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Alternatives Analysis and Compensatory Mitigation Plan
IP Orange Mill
Orange, Texas

International Paper
Orange, Texas

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Table of Contents

List of Sections

List of Figures

List of Tables

List of Appendices

List of Acronyms

Acronym	Description
AJD	Approved Jurisdictional Determination
CWA	Clean Water Act
CFR	Code of Federal Regulations
ESA	Endangered Species Act
FCI	Functional Capacity Index
FCU	Functional Capacity Unit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GNSS	Global Navigation Satellite System
RIBITS	Regulatory In-lieu fee and Bank Information Tracking System
iHGM	Interim Hydrogeomorphic Model
IP	International Paper
IPaC	Information for Planning and Conservation system
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	National Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
SOP	Standard Operating Procedure
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAA	Wetland Assessment Area

Executive Summary

International Paper (IP) Orange Mill is proposing an onsite landfill (Cell #3) on a 36.3 acre site and the establishment of a nearby preservation mitigation area to offset unavoidable impacts to wetlands associated with the project in Orange County. IP has minimized the impacts by surveying the area in a siting study, and realignment of the footprints of the landfill and associated borrow pits. Based on available information, IP has determined that the proposed location is the least damaging alternative, even though it impacts 5.38 acres of wooded wetlands. The applicant has an Approved Jurisdictional Determination (AJD) that covers the proposed footprint of Cell #3 which was issued by United States Army Corps of Engineers Galveston (SWG USACE) on 10/28/16. Using the iHGM Functional Capacity Index (FCI) assessment model indices estimates for the values and functions of the impact area were 2.23 units of function for Temporary Storage & Detention of Storage Water, 3.73 units of function to Maintain Plant and Animal Communities, and 3.09 units of function for Removal & Sequestration of Elements & Compounds.

Because there is no bank in the area, a Permittee-Responsible Mitigation Plan is required for compensatory mitigation associated with impacts due to construction of Cell #3. The applicant proposes preservation based compensatory mitigation. The mitigation plan presented in this document follows the 12 components listed in 33 CFR PART 332. The proposed nearby mitigation site is entirely contained within property owned and managed by IP. The area appears to be a naturalized old oxbow in the floodway of the Sabine River. There do not appear to be artificial berms placed along the river in this reach, and there were also no obvious signs of prior management such as stumping. However, there are forest roads, as well as a long abandoned skid trail, which are consistent with the practice and purpose of forestry.

A special aquatic site determination was conducted into onsite resources of the proposed mitigation area, and concurrently an Interim Hydrogeomorphic Model (iHGM) estimation of functional capacity was performed for both the proposed mitigation site and the impact site, and is detailed in this report. The mitigation area was originally estimated to be one contiguous jurisdictional area of 42.8 acres within the 45.3 mitigation area using routine methods (USACE, 1987). The SWG USACE compliance branch staff obtained, and processed a LiDAR point cloud data set to produce a DEM that allowed contour lines to be drawn based on elevation. The SWG USACE compliance branch staff suggests that this data better represents the hydrology aspect of determination, and estimates the wetland area in the mitigation area to be

41.03 acres and an AJD was issued by SWG USACE on 1/12/2018. The proposed mitigation area is bordered to the east by the Sabine River, to the south by a pipeline right of way, and unimproved roads to the west and north.

The delineation report submitted to the SWG USACE Compliance Branch found the proposed mitigation area to be homogeneous with respect to the criteria used to assess wetland functions. Sampling was done at ten observation points within the mitigation area, and it was a realistic representation that 10 observations were taken of a single population, or a single Wetland Assessment Area. To represent the central tendency of the population from individual point estimates a mean and median of each model output for the observation points along with the preliminary estimated jurisdictional area from the delineation report were used in the iHGM estimates. The assessment models output yielded the following estimates of units for the mitigation area:

FCU	Impacted Wetland D	Impacted Wetland E	Impacted Wetland F	Total Impacted	Using Mean of Mitigation Area FCI	Using Median of Mitigation Area FCI	Mitigation FCU Ratio using the Mean FCI	Mitigation FCU Ratio using the Median FCI
Acres of Resource	2.10	2.98	0.30	**5.38**	**41.03**	**41.03**	-	-
Temporary Storage & Detention of Storage	0.93	1.19	0.12	**2.23**	**36.38**	**36.30**	**16.29**	**16.25**
Maintain Plant & Animal Community	1.45	2.05	0.23	**3.73**	**33.25**	**33.08**	**8.91**	**8.86**
Removal & Sequestrian of Elements & Compounds	1.27	1.66	0.16	**3.09**	**36.65**	**37.68**	**11.84**	**12.17**

The ratio of the impact site (the proposed project site) to the proposed mitigation area results in replacement ratios in terms of iHGM Functional Capacity Units (FCU) that range 8.9 to 16.25. The use of an arithmetic mean or median to estimate central tendency made little difference in the estimated assessment model FCU ratios. In addition, all FCU estimates exceed the area based ratios given to many of the preservation only mitigation banks, and the wetlands at the impact site scored slightly lower in the iHGM indices on average due mainly to their geospatial locations. The FCU ratio estimates also fail to consider significant ecological values provided for wide ranging and threatened species in the area such as black bear and the Texas Pigtoe mussel.

Section 1
Introduction

1.1 Site Location and Regional Parameters

International Paper (IP) is proposing an onsite landfill on a 36.3 acre site and associated 5.9 acre borrow area in Orange County (Figure 1, 2). The USACE Regulatory In-lieu fee and Bank Information Tracking System (Ribits) does not list any banks that have primary or secondary service areas that cover wetland impacts for this area. Therefore, the applicant will be required to provide a Permittee-Responsible Mitigation plan for any impacts to jurisdictional resources. The applicant proposes to set aside a nearby preservation mitigation area to offset unavoidable impacts to wetlands associated with the project, which is shown with a red polygon in Figure 3. The proposed mitigation site is bordered by the Sabine River that supplies the hydrology for the wetlands. A request for an Approved Jurisdictional Determination (AJD) of the mitigation area has been submitted to the United States Army Corps of Engineers (USACE) Galveston Compliance Branch on May 30, 2017.

Both the proposed project site and the proposed mitigation area are bordered to the east by the Sabine River, and are within a large tract of land owned by IP. The properties are within the United States Geological Survey (USGS) watershed of the Hydrologic Unit Code (HUC) 12010005, the lower Sabine River. Elevations at the project site are approximately 20 feet, and the wet areas of the proposed mitigation site are approximately 5 foot or less in elevation. They are located in the United States Environmental Protection Agency (USEPA) Level III Western Gulf Coastal Plains, which is described as flat grasslands, croplands, and urban and industrial development (USEPA, 2013). Orange, Texas, receives an annual average of 60 inches of precipitation (NRCS, 2014). The growing season is between 250 and 280 days (NRCS, 2006). The assessments were done during times of normal precipitation (Appendix 1).

1.2 Soils

The native soils in the proposed landfill site area (impact area) consist of the Texla silt loams, and Evadale silt loams. These soils are poorly drained, and have a very low transmissivity. The proposed mitigation area is predominately Cowmarsh Mucky Clay, but to the west along higher terraces the soils change to the Spurger-Caneyhead Complex, which is a very fine sandy loam

that is moderately well drained (NRCS 2017 Appendix 2). Slopes of wet areas in the mitigation and impact sites are very low at 0 to 1 percent.

1.3 FEMA FIRM

The 1997 Federal Emergency Management Agency Flood Insurance Rate Map (FEMA FIRM) has a determination of a 1% annual base flood elevations of 13 feet to 14 feet in the area (Appendix 3). The landfill site is above the 100 year flood plain, and the proposed mitigation area is within the 100 year flood plain. The impact site roughly shown on the United States Geological Survey (USGS) Echo Quadrangle map as being bordered on the northern and eastern sides by an intermittent stream and a drainage (Figure 4), while the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) does not show the western stream and does not rate the impact site as being within the 100 year floodplain (Figure 5). The FIRM may not be accurate in the impact site area, as personal communication with mill staff indicates that in their experience the impact site does flood with a frequency above the 1% annual base flood frequency (personal communication June 8, 2017). The proposed mitigation areas are frequently flooded by the Sabine River and wetland areas are within the floodway.

