Appendix D

Reports and Other Correspondence

Subject: Caldwell Parish - Hurricane Creek (11-11-584E) MVK-2011-1213

From: McManus Engineers (mcmanusengineers@yahoo.com)

To: robert.g.ulmer@usace.army.mil;

Date: Thursday, March 22, 2018 12:21 PM

Robert,

Please see the attached location for the Police Jury Public Works Facility, where the spoil will be stored.

Also, just to clarify from yesterday, the project will still be working on one side of the bank. For the North end from Martin Luther St. to Hwy 165, most of the work will be performed on the West side. As the project heads South of Sidney Ln, and heads towards Hwy. 165, we will be changing over to the East/South side due to accessibility. For the South end, from Hwy. 165 to LA 126, the work will be performed on the West side.

Should you have any questions, please feel free to contact us.

Sincerely,
Cinnamon Gooding, P.E.,
Chief Engineer

McManus Consulting Engineers, Inc.
116 Smelser Road, Monroe, LA 71202
P.O. Box 4318, Monroe, LA 71211
Voice (318) 343-5600 Fax (318) 343-5717
mcmanusengineers@yahoo.com

Attachments

- Spoil Disposal.jpeg (1.22MB)


Untitled Map
Write a description for your map.
Legend
N32.0791°
W92.1093°
N32.0788°
W92.1101°
N32.0774°
W92.1084°
N32.0770°
W92.1093°
4
960
N
400 ft
Google Earth
© 2018 Google

McMANUS CONSULTING ENGINEERS

KENNETH C. MCMANUS, P.E.

P. O. BOX 4318
MONROE, LOUISIANA 71211
PHONE: (318) 343-5600, 343-5460
FAX: (318) 343-5717
mcmanusengineers@yahoo.com

November 7, 2017

U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, MS 39180

Attn: Ms. Kristi Hall

Re: Caldwell Parish Police Jury
Hurricane Creek Drainage Improvements
MVK-2011-1213
HMGP #1603N-021-0005
FEMA-1603-DR-LA, Project #0363
Project No. 11-11-584E

Dear Ms. Hall:

We submitted this project over two years ago, and have been waiting on FEMAs approval to go ahead and perform the Wetlands Delineation and Determination. We would like to request a Nationwide Permit review, as FEMA will not pay for any wetlands mitigation. The project seeks to improve drainage but does not want to disturb any wetlands outside the bottom of the creek. Attached are the following documents:

- USACE 404 Permit Application (1 copy)
- Plans – Half Size Set (1 copy)
- Electronic Shape file for Points and Project extents
- Wetlands Determination and Delineation Report
- Alternatives Analysis
- Impacts Worksheet

The purpose of this project is to clear, grade and remove impediments on one side of the creek, from the bottom of the creek to the top bank, for approximately 17,755 L.F. of Hurricane Creek, from LA Hwy. 849 to LA Hwy. 126, including all of one tributary, N. of Central St. near the High School, and a small portion of another tributary, at Hanchey Road. To reduce impact to the environment, work will be performed on one side of the

FILE COPY

creek. The project will include replacing several existing culverts in Bank Springs which are either misaligned with creek, broken, or undersized. A portion of creek near Martin Luther Street will be rerouted into storm drain system due to extreme meandering of creek at the road crossing which causes flooding in adjacent areas.

The creek will be rechannelized to bottom widths which vary from 6 feet at the northern most limits to 16 feet at the southern extents. The height of the channel varies depending on adjacent land areas. The total top width of the creek varies, but averages approximately 40 feet wide. Side slopes will be constructed at 2 to 1 due to the proximity of adjacent structures.

The attached impacts form gives more information on coordinates of the location of the work. The project can advertise for bids once a permit from the Corps of Engineers is received.

Upon your review, should you have any questions or comments, please feel free to contact this office.

I remain sincerely,

McManus Consulting Engineers, Inc.

Cinnamon Gooding

Cinnamon Gooding, P.E.
Chief Engineer

cc: Caldwell Parish Police Jury, c/o Ms. Wanda Stowe, P.O. Box 1737, Columbia, LA 71418 (w/ report)
Mr. Robert Mears, 208 Littleton Loop Rd., Downsville, LA 71234 (w/o encl.)
File

U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 30-SEPTEMBER-2015

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - BEN Middle - Last - CLARK	First - KENNETH Middle - C. Last - MCMANUS
Company - CALDWELL PARISH POLICE JURY	Company - MCMANUS CONSULTING ENGINEERS, INC.
E-mail Address - wandacppj@att.net	E-mail Address - mcmanusengineers@yahoo.com
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address- P.O. BOX 1737	Address- P.O. BOX 4318
City - COLUMBIA State - LA Zip - 71418 Country - US	City - MONROE State - LA Zip - 71211 Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business 318-649-2681 c. Fax 318-649-5930	a. Residence b. Business 318-343-5600 c. Fax 318-343-5717

STATEMENT OF AUTHORIZATION

11. I hereby authorize, McManus Consulting Engineers to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Ben Clark — SIGNATURE OF APPLICANT

10-25-17 — DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

MVK-2011-1213- HURRICANE CREEK DRAINAGE IMPROVMEENTS

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
HURRICANE CREEK	Address
15. LOCATION OF PROJECT Latitude: °N 32.0291 Longitude: °W -92.1309	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality CALDWELL PARISH POLICE JURY

Section - 29,30,31 & 6 Township - 13N & 12N Range - 4E

17. DIRECTIONS TO THE SITE

PROJECT IS LOCATED IN BANK SPRINGS AND GRAYSON, LOUISIANA. PROJECT STARTS AT LA HWY 849 AND CONTINUES SOUTH TO LA HWY 126. THE PROJECT INCLUDES CLEARING TWO TRIBUTARIES. ONE IS LOCATED IN FRONT OF THE PARISH HIGH SCHOOL AND JOINS THE CREEK JUST NORTH OF CENTER ST. THE OTHER TRIBUTARY CROSSES HANCHEY RD. AND FLOWS INTO THE CREEK NORTH OF LA HWY. 126.

