



**UPRR Angleton SIT and Classification Yard – Individual Permit Application
Proposed Compensatory Mitigation Plan**

The Applicant has prepared this mitigation plan as required by Code of Federal Regulations (CFR) Title 33, Part 332.4. Since the Applicant proposes to fulfill their compensatory mitigation obligation by securing credits from an approved mitigation bank, this mitigation plan includes the names of the potential banks to be used, baseline information, and the determination of credits using the interim Hydrogeomorphic Assessment Method (iHGM) published by the U.S. Army Corps of Engineers (USACE) Galveston District.

PART I: PROJECT INFORMATION

Project Name: Union Pacific Railroad (UPRR) SIT and Classification Yard

Project Location: City of Angleton in Brazoria County, Texas

Potential Mitigation Site Location(s):

1. Danza del Rio Mitigation Bank (Secondary Service Area)
2. Lower Brazos River Mitigation Bank (Primary Service Area)

Watershed(s): Austin – Oyster (HUC 12040205)

County or Counties: Brazoria County

PART II: AVOIDANCE AND MINIMIZATION

Avoidance, minimization, and compensatory mitigation measures will be implemented to the extent practicable in order to ensure that the proposed project will result in minimal adverse effects to the aquatic environment.

1. Avoidance

The Applicant has avoided and minimized impacts to waters of the U.S., including wetlands, to the extent practicable through the design of the proposed project. The locations of waters of the U.S. as well as the design requirements to meet the project purpose and need do not allow complete avoidance of impacts. However, waters of the U.S. in the project vicinity will be avoided by the location and layout of the proposed project. Furthermore, the design includes bridges to the extent practicable to avoid permanent impacts to wetlands crossed by the project.

2. Minimization

The design of the proposed project has minimized impacts to waters of the U.S., including wetlands, to the extent practicable, by not impacting all waters of the U.S. within the project area. The design of the proposed project will include drainage structures to minimize downstream impacts by mimicking the existing flows from the site in order to minimize the erosion potential. Wetlands with temporary impacts will be restored to pre-construction elevations and re-vegetated as appropriate. Furthermore, the proposed project will incorporate water quality measures and best management practices during construction to minimize erosion and sedimentation effects to downstream waters of the U.S.



PART III: COMPENSATORY MITIGATION

Since the Applicant proposed to fulfill their compensatory mitigation requirements by the purchase of credits from an approved mitigation bank, as outline in the Code of Federal Regulations (CFR) Title 33, Part 332.4, only sections on baseline information and determination of credits are included in this Mitigation Plan.

1. Baseline Information

The following section describes the ecological condition of the proposed impact site. The proposed impact site lies in the Atlantic and Gulf Coast Lowland Forest and Crop Land Resource Region and within an area that has been previously impacted by an existing railway and associated right-of-way that traverses rural properties comprised of pasture/hay, herbaceous, and forested communities. The site is crossed by one tributary, Bastrop Bayou East Tributary, which generally flows south and becomes Bastrop Bayou approximately 2 aerial miles southeast of the project site. Temporary impacts to Bastrop Bayou East Tributary were previously evaluated by the U.S. Army Corps of Engineers under a Nationwide Permit 14 (SWG-2016-00127); therefore, impacts to this tributary were not included in the development of this Mitigation Plan.

Wetlands identified within the study area were located mostly within the trackside ditches and present likely due to freshwater runoff from the railway and surrounding areas. The impact site contains both forested and emergent wetland. Most of the emergent wetlands appeared to merge into forested wetland, changing from predominantly herbaceous cover to woody cover. Two emergent wetlands were identified as fringe wetlands along three excavated ponds on the southern side of the railway and an adjacent, linear emergent wetland was identified south of the excavated ponds to the southern side of the project area. Common vegetation within the emergent wetlands included halberd-leaf rose-mallow (*Hibiscus laevis*), various sedges (*Carex* sp.), maiden-cane (*Panicum hemitomon*), and the vine trumpet creeper (*Campsis radicans*). Palustrine forested wetlands were also located mostly within the trackside ditch. Common vegetation within the forested wetlands included water oak (*Quercus nigra*), sugar-berry (*Celtis laevigata*), cedar elm (*Ulmus crassifolia*) and the invasive Chinese tallow tree (*Triadica sebifera*). This species composition as well as the dominant age structure of the trees (less than 30 years old) indicates past clearing for agriculture or transportation maintenance. Thus the forested wetlands provide low quality wildlife habitat since they are dominated by exotic species due to impacts by previous land uses.

