APPENDIX C: Project Information Sheet for Wetland Value Assessment (US Fish and Wildlife)

U.S. Fish and Wildlife Service, Ecological Services
200 Dulles Drive, Lafayette, LA 70506
(337) 291-3100, FAX (337) 291-3139

MEMORANDUM

DATE: May 18, 2021

TO: U.S. Army Corps of Engineers (NOD)

FROM: U.S. Fish and Wildlife Service (Service)

SUBJECT: Project Information Sheet for the Wetland Value Assessment (WVA) for the proposed Humble Canal Preload Project – Fresh Marsh Impacts.

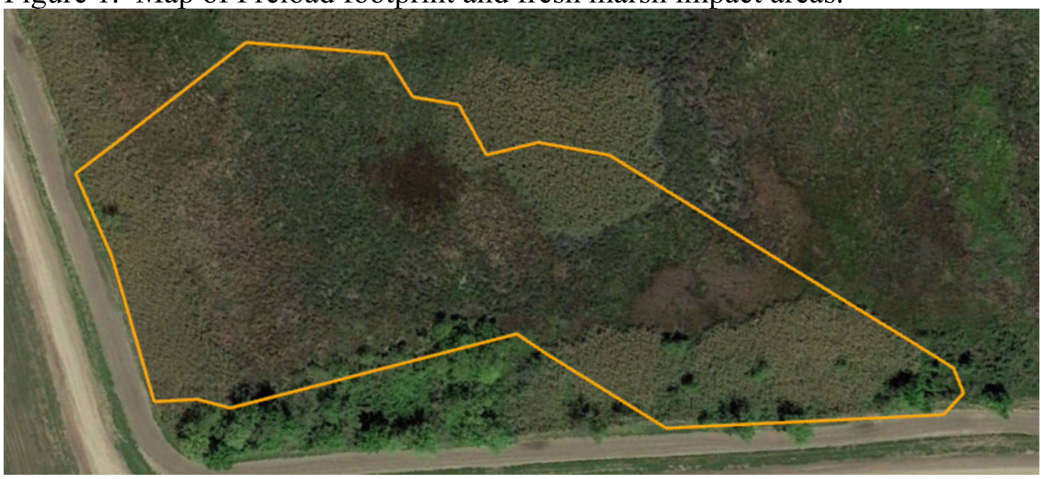
The objective of this project is to construct an initial, or preload levee, to prepare the site for the future construction of a floodgate, associated floodwalls, and earthen levees across Humble Canal. The preload levee will provide a good base and working surface for future construction by promoting settlement and strengthening the foundations of the future levee and floodwalls. The preload levee will tie-in to existing flood protection levees. The USACE-certified Coastal Marsh (Fresh-Intermediate WVA Model (version 2.0) was used for the marsh creation analysis. Target Years (TY) were set as follow: 0, 1, and 50.

Habitat Assessment Method

The WVA operates under the assumption that optimal conditions for general fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values, and 3) a mathematical formula that combines Suitability Index (SI) for each variable into a single value for wetland habitat quality; that single value is referred to as the Habitat Suitability Index, or HSI.

Land Loss/ Sea Level Rise Effects
The project area is located northeast of Humble Canal and within the community of Montegut forced drainage area. The area was once tidal low-salinity marsh prior to being leveed and forced drained. Pumping and elimination of saltwater inputs has promoted conversion to a fresh marsh. The area is impounded and receives no tidal input. Results will remain constant for all sea level rise (SLR) scenarios.

Figure 1. Map of Preload footprint and fresh marsh impact areas.



<u>Variable V_1 – Percent of Wetland area covered by emergent vegetation</u>
Persistent emergent vegetation (i.e., emergent marsh) plays an important role in coastal wetlands by providing foraging, resting, and breeding habitat for a variety of fish and wildlife species; and by providing a source of detritus and energy for lower trophic organisms that form the basis of the food chain. An area with no emergent vegetation (i.e., shallow open water) is assumed to have minimal habitat suitability in terms of this variable, and is assigned an SI of 0.1. Optimal vegetative coverage (i.e., percent marsh) is assumed to occur at 60-80 percent (SI=1.0).

FWOP – due the impounded and forced drained conditions of the site, a land loss rate was not applied to the existing marsh. Emergent vegetation is expected to remain constant through all target years.