18. Nature of Activity (Description of project, include all features)

SEE ATTACHED "BLOCK 18"

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

CREEK IS A MAJOR DRAINAGE CHANNEL IN AREA, AND FLOODS IN RELATIVELY SMALL STORMS DUE TO INADEQUATE CULVERTS, INADEQUATE CROSS SECTIONS, AND HEAVY BRUSH. MITIGATE FLOODING ISSUES CAUSED BY HEAVY BRUSH AND LARGE TREES WITHIN CREEK. NORTHERN PORTIONS HAVE SEVERAL CULVERTS WHICH ARE EITHER INEFFECTIVE OR DAMAGED WHICH WILL NEED TO BE REPLACED. BOTTOM OF CREEK WILL BE RECHANNELIZED. CREEK WILL BE CLEARED OF BRUSH AND RESTABILIZED. CONSTRUCTION TO BEGIN IN MARCH, 2018 AND END IN JULY, 2018.

IN ADDITION, CENTRAL ST. BRIDGE WILL BE REPLACED WITH A 70 FT.LONG x 19 FT. WIDE RAILROAD FLATCAR BRIDGE. EXISTING BRIDGE HAS BEEN CLOSED BY DOTD.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

A PORTION OF THE CREEK AT MARTIN LUTHER ST., MAKES TWO 90 DEGREE TURNS IN ABOUT 200 FT. IN ORDER TO GO THROUGH CULVERTS UNDER A ROAD. THERE ARE EROSION PROBLEMS CAUSING A DRIVEWAY WITH CULVERTS TO BE SLOWLY CAVING IN AND THE WATER OVERTOPS THE ROAD AT THIS LOCATION FREQUENTLY. THE DESIGN WILL PLACE THIS PORTION OF THE CREEK IN AN UNDERGROUND STORM DRAIN SYSTEM, WHICH WILL REQUIRE SOME FILL. RENO MATTRESSES WILL BE INSTALLED AT ANOTHER LOCATION WHERE THE CREEK IS ERODING SEVERELY INTO THE LOCAL MEDICAL CENTER HELECOPTER PAD. CLEAR DEBRIS AND SEDIMENT DEPOSITS OUT OF CHANNEL. RECHANNELIZE CREEK AND PROVIDE STABILIZED SLOPE TO REDUCE EROSION. ANY REMAINING MATERIAL WILL NOT BE DISCHARGED IN WETLAND AREA, AND DISPOSED OFF-SITE.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
2,000 C.Y. FILL, 38,550 C.Y. CUT	120 C.Y. CONCRETE, 575 C.Y. RIP RAP	2,500 S.Y. RENO MATTRESS

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

or

Linear Feet SEE "BLOCK 22"

23. Description of Avoidance, Minimization, and Compensation (see instructions)

DREDGED MATERIAL TO BE REMOVED AND DISPOSED FROM SITE. STORMWATER POLLUTION PREVENTION MEASURES WILL BE USED TO KEEP EROSION AND SEDIMENT DEPOSITS FROM ENTERING DOWNSTREAM AREAS.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- SEE ATTACHED LIST

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
FEMA	CONSTRUCTION		05-06-14		
DEQ	STRM WTR.		PRIOR TO CONST.		

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Ben Clark — SIGNATURE OF APPLICANT — 10-25-17 — DATE

Ken McManus, PE — SIGNATURE OF AGENT — 10.24.17 — DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

BLOCK 18

Project is to clear and rechannelize 17,755 l.f. of Hurricane Creek. The creek floods adjacent areas during relatively small storm events due to inadequate culverts, ineffective culverts, heavy brush and large trees, and inadequate cross sections. Project will include replacing several existing culverts in Bank Springs which are either misaligned with creek, broken, or undersized. Portion of creek near Martin Luther Street will be rerouted into storm drain system due to extreme meandering of creek at road crossing. Limited area for construction will require installation of underground storm drains to eliminate erosion and flooding issues in the area.

Creek will be rechannelized to bottom widths which vary from 6 feet at the northern most limits to 16 feet at the southern extents. Height of the channel varies depending on adjacent land areas. Total top width of the creek will be approximately 40 feet wide. Side slopes will be constructed at 2 to 1 due to the proximity of adjacent structures.

The bottom of the creek will be leveled to improve the hydraulic capacity of the creek. Areas near culverts appear to have washed out and will require fill. An estimated 2,000 c.y. of clean fill will be required to level portions of the creek and fill in damaged areas at crossings. A majority of the work will require dredging of the channel to create a more stabilized slope. Currently the channel side slopes are steep which are causing erosion issues in several areas. A less steep slope will also assist in the stabilization of the banks after construction. An estimated 575 c.y. of rip rap and 2,500 s.y. of reno mattress will be placed to stabilize areas from erosion and to create dissipaters to reduce the velocity of the creek. 120 c.y. of concrete will be required to replace an existing small drive way to replace existing culverts with larger storm drains at Martin Luther St.

Replacement of the culverts will require removal, replacement of bedding and fill to be placed back over the culverts. In addition, a portion of the creek will be filled at Martin Luther Street to place the creek in an underground storm drain system, as discussed above.

Erosion control blankets, rip rap check dams, and seeding will be installed to stabilize areas disturbed by construction.

In addition, a 70 foot long by 19 foot wide railroad flatcar bridge will be constructed at Central St. The bridge will reuse the existing timber headwalls. The current existing bridge has been closed by DOTD, and immediate replacement is needed.

There were wetlands found South of Martin Luther St., on the West side of the creek. The access road and improvements will stay clear of this area. Wetlands were also found on parts of Alternate No. 1 – a tributary that crosses Hanchey Rd. The improvements on Alternate No. 1 will now be limited to 100' of clearing to the West of the first crossing, near the beginning of the tributary.