1.4 USFWS NWI Map

The U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) map were consulted for both the proposed landfill and the mitigation areas. The approximate locations of the landfill, borrow area, and mitigation sites were hand drawn on the maps the NWI wetlands mapper produced. Because the boundaries are hand drawn, the map may contain minor inaccuracies, and should only be relied upon to illustrate wetlands the NWI has identified in the area. There have been delineation efforts on both the proposed impact and mitigation sites that have more accurate boundaries based on field sampling.

The NWI of the landfill site, the western red polygon, identifies two of the three wetlands that were delineated as PFO1C (Figure 6), which are palustrine forested broadleaf deciduous wetlands. The borrow area does not show Stream A (SA), or Stream B (SB) in the locations found in the AJD, and show no NWI wetlands on the borrow site.

The proposed mitigation area is shown as a blue polygon in Figure 7 in a NWI output. This area is shown as almost entirely wet, and the wetlands are also palustrine forested broadleaf deciduous wetlands as were identified at the impact site. While the polygon is hand drawn, and

the NWI itself is not meant to be a geospatially accurate delineation, the NWI suggests that there are minor inclusions of uplands within the proposed mitigation site boundaries. The upland inclusion within the mitigation site was confirmed with the delineation field data that was submitted to the USACE in the request for the AJD of the mitigation site. The wetlands on the mitigation site are not supported by local watersheds, and the inclusion of uplands is due to the need to describe a complex wetland shape with a reasonable and identifiable metes and bounds for the site protection instrument. These wetland upland boundaries were more accurately delineated in the request for an AJD that has been submitted, and upland areas will not be included in wetland functions and values calculations. The following wetland classifications were noted on the NWI as being present within the mitigation area:

- PFO1A Palustrine Deciduous Forested Wetland, temporarily flooded.
- PFO1/2F Palustrine Forested wetland, mixture of deciduous or needle leaved. Semi permanently flooded.
- PFO1C Palustrine Deciduous Forested. Seasonally flooded.
- PFO1F Palustrine Forested. Semi permanently flooded.

The NWI was used to help guide the detailed on-the-ground inspection of resources at the proposed mitigation areas, boundaries, and classifications.

1.5 Threatened and Endangered Species

The USFWS Information for Planning and Conservation (IPaC) system was consulted and an official species list was requested that has 4 listed species, and had no critical habitats. All of the listed species were not covered by a determination key, and they will have to be evaluated manually to make an effect determination. A supplemental report was written in June 2017 (Appendix 4), to address the possible effects on federally endangered, threatened, proposed and candidate species and their preferred habitat that are listed by the US Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS) in the area of the project plot, which listed 4 species and all are covered in the supplemental report.

The objective of the evaluation was to determine the potential for presence of threatened and endangered species and the potential effects of the landfill development. The evaluation considered animal and plant species that are protected under the Endangered Species Act (ESA) as listed by the USFWS and NMFS in Orange County. The report also includes species listed by the Texas Parks and Wildlife Department (TPWD) as state threatened or endangered species, and other species of concern.

Information and literature reviewed regarding the life histories and habitat requirements of the species for consideration include state and federal agency reports, management documents, peer-reviewed scientific literature, online data, FWS, and TPWD data. This evaluation was also based on the on-site direct observations made of the project area and the larger action area conducted by RPS staff. The complete IPaC list is provided in Appendix 5. For all the federally listed species the proposed action would likely have no adverse effect.

1.6 Cultural Resources

An archeological survey of the proposed landfill site and the surrounding 130 acres was done by SWCA in December 2015, and in compliance with Section 106 of the National Historic Preservation Act of 1966. Fieldwork included a pedestrian survey and systematic shovel testing across the entire area for potential effects for archeological resources. Archeologists utilized 11 transects, and excavated 31 shovel tests. However, no new archeological sites or cultural materials were documented within the project area during field investigations (Appendix 6). The report was sent to the Texas Historical Commission (THC), and was received on January 13 2016. The THC returned the letter saying that no historic properties would be affected, and the project may proceed on January 29, 2016 (Appendix 7).

There has not been a cultural resource survey of the proposed mitigation area, but the 1932 map does not show any structures being in the area (Figure 8), and the 1975 photo revised version of the 1955 USGS map indicates that there were some small buildings or structures in this area by 1955 mainly along the unnamed unimproved roads along the north and west side (Figure 4). Along the northern edge of the site along an existing unimproved road there is shown to be two structures, but no remains of these structures were observed. There is also a structure denoted within the northern part of the mitigation area, but no remains of that structure were observed during the field work. However, there was some evidence that something had been in the area as a small burn site was observed in this portion of the site, which contained

some old glass, and a few porcelain coated or galvanized steel objects. Field recognizance also found what looked like illegal dumping of a washer of more modern vintage in the far northwest edge of the site, but this is likely not associated with the structures. The 1975 map also denotes structures along the high ridge along the southwestern edge of the site in 1955, but nothing related to those structures was observed. There is also a structure denoted just outside the mitigation area to the west, but that area has subsequently been planted in pines. The quadrangle was photo revised in 1960, and that revision indicates no new structures in the area. In the 1960 photo revision of the quadrangle, there is a new pipeline right of way (ROW) shown that bisects the property (Figure 4). Field observation of this area indicated it is maintained and that there were no trees or saplings in this ROW. The current 2016 quadrangle does not show any extant structures in the area (Figure 9).

The mitigation area is being proposed as an in kind compensatory mitigation area, however no extant structures exist, and no earthwork or disturbance is planned to occur on this site as part of the mitigation plan. The Regulatory Archeologist was forwarded the Archelogy report for the proposed landfill site and mitigation project for compliance with Section 106 of the National Historic Preservation Act. On September 12, 2017 RPS received an email that stated that that the reports addressed all concerns, and that he had completed the required consultation with the Texas State Historic Preservation Officer. It was agreed that there were no historic properties present, and that all cultural resource concerns have been resolved and the project may proceed.

Section 2 Alternatives Evaluation

In its evaluation of permit applications to discharge fill material into jurisdictional waters an alternatives analysis of the proposed project that practicably and reasonably achieve the project purpose is needed. This analysis concentrates on the 404(b)(1) Guidelines but also on the National Environmental Policy Act (NEPA) requirements. A key provision of the 404 (b)(1) guidelines is the “practicable alternative test” which requires that “no discharge of fill material shall be permitted if there is a practicable alternative to the proposed fill which would have less adverse impact on the aquatic ecosystem.” The Applicant has investigated several available alternatives to meet the overall project purpose, in order to demonstrate that there are no less

damaging options available, and that all onsite impacts to waters of the U.S. have been avoided to the maximum practicable extent possible.

The goal under 404(b)(1) is to avoid all impacts to waters of the United States, including wetlands. However, the project could not be practicably redesigned to avoid affecting all waters of the US. The design process evaluated several possible designs to find practicable alternatives that would have the least adverse impact on the aquatic ecosystems, and would maximize the avoidance and minimization of impacts to waters of the United States. Several designs were considered by International Paper, including a no action analysis.

