Mile Branch St Tammany Project
Methodology and Assumptions for Determining Desktop Estimates for Impacts

The proposed deepening and widening of 2 miles of Mile Branch would impact approximately 3 acres of riverine stream bottom habitat and 33 acres of riparian habitat. It is anticipated that the impacts to 3 acres of stream bottom would be offset by replacement of three acres of water bottom habitat through the establishment of backwater areas connecting the existing stream. The backwater area(s) would be a part of the nature-based design that would be further fleshed out during the Planning, Engineering and Design (PED) phase of the study once project authorization and funding are received.

Due to time, lack of access and lack of an adequate riparian community model, it was determined that a desktop estimate could be conducted utilizing riparian habitat data from a similar project of similar habitat, specifically for the East Baton Rouge (EBR) Project, as well as the limited data collected in the Mile Branch riparian zone. The Mile Branch riparian zone is dominated by a pine/hardwood mix. However, due to limited access to collect data, the data that was collected is more representative of dry bottomland hardwood habitat (BLH) and may not fully account for the intermixture of pine habitat. The EBR project sites have similar bottomland hardwood habitat to Mile Branch but this does not include an intermixture of pine habitat. It will be important to reanalyze the Mile Branch riparian habitat once a riparian and stream community model is fully developed during PED.

Acres of riparian zone (Pine/BLH) and stream (Water) impacted can be seen in table 1.

Table 1. Riparian zone (Pine/BLH) and stream (water) impact acres.

Mile Branch			Totals
Habitat	Permanent Acres	Temporary Acres	Acres
Pine/Hardwood	31.4	1.3	32.7
Developed	5.4	1.9	7.3
Water	3.0	0.0	3.0

Figure 1. Mile Branch project area.

East Baton Rouge Riparian Bottomland Hardwood WVA

Data from three EBR project sites that seemed to be most similar to the habitat of Mile Branch based on the limited field data collected were utilized for the desktop estimate. The EBR sites included EBR 8, EBR 10, and EBR 20 (see Table 2). WVAs were conducted for the EBR sites and the Average Annual Habitat Units per acre (AAHU/ac) calculated are shown in Table 2.

Table 2. East Baton Rouge (EBR) Average Annual Habitat Unit (AAHU) per acres for sites similar to the Mile Branch riparian habitat.

East Baton Rouge Project (similar sites)				AAHU/ac
EBR8	sycamore dominant			-0.73
EBR10	sycamore dominant			-0.66
EBR20	cottonwood dominant			-0.74
Average				-0.71

Mile Branch Limited Data

Bottomland Hardwood Wetland Value Assessment

We then evaluated the limited Mile Branch data in a Bottomland Hardwood (BLH) WVA.

Methods used to determine BLH impacts

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

The assumptions for assessing the direct impacts associated with construction activities of the Mile Branch Riparian Zone and the assumptions used to determine BLH baseline, FWOP, and FWP projections for the proposed Project area are described below:

Changes in each variable are predicted for future without-project and future with-project scenarios over a 50-year project life. The latest (2018) USACE Civil Works versions of the BLH (v1.2) WVA was used.

The BLH WVA consists of seven variables:

1. Tree species composition;
2. Stand maturity;
3. Understory/midstory;
4. Hydrology;
5. Size of contiguous forested area;
6. Suitability and traversability of surrounding land uses; and
7. Disturbance.

General Assumptions

The period of analysis expands from 2031 (TY0) to 2082 (TY50), with TY0 representing baseline conditions. In determining future with-project conditions, all project-related direct (construction) impacts were assumed to occur in Target Year 1. Target Years (TYs) for FWOP and FWP include TY0, TY1, and TY50.

The HET assumed the habitat within the temporary staging areas would be lost permanently due to repeated use over time, compression and compaction as well as lack of plans to restore the areas to match pre-existing conditions. All temporary impacts, therefore, were included in the permanent impacts assessment.

Relative Sea Level Rise (RSLR) was assumed to not impact the Mile Branch Riparian zone because it is high in elevation and too far inland.

Data Collected from Mile Branch Site Visits

Limited baseline data (1 plot) for riparian habitat was collected from site visits in December 2021. This will be helpful for determining the rough order of magnitude (ROM) estimates but more data will need to be collected to get a better representation of the impacted habitat.