BLOCK 22

Up to 38,550 c.y. of sediment will be removed from the channel. The upstream portions of the slough will require minimal cut, but the sediment removal amounts increase towards the downstream portions of the project. The existing creek at the downstream portion of the project is filled in with sediment over the years and is actually smaller in depth and width than the upstream portions of the project, causing issues in the Bank Springs and around the High School.

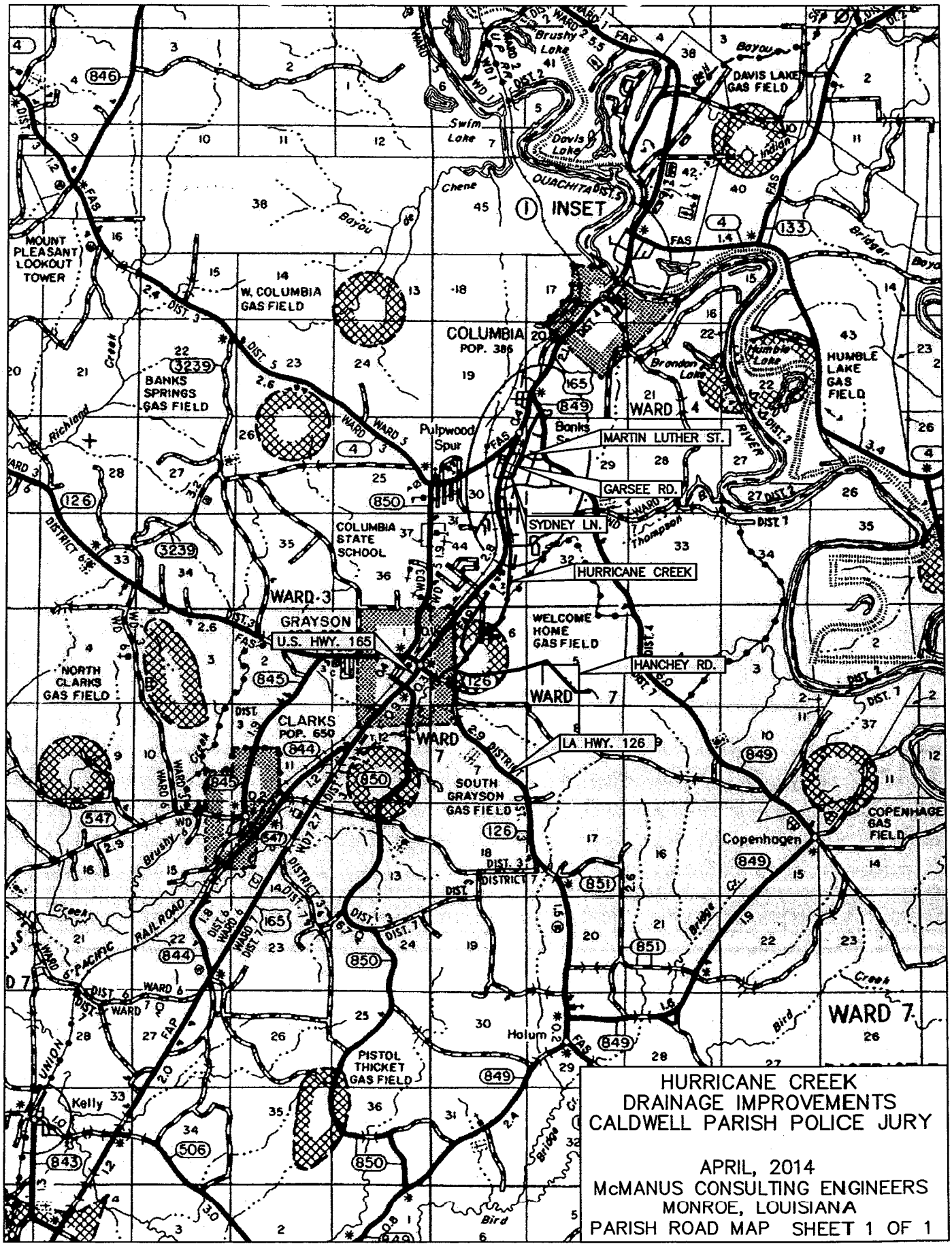
A portion of the creek which meanders at the crossing with Martin Luther St. will be filled in and a storm drain system will be installed (2,000 c.y. of fill). The creek is currently flowing parallel with Martin Luther St., and is forced into a 90 degree turn into a culvert. The storm drain system will start North of Martin Luther St., and end South of Martin Luther St. The pipes will follow a similar path as the existing stream with junction boxes at turns.

The creek makes a 90 degree turn near the Caldwell Parish medical center and is causing erosion along the bank. The medical center has a helipad that is becoming in jeopardy due to the erosion. The project will install a reno mattress system at this location to mitigate this erosion.

Sediment will be removed with a trackhoe from one side of the slough or from within the slough. The slough will only be cleared and graded on one side, to reduce disturbance to the existing environment.

Removed material will not be placed in wetlands areas and will be preferably exported to an off-site permitted facility. Berms, coffer dams, and turbidity barriers, which will detain construction storm water, and erosion control blankets with seeding will be installed along the side banks of the creek to stabilize the side slopes.

There were wetlands found South of Martin Luther St., on the West side of the creek. The access road and improvements will stay clear of this area. Wetlands were also found on parts of Alternate No. 1 – a tributary that crosses Hanchey Rd. The improvements on Alternate No. 1 will now be limited to 100' of clearing to the West of the first crossing, near the beginning of the tributary.



HURRICANE CREEK DRAINAGE IMPROVEMENTS CALDWELL PARISH POLICE JURY

APRIL, 2014

McMANUS CONSULTING ENGINEERS
MONROE, LOUISIANA

PARISH ROAD MAP SHEET 1 OF 1

Alternatives Analysis

MVK-2011-1213
Caldwell Parish – Hurricane Creek Drainage Improvements

Project Development

Project is to remove impediments and improvement drainage conditions in 17,755 L.F. of Hurricane Creek. The creek floods adjacent areas during relatively small storm events due to heavy brush and large trees, and sediment deposits which have reduced the channel's capacity.