2.1 Alternatives Analysis

IP Orange Mill operations consist of unbleached kraft pulp and paper fiberboard manufacturing that pulps virgin fiber and recycles Old Corrugated Cardboard (OCC) as feedstock. The milling operations result primarily in wastes that are TCEQ Class 1 and Class 2 in nature. The mill estimates that they are producing almost 18,000 cubic yards of waste per month, which is landfilled on-site. The current landfill areas consist of Cells 1 and 2. Cell 1 was built in 1967 and Cell 2 in the 1990's. Cell 1 is in the final stages of closure, having received its last load of waste. Cell 2 is currently receiving all qualified wastes (non-hazardous, no free liquid) generated by the mill. Cell 2 is now reaching the end of its service life with less than a year of capacity before it enters closure. With Cell 2 reaching capacity, no action is not a viable alternative, and IP considered options to dispose of future waste produced by the mill in a reasonable manner.

IP looked at offsite options, but due to the volume of waste produced all options would result in nearly 700 trucks per month, which county bridge and road infrastructure would not be able to handle safely, contributing to a significant public hazard along public routes as well as the potential for secondary impacts to aquatic ecosystems due to the expansion of local and regional infrastructure to handle the large increase in loads. Additionally, there were no offsite facilities nearby that could handle the volume of waste produced. Economic evaluations and analysis of offsite options also indicated a large increase in cost per cubic yard to dispose of material placing constraints on the practicability of all offsite options. Therefore, a combination of factors made offsite alternatives not practicable or reasonable based on consideration of logistics, existing infrastructure, and cost. Therefore, on-site placement areas were considered,

and this process started with an assessment of the property for probable sites to avoid and minimize impacts to aquatic ecosystems.

In efforts to achieve the project purpose and 404(b)(1) intents, International Paper has examined three onsite alternatives in the areas covered by the AJD:

- An attempt to place the project solely in upland areas was undertaken from the early conceptual phases in the search for placement of an onsite landfill of the size that was practicable for the volume that will be produced as well as is viable and consistent with the permitting processes with the Texas Commission on Environmental Quality's (TCEQ) waste management guidelines for Class 1 and Class 2 waste to limit the potential to impact the water table. Arcadis (2016) performed an assessment of a majority of the IP Orange Mill site to identify an area to obtain borrow material and site for the landfill, while impacting the minimum amount of resources (Appendix 8). Three possible sites were identified in this study and were given to USACE Galveston Compliance Branch for the AJD mentioned above. However, within the large overall IP property that was observed, the three sites that were identified as possible sites still contained wetlands, with the western site having a greater percentage as well as a flooded borrow pit that was naturalizing. The wetlands on these sites were found to be dispersed in a uniform or random distribution and were of small physical sizes. The study resulted in the western site being eliminated due to the higher percentage of wetland coverage. The two remaining sites, which were estimated to contain the smallest percentage coverage of wetlands or other special aquatic sites, were proposed as possible sites for Cell #3 and the borrow area that will be needed to develop Cell #3. However, even at the two proposed impact sites wetlands and streams existed on site, and the wetlands were not located strictly adjacent to streams but were dispersed across the landscape. Therefore, the proposed sites were chosen as preferred sites because these sites would have the potential to maximize the avoidance of onsite resources to the most practicable extent possible, while meeting the goals of the project. However, due to the dispersed nature of the wetlands, it was not found to be strictly possible or practicable to avoid all resources even on the chosen sites while taking into consideration existing technology and the overall project purpose. It should be noted that on the proposed landfill and borrow areas, there is also a large contiguous wetland stream complex within the proposed Cell #3 area as well as two tributaries, that were identified along the eastern edge borrow area. The location of the jurisdictional

resources and their locations were determined in the October 28, 2016 AJD (Appendix 9). The avoidance of these resources were considered below in possible alternate project site layouts and alteration of proposed construction plans in an attempt to potentially avoid and/or minimize impacts to special aquatic sites, and these are considered as alternatives in the sections below.

- Realigning the landfill was considered to avoid onsite resources on the landfill plot. On the landfill plot there was a large adjacent wooded wetland system of approximately 13.36 acres running east to west along the northern portion of the plot which then turns to the south to run along the western edge of the plot (Wetland WC on Figure1). Through realignment and redesign of the proposed landfill to be located further to the south on the proposed project area, it was found that it was practicable to completely avoid this large contiguous wetland. This avoidance was found to be possible and practicable; considering cost, existing technology, and logistics, while still meeting the overall project purpose.

- It was found that by redesigning the landfill project and realigning it slightly to the west it was found to be possible and practicable to avoid, the tributary system (Stream SC on Figure 2), which drains the adjacent wetland WC mentioned above. This avoidance not only avoided impacts to this resource, but also preserved the functionality of the stream/wetland system. This realignment also allowed the avoidance of the wetlands adjacent to the stream along the eastern side of the landfill project site which were considered part of wetland WC in Figure 2. A minimum buffer of 10 feet is proposed to be maintained between the area of impact and the adjacent wetland/ tributary system. The realignment and avoidance was found to be possible considering cost, existing technology, and meeting the overall project purpose.

- Clay material used to develop the new landfill cell is to be excavated from an on-site borrow area. This borrow area was considered in the plots covered by the AJD and was one of the sites presented. It was found that this borrow area plot was bordered to the north and east by two tributaries (Figure 2). By limiting the borrow area to the west of these features, the excavation avoided the tributary areas. This avoidance of these tributaries was found to be possible considering cost, existing technology, and meeting the overall project purpose.

The applicant has investigated available practicable alternatives to meet the overall project purpose, in order to demonstrate that there are no less damaging options available and that all onsite impacts to waters of the U.S. have been avoided to the maximum practicable extent possible as presented in the Alternatives Analysis section above. The applicant believes that the preferred plan will minimize impacts, but it will not be able to avoid all impacts to aquatic resources.

2.2 State Reviews

The project as proposed will also require a Section 401 Tier II review by the Texas Commission on Environmental Quality (TCEQ). The criteria identified by the TCEQ for their review has been satisfied by other state and federal requirements and are addressed in this report. This project incorporates the requirements necessary to comply with the TCEQ criteria for landfills, many of which are shared between the two TCEQ programs as the provisions for landfill design are to safeguard both aquifers and surface water quality, which are parts of the TCEQ Tier II review. Other parts of the TCEQ Tier II review overlap the 404(b)(1) analysis required by the USACE, and are presented in Section 2.1.

The Texas General Land Office (GLO) manages Coastal Management Plan (CMP) for Texas. The Coastal Management Plan (CMP) general map for Texas would appear to indicate that the Coastal Management Zone (CMZ) boundary is north of the project. It should be noted that International Paper is seeking a section 404 permit for a landfill that is within TCEQ stream segment 0502 (Sabine River above Tidal). In TAC§ 33.203(B) Coastal Natural Resource Areas (CNRA) are defined not only as within rivers and streams to the extent of tidal influence, as shown on the Texas Natural Resource Conservation Commission's stream segment maps, but the boundaries of the CNRA's are set by a distance from Texas Natural Resource Conservation Commission's stream segment maps in § 33.203(C) that are within one mile of the mean high tide of the portion of river and stream described by Paragraph (B), except as provided by Paragraphs (D) and (E) (Trinity and Neches River segments). However, at the closest edge the project is 2.07 miles from segment 0501 boundary, and thus may not be in the CMZ. Segment 0501 is to be updated in the 2018 revision of the Texas Water Quality Standards (personal communication TCEQ Standards Development Staff 6/27/17, but this revision has not been approved by the commission or EPA, thus the project does not appear to be within the CMZ. If the project lies within the CMZ, it will require a statement of consistency. The project does not impact

any coastal natural resource areas as defined other than riverine forested wetlands. The project is the construction of an onsite landfill that is compliant with TCEQ policies. TCEQ adopted rules that include the construction and operation of solid waste treatment, storage, and disposal facilities, which contain provisions for point and non-point sources that are compliant with CMP policies.

2.2 Proposed Project Design

IP proposes the clearing, excavation, and subsequent discharge of a composite clay liner material into 5.38 acres of wooded wetlands in conjunction with the construction of an onsite landfill in order to meet the demand for disposal of waste produced at the IP Orange Mill facility.

