediment control and transportation be viewed systematically throughout every watershed in the Study and especially at the Houston Ship Channel, rather than just upstream of the reservoirs.
	Tunnels	8	<p>Each of the comments in this section suggest specific paths that the tunnel measure should take.</p> <ul style="list-style-type: none"> • Between Beltway 8 and I-610, an underground by-pass should be considered. It would be about 6 miles versus the 20+ being considered to the North. This would reduce the environmental and real estate costs and impacts of widening this torturous section of bayou. • Tunnel options with discharge into Lake Houston. • Several outfall options should be considered with the tunnel options just in case of offshore storm “pushback.” • Tunnels to Brays must be of sufficient size to first handle Brays flooding and then any additional watersheds’ flooding that is being diverted to Brays. • Use expertise and techniques implemented in Norway. • Tunnel with an inlet at the eastern edge of Meyerland to the Ship Channel/Buffalo bayou downstream of where Brays enters Buffalo Bayou (approximately 13.6 miles).
Clarification of Alternatives		11	<p>This category of comments includes all comments that had specific questions related to how the alternative would perform. Although many of the comments were open-ended questions and by definition should probably not be substantive, they were considered substantive because they are questions that are valid in relation to how the alternatives will operate and can be defined within the alternative write-ups.</p> <ul style="list-style-type: none"> • Clear decision making criteria needs to be described as to when and how diversion would occur. With diversion, there is concern that lower income properties will be negatively impacted because the potential cost impact will be considered over other factors that may be considered “fair” (this could be dwellings, people, but no matter what this is difficult to agree on). • What clearing/control will be affected between Beltway 8 to Loop 610? • It is unclear why diversion options for Sims Bayou have been included. • How much water would be diverted to the tunnel? • Why is only a potential reservoir identified for the tributaries while potential solutions for Barker Reservoir also include detentions basins? • How will the tunnels perform in the sugar sand soils of the watershed? • What maintenance will be involved with operating a tunnel or pumping station? Will there be redundancies to avoid failure during an event?

Area of Concern		Number of Comments	Summary
Supported Alternatives	Channel Improvements	9	All comments in these categories support the measure listed in the second column. Each of the comments describes why the measure should be implemented with rationale ranging from cost effectiveness, long-term performance, to environmental acceptability.
	Conveyance	3	
	Cypress Creek Levee	7	
	Detention	2	
	Diversion	2	
	Increase Reservoir Capacity	5	
	Modified Dam Operations	1	
	New Reservoir	10	
	Nonstructural	3	
	Storage	4	
	Tunnels	9	
Unsupported Alternatives	Brays Bayou Diversion	48	<p>Two main themes are expressed in these comments:</p> <ul style="list-style-type: none"> • Adding more water to Brays Bayou will result in increased flooding and economic impacts to the watershed because Project Brays can only provide relief for what is currently flowing. • Concern that the Brays Bayou would appear to be of lower economic value and therefore the decision would be made to divert water and cause harm in the Brays Bayou watershed rather than flood areas along the Buffalo Bayou.
	Conveyance	10	These comments express concern that conveyance measures such as diversions and channel improvements (e.g. deepening, widening, straightening, and/or concreting) will result in costly, ineffective and damaging features that will just continue to flood and result in increased erosion/bank collapse, sedimentation, and transferred risk.
	Cypress Creek Levee	18	Comments related to the Cypress Creek Levee adamantly oppose the measure because it would keep flood waters within Cypress Creek. Comments suggest that Cypress Creek cannot handle the added flow that would have gone into the Addicks Reservoir and would result in catastrophic flooding along Cypress Creek to Lake Houston.
	Levees	3	Comments suggest a levees measure because it restricts the natural movement of the floodways and results in more water and increased flooding elsewhere.

Area of Concern		Number of Comments	Summary
	New Reservoir	3	Comments suggest that construction of a new reservoir will give downstream individuals a false sense of engineered security and encourage new development in inherently floodprone areas.
	Nonstructural	2	Comments suggest that large scale buyouts would destroy existing neighborhoods and businesses and significantly reduce the tax base.
	Spillway Modifications	6	Comments suggest that extending the spillway will increase the flood pool putting more homes and businesses upstream at risk.
	Tunnels	5	Comments suggest that constructing tunnels would take too long to be worth the effort give changing climate conditions and the overall cost of constructing and operating a tunnel is cost prohibitive. One comment also suggested that the tunnel would be environmentally damaging and most likely a point source for water pollution in Galveston Bay.

