WRRDA 7001 Submissions Package

U.S. Army Corps of Engineers

Proposal Name: Black River Drainage Study

Submission Date: 09/19/2016

Proposal ID Number: a72d4e6c-0ef4-467e-b39b-b80fc8a9e5c6

Purpose of Proposal: A contractor was hired by St. Tammany Parish to complete a watershed management plan of the Black River Tributary Basin which included the creation of a Geographic Information System (GIS) with hydraulic, hydrologic, and environmental data. Analysis includes the hydrologic and hydraulic modeling of the existing basin and recommended basin improvements. Results from the model and the GIS are to be provided to St. Tammany Parish for their engineers to implement these improvements into actual construction projects to reduce the likelihood of street flooding in this area. Analysis includes creating a simulated computer model for the 10, 25, 50 and 100 year storms with improvements for the 10, 25 and 50 year storms presented herein. The purpose of this report is to define model parameters and engineering assumptions to provide a cost effective solution to reduce street flooding along Brewster Road, Oak Park Drive, within the Ruelle Du Chene Subdivision while minimizing negative affects to water surface profiles along Black River and its tributaries. While a reduction in street flooding is the ultimate goal of this phase of the Black River Tributary Basin Study, improvements to one part of the basin should not have a negative effect on another part of the basin. Therefore, detention capability will be required to offset any increase in peak flows created by the street drainage improvements.

1. Administrative Details

Proposal Name: Black River Drainage Study

by Agency: St. Tammany Parish Government

Locations: LA

Date Submitted: 09/19/2016

Confirmation Number: a72d4e6c-0ef4-467e-b39b-b80fc8a9e5c6

Supporting Documents

File Name	Date Uploaded
BR Tributary Drainage Report.pdf	09/19/2016
Black River Drainage Study Support Letter.pdf	09/19/2016
Black River Drainage Maps.pdf	09/19/2016
Black River Forest Cost Estimate.pdf	09/19/2016

2. Provide the name of the primary sponsor and all non-Federal interests that have contributed or are expected to contribute toward the non-Federal share of the proposed feasibility study or modification.

Sponsor	**Letter of Support**
St. Tammany Parish Government(Primary)	The St. Tammany Parish Administration is in full support of this project and will provide all necessary resources to ensure that it is completed.

3. State if this proposal is for a feasibility study, a modification to an authorized USACE feasibility study or a modification to an authorized USACE project. If it is a proposal for a modification, provide the authorized water resources development feasibility study or project name.

[x] Feasibility Study

4. Clearly articulate the specific project purpose(s) of the proposed study or modification. Demonstrate that the proposal is related to USACE mission and authorities and specifically address why additional or new authorization is needed.

A contractor was hired by St. Tammany Parish to complete a watershed management plan of the Black River Tributary Basin which included the creation of a Geographic Information System (GIS) with hydraulic, hydrologic, and environmental data. Analysis includes the hydrologic and hydraulic modeling of the existing basin and recommended basin improvements. Results from the model and the GIS are to be provided to St. Tammany Parish for their engineers to implement these improvements into actual construction projects to reduce the likelihood of street flooding in this area. Analysis includes creating a simulated computer model for the 10, 25, 50 and 100 year storms with improvements for the 10, 25 and 50 year storms presented herein. The purpose of this report is to define model parameters and engineering assumptions to provide a cost effective solution to reduce street flooding along Brewster Road, Oak Park Drive, within the Ruelle Du Chene Subdivision while minimizing negative affects to water surface profiles along Black River and its tributaries. While a reduction in street flooding is the ultimate goal of this phase of the Black River Tributary Basin Study, improvements to one part of the basin should not have a negative effect on another part of the basin. Therefore, detention capability will be required to offset any increase in peak flows created by the street drainage improvements.

5. To the extent practicable, provide an estimate of the total cost, and the Federal and non-Federal share of those costs, of the proposed study and, separately, an estimate of the cost of construction or modification.

	Federal	**Non-Federal**	**Total**
Study	$173,640	$0	$173,640
Construction	$1,736,400	$0	$1,736,400

Explanation (if necessary)

The project construction cost will be $1,736,400. The soft cost (engineering, permitting, etc.) is $347,280. The total cost is $2,083,680. The estimated Federal study cost is 10% of the total construction cost for a total of $173,640.

6. To the extent practicable, describe the anticipated monetary and nonmonetary benefits of the proposal including benefits to the protection of human life and property; improvement to transportation; the national economy; the environment; or the national security interests of the United States.

The project will improve drainage to area and reduce the risk of flooding for several subdivision in the Black River Tributary Basin.

7. Does local support exist? If 'Yes', describe the local support for the proposal.

[x] Yes

Local Support Description

The St. Tammany Parish Administration is in full support of this project and will provide all necessary resources to ensure that it is completed.

8. Does the primary sponsor named in (2.) above have the financial ability to provide for the required cost share?

[x] Yes

Additional Proposal Information

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BR Tributary Drainage Report.pdf

BLACK RIVER TRIBUTARY WATERSHED MANAGEMENT PLAN

FOR

ST. TAMMANY PARISH, LA

Prepared By:

RICHARD C. LAMBERT Consultants, L.L.C.

900 West Causeway Approach
Mandeville, LA 70471

July 18, 2008

RCL CONSULTANTS, L.L.C.
Planning • Architecture • Engineering • Construction Management

STATE OF LOUISIANA
FRANZ J. ZEMMER
License No. 26232
PROFESSIONAL ENGINEER IN CIVIL ENGINEERING
07/18/08

ST. TAMMANY PARISH ★ STATE OF LOUISIANA

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OBJECTIVE

Richard C. Lambert Consultants, L.L.C. (RCLC) has been contracted by St. Tammany Parish to complete a watershed management plan of the Black River Tributary Basin which included the creation of a Geographic Information System (GIS) with hydraulic, hydrologic, and environmental data. Analysis includes the hydrologic and hydraulic modeling of the existing basin and recommended basin improvements. Results from the model and the GIS, in printed and digital formats, are to be provided to St. Tammany Parish for their engineers to implement these improvements into actual construction projects to reduce the likelihood of street flooding in this area.

Analysis includes creating a simulated computer model for the 10, 25, 50 and 100 year storms with improvements for the 10, 25 and 50 year storms presented herein. The purpose of this report is to define model parameters and engineering assumptions to provide a cost effective solution to reduce street flooding along Brewster Road, Oak Park Drive, within the Ruelle Du Chene Subdivision while minimizing negative affects to water surface profiles along Black River and its tributaries.

While a reduction in street flooding is the ultimate goal of this phase of the Black River Tributary Basin Study, improvements to one part of the basin should not have a negative effect on another part of the basin. Therefore, detention capability will be required to offset any increase in peak flows created by the street drainage improvements.

WATERSHED DESCRIPTION

Black River and its tributaries are located in Madisonville in western St. Tammany Parish as illustrated on Figure 1 in Appendix A. The tributary studied herein commences at the western side of Ruelle du Chene Subdivision and ends at its confluence with the Black River on the eastern edge of Black River Estates. Black River discharges into the marshes north of Lake Pontchartrain. The portion of the Black River Tributary Basin studied herein is bounded by LA 22 on the south, Ruelle Du Chene and Windemere Subdivisions to the west, Black River Estates to the east and a ridgeline just north of Bootlegger Road for the northern boundary. It encompasses an area of approximately 1.929 square miles with a stream length of about 2.1 miles within the study boundary and is shown on Figure 2 in Appendix A.

The Black River Tributary bisects Ruelle Du Chene, Belle Pointe, Pine Creek, Autumn Creek and Black River Estates and drains numerous other subdivisions in the area including Windemere, Dominion, and Aldridge Estates. Near its headwaters the invert elevation of the tributary is about 13.1 and at its downstream portion of the study at its confluence with Black River an elevation of around 0. The areas along the river are primarily wooded land with a change in elevation of about 13 feet over 2.1 miles.

Over the years, portions of channel have been modified to accommodate development. Culverts have been added for stream crossings and stream alignment has been altered in a few locations. Undoubtedly, these modifications affect the efficiency of the channel. Generally in areas where the tributary has not been relocated, the channel is a gentle winding stream with a slight gradient. Pictures of the tributary and structures are presented in Appendix C. An aerial view of the basin delineation is shown in Figure 2 of Appendix A.

The upper portion of this basin consists of a network of side road ditches and driveway culverts along Brewster Road, Cheryl Drive and Oak Park Drive drain into the Primary Black River Tributary. See Figures 7.1, 7.2 and 7.3 for the locations of these streets.

MODEL SIMULATION

Simulation of the model involved the use of several computer software programs including ArcView, the United States Corps of Engineers Hydrologic Engineering Center Hydrologic Model System (HEC-HMS) and Hydrologic Engineering Center River Analysis System (HEC-RAS), AutoCad Civil 3D 2008 and Microsoft Excel. Functionality of these software programs and assumptions made within are defined hereafter.

HEC-HMS software was designed to simulate the precipitation-runoff process of watershed systems by means of precipitation, evapotranspiration, infiltration, excess precipitation transformation, base flow, and open channel routing. Within this program, the existing and improved watersheds were analyzed by the USDA Urban Hydrology for Small Watersheds Technical Reference 55 (TR-55) methodology simulating the SCS Type III rainfall distribution. This rainfall distribution is used for areas of heavier rainfall with longer durations due to the coastal influences of the Gulf of Mexico.

HEC-RAS software was designed to calculate water surface profiles for one-dimensional steady flow and unsteady flow of natural and constructed channels. This model, as directed by the St. Tammany Department of Engineering, simulates a steady state flow regime. Water surface profiles were created by inputting the following data:

1. Cross section data taken from field surveys and LIDAR imagery contours.
2. Channel conditions such as roughness, shape, length and slope.
3. Structures such as bridges and culverts.
4. HEC-RAS starting boundary condition (i.e. water surface elevation at the channel outfall).
5. Runoff.

In order to assimilate data to input into these computer programs, a multitude of steps were taken. Prior to any analysis, aerial photos and Light Detection And Ranging (LIDAR) contours on two feet intervals were provided by the St. Tammany Department of Information Services to delineate the basin. This information was input into ArcView to create a Geographic Information System (GIS) map and then plotted. By referencing these contours and viewing the topography on the aerial maps, ridgelines were located and structures such as bridges and culverts were denoted. After structures were located on the aerial GIS map, sub-basin sub-areas where delineated. LIDAR contours superimposed on the aerial and Basin Delineation Map are shown on Figure 3 in Appendix A.

Cross section locations were determined by referencing an aerial map illustrating stream location, contours and streets. This map was forwarded to the surveyor for cross sections to be taken. Cross sections were taken along the length of the tributaries upstream and downstream of structures, at significant changes in channel direction and typically at 1,000 feet intervals. Locations of cross sections are shown on Figures 7.1, 7.2 and 7.3 in Appendix A and survey field data is presented in Appendix D. With to the availability of the LIDAR contours, surveyed cross sections were typically taken from top of bank to top of bank and then extended using the LIDAR data.

LIDAR contours are generated using the same principle as RADAR. The LIDAR instrument transmits light out to a target. Some of this light is reflected back to the instrument. The time for the light to travel out to the target and back to the LIDAR instrument is used to determine the range to the target. Repeating this process produces a grid of elevations commonly referred to as a Digital Elevation Model (DEM). This DEM is then run through software, such as AutoCad Civil 3D or ArcView Spatial Analyst, to create a Triangular Irregular Network (TIN) and contours. The contours provided were spaced at two feet intervals. RCLC recomputed the contours at a one foot interval. Using one foot contour intervals, AutoCad Civil 3D created cross sections to extend the field surveyed cross sections. These cross sections were then input into HEC-RAS. Generally cross sections were extended to boundary of the basin or to an elevation higher than the 100 year water surface profile.

Field investigations were made over the course of this study and photographs were taken which are included in Appendix C. At that time, affects of structures on the water surface profile were documented. With this knowledge, the structures and ineffective flow area data were input into HEC-RAS. Ineffective flow areas were used for portions of cross sections in which water ponds, but the velocity of that water in the downstream direction, is close to or equal to zero. This water is included in the storage calculations, but it is not included as part of the active flow area.