An overlay of the design drawings in plan view with the wetlands delineated in the AJD overlaid is presented in Figure 10. Figure 11 is the plan view of the grading design with the locations of cross sections A-A', and B-B' shown. Figures 12 and 13 show the two cross sections indicated in Figure 11.

The preferred plan will impact a total area of 5.38 acres of wetlands.

Section 3 Compensatory Mitigation Purpose

The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States authorized through the permitting process. Compensatory mitigation is based on what is practicable and capable of compensating for with aquatic resource functions, and when evaluating compensatory mitigation options the options should consider what would be the most environmentally preferable to maintain functions and services.

Mitigation plans under 33 CFR PART 332 require that 12 fundamental components of mitigation be addressed: objectives; site selection criteria; site protection instruments; baseline information for impact and compensation sites; credit determination methodology; a mitigation work plan; a maintenance plan; ecological performance standards; monitoring requirements; a long-term management plan; an adaptive management plan; and financial assurances.

Section 4 Mitigation Site Selection Criteria and Objectives

The USACE Ribits database does not list any banks that have primary or secondary service areas that cover wetland impacts to this area. Therefore, the applicant will be required to provide a Permittee-Responsible Mitigation plan for any impacts to jurisdictional resources.

The delineation report and a request for an AJD for the proposed mitigation area were sent to the SWG USACE Compliance Branch on 5/30/17. The mitigation area was originally estimated to be one contiguous jurisdictional area of 42.8 acres within the 45.3 mitigation area. The SWG USACE compliance branch staff obtained, and processed a LiDAR point cloud data set to produce a DEM that allowed contour lines to be drawn based on elevation. The SWG USACE compliance branch staff suggests that this data better represents the hydrology aspect of determination, and estimates the wetland area in the northern and southern areas to be 41.03 acres. The proposed plan will preserve 41.03 acres of mature hardwood forested wetlands, which provide ecological benefits to the watershed, and ecoregion.

The proposed mitigation site is adjacent to the impact site and is bordered by the Sabine River that supplies the hydrology for the preserved wetlands (Figure 3). The mitigation area chosen is an onsite in-kind mitigation concentrating on preservation to preserve the landscape perspective of these functions and values that are important to the physical, chemical, and ecological functions and values of the local watershed that compensatory mitigation is meant to safeguard.

The mitigation area is a self-sustaining aquatic resource. The hydrological conditions, soil characteristics, and other physical and chemical characteristics support a mature wooded wetland containing a climax community of considerable ecological value maintaining aquatic habitat diversity, water quality, habitat connectivity, and other landscape scale functions.

It should be noted that the 45.3 acre proposed mitigation plot is across the Sabine River from the State of Louisiana's 8,695 acre Sabine Island Wildlife Management Area. The large plot adjacent to the mitigation area would actually increase the value of the mitigation area for species that have an extended range or avoid anthropogenically disturbed areas such as some birds and the Black Bear. Additionally, during the delineation efforts in the proposed mitigation

area there were observations of mussel beds along the Sabine River, and a couple dozen individuals were found, both alive as well as fresh dead. Two matching valves from a recently dead specimen were keyed to the species Texas pigtoe (*Fusconaia askewi*). This identification was confirmed by Texas Parks and Wildlife biologists (Appendix 10). The Texas pigtoe is a regional endemic limited to a relatively small area in Texas and Louisiana, and is listed as a state threatened species.

Historic and potential future aquatic resource conditions are dependent on the aquatic resources of the local watershed, and even the terrestrial connections between these aquatic resources. It is acknowledged that preservation type plans are, and should be, very restrictive, and it is stated in 33 CFR PART 332 that preservation only plans will only be considered in exceptional circumstances. However, the values and functions of the wetlands proposed to be preserved are a natural high quality mature wooded wetland where little or ecological lift could be achieved through enhancement, and perhaps even damage that would occur through the disturbance of enhancement activities may exceed lift. The values and functions of these wetlands serve the local and regional area, and may contribute valuable habitat values to federal and state threatened species.

Section 5 Mitigation Type

The applicant proposes to set aside a nearby in-kind preservation mitigation area to offset unavoidable impacts to wetlands associated with the project, which is shown with a red polygon in Figure 3. Preservation is defined as the removal of a threat to, or preventing the decline of, aquatic resources, and this term includes activities commonly associated with the protection of valuable aquatic resources and functions through the implementation of appropriate legal and physical mechanisms.

The USGS maps of the area indicated during the period from 1932 to 1955 that there were forest roads created, as well as a long abandoned skid trail (observed), which are consistent with the practice and purpose of forestry (Figures 9 and 10). IP as well as other private owners and leasees use this regional area for forestry, and cypress areas such as the mitigation area are valuable resources that contribute billions of dollars to the economy (Williston et al. 1980, LASAF 2015), and those are activities exempt under Section 404(f)(1), placing these resources are under threat of destruction or adverse modifications by unregulated activity. This wetland

type has been identified by SWG USACE as a high priority area, and has been specifically removed from the Nationwide permit process in the district to help preserve this rapidly disappearing wetland habitat.

The impacted wetlands as well as the preservation area contain wetlands of a difficult-to-replace resource. The wetlands are mature wooded wetlands which would take decades to create, are at risk of invasion by nonnative species, and the required compensation that is practicable to provide is preservation since there is greater certainty that these methods of compensation will successfully offset permitted impacts. These resources to be preserved and immediately provide important physical, chemical, and biological functions for the watershed that cannot be replaced on a reasonable timescale. In addition, the delineation of the mitigation area, it was found that a state threatened unionid mussel, the Texas pigtoe, was identified, and verified by Texas Parks and Wildlife (TPWD). Mussels can be sensitive to changes in habitats, declining water quality, and preservation of these resource aspects may affect declines seen in mussel populations.

The compensatory mitigation for losses of aquatic resources under 33 CFR PART 332 suggests that preservation plans should provide compensatory mitigation with enhancement if practicable. However, the area is a natural and mature wooded wetland with a persistent climax community where little or no ecological lift could be achieved, and perhaps, even untended or secondary, damage could occur through the disturbance of the enhancement activities that may exceed the intended goal of what little ecological lift could be achieved. The wetlands of the proposed perseveration site are within a floodway, and provide both local and regional biological and hydrological connectivity.

Section 6 Site Protection Instruments

Onsite compensatory resources will be protected in perpetuity with a legal instrument to protect them such as a deed restriction, conservation easement, restrictive covenants, or equivalent legal instrument. The proposed mitigation area is estimated to be 45.3 acres, and includes 7.08 acres of surrounding upland. Compliance branch has reviewed the area, and determined that the mitigation site contained 41.03 acres of wooded wetlands, and issued an AJD on January

12, 2018. A site specific protection instrument will be submitted for review by the Corps for this area, and when approved filed with the County of Orange.

Section 7 Methodology for the Estimation of Current Ecological Characteristics

To mitigate for unavoidable impacts to aquatic resources will require quantifying both the area and the functions of impacted wetlands, and then replacing these functions and services provided by the impacted area with compensatory mitigation. To ensure the function and value of impacted wetlands are adequately compensated for, the USACE Galveston District's interim forested riverine Hydrogeomorphic Method ("iHGM") was used to estimate current values and functions of wetlands. The Hydrogeomorphic methods have been developed that allow the representation of areal impacts to resources more accurately as functional resource impacts so that these functions can be accounted for in a less biased and procedure based manner. The iHGM metrics attempt to make the values and functions fungible, like a coin is of fungible value with any particular coin able to replace or be replaced by another identical coin; they are mutually interchangeable. A function based system takes advantage of fungible qualitative measure that functional metrics have given to compare among wetlands and other aquatic sites, and have been used extensively in banking instruments. However, there are no banks in the area that have primary or secondary service areas that would cover the project. Thus for this project a Permittee-Responsible Mitigation plan will be required, but preferably should still follow quantification by functional metrics. Because of the land tracts owned by IP it is practicable to offer the preferred adjacent compensatory mitigation (i.e., on-site mitigation) following regulatory guidance in 33 CFR 332.4(c)/40 CFR 230.92.4.