Environmental Consequences

A total of 72 comments were categorized “Environmental Consequences.” The category was broken down into 11 areas of concern. The issues and concerns expressed for each area of concern are summarized in Table 6.

Table 5. Summary of Comments Categorized as Environmental Consequences.

Area of Concern	Number of Comments	Summary
Aquatic Resources	11	Comments provided or requested information be incorporated into the EIS about natural and semi-natural streams, bays and estuaries, and wetlands. Concern about the impact measures would have on physical, chemical, and biological health of Galveston Bay were noted in a couple of comments.
Biological Resources	11	Comments expressed concern for whether or not the bayous, upland forests, wetlands, or Katy Prairie would continue to support the various biological communities that are currently found within the measure footprints if any of the proposed measures were implemented.
Cumulative Effects	4	Comments identified the need to determine the cumulative effects of how any alternative proposed during this study will affect other projects and cumulatively how it will impact the environment. <ul style="list-style-type: none"> • The interaction of coastal barriers and other large scale coastal projects with this project. • 237 qualified projects approved by Harris County voters that will be implemented over the next decade. • Cohesiveness of the Fort Bend County drainage study and other flood planning and resiliency studies/projects included in SB6, SB7, and SB8.
Future Without Project Condition	4	Three of the four comments recommend climate change, which includes increased rainfall rates, be factored into the predicted future conditions. The last comment states that extensive development is ongoing and should be accounted for when calculating the amount of overland flow expected in the future.
Geologic Resources	8	Most comments are related to how the soils would be impacted by alternatives, particularly related to the concern that measures may increase erosion rates ultimately leading to additional sedimentation and loss of capacity in the reservoirs and bayous. One comment expressed concern about the suitability of soils to construct the tunnels.
Hydrology – Flooding	14	All of these comments centered around the general concern that proposed alternatives would transfer the flood risk from one area to another. The comments suggest the analysis clearly show where and how flooding will change with implementation of any of the alternatives.

Area of Concern	Number of Comments	Summary
Navigation	2	These comments express concern for how the projects would impact the Houston Ship Channel and what mitigation would be done if impacts are identified.
Real Estate	1	This comment states that storage and conveyance measures would also have impacts to the City of Houston right-of-ways and infrastructure.
Recreation	5	The three comments state the value and significance of Memorial Park while expressing concern that the alternatives could negatively impact the park itself and the recreational opportunities it provides.
Significant Resources	8	<p>A couple of significant resources were identified in the comments including:</p> <ul style="list-style-type: none"> • A robust breeding alligator snapping turtle population in the Buffalo Bayou. • The reservoirs provide recreational opportunities, preserve greenspace, and provide ecological habitats for a variety of species. • The Katy Prairie should not be built on or negatively impacted because these lands already provide benefits to the region that would be lost.
Socioeconomics	4	The comments stated that flooding would have a significant impact on the socioeconomics of the city and identified ways that alternatives could benefit individuals and businesses both economically and socially.

Process

A total of 83 comments were received that were categorized as “Process” (Table 7).

