



8 February 2019

U.S. Army Corps of Engineers, Galveston District
Attention: Ms. Jennifer Morgan
Environmental Compliance Branch
Regional Planning and Environmental Center
P.O. Box 1229
Galveston, Texas 77553-1229
Sent via Email <CoastalTexas@usace.army.mil>

RE: Coastal Texas Protection and Restoration Feasibility Study and Draft Integrated Feasibility Report & Environmental Impact Statement

Dear Ms. Morgan,

Bayou City Waterkeeper¹ and Healthy Gulf² appreciate the opportunity to comment on the Coastal Texas Protection and Restoration Feasibility Study ("Coastal Texas Study") and Draft Integrated Feasibility Report and Environmental Impact Statement ("DIFR-EIS"). The following comments are limited to the preferred alternative for the Coastal Texas Study Upper Texas Coast planning area in the counties of Brazoria, Chambers, Galveston and Harris, unless otherwise noted.

We recognize the efforts that went into the development of the Coastal Texas Study and DIFR-EIS, and appreciate the U.S. Army Corps of Engineers (USACE) and Texas General Land Office's (GLO) efforts to meet with stakeholders during this planning process. However, there are significant concerns that must be addressed before a final feasibility report and environmental impact statement are issued. While we recognize the need for storm protection for our coastal communities, the placement of large coastal storm risk management structures could create significant and permanent effects on the ecological health of Galveston Bay and places residents directly in harm's way.

As supported by the comments below, we call upon the U.S. Army Corps of Engineers to produce a comprehensive Supplemental Environmental Impact Statement (EIS) to adequately address our concerns. We

¹ Bayou City Waterkeeper seeks to protect and restore the integrity of our bayous, rivers, streams, and bays throughout the Lower Galveston Bay Watershed working to make our waterways fishable, swimmable, and drinkable for all. (2010 N. Loop West, Ste 275, Houston, TX 77018)

² Healthy Gulf, formerly Gulf Restoration Network, is a region-wide organization committed to uniting and empowering people to protect and restore the natural resources of the Gulf Region. (PO Box 2245, New Orleans, LA 70176)

have significant questions regarding the scope and design of the Coastal Barrier Tentatively Selected Plan (TSP). Additionally, we do not believe that USACE has met the threshold requirements of the National Environmental Policy Act (NEPA) and are thus opposed to the project put forward in the Coastal Texas Study and DIFR-EIS.

I. Ambiguity in the Tentatively Selected Plan

In Section 4.3.4.4, the USACE indicates, “For planning purposes, the team has evaluated a levee/floodwall system across Bolivar Peninsula and Galveston Island; however, the team recognizes that there are opportunities to optimize the design and alignment to minimize impacts to existing structures and the environment on the peninsula and island. Future design efforts would focus on where engineered dune systems may be appropriate versus levees and floodwalls.”

Representatives from the USACE and GLO have consistently indicated that the Coastal Barrier TSP placement is “just a line on the map.” In December, a USACE representative stated that the Coastal Barrier is “only at 10% design.”³ Without the knowledge and understanding of the location and design of the proposed levees/floodwalls and environmental surge gate structures it is impossible for the public to provide meaningful, informed comments assessing the Coastal Barrier project. Given the lack of comprehensive details regarding the project, the Coastal Texas Study and DIFR-EIS do not meet the requirements of a complete EIS.

This deferral of assessing the true impacts of this alternative fails to “[r]igorously explore and objectively evaluate” the environmental and community impacts of this alignment.⁴ If this alignment is only 10% designed, it would be impossible for the USACE to do this rigorous evaluation.

Review of the project description and environmental assessment reveals that the Coastal Barrier will significantly impact the human environment and must be the subject of a comprehensive environmental impact statement prior to construction. Due to the significant environmental impacts of the Coastal Barrier project, it is imperative that this project undergo a separate and detailed EIS under NEPA. An EIS is required for all “major Federal actions significantly affecting the quality of the human environment”.⁵ “If *any* ‘significant’ environmental impacts might result from the proposed agency action then an EIS must be prepared *before* agency action is taken.”⁶

According to NEPA regulations, determining whether an action “significantly” affects the environment requires consideration of both context and intensity.⁷ *Context* means that “the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole.

³ Ferguson, John Wayne. “Groups say maps shows Corps’ true plans for coastal barrier,” Galveston Daily News. 3 December 2018. https://www.galvnews.com/news/article_06461717-6df2-57a6-bbcd-27a5828fea0e.html

⁴ 40 C.F.R. § 1502.1 (2014). The purpose of an EIS is to “inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.” *Id.*

⁵ 42 U.S.C. § 4332(2)(C); 40 C.F.R. § 1501.4.

⁶ *Sierra Club v. Peterson*, 717 F.2d 1409, 1415 (D.C. Cir. 1983)(emphasis in original).

⁷ 40 C.F.R. § 1508.27.

Both short- and long-term effects are relevant.”⁸ A “significant” impact may exist due to “unique characteristics of the geographic area such as proximity to . . . park lands, . . . wetlands, . . . or ecologically critical areas.”⁹ An action may have significant effects on the environment that trigger the completion of an EIS regardless of whether those impacts are negative or beneficial impacts.¹⁰

The Coastal Barrier will have a significant effect on local and surrounding communities. It is unacceptable for the USACE to release incomplete studies. Comprehensive studies are necessary for the public to review and determine the direct and indirect environmental impacts of the project. Home and business owners, landowners and non-governmental organizations (NGOs), need this information to make informed comments about impacts to their assets. There are NGOs in the Upper Texas Coast that manage lands specifically protected for their habitat and water quality functions, and it is currently impossible to evaluate the full expected impact on those lands. The interested public should have the necessary information about what impacts the implementation of the Coastal Barrier may have on property habitat, water quality and wildlife that live in surrounding area.¹¹

II. Community Impact

Property Ownership

The impact assessment of buildings, structures, businesses and residences on Bolivar Peninsula and Galveston Island is inaccurate in the DIFR-EIS. Our analysis of GIS data from the USACE, Houston-Galveston Area Council (HGAC), and Galveston County shows significantly more structures will be affected than are listed in the DIFR-EIS. Two key analyses were completed regarding property affected by the Coastal Barrier proposal. Property ownership and buildings were each analyzed separately with respect to the Coastal Barrier.¹² We compared our tabulations with those put forward by the USACE.¹³ The City of Galveston was excluded from all of our analyses, since Galveston already has a floodwall and thus contains fewer properties that will be further damaged or condemned.

