



BAYOU PRESERVATION
ASSOCIATION
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Submitted via email to:

Attn: BBTRS, United States Army Corps of Engineers (USACE), Galveston District
BBTRS@usace.army.mil

Re: Buffalo Bayou and Tributaries, Texas Resiliency Study (BBTRS) Interim Report

10/30/2020

Dear USACE Galveston District,

Introduction

When the USACE project to identify, study and recommend measures to address flood risk along Buffalo Bayou (the Buffalo Bayou and Tributaries Resiliency Study) was presented at public scoping meetings in the spring of 2019, many people in this region saw a welcome opportunity for substantial federal recognition and involvement in solving the flooding issues that had become so devastating over the past several years, up to and including the flooding from Hurricane Harvey in the fall of 2017. That the USACE identified “Engineering with nature and implement nature-based features” as second on their list of opportunities was encouraging. There was talk of the project being the bold initiative that has been so needed and that would be reflective of what has been experienced and learned over the now 80 years since the 1940s plan that was never fully implemented.

Public input on the study project and its scope was solicited. At that time, the Bayou Preservation Association submitted its Resiliency and Flood Damage Reduction Policy Principles as part of its comments on the Study’s scope. These principles are a Board-adopted set of standards of consideration for future projects on area bayous, which were developed by community experts and advisors to Bayou Preservation. They are reflective of what has been learned about both flood mitigation and healthy bayou systems. The short version of these principles is listed here, and the longer version, with more explanation, is attached.

- Principle 1. Avoidance of Adverse Impacts on the Functions and Values of Riparian Corridors.
- Principle 2. Avoidance of Adverse Impacts on Water Quality.
- Principle 3. Utilization of Best Practices for Improving Stormwater Management.
- Principle 4. Accommodation for Both Current and Future Needs.
- Principle 5. Evaluation of ALL Associated Benefits and Impacts.

The Buffalo Bayou and Tributaries Resiliency Study, Texas (“Study”), as reflected in that study’s recently released Interim Feasibility Report (“Interim Report”), does not demonstrate alignment with these five principles, and instead relies on an outdated approach to flood management that reflects a decades-old “lone ranger” search for a “silver bullet” solution, or two, which is neither realistic nor practical. Furthermore, the Study negates the long history (from the early 1960s) of work by multiple government and philanthropic efforts to preserve Buffalo Bayou in a near natural state, though continuously threatened by impacts from increasing watershed development.

Missed Opportunities

Based on what’s been presented in the Interim Report, the following are among the Study’s missed opportunities, and subsequent obstacles.

Our Mission is to celebrate, protect and restore the natural richness of all our bayous and streams.
Our Vision is a network of healthy bayous, streams and watersheds.

- The Study does not incorporate modern (21st century) thinking about addressing flooding problems/projects from a more holistic, multi-disciplinary, collaborative, decentralized approach.

The Report seems to stick to versions of the 1940s plan that created Addicks and Barker reservoirs with some channelization of Buffalo Bayou – that is, promoting more extensive channelizing of Buffalo Bayou along with another reservoir on the scale of and akin to Addicks and Barker reservoirs.

Yet today we know more about streams and how they function, including the watersheds in which they operate and the geomorphology of their channels. We know streams can produce multiple benefits and uses – with wildlife habitat and ecosystem services and recreation alongside drainage. We know that large-scale control projects – getting water away – have moved toward integrating stormwater management with water quality management as well as water supply (also known as “one water”), and focusing more on green stormwater infrastructure and landscape renovation, and more practices at the site development level.

We also know that effective resiliency planning engages stakeholders and multi-disciplinary subject matter experts throughout the process, to define goals and objectives, create partnerships and support, and find practical solutions for large- and small-scale community issues and projects.

Furthermore, a decentralized approach would avoid the risks from failure of one, or two, big projects, as well as the devastating impacts of their construction, much less the time it would take to realize any stormwater management benefits from such large projects.

- Other than including the word resilience or resiliency in a couple of brief lists of planning objectives and decision criteria, and contrary to the Interim Report’s title, the Interim Report does not reflect that the Study has addressed resiliency as a fundamental and transparent driver.

The “resiliency” term is not defined for this Study’s purposes, nor does the Interim Report explain how it is to be achieved, evaluated, or measured.