Table 6. Summary of Comments categorized as Process

Area of Concern	Number of Comments	Summary
Assumptions	5	<p>The comments in this category recommended the inclusion of assumptions when developing the alternatives.</p> <ul style="list-style-type: none"> • Sediment Capture and Control should be a design criterion/consideration for any flood control or navigation project. Not every project may need it or be economically justified, but every project should consider it consistently and should act on the results as recommended. • Assume a 100% build out and 80% impervious surface in each watershed for planning, public education and participation, flood prevention and control, and regulatory efforts. That way flood control efforts can be overprotected and buffered. • Alternatives should be developed to meet the needs of a design year (suggest 20 years out). • Assume the forecasts have been overstated when reservoir rate targets are being assessed.
Authorization	1	<p>This comment questions whether or not the appropriate authorization has been used to implement this study because Section 216 (Dec. 31, 1970) does not mention Harris County, Buffalo Bayou, or the two dams despite mentioning several other studies.</p>
Evaluation Criteria	21	<p>Comments suggest that the following evaluation criteria be used when selecting an alternative:</p> <ul style="list-style-type: none"> • Cost-benefit analysis including the long-term operational and maintenance costs • Project life • Resiliency in terms of repeated flooding along Buffalo Bayou for the 1% annual chance or greater • Ecosystem Services Benefits and Costs (e.g. holistic health and functionality of the watershed and its ecosystems; water quality; carbon capture, etc.) • Social Benefits and Costs (e.g. aesthetics, mobility, light pollution, improved quality of life, etc.) • Recreation Benefits and Costs (e.g. amenities, availability, etc.) • Sustainable (use the Sustainable Infrastructure’s ENVISION rating system). • 2-D modeling for non-riverine areas should be used

Area of Concern	Number of Comments	Summary
Goals	2	<p>Two comments suggested two different goals that were not already identified including:</p> <ul style="list-style-type: none"> • Identify spaces that provide multi-purpose benefits, such as those that provide flood risk reduction benefits, but when not needed serve as recreational greenspace. • Find solutions that convey water faster and reduce the need to store water.
Implementation	1	<p>Comment suggests that inundation maps post-construction must be circulated/provided to the impacted neighborhoods below the dam.</p>
Methodology	4	<p>The following themes were identified in the comments that suggested ways to accomplish the analyses including:</p> <ul style="list-style-type: none"> • Run 150+ storm scenarios to test potential levee/pump options. • Establish accurate LiDAR elevations for the entire area and identify topology prone to flooding • Design all reservoirs and flood risk reduction measures so that they can handle an event comparable to Harvey, or worse. • Brays Bayou may be larger than previously published and should use current information available for Brays Bayou when running models.
NEPA	2	<p>The comments suggest that a NEPA analysis may not be required at the feasibility phase unless the feasibility report will be used to describe competing alternatives and select among the options an action plan. The comment also suggests that the USACE be the lead agency if an EIS is warranted.</p>
Objectives	2	<p>The following objectives were identified:</p> <ul style="list-style-type: none"> • Maximize buyouts to increase riparian corridor preservation • Undertake large-scale, landscape level conservation and protection • Identify innovative approaches to reduce flooding • Fix existing infrastructure • Implement nature-based features • Accommodate current and future needs of a rapidly growing urban area
Period of Analysis	1	<p>The analysis should identify a design year and USACE and HCFCFCD should determine what that period is. Comment suggests 20 years which will require forecast and prediction of the various rainfalls that might occur during that time.</p>
Public Involvement	15	<p>Comments identified additional stakeholders that should be included in future meetings, collaborated with, and be kept informed of the study progress.</p>

Area of Concern	Number of Comments	Summary
Study Area	9	Comments suggest inclusion of all of Cypress Creek rather than just the portion that overflows into Addicks. As well, some comments suggested expanding the formulation of alternatives to Brays, Keegan, Sims, and White Oak Bayous
Study Process	3	Three comments pertained to the study process: <ul style="list-style-type: none"> • More than one option should be given to Congress to chose from • Some amount of study funds should be used to develop “off the shelf” response plans for the range of storms recently experienced • An interim chief’s report is warranted and should be submitted as soon as possible.
Study Scope	1	The comment suggests that the study review policies on sediment at a more macro scale and to develop solutions that not only consider conveyance, but also the ability to reduce sediment loads on a macro scale created by micro elements.
Technical Analysis	1	The comment suggests that a comprehensive geomorphic assessment and Watershed Assessment of River Stability and Sediment Supply of Buffalo Bayou be completed.
Timeline	15	All comments imply that the schedule is way too long and that action needs to be taken very soon rather than decades into the future.

Dam Safety

Two comments raised concerns about dam safety both essentially stating that the dams must be modified in order to handle the increased rainfall that is expected in the future. The comments suggest that whatever plan is made for 20 years out, that plan should be able to be easily modified at the end of the 20-year period to accommodate the changed conditions.

Informal Scoping Comment Results

Between 06 June and 26 December 2019, five submissions were received. One letter was a duplicate of another received earlier in the month and was therefore not considered further.