Table 1. FWOP % Emergent Vegetation by site and TY.

Site	TY0	TY1	TY50
Fresh	100	100	100

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

<u>Variable V_2 – Percent of open water covered by aquatic vegetation</u>

FWOP- A site visit was conducted on April 22, 2021, no aquatic vegetation was observed. Conditions are expected to remain constant through all target years.

Table 3. FWOP % Submerged Aquatic Vegetation

Fresh	
	% SAV
TY0	0
TY1	0
TY50	0

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_3 – Marsh edge and interspersion

This variable takes into account the relative juxtaposition of marsh and open water for a given marsh**:**water ratio.

FWOP- Interspersion classes were determined utilizing aerial imagery and site data collected during the field trip. Based on imagery and field observations, the area is considered a "carpet marsh."

Table 5. Interspersion Class and % Cover

Fresh		
	Class	%
TY0	3	100
TY1	3	100
TY50	3	100

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_4 – Percent of open water ≤ 1.5 feet deep, in relation to marsh surface

FWOP- Shallow water areas are assumed to be more biologically productive than deeper water due to a general reduction in sunlight, oxygen, and temperature as water depth increases. Field site visits were conducted on 22 April 2021. No shallow open was observed. Existing conditions are not expected to change.

Table 7. % SOW ≤ 1.5 feet

Fresh	
	Water ≤ 1.5ft (%)
TY0	0
TY1	0
TY50	0

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_5 – Salinity

The proposed site is currently impounded and receives no tidal input (0.05ppt was used to represent the lowest salinity).

Fresh Marsh

FWOP- Existing conditions are expected to remain static through all TYs.

TYs	Fresh
TY0	0.05 ppt
TY1	0.05 ppt
TY50	0.05 ppt

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

TYs	Fresh
TY0	0.00 ppt
TY1	0.00 ppt
TY50	0.00 ppt

Variable V_6 – Aquatic Organisms (% wetland accessible & type of access)

FWOP – The proposed site is currently leveed and under forced drainage. It is assumed that aquatic organisms have no access to the site.

Table 9. Aquatic Organism Access

Fresh	
	Access
TY0	0.00
TY1	0.00
TY50	0.00

FWP – The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Project Impacts

Based on the above assumptions, the Humble Canal Preload Project would result in a combined direct and indirect impact fresh marsh of 1.77 Average Annual Habitat Units (AAHUs). Results will remain constant for all SLR scenarios.

TOTAL BENEFITS IN AAHUs DUE TO PROJECT
(Low SLR scenario)

A. Emergent Marsh Habitat Net AAHUs =	-2.62
B. Open Water Habitat Net AAHUs =	0.00
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 =	**-1.77**

TOTAL BENEFITS IN AAHUs DUE TO PROJECT
(Int. SLR scenario)

A. Emergent Marsh Habitat Net AAHUs =	-2.62
B. Open Water Habitat Net AAHUs =	0.00
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 =	**-1.77**

TOTAL BENEFITS IN AAHUs DUE TO PROJECT
(High SLR scenario)

A. Emergent Marsh Habitat Net AAHUs =	-2.62
B. Open Water Habitat Net AAHUs =	0.00
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 =	**-1.77**

Literature Cited

Coastal Protection and Restoration Authority of Louisiana. 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

Louisiana Office of Coastal Protection and Restoration. 2019. Coastwide Reference Monitoring System-Wetlands Monitoring Data. Retrieved from Coastal Information Management System (CIMS) database. http://cims.coastal.louisiana.gov. Accessed March 2021.

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MEMORANDUM

DATE: May 18, 2021

TO: U.S. Army Corps of Engineers (NOD)

FROM: U.S. Fish and Wildlife Service (Service)