The emergent wetland habitat was dominated by native herbaceous species, but showed signs of disturbance by agriculture and maintenance activities. Some wetlands appear to have formed within depressional areas between the existing rail berm and elevated roads, and as a result of poor drainage at culvert outlets. Thus the emergent wetlands provide low to medium quality wildlife habitat since they are impacted by development and management. The hydrologic conditions of the wetlands at the impact site have been impacted by past site disturbances. This includes maintained drainage ditches for the surrounding agricultural and industrial land uses, along with the existing railroad. The wetland hydrology is heavily manipulated and impaired by

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past excavation, grading, and drainage activities. In addition, the surrounding land uses have reduced water quality on the site with sediment and other suspended solids.

2. Determination of Credits:

The proposed project will permanently impact a total of 0.044 acre of palustrine forested wetland and 1.242 acres of palustrine emergent wetland. The determination of credits needed from a mitigation bank to offset the adverse wetland impacts as a result of the proposed project were calculated using two hydrogeomorphic (HGM) analyses, the Forested Riverine interim HGM (iHGM) and the Herbaceous Riverine iHGM provided from the USACE Galveston District's Website (see attached worksheets in Attachments A and B). As indicated above, the Applicant proposes to purchase credits from the Danza del Rio Mitigation Bank, and/or Lower Brazos River Mitigation Bank (depending on credit availability and price).

The functional capacity units (FCU)/credits needed to be purchased were calculated for three different riverine wetland functions including: Temporary Storage and Detention of Storage Water (Physical), Maintenance of Plant and Animal Community (Biological), and Removal and Sequestration of Elements and Compounds (Chemical). FCU's were calculated separately for impacts to forested and herbaceous wetlands (see attached worksheets) based on the pre-project functional capacity indices (FCIs) as well as the impacted acreage.

For herbaceous (emergent) wetlands, a total of 1.0 FCU will be needed to mitigate losses for temporary storage and detention of surface water functions. A total of 0.9 FCU will be needed to mitigate losses for the maintenance of plant and animal community functions (see Attachment A). A total of 0.8 FCU will be needed to mitigate losses for the removal and sequestration of elements and compounds functions (all FCU values were rounded up to the nearest tenth). The impacted herbaceous wetlands are located within the primary service area of the Lower Brazos Mitigation Bank, therefore, no additional service area multiplier is anticipated and a 1:1 multiplier will apply. Therefore, the total credit purchases for impacts to herbaceous wetland will include 1.0 FCU physical credits; 0.9 FCU biological credits; and 0.8 FCU chemical credits (see Table 2).

For forested wetlands, a total of 0.03 FCU will be needed to mitigate losses for temporary storage and detention of surface water functions. A total of 0.04 FCU will be needed to mitigate losses for the maintenance of plant and animal community functions (see Attachment B). A total of 0.03 FCU will be needed to mitigate losses for the removal and sequestration of elements and compounds functions. Since the impacted forested wetlands are within the secondary service area of the Danza Del Rio Mitigation Bank, a 1.5:1 service area multiplier will apply. Therefore, the total credit purchases for impacts to forested wetlands (with FCU values rounded up to the nearest tenth) will include 0.1 FCU hydrological credits; 0.1 FCU biological credits; and 0.1 FCU sequestration credits (see Table 3).

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Table 1. Summary of total purchase credits for permanent impacts to wetlands within the project site.