Our analysis found the projected real estate costs in the DIFR-EIS to be alarmingly low. Even excluding the City of Galveston from the USACE’s estimates, the numbers are lower than what we found. The numbers of structures listed as affected in the DIFR-EIS were also significantly lower than our analysis showed, and furthermore the USACE’s own data is inconsistent with the projected costs.

The USACE estimates approximately \$660 million¹⁴ in real estate costs (Table 10-1, Appendix F), including the City of Galveston. As illustrated in Table 1 below, we estimate similar cost for only parcels underlying the Coastal Barrier excluding the City of Galveston, thus an accurate estimate would be higher. Furthermore, the USACE fails to assess property value or remediation cost for the thousands of properties that sit toward the Gulf of Mexico (“flood side”), from the Coastal Barrier. Through this analysis, we estimate that over 11,700 potentially unprotected parcels are on the flood side of the Coastal Barrier, with a combined worth of more than \$2 billion.

⁸ 40 C.F.R. § 1508.27(a).

⁹ 40 C.F.R. § 1508.27(b)(3).

¹⁰ 40 C.F.R. § 1508.27.

¹¹ This includes - but is not limited to - erected structures, construction disruption, traffic congestion, evacuation routes,

¹² The Coastal Barrier data was obtained from USACE in public records Freedom of Information Act request (FOIA).

¹³ USACE 2018. Coastal Texas Protection and Restoration Study, [Real Estate Appendix F](#).

¹⁴ USACE 2018. Coastal Texas Protection and Restoration Study, [Real Estate Appendix F](#). p. 10-2, Table 10-1.

We assert that properties on the flood side would experience more volume and intensity of flooding from storm surges that do not overtop the Coastal Barrier.

Table 1. Real Estate Analysis Comparison

Real Estate Analysis - Parcels	<u>Parcels</u> Healthy Gulf* ¹⁵	<u>Value</u> Healthy Gulf*	<u>Tracts</u> USACE**	<u>Tracts</u> USACE ^a	<u>Value</u> USACE ^a
Under the Levee	1,697	\$654m	1,460	1,701	\$658m
Gulf of Mexico Side of the Levee	11,749	\$2.1b	n/a	n/a	n/a
Combination	13,446	\$2.79b	1,460	1,701	\$658m

All USACE data excludes Clear Lake Gates unless specified.

*Data from Galveston County and HGAC. Actual Healthy Gulf Property Values: Under Levee = \$653,756,068; Gulf side = \$2,135,807,578; Total = \$2,789,563,646

**Excluding city of Galveston

^a Including city of Galveston

There are inconsistencies in the DIFR-EIS within different sections of the real estate assessment and costs. For example, in Appendix F, section 4.2.1 Table 4-1 the total number of estimated tracts to be acquired (either as fee simple or flood protection easement) is 1,701. However, calculations from DIFR-EIS Table 10-1 (Appendix F) show only 342 tracts and 20 subdivisions as condemnation costs. In addition, the amount allocated for “relocations” is limited to \$34,000 per landowner (\$10,200 for tenants).¹⁶ USACE gives no indication of how comprehensive the compensations are for those affected by relocation. For example, do relocation expenses include food, lodging, transportation and lost wages compensation? We request that for any Coastal Barrier project the USACE propose detailed relocation amounts that meet current standard of living in the Greater Houston region. Furthermore, the DIFR-EIS gives no indication of how the \$43 million specified for relocations¹⁷ would be divided between property owners, tenants and business expenses. A comprehensive real estate assessment should include: a) how many tracts would be condemned, b) at what rate would landowners and tenants be reimbursed/compensated for their loss; and, c) what are the parameters of relocation costs?

In addition to property owners, communities stand to lose money due to the Coastal Barrier. The DIFR-EIS does not address the loss of tax base that would occur from relocation. Property taxes accounted for 69% of revenue funding Galveston County in 2017, and that number has increased each year since 2014¹⁸. In a county of 300,000 people,¹⁹ every bit of revenue matters. Property value and property taxes are extremely important for the county’s tax base (Table 2). Affecting properties worth \$2 billion (Table 1) would significantly weaken the coast’s contribution to Galveston County’s revenue.

¹⁵ Values have been refined from the [Divided We Fail Report](#) (Jan 2019) for further accuracy.

¹⁶ USACE 2018. Coastal Texas Protection and Restoration Study, [Real Estate Appendix F](#). p. 11-1.

¹⁷ USACE 2018. Coastal Texas Protection and Restoration Study, [Real Estate Appendix F](#). p. 10-2, Table 10-1.

¹⁸ Compiled from Galveston County annual financial reports: <http://www.galvestoncountytexas.gov/Pages/Financial-Transparency.aspx>

¹⁹ Galveston County, Texas. Comprehensive Annual Financial Report. p. 42.