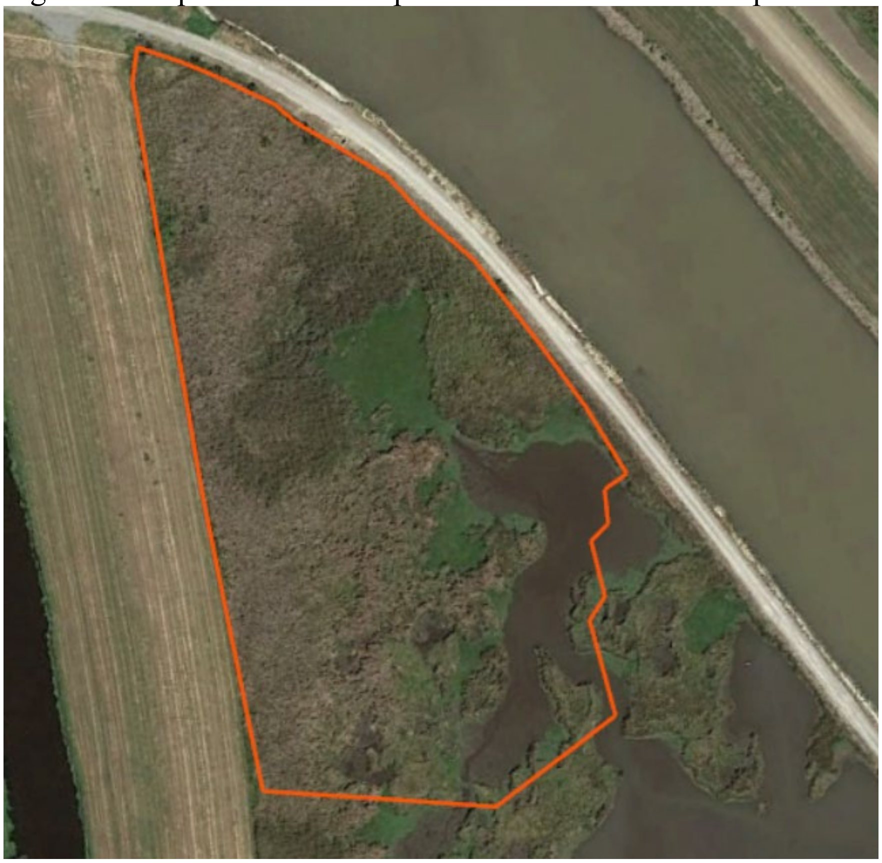
SUBJECT: Project Information Sheet for the Wetland Value Assessment (WVA) for the proposed Humble Canal Preload Project- Brackish Marsh Impacts

The objective of this project is to construct an initial, or preload levee, to prepare the site for the future construction of a floodgate, associated floodwalls, and earthen levees across Humble Canal. The preload levee will provide a good base and working surface for future construction by promoting settlement and strengthening the foundations of the future levee and floodwalls. The preload levee will tie-in to existing flood protection levees. The USACE-certified Coastal Marsh (Brackish WVA Model (version 2.0) was used for the marsh creation analysis.

Habitat Assessment Method
The WVA operates under the assumption that optimal conditions for general fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values, and 3) a mathematical formula that combines Suitability Index (SI) for each variable into a single value for wetland habitat quality; that single value is referred to as the Habitat Suitability Index, or HSI.

Land Loss/ Sea Level Rise Effects
Land loss rates estimated by the Service were adjusted to project the effects of the low, intermediate and high relative sea level rise (RSLR) scenario for these analyses. The land loss rate for the Wonder Lake-Terrebone Basin was used (-1.67% per year for the period 1985-2016) based on USGS data for the area. An average accretion rate of 6.70 mm/year was used for this site (SE Madison Bay). An estimated subsidence rate of 4.6 mm/yr was used in the Bayou Petit Caillou at Cocodrie (gauge 76305). Targets years (TY) were adjusted for each SLR scenario to represent the year when marsh acreage reaches zero.

Figure 1. Map of Preload footprint and brackish marsh impact areas.



Variable V_1 – Percent of Wetland area covered by emergent vegetation
Persistent emergent vegetation (i.e., emergent marsh) plays an important role in coastal wetlands by providing foraging, resting, and breeding habitat for a variety of fish and wildlife species; and by providing a source of detritus and energy for lower trophic organisms that form the basis of the food chain. An area with no emergent vegetation (i.e., shallow open water) is assumed to have minimal habitat suitability in terms of this variable and is assigned an SI of 0.1. Optimal vegetative coverage (i.e., percent marsh) is assumed to occur at 60-80 percent (SI=1.0).

FWOP – a predetermined land loss rate of -1.67% was applied to the existing marsh acreage for lifespan of the project. In each coastal marsh model, this variable is weighted the highest and thus influences project impacts the most (calculations were made using the MIMS 3.10 marsh model).