Channel friction values were determined through field investigation, aerial maps, pictures and field survey data. Values were determined by referencing the Manning's "n" Information Table included within the HEC-RAS software. Typically, 0.08 was used for over bank "n" values and 0.035 to 0.40 for the channel.

As part of the study, RCLC was given storm surge elevations of Lake Pontchartrain from St. Tammany Parish Department of Engineering. Elevations of 6.5, 9.5, and 11.0 were given for the 10, 50 and 100 year storm frequencies to be used as the boundary / starting conditions to create the water surface profiles in the HEC-RAS Software. The 25 year surge elevation of 7.6 was derived by interpolating the 10 and 50 year surge elevations.

Basin characteristics were analyzed and input into the HEC-HMS model. Data includes Soil Conservation Service (SCS) Curve Number (CN) and lag time. CN calculations were based on SCS Technical Release 55, "Urban Hydrology for Small Watersheds", June 1986 edition. Baseflow within the basin was assumed to be negligible. Calculations of CN and lag time are given in Tables 1 and 3 in Appendix B. Basin characteristics are presented on Table 2.

Throughout St. Tammany Parish, subdivisions are required to incorporate detention facilities in order to reduce the peak runoff rate after the subdivisions have been constructed. According to the SCS method of determining CN, a sub-basin is characterized as wooded (undeveloped), pastureland, parks, a residential subdivision based on dwellings per acre, commercial property, and industrial, among a few other categories. Each of these categories has a designated CN based on the soil type.

To account for sub-basins with subdivision detention ponds, CN with wooded (undeveloped) values replace CN values for subdivisions. For instance, reference Basin No. 1 on Table 2 which has a subdivision comprised of ½ acre lots with a detention pond. To account for the detention pond this basin is modeled as though it is undeveloped.

Land Use, aerial and soil maps were referenced in order to compute CN values. A hydric soil map for the basin is shown in Figure 4. Existing and additional (or changing) future land use maps are included as Figures 5.1 and 5.2 in Appendix A.

Time of concentration (Tc) is the time it takes for runoff to migrate from the farthest upstream point in a basin to its point of discharge. The Kirpich Equation was used to calculate Tc which derives this time length based on the basin slope and the hydraulic length across the basin. Tc was then related to Lag Time which is part of the HEC-HMS input procedure. Lag time is the time differential between the effective rainfall and the peak runoff within the basin and roughly equates to 60% of the time of concentration.

After runoff was generated, each sub-basin needed to be routed and combined with the downstream sub-basin. The chosen methods of reach routing were Muskingum-Cunge and Modified Puls. Muskingum-Cunge was used for routing roadside ditches and driveway culvert systems while the Modified Puls method was used along the Black River tributaries. Figure 6 of Appendix A shows the locations of the routing reaches for the existing conditions, and Figures 8.1 and 8.2 show the locations of routing reaches for the improved conditions.

Modified Puls models a reach as if each reach is a detention pond by creating storage versus flow curves. By utilizing the GIS created for the watershed, HEC-RAS is capable of generating a series of storage curves based on user input flows. These curves as shown on Table 4.1 are then input into the HEC-HMS Modified Puls reach function. Based on the storm water flows generated for each sub-basin within the HEC-HMS model an attenuated (reached) flow is then calculated. These flows can then be combined with the peak flow of the downstream sub-basin.

The Muskingum-Cunge method works similar to the Modified Puls method without the need to run storage versus flow curves. Instead, the ditch or culvert is input into HEC-HMS. For a ditch section the bottom width, side slope, ditch height and ditch slopes are entered. Similarly for the culverts the pipe diameter and slopes are entered. These areas are used along with the slopes to calculate the anticipated time for the peak flow to reach the downstream location where it will then be combined with the downstream sub-basin. Input data for the Muskingum-Cunge reach routing is shown on Table 4.2.

With all data coded in HEC-HMS, the program was run for the 10, 25, 50 and 100 year storm frequencies using the SCS Type III rainfall distribution. Precipitation amounts (in inches for a 24 hour duration) for these storm frequencies were taken from the Louisiana Department of Transportation and Development Hydraulics Design Manual, 1987 edition for Region I. Rainfall depths in Region I with a 24 hour duration for the 10, 25, 50 and 100 year return periods are 7.8, 9.6, 11.1 and 12.6 inches, respectively.

HEC-HMS peak runoff flows are presented in Tables 5.1, 5.2, 5.3 and 5.4 of Appendix B. Per Table 5.4 (Hydrologic Element R28 and River Station 1182) the computed 100 year existing condition peak flow for Black River Tributaries near its confluence with Black River is 1,430 cfs. This flow was compared to the regional flow of 1,333 cfs derived for St. Tammany Parish from the USGS Regression Equations (USGS, 1985).

Computed HEC-HMS peak flows were then copied into Microsoft Excel and configured for input into the HEC-RAS steady state flow data editor. HEC-RAS was then run to produce water surface profiles for existing basin conditions using the HEC-HMS peak flows. Water surface elevations for the existing condition are given in Table 7.1, 7.2, 7.3 and 7.4 of Appendix B for the 10, 25, 50 and 100 year storm intensities.

Due to the lack of stream gauges along the Black River tributaries, typical calibration methods were not possible. To explain, RCLC was not able to relate stream elevations for a certain storm event to those produced by the computer model. Rudimentary calibration of the existing tributaries were made by referencing storm events to water elevations at bridge and culvert crossings. For instance, water surface profiles near existing crossings were compared to water surface elevations generated by HEC-RAS.

For an additional reference, flood inundation maps were created in AutoCad Civil 3D. These maps were produced from the TIN created by the DEM. Basically the water surface elevations at each river station were input into the TIN and contours of those elevations were created. These contours were joined and hatched with a fill pattern which produced the inundation areas. Inundation maps were made for the 10, 25 and 50 year storms for the existing and improved basins and are presented on Figures 9.1, 9.2 and 9.3 in Appendix A for the existing conditions and 10.1, 10.2 and 10.3 for the improved conditions.

Attention to the inundation areas within the Ruelle du Chene Subdivision shows this subdivision becomes inundated from heavy rainfall events. While no houses in this subdivision have been reported as flooding, some have come extremely close. Streets, side and rear yards become submerged from these rainfalls with the house pads becoming isolated islands due to lot filling. Since the LiDAR data was taken in 1998 prior to the construction of this subdivision in 2003, these house pad islands are not depicted on the inundation maps. Pictures illustrating the street, rear and side yard flooding within Ruelle du Cheneare presented in Appendix C.

DRAINAGE MITIGATION METHODS

Several Scenarios were investigated to help lower water surface elevations across the Black River Tributary Basin. Flooding primarily occurs in the upper areas of the basin along Brewster Road, Oak Park Drive and within the Ruelle du Chene Subdivision. Pictures of these areas after several intense rainfalls are presented in Appendix C.

Typically when conducting a study to improve a watershed basin, the first scenario St. Tammany Parish Engineering wants to analyze is increasing the detention requirements for new subdivisions to be constructed within the basin. Unfortunately, there are only two areas along the tributaries that are available for detention resulting from subdivision development. The first is Pine Creek Subdivision which is an ideal place for a detention pond. It is located in an area where two of the Black River Tributaries join. The Pine Creek Subdivision plans show a detention pond to be constructed in this area but through our preliminary analysis the pond did not appear to be large enough for any significant benefit to the basin. If at all possible, St. Tammany Parish should acquire several lots within this subdivision to increase the size of the detention pond so significant storm water storage can be attained.

The second area where detention can be added during the construction of a new subdivision is within Autumn Creek Phase 2. The developer has allowed for an area to be used as an online pond. This pond should be sized large enough to accommodate the increased peak flow from their development while also storing excessive flows already existing within the watershed. At the same time, an existing offline pond situated in Phase 1 of Autumn Creek can be converted into an online pond. Currently this pond is separated from the tributary by a narrow levee which can be removed. Removing this levee will allow storm water storage in the areas presently occupied by the levee. These two scenarios have not been evaluated at this time, but are to be studied in an amendment to this report when information from the developer's engineer is made available to St. Tammany Parish.

An existing 84" reinforced concrete culvert at the entrance to Autumn Creek Subdivision is undersized and creates a significant backwater affect. This undersized culvert in effect acts as a control structure along the tributary causing temporary flooding of lower areas upstream of the culvert but also providing relief of downstream areas such as Black River Estates and Black River Forest by attenuating peak flows. Downstream effects of upgrading this undersized culvert will also be studied as an amendment to this report when information from the developer's engineer is made available to St. Tammany Parish.

In the area of Autumn Creek and upstream of the undersized culvert, the tributary becomes very narrow as it snakes past the levee between it and the Autumn Creek Phase 1 detention pond. As a result, the stream flow becomes turbulent and inefficient resulting in an elevated water surface profile. This problem should be corrected when the levee is removed to create an online detention pond provided the future analysis shows this to be a viable alternative.

Regarding Black River Estates and Black River Forest Subdivisions, low lying areas of these subdivisions become inundated by storm water during heavy rainfall events and elevated tides within Lake Pontchartrain. Reasons for this inundation is that the subdivisions are located within the Black River floodplain and also affected by tidal influences of Lake Pontchartrain. For instance, as explained earlier, the lake storm surge elevations are 6.5 for the 10 year storm, 7.6 for the 25 year storm, 9.5 for the 50 year storm, and 11.0 for the 100 year storm. Certainly, any area below these elevations will become inundated during these events. Referencing the contour elevations show that portions of these two subdivisions are below these elevations. These areas of flooding are primarily roadways and backyards with the house pads filled above the 100 year FEMS elevations. At the time of this report we have not been informed of any house flooding.

Improvements to Black River and its tributaries in the area of Black River Estates and Black River Forest Subdivisions were not included in this report because the flooding conditions result from tidal conditions and heavy rainfall within areas currently designated as flood zones. As a result, there are very little improvements that can be implemented to improve this condition. However, due to frequent concerns voiced from homeowners in these two subdivisions regarding the adequacy of the existing five cell reinforced concrete box culvert under LA 22, St. Tammany Parish has requested RCLC expand the watershed delineation to include modeling the existing five cell box culvert. Results from this model will be presented in a subsequent report when additional surveying of Black River and the box culvert is made available. See Appendix C for a picture of this five cell reinforced concrete box culvert.

Improvements which are believed to best relieve the flooding in the upper portions of the basin are to upgrade the culverts along Brewster Road near Dominion Subdivision and along Oak Park Drive while also providing additional detention in the Ruelle du Chene Subdivision to benefit the lower portions of the tributary basin. Several other areas were also researched as a possible detention pond location. These areas are shown on Figure 2.2 within the Watershed Delineation Plan

To offset the peak flow created by upsizing the culverts along Brewster Road and Oak Park Drive, an online detention pond connected directly to the Black River tributary is to be constructed within a wooded green space area within the Ruelle du Chene Subdivision. This pond will accommodate about 36 acre-feet of storm water detention. The control structure for this online detention pond will be the existing culvert under Oak Park Drive which will serve to maintain the existing downstream conditions. Results from the HEC-HMS software for 10, 25 and 50 year storm intensities improved conditions are presented on Tables 6.1, 6.2 and 6.3 in Appendix B.

Since the time this study was conducted but prior to the issuance of this report, it was concluded that the green space area within Ruelle du Chene Subdivision was dedicated to a third party as a Wetlands Conservatory Servitude. Therefore, this area will not be usable as a detention pond.

Several other areas were also evaluated for possible detention pond locations. These locations are shown on Figure 2 in Appendix A. However, these locations were also determined impractical for various reasons.

Inundation maps for the 10, 25 and 50 year storms have been produced for these basin improvements along Brewster Road and Oak Park Drive with detention within Ruelle du Chene. These maps are located in Appendix A on Figures 10.1, 10.2 and 10.3. Water surface elevations for the 10, 25 and 50 year storm intensities representing the improved condition are given on Tables 8.1, 8.2 and 8.3 in Appendix B.

