

Alternative Analysis

The purpose of the proposed project is for channel maintenance that is necessary to improve flood conveyance, stabilize the channel side slopes within the Outfall #13 drainage ditch, and to prevent loss of land on adjacent private properties due to lateral erosion. Significant erosion within the existing facility has created a discontinuous channel with opportunities for shallow pools and stagnant water throughout the channel which can create a health hazard to the surrounding population. The intermittent stream portion of the ditch is experiencing extreme bank erosion and in-channel instability is threatening to undermine the bridge structure at Townsen Boulevard. The project is needed to improve the existing facility so that it can adequately support the FM 1960 widening project by providing more efficient drainage within the project area.

Under the No-Build Alternative the existing channel would not be improved, the channel would continue to erode, and the health hazards presented by stagnant pools would still be present. The current and future anticipated erosion conditions would not be mitigated and effective stormwater conveyance would not occur for the citizens of the City of Humble and the general traveling public along FM 1960 in the project area.

Due to right of way (ROW) limitations, only a single build alternative was considered (Alternative 1). TxDOT is constrained by existing ROW bordering several privately owned parcels and does not have any flexibility to explore lateral drainage alternatives to facilitate stormwater runoff.. Additionally, limited construction materials are available to provide the sediment/slope stability to the Outfall #13 drainage ditch, due to the poorly consolidated sandy loams. To accomplish the purpose of this project, the build alternative, Alternative 1, would be considered the least environmentally damaging practical alternative.

Mitigation Plan

Proposed Wetland Mitigation

The Riverine Herbaceous/Shrub HGM Interim (HGMi) Model was were utilized to evaluate current wetland functions, predict potential changes to wetland functions that may result from proposed activities, and to calculate the pre-project and post-project Functional Capacity Index (FCI) and Functional Capacity Units (FCU) for the project wetland. A Wetland Functional Assessment Report is included in **Appendix J. Table 1** summarizes wetland functional loss potentially caused by the proposed project, please see **Appendix J** for a detailed summary per individual wetland functional loss.

Table 1. Pre- and Post-project FCUs for Wetlands Within the FM 1960 Outfall Ditch #13 Project Area

	Wetland Type	Formula Names	Pre-Project FCU	Post-Project FCU	Net FCU Loss	FCU Debits to Offset at Tarkington Bayou Mitigation Bank
	WET 1- Emergent Wetland	Temporary Storage & Detention of Storage Water	2.738	0.000	2.738	2.738
		Maintain Plant and Animal Communities	2.550	0.000	2.550	2.550
		Removal & Sequestration of Elements & Compounds	2.792	0.000	2.792	2.792

Table 2. FCU Project Impact Debits and Proposed FCU Credits to be Purchased at Tarkington Bayou Mitigation Bank for Unavoidable Impacts to Wetlands Within the FM 1960 Outfall Ditch #13 Project Area

	Wetland Type	Formula Names	FCU Debits to Offset at Mitigation Bank(s)	FCU Credits to be Purchased at Mitigation Bank(s)
	WET 1- Emergent Wetland	Temporary Storage & Detention of Storage Water	2.738	2.8*
		Maintain Plant and Animal Communities	2.550	2.8*
		Removal & Sequestration of Elements & Compounds	2.792	2.8*

* Mitigation credits to be purchased in a suite, with the highest impact debit, Maintenance of Plant and Animal Communities, determining number of credits to be purchased for Temporary Storage and Detention of Storage Water and Removal and Sequestration of Elements and Compounds.

Compensatory wetland mitigation to offset the physical, biological, and chemical functions were evaluated from a watershed approach as outlined in Compensatory Mitigation for Losses of Aquatic Resources under CWA Section 404 (Final Rule). The United States Army Corps of Engineers (USACE)

Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) indicate that the unavoidable wetland impacts of the project are located within the primary service area of two mitigation banks: Greens Bayou Wetlands Mitigation Bank (GBWMB) and Tarkington Bayou Mitigation Bank (TBMB). Two additional mitigation banks, Gin City Mitigation Bank (GCMB) and Spellbottom Mitigation Bank (SMB), could potentially offset project impacts but the project is located within the secondary service areas of these two banks and both only have forested wetland credits available.