Table 1. FWOP % Emergent Vegetation by site, TY and SLR scenario.

Site (Brackish)	TY0	TY1	TY24	TY50
Low-SLR	67	64	0.00	0.00

Site (Brackish)	TY0	TY1	TY19	TY50
Int-SLR	62	59	0.00	0.00

Site (Brackish)	TY0	TY1	TY11	TY50
High-SLR	47	43	0.00	0.00

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_2 – Percent of open water covered by aquatic vegetation

FWOP A site visit was conducted on April 22, 2021, no aquatic vegetation was observed. Conditions are expected to remain constant through all target years and SLR scenarios.

Table 3. FWOP % Submerged Aquatic Vegetation

Brackish (all SLR scenarios)	
	% SAV
TY0	0
TY1	0
TY11	0
TY19	0
TY24	0
TY50	0

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_3 – Marsh edge and interspersion

This variable takes into account the relative juxtaposition of marsh and open water for a given marsh**:**water ratio.

FWOP- Interspersion classes were determined utilizing aerial imagery and site data collected during the field trip.

Table 5. Interspersion Class and % Cover

Brackish (Low-SLR)		
	Class	%
TY0	1 3	63 37
TY1	1 3	60 40
TY24	5	100
TY50	5	100

Brackish (Int-SLR)		
	Class	%
TY0	1 3	55 45
TY1	1 3	52 48
TY19	5	100
TY50	5	100

Brackish (High-SLR)		
	Class	%
TY0	1 3	38 62
TY1	1 3	34 66
TY11	5	100
TY50	5	100

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_4 – Percent of open water ≤ 1.5 feet deep, in relation to marsh surface

FWOP- Shallow water areas are assumed to be more biologically productive than deeper water due to a general reduction in sunlight, oxygen, and temperature as water depth increases. Field site visits were conducted on 22 April 2021. Existing conditions are expected to gradually degrade as sea level rise rates and marsh loss increases across the project area.

Table 7. % SOW ≤ 1.5 feet

Brackish (Low-SLR)	
	Water ≤ 1.5ft (%)
TY0	100
TY1	100
TY24	0
TY50	0

Brackish (Int-SLR)	
	Water ≤ 1.5ft (%)
TY0	100
TY1	100
TY19	0
TY50	0

Brackish (High-SLR)	
	Water ≤ 1.5ft (%)
TY0	100
TY1	95
TY11	0
TY50	0

FWP- The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_5 – Salinity

Brackish Marsh

An estimate for area salinity was calculated from data recorded at CRMS0385 and CRMS0315 (CRMS 2020) which are in the vicinity of the project area. An average of the two sites was used to account for seasonal freshwater input.

The mean salinity recorded at:

CRMS0385 was approximately 3.65 ppt.
CRMS0315 was approximately 8.72 ppt.
Average: 6.19 ppt

The FISS spreadsheet 1.0 was used to predict future salinity averages. It takes into account both the effects of local subsidence and SLR to the area. A third CRMS location (CRMS3296) was chosen to aid in these calculations. CRMS3296 is a more saline environment and represent future conditions if subsidence and SLR continue to increase.

The mean salinity recorded at:

CRMS3296 was approximately 12.67 ppt.

FWOP– With time, existing salinities are expected to gradually increase through the life of the project.

Salinity FWOP:

Brackish			
TYs	(Low-SLR)	(Int-SLR)	(High-SLR)
TY0	6.20 ppt	6.20 ppt	6.20 ppt
TY1	6.20 ppt	6.20 ppt	6.81 ppt
TY 11	-	-	7.17 ppt
TY19	-	7.17 ppt	-
TY24	7.17 ppt	-	-
TY50	7.26 ppt	7.28 ppt	7.32 ppt

Salinities will gradually increase.

FWP – The preload footprint will be cleared and converted to a pre-levee. No habitat will remain.

Variable V_6 – Aquatic Organisms (% wetland accessible & type of access)

FWOP – The proposed preload site is not currently impounded or hydrologically controlled by any structures. However, there is limited access for aquatic organisms. Two bridge access points exist but may limit aquatic organism access and deter entrance therefore a structure rating of 0.5 (SI unit 0.5) was given to the site.