SUMMARY AND COST RECOMMENDATIONS

Current conditions within the Black River Tributary Basin show need for improvement. As stated earlier, RCLC with continued review by St. Tammany Parish believed the best improvement for the basin was to upgrade the culverts along Brewster Road and Oak Park Drive and provide some additional regional detention to attenuate peak flows to reduce flooding downstream. However, at the later stages of this report we were informed that this scenario was not possible due to a third party Wetlands Conservatory Servitude.

Due to the timing of this information, RCLC was instructed to complete this report based on the initial study parameters discussed above and present a cost estimate for the improvements in the event the third party Wetlands Conservatory Servitude issue could be resolved.

RCLC's opinion of estimated construction costs to construct a 36 acre-feet regional detention facility in Ruelle du Chene Subdivsion is about $585,000 provided the land is donated by the subdivision. Of course there is the ability to sell the excavated material to help mitigate some of this cost if it is suitable for use elsewhere although this is not likely usable material due to its location within organic wetlands.

The probable cost to upgrade the drainage facilities along Brewster Road and Oak Park Drive is approximately $862,000. St. Tammany Parish has under contract the design of roadway improvements to Brewster Road from Bootlegger Road to LA 1077. Brewster Road drainage improvements could be upgraded at that time if determined appropriate. These costs are approximate and will increase over time. Adjustments may be required to suit current contracting costs.

Subsequently, RCLC is to expand their scope of services and prepare an amendment to this report which will include studying the removal of an existing levee between the Black River Tributary and an existing detention pond. Removal of this levee will create an even larger online detention pond. Additions to the scope also include researching the benefits of adding another online detention pond at the future site of Autumn Creek Phase 2 and upgrading the undersized 84" reinforced concrete drain culvert at the entrance of Autumn Creek Phase 1. The last amendment to the scope would be to analyze the capacity of the five cell box culvert crossing under LA 22.

RCLC does not warrant that these are the only needed improvement plans to mitigate flooding along Black River Tributary Basin. However, they are sound and cost effective alternatives.

Primary Sponsor Letter of Support

(As uploaded)

Black River Drainage Study Support Letter.pdf

ST. TAMMANY PARISH
PATRICIA P. BRISTER
PARISH PRESIDENT

September 9, 2016

Re: Black River Drainage Study

Dear Sir/Madam:

On behalf of St. Tammany Parish, I am pleased to submit the Black River Drainage Study for consideration under WRRDA and hereby request funding assistance from United States Army Corps of Engineers.

The purpose of this study is to define model parameters and engineering assumptions to provide a cost effective solution to reduce street flooding along Brewster Road and Oak Park Drive within the Ruelle Du Chene Subdivision.

Sincerely,

Patricia P. Brister
Parish President

OFFICE OF THE PARISH PRESIDENT
P.O. BOX 628 | COVINGTON, LOUISIANA 70434 | PBRISTER@STPGOV.ORG | 985-898-2362
WWW.STPGOV.ORG

Map Document

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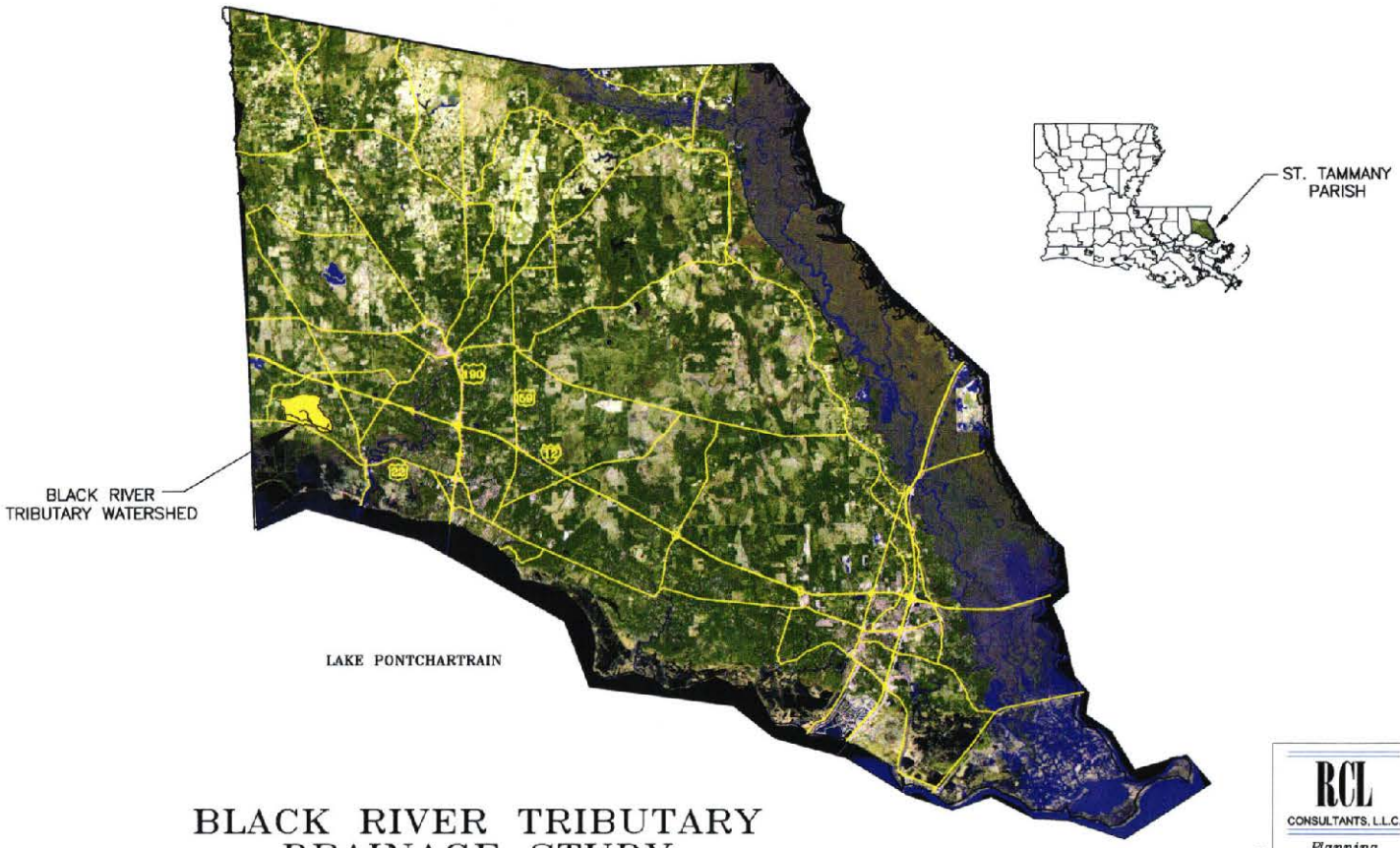
Black River Drainage Maps.pdf



BLACK RIVER TRIBUTARY DRAINAGE STUDY

VICINITY MAP
ST. TAMMANY PARISH, LOUISIANA

NOT TO SCALE
JULY 18, 2008

FIGURE 1

RCL
CONSULTANTS, L.L.C.
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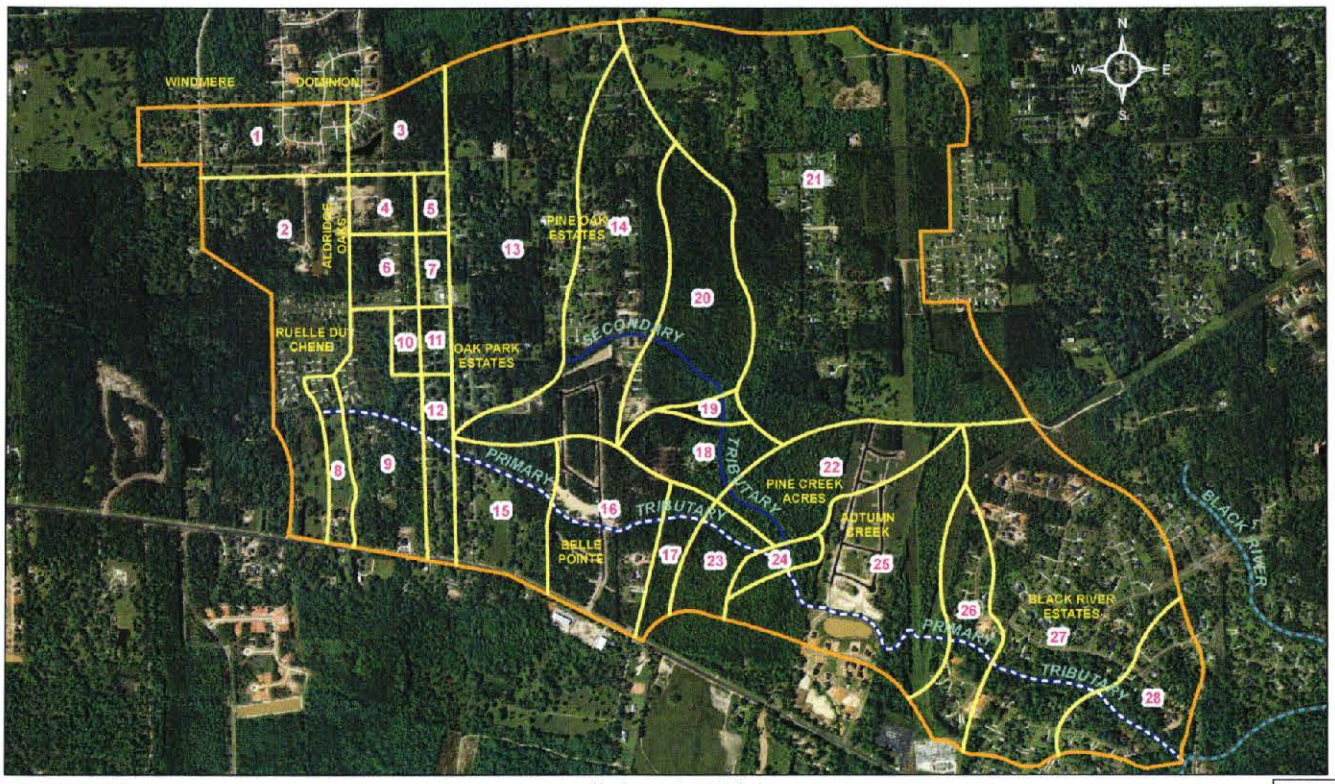

1 inch equals 1,000 feet

Legend

- Black River
- Inner Ridgeline
- Primary Tributary
- Secondary Tributary
- Study Perimeter
- Subbasin Designation

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BLACK RIVER TRIBUTARY DRAINAGE STUDY