The bottom channel widths will vary and the height of the channel varies depending on the elevation of adjacent land areas. Total top width of the creek varies from 30 feet wide to 45 feet wide. Side slopes will be constructed at 2 to 1 due to the proximity of adjacent structures.

Location and Design Criteria

- Location of drainage channel and areas affected
- Percentage of Low to Moderate Income Families (required for State Funding)
- Drainage Design – Improve flow through the channel and existing culverts

Alternative Site Analysis

For this area that floods, this is the only drainage channel that conveys storm water away from the area. The only Alternatives that could be assessed were those which do not improve flooding in this area but improve flooding in the Parish, which were not feasible. The area still floods frequently due to the damage to the channel from the flooding from the initial storm event.

Avoidance and Minimization

Within the project area there are two areas of wetlands. The project originally was to clear and remove impediments out of the channel from LA 849 to LA 126, and from two tributaries. Wetlands were found in a small section South of Martin Luther St. This area will be avoided. Wetlands were also found in the tributary which starts at Hanchey Rd. and ends just North of LA 126. The majority of this creek will be avoided, with only a small amount cleared at the first crossing at Hanchey Rd., outside of the wetlands. Access roads will be located on only one side of the channel. Access roads will be kept to 20 feet maximum, and will meander around trees to keep as many trees as possible. Any tree removed will be cut off down to the stump. The sediment will be hauled off and disposed at an off-site permitted facility to keep landowners and the contractor from depositing soils in wetlands. A Limits of Disturbance line is noted on the plans to keep the contractor from placing debris or equipment in areas outside of the project area.

A Storm Water Pollution Prevention Plan will be in place during construction to keep sediment from washing down stream. Best Management Practices will be used to filter sediment from storm water discharges and for erosion control purposes. Erosion control blankets and seeding will be used to stabilize side banks.

WETLANDS DELINEATION

HURRICANE CREEK DRAINAGE

McManus
Consulting
Engineers, Inc.

P.O. BOX 4318
MONROE, LA. 71211
(318) 343-5600
mcmanusengineers@yahoo.com

Caldwell Parish Police Jury
MVK-2011-1213
Project No. 11-11-584E

WETLANDS DELINEATION REPORT
CALDWELL PARISH POLICE JURY
HURRICANE CREEK DRAINAGE IMPROVEMENTS
PROJECT NO. 11-11-584E

TABLE OF CONTENTS

APPENDIX

Introduction

The purpose of this report is to ensure that the construction of this project complies with federal water quality regulations in the Clean Water Act (CWA) of 1972. McManus Consulting Engineers, Inc.has been contracted by the Caldwell Parish Police Jury to provide awetlands delineation and determination information for theHurricane Creek Drainage Improvements. The project scope includes clearing and rechanneling portions of Hurricane Creek, near Columbia, LA.

In reviewing the National Wetland Inventory Maps for the adjacent area it appears that there are currently no mapped wetlands within the project area, other than the riverine type wetlands within the channel. In order to verify the wetlands status in the project vicinity,observation points have been performed around the project.

Regulatory Requirements

Section 404 of the CWA regulates all discharges of dredged or fill material into "waters of the United States". The U.S. Army Corps of Engineers (USACE) has the authority to determine which bodies of water are considered a "waters of the United States" based on the CWA, and the authority to review and permit any activity which proposes these types of discharges in wetlands or other waters of the U.S. Other federal and state agencies, such as the Louisiana Department of Environmental Quality (DEQ) may also review these activities. Additional permits, such as Section 401 for water quality permits, may be required by these agencies.

All procedures used in this report are based on the *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1*(1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* (2010).

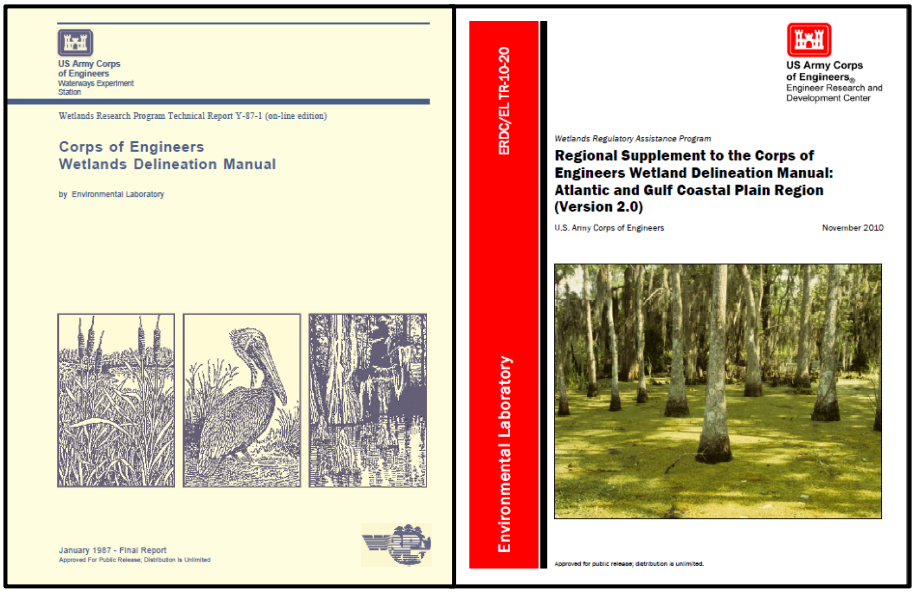


Figure 1: U.S. Corps of Engineers Wetlands Delineation Manual and Regional Supplement

Project Area

The project is located just South of Columbia, inCaldwell Parish. More specifically, the project starts South of Columbia, at LA 849 and ends in Grayson, at LA 126. This project will clear, regrade and remove impediments from the creek in order to mitigate flooding and erosion issues. The creek floods in relatively small rain events due to the fact that the sediment and debris have built up in the lower reaches of the creek. In addition, several culverts will be replaced with the project.