Table 9. Aquatic Organism Access

Brackish (all SLR scenarios)	
	Access
TY0	0.5
TY1	0.5
TY11	0.5
TY19	0.5
TY24	0.5
TY50	0.5

FWP – Following construction (TY1), aquatic organisms will have no access to the created preload platform.

PROJECT IMPACTS

Based on the above assumptions, the Humble Canal Preload Project would result in a combined direct and indirect impact to brackish marsh of 0.67 (Low SLR), 0.58 (Int. SLR) and 0.43 (High SLR) Average Annual Habitat Units (AAHUs).

Brackish Marsh- Low SLR

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.52
B. Open Water Habitat Net AAHUs =	-1.06
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	**-0.67**

Brackish Marsh- Int. SLR

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.38
B. Open Water Habitat Net AAHUs =	-1.11
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	**-0.58**

Brackish Marsh- High SLR

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.14
B. Open Water Habitat Net AAHUs =	-1.17
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	**-0.43**

Literature Cited

Coastal Protection and Restoration Authority of Louisiana. 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

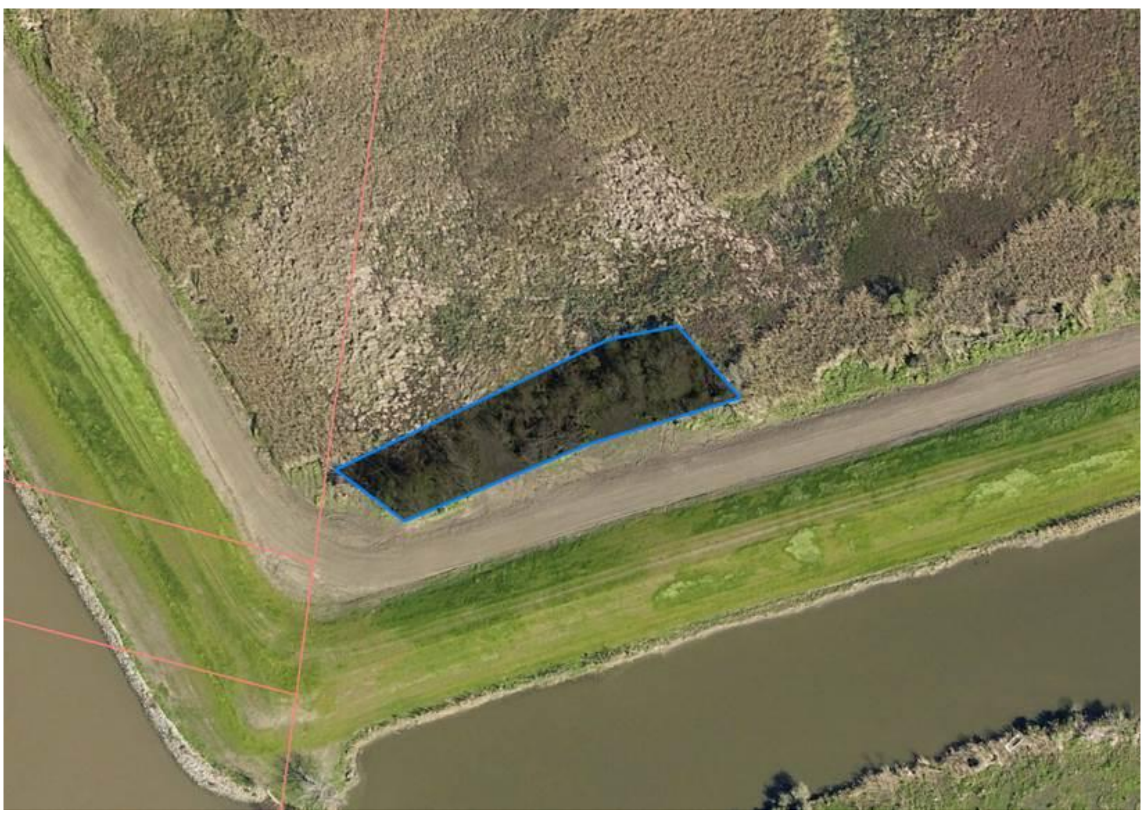
Louisiana Office of Coastal Protection and Restoration. 2019. Coastwide Reference Monitoring System-Wetlands Monitoring Data. Retrieved from Coastal Information Management System (CIMS) database. http://cims.coastal.louisiana.gov. Accessed March 2021.