The accounting of the functions and values of both onsite resources and proposed compensatory mitigation will utilize the iHGM metrics to estimate or quantify functions and values of aquatic resources presently on the project site, or to obtain their fungible values. These metric values will also be used to estimate the functions and values protected in onsite preservation.

7.1 Quantification of Area of Impacts to Resources within the Impact Area

Special aquatic sites were found on the proposed project site. The boundaries of the project site resources have been delineated and verified in the AJD report from Compliance Branch dated 10/28/2016. The Galveston Compliance Branch verified the impact area of project and has supplied this determination to the Galveston Evaluation Branch, and the report is attached in Appendix 9.

7.2 Quantification of Area of Mitigation Site Resources

The USACE Ribits database does not list any banks that have primary or secondary service areas that cover wetland impacts to this area. Therefore, the applicant will be required to provide a Permittee-Responsible Mitigation plan for any impacts to jurisdictional resources. IP is proposing a nearby preservation mitigation area for the unavoidable impacts to wetlands due to the landfill project. The Applicant has investigated available practicable alternatives to meet the overall project purpose in order to demonstrate that there are no less damaging options available, and that all onsite impacts to waters of the U.S. have been avoided to the maximum practicable extent possible with the proposed plan (Figure 2). The applicant believes that the preferred plan will minimize impacts, but it will not be able to avoid all impacts to aquatic resources (Figures 8A-8C). Aquatic sites were found on the proposed mitigation site, and boundaries of these resources were estimated following protocols set forth in the Wetlands Delineation Manual (USACE, 1987) and the Regional Supplement for the Atlantic Gulf Coast Region (USACE, 2010).

To mitigate for unavoidable impacts to aquatic resources will require quantifying and then replacing these functions and services provided by the impacted area with compensatory mitigation. To ensure the function and value of impacted wetlands are adequately compensated for, the applicant proposes that the USACE Galveston District's iHGM be used to estimate current values and functions of wetlands on both the impacted site and the mitigation site. Because jurisdictional area is required in the metrics, this required that the applicant have an AJD for the mitigation site.

Twelve (12) observations sites were set up on or near the proposed mitigation site for areas that may be jurisdictional. Ten (10) of the twelve (12) were found to meet the three field measures to be jurisdictional wetlands. The Galveston District has issued a April 2016 Standard Operating Procedures for Recording Jurisdictional Delineations using Global Positioning Systems (USACE GPS SOP) to define expectations of reasonably accurate delineation using GPS technology. All mapping work followed protocols set forth in the 2016 USACE GPS SOP.

A report titled Report to SWG USACE Compliance, Special Aquatic Site Determination Report Proposed Mitigation Areas and Request for an Approved Jurisdictional Determination, International Paper – Orange, Texas Mill Orange, Texas was submitted to John Davidson of the USACE Galveston Compliance Branch that preliminarily identified jurisdictional resources on the proposed mitigation site. The report was submitted on May 30, 2017, and received on June 1, 2017. As the proposed mitigation area is to be used as part of a permittee responsible mitigation plan, an AJD was requested in the same report package.

USACE Galveston Compliance Branch confirmed Special aquatic sites on the proposed mitigation site in an October 5, 2017 site visit. RPS subsequently worked with Compliance Branch to incorporate LiDAR data to better estimate hydrology. An updated report was submitted by RPS on January 17, 2018 to the Compliance Branch, and estimated that 41.03 acres of the mitigation area are jurisdictional wooded wetlands (Figure 14). This determination has been supplied to the Galveston Evaluation Branch, and the updated report is attached in Appendix 10. The Galveston Compliance Branch also verified the extent of the wetlands of the proposed mitigation site as 41.03 acres of jurisdictional wooded wetlands are contained within the mitigation area. The boundaries of the mitigation site resources have been delineated and verified in the AJD report from Compliance Branch dated January 12, 2018 (Appendix 11).

The mitigation area is bordered on the northern edge by an unimproved road and on the south by a pipeline right of way and to the east by the Sabine River. The shape and size of the proposed wetland mitigation area were driven by several factors including; a pipeline right of way (ROW) that is maintained free of woody vegetation and because of this activity would not be acceptable for preservation, an upland planted pine plantation, and simplification of the polygon shape for a metes and bounds in a deed restriction resulted in the inclusion of a 7.08 acres of upland that did not meet all three criteria to be a jurisdictional wetland.

Section 8 iHGM Wetland Functions and Assessment Model

The use of the iHGM allows the conversion of areal aspects of the onsite impacts through calculation to be functional units so that it would be possible to calculate the compensation requirements for impacts of the onsite resources. The purpose of the method is to provide a rapid assessment of the current function of a given aquatic resource. The fundamental unit for evaluating impacts, and compensatory mitigation resources being able to replace them, is enabled by calculating Functional Capacity Indexes ("FCI's"), which are used to determine the ecological value of services lost as a result of the project impacts, and then these services can be replaced through a compensatory mitigation plan using the same functional analysis. The iHGM uses three sub-indices to determine the functional capacity values which are for: biota, physical, and chemical aspects of the wetlands. The FCI value of each sub-index is calculated by incorporating field data from 15 attributes which are incorporated into specific equations to calculate the FCI for that wetland assessment area. It is important to note that FCI values are intended to be applied to one jurisdictionally defined Wetland Assessment Area (WAA).

The FCI values are converted to Functional Capacity Units (FCU) by multiplying the areal extent of the WAA by the FCI. The proposed impact area has an AJD issued by the USACE Galveston District on October 28, 2016, and these acreages were utilized. The proposed mitigation area has an AJD issued by the USACE Galveston District on January 12, 2018, and these acreages were utilized.

It should be noted that there were also two observation sites near the mitigation area, T2.0 and T3.0, which did not meet all three field criteria to be considered jurisdictional. Both sites are formally outside the mitigation area, but were used to define the boundary of the mitigation area. These sites had FCI field variables taken, and the variable values are presented for these sites, but not used in the calculations of values and functions.

8.1 Model Exceptions

It should be noted that several aspects of the mitigation area are not captured in the iHGM models that may increase the ecological value of the mitigation site. Most importantly there were observations of mussel beds along the Sabine River. A couple dozen individuals were

found, both alive as well as fresh dead. A shell was keyed to species, which was the Texas Pigtoe (*Fusconaia askewi*) (Figure 15, 16), and confirmed by Texas Parks and Wildlife biologists (Appendix 12). The Texas pigtoe is a regional endemic limited to a relatively small area in Texas and Louisiana, and is listed as state threatened. Additionally, the proposed mitigation area is across the Sabine River from the State of Louisiana's 8,695 acre Sabine Island Wildlife Management Area. The large plot adjacent to the mitigation area would actually increase the value of the mitigation area FCI metric for Maintenance of Plant and Animal Communities for species that have an extended range or avoid anthropogenically disturbed areas such as some birds and the Black Bear.

8.2 iHGM Field Variables

On the impact site, three observation points were chosen, one in each AJD identified wetland, on the as depicted in Figure 2. At the mitigation site, 10 observation points along 4 transect lines, were selected within delineated wetlands along transect lines as depicted in Figure 3. All of the areas were representative of the local hydric areas of the WAA. At each observational point, the 15 iHGM attributes were estimated. The observation plot areas for the iHGM on the mitigation site were the 30-ft-(9.1-m) radius plots used in the delineation that has been submitted to the Compliance Branch on May 30, 2017, and in the updated report on January 17, 2018.