Wetland Type	Approximate Permanent Impacts (Acres)	Mitigation Bank	Mitigation Bank Service Area Multiplier	Credits (Total FCUs Rounded Up)
Emergent / Herbaceous (PEM)	1.242	Lower Brazos	1	2.7
Forested (PFO)	0.044	Danzo del Rio	1.5*	0.3
Totals	1.286	-	-	3.0

* For secondary service area

Table 2. Total FCU calculated using HGM analysis and the Lower Brazos Mitigation Bank service area multiplier for impacts to emergent/herbaceous wetlands within the project site.

Wetland Type	Mitigation Bank Service Area Multiplier	Physical FCU	Biological FCU	Chemical FCU	Total Purchase Credits (FCUs)
Emergent / Herbaceous (PEM)	1	1.0	0.9	0.8	2.7

Table 3. Total FCU calculated using HGM analysis and the Danzo del Rio Mitigation Bank service area multiplier for impacts to forested wetlands within the project site.

Wetland Type	Mitigation Bank Service Area Multiplier	Physical FCU*	Biological FCU*	Chemical FCU*	Total Purchase Credits (FCUs)*
Forested (PFO)	1.5	0.1	0.1	0.1	0.3

* Includes rounding up to nearest tenth after secondary service area mitigation bank multiplier

Based on the tables above, the Applicant proposed to purchase 2.7 emergent/herbaceous wetland credits (FCUs) from the Lower Brazos Mitigation Bank and 0.3 forested wetland credits (FCUs) from the Danzo Del Rio Mitigation Bank (by FCU type) to offset permanent adverse impacts to 1.286 acres of wetlands resulting from the proposed project.

If one of the mitigation banks proposed above does not have the proposed credits (FCUs by type) available at the time necessary for credit purchase, then the applicant may choose to purchase credits from another approved mitigation bank, such as the Mill Creek Mitigation Bank, in accordance with the approved multipliers for the bank. The project site is within the primary service area of the Mill Creek Mitigation Bank. If necessary the applicant will confirm the revised credit purchase with the USACE prior to completion.



ATTACHMENT A
Herbaceous Wetland Hydrogeomorphic Assessment Method (iHGM) Worksheet



Riverine Herbaceous/Shrub HGM (Interim) Assessment Pre-Impacts

Applicant: UPRR WAA ID: 1 WAA Acreage: 1.242

<p>V_{dur}: Percent of the WAA that is flooded and/or ponded due to the hydrology (i.e. flooding overbank flow) of the nearby waterway</p> <p style="text-align: center;"><i>In an average year, at least 80% of the WAA either floods and/or ponds for at least 14 consecutive days.</i></p>	
	Subindex: 1.000
<p>Comments:</p>	

<p>V_{freq}: Frequency that the WAA is flooded and/or ponded by the nearby waterway</p> <p style="text-align: center;"><i>Floods or ponds 2 out of 5 years (100-year floodplain).</i></p>	
	Subindex: 0.500
<p>Comments:</p> <p><i>Not within or near floodway.</i></p>	

<p>V_{topo}: Roughness associated with the WAA</p> <p style="text-align: center;"><i>Greater than 30% of the WAA is represented by dips, hummocks, channel sloughs, and/or other topographic features.</i></p>	
	Subindex: 1.000
<p>Comments:</p>	

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V_{wood} : Percentage of the WAA that is covered by woody vegetation	
<i>0-10% of the WAA is covered with woody vegetation.</i>	
Proportion of site covered by typical vegetation:	Subindex: 0.100
Comments: <i>Emergent wetland with little woody vegetation based on wetland determination data forms.</i>	

V_{mid} : The average/mean coverage of the midstory (shrub/sapling) layer in the WAA	
<i>Midstory coverage of the WAA is between 1-25%.</i>	
Proportion of site covered by typical vegetation:	Subindex: 0.250
Comments: <i>Emergent wetland with low midstory based on wetland determination data forms.</i>	

V_{herb} : The average/mean coverage of the herbaceous layer in the WAA	
<i>Herbaceous cover in the WAA averages between 50-75%.</i>	
Proportion of site covered by typical vegetation:	Subindex: 0.750
Comments: <i>Average cover of herbaceous layer based on wetland determination data forms.</i>	

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Applicant: UPRR WAA ID: 1 WAA Acreage: 1.242

V_{connect}: Number of habitat types within 600 feet of the perimeter of the WAA
Habitat to be counted has to be at a minimum 5% of the size of the WAA

Habitat Types:

Forested	Shrub/Sapling
Herbaceous/Prairie/Abandoned Ag Field	Active Ag Field
Open Water	Wetland
Mudflat	Lawn

Wetland plus four habitats and/or surrounded by forested.