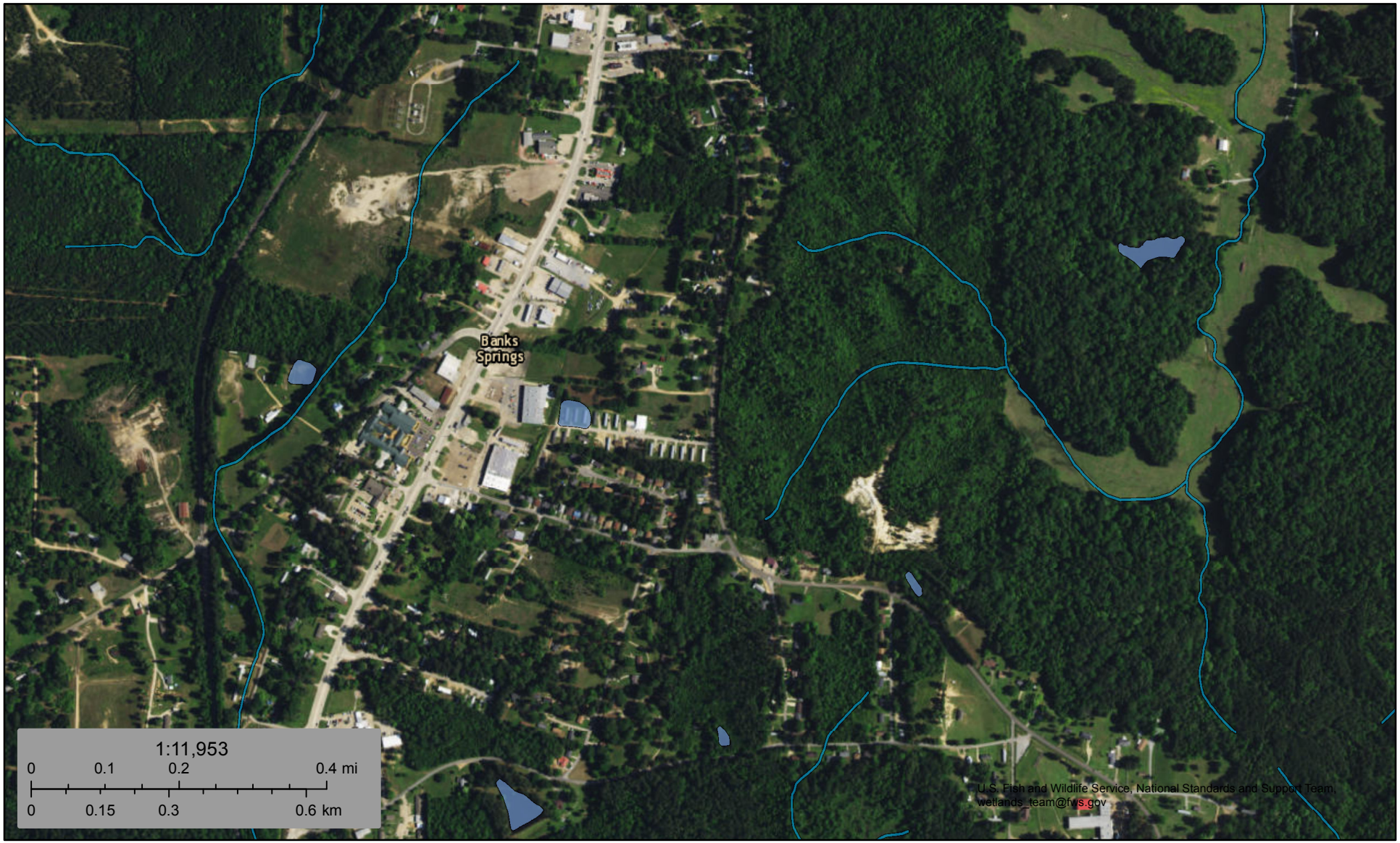
The scope of the report is to determine if there are any wetlands within the project area, other than the riverine type wetlands within the channel. If any wetlands are found, the project will be revised to exclude those portions from the project. The project legal coordinates are N 32.0872°, W92.0869°at the beginning of the project and N 32.0479°, W92.1058°at the end of the project. The National Wetlands Inventory maps indicate there are only riverine type wetlands within the channel(Figure 3). In addition, the project will include two tributaries as alternate portions of the bid. The first of these tributaries starts in front of the high school at N 32.0599°, W92.0976° and ends just North of Central St. at N 32.0544°, W92.0977°. The other tributary starts at Hanchey Rd., N 32.0473°, W92.0903°, runs North and then West along the Southern portion of the sewer plant and ends at N 32.0490°, W92.1031°.

Hurricane Creek is bounded by residential and commercial areas in the Northern Section, and mainly forested area with some agricultural areas along the Southern portion. The bayou is characterized by a single channelized creek. There are portions of the creek which have narrow strips of adjacent hardwood forests and portions with much wider forested areas.

Figure 2: Sampling Locations From Martin Luther St. to South of Sidney Ln.