The wetlands at the impact site were relatively uniform, and thus one observation site in each of the three identified jurisdictional wetlands at the impact site was evaluated by the iHGM protocols. In the mitigation area, a total of 12 observation plots were placed for the delineation effort of the proposed mitigation area, and these were also the observational points where the iHGM attributes were collected. However, two of the observation points in the delineation of the mitigation area were not used in the calculations of the iHGM as the RPS delineation report, and the Compliance Branch AJD, indicated that they did not meet all three criteria to be considered jurisdictional wetlands. These two points were used in the delineation report to define the edge of the wetland upland boundary and they had iHGM field attribute measures taken, which will be presented in greyed out columns to prevent confusion, but they were excluded from all calculations of functional units of the mitigation site because they were determined not to be jurisdictional.

An explanation of the estimation of each field variable for the iHGM, for both the impact and mitigation area, is presented in the subsections below. The median and mean values of each field attribute for the mitigation area are also presented, which exclude the two upland sites, but these average and median field variable values are not used in any calculations (Table 1).

8.2.1 Vdur

The field variable Vdur is a measure of the % of the WAA that is flooded and/or ponded due to the hydrology (i.e. flooding overbank flow) of the adjacent waterway. The mitigation area is within a floodway, and they are frequently flooded. The mitigation sites have an average value of 0.90 and a median value of 1.00 (Table 1). This indicates that these wetlands are near the reference standard for this metric, which based on logic and professional judgement is true. The impact site has a nearby onsite tributary, which varies from 80 feet from wetland WD to approximately 1200 feet from wetland WF. The only demarcation on the FEMA FIRM for the project area is the 100 year floodplain, and the project area is shown as outside of this zone, but antidotal evidence from mill personnel indicates higher probability of flood events. The project area also has a contiguous tributary, which was not shown on the FIRM, but other tributaries in the area are shown to be within the 1% base flood. Because of the proximity of the tributary, the values of this variable were not thought to be zero in any impact site wetland, and ponding was observed in the wetlands, but this metric varies within the range of 0.75 to 0.25 respectively in these WWA's for flooding in an average year (Table 1).

8.2.2 Vfreq

The field variable Vfreq is a measure of the frequency that the WAA is flooded and/or ponded by nearby waterway. This index is also based on the floodway and floodplains. The mitigation area is in the floodway of the Sabine River, and again has an average and median values of 0.95 and 1.00 (Table 1). This indicates that these wetlands are near the reference standard for this metric. For the impact site, because the FIRM doesn't even show the contiguous stream, which was referred to in the AJD as a Relatively Permeant Water (RPW), the impact site values should not be assigned from the FEMA map of the area. For the impact site the iHGM application of this index should consider that the project site is flat, low, and near a RPW that was identified in the AJD. This still constrains the variable to the range to a low value on the

project site, but since there was a RPW, and the 500 year floodplain is not indicated on the FIRM, a value of 0.25 was given to the wetlands on the impact site (Table 1).

8.2.3 Vtopo

The field variable Vtopo is a measure of roughness due to topographic features within a WAA. The mitigation area does have dips and sloughs, and is in fact basically a large oxbow slough. Thus the WAA of the mitigation area has channels, microtopography, sloughs, and dips. The mitigation sites have an average value of 0.88 and a median value of 1.00 (Table 1). This indicates that these wetlands are near the reference standard for this metric. In contrast the impact site is for the most part smooth, flat, and has little to no topographic features. Therefore an index value of 0.10 is appropriate for the individual WAA's on the impact site (Table 1).

8.2.4 Vcwd

The field variable Vcwd is a measure of the concentration of large woody debris in a WWA. Large woody debris is considered anything over 3 inches in diameter. A diameter of 3 inches is usually a rather small sized branch from a mature tree, not a trunk of a mature tree. Both the impact site and the mitigation area are covered with mature forest, and thus there is abundant coarse woody debris. The measures of this metric across all observations were high and of similar value. The mitigation area had average value of 0.80 and a median value of 1.00 (Table 1). The impact site had two WAA's that scored 0.50 and one that scored a 1.00 on this metric.

8.2.5 Vwood

The field variable Vwood is a measure of the percentage of the WAA that is covered by woody vegetation. The WAA's on the impact site, and at all observation sites, are covered by mature forest. The tree cover at all sites approaches 100%. This is also reflected in the sapling shrub stratum, and the herbaceous stratum, which typically had low coverages. This results in high values across the site, but this metric has a break at a high 90% coverage (0.75 or 1.00 value of the metric). The study was done in February before leaf out of deciduous trees to allow GPS to

be used, however this makes it somewhat unreliable to estimate the difference between 90 and 91 percent coverage by ocular estimation. The mitigation site has both a maximum value for both average value and the median value of 1.00 (Table 1). The impact site WWA's also were similar in densities, but the WWA's index value in the field were estimated at 0.75 (Table 1).

8.2.6 Vtree

The field variable Vtree is a measure of the percentage of the trees in the WAA that are mast producers. Mast is not rigidly defined in the iHGM but is usually nuts, seeds, or fruits that are eaten by wildlife. In a botanical sense mast can mean only hard mast such as acorns, hickory and like nuts and seeds, but is commonly expanded to include soft mast such as maple, elm, and sugarberry seeds. Some references even include pine and magnolia seeds as important to wildlife. Whatever the precise definition, the community of trees on both the impact site and the mitigation site was dominated by mast producers which can include: cherrybark oak, water oak, bald cypress, water tupelo, and red maple. These species are dominant species at many observation sites, as well as on the impact site. There was one part of the metric that did result in lower scores in this metric as some areas did contain some Chinese tallow, which is mentioned as a negative attribute in the index, and this severely impacted the index score at T3.2 (0.30). The mitigation sites have an average value of 0.91 and a median value of 1.00 (Table 1). This indicates that these wetlands are near the reference standard for this metric. The impact site WWA's also were similar and had two WWA's that had index value of 0.80 and one WWA that scored as a 1.00 (Table 1).

8.2.7 Vrich

The field variable Vrich is a measure of the diversity of the tree species within the WAA. The wetlands in this area contain diverse tree communities, and score high on this metric in general. The site plant list for the mitigation site indicates 20 species of trees were found on that site. However, if you look by observation plot there was a range from 3 to 5+ species per plot that had a density of 5% or over, which is 0.60 to 1.00 on the metric. Three quarters of the WWA's on the impact site, and half the sites within the mitigation area received a maximal score on this metric (Table 1).

8.2.8 Vbasal

The field variable Vbasal is a measure of the mean cross sectional area of trees in a WAA. Both the impact area and the mitigation site are mature forested areas, and high values for this index of either 0.80 or 1.00 were estimated for all sites (Table 1). This metric was estimated from Vdensity, and the average diameter using a mnemonic table (Elledrige and Barlow 2012).

8.2.9 Vdensity

The field variable Vdensity is a measure of the average trees per acre in a WAA that are over 3" dbh. Again, as the site is a mature and dense forested area which scores high in this metric. There are only 3 index scores for wooded areas, and index this metric could be roughly estimated from average stride length between trees like planting seedlings per acre. Most sites scored very high on this metric, although some had smaller trees in dense stands, which scores lower in the metric, or extremely large trees that were spaced at a lower density, which also lowers the metric. The mitigation sites have an average value of 0.72 and a median value of 0.60 (Table 1). This indicates that these wetlands are high quality, but they are not near the reference standard condition for this metric, which professional opinion does not support. The impact site WWA's also are similar to the migration area values, and had similar index values (Table 1). Thus if this index is biased low, both the impact site and the mitigation share the bias, lessening the effect of the bias on the comparisons of the iHGM FCI calculations of values and functions, which are additive in nature.