Humble Canal Preload Project
Bottomland Hardwood Forest Impacts
Project Information Sheet
3-May 2021

<u>Direct and Indirect Impacts</u>: The red polygon in Figure 1 shows the portion of the preload footprint that would impact bottomland hardwood habitat (BLH), identified in the green polygon. In addition to direct impacts from construction activities, BLH and fresh-intermediate marsh would be indirectly impacted via impoundment between the preload site and the existing levee. The combined BLH impact direct and indirect impact zone is 0.48 acres (see Figure 1 green polygon).

With construction of the new levee and sector gate along Humble Canal, the old levee could be degraded to unimpound these wetlands. However, construction funding availability and scheduling are unknown. Rather than attempt to predict when unimpoundment might occur, it is assumed that the impounded wetlands (indirect impact) will be impacted concurrently with direct impacts from the constructed preload footprint.

Figure 1. Map of Preload footprint and BLH direct and indirect impact areas.



BLH Variable # 1: Tree Species Composition

Within an observation area approximately 0.10 acre, the following trees were observed on 22-Apr-2021.

Table 1. Observed trees and estimated diameter at breast height (dbh) . Seedlings not included.

Tree species	Dbh (in)	Dbh (in)	Dbh (in)	Dbh (in)	Dbh (in)	Dbh (in)	Dbh (in)	Dbh (in)	Dbh (in)
Water oak	14								
Chinese tallow	14	5	4	3	3	4	5	3	10
Black willow	16	4	10						
Honey locust	6								

The canopy coverage was approximately 25%, midstory was 25%, and herbaceous cover 100%. A number of small black willow were observed in other portions of the area as were a number of very small water oak seedlings. Based on early aerial imagery of this BLH area, it appears that the woody vegetation has replaced what was previously tidal marsh, growing larger canopies as a result of forced drainage from the levee. Sugarberry and a few small live oaks were also observed beyond the 0.10 acre observation area. Given the presence of several water oak seedlings and live oaks nearby, it is assumed that hard mast producers will increase over time. Table 2 provides V1 values used in the wetland value assessment (WVA) for BLH.

Table 2. Variable 1 values used.

TY	FWOP	FWP
0	Class 1	Class 1
1	Class 1	Class 1
25	Class 1	Class 1
50	Class 2	Class 1

Variable 2: Stand Maturity

The in-growth spreadsheet was used to calculate diameter at breast height (dbh) change over time. Given the diversity of trees and the presence of slower growing varieties (compared to black willow and Chinese tallow), the dbh growth rate associated with the “cedar elm, winged elm, black tupelo, hickories, or sugarberry dominated stands” was selected for use in the in-growth spreadsheet. This spreadsheet’s mortality function was zeroed out. Instead, windthrow mortality is assumed to occur during tropical storms which would occur once every 8 years and would affect only trees >= 20 inches dbh. The Microsoft Excel random number function was used to generate random numbers for each storm event target year (TY). It was assumed that two >20in dbh trees would be thrown down if random# < 0.33, one > 20in dbh tree would be thrown down if random# between 0.33 and 0.66, and no trees down if random# > 0.66. The random number results are shown in Table 3. The loss of trees due to windthrow within the spreadsheet was done manually as the in-growth spreadsheet is not set up to do this. Additionally, the < 6in dbh trees (including seedlings) were entered into the in-growth spreadsheet in order to capture recruitment into the >6inch dbh class used in the WVA.

Table 3. Windthrow tree mortality using random numbers.

	<0.33	two trees > 20 in dbh down
Storm	0.33 to 0.66	one tree > 20 in dbh down
Event	>0.66	no trees down
Tys	**Rand #**	**Outcome**
0	**0.385**	no trees > 20 in dbh
8	**0.396**	no trees > 20 in dbh
16	**0.739**	no trees > 20 in dbh
24	**0.040**	only one > 20 in - 1 down
32	**0.660**	1 tree down (largest)
40	**0.508**	1 tree down (largest)
48	**0.023**	2 trees down (largest)

As described above, the in-growth spreadsheet results factor in both mortality and recruitment, which are very important drivers of dbh and basal area change over a 50 year time period. V2 values used in the WVA are provided in Table 4.

