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

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MEMORANDUM

DATE: July 13, 2020

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 Tiger Pass MROV BUDMAT Marsh Habitat Creation site.

The U.S. Army Corps of Engineers (USACE), New Orleans District has proposed, under the authority of Title VII of the Water Resources Development Act of 2007, to beneficially use dredged material removed from the Tiger Pass Federal navigation channel located within Plaquemines Parish Louisiana in vicinity from the Port of Venice. 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, 5, 20, 40 and 50. TY 40 was added to account for expected variable changes due to SLR based on a review of other projects (ERDC 2016 and CPRA 2017 (reference Delft Modeling) in the project area).

The objective of this project would create marsh habitat within proposed marsh creation sites through deposition of dredge material obtained from the lower portion of Tiger Pass (Miles 0.0 to 13.8) through long distance transport of dredged material that would be obtained during USACE Operations & Maintenance dredging of the lower portion of Tiger Pass. This revised project information sheet (PIS) replaces our previous PIS (dated February 3, 2020). As project designs progressed, updates and changes were needed to reflect impacts. All changes will be addressed in the final Fish and Wildlife Coordination Act report.

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 by the projected effects of the medium relative sea level rise (RSLR) scenario for these analyses. The land loss rate for the Mississippi River Delta-West Bay region was used (0.10% per year for the period 1985-2016) based on USGS data for the extended project boundary (West Bay, total 113,966 acres). The loss rate of the created marsh is assumed to be 50% of the background loss rate until the year that 10 inches of accretion occurs post construction. After that the loss rate used in our calculations reverts back to the actual background rate. An average accretion rate of 26.1 mm/year was used for this site (26.1 mm/yr from Coastwide Reference Monitoring System [CRMS] Station 163 long-term data, CRMS 2019).

An estimated subsidence rate of 21.3 mm/yr was used in the Mississippi River Delta (gage 01480). The eustatic sea level rise was assumed to be 1.7 mm/yr. The estimations were calculated using the USACE's Sea-Level Calculator. The Mississippi River at Venice (01480) was the closest long-term gage station to proposed sites.

Figure 1. Tiger Pass Focused Array Marsh Habitat Creation site

<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).

Created marsh platforms have limited marsh function until material settlement, wetland plant growth, flooding and channel development. Based on the standard assumption guidelines (0%, 25%, 50%, 75% and 100% for TY years 1, 3, 5, and 6, respectively) calculations were made using the MIMS 3.9 marsh model.

FWOP – a predetermined land loss rate of 0.10% 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 benefits the most.

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

Site	**TY0**	**TY1**	**TY5**	**TY20**	**TY40**	**TY50**
TP 2-3	0	0	0	0	0	0
TP 4	4	4	4	4	4	4
TP 5	5	5	5	5	5	4
TP10	32	32	32	31	29	28

FWP- projections address the changes expected to occur as a result of project implementation.

Table 2. FWP % Emergent Vegetation by site and TY.

Site	**TY0**	**TY1**	**TY5**	**TY20**	**TY40**	**TY50**
TP 2-3	0	9	88	86	82	79
TP 4	4	12	88	86	82	80
TP 5	5	13	82	80	76	73
TP10	32	38	100	98	93	90

Variable V_2 – Percent of open water covered by aquatic vegetation

FWOP- Field site visits were conducted in early November 2019 when Submerged Aquatic Vegetation (SAV) coverage was not at peak density. It can be assumed that maximum coverage is achieved at the end of a growing season (late summer-early fall). A visual estimate was taken at each transect line. Conditions are expected to remain constant through target years TY0-TY40, with a decrease in coverage for years TY50 based on the change in shallow open water to deeper water and increased wave fetch. In addition, sea level rise predications and a slight increase in salinity could result in degradation of SAV.

SAV projections used the baseline SAV with adjustments based on change to shallow open water. Equation = (baseline SAV TY0)-(baseline SAVTY0 * change in SOW TYy)

Table 3. FWOP % Submerged Aquatic Vegetation

TP 2/3	
	% SAV
TY0	57
TY1	57
TY5	57
TY20	57
TY40	29
TY50	29

TP 4	
	% SAV
TY0	10
TY1	10
TY5	10
TY20	10
TY40	5
TY50	5

TP 5	
	% SAV
TY0	10
TY1	10
TY5	10
TY20	10
TY40	5
TY50	5

TP 10	
	% SAV
TY0	50
TY1	50
TY5	50
TY20	50
TY40	25
TY50	25

FWP- During marsh land platform construction, all existing SAV will be buried with dredged material. Until the created marsh platform settles to marsh elevation, it is assumed that very little open water exists to support SAV growth.