On the other hand, working with the City of Houston on implementation of its *Resilient Houston plan* would substantially reduce flood damages (and loss of life) downstream. *Resilient Houston* defines and gives a vision for urban resilience, along with goals and actions. Goal 8 of the plan is “We will live safely with water,” and includes actions such as #25.1, “Remove all habitable structures and prevent new development of habitable structures in the floodway,” and #25.3, “Expand detention capacity of bayou corridors.” These actions have multiple components and would occur incrementally, providing benefits along the way, and mostly across a shorter time frame than likely with any of the selected proposed projects.

Furthermore, designing for resilience means looking at a full range of solutions across the watershed. Flood damages are a result of multiple conditions, including physical events, the structure and form of drainage pathways, historical and current land use and surface water management, and stormwater management policies. Addressing only part(s) of these conditions ensures only a partial solution, and likely one that fails. Developing a plan for Buffalo Bayou flood damage reduction before the Metropolitan Houston Regional Watershed Assessment is completed would seem a recipe for inefficient, and possibly misdirected and wasted, expenditures of funds.

- The Study does not sufficiently incorporate nature-based solutions in its projects.

Nature-based solutions are those that incorporate protecting, restoring, and/or mimicking natural processes for their ecosystem services and benefits for society. The International Union for the Conservation of Nature has defined nature-based solutions as “actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g., climate change, food

and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits.”

Nature-based solutions with their ecosystem services have been shown to be effective in reducing flood damages and are widely supported. As an example of their increasing acceptance, FEMA has recently announced a policy clarification that “the inclusion of ecosystem service benefits in the Benefit-Cost Analysis (BCA) was no longer limited to only acquisition/open space mitigation activities.” The policy also allows “consideration of ecosystem service benefits for a project regardless of BCR value.” That is, FEMA rescinded the policy of only considering a BCR of greater than 0.75, which was done “in recognition that the natural environment is an important component of a community’s resilience strategy.”

In fact, “Nature-based features” were named one of the six main themes of public input during the scoping process in Spring 2019, and yet were eliminated for further consideration by the USACE.

The Study also fails to include “the integration of natural systems and processes,” as supported in the USACE’s *Engineering with Nature Strategic Plan, 2018-2023, Expanding Implementation*. This plan notes that outdated beliefs about infrastructure development and nature being at odds have “been replaced by the goal of sustainable development.” Yet the Interim Report’s selected proposed projects show no signs of following this goal.

Furthermore, the Study is not consistent with the Harris County Flood Control District’s (HCFCD) mission to: “provide flood damage reduction projects that work, with *appropriate regard for community and natural values*.” [emphasis added] HCFCD is a logical potential partner and even local sponsor for a federal project for flood reduction here. Over the past decade, the HCFCD has been turning the corner in incorporating greater regard for community and natural values; yet the Interim Report does not promote further accomplishment of that mission, jeopardizing a potential partnership.

- The Interim Report does not provide sufficient information and data on the selected proposed projects to provide justification for support from a local non-federal partner, especially given their substantial negative impacts.

The Study’s alternatives and background data – including hydrologic and hydraulic modeling, specific mitigation plans and costs, and project cost estimate details that include O&M and which portions are the responsibility of the local nonfederal partner – have not been provided in sufficient detail to enable an evaluation of possible support for selected proposed projects. In fact, “Appendix A, Hydrology, Hydraulics and Climate,” while referenced in the Interim Report, was not included in the publicly released document.

Many of the details, especially on the proposed Buffalo Bayou Channel Improvement alternative, are inconsistent or unclear. Particular examples include: What would be the full length (22 miles or 22.5 miles or 24 miles) of the channel improvements? Would there be a low flow channel throughout? Would the channel be lined with articulated concrete blocks (ACB) throughout? Would the “improved” channel follow the existing centerline throughout, or not?

Many of the potential impacts have been missed or given short shrift and are even more difficult to evaluate given the conflicting information. For example, the use of open cell ACBs to line the channel “allowing the for establishment of turf within the block cells” is likely totally unrealistic, and would depend completely on the type of vegetation and the length of time it would be inundated under various conditions.

Furthermore, the quantities of required mitigation appear underestimated and without solution, with no consideration demonstrated for the availability or cost of mitigation sites.

