

JUN 11 2018



## **Mitigation Plan**

### **SWG-2018-00473 – Fort Bend County, Texas** **City of Missouri City – Knight Road Expansion and Extension Project**

The City of Missouri City (Applicant) proposes to permanently impact 0.96 acres of non-tidal forested wetlands for the purposes of constructing the expansion and extension of Knight Road. Compensatory mitigation will be conducted through the purchase of the appropriate number of Functional Credit Units (FCUs) from Danza Del Rio Mitigation Bank.

The Applicant is proposing to expand and improve two existing sections of Knight Road, totaling 0.68 miles, and connect these sections by constructing a new section of Knight Road, referred to as the extension; consisting of 0.86 miles of new road and bridge construction. The total area investigated and included within this Project Area is 1.52 linear miles by 100 feet wide or 20.42 acres of undeveloped and developed land. The subject property consists of 18.50 acres of mixed uplands, 1.34 acres of jurisdictional wetlands, and 0.58 acres (373 linear feet) of non-vegetated waters of the U.S., Oyster Creek Bypass and Briscoe Canal.

#### **1.) Goals and Objectives**

To compensate for unavoidable impacts to 0.96 acres of waters of the U.S., specifically 0.96 acres of forested wetlands, the Applicant has proposed to purchase credits from an approved mitigation bank. Initially, mitigation banks in the primary service area were explored, concluding that no credits were available in this area.

Therefore, the Applicant looked for mitigation banks whose secondary service area covers the project area. The subject property is geographically located within the Secondary Service area for the Danza Del Rio Mitigation Bank and the appropriate mitigation credits needed to compensate for the projects impacts are available at this time. Wetlands proposed to be impacted were evaluated by the USACE Galveston District's interim Hydrogeomorphic Model (iHGM) for Riverine Forested Wetlands. Therefore, at this time, compensatory mitigation is proposed to be completed by purchasing palustrine forested wetland credits from Danza Del Rio. Please reference the Mitigation Plan in Appendix D for details concerning the mitigation plan and iHGM information. These wetlands had their functional value assessed using the Galveston District Interim Riverine Forested Hydrogeomorphic Model (iHGM).

#### **2.) Credit Determination**

The total FCUs assessed in the proposed impacted wetlands are 0.388 physical, 0.425 biological, and 0.406 chemical.

Please see Table 1 below for iHGM information and the included iHGM data sheet for specific information. However, due to project site being located within the secondary service area of Danza Del Rio Mitigation Bank, a 1.5x multiplier is required when calculating total crediting for Applicant. Therefore, the total number of credits proposed to be purchased is 46.6 FCUs; 13.1 physical, 18.2 chemical, and 15.3 biological.



JUN 11 2018

**Table 1. Galveston District Forested Wetland interim Hydrogeomorphic Model Data**

<b>TOTAL FCUs TO BE PURCHASED</b>			
<b>Wetland ID</b>	<b>Physical FCUs</b>	<b>Biological FCUs</b>	<b>Chemical FCUs</b>
<b>Wetland 1</b>	0.002	0.002	0.002
<b>Wetland 2</b>	0.002	0.002	0.002
<b>Wetland 3</b>	0.088	0.096	0.092
<b>Wetland 4</b>	0.06	0.066	0.063
<b>Wetland 5</b>	0.016	0.018	0.017
<b>Wetland 6</b>	0.088	0.096	0.092
<b>Wetland 7</b>	0.008	0.009	0.008
<b>Wetland 8</b>	0.08	0.088	0.084
<b>Wetland 9</b>	0.036	0.039	0.038
<b>Wetland 10</b>	0.008	0.009	0.008
<b>Existing FCUs</b>	0.388	0.425	0.406
<b>Multiplier</b>	1.5X	1.5X	1.5X
<b>TOTAL FCUs TO BE PURCHASED</b>	<b>0.58</b>	<b>0.64</b>	<b>0.61</b>

**3.) Baseline Information**

The subject property consists of 18.50 acres of mixed uplands, 1.34 acres of jurisdictional wetlands, and 0.58 acres (373 linear feet) of non-vegetated waters of the U.S., Oyster Creek Bypass and Briscoe Canal.

It is BIO-WEST's professional judgement that the subject property contains 18.50 acres of mixed uplands, 1.34 acres of adjacent wetlands, and 0.58 acres (373 linear feet) of non-vegetated waters of the U.S., Oyster Creek Bypass Channel and Briscoe Canal. The property investigated for the purposes of this permit application is situated along:

- 1) an existing 0.33 mile section of Knight Road, the northern section;
- 2) an existing 0.35 mile section of Knight Road, the southern section; and
- 3) an undeveloped 0.86 mile section of semi-forested, vacant property.