One tenth acre (37.2 ft radius) size plot was used. Parameters such as diameter at breast height (dbh), stand structure, and hydrology was taken. The site was directly on the proposed construction footprint.

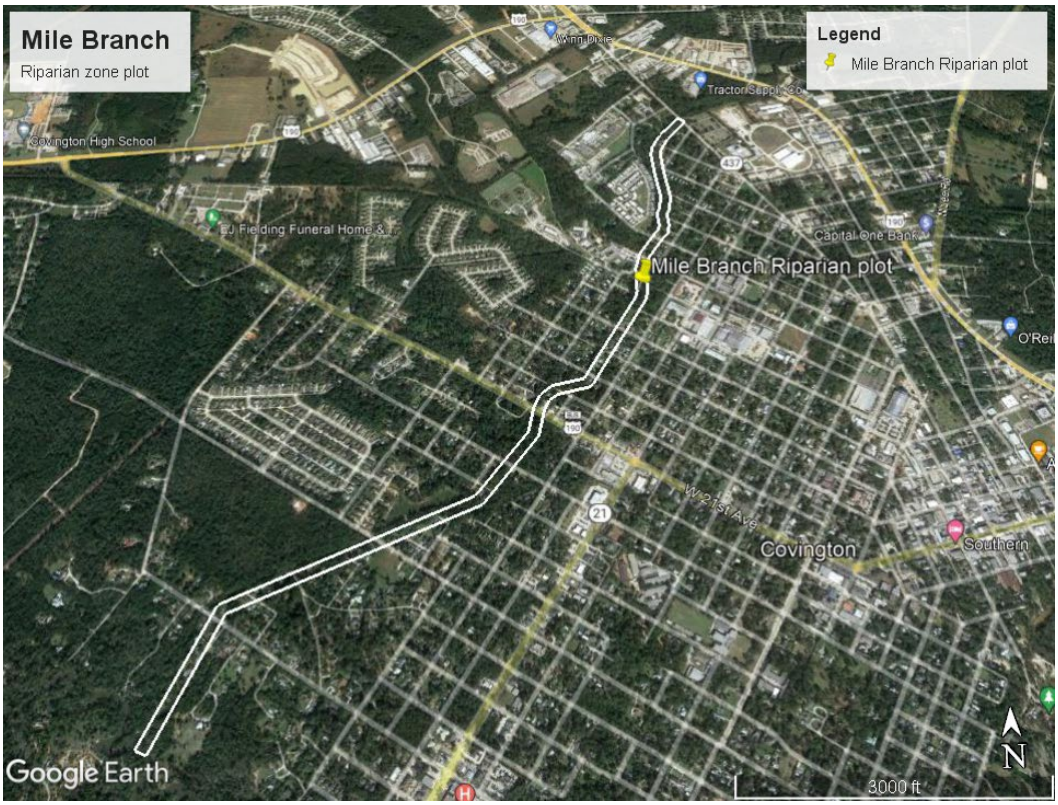

Figure 2. WVA site visit plot location.

In-growth spreadsheets

In-growth spreadsheets were used to predict tree growth for individual trees from the plot's data. This spreadsheet grows individual tree dbh and field site basal area over time. Outputs from the plot's in-growth spreadsheets including tree composition (Variable V1), stand maturity (Variable V2), and understory/midstory (Variable V3) for each target year. The plot data had notes on the condition of individual trees and the overall site conditions including water levels at the time of the data collection. In general the site was considered to be medium quality based on the tree

types and the size and conditions of the trees. Initial growth rates were based on dominant trees and site conditions of each plot. A growth factor for BLH was used to project tree growth of typical BLH species (Putnam et al. 1960).

Recruitment was addressed by allowing saplings to grow into the population over time. Sapling sizes were either measured or estimated in the plot and became a part of the plot when they reached 6" dbh or greater. Plots with very small saplings were entered as 0.1 (when marked as < 0.5"), 0.5 (when marked as <1") or 1.5 (when marked as <2") inch dbh depending on field notes and/or measurements. Saplings with a 2" or greater dbh were measured and recorded.

Trees in each plot were grown in for 50 years and included BLH mortality which was factored into the basal area calculations. The mortality values used are seen in Table 3.

Table 3. Mortality rate of bottomland hardwood.