<http://www.galvestoncountytexas.gov/ao/AnnualFinancialReports/CAFR%202017%20Final.pdf>

Table 2. Percent of Revenue from Property Taxes in Galveston County, TX

Year	2014	2015	2016	2017
Percent of Revenue*	56.4 %	58.8 %	63.5 %	69.1 %

*Data from Galveston County financials.

There are also secondary effects that could cause people to move away from or refrain from investing in the area. These include decreases in property value for properties on the flood side, decreased property value from a change in viewshed or ease of access, disruption of business during construction or maintenance of the Coastal Barrier, and an increase in insurance rates. The prohibitive cost of insurance alone could keep people from investing in property in the area, or drive already established homeowners away. As of now, property owners on the coast pay up to \$8,000 in homeowners insurance per year, and are required to carry insurance for storm-based damages²⁰. In other parts of neighboring Harris County, for similarly sized properties, residents in the 100-year floodplain pay \$3,200 and those outside the floodplain \$450. The already-high insurance rates on the flood side of the Coastal Barrier would most certainly go up.

The Coastal Barrier is not justified especially given that Galveston County has already spent millions of dollars in property mitigation and condemnation following Hurricane Ike. By the end of FY 2017, Galveston County had spent \$80.1 million in property buyouts, funded by the Federal Emergency Management Agency (FEMA) and GLO. In addition to direct buyouts, Galveston County spent \$213.8 million in elevating homes, home improvement and other replacement. It is irresponsible to turn a blind eye to the almost \$300 million already spent on the Texas coast for remediation and rehabilitation. The DIFR-EIS does not address overlap or redundancy with Galveston County's expenditures. For example, would the levee condemn properties that were recently rebuilt with taxpayer dollars? It is impossible to properly evaluate the Coastal Barrier project without knowing the full details of the project plan.

Existing Coastal Structures

In addition to property ownership analysis, we examined the presence of buildings and structures on the coast. The USACE estimated that "1,000 structures" might see induced flooding as a result of the Coastal Barrier²¹. Publicly available data was utilized to examine the reach of the barrier, along with buildings that would be subject to induced flooding. Our analysis found more than three times the number reported by the USACE of structures would see induced flooding (Table 3).

²⁰ Baddour, D., "[Deep in debt, flood insurance program expected to boost rates](#)". Houston Chronicle, 17 Mar 2017.

²¹ USACE 2018. Coastal Texas Protection and Restoration Study, [Real Estate Appendix F](#). p. 9-1.

Table 3. Buildings/Structures Comparison

Buildings source dataset from the nationwide Microsoft US Buildings Footprint coverage, and refined to 2014-2015 imagery by the Houston Galveston Area Council (HGAC).

Buildings Analysis	<u>Buildings</u> Healthy Gulf	<u>Buildings</u> USACE
Under the Levee	299	n/a
Gulf of Mexico Side of the Levee	3,508	1,000
Combination	3,807	1,000

Furthermore, through error checking we found that our calculation of 3,800 structures in harm's way was a very low estimate. We compared the buildings dataset used for our analysis to 2018 aerial photographs. We found that our calculation could be as low as half of the number of actual structures on the ground (see Appendix A, Figure A1). A detailed explanation and justification of the USACE estimate of 1,000 structures that would be flood side of the barrier is paramount to fully understand the scope of impact.

Induced Development

According to a National Research Council report, "A frequent consequence of levee construction is human settlement of areas behind levees, as these areas may be seen as safe for development and habitation. This phenomenon may take place in previously undeveloped and uninhabited areas; similarly, it may occur in flood-damaged areas such as New Orleans, where settlement or resettlement may take place behind strengthened and raised levees."²² Further, the Association of Floodplain Managers concludes that "levees are not a wise community choice and should never be used to protect undeveloped land so development can occur in the flood risk area behind the levee."²³ However, a levee/floodwall is what is proposed by the Preferred Alternative.

Once a levee is built, it gives community members a sometimes false sense of security. They do not understand that levees and floodwalls do not guarantee flood protection.²⁴ The Coastal Texas Study and DIFR-EIS does not adequately address the issue of induced development around the proposed Galveston Island levee or behind the levee on Bolivar Peninsula. Two of the objectives of the Coastal Texas Study and DIFR-EIS are to "[r]educe economic damage to businesses, residents, and infrastructure," and "2. [r]educe risk to human life from storm surge impacts." Building massive levees and floodwalls may in fact not achieve either of these goals and actually exacerbate the problem.

²² National Research Council 2009. Final Report from the NRC Committee on the Review of the Louisiana Coastal Protection and Restoration (LACPR) Program. Washington, DC: The National Academies Press. <https://doi.org/10.17226/12708>.

²³ ASFM 2007. National Flood Policy Challenges, Levees: The Double-edged Sword. ASFM White Paper. https://www.floods.org/PDF/ASFPM_Levee_Policy_Challenges_White_Paper_021907.pdf

²⁴ Lundy J and G M Kondolf. 2012. Flood risk perception in lands "protected" by 100-year levees. Natural Hazards. http://www.floods.org/ace-files/documentlibrary/Hot_Topics/LudyKondolf2012_FloodRiskPerceptionPaper.pdf

III. Incomplete Cost-Benefit Analysis

Given the uncertainty and lack of design for the Coastal Barrier alignments and the gate components, we believe that the cost-benefit analysis in the DIFR-EIS does not reflect the range of actual costs. Map data that we received from a Freedom of Information Act (FOIA) response from USACE and the U.S. Fish and Wildlife (USFW)²⁵ suggest that the USACE has a particular alignment plan - despite the USACE indication at public meetings that it is still considering a wet beach “dune-levee” system alignment in lieu of the “earthen levee/floodwall” system as presented in the TSP and its reference in the DIFR-EIS.^{26,27} The USACE also indicated that the environmental gates could take many forms, such as lift gates, Thames Barrier rotating gates, or piston-hinge gates.