WATERSHED BASIN DELINEATION

ST. TAMMANY PARISH, LOUISIANA

FIGURE 2.1

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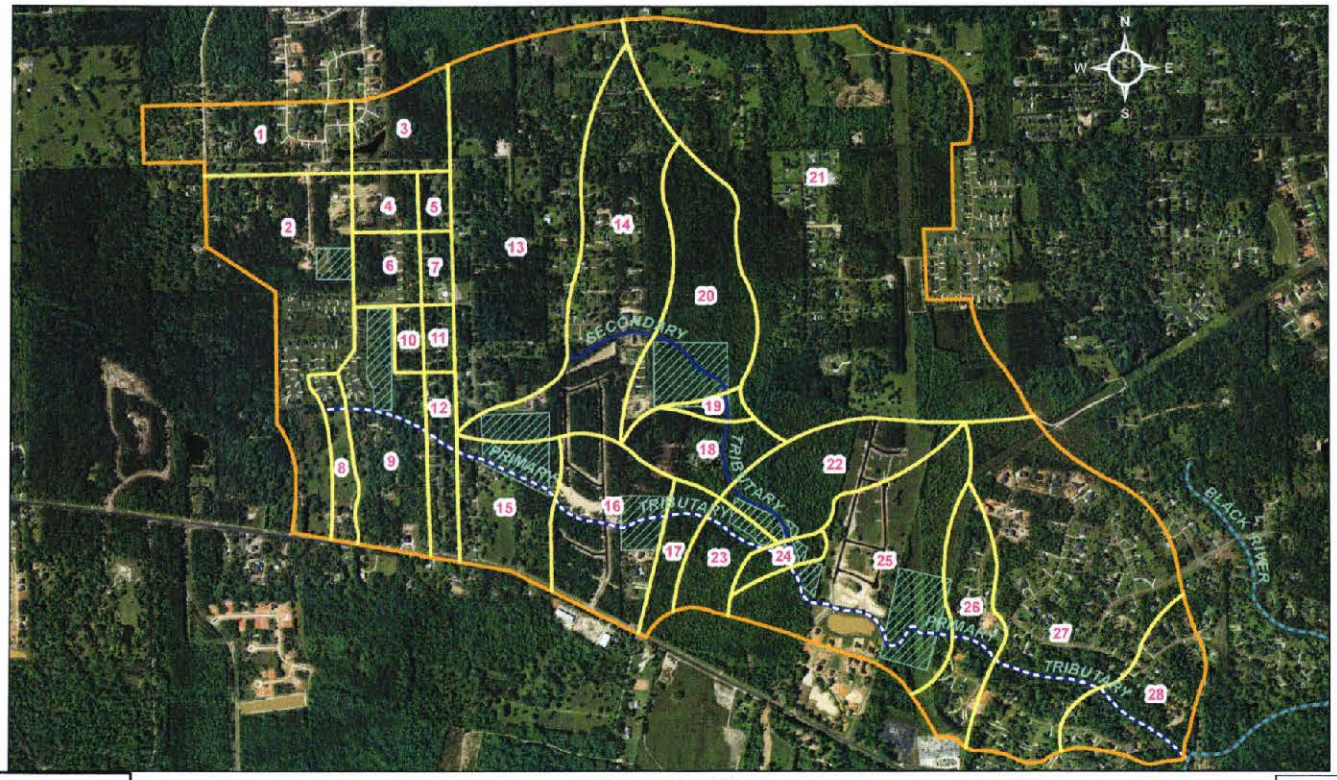

Legend

- Black River
- Inner Ridgeline
- Primary Tributary
- Secondary Tributary
- Study Perimeter
- Subbasin Designation
- Possible Detention Area

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1 inch equals 1,000 feet

BLACK RIVER TRIBUTARY DRAINAGE STUDY

WATERSHED BASIN DELINEATION

ST. TAMMANY PARISH, LOUISIANA

FIGURE 2.2

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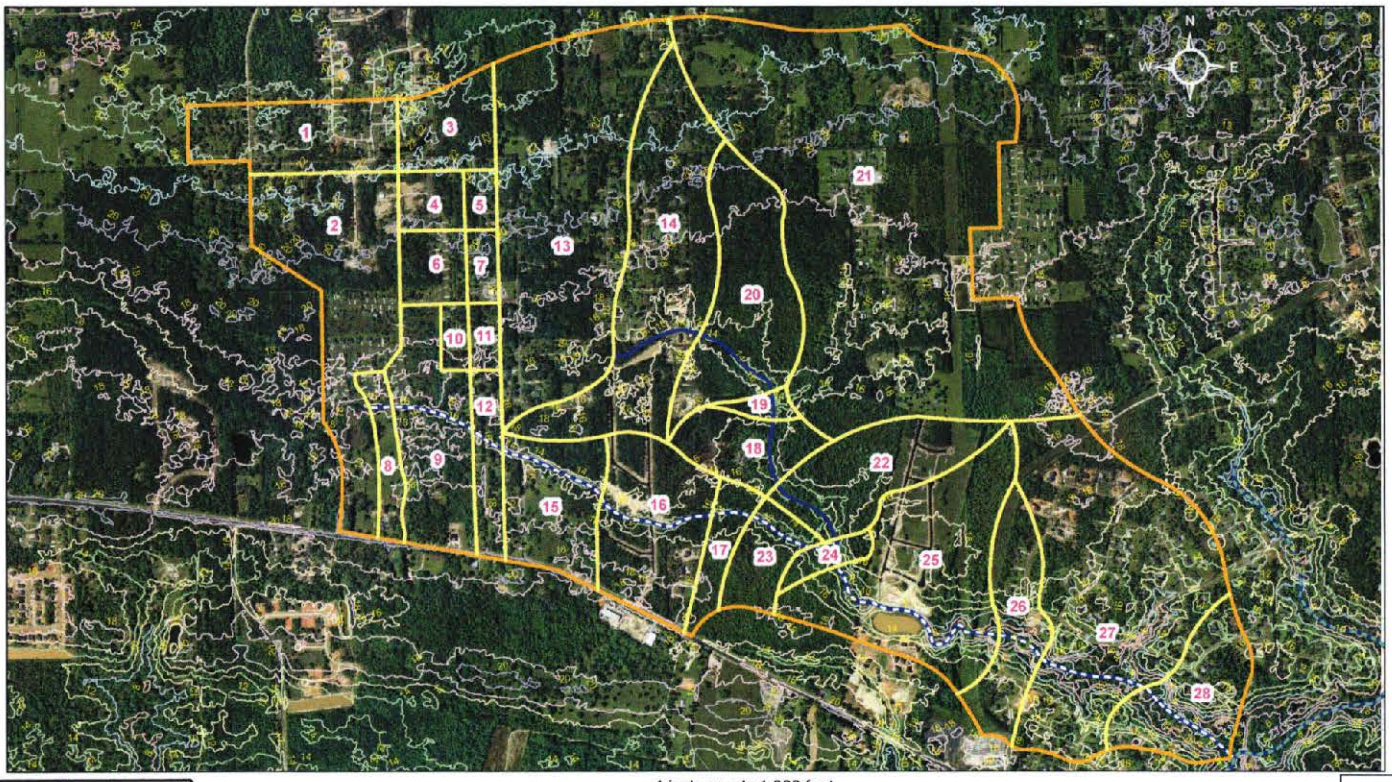

1 inch equals 1,000 feet

Legend

- Black River
- Inner Ridgeline
- Primary Tributary
- Secondary Tributary
- Study Perimeter
- Subbasin Designation

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BLACK RIVER TRIBUTARY DRAINAGE STUDY

2' CONTOURS – LIDAR

ST. TAMMANY PARISH, LOUISIANA

FIGURE 3

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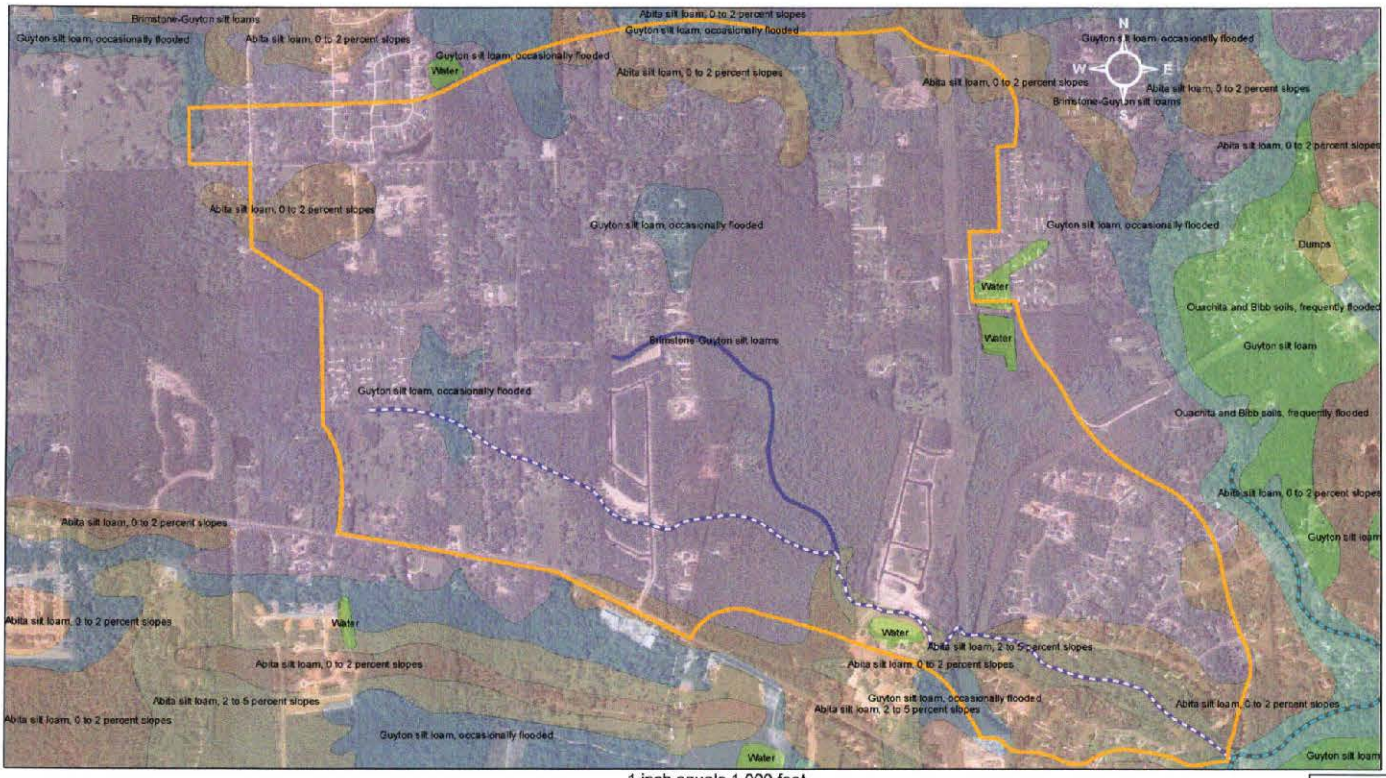

1 inch equals 1,000 feet

Legend

- Black River
- Primary Tributary
- Secondary Tributary
- Study Perimeter

BLACK RIVER TRIBUTARY DRAINAGE STUDY

HYDRIC SOILS

ST. TAMMANY PARISH, LOUISIANA

FIGURE 4

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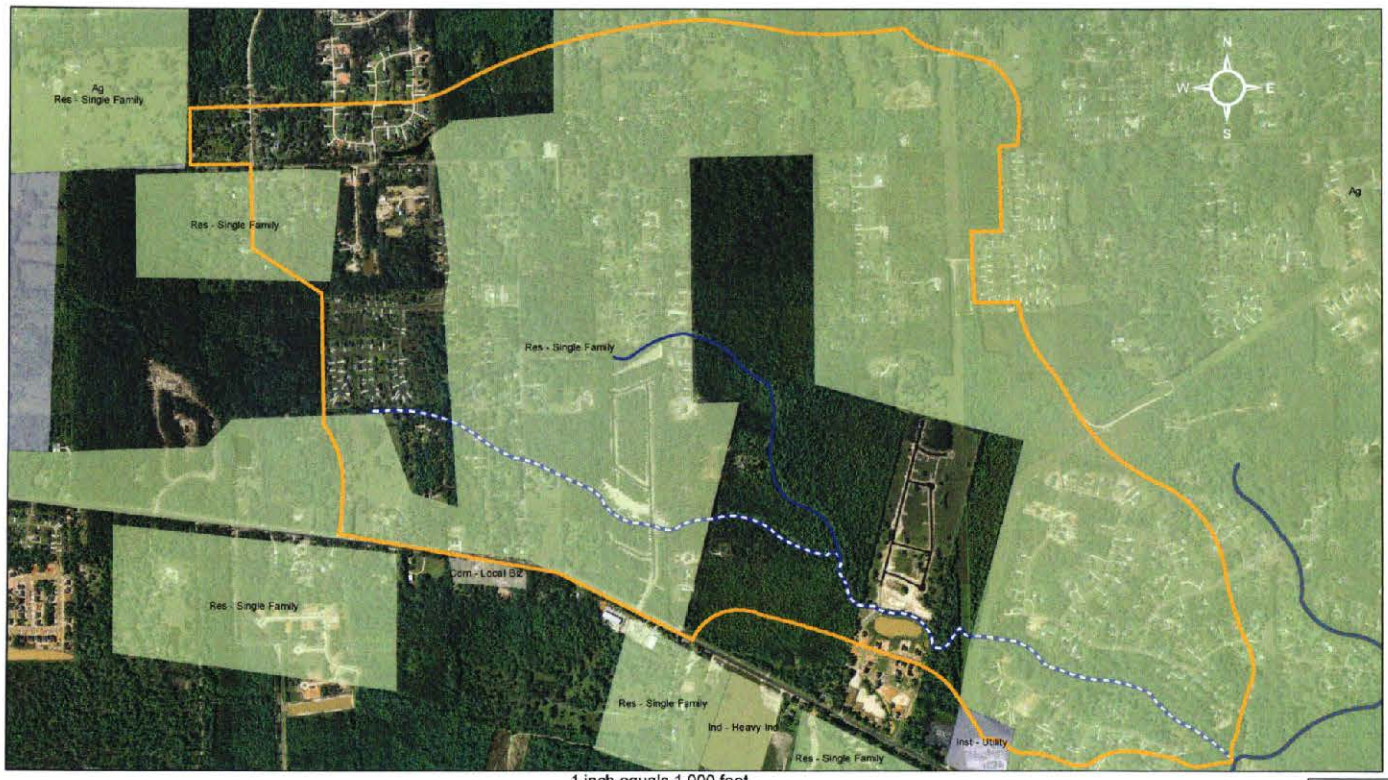