- The Interim Report reflects an even greater omission in analysis – the complete lack of geomorphic assessment for the Buffalo Bayou Channel Improvement alternative.

The failure of the Study to include a full analysis of geomorphic conditions of Buffalo Bayou – stability rating, stream capacity, sediment transport modeling, etc. – is a fatal flaw, and one that reflects a lack of understanding of stream dynamics, which then will prevent achievement of a stable channel system with the proposed project.

Buffalo Bayou already experiences substantial bank erosion and deposition issues through much of the length of this project, primarily from the current operation of the reservoir dams, with huge impacts still farther downstream of the proposed project. Lack of analysis and understanding of geomorphic principles and failure to consider the entire stream and its watershed will likely only exacerbate such impacts.

- None of the selected proposed projects in the Interim Report makes economic sense per the USACE's own guidance.

At estimated projects costs from \$4.5 B to \$7.0 B, the benefit:cost ratios of the projects are all less than 1.0, ranging from 0.1 to 0.3. That is, projected costs are 3 to 10 times greater than the value of the benefits.

The Interim Report notes a potential reduction in “life loss” with the selected proposed projects, though not more than about 60 percent, and with no comparisons with other alternative projects nor any of the data to support their conclusion.

- None of the selected proposed projects could be implemented quickly and would only provide benefits in flood damage reductions once completed, some 15 to 20 years (or more) out.

A decentralized, distributed approach – with floodway/floodplain preservation and creation of shallow detention with low berms in the upper Cypress and Addicks watersheds, including lands on the Katy Prairie – could begin to provide flood damage reduction benefits within a few years, and provide long-term redundancy and resilience, with an estimated combined storage capacity of more than 150,000 acre feet.

- The Cypress Creek Reservoir alternative, or the Combo alternative, would irreparably damage the Katy Prairie plant and animal community.

The Katy Prairie Conservancy has noted the complete destruction of the plant and animal community. Such destruction would occur beneath the footprint of the proposed dam and would be experienced on portions of the Prairie with the flooding that would occur for extended periods of time. The acreage listed for mitigation of the project seems underestimated (approximately 7,500 acres), given the significance of many of the ecological impacts. No mitigation sites are identified and no costs provided.

- The Buffalo Bayou Channel Improvements alternative, or the Combo alternative, would also substantially damage major portions of Buffalo Bayou's riparian community and public access, with unsupportable social, economic and environmental impacts.

The riparian community and public access impacts include those on two major regional parks: Memorial Park – Houston's Central Park, only larger, which is undergoing a substantial 10-year, and more than 200-million-dollar restoration and re-vitalization – and Buffalo Bayou Park – an award-winning, wildly popular community bayou amenity in central Houston, which was 15 years and tens of millions of dollars in the making (and currently celebrating the fifth anniversary of its completion). The impacts to these parks, as well as to Terry Hershey Park, is neither acknowledged nor addressed (including compensation) in the Interim Report.

The proposed Buffalo Bayou Channel Improvements project would encompass one-half the length of Buffalo Bayou Park (approximately 1.32 miles of 2.55 miles). Widening the channel through that reach would eliminate tens of millions of dollars of habitat and access improvements, including stretching the channel width to beyond the hike-and-bike trails on one or both sides of the bayou, and would disrupt any remaining park access or use during the years of construction.

Buffalo Bayou is also home to a notable population of Western Alligator Snapping Turtle (AST) (*Macrochelys temminckii*), a species that is State Threatened and a candidate for federal listing. This species is unlikely to have long-term survival in a channel lined with articulating concrete blocks (ACB).

Memorial Park is in the second year of a 10-year build-out of a master plan with local investment of \$210 million. Deep ravines and five major tributaries drain to Buffalo Bayou (the park's 4.5-mile southern border). This natural drainage system forms the core of the park's wilderness area and supports major recreational opportunities and a restorative landscape for visitors. Deepening and widening the Buffalo Bayou channel as proposed would have an extreme impact on the entire park, with the ravine flowlines adjusting to the new depth, resulting in head-cutting and widening.

- The Buffalo Bayou Channel Improvements alternative, or the Combo alternative, would make the bayou essentially unsafe for paddling.