Within the 0.86 mile section and north of Oyster Creek Bypass, a 0.45 mile existing improved gravel/rock road is currently used for general ranch activities. The area investigated is not currently used for cattle grazing, timber harvesting, or any other type of agricultural production as the majority is situated along an existing county maintained road, an improved maintained private road, and maintained unimproved dirt road.

**4.) Site Selection**

In order to comply with the Final Compensatory Mitigation Rule (2008), the Applicant has proposed to purchase the appropriate number of mitigation credits through an approved mitigation bank. The subject property lies within the Primary Service Area of the Lower Brazos River Mitigation Bank; however this The Lower Brazos River MB does not have sufficient credits therefore the Applicant chose to use Danza Del Rio MB. The project site lies within Danza Del Rio's secondary service area and a 1.5x multiplier to credits will be assessed.

JUN 11 2018

**5.) Mitigation Work Plan**

The Applicant is proposing to purchase credits from Danza Del Rio Mitigation Bank. Therefore, the Applicant is not responsible for any portion of the mitigation work plan if credits are available, purchased, and this mitigation plan approved.

**6.) Site Protection and Maintenance**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.

**7.) Performance Standards**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.

**8.) Monitoring Plan**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.

**9.) Long Term Management Plan**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.

**10.) Adaptive Management Plan**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.

**11.) Financial Assurances**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.

**12.) Long Term Financing**

Danza Del Rio Mitigation Bank will be responsible for all short term and long term responsibilities associated with the mitigation credits and mitigation bank.



JUN 11 2018

**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 1 - Impacted

8-Feb-18

Acreage = 0.004

Natural Existing Wetland to be Impacted

WAA 2

**Wetland Assessment Area**

Pre-Project Year - 0

Variable	Subindex	Notes:
V <sub>dur</sub>	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
V <sub>freq</sub>	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
V <sub>topo</sub>	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
V <sub>cwd</sub>	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
V <sub>wood</sub>	0.25	11-33% of the WAA is covered with woody vegetation
V <sub>tree</sub>	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
V <sub>rich</sub>	0.40	One to two tree species present
V <sub>basal</sub>	0.60	The average basal area of the WAA is between 60-80 square ft/acre
V <sub>density</sub>	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
V <sub>mid</sub>	0.25	Midstory coverage of the WAA is less than 10%
V <sub>herb</sub>	0.50	Herbaceous cover in the WAA averages between 31-50%
V <sub>detritus</sub>	0.50	From 11-84% of the area possesses an O or A horizon
V <sub>redox</sub>	0.10	Redox features less than 20%
V <sub>sorpt</sub>	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
V <sub>connect</sub>	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

**Functional Capacity Units (FCU)**

Pre-Project

Calculated FCU (Temp Storage)	0.002	physical
Calculated FCU (Maintain Plant & Animal)	0.002	biological
Calculated FCU (Removal of Elements)	0.002	chemical

JUN 11 2018

**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 2 - Impacted

8-Feb-18

Acreage = 0.004

Natural Existing Wetland to be Impacted

WAA 2

**Wetland Assessment Area****Pre-Project Year - 0**

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

**Functional Capacity Units (FCU)****Pre-Project**

Calculated FCU (Temp Storage)	0.002	physical
Calculated FCU (Maintain Plant & Animal)	0.002	biological
Calculated FCU (Removal of Elements)	0.002	chemical

JUN 11 2018

**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 3 - Impacted

8-Feb-18

Acreage = 0.22

Natural Existing Wetland to be Impacted

WAA 3

**Wetland Assessment Area****Pre-Project Year - 0**

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

**Functional Capacity Units (FCU)****Pre-Project**

Calculated FCU (Temp Storage)	0.088	physical
Calculated FCU (Maintain Plant & Animal)	0.096	biological
Calculated FCU (Removal of Elements)	0.092	chemical

# Interim Riverine Forested Hydrogeomorphic Analysis Worksheet

Wetland 4 - Impacted

8-Feb-18

Acreage = 0.15

Natural Existing Wetland to be Impacted

WAA 4

## Wetland Assessment Area

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-34% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{serpt}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

## Functional Capacity Index (FCI)

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

## Functional Capacity Units (FCU)

Pre-Project

Calculated FCU (Temp Storage)	0.060	physical
Calculated FCU (Maintain Plant & Animal)	0.066	biological
Calculated FCU (Removal of Elements)	0.063	chemical

JUN 11 2018

**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 5 - Impacted

8-Feb-18

Acreage = 0.04

Natural Existing Wetland to be Impacted

WAA 5

**Wetland Assessment Area**

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorpt}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