Logically, it would be difficult to perform a cost-benefit analysis without making some choices and assumptions. Thus, we maintain that the cost-benefit analysis is most likely based on an earthen levee/floodwall system. Importantly, the costs to construct and maintain such an earthen levee/floodwall system placed north of Hwy. 87 on Bolivar Peninsula and FM 3005 on Galveston Island will vary greatly from a dune-levee system constructed on a wet beach. For example, the costs to mitigate for direct impacts to jurisdictional wetlands in the footprint of the system alignment would be much higher for a dune-levee system. Therefore, we believe the Coastal Barrier cost-benefit ratio presented in the DIFR-EIS is lacking in significant details and accuracy.

Other components of the cost-benefit analysis presented in the DIFR-EIS are vague and consequential. For example, there is only a brief discussion of the location for dredge and fill material for any barrier. As correctly cited in the DIFR-EIS, the location of fill material could dramatically increase the cost of transporting it. Similarly, there is no specification if the same source will be used for maintenance fill, beach nourishment or other sediment supply needs.

The vagueness around the fill material cost is unacceptable, as this variable could change the cost-benefit ratio dramatically. Another example of missing information for the cost-benefit analysis of the TSP is accounting for Relative Sea Level Rise (RSLR). Accounting for a larger range of RSLR scenarios would generate different cost-benefit scenarios. We urge the USACE to take all of these factors into account and issue a revised cost-benefit analysis incorporating our concerns.

Given that many proposed alternatives have been recognized by the USACE - both officially and unofficially - as potential options, we ask that the USACE provide a thorough cost-benefit ratio analysis for each proposed component²⁸ so the public has a clear understanding of the benefits and loss of each.

²⁵ See our GIS map here <<http://bit.ly/galvmap>>. Developed by Healthy Gulf, Bayou City Waterkeeper, Turtle Island Restoration Network, and Galveston Bay Foundation utilizing shapefile information obtained from the referenced FOIA requests by Healthy Gulf, Bayou City Waterkeeper, and Galveston Bay Foundation. See the FOIA Timeline here: <https://bit.ly/2SJw92t>

²⁶ e.g. City Council of the City of Galveston Workshop. “Update From U.S. Army Corps Of Engineers Galveston District On The Coastal Texas Protection & Restoration Feasibility Study.” 23 Aug 2018.

²⁷ Texas Coastal Study & DIFR-EIS. Section 4.3.4.4

²⁸ i.e. Earthen Levee and Floodwall; wet beach dune-levee system; individual analysis for each proposed environmental sector flood gate type and location.

IV. Inadequate Analysis of Environmental Impacts

Geology

The DIFR-EIS plan does not factor in land subsidence, sediment transport, or relative sea level rise (RSLR) seriously enough. Subsidence has been an historical problem for Galveston Island and Bolivar Peninsula due to human action.²⁹ Between post-war 1940s to the late 1970s, groundwater extraction reached unprecedented levels in Galveston County, and resulted in very high subsidence rates along the coast.³⁰ Subsidence rates have decreased and stabilized in recent years to less than 3 mm/year.³¹ Oil and gas drilling and extraction have also been extensive in the region, and contribute to subsidence.

Sediment supply and sea-level rise, in addition to subsidence, all play a part in determining coastal stability and erosion. The DIFR-EIS cites subsidence, sediment supply and RSLR as contributors to erosion and land loss. However, the USACE does not discuss differential subsidence. Differential subsidence refers to one part of the land sinking faster than its neighbors. Subsidence and erosion could accelerate under either “T” or “I” walls if not placed properly at depth. Subsurface flow underneath the levee would create erosion. The maintenance and remediation costs of such events is not reflected in the DIFR-EIS. Furthermore, subsurface erosion would contribute to accelerated local subsidence. The depth of any Coastal Barrier system would need to be appropriate for preventing such erosion. Subsurface flow and remediation of unintended consequences should be evaluated and included in the cost-benefit analysis of a complete EIS. A full evaluation and assessment of differential subsidence throughout the area where a Coastal Barrier system would be implemented is essential.

The issue of sediment supply is not sufficiently addressed in the DIFR-EIS. Rigorous geological sampling and sediment modeling has shown that, “Sediment supply to the [North Texas] coast is not sufficient to keep up with the current rate of sea level rise.”³² Given this, and the failure of other beach nourishment attempts in the area, we demand a detailed breakdown of the plan and cost for maintenance and source material for beaches and dunes in Galveston County.

The mitigation plan does not account for an increase in dredge/fill permits behind the Coastal Barrier due to an increase in population growth and development. Revetments and breakwaters will not protect freshwater marshes in dunes and coastal prairies from loss due to sea level rise and the construction and operation of the Coastal Barrier. A 10-year timeframe to create marshes will result in marsh loss as sea level rises during the marsh creation process. The USACE fails to state how long any restored wetland or marsh habitat will last before sea level rise and erosion from the Coastal Barrier structures overwhelms these habitats.

Only the more conservative model predictions of RSLR are utilized in the DIFR-EIS. In Appendix D, USACE shows the RSLR modeling used in the study in comparison with the definitive National Oceanic and Atmospheric Administration (NOAA) predictions in Figure 2-13.^{33,34} The USACE model aligns most closely with the NOAA 2017

²⁹ Anderson and Wallace (2011), *I. Science Behind the Plan*, Atlas of Sustainable Strategies for Galveston Island, Rice University, TX. 24 pp.

³⁰ [Anderson and Wallace \(2011\)](#); A. Kolker personal communication; see also https://txpub.usgs.gov/houston_subsidence/home/

³¹ Yu et al. (2014) [Is There Deep-Seated Subsidence in the Houston-Galveston Area?](#) International Journal of Geophysics, Volume 2014, Article ID 942834, 11 pp.