We assumed by TY 5, all diked material has disintegrated and marsh elevations have stabilized allowing for SAV regrowth. Existing seed banks, increased shallow open water, and low wave fetch should expedite recovery time and increase productivity.

SAV projections used the baseline SAV with adjustments based on change to shallow open water. Equation = SAV TYx-(SAVTYx * change in SOW TYy)

Table 4. FWP % Submerged Aquatic Vegetation

TP 2/3	
	% SAV
TY0	57
TY1	0
TY5	100
TY20	86
TY40	78
TY50	71

TP 4	
	% SAV
TY0	10
TY1	0
TY5	100
TY20	86
TY40	78
TY50	72

TP 5	
	% SAV
TY0	10
TY1	0
TY5	100
TY20	80
TY40	72
TY50	66

TP 10	
	% SAV
TY0	50
TY1	0
TY5	100
TY20	100
TY40	92
TY50	79

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 varied between areas and were determined utilizing aerial imagery and site data collected during our field trip.

Table 5. Interspersion Class and % Cover

TP 2/3		
	Class	%
TY0	5	100
TY1	5	100
TY5	5	100
TY20	5	100
TY40	5	100
TY50	5	100

TP 4		
	Class	%
TY0	1 5	4 96
TY1	1 5	4 96
TY5	1 5	4 96
TY20	2 5	4 96
TY40	2 5	4 96
TY50	3 5	4 96

TP 5		
	Class	%
TY0	1 5	5 95
TY1	1 5	5 95
TY5	1 5	5 95
TY20	2 5	5 95

TP 10		
	Class	%
TY0	1 4	32 68
TY1	1 4	32 68
TY5	1 4	32 68
TY20	2 5	32 68

TY40	2 5	5 95
TY50	3 5	5 95

TY40	2 5	32 68
TY50	3 5	32 68

FWP- For areas created by dredged material placement, the standard workgroup convention for marsh creation was used.

Table 6. Interspersion Class and % Cover

TP 2/3		
	Class	%
TY0	5	100
TY1	5	100
TY5	1	100
TY20	1	100
TY40	1	100
TY50	2	100

TP 4		
	Class	%
TY0	1 5	4 96
TY1	5	100
TY5	1 5	88 12
TY20	1 5	86 14
TY40	1 5	82 18
TY50	2 5	80 20

TP 5		
	Class	%
TY0	1 5	5 95
TY1	5	100
TY5	1 5	82 18
TY20	1 5	80 20
TY40	1 5	76 24
TY50	2 5	73 27

TP 10		
	Class	%
TY0	1 4	32 68
TY1	5	100
TY5	1	100
TY20	1	100
TY40	1	100
TY50	2	100

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

FWOP- Field site visits were conducted on 5 November 2019 and 20 November 2019. Water depths were measured using a water depth staff guage and recorded to a tenth of a foot. Using the collected data, the percent of open water less than or equal to 1.5 feet was calculated. Due to limited shoreline access an adjusted percent was calculated to account for the missing data. Based on sea level rise projections, % open shallow water will decrease by target year 40.

Open water and nourished portions of each site was weighted for Shallow Open Water (SOW). Open water portions used data from site visit surveys. It was the assumption that 80% nourished area was shallow. A weighted average was calculated and used for input into the WVAs. Equation = ((Disposal acres*SOW field data) + (Nourished acres*SOW 80%))/project acres. Note TP5 also includes a portion of the open water area that will not be filled (This portion assumed water depths determined in the field and adjusted as stated above).

Table 7. % SOW ≤ 1.5 feet

TP 2/3	
	Water ≤ 1.5ft (%)
TY0	7
TY1	7
TY5	7
TY20	7
TY40	4
TY50	4

TP 4	
	Water ≤ 1.5ft (%)
TY0	6
TY1	6
TY3	6
TY20	6
TY40	3
TY50	3

TP 5	
	Water ≤ 1.5ft (%)
TY0	6
TY1	6
TY5	6
TY20	6
TY40	3
TY50	3

TP 10	
	Water ≤ 1.5ft (%)
TY0	48
TY1	48
TY3	48
TY20	48
TY40	24
TY50	24

FWP- All water acres in the marsh creation polygons were considered to be 100% shallow open water FWP for TY1-5 per standard workgroup convention.

TP5 includes a portion of the open water area that was used for excess effluent but is not anticipated to be filled to marsh elevations rather it will become shallower. It was assumed all areas of TP5 would become shallow until TY20 when a weighted average was calculated using the following the pattern: FWP (TY20-100%, TY40-95%, and TY50-90%) applied to the created portion and assuming the nourished open water portion deepened over time (TY20-80%, TY40-60%, TY5050% shallow).