0 - 1.9 DBH	**20%/yr**	0.150
2 - 3.9 DBH	**10%/yr**	0.075
≥ 4 DBH	**1.9%/yr**	0.014

Variable V1 Tree Species Association

Wildlife species that utilize bottomland hardwoods depend heavily on mast, other edible seeds, and tree buds as primary sources of food. The basic assumptions for this variable are: 1) more production of mast (hard and/or soft) and other edible seeds is better than less production, and 2) because of its availability during late fall and winter and its high energy content, hard mast is more critical than soft mast, other edible seeds, and buds. Table 4 shows the class values based on tree species.

Table 4. BLH Variable V1 Tree Species Association Class descriptions.

Class 1:	Less than 25% of overstory canopy consists of mast or other edible-seed producing trees or more than 50% of soft mast present but no hard mast.
Class 2:	25% to 50% of overstory canopy consists of mast or other edible-seed producing trees, but hard mast producers constitute less than 10% of the canopy
Class 3:	25% to 50% of overstory canopy consists of mast or other edible-seed producing trees, and hard mast producers constitute more than 10% of the canopy.
Class 4:	Greater than 50% of overstory canopy consists of mast or other edible-seed producing trees, but hard mast producers constitute less than 20% of the canopy.
Class 5:	Greater than 50% of overstory canopy consists of mast or other edible-seed producing trees, and hard mast producers constitute more than 20% of the canopy.

<u>FWOP</u>

TY0, TY1, and TY50 - Class 4.

The canopy was made up of trees that provide either hard (water oak) or soft (cottonwood) mast. We estimated about 25% hard mast for this plot. However, we reduced the estimate to less than 20% hard mast overall because sites not samples would have more pine.

FWP Permanent

Habitat would be removed for structure footprint.

Variable V2 Stand Maturity

The production of mast and other edible seeds is expected to begin at about Age 10, increase with age, and reach maximum potential by approximately Age 50. In addition to increased production of hard mast, soft mast, other edible seeds, and buds, older stands provide important wildlife requisites such as tree snags, nesting cavities, and the medium for invertebrate (wildlife food) production. Also, as the stronger trees establish themselves in the canopy, weaker trees are outcompeted and eventually die, forming additional snags and downed treetops that would not be present in younger stands. Because the average age of canopy-dominant and canopy-codominant trees is usually unknown, average tree diameter at breast height (dbh) can be used to determine the Suitability Index for this variable.

Data was collected from the site visit for baseline estimates. Projections for the site was processed through the WVA Site-Ingrowth spreadsheets. The results of the In-growth spreadsheets can be seen in Table 5 which show the FWOP dbh and basal area (BA) for TY0, TY1, and TY50. FWP permanent habitat would be removed for structure footprint.

Table 5. Diameter at breast height and basal area from Mile Branch.

ROE 4 Mile Branch BLH plot

Year 0.0		Year 1.0		Year 50.0	
DBH	BA	DBH	BA	DBH	BA
10.5	84.0	10.4	94.0	32.3	1346.4
11.0		12.8		23.3	

Variable V3 Understory / Midstory

The understory and midstory components of bottomland hardwoods provide resting, foraging, breeding, nesting, and nursery habitat. The understory and midstory provide soft mast, other edible seeds, and vegetation as sources of food. The understory and midstory also provide the medium for invertebrate production, an additional food source.

Data was collected from the site visit for baseline estimates.

FWOP

TY	0	TY	1	TY	50
Class/Value	SI	Class/Value	SI	Class/Value	SI
Understory %		Understory %		Understory %	
60		60		20	
Midstory %		Midstory %		Midstory %	
40	1.00	40	1.00	30	0.85

FWP Permanent

Habitat would be removed for structure footprint.

Variable V4 Hydrology

The hydrology variable considers the flooding duration and amount of water flow or exchange in forested wetlands using eight categories (Table 6).

Table 6. BLH Variable V4 Hydrology

		Flow/Exchange			
		High	Moderate	Low	None
Flooding Duration	Temporary	1.00	0.85	0.70	0.50
	Seasonal	0.85	0.75	0.65	0.40
	Semi-Permanent	0.75	0.65	0.45	0.25
	Permanent/Dewatered	0.65	0.45	0.30	0.10

Baseline hydrology was primarily based on knowledge of the area and best professional judgment. Mile Branch is a tributary of the Tchefuncte River and receives rain water and drainage from the surrounding city of Covington. Field visits confirmed water levels varying from shallow to potentially over topping its banks (based on increase berm by residents).