1 inch equals 1,000 feet

Legend

- Black River
- Primary Tributary
- Secondary Tributary
- Study Perimeter

BLACK RIVER TRIBUTARY DRAINAGE STUDY

EXISTING LAND USE

ST. TAMMANY PARISH, LOUISIANA

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FIGURE 5.1

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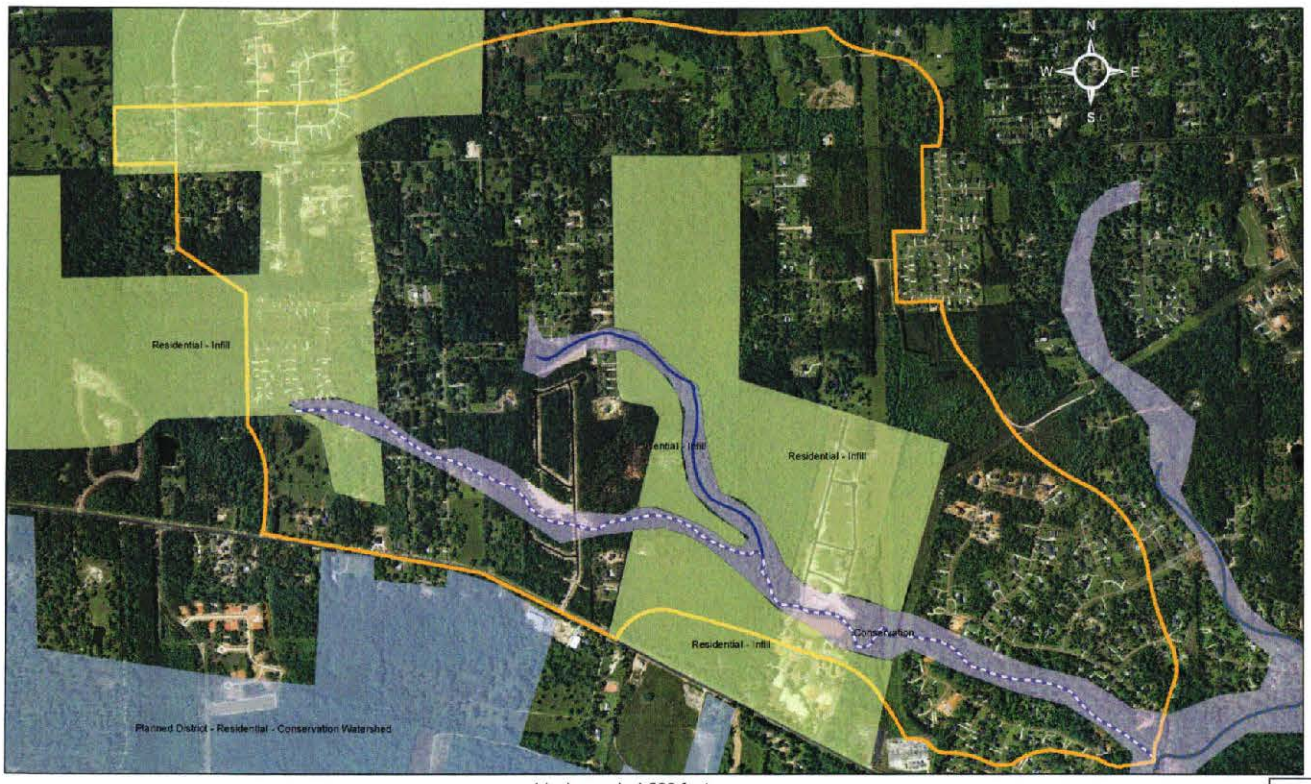

1 inch equals 1,000 feet

Legend

- Black River
- Primary Tributary
- Secondary Tributary
- Study Perimeter

BLACK RIVER TRIBUTARY DRAINAGE STUDY

FUTURE LAND USE

ST. TAMMANY PARISH, LOUISIANA

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FIGURE 5.2

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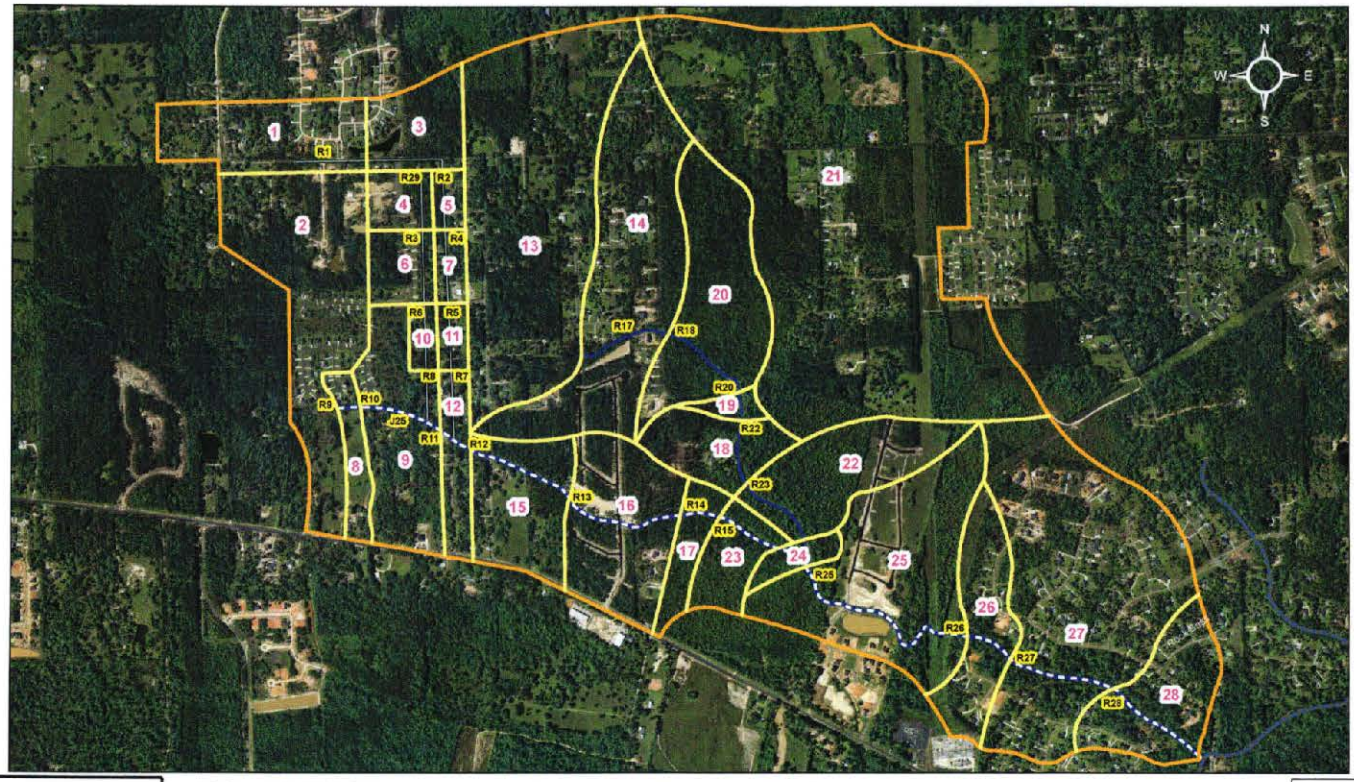

Legend

- Black River
- Primary Tributary
- Secondary Tributary
- Route
- Inner Ridgeline
- Study Perimeter
- Stream Flow Input Location
- Subbasin Designation

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1 inch equals 1,000 feet

BLACK RIVER TRIBUTARY DRAINAGE STUDY

HEC–HMS

EXISTING ROUTING REACHES

ST. TAMMANY PARISH, LOUISIANA

FIGURE 6.1

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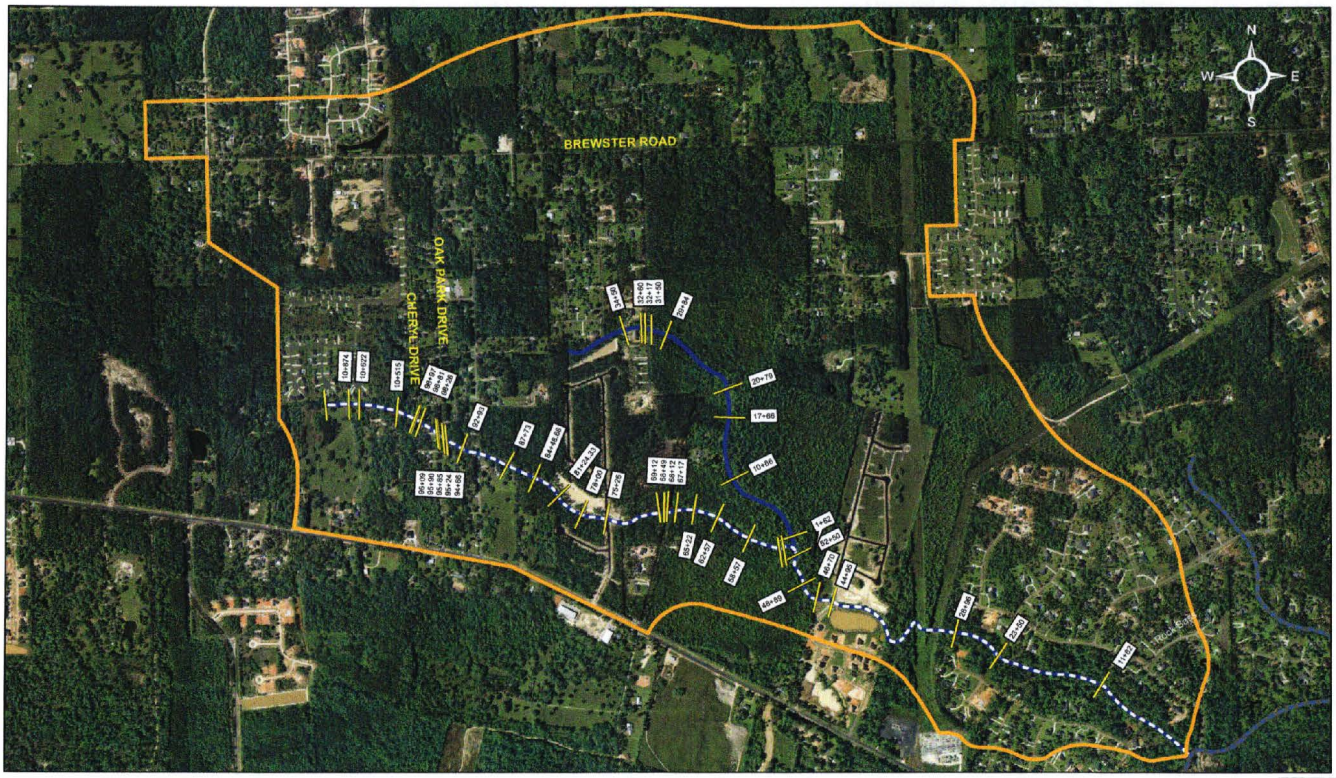