Table 4. Variable 2 values used.

TY	FWOP	FWP
0	11.7 in	11.7 in
1	11.9 in	0 in
25	9.6 in	0 in
50	13.0 in	0 in

Variable 3: Understory and Midstory

Over time as the canopy matures and closes, it is assumed that the midstory will gradually decrease. Likewise, it is assumed that the herbaceous understory will also gradually decrease. Table 5 lists the V3 values used.

Table 5. Variable 3 values used.

TY	**FWOP Understory**	**FWOP Midstory**	**FWP Understory**	**FWP Midstory**
0	100%	25%	100%	25%
1	100%	25%	0%	0%
25	85%	20%	0%	0%
50	75%	18%	0%	0%

Variable 4: Hydrology:

Because the BLH site is located within a forced drainage area and is likely on a higher elevation site than the adjoining marshes, it is assumed that there is no water exchange and flooding is temporary if ever it occurs. Table 6 provides V4 values used.

Table 6. Variable 4 values used.

TY	FWOP Exchange	FWOP Duration	FWP Exchange	FWP Duration
0	None	Temporary	None	Temporary
1	None	Temporary	None	Temporary
25	None	Temporary	None	Temporary
50	None	Temporary	None	Temporary

Variable 5: Size of Continguous Forest

There is no forest adjoining the project area BLH. Therefore, V5 is a Class 1 (0 to 5 acres adjoining forest) for FWOP and FWP under all TYs.

Variable 6: Suitability and Traversability of Surrounding Land Uses:

Within a 0.5 mile radius of the project area center, there is marsh, water, and developed lands. Table 7 provides percentages of each. Given the high loss rate of tidal marsh, all tidal marsh is predicted to be lost by TY19, thus, percent of water increases by TY25. V6 values are the same under FWOP and FWP.

Table 7. Land use within 0.5 mile radius of the project site (FWOP and FWP).

TY	Forest/marsh	Water	Developed
0	33%	45%	22%
1	33%	45%	22%
25	17%	61%	22%
50	17%	61%	22%

Variable 7: Disturbance

The major disturbance to project area BLH is the existing road along the base of the levee which is being used for hauling dirt to build levee reaches located to the east. Disturbance types and distances within both 50 foot and 500 foot buffers around the BLH area are provided in Table 8 and used to calculate the final weighted V7 Suitability Index (SI). The resulting value was inserted manually into the WVA spreadsheet for both FWOP and FWP.

Table 8. Calculation of V7 value for FWOP and FWP.

Distance	Disturbance Type	SI	Percent	Weighted SI
0 to 50	1	0.01	0	0
0 to 50	2	0.26	4.5	1.17
0 to 50	3	0.41	0	0
0 to 50	4	1	5.5	5.5
50 -500	1	0.26	0	0
50 -500	2	0.5	9	4.5
50 -500	3	0.65	18	11.7
50 -500	4	1	63	63
			100	85.87
		overall weighted SI =		**0.859**

Under FWP, it is assumed that the BLH site is converted entirely to a pre-levee, hence it no longer exists beginning in TY1. As long as the FWP acreages are zero (as shown in Table 9), the entries for many of the FWP variables do not matter as no habitat value will be generated in terms of Habitat Units.

Based on the above assumptions, the Humble Canal Preload Project would result in a combined direct and indirect impact to BLH of 0.18 Average Annual Habitat Units (AAHUs).

Table 9. AAHU calculation worksheet and WVA results.

AAHU CALCULATION

Project: Humble Canal PreLoad - direct & indirect impacts

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.48	0.37	0.18	
1	0.48	0.38	0.18	0.18
25	0.48	0.31	0.15	3.98
50	0.48	0.48	0.23	4.75
Max TY=	50		Total AAHUs =	8.91
			AAHUs =	0.18

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.48	**0.37**	0.18	
1	0		0.00	0.06
25	0		0.00	0.00
50	0		0.00	0.00
Max TY=	50		Total AAHUs =	0.06
			AAHUs =	0.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future Without Project AAHUs =	0.18
B. Future With Project AAHUs =	0.00
Net Change (FWP - FWOP) =	-0.18