U.S. Fish and Wildlife Service
National Wetlands Inventory

North - Hurricane Creek



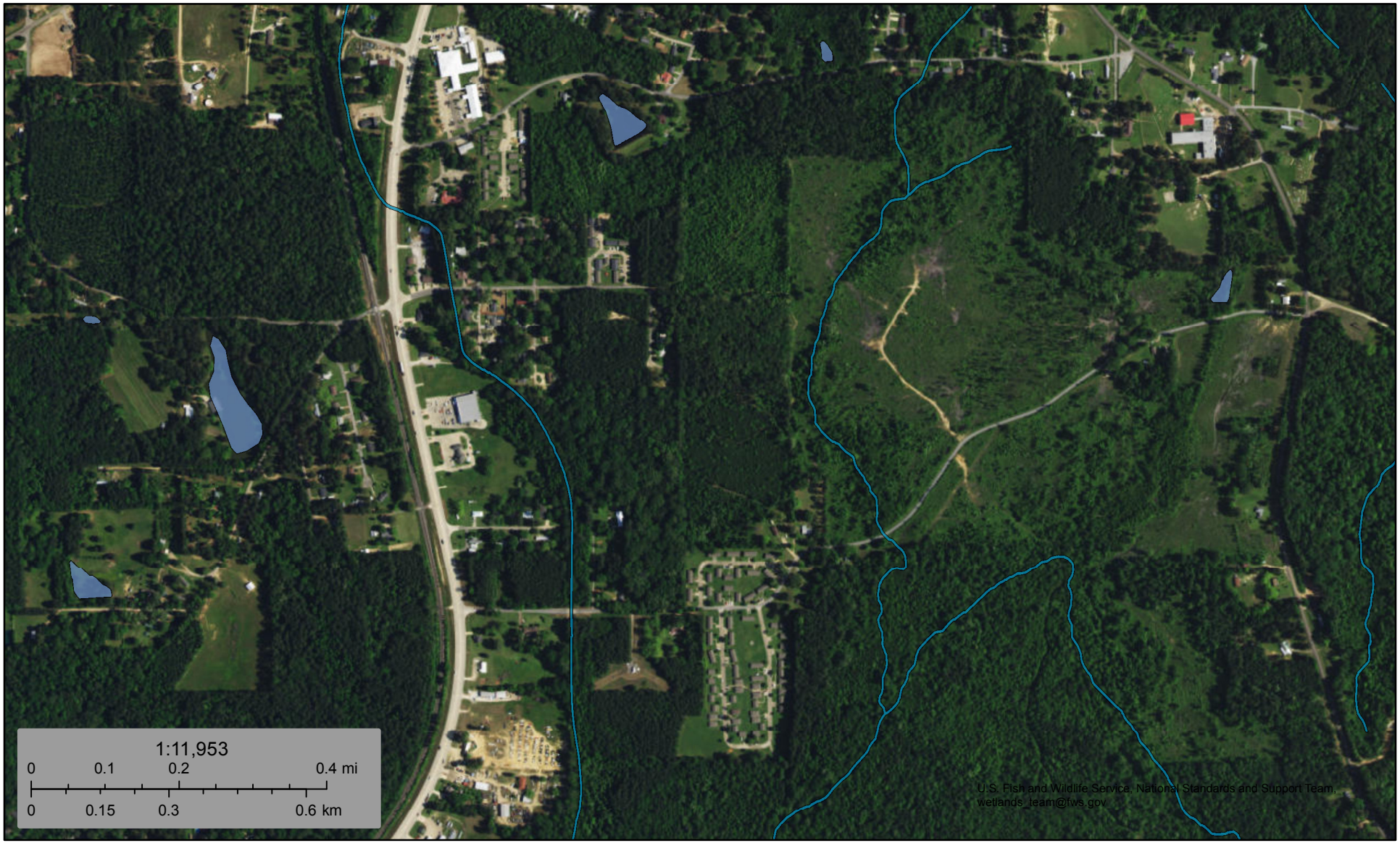
October 17, 2017

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

Middle - Hurricane Creek



October 17, 2017

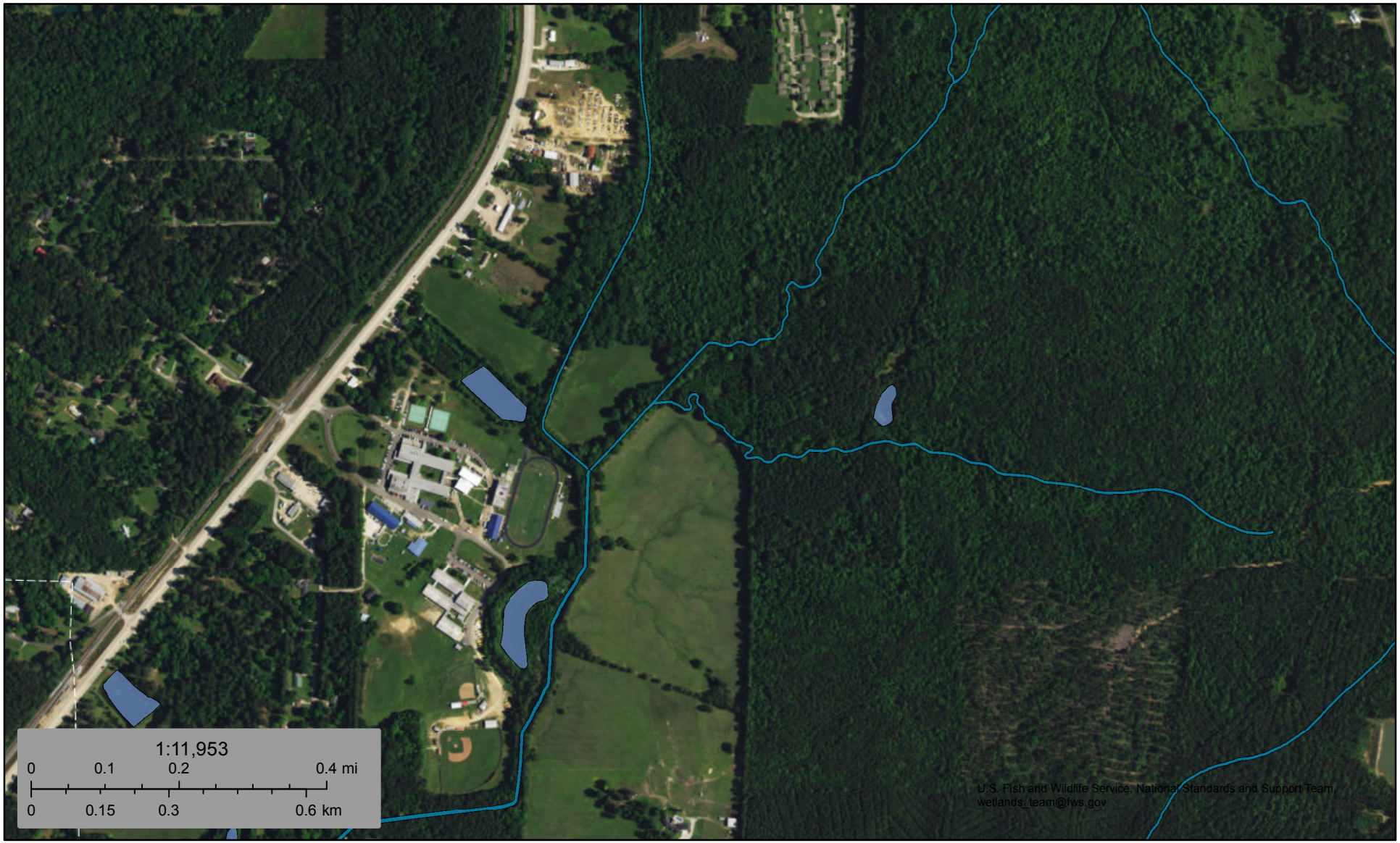
Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