1 inch equals 1,000 feet

Legend
- Black River
- Primary Tributary
- Secondary Tributary
- cross sections Franz
- Study Perimeter

BLACK RIVER TRIBUTARY DRAINAGE STUDY

EXISTING AND IMPROVED CROSS SECTION LOCATIONS
ST. TAMMANY PARISH, LOUISIANA

FIGURE 7.1

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1 inch equals 200 feet

Legend
Primary Tributary

BLACK RIVER TRIBUTARY DRAINAGE STUDY

EXISTING BREWSTER AND OAK PARK CROSS SECTION LOCATIONS

ST. TAMMANY PARISH, LOUISIANA

FIGURE 7.2

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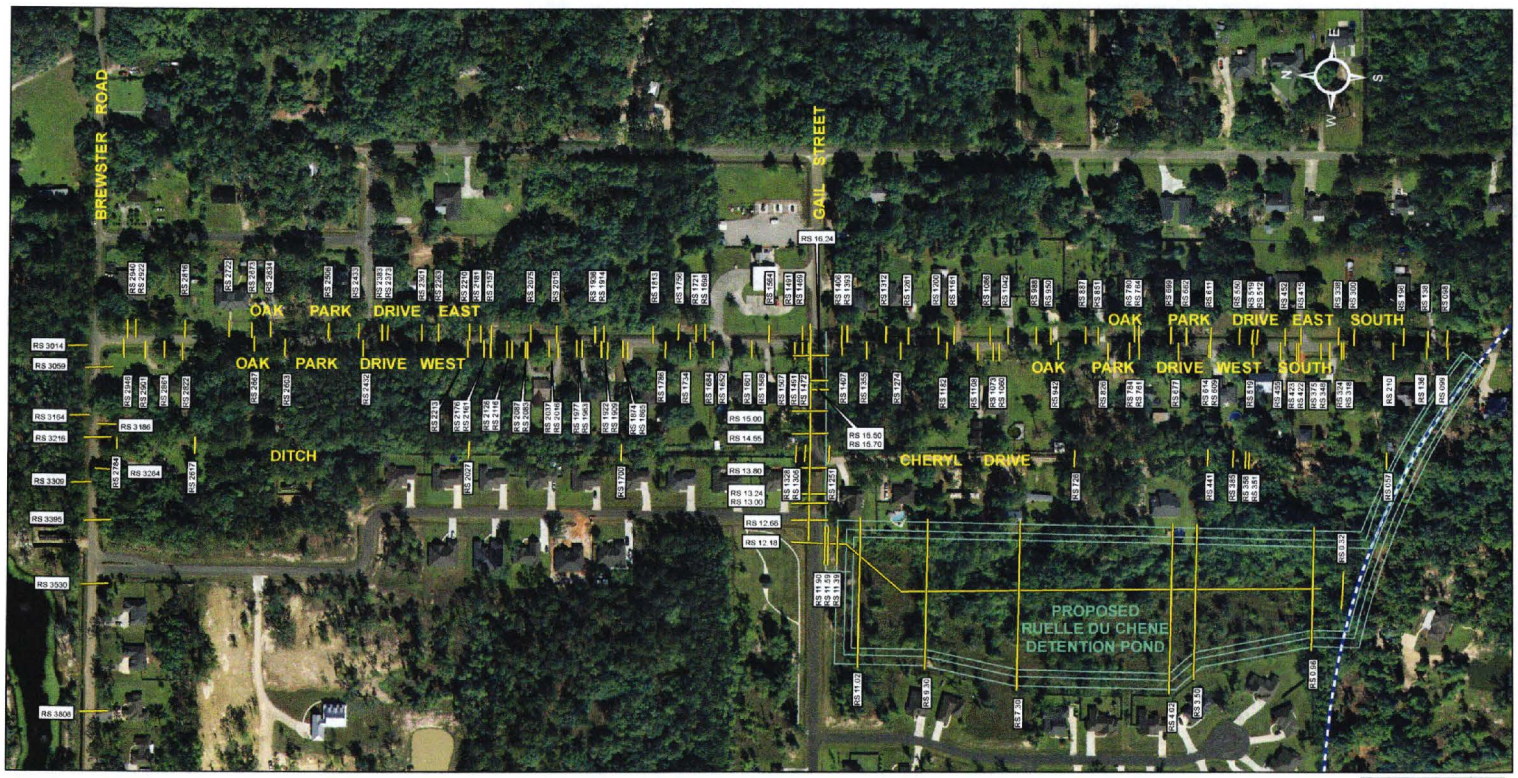

1 inch equals 200 feet

Legend

- Primary Tributary

BLACK RIVER TRIBUTARY DRAINAGE STUDY

IMPROVED BREWSTER AND OAK PARK CROSS SECTION LOCATIONS

ST. TAMMANY PARISH, LOUISIANA

FIGURE 7.3

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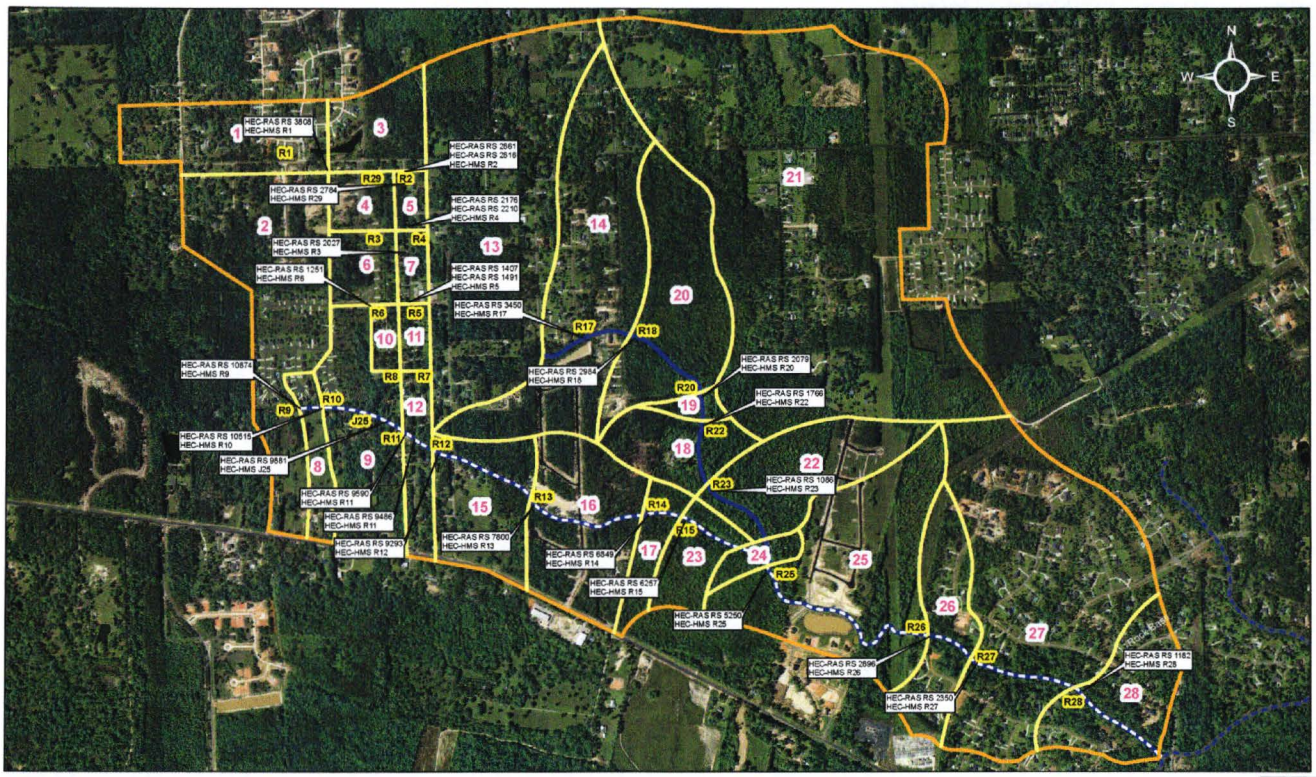

1 inch equals 1,000 feet

Legend

- Black River
- Primary Tributary
- Secondary Tributary
- Inner Ridgeline
- Study Perimeter
- R1 Stream Flow Input Location
- 23 Subbasin Designation

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BLACK RIVER TRIBUTARY DRAINAGE STUDY

HEC-HMS CORRELATION TO HEC-RAS

EXISTING CONDITIONS

ST. TAMMANY PARISH, LOUISIANA

FIGURE 8.1

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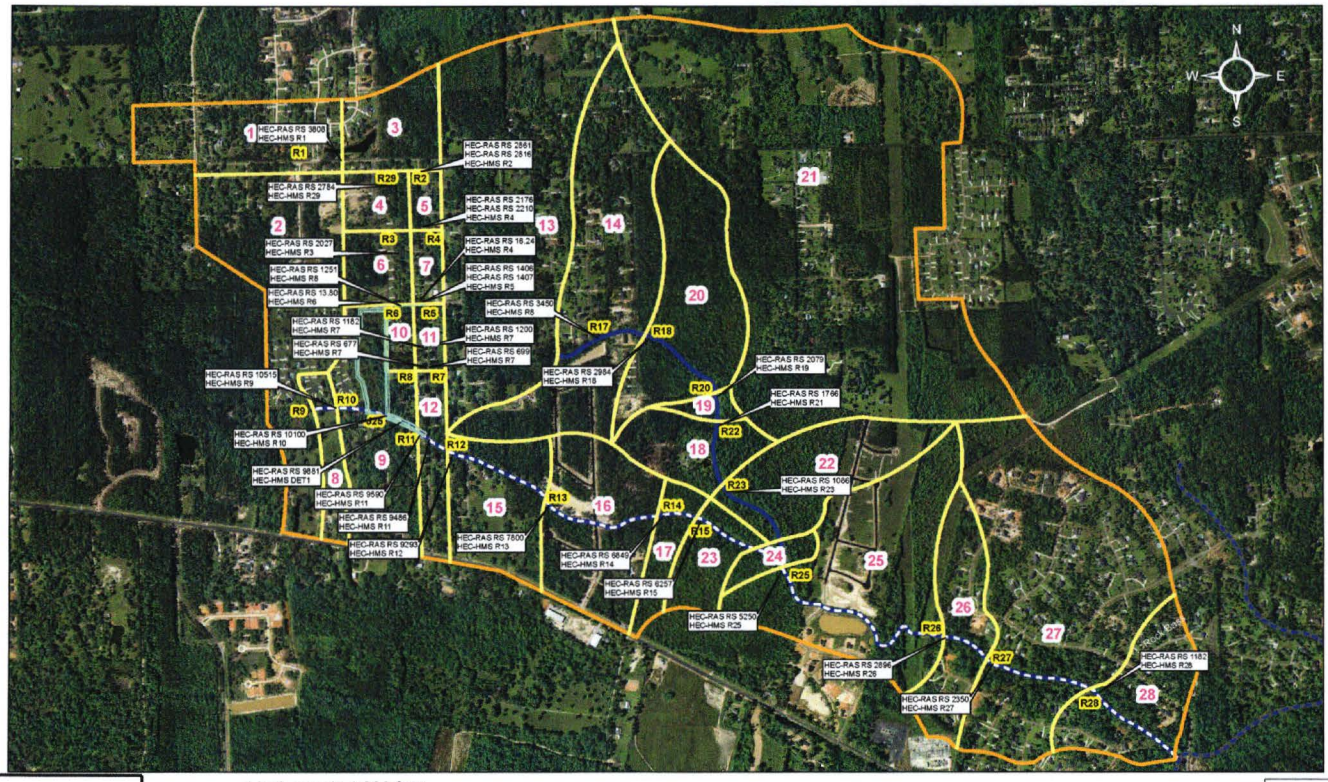