TY	0	TY	1	TY	50
Class/Value	SI	Class/Value	SI	Class/Value	SI
Flow/Exchange		Flow/Exchange		Flow/Exchange	
Moderate		Moderate		Moderate	
Flooding Duration		Flooding Duration		Flooding Duration	
Temporary	0.85	Temporary	0.85	Temporary	0.85

Variable V5, V6, and V7 General

To estimate Variables V5 Contiguous forest, V6 Surrounding Land Uses, and V7 Disturbance.

Variable V5 Size of Contiguous Forested Area

Although edge and diversity, which are dominant features of small forested tracts, are important for certain wildlife species, it is important to understand four concepts: 1) species which thrive in edge habitat are highly mobile and presently occur in substantial numbers, 2) because of forest fragmentation and ongoing timber harvesting by man, edge and diversity are quite available, 3) most species found in "edge" habitat are "generalists" in habitat use and are quite capable of existing in larger tracts, and 4) those species in greatest need of conservation are "specialists" in habitat use and require large forested tracts. Therefore, the basic assumption for this variable is that larger forested tracts are less common and offer higher quality habitat than smaller tracts. For this model, tracts greater than 500 acres in size are considered large enough to warrant being considered optimal. See Table 7.

Table 7. Variable V5 Size of Contiguous Forested Area.

Class 1.	0 to 5 acres
Class 2.	5.1 to 20 acres
Class 3.	20.1 to 100 acres
Class 4.	100.1 to 500 acres
Class 5.	> 500 acres

For this variable, USGS 2008 National Wetlands Inventory (NWI) and 2019 imagery were used to determine sizes of contiguous forested areas. Corridors less than 75 feet wide do not constitute a break in the forested area contiguity**.**

The Mile Branch has extensive forest connecting to the southern portion of the project area. Further north Mile Branch is surrounded by the city of Covington with some smaller forest (Figure 3). The HET estimated 1/3 of the area would be optimal (Class 1 - connected to over 500acres of forest) and 2/3 of the area categorized as a Class 3. Using a weighted average we estimated V5 to be a 0.73 for all target years.