Buffalo Bayou has long been a popular paddling destination in this region. The Buffalo Bayou Paddling Trail was developed in 2009 by Bayou Preservation Association, in conjunction with the Houston Canoe Club and others, and was the first paddling trail in Texas sanctioned by Texas Parks & Wildlife Department, and at one time was also the longest paddling trail in the state. Additionally, it is the site of the Buffalo Bayou Partnership's annual (excepting, of course, this pandemic year) Buffalo Bayou Regatta, which began in 1971 and is the largest canoe race in Texas, in which more than 800 participants paddle their craft on Buffalo Bayou from West Houston (San Felipe bridge) to downtown (University of Houston).

A channel lined with ACB would fix the channel plan form and prevent formation of natural meanders and eddies, making the channel unsafe for paddling, because there would not be places to pull safely out of the stream flow, whether for rest or in an emergency.

- The Interim Report does not provide information on how any of the projects would accommodate for future climate change impacts.

As previously noted, "Appendix A, Hydrology, Hydraulics and Climate," while referenced in the Interim Report, was not included in the publicly released document. Without it, there is no way for the public to assess whether any of the proposed projects have adequately considered the issue of climate change impacts.

Study Alternatives in Need of Further Analysis

The following Study alternatives need significant further analysis:

- > Cypress Creek Dam and Reservoir, Alternative 2

This alternative, as presented in the Report, is a large project in the older 1940s vein that would substantially damage the Katy Prairie, a vanishing and irreplaceable natural resource (less than 1% of coastal prairie remaining in a near natural state in the U.S.) that currently provides multiple benefits to the greater Houston region – natural stormwater detention/retention, habitat for thousands of birds, protected water quality, recreation and solace for the region's urbanized population, and agricultural products. By instead shifting from a large-scale construction project without benefit for decades, to

more natural/green solutions in the upper Buffalo Bayou/Addicks Reservoir and Cypress Creek watersheds, comparable benefits can be achieved much faster with far less cost, increased resiliency, and greater natural resource, recreation, and agricultural benefits. (See below for more on the nonstructural, nature-based, and other alternatives.)

> Addicks & Barker Excavation, Alternative 3

The Study's analysis for the reservoir excavation alternative appears to undervalue significantly the potential opportunities by estimating the water table depth to be 5 to 15 feet. Yet other studies have estimated a minimum of 10 to 12 feet, and as much as 25 feet. Clearly these depths make a difference in potential additional storage capacity and need to be resolved before rejecting this alternative. If the greater depths are true, capacity of the reservoirs could be doubled.

The Report also notes issues with the cost of disposal of the dirt to be excavated but gives no information to support that concern – neither potential uses of the dirt nor costs for transport. Potential uses that have been identified by others include: cover for nearby landfills, public amenities (park, hill, amphitheater), fill for raising elevations of those homes remaining within the reservoir footprint, and/or creating a berm between the reservoirs and upstream neighborhoods.

> Tunnel, Alternative 4

The Report contends that a tunnel to convey flows from Buffalo Bayou or the reservoirs would be too costly and take too long. Several of the assumptions leading to these conclusions are in stark contrast to other evaluations. For one, the estimated construction time in the Study was based on a San Antonio project with entirely different and more difficult geology. For another, the rigorous cost analysis by HCFCD has yielded results that are 50% less expensive than the USACE analysis.

Also to be re-evaluated is the comparison analysis with other alternatives, given that the cost information for other alternatives appears to underestimate some costs, not consider others, and is, in any case, not transparently presented for public evaluation and input.

In addition to the many environmental considerations for a tunnel that are also yet to be elucidated and resolved, it is clear that more study is needed if for no other reason than to resolve the vast differences in cost analysis between the USACE approach and that of HCFCD.

Furthermore, a stormwater tunnel offers an opportunity to explore other benefits – cost and otherwise – of taking a “one water” approach, one that considers stormwater as a potential source of drinking water supply, as suggested by Houston Stronger.

> Nonstructural (Property Buyouts), Alternative 7

As the first line of defense in flood protection, prevention of development in flood-prone areas like floodplains and floodways will always be the gold standard of flood protection. However, when that has not been possible, for whatever reasons, and once other flood mitigation efforts have been selected and modeled, voluntary buyouts should be the priority. Selected buyouts will remain an important piece of any flood damage reduction plan, and this removal of people from harm's way should be the secondary line of defense whenever feasible. That feasibility is a major consideration in addressing flood damages downstream of the reservoirs, and it appears that the costs presented in the Report may be low. As presented, the BCR becomes unsatisfactory for a storm with a less than two percent probability of occurrence (50-year), and other measures should be considered.