Legend

- Black River
- Primary Tributary
- Secondary Tributary
- Detention Pond
- Inner Ridgeline
- Study Perimeter
- (R1) Stream Flow Input Location
- (23) Subbasin Designation

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1 inch equals 1,000 feet

BLACK RIVER TRIBUTARY DRAINAGE STUDY

HEC-HMS CORRELATION TO HEC-RAS

IMPROVED CONDITIONS

ST. TAMMANY PARISH, LOUISIANA

FIGURE 8.2

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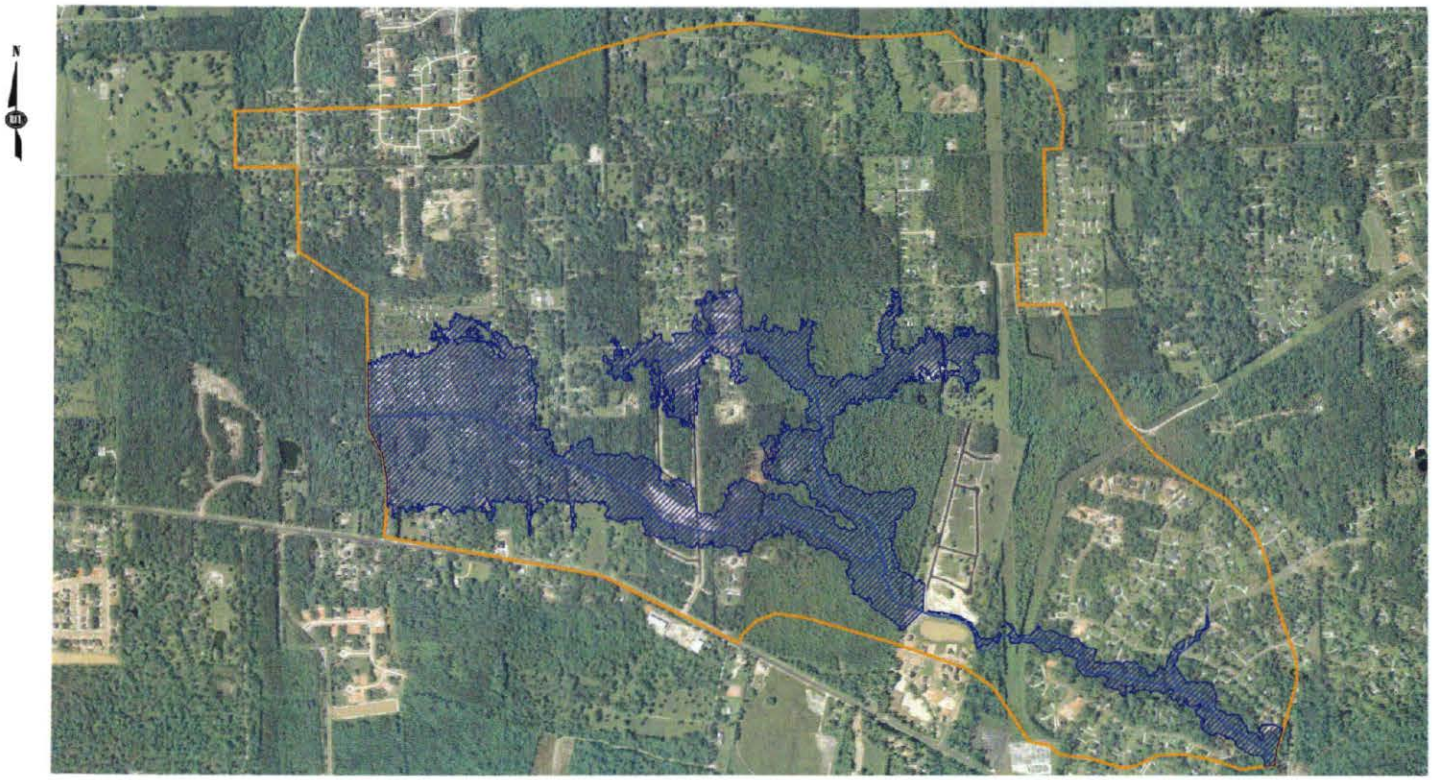

SCALE: 1"=1000'

BLACK RIVER TRIBUTARY DRAINAGE STUDY

EXISTING 10 YEAR INUNDATION MAP

ST. TAMMANY PARISH, LOUISIANA

FIGURE 9.1

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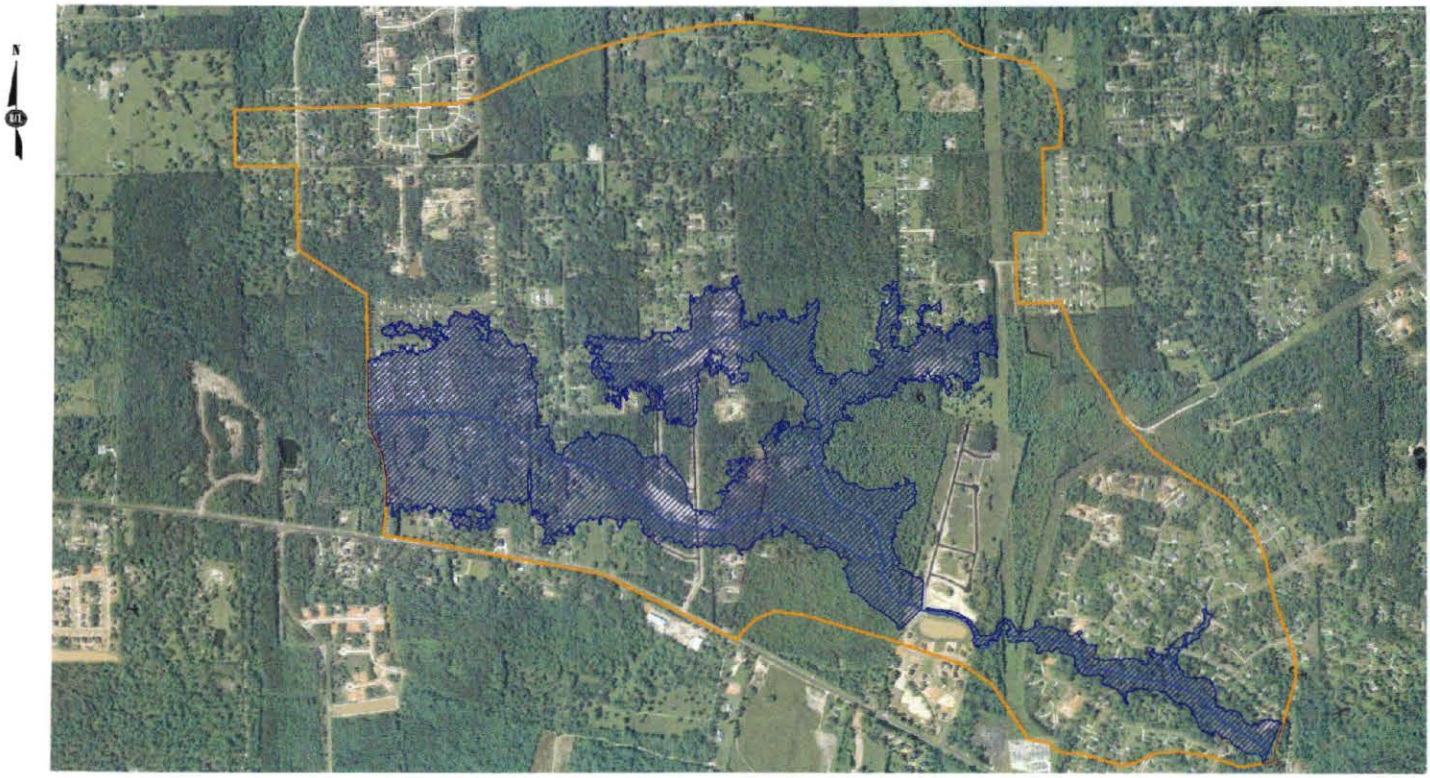

SCALE: 1"=1000'

BLACK RIVER TRIBUTARY DRAINAGE STUDY

EXISTING 25 YEAR INUNDATION MAP

ST. TAMMANY PARISH, LOUISIANA

FIGURE 9.2

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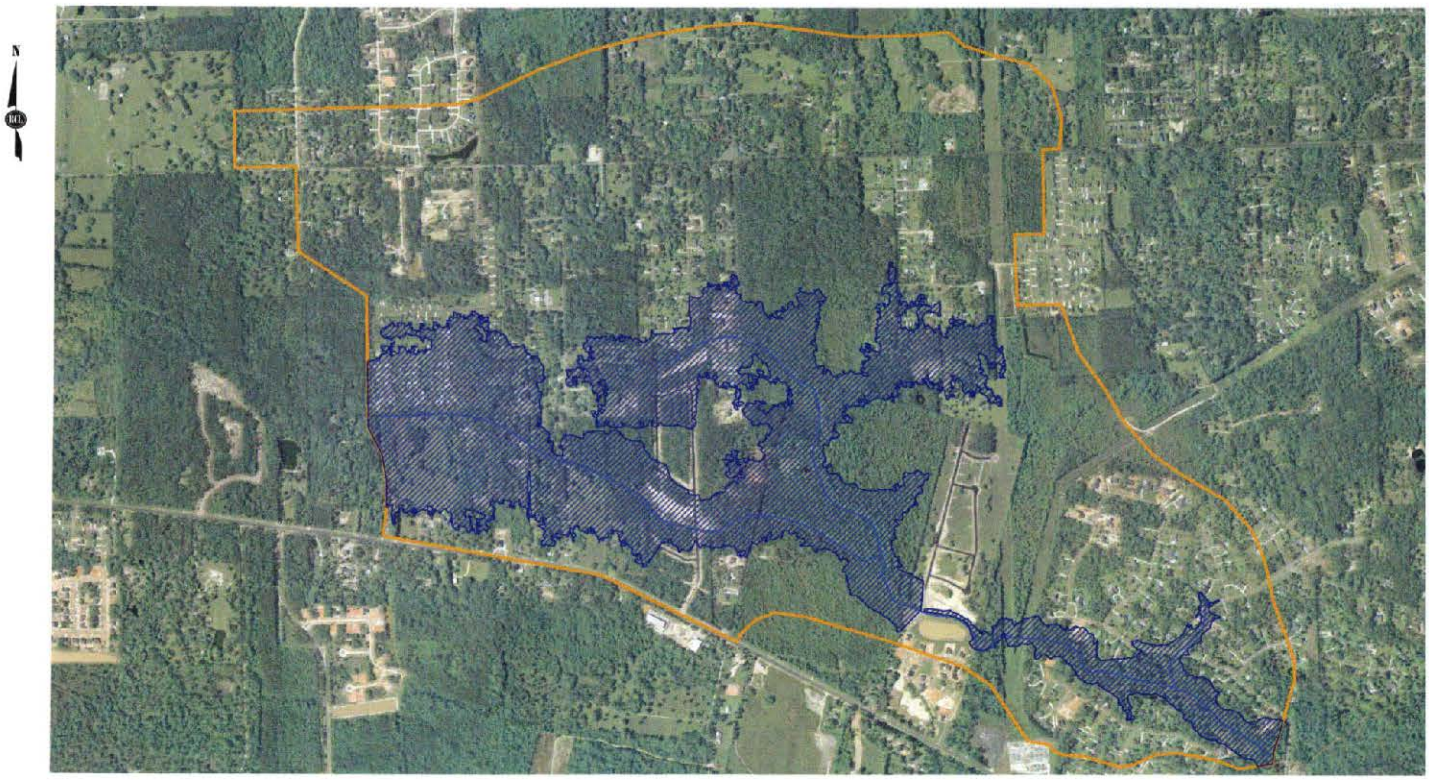