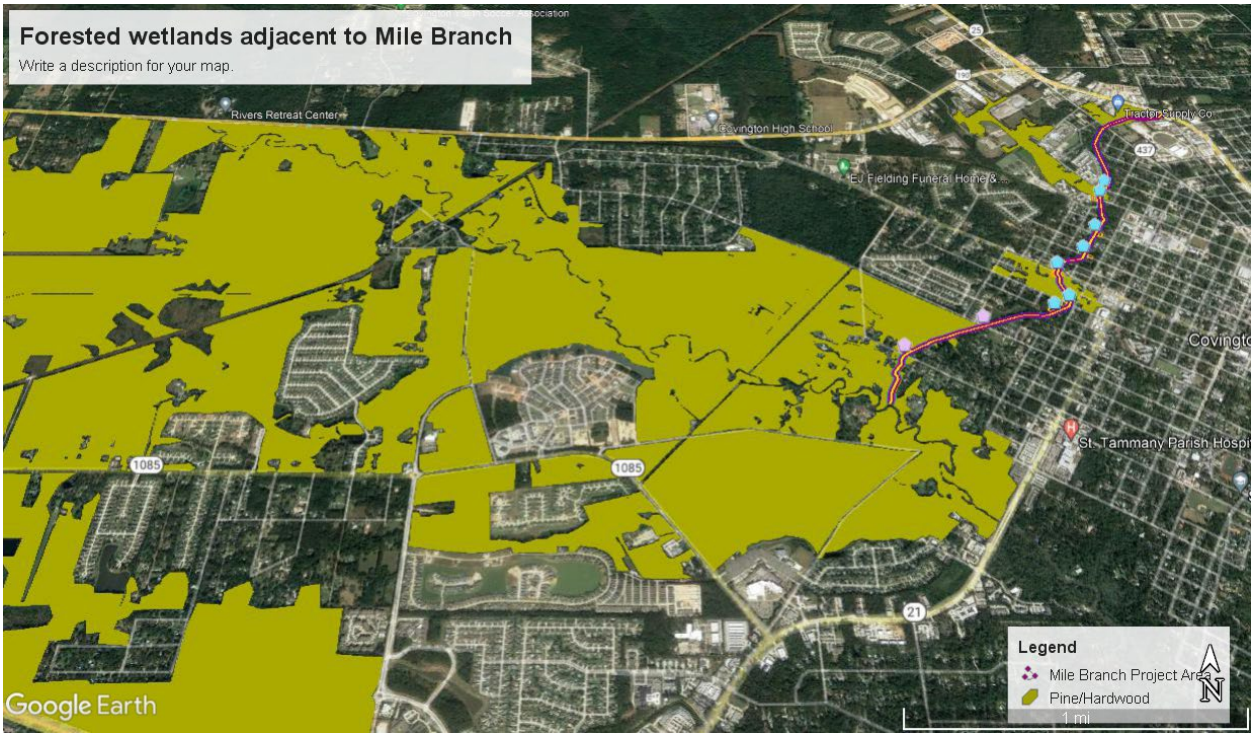

Figure 3. Variable 5 Mile Branch surrounding forest.

Variable V6 Suitability and Traversability of Surrounding Land Uses

Many wildlife species commonly associated with bottomland hardwoods will often use adjacent areas as temporary escape or resting cover and seasonal or diurnal food sources. Surrounding land uses which meet specific needs can render a given area of bottomland hardwoods more valuable to a cadre of wildlife species. Additionally, the type of surrounding land use may encourage, allow, or discourage wildlife movement between two or more desirable habitats. Land uses which allow such movement essentially increase the amount of habitat available to wildlife populations.

For the quick desktop estimates, an ocular review of the area was performed. Based on this review we categorized all habitat as either forest (50%) or developed (50%) for all target years.

Variable V7 Disturbance

Human-induced disturbance can displace individuals, modify home ranges, interfere with reproduction, cause stress, and force animals to use important energy reserves. The effect of disturbance is a factor of the distance to, and the type of, disturbance (Table 8).

Note: Linear and/or large project sites may be exposed to various types of disturbances at various distances. The SI for this variable should be weighted to account for those variances.

Table 8. Variable V7 Disturbance Classes.

Distance Classes	Type Classes
Class 1. 0 to 50 ft.	**Class 1.** Constant/Major. (Major highways, industrial, commercial, majornavigation.)
Class 2. 50.1 to 500 ft.	**Class 2.** Frequent/Moderate. (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats).
Class 3. > 500 ft.	**Class 3.** Seasonal/Intermittent.(Agriculture, aquaculture.)
	Class 4. Insignificant. (Lightly Used roads and waterways, individual homes, levees, rights of way).

The USGS 2008 NWI habitat/land classification overlaid on 2019 aerial photographs of the area was viewed to estimate the disturbance categories. It was estimated that the class type was moderate (residential) or Class 2 and the distance was within 50ft or Class 1 and is expected to remain the same for 50 years.

Results of Bottomland Hardwood WVA

A summary of resulting AAHUs and acres impacted for all direct BLH impacts for the Mile Branch Project are shown in Table 9.

Table 9. Mile Branch Estimated Bottomland Hardwood Impacts.

	Initial Acres	Net Acres	AAHUs	AAHUs/acre
Mile Branch Riparian Zone	32.73	-32.73	-21.43	-0.65

Literature Cited

ELOS. 2018. Wetland Delineation Report for the Mid-Breton Sediment Diversion Project in Plaquemines Parish, LA.

Putnam, J.A., G.M. Furnival, and J.S. McKnight. 1960. Management and inventory of southern hardwoods. Agricultural Handbook No. 181. U.S. Department of Agriculture, Forest Service publication. 102pp.

Summary of the Mile Branch Desktop Estimates
For Impacts to the Riparian Zone

Taking the average of the 3 EBR sites and the BLH desktop WVA an average AAHUs per acre was used and applied to the impacted acres of Mile Branch Riparian Zone (Table 10).

Table 10. Summary of Mile Branch Impacts based on Desktop Estimates.

	AAHUs	Acres	AAHU/ac
Minimal data Mile Branch WVA	-21.43	-32.73	-0.65
EBR Average	-23.31	-32.73	-0.71
Mile Branch Desktop Impacts Estimate	**AAHUs**	**Acres**	**AAHU/ac**
	-22.37	-32.73	-0.68