The Report only considers nonstructural measures to be those directly related to structures – relocating them, buying them out, elevating them, floodproofing them, operating them (the reservoirs), warning them, and zoning them. The major missing piece here is nature-based alternatives, discussed below.

Nature-Based Alternatives

Again, the missing piece, despite the extensive requests during the scoping process, remains the investigation of nature-based alternatives. A combining of concepts – the Dutch and Louisiana multiple lines of defense for storm surge and the “holding water where it falls, before it enters the bayou” action for stormwater in the Living Safely With Water section of the Resilient Houston plan – holds promise for flood damage reduction for the entire Houston region. Such an approach could create redundancy for increased safety through distributed, decentralized, lower cost, nature-based, and resilient solutions, such as those proposed by the Katy Prairie Conservancy and supported by other groups. Among the nature-based projects proposed are the following:

- Expanded land conservation on the Katy Prairie, to store up to nearly 10,000 acre-feet of stormwater.
- Shallow detention areas in the upper Cypress Creek watershed, to store up 26,000 acre-feet of stormwater.
- Detention along Cypress Creek, to store 7,400 acre-feet of stormwater.
- Medium retention in upper Addicks watershed, to store up to 60,000 acre-feet of Cypress Creek overflows.
- Retention along Bear & South Mayde creeks, to store up to 50,000 acre-feet of stormwater.

The above projects would best be evaluated along with two projects rejected by the USACE: (a) excavation of the reservoirs, to increase their storage capacity, as much as doubling it; and (b) a tunnel, to convey excess stormwater from the reservoirs to the San Jacinto River.

All these projects provide multiple benefits; some do not require environmental permits; and many can be replicated in other watersheds.

Other nature-based measures suggested through the scoping process (as noted by Houston Stronger) included:

- Preserving the Katy Prairie through land acquisition
- Restoring native habitats and bayous
- Using green infrastructure in place of gray infrastructure
- Preserving natural features such as oxbows and meanders
- Removing invasive trees from the reservoirs
- Constructing a series of detention ponds throughout the system – taking into account the work already being performed by HCFCO
- Preserving and restoring the Katy Prairie and other important wetland, grass land and forested habitat types.

It is also valuable to remember the lessons studied and learned after Harvey, through the work of the Greater Houston Flood Mitigation Consortium, an independent collaboration of experts and advocates to advance resilience by collecting, analyzing and sharing the data collected from Harvey to inform decision-making for the future. One of their reports, issued in May 2019, was *Cypress Creek Watershed: Analysis of Flooding & Storage Options*. The study’s purpose was to investigate the benefits of adding more storage in the upper watershed to mitigating flooding downstream on Cypress Creek and to Buffalo Bayou. The Study’s third conclusion supported preserving undeveloped land in the upper watershed to keep flooding and overflow from getting worse. (The other two conclusions were more focused on potential downstream flooding solutions for Cypress Creek.)

Conclusion

This Study should be wholly rejected for not adequately addressing the points outlined above. We need the USACE to go back to the drawing board and create a new plan that combines the best regional recommendations: specifically, a plan that incorporates alternatives not included in the October 2020 Interim Report, plus modification and/or further investigation of two Study alternatives (tunnel(s) and excavation). That is, we need a plan that is more comprehensive, more sustainable and resilient, more cognizant of watershed processes and stream geomorphology – rather than the complete destruction or disruption of the natural, recreational, aesthetic and socioeconomic benefits of what could be a healthy bayou ecosystem with natural stable channel design and a healthily functioning riparian corridor.

[Sources: USACE BBRTS Interim Report, Katy Prairie Conservancy, Houston Stronger, Memorial Park Conservancy, Buffalo Bayou Partnership, Turtle Survival Alliance, Allen Boone Humphries Robinson, Harris County Flood Control District, Resilient Houston, Biohabitats, Greater Houston Flood Mitigation Consortium, and Public-Private Partnerships for Flood Risk Mitigation Workshop by AccelerateH2O]

Sincerely,



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