SCALE: 1"=1000'

BLACK RIVER TRIBUTARY DRAINAGE STUDY

EXISTING 50 YEAR INUNDATION MAP
ST. TAMMANY PARISH, LOUISIANA

FIGURE 9.3

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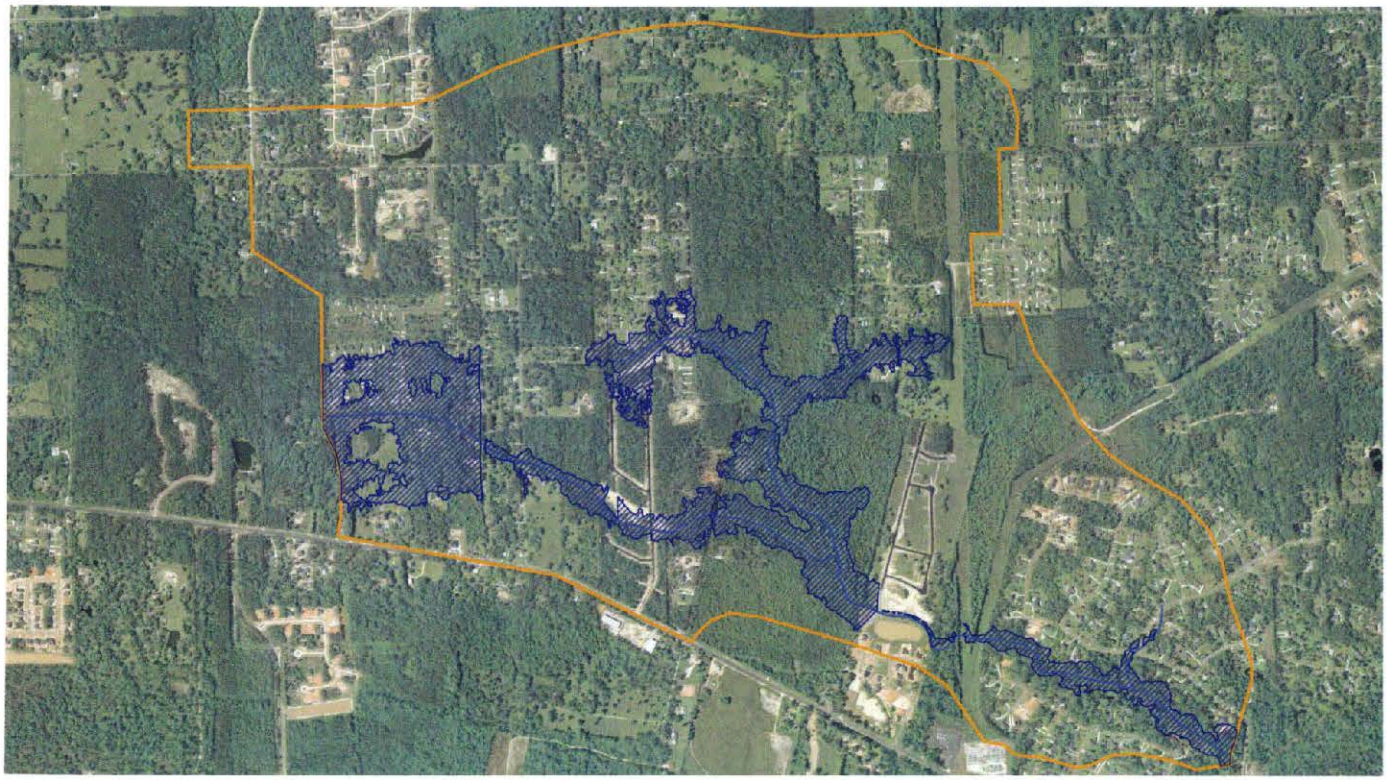

SCALE: 1"=1000'

BLACK RIVER TRIBUTARY DRAINAGE STUDY

IMPROVED 10 YEAR INUNDATION MAP

ST. TAMMANY PARISH, LOUISIANA

FIGURE 10.1

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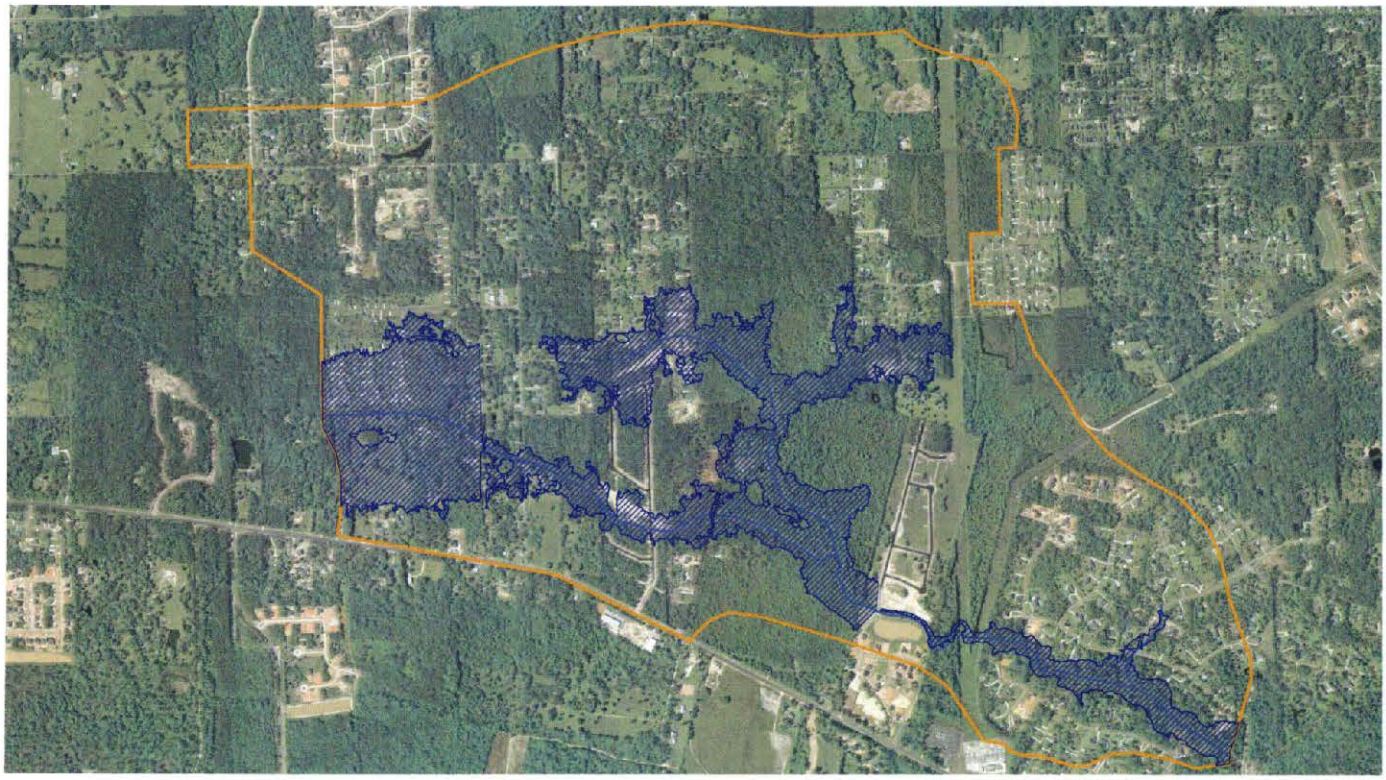

SCALE: 1"=1000'

BLACK RIVER TRIBUTARY DRAINAGE STUDY

IMPROVED 25 YEAR INUNDATION MAP

ST. TAMMANY PARISH, LOUISIANA

FIGURE 10.2

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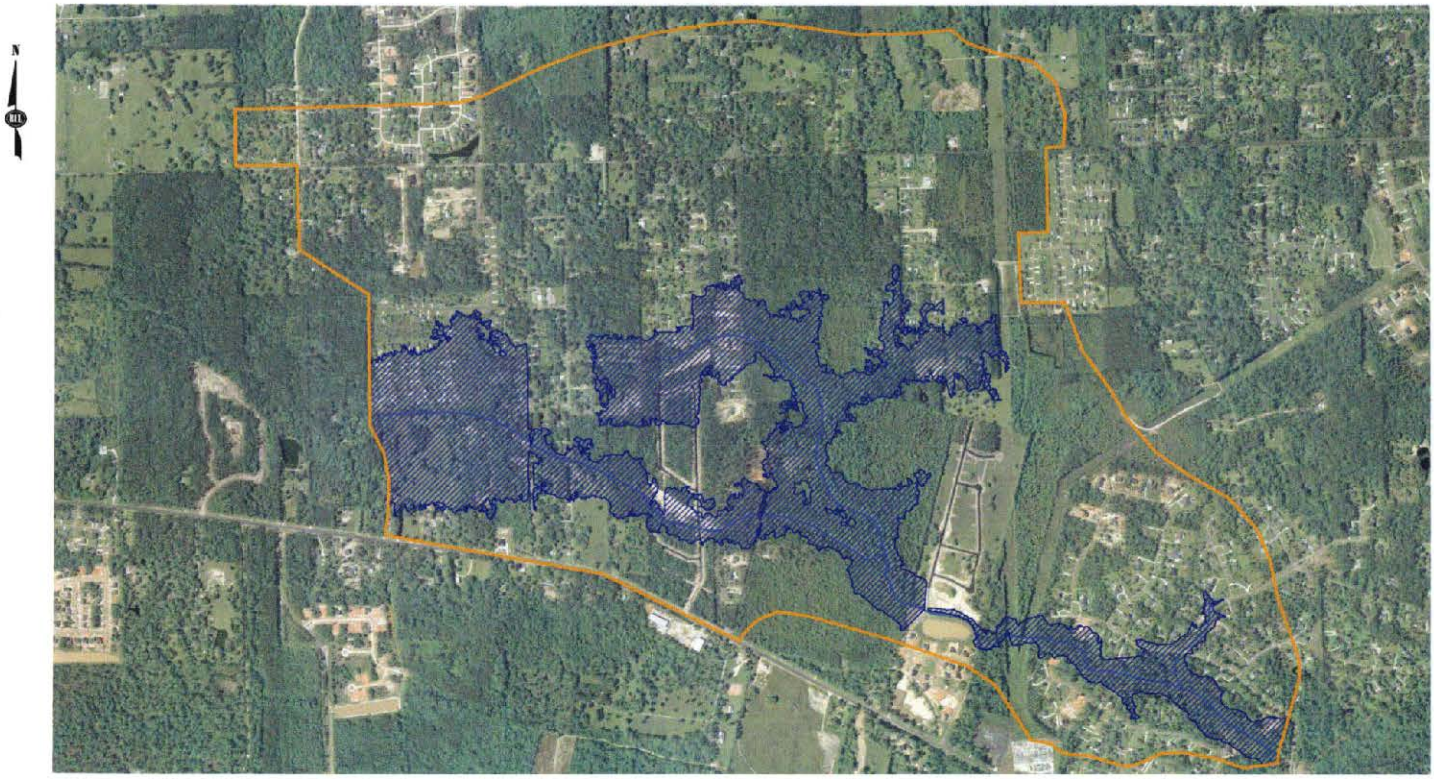

SCALE: 1"=1000'

BLACK RIVER TRIBUTARY DRAINAGE STUDY

IMPROVED 50 YEAR INUNDATION MAP

ST. TAMMANY PARISH, LOUISIANA

FIGURE 10.3

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Additional Proposal Information

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Black River Forest Cost Estimate.pdf

Black River Tributary Basin
Cost Estimate

36 Acre-feet regional detention pond	$ 585,000.00
Drainage upgrades to Brewster Road/Oak Park Drive	$ 862,000.00
Construction Cost:	$ 1,447,000.00
20% Contigenticy	$ 289,400.00
Total Constrcutin Cost:	$ 1,736,400.00