Table 8. % SOW ≤ 1.5 feet

TP 2/3	
	Water ≤ 1.5ft (%)
TY0	6
TY1	100
TY5	100
TY20	86
TY40	78
TY50	71

TP 4	
	Water ≤ 1.5ft (%)
TY0	6
TY1	100
TY3	100
TY20	86
TY40	78
TY50	72

TP 5	
57	Water ≤ 1.5ft (%)
TY0	6
TY1	100
TY5	100
TY20	80
TY40	72
TY50	66

TP 10	
	Water ≤ 1.5ft (%)
TY0	48
TY1	100
TY3	100
TY20	100
TY40	93
TY50	86

Variable V_5 – Mean high salinity during the growing season (March through November)

The Tiger Pass BUDMAT project area is located near the Gulf of Mexico, but receives continuous freshwater input from the Mississippi River. An estimate for area salinity was calculated from data recorded at CRMS0163 (CRMS 2019) which is in the vicinity of the project area.

The mean high salinity recorded at CRMS0163 was approximately 0.57 ppt. This average was calculated using data gathered during the growing season (March-November) from years 2015-2019. Hydrograph models used to project future salinity average also suggest a continued increase in salinity through the life of the project. The Delft model was based off a high sea level scenario, but adjusted to account for an intermediated sea level rise scenario.

FWOP and FWP– Existing conditions are expected to gradually increase through the life of the project.

Salinity FWP and FWOP:

TY0	0.57 ppt
TY1	0.57 ppt
TY5	0.57 ppt
TY20	0.75 ppt
TY40	0.85 ppt
TY50	1.00 ppt

Salinities will gradually increase to 1.00 ppt by TY50.

<u>Variable V_6 – Aquatic Organisms (% wetland accessible & type of access)</u>

FWOP – The proposed marsh creation sites TP 2/3 and TP10 are not currently impounded or hydrologically controlled by any structures. It is assumed that aquatic organisms have full access to sites. Access to TP4 and TP5 is slightly altered with culverts and narrow channels. This may limit aquatic organism access and deter entrance therefore a rating of 0.50 (TP 4) and 0.40 (TP 5) was given to the sites.

Table 9. Aquatic Organism Access

TP 2/3	
	Access
TY0	1.00
TY1	1.00
TY5	1.00
TY20	1.00
TY40	1.00
TY50	1.00

TP 4	
	Access
TY0	0.50
TY1	0.50
TY3	0.50
TY20	0.50
TY40	0.50
TY50	0.50

TP 5	
	Access
TY0	0.40
TY1	0.40
TY5	0.40
TY20	0.40
TY40	0.40
TY50	0.40

TP 10	
	Access
TY0	1.00
TY1	1.00
TY3	1.00
TY20	1.00
TY40	1.00
TY50	1.00

FWP – For marsh created by dredged material placement, for all alternatives, the following assumptions were used.
Following construction (TY1), aquatic organisms will have no access to the created marsh platform due to marsh containment dikes and marsh plugs. By TY5 it is assumed that the plugs and containment dikes have disintegrated to allow for full access to aquatic organisms.

An access value 0.30 was assigned to TP 10 at TY1 due to moderate preexisting tidal input

NOTE:

1. **TP5 left FWP fish access at 0.4 due to access being limited by culverts on one side (0.5) and restricted access on remaining sides. If the USACE provides assurances they can open the area more we will bump it to 0.6 (open culverts but one more opening).**

2. **A combination of earthen weirs and retention dikes will be used to contain dredge pumped material in TP 10. After fill operations are completed but prior to demobilization, USACE has offered assurance that three gaps shall be placed in the containment dikes at specified locations to promote dewatering and full fish access therefore a rating of 1.00 was given to the site. More gaps may be required to ensure-- tidal flow and fisheries access at the site.**

Table 10. Aquatic Organism Access

TP 2/3	
	Access
TY0	1.00
TY1	0.00
TY5	1.00
TY20	1.00
TY40	1.00
TY50	1.00

TP 4	
	Access
TY0	0.50
TY1	0.00
TY3	0.50
TY20	0.50
TY40	0.50
TY50	0.50

TP 5	
	Access
TY0	0.40
TY1	0.00
TY5	0.40
TY20	0.40
TY40	0.40
TY50	0.40

TP 10	
	Access
TY0	1.00
TY1	0.30
TY3	1.00
TY20	1.00
TY40	1.00
TY50	1.00

PROJECT BENEFITS

TP 2/3

Initial Acres			
Open Water (for disposal)			195
Nourished acres			0.9
Open Water nourish area			27.7
Total Project acres			223.6
NET Acres Benefited			
Land			177
Water			47
Total Acres			224
AAHUS			66.69