³² [Anderson and Wallace \(2011\)](#). p. 13

³³ USACE 2018. Coastal Texas Protection and Restoration Study, [Appendix D](#). Figure 2-13, p. 2-23.

³⁴ Sweet et al. (2017) Global and Regional Sea Level Rise Scenarios for the United States. NOAA Tech. Report NOS CO-OPS 083.

“low” scenario prediction. This indicates that the conclusions in the DIFR-EIS regarding climate change and sea level rise are all based on a low rate of RSLR change, rather than a robust range of predictions. In addition, details of the models used are not available in the DIFR-EIS. From Appendix D,

“More details on each of the numeric models, sample validation results and a description of how they were applied to the Coastal Texas Study can be found in the detailed report *to be provided* by ERDC (Massey, 2018).”³⁵ (emphasis added)

The report cited therein from Massey et al. 2018 is listed as “in process” and was still not available as of February 8th, 2019. An EIS should be completed that takes into account the range of NOAA’s RSLR scenarios. The models and predictions should be available to the public for review, before any Coastal Barrier project can be fully evaluated. Furthermore, using the low rate is irresponsible, given the high cost and high risk of the project. The definitive NOAA report from 2017 states, “The growing evidence of accelerated ice loss from Antarctica and Greenland only strengthens an argument for considering worst-case scenarios in coastal risk management.”³⁶ The RSLR prediction given in the USACE models have a 66% chance of occurring. This level of risk (34%) seems too big, since the consequences of being wrong would be so costly. We do not believe that the construction of the Coastal Barrier System is worth the capital cost and the environmental and socio-economic risk to the region and its residents. The EIS should to include a large envelope of RSLR model predictions for the basis of its analysis. The cost-benefit analysis should also be revised, once the higher RSLR scenarios are incorporated.

One area of particular environmental concern is San Luis Pass. Existing flow patterns are such that San Luis Pass captures only about 12 percent of the flow between the main body of Galveston Bay and the Gulf of Mexico, as stated in the DIFR-EIS itself.³⁷ USACE acknowledges the increased velocity, flow and scour through San Luis Pass that would occur if the surge gates were closed during a storm.³⁸ However, we maintain that the surge gate structures themselves, even with the gates were open, would create a detrimental constriction. The structures would restrict flow through Bolivar Roads, and even under normal conditions significantly more water would be shunted through the West Bay toward San Luis Pass.

In a storm scenario, with the surge gates closed, there could be intense scour from high velocity water shunted to the Pass. Furthermore, sediment and fresher water are more likely to be entrained in the West Bay or wetlands, because of the restriction of flow already present due to the bridge structure over the Pass. The geomorphology, salinity and hydrologic regimes of San Luis Pass and the West Bay would be significantly altered. While the USACE acknowledges some of the geomorphological changes that could occur, a full account of the effects of a Coastal Barrier system, including sediment modeling and budgeting, is essential before an adequately comprehensive review of the plan can be completed.

Salinity

Salinity regimes will change significantly in Galveston Bay and surrounding estuarine waterways due to a Coastal Barrier system. Surge gates in particular will change the salinity regime in Galveston Bay and especially San Luis Pass (see above, in “*Geology*”). Other features of the Coastal Barrier proposal also have the potential to alter

³⁵ USACE 2018. Coastal Texas Protection and Restoration Study, [Appendix D](#). p. 34.

³⁶ Sweet et al. (2017) Global and Regional Sea Level Rise Scenarios for the United States. NOAA Tech. Report NOS CO-OPS 083, p. 14.

³⁷ Coastal Texas Study & DIFR-EIS. p xxii.

³⁸ *Ibid.* p 5-6.

salinity, such as dredge and fill materials and construction byproducts or run-off. The East Bay and Trinity Bay areas could see a shift to fresher water, since constriction at Bolivar Roads could restrict outflow of freshwater and inflow of saltier water.

Changes in salinity in the bay and the marine waters would have lasting impacts for aquatic life, as well as potentially exacerbating climate change. Salinity changes will affect Galveston Bay food webs. The DIFR-EIS mitigation plan (Appendix C-9) fails to discuss impact to food webs. Instead, the mitigation plan is concerned with habitat for three species (alligator, brown shrimp, oysters). While we agree these species are critically important, we also request a full review of the effects of a barrier to the entire ecosystem and ecosystem services of Galveston Bay. Mitigation needs to address full ecosystem mitigation, as well as addressing species of special concern.

Furthermore, water with higher salinity can absorb more carbon dioxide and thus contributes more to climate change and ocean acidification. Any change from a fresher area to a more saline area will drive more ocean acidification.

Ecology

Marine mammals, manatees, and piping plovers are all species with special protections under federal law, but with no clear mitigation plan for the Coastal Barrier system implementation. USACE agrees that dolphins will be impacted by the Coastal Barrier system, especially during construction.

“The location and size of the Coastal Barrier makes it the most likely structure to impact dolphin populations. The extended construction time and geographical extent of pile driving necessary to build the Bolivar Roads reach will make noise an important consideration for marine mammal stocks utilizing this region, as discussed above. The Bolivar Roads surge barrier gates have the potential to hinder dolphin movements in and out of the inlet.”³⁹

USACE goes on to state later that plans have been initiated for mitigation of dolphin impact.⁴⁰ However, the public has not been allowed to view or review any plans. Marine mammal impact mitigation must be made public and needs to be included in an EIS.