Based on conversations with Harris County Flood Control District (HCFCD), the Bank Sponsor of GBWMB, no mitigation credits are currently available for purchase at this mitigation bank. TxDOT Houston District is proposing to purchase mitigation credits from TBMB to offset all unavoidable impacts to wetlands. Based on conversations with, TBMB will have emergent wetland credits available at the time of permit issuance. The applicant proposes to offset all emergent wetland impacts at a 1:1 mitigation ratio. Therefore, a total of 2.8 emergent HGMi credits, sold as a suite, would be purchased from TBMB to compensate for unavoidable project impacts to wetlands (**Table 2**).

Proposed Stream Mitigation

TxDOT conducted a Stream Conditional Assessment Report for IS1 utilizing the Galveston District Stream Condition Assessment Level 1 (**Appendix J**). The report details the pre- and post- project condition for channel condition, riparian buffers, aquatic use, and channel alteration of IS1 where unavoidable impacts below the identified OHWM would occur. Unavoidable impacts to IS1 are associated with in-channel placement of gabion baskets and native fill bank grading and changes in riparian buffer type. IS1 was evaluated to determine post-construction conditional scoring by accounting for type of proposed impact and modifications to riparian buffer by increases in cleared maintained right-of-way. The delta, or difference, between the pre-project and post-project functional score was utilized to determine the appropriate impact factor to be utilized in the equation to determine the appropriate mitigation credits required. **Appendix F** depicts the location and type of stream impacts. **Table 3** below details the calculation of stream debits required to be offset by the project.

Table 3. Channel Condition, Riparian Buffer, Aquatic Use, Channel Alteration, and Reach Condition Index Scores- Pre

Waterbody Name	Transect	Name	Channel Condition (CV)	Riparian Buffer (BV)	Aquatic Use (UV)	Channel Alteration (AV)	Condition Index (CI)	Reach Condition Index (RCI)
Pre-Construction IS1	1	Unnamed Tributary to West Fork San Jacinto River	2.00	1.80	1.00	1.00	1.45	1.88
	2		2.00	2.40	1.00	3.00	2.10	
	3		2.00	2.40	1.00	3.00	2.10	
Post-Construction IS1	1	Unnamed Tributary to West Fork San Jacinto River	1.00	1.80	1.00	1.00	1.20	1.23
	2		1.00	2.00	1.00	1.00	1.25	
	3		1.00	2.00	1.00	1.00	1.25	
Pre-Post Construction RCI Delta								0.65
Waterbody Name	Stream Length	Name	Pre-Project RCI	Post-Project RCI	Delta (pre-post RCI)	Impact Factor	LF of Impact ¹	Debits ²
IS1	1908	Unnamed Tributary to West Fork San Jacinto River	1.88	1.23	0.65	2	1765	2,295
Total Project Stream Debits								2,295

1 LF of Impact calculated by Total Stream Length subtracted by Previously Culverted Portion of IS1 (1,908 LF – 143 LF culverted = 1,765 LF)

2 RCI Delta x Impact Factor x LF of Impact = Debits

Compensatory stream mitigation to offset linear WOTUS functions were evaluated from a watershed approach as outlined in Compensatory Mitigation for Losses of Aquatic Resources under CWA Section 404 (Final Rule). The United States Army Corps of Engineers (USACE) Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) indicate that the unavoidable stream impacts of the project are located within the primary service area of Houston Conroe Mitigation Bank (HCMB). A total of 2,295 stream debits are required to offset the impact to project streams. Therefore, TxDOT Houston District anticipates purchasing 2,295 SWG stream credits from HCMB to satisfy stream mitigation requirements for this project.