Subindex:	1.000
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V_{detritus}: The amount of detritus on the WAA (The A-horizon has to have a Munsell value of 4 or less)
Greater than 85% of the area possesses an O or A horizon.

Subindex:	1.000
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Comments:

V_{redox}: The amount of the WAA that exhibits redox features as an indication of the chemical exchange
Redox features less than 20%.

Subindex:	0.100
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Comments:
Based on wetland determination data forms.



Riverine Herbaceous/Shrub HGM (Interim) Assessment Pre-Impacts

<p>V_{sorpt}: The absorptive properties of the soils in the WAA</p> <p><i>The WAA is dominated by montmorillonitic clayey soils (clay, clay loams, silty clay loams) or soils with high organic (2/1, 2/2, or 3/1).</i></p>	
<p>Comments:</p>	<p>Subindex: 1.000</p>

Functional Capacity Indices (FCI) and Units (FCU=FCI*WAA Acreage)	Pre-FCI	Pre-FCU
Temporary Storage & Detention of Storage Water $\{ \{V_{dur} * V_{freq}\} 1/2 * \{v_{topo} + \{V_{herb} + V_{mid}/2\}/2\} 1/2$	0.73	0.9045
Maintain Plant & Animal Community $\{V_{mid} + V_{herb} + V_{connect}\}/3$	0.67	0.8280
Removal & Sequestration of Elements & Compounds $[[V_{wood} + V_{freq} + V_{dur} + [\{V_{topo} + V_{herb} + V_{mid}\}/3] + [\{V_{detritus} + V_{redox} + V_{sorpt}\}/3]]/5$	0.59	0.7369



ATTACHMENT B
Forested Wetland Hydrogeomorphic Assessment Method (iHGM) Worksheet



Interim Riverine Forested Hydrogeomorphic Analysis Worksheet
Existing Wetland Assessment Area 2

Acreage =

0.044

Pre-Project Year - 0

Variable	Subindex	Comment
V_{dur}	1.00	In an average year, at least 80% of the WAA floods and/or ponds for at least 14 consecutive days.
V_{freq}	0.50	Floods or ponds 2 out of 5 years (100-year floodplain).
V_{topo}	1.00	Greater than 30% of the WAA is represented by dips, hummocks, channel sloughs, and/or other topographic features.
V_{cwd}	1.00	More than 7 pieces of cwd greater than 3" in diameter along a 100-foot transect.
V_{wood}	1.00	Greater than 90% of the WAA is covered with woody vegetation.
V_{tree}	0.50	More than 20% of stand is oak, hickory, cypress, maple, and/or elm. Black willow, cottonwood, Chinese tallow, and sycamore do not represent more than 15% of the stand.
V_{rich}	1.00	Five or more species present.
V_{basal}	1.00	The average basal area of the WAA is greater than 100 square feet per acre.
$V_{density}$	1.00	The WAA averages a tree density of 100-250 trees per acre.
V_{mid}	1.00	Midstory coverage of the WAA is more than 50%.
V_{herb}	1.00	Herbaceous cover in the WAA averages between 5-30%.
$V_{detritus}$	1.00	Greater than 85% 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, or 3/1).
$V_{connect}$	1.00	Wetland plus four habitats and/or surrounded by forested area.



**Interim Riverine Forested Hydrogeomorphic Analysis Worksheet
 Existing Wetland Assessment Area 2**

Acreage =

Functional Capacity Index (FCI)

Temp. Storage
 of Water (1)

Maintain Plant
 & Animal Com. (2)

Removal of
 Elements (3)

Functional Capacity Units (FCU)

Pre-Project

Calculated FCU (Temp Storage)

Calculated FCU (Maintain Plan & Animal)

Calculated FCU (Removal of Elements)