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	161.34
B. Open Water Habitat Net AAHUs =	-132.08
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 =	**66.69**

TP 4

Initial Acres			
Open Water (for disposal)			160
Nourished acres			10.2
Open Water nourish area			22.8
Total Project acres			193
NET Acres Benefited			
Land			152
Water			38
Total Acres			190
AAHUS			75.56

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	125.96
B. Open Water Habitat Net AAHUs =	-30.28
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 =	**75.56**

TP 5

Initial Acres			
Open Water (for disposal)			187
Nourished acres			12
Open Water nourish area			45
Total Project acres			244
NET Acres Benefited			
Land			178.1
Water			65.9
Total Acres			244
AAHUS			96.19

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	154.32
B. Open Water Habitat Net AAHUs =	-25.90
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 =	**96.19**

TP 10

Initial Acres		
Nourished acres		105
Open Water nourish area		227
Total Project acres		311
NET Acres Benefited		
Land		298.8
Water		33.2
Total Acres		311
AAHUS		66.7

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	172.33
B. Open Water Habitat Net AAHUs =	-155.12
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	**66.70**

Conclusion

The WVA operates under the assumption that a value can be assigned to a given habitat, which can then be quantified through the use of community driven modeling to produce a single value referred to as the Habitat Suitability Index, or HSI. However, limitations do exist and not all types of future benefits are captured through the use of this type of modeling.

Knowing TP10 would initially create 227 acres of new marsh and nourish 105 acres of existing marsh we know the project will have a greater benefit to a larger area (332 acres) than of any of the alternatives and therefore should produce the greatest marsh creation and nourishment benefits (represented by Average Annual Habitat Units, or AAHUs). However, application of the WVA model results in one of the lowest AAHU scores of all the sites evaluated. Similarly, TP 2/3 would create 195 acres and nourish 28.6 and results in the lowest AAHU score. While counter intuitive, the low land loss rate of the larger study areas (0.10% per year for the period 1985-2016) and relatively high areas of nourishment, coupled with an abundance of preexisting SAV and shallow open water, drives the modeled numbers down. Because the loss rates in the project area are so low, the water is already shallow, and SAVs already exists, the difference shown between the future with project compared to future without project are not as great as the other alternatives. TP 4 and TP 5 result in a greater difference between the two futures for these variables since they are in poorer condition, are deeper, have less surrounding marsh, and have less SAVs.

In the case of TP 2/3 and TP10, the HET and PDT should take into account impacts that go beyond the standard WVA variables. In this instance, we know if TP10 is left unchecked the area would worsen with time and become more expensive to restore in the future. This area is the most natural and healthy of all the sites because it maintains tidal inlets, water movement, ingress and egress, while some of the other alternatives are enclosed with restricted access and minimal water flow (even stagnate). Therefore, fortifying this more natural area would result in a more desirable and healthy habitat compared to some of the other alternatives which would create marsh that may not function as fully as marsh in a natural system.

TP10 has the highest amount of existing shallow open water and SAV and still maintains a degree of broken marsh. It lies adjacent to a larger bay open to the Gulf of Mexico. This site's surrounding marsh is the only remaining protection from daily wave action and periodic storm events that would cause breaching between the site and the adjacent open bay. A breach would exacerbate loss rates, increase wave fetch and impacts from storms, increase deeper open water, and decrease SAV growth.

Comparably TP 2/3 is also a productive and healthy site, with a relatively high degree of connectivity and tidal exchange. It is a mostly self-contained site with shallow open water and SAV. Existing marsh boundaries help insulate the site from the degrading effects of wave action which can intensify loss rates. Located between Tiger Pass and Grand Pass, its proximity to Plaquemines Parish could protect critical infrastructure and reduce impacts from storm surge.

Historic loss rates of the larger study area are some of the lowest in Louisiana's coast, the WVA maintains most of the existing marsh and does not capture the localized potential losses to TP 2/3 and TP 10 marsh, shallow open water, and SAVs. While both TP 2/3 and TP 10 would enhance current conditions, we know the new and created marsh of these alternative will be more resilient (built to a higher elevation and having better soil conditions), the initial loss of SAV would rebound rapidly, shallow open water would be increased, and by creating and nourishing this wetland, the marsh will maintain a stronger more healthy habitat that will withstand wave action and storm events for longer.

While the WVA model is considered a trusted tool when assessing wetland benefits, best professional judgment should still be applied. The above mentioned issues (the driving forces of the lower AAHUs, the natural habitat of TP 2/3 and TP 10, and the impacts of the localized area losses), should be considered along with the WVA outputs.

Literature Cited

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