8.2.10 Vmid

The field variable Vmid is a measure of the average coverage of the midstory (shrub/sapling) layer in a WAA. All areas had a mature overstory, and thus the understory is suppressed in most areas. This resulted in a middle range value of this metric for most sites. While not being familiar with the data used in the development of this metric for the iHGM, this metric does not seem to follow ecological theory in the identification of wetlands that are near the reference standard for the stated iHGM population, which is Riverine Forested Wetlands. The metric would also seem to be influenced by disturbance, anthropogenic or otherwise. The metric does identity if the area is not forested, and gives these areas a low score. However, the metric also

suggests that high levels of midstory coverage are the reference condition, which is usually a sign of disturbance, and it is unlikely to be true in a mature reference community, although multi-layered canopies are needed for individual replacement. Many sites scored poorly on this metric, including the impact sites. The mitigation area had average value of 0.68 and a linear interpolated median value of 0.63 (Table 1). The impact site had two WAA's that scored 0.25 and one that scored a 0.50 on this metric. Although this metric may be biased, the effect is similar on both the impact site and the mitigation area, and should not have much effect on the comparison of FCI values and functions.

8.2.11 Vherb

The field variable Vherb is a measure of the average coverage of the WAA by the herbaceous layer. As mentioned above, most of the site is highly shaded, and not much herbaceous coverage occurs. However, unlike the metric Vmid, this metric is not linear and has two low ranges of less than 5% or greater than 50% coverage. None of the sites had high herbaceous coverage, but because of the bimodal distribution of this functions, sites that were ecologically very similar received either a high score or a low score on this function based on if they had slightly more or slightly less than 5% herbaceous coverage. The mitigation area had average value of 0.51 and median value of 0.30 (Table 1). The impact site had two WAA's that scored 0.30 and one that scored a 0.50 on this metric.

8.2.12 Vdetritus

The field variable Vdetritus is a measure of the amount of the detritus on a WAA. Detritus has a broad meaning, but in terrestrial ecosystems detritus usually refers to leaf litter and other organic matter intermixed with soil, which has been somewhat mechanically broken down, but not chemically remineralized. The endpoint before remineralization is referred to as humus which contributes to the top layers of soils. Thus, this index seems to be indicating broadly if the site has normal soil structures, or conversely if the topsoil has been removed by erosion or other effects such as plowing. Therefore, due to the natural soil structure, this variable scored the high value (1.00) at all sites despite there being a predominance of sites that did not strictly have an A horizon..

8.2.13 Vredox

The field variable Vredox is a measure of the percentage of the soil in a WAA that is identified as a redox feature, which is an indication of the chemical exchange due to saturation. The point of the delineation exercise was to assess the values and functions of wetland areas. Thus, very few sites were in upland areas, and all jurisdictional wetland areas by definition display some redoximorphic features. This metric only has two values (0.10 and 1.00) and is based on if there is 20% or more redoximorphic features. In this area many sites had abundant, as well as distinct, redoximorphic features in some areas, but lower percentages in others. A predominance of the sites scored a high value for this metric. The mitigation area had average and median value of 0.55 (Table 1). At the impact site all three WAA's scored 1.00 on this metric.

8.2.14 Vsorpt

The field variable Vsorpt is a measure of the absorptive properties of the soils in a WAA. The site has several different soil units: EvaA, SpyA, CowA. These soils are of alluvial origin and are silts or clays, which score very high on this metric. However, there are several observation plots in the mitigation site that occurred in sandy formations within the floodway, which score lower on this metric. The mitigation area had average value of 0.72 and median value of 1.00 (Table 1). At the impact site all three WAA's scored 0.50 on this metric.

8.2.15 Vconnect

The field variable Vconnect is a measure of the connectivity of a WAA by the number of habitat types within a 600' of the parameter of the WAA. The habitat types that were identified on the two sites within 600' of any onsite WWA consisted of the following; Wetland, Forested, and Open Water. A review of the layout of these basic habitat types on the site would seem to indicate that any one WAA area could be geolocated proximately to a maximum of three other habitat types. The scoring index for the mitigation site was a maximal value, as all sites were within 600' of the Sabine River or one of the sloughs of the oxbow feature (Table 1). Wetland D was within 86' of identified Stream C. Wetland C was within 582 feet of Stream C, but the

stream at this point was outside the AJD verification. Wetland F was outside 600' from Stream C, but within 450 feet from a 6.5 acre lake to the south. These habitat types result in all three WAA's at the impact to be scored 0.75 on this metric (Table 1).

Section 9 Functional Calculations

The use of the iHGM allows the conversion of areal aspects of the onsite impacts and mitigation to be expressed as functional units so that it would be possible to calculate the compensation for impacts of the onsite resources to be expressed as replacement of functions. The purpose of the method is to provide a rapid assessment of the current function of a given aquatic resource versus the proposed functions of a mitigation plan.

As pointed out above 12 observation plots along 4 transect lines were selected within proposed mitigation area for a delineation effort that was submitted to SWG USACE Compliance Branch, and the observation points were also used for functional calculations. Two of the observation points in the report did not meet all three criteria to be considered jurisdictional wetlands. As they had iHGM field attribute measures taken, the functional index calculations are presented in greyed out columns. However, these two sites were excluded from all calculations of functional units of the mitigation site because they do not appear to be jurisdictional wetlands.

9.1 Assessment Model Calculations

Assessment model indices, or FCI models, for Temporary Storage & Detention of Storage Water, Maintain Plant and Animal Communities, Removal & Sequestration of Elements & Compounds, were calculated using the formulas contained in the iHGM that has been adopted by the Galveston Corps. The field variables from Section 8.2 were utilized to calculate the FCI's for both the impact and mitigation observation sites following the iHGM methodology. The FCIs's are intended for use on a single WAA, but observation points in the mitigation area were also calculated based on the field data attributes of that local observation area and are shown in Table 2.

The impact site had an AJD that identified specific jurisdictional resources. Because the AJD shows the wetlands as individual and separate, they should be considered separate WAA's in the iHGM assessment model calculations. The FCI values for these resources were calculated and presented by identified resource, or WAA in Table 2.

For the proposed mitigation area, each observation site in the proposed mitigation area was presented using local observation area field data attributes to calculate the three local FCI's for each observation point (Table 2). The mitigation area had preliminarily identified as a 48.2 acre contiguous wetland area in the report submitted to SWG USACE Compliance Branch, on May 30, 2017 using routine methods. The updated RPS report using LiDAR on January 17, 2018 and the AJD identified a series of small wetlands based on elevation alone on the north end of the proposed mitigation area, that were connected to a large 40.7 acre wetland basin. This wetland mosaic was relatively homogeneous with respect to the criteria used to assess wetland functions (i.e., hydrologic regime, vegetation structure, topography, soils, successional stage), and thus the mitigation area could reasonably be considered a single WAA as it is defined in the iHGM methodology. Thus, in the mitigation area it could be argued that RPS took 10 repeated samples of the population within a single WAA. Therefore, in addition to local FCI calculations by observation point, statistics of central tendency were calculated for the three FCI assessment models in the mitigation area using the local FCI values for each point. As the iHGM uses the field variables in an additive fashion in each FCI assessment model calculation, the parametric central tendency of the population that is appropriate to be expressed is the arithmetic mean. The nonparametric statistic, the median, can be supported as well for the same reasons. The mean does have the assumption that the distribution of the field variables are normal, and the median does not. A formal analysis of the distribution was not done, but the FCI mean and median values, which excluded the two non-jurisdictional observation points in the calculations, were presented in Table 2.

9.2 Calculation of Wetland FCU Values

Estimates of areal extent of the jurisdictional resource in acres, and the FCI calculations in Table 2, were used to calculate the FCU's for both the impact and mitigation sites following the iHGM methodology. The iHGM methodology allows comparisons to be made on a functional basis to be made to assure that the functions and values will be replaced in a compensatory mitigation plan.

On the impact site the FCUs for each WAA were calculated based individual WAA FCI values, and the area of that WAA as defined by the AJD (Table 3). The FCU values for each assessment model calculation on the impact site can then be summed by the assessment model following the iHGM methodology to give the total functional units impacted, and is also presented by assessment model in Table 3.