U.S. Fish and Wildlife Service
National Wetlands Inventory

Middle - Hurricane Creek



October 17, 2017

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

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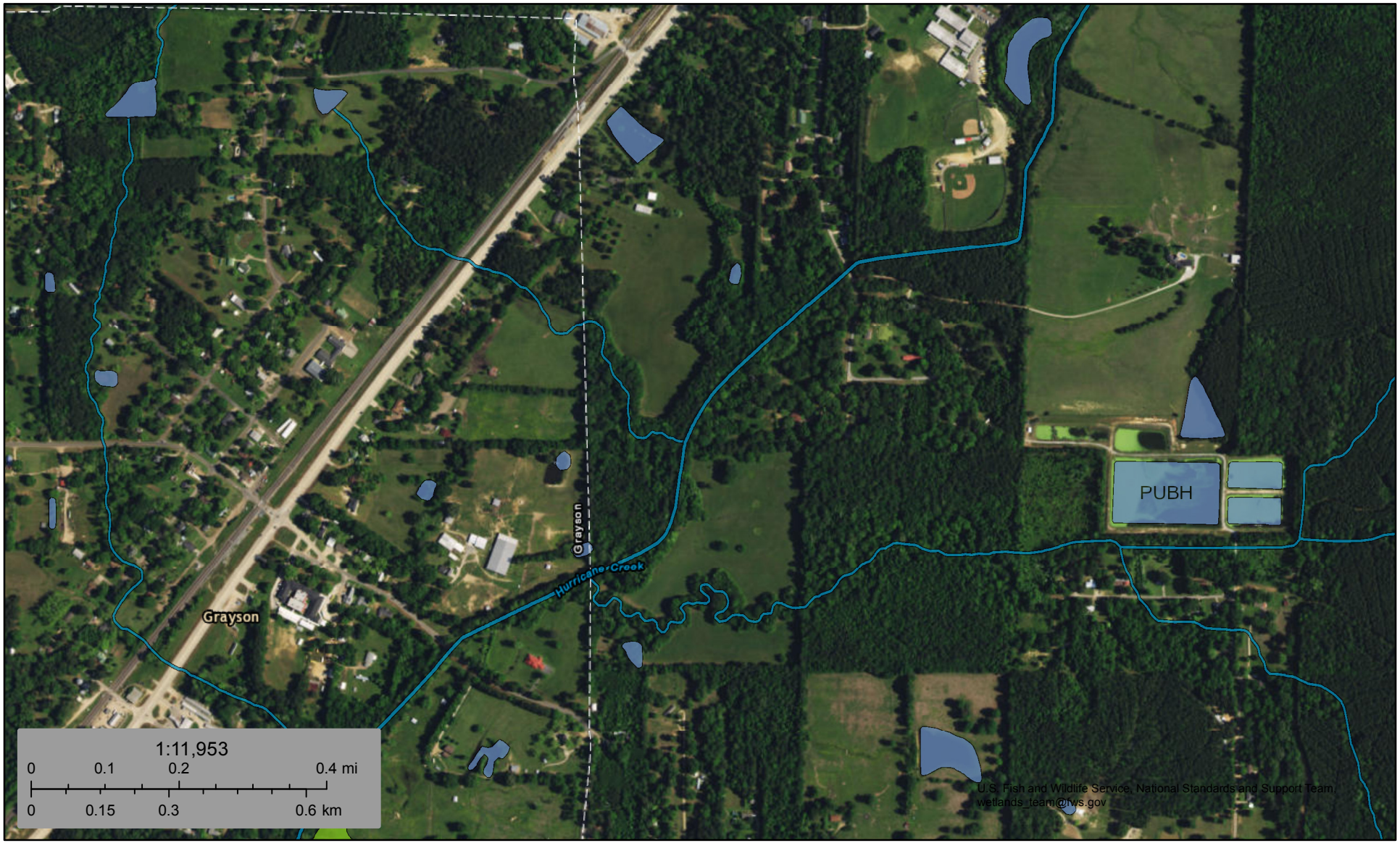
U.S. Fish and Wildlife Service

National Wetlands Inventory

South - Hurricane Creek



October 17, 2017

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
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National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Project Location - USACE Regional Information

According to the *Regional Supplement*, the project is located in an area known as the Mississippi Alluvial Valley (LRR O). Over a period of time the Mississippi River and its tributaries have deposited alluvial soils. Other deposited soils such as clay are found in flats and swamps. A majority of the native bottomland hardwood forests have been cleared over the years for agricultural and silviculture. Native types of plants are dictated by moisture conditions, which can vary from seasonal flooding to permanent inundation. Flooded areas can contain species such as *Taxodiumdistichum*(Bald Cypress) and *Nyssa aquatic* (Water Tupelo). Swamps and areas that are poorly drained usually contain common species such as *Quercusnigra*(Water Oak), *Ulmusamericana*(American Elm), *Liquidambar styraciflua* (Sweet Gum), and *Sabal minor* (Dwarf Palmetto). Areas which drain well may contain other species of oak such as *Quercus pagoda* (Cherrybark Oak) and *Quercusmichauxii* (Swamp Chestnut Oak).