We are very concerned that the DIFR-EIS understates the potential impacts to oysters. While the USACE has modeled the changes to absolute salinity concentrations, it does not answer the question of the long-term health of the oysters during floods and droughts when the species is at its most vulnerable.⁴¹ Given the critical nature of oysters in Galveston Bay as a keystone species, the USACE must provide detailed information on the potential magnitude and duration of these high freshwater inflow and drought conditions, using data from modeled events and supplemented with data from the many historical events that have occurred in Galveston Bay. Given projected climate change scenarios, these extreme events will inevitably only increase, placing Galveston Bay’s oysters in even more danger due to the effect of the gate constriction at Bolivar Roads on salinity changes.

³⁹ Coastal Texas Study & DIFR-EIS. p. 5-61.

⁴⁰ *Ibid.* p. 7-5.

⁴¹ See Section 5.3.2.2.1 in the Coastal Texas Study & DIFR-EIS.

Overall, the ecological and habitat evaluation of the Preferred Alternative falls short of the basics needed for ecologists and other stakeholders to accurately evaluate the plan.

V. Industry Responsibility

The goals of the Coastal Texas Study and DIFR-EIS include the reduction of “economic damage to businesses” and the reduction of “economic impacts of petrochemical supply-related interruption.” Yet it does not seem that these companies that would benefit this massive spending of public funds are expected to pay their fair share. Specifically, the petrochemical industry is largely responsible for the emission of the pollution that is exacerbating climate change and sea level rise. The Coastal Texas Study and DIFR-EIS should take a hard look at the contributions these private entities have on climate change and sea level rise, and expect them to help in the restoration and protection of Galveston Bay and its surrounding areas.

VI. Working with Nature: Serious Consideration of a Nature-Based Alternative

While we appreciate the incorporation of environmental restoration measures throughout the Coastal Texas Study’s scope of projects, we recommend the full consideration of an alternative comprised entirely of nature-based infrastructure and nonstructural measures. This would include wetland and oyster reef restoration, beach and dune restoration and coastal land acquisitions, along with more localized structural protections for highly vulnerable areas. As NEPA requires, an EIS must provide a “full and fair discussion of significant environmental impacts and . . . inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.”⁴²

Additionally, America’s Water Infrastructure Act of 2018 requires precisely such an analysis:

“(c) NATURAL INFRASTRUCTURE—In carrying out a feasibility report developed under section 905 of the Water Resources Development Act of 1986 (33 U.S.C. 2282) for a project for flood risk management or hurricane and storm damage risk reduction, the Secretary shall consider the use of both traditional and natural infrastructure alternatives, alone or in conjunction with each other, if those alternatives are practicable.”

The Upper Texas Coast must invest in long-term, resilient systems to offset the impacts of sea level rise, coastal erosion, and the threats of major storm events. A nature-based system could provide a mechanism for planning and adaptation that minimizes risk to communities, its economies, and the environment by managing how they are exposed to these risks. A multi-tiered strategy that incorporates nature-based solutions provides the foundational support that unifies the vision of a healthy and protected ecosystem, while also providing critical protection to people, place and property.

⁴² 40 C.F.R. § 1502.1.

VII. Public Participation

We appreciate the U.S. Army Corps of Engineers' extension of the comment period to 8 February 2019, which has allowed for better public participation. However, considering the magnitude of this document, the timing and structure of the public comment period limited the public's ability to fully engage with the process: 1) The comment period coincided with several major holidays; 2) public meetings on the Upper Texas Coast were scheduled less than a month from the initial comment deadline; and, 3) the public was only allotted one-minute for oral testimony (despite attendance and number of speakers).

Despite the extra 30 days granted on the eve of the initial January 9th deadline, the public deserves a more thoughtful and meaningful process to participate. We hope that the USACE and the GLO will take this into consideration when evaluating its public participation processes. We recommend the USACE provide an opportunity for the public to comment and review the Supplementary EIS with a 120-day comment period, at least 2-3 minute oral testimony at public meetings, as well as consider a public question-and-answer period that is heard by all (in lieu of or supplementing an open house). By providing more meaningful opportunities for the public to engage in the process, those with questions and concerns will have the option to be heard and provide better feedback to the overall process.

In Conclusion

Bayou City Waterkeeper and Healthy Gulf reserve the right to rely on all public comments submitted, request a written response to our comments, and request written notification when any action is taken on this Feasibility Study and Draft Integrated Feasibility Report & Environmental Impact Statement. If you have any questions, please contact Jordan Macha at jordan@bayoucitywaterkeeper.org, or Naomi Yoder at naomi@healthygulf.org.

Thank you for your consideration and the opportunity to comment.

Sincerely,

Jordan Macha
Executive Director, Bayou City Waterkeeper

Matt Rota
Senior Policy Director, Healthy Gulf

Cc: Commissioner George P. Bush, Texas General Land Office

Appendix A - Real Estate Analysis Methods

A-1 Data Sources

- I. Healthy Gulf, Bayou City Waterkeeper, and Turtle Island Restoration Network made a Freedom of Information Act records request (FOIA) from the USACE and obtained the proposed Coastal Barrier project footprint. The spatial data was utilized to examine spatial relationships with parcels, buildings and communities that will be impacted.
- II. Parcel data was from the Galveston County Assessor's Office, available here: http://www.galvestoncad.org/index.php/Shape_Files.
- III. Buildings footprint data were from:
 - A. The Houston Galveston Area Council
<https://h-gac.sharefile.com/d-s4dec153ba8947be9> (password protected, free username required for logon)
 - B. ArcGIS
<https://www.arcgis.com/home/item.html?id=9da0f8ae5fee45aca11bf77f712884c8>.
 - C. Original source of the building footprints data from Microsoft
<https://github.com/Microsoft/USBuildingFootprints>.