**Functional Capacity Units (FCU)**

Pre-Project

Calculated FCU (Temp Storage)	0.016	physical
Calculated FCU (Maintain Plant & Animal)	0.018	biological
Calculated FCU (Removal of Elements)	0.017	chemical



**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 6 - Impacted

8-Feb-18

Acreage = 0.22

Natural Existing Wetland to be Impacted

WAA 6

**Wetland Assessment Area**

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

**Functional Capacity Units (FCU)**

Pre-Project

Calculated FCU (Temp Storage)	0.088	physical
Calculated FCU (Maintain Plant & Animal)	0.096	biological
Calculated FCU (Removal of Elements)	0.092	chemical

JUN 11 2018

**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 7 - Impacted

8-Feb-18

Acreage = 0.02

Natural Existing Wetland to be Impacted

WAA 7

**Wetland Assessment Area**

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

**Functional Capacity Units (FCU)**

Pre-Project

Calculated FCU (Temp Storage)	0.008	physical
Calculated FCU (Maintain Plant & Animal)	0.009	biological
Calculated FCU (Removal of Elements)	0.008	chemical

# Interim Riverine Forested Hydrogeomorphic Analysis Worksheet

Wetland 8 - Impacted

8-Feb-18

Acreage = 0.20

Natural Existing Wetland to be Impacted

WAA 8

Wetland Assessment Area

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

## Functional Capacity Index (FCI)

Temp. Storage of Water (1) 0.398

Maintain Plant &amp; Animal Com. (2) 0.438

Removal of Elements (3) 0.420

## Functional Capacity Units (FCU)

Pre-Project

Calculated FCU (Temp Storage)	0.080	physical
Calculated FCU (Maintain Plant & Animal)	0.088	biological
Calculated FCU (Removal of Elements)	0.084	chemical

### Interim Riverine Forested Hydrogeomorphic Analysis Worksheet

Wetland 9 - Impacted

8-Feb-18

Acreage = 0.09

Natural Existing Wetland to be Impacted

WAA 9

#### Wetland Assessment Area

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-79% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{req}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

#### Functional Capacity Index (FCI)

 Temp. Storage  
 of Water (1) 0.398

 Maintain Plant  
 & Animal Com. (2) 0.438

 Removal of  
 Elements (3) 0.420

#### Functional Capacity Units (FCU)

Pre-Project

Calculated FCU (Temp Storage)	0.036	physical
Calculated FCU (Maintain Plant & Animal)	0.039	biological
Calculated FCU (Removal of Elements)	0.038	chemical

JUN 11 2018

**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet**

Wetland 10 - Impacted

8-Feb-18

Acreage = 0.02

Natural Existing Wetland to be Impacted

WAA 10

**Wetland Assessment Area**

Pre-Project Year - 0

Variable	Subindex	Notes:
$V_{dur}$	0.50	In an average year 50-75% of the WAA either floods and/or ponds for at least 7 consecutive days
$V_{freq}$	0.50	Floods or ponds 2 out of 5 years (100 yr floodplain)
$V_{topo}$	0.40	Less than 15% of the WAA is represented by dips, hummocks, channel sloughs and/or other topographic features
$V_{cwd}$	0.30	Less than 3 pieces of cwd greater than 3" diameter along 100' transect
$V_{wood}$	0.25	11-33% of the WAA is covered with woody vegetation
$V_{tree}$	0.30	Less than 20% of the stand is oak, hickory, cypress, maple and/or elm
$V_{rich}$	0.40	One to two tree species present
$V_{basal}$	0.60	The average basal area of the WAA is between 60-80 square ft/acre
$V_{density}$	0.40	The WAA averages less than 49 trees/acre or greater than 500 trees/acre
$V_{mid}$	0.25	Midstory coverage of the WAA is less than 10%
$V_{herb}$	0.50	Herbaceous cover in the WAA averages between 31-50%
$V_{detritus}$	0.50	From 11-84% of the area possesses an O or A horizon
$V_{redox}$	0.10	Redox features less than 20%
$V_{sorp}$	1.00	The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, 3/1)
$V_{connect}$	0.75	Wetland plus two or more habitat types (other than forested) or three or more habitat types

**Functional Capacity Index (FCI)**Temp. Storage  
of Water (1) 0.398Maintain Plant  
& Animal Com. (2) 0.438Removal of  
Elements (3) 0.420**Functional Capacity Units (FCU)**

Pre-Project

Calculated FCU (Temp Storage)	0.008	physical
Calculated FCU (Maintain Plant & Animal)	0.009	biological
Calculated FCU (Removal of Elements)	0.008	chemical