For the mitigation site it would not be appropriate to use local observation point FCI values, with the proviso that the two observation points that did not support being jurisdictional wetlands should be excluded (the grayed out columns). The 10 observational points within the wetlands of the proposed mitigation area should not be used individually as areal extent of the resource with these values in acres cannot be formally defined, but yet they are part of the WAA of the mitigation area. This is because the original delineation effort using routine methods that was presented to the SWG USACE Compliance branch indicated that all the mitigation area observation points were within the same WAA, and the updated LiDAR data separated these out based on elevation alone, not other metrics. Therefore, on the mitigation site, both the arithmetic mean and the median of each FCI assessment model of observation sites that met all three criteria to be jurisdictional wetlands, or all other sites other than the two greyed out columns, were utilized from Table 2 to calculate functional units and are presented by assessment model following the iHGM methodology on the arithmetic mean or median values of the FCI calculations of the individual sites. The area of the mitigation WAA used is January 12, 2018 acreage of 41.03 acres of the AJD of the mitigation site. The total functional units are presented by assessment model in Table 3.

Section 10 Credit Determination through FCU Values

The project is located within the USGS HUC12010005, lower Sabine River watershed. There are no mitigation banks that have coverage in the area; therefore proposed permittee responsible in-kind on-site wetland mitigation follows the USACE guidelines. The proposal set forth is designed to satisfy the plan requirements set forth in 33 C.F.R. § 332.4(c)(2)-(14).

Functional metrics under the hydrogeomorphic method have been developed to allow the representation of areal impacts to resources as functional resource impacts so that these functions can be accounted for in a less biased and procedure based manner. The HGM metrics attempt to make the values and functions fungible, like a coin is of fungible value with any particular coin able to replace or be replaced by another identical coin; they are mutually interchangeable. USACE Galveston has adopted an interim method (iHGM) Forested Riverine model for Texas. The accounting of the functions and values of both impacted resources and proposed compensatory mitigation utilized the iHGM metrics to estimate or quantify functions and values of aquatic resources presently on the project site, or to obtain their fungible values.

In 33 CFR PART 332 Compensatory Mitigation for losses of Aquatic Resources it is stated that if preservation is used, then the district engineer should apply a higher mitigation ratio if the requirements are to be met through the use of preservation credits. In determining this higher ratio, the district engineer must consider the relative importance of both the impacted and the preserved aquatic resources in sustaining watershed functions.

On the impact site the FCUs for each WAA were calculated based on that WAA FCI, and the area of that WAA as defined by the AJD, and summed to provide the total functional value impacted (Table 3). The Preserved FCU in Table 3 uses the central tendency value of the FCI value of the observation sites within the mitigation area that met the three criteria to be jurisdictional from Table 2, specifically the arithmetic mean and median of the FCI models. These values are the iHGM estimate of the FCU's that will be preserved at the proposed onsite mitigation area.

The ratio of the impact site (the proposed project site) and Mitigation area results in replacement ratios in Table 3 as related to the values and functions of the wetland impacted due to the proposed project in FCU's as simple preservation based mitigation. The preservation ratio calculated from the FCU metrics range from 8.9 to 16.25. The use of an arithmetic mean or median FCI in this estimation makes little difference in the estimated assessment model FCU ratio (Table 3). In addition, all FCU estimates exceed area based ratios given to many of the legacy preservation only mitigation banks. These FCU estimates also fail to consider significant ecological values to wide ranging and threatened species in the area.

Section 11 Maintenance Plan

The proposed mitigation will be protected by a long-term legal protection instrument (e.g. a deed restriction by International Paper Orange Mill). The proposed mitigation area is a naturally maintaining mature wooded wetland with cypress and tupelo components. A mitigation work plan does not seem to be needed since no work will be done. The area has naturally progressed to a climax community, which is resistant to change, and thus no maintenance is anticipated to be needed either. The area will be monitored as is detailed below.

Section 12 Ecological Performance Standards

The proposed mitigation area is a naturally maintaining mature wooded wetland with cypress and tupelo components, and is basically functioning at or near reference levels as demonstrated by the iHGM functions and values of the assessment models (FCI's). The area has naturally progressed to a climax community, which is also resistant to change. No change in quantifiable faunal or vegetative parameters or patterns is desired for the mitigation area, only for the area to maintain current and desired functions. The hydrological balance of the area is regionally controlled by the Sabine River.

Section 13 Monitoring Requirements

There is only limited invasion by a single nonnative tree species within the mitigation area, specifically the Chinese Tallow tree (*Triadica sebifera*). Unfortunately, a single tree can produce nearly 100,000 viable seeds per year, and these can be spread by water and by birds. International Paper Orange mill will be the party responsible for monitoring this area for this tree. The location of the proposed mitigation area and the abundant wildlife provide vectors for spreading this tree from regional sources. The Tallow tree prefers disturbed areas, not mature climax communities, and may be why the mitigation area has very limited invasion by this tree. This tree will be monitored for increases in density using a transect method on the tree community yearly for a period of 5 years. A monitoring report will be will be submitted yearly from the date of permit issuance from the district engineer.

Section 14 Adaptive Management Plan

The International Paper Orange mill will be the responsible party to establish and manage any adaptive management for the mitigation area. IP intends to set aside an escrow account of $120,000 dollars to be used in the monitoring and any adaptive management that is needed to maintain the area's current performance standards as functions and values for the period of 5 years. Challenges are not expected as the area is a mature wooded wetland that has been self-maintaining for many years. If the invasive species Chinese Tallow are found above an average 20 percent coverage, which follows the dominance rule, then they will be treated to be below this coverage. IP proposes that escrow surpluses be released based on the same frequency as the monitoring report, which is annually over the monitoring period. Release will be made as management goals are met for that year. The full remaining amount, including interest accrued, will be released at the end of the monitoring period.

Section 15 Long-term Water Budget

A long term water budget is not needed for this project. The area is sustainable and self-maintaining. The water supporting the mitigation area is a regionally supplied water budget from the Sabine River that has been and will be sufficient to sustain long-term wetland hydrology.

Section 16 Mitigation Work Plan

Formally, since the proposed mitigation exists and is preservation based, thus there is no grading plan, no micro-topography changes, changes in hydroperiod, or construction schedules. Therefore, there is no formal mitigation work plan needed. However, maps marking boundaries of proposed mitigation have been provided, the types of resources have been discussed, as has the quality of the resources in the mitigation area. Finally, a deed restriction with proper metes and bounds will define the mitigation area. These actions could be considered part of a work plan to define and preserve the mitigation area and assure its viability in perpetuity.

Section 17 Financial Assurances

The overall goal of 33 CFR 332 is to ensure that compensatory mitigation projects actually, and reliably, offset the aquatic resource functions lost through permitting. In this section of the CFR there are a number of mechanisms used to assure compensatory mitigation project success, and is the basis of the 12 steps outlined in this section. Financial assurances are one of these mechanisms, and the roles of financial assurances are to ensure that mitigation projects are successfully completed and progress to meet their performance standards. Because it is funding set aside, this mechanism is related to funding for long term management of mitigation projects after performance standards have been meet, or funding for the monitoring period. The federal mitigation rule speaks at some level to the applicability financial assurance, the amount, and the types of financial assurance instruments that may be used to assure the success of compensatory mitigation projects (33 CFR 332.3(n)(1)).

Technically, financial assurances as defined in 33 CFR 332.3 may not be applicable to this project as financial assurance is based on the doubt or uncertainty about whether a mitigation project will be completed and meets its performance standards. Thus following Corps and EPA

guidance in this area, the appropriate amount of financial assurances should be based solely on the risk and uncertainty associated with a specific compensatory mitigation project. This project is a mature self-maintaining wetland area, and therefore the risk and uncertainty is essentially zero that it will not meet its values and functions at the time commencing permitted work in waters of the U.S., and exceptionally low that it will not continue to meet its current functions and values in the foreseeable future,

Section 18 References

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