A-2 Methods: Property Ownership

Parcel polygons from the Galveston County Assessor were trimmed and tabulated based on whether they overlap entirely with the proposed levee, or if they were geographically located toward the Gulf of Mexico from the levee ("flood side"). The analysis was restricted to Galveston Island and Bolivar Peninsula. High Island region parcels where the majority of the parcel occurs above 5 ft elevation were omitted. The City of Galveston was excluded from the analysis. Parcels were split using "Intersect", and then merged and dissolved. The first iteration of the analysis in the [Divided We Fail Report](#)⁴³ did not include the dissolve function, and thus the numbers of the Healthy Gulf analysis have been revised. Property values were calculated using the US dollar value for 2018 from the Galveston County Assessor (field VALTOT18 in the shapefile data table).

A-3 Methods: Buildings

Buildings polygon data from the Houston Galveston Area Council (HGAC) were originally from the Microsoft Buildings Footprint national dataset. HGAC then performed quality checking by comparing the national dataset with aerial photographs from 2014-15. Healthy Gulf quality checks showed many (up to half) the buildings in current photos were excluded (see Figure A1).

Buildings polygons were intersected with the Coastal Barrier layer and dissolved. Then buildings layer was inspected for slivers or outliers that might have overlapped the Coastal Barrier but where the majority of the building was not within the Coastal Barrier. Those slivers and outliers were eliminated. The buildings data was spot checked in several locations along Galveston County coast, and in all cases the buildings layer didn't capture all of the buildings in current aerial photographs. Thus, the calculations made from the building analysis are thought to be very conservative (Figure A1).

⁴³ Eustis, Scott & N. Yoder. Divided We Fail, Healthy Gulf. <https://bit.ly/2RuDFta> (Jan 2019)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, HGAC

Map and Analysis: Gulf Restoration Network 2019

Figure A1. Buildings Analysis Dataset Evaluation - Spot check in Crystal Beach, TX

Limitations

The property values for this analysis did not include the aesthetic damages to coastal views, ecological damages, or restrictions to beach access of properties in question. Including these values would drive the actual property value losses even higher.

Appendix B - December 2018 Organizational Response to Coastal Barrier Alternative

***American Bird Conservancy • Artist Boat • Bayou City Waterkeeper • Defenders of Wildlife
Galveston Bay Foundation • Gulf Restoration Network • Houston Audubon
Houston Sierra Club • Lone Star Sierra Club • National Wildlife Federation
Save Buffalo Bayou • Surfrider Foundation Galveston • Surfrider Foundation South Texas Surfrider Central
Texas • Turtle Island Restoration Network***

Response to Coastal Barrier Alternative

Environmental and Conservation Groups Raise Concerns About Current USACE Plan

Together with conservation groups across the Greater Houston-Galveston region, we offer these comments and concerns to the US Army Corps of Engineers (USACE), General Land Office (GLO), and the decision-makers who support the currently proposed Coastal Spine across Galveston Island, Bolivar Peninsula, and Bolivar Roads.

In October 2018, the Army Corps of Engineers released its Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS) for the Coastal Texas Protection and Restoration Study, outlining its selected plan for the Galveston-Bolivar Coastal Barrier project. The selected Coastal Barrier Alternative— previously designated Alternative A during the alternatives analysis phase—primarily focuses on hard infrastructure consisting of floodwalls, floodgates, and surge barrier gates along and between Galveston Island and Bolivar.

Throughout the scoping process, many organizations have consistently raised concerns about the impacts to the ecology and overall health of Galveston Bay and its surrounding communities. Unfortunately, the Coastal Study and DIFR-EIS have not adequately addressed these issues. Our collective concerns are premised on the following:

The information provided in the Feasibility Report and Environmental Impact Statement is insufficient to enable thorough and informed comments. In particular:

- No clear indication of where the various structures will be placed, which seriously affects current residents and business-owners; and,
- Few details on the overall impacts that affect commercial/recreational fisheries and coastal wildlife habitat; and,
- Concerns regarding the accuracy of ecosystem modeling and the subsequent impacts to people, property, and the environment.

Representatives from the USACE and GLO have consistently indicated that the Coastal Barrier Alternative placement is “just a line on the map.” Recently a representative of the USACE stated that the Coastal Barrier is “only at 10% design.” (Galveston Daily News, Dec. 4, 2018) Knowing the placement and understanding the full scope of the project is vital for evaluating the impacts to people, property, and the environment, as well as the

effectiveness of the proposed Alternative. Without this information, it is impossible for the public to complete an assessment of the Study and DEIS.

Throughout this process, groups have asked the USACE to consider practicable non-structural solutions such as preservation and enhancement of prairies, riparian areas, barrier islands, and wetlands, buyouts/strategic withdrawal from areas that cannot be adequately protected, and appropriate land-use regulation to implement those concepts. A multi-tiered approach that focuses on these kinds of measures can be incrementally applied in the short-term to help provide protection for our communities now—and reduce major harm to the natural resources on which our region is dependent.

We believe that any alternative, or combination of alternatives, must be fully analyzed for environmental impacts as well as cost-benefit ratios – and that in evaluating the alternatives, we must consider the long-term future effectiveness of our selected remedy. Given rapidly changing climatic conditions and their effect on the coastal area, we believe that the projection should extend to 2100.

We believe that the following principles must be applied in formulating a successful flood and storm surge protection strategy:

1. Public, Private and Corporate Responsibility

- An industrial facility should provide its own first line of defense. All industrial facilities in the Greater Houston area should be required to protect themselves from anticipated storm surge and flood waters. This will further protect the general public from releases of hazardous materials caused by flooding.
- Our political subdivisions must pass regulations that prevent development in floodways and floodplains. This will keep people out of harm's way. To prevent contamination of surface water and disruption of essential services, authorities must not permit infrastructure, such as wastewater treatment plants or drinking water treatment plants, in the floodways and floodplains.
- Our development community must recognize that even a rare event, such as flooding from Hurricane Harvey, is an unacceptable disaster when thousands of people and billions of dollars in property have been deliberately placed in harm's way for profit.