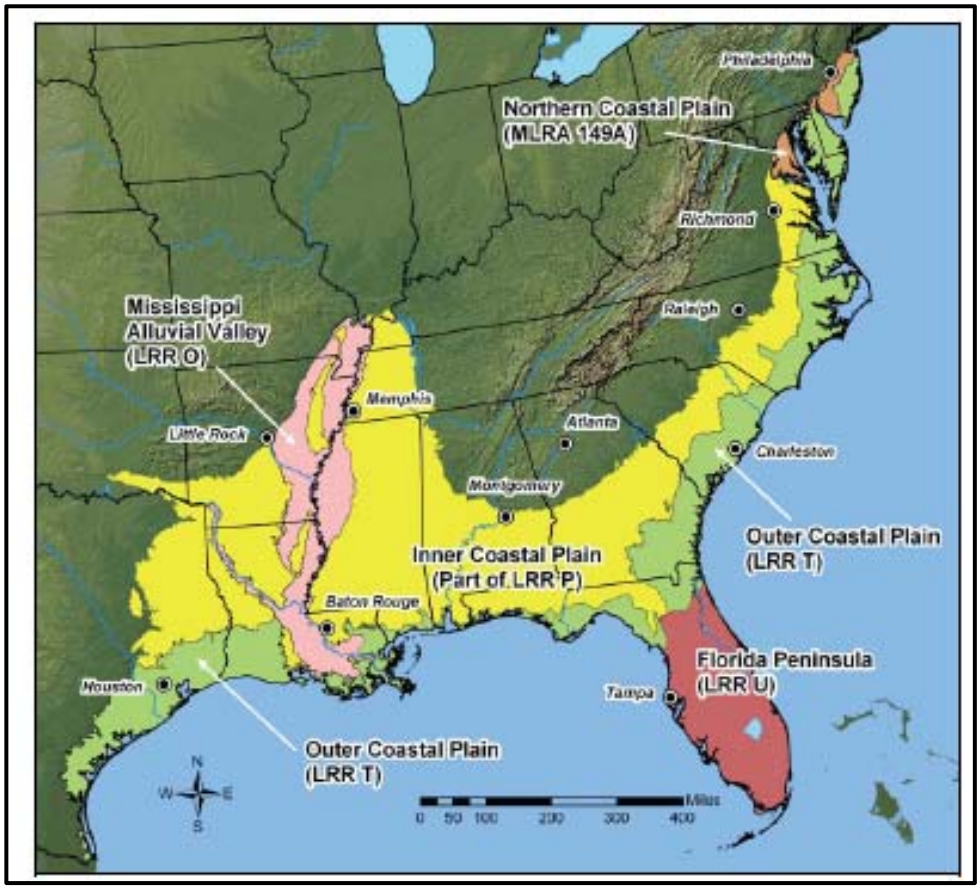

Figure 4: Subregions of the Atlantic and Gulf Coastal Plain Region (USACE, 2010)

Project Design

The creek floods in relatively small rain events due to the fact that the sediment and debris have built up in portions of the channel. In order to mitigate flooding and erosion issues, the proposed project will clear, regrade and remove impediments from the creek.

This report will encompass the entire channel from LA 849 to U.S. 165, and then from U.S. 165 to LA 126. There is a portion of the creek along U.S. 165 that is conveyed through an underground storm system, which will not be included in this report or within the proposed improvements.

From LA 849, South to Martin Luther St., the improvements will be performed on the West side of the creek. At Martin Luther St., the channel makes two 90 degree turns shortly before crossing under the road causing flooding and erosion. At this location, the creek will be placed in an underground storm drain system in order to reduce these issues. After Martin Luther St., the improvements will still be performed on the West side of the creek, South to Sidney Ln. Culverts at Garsee Rd. and Sidney Ln. will be replaced. After Sidney Ln., the East side of the creek will be cleared for approximately 75 feet, before a transition into clearing both sides of the creek. At this location, the creek takes a 90 degree turn prior to entering the storm drain system under U.S. 165. There have been erosion issues along the outer banks, which are now encroaching on the helicopter pad for the Caldwell Parish Medical Clinic, and proposed reno mattresses will be used to help protect the banks from further erosion.

Figure 5: Existing Creek Entering U.S. 165 Storm Drains

From U.S. 165 to LA Hwy. 126, the West side of the creek will be cleared. Improvements will also include two tributaries. The tributary North of Central St., in front of the High School, will be cleared in the channel from Spartan Drive to the intersection with Hurricane Creek. The tributary that intersects the creek North of LA 126, will be regraded from Hanchey Rd, West to Hurricane Creek.Access roads will be placed along top banks, with staging areas located near major road intersections North of Garsee Rd., South of Rushing St., South of Anding Heights Rd., and North and South of Central St. Trees along the top proposed bank will have the stumps preserved to help preserve the bank slope stability.

Wetlands Determinations

The *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1* issued by the USACE in 1987 defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

The Manual states that there are three characteristics, hydrology, hydrophytic vegetation, and hydric soils, which are used for determining wetlands. All three characteristics must have one primary indicator or two secondary indicators present in order for the area to be classified as a wetlands.

On-Site Observation Procedure

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FZ	Fritzell-Guyton-Providence association, 0 to 2 percent slopes	12	76.8	44.6%
GY	Guyton and Ouachita silt loams, frequently flooded	87	88.4	51.3%
SH	Stough-sacul association, gently sloping	25	6.9	4.0%
Totals for Area of Interest			172.2	100