2. Preserve and Restore Riparian Capacity, Open Space and Barrier Islands

- Conserve lands that provide more open space and flood capacity, by either the purchase of lands or private conservation easements. Our bayous, given sufficient floodplain, are our natural storm drains and detention systems. Preserving these areas also provides the important secondary benefit of recreational green space.
- Preserving the lands obtained through buyouts of flooded homes and other structures, such as riparian green space, will also increase the capacity of our natural floodways and floodplains. Banning redevelopment of these acquired lands will also contribute to keeping people out of

harm's way.

- Preserving land on our barrier islands and along our Bayfront keeps people out of harm's way and provides a buffer zone to naturally absorb storm surge.

3. Minimize Building Dams, and Dikes and Elevating Roads

- Dams, dikes, and raised roadways should only be employed where nonstructural alternatives are not feasible to protect lives and critical infrastructure from storm surge and flooding.
- Any proposed dams, dikes or elevated roads must be assessed for their potential to exacerbate local and regional flooding, as well as beach/coastal erosion.
- These structural alternatives work against nature. These types of structures may also have the secondary effect of encouraging development in vulnerable areas, effectively moving people into harm's way.

Appendix C - Working with Nature: Coastal Spine Alternative

***Artist Boat • Bayou City Waterkeeper • Christmas Bay Foundation • Defenders of Wildlife
Galveston Bay Foundation • Gulf Restoration Network • Houston Audubon
Houston Sierra Club • Lone Star Sierra Club • Lower Brazos Riverwatch
National Wildlife Federation • Save Buffalo Bayou • Surfrider Foundation Galveston
Texas Campaign for the Environment • Turtle Island Restoration Network***

Working with Nature:

An Economically and Environmentally Sound Storm Surge Alternative for Houston-Galveston Area

The organizations that support this storm surge alternative urge elected leaders and public agencies to first prioritize working with the natural landscape to better protect people and property. To do so reflects a shift in thinking--requiring private industry and individuals to pay their fair share in protecting their own assets and in adapting to the new norm of intense storms.

Non-structural elements must be a significant part of any storm surge protection solution. This is reflected in the Texas General Land Office Coastal Resiliency Master Plan and should receive the same analysis as the structural components during this planning phase. These conservation values for the Texas Gulf Coast will result in a more efficient use of public dollars

This storm surge alternative will deliver better results when cities, counties, and other entities make coordinated non-structural improvements, such as:

1. adopt the tightest coastal development, building, and planning standards possible;
2. prepare and use coastal geo-hazards maps to stop the destruction of wetlands and barrier islands, as well as the ill-advised placement of industrial facilities or housing;
3. improve coordinated emergency and evacuation planning, equipment acquisition, and implementation;
4. acquire more public and private conserved open space and conservation easements; and,
5. plan operation and maintenance on a longer time frame by considering 100 years into the future.

Our Storm Surge Alternative

Below, we have identified key scenarios and opportunities for an alternatives analysis. Due to sea level rise and increased storm intensity, all alternatives must consider operations and maintenance by including a 100-year planning horizon.

Galveston Island and Bolivar Peninsula Area

1. Protect and expand existing public and private conservation lands on our barrier islands.
2. Consider the feasibility of protections that safeguard the populated east end of the City of Galveston.
3. Institute coordinated local, state, and federal programs of voluntary buyouts in particularly vulnerable, risky, and ecologically sensitive areas in Galveston County.

4. Acquire land buffers around existing public and private conservation lands so that these landscapes can migrate inland as sea level rises.
5. Implement ecological restoration projects for Galveston Island and Bolivar Peninsula.

Houston Ship Channel & Baytown Area

1. Require risk assessment by facility owners on industrial complexes, storage tanks and units in areas subject to storm surge.
2. Require implementation of storm surge and flood protection mitigation strategies in industrial complexes by facility owners, such as building and/or improving existing industrial and other levee structures.
3. Consider the feasibility of a structure at/or near the mouth of the Houston Ship Channel in Upper Galveston Bay that protects communities and the natural resources from storm surge.
4. Protect and expand existing public and private conservation lands.

NASA, Clear Lake, West Side of Galveston Bay, and Texas City, La Marque, and Hitchcock Areas

1. Consider a levee and gate at/or near the Clear Lake and NASA area.
2. Improve and maintain the Texas City Levee.
3. Protect and expand existing public and private conservation lands.

San Luis Pass and Christmas Bay Area

1. Implement the Texas Parks and Wildlife Department Follet's Island Initiative or larger conservation land project.
2. Implement ecological restoration projects for Christmas Bay and other habitats behind Follet's Island.
3. Protect and expand existing public and private conservation lands on our barrier islands.

East Side of Galveston Bay Area

1. Protect and expand existing public and private conservation lands.
2. Institute coordinated local, state, and federal programs of voluntary buyouts, in particular vulnerable, risky, and ecologically sensitive areas in Galveston and Chambers Counties.
3. Implement ecological restoration projects for the East side of Galveston Bay.

Conclusion: The Triple Bottom Line to Enhance Communities

When social, environmental and financial values are considered, protection of natural resources will rise to the top in any cost benefit analysis and more effectively keep people out of harm's way.

Our goal is to provide an economically feasible alternative that will protect people from dangerous pollutants, protect the refinery and petrochemical infrastructure from storm surge breach, and protect our remaining important and ecologically sensitive places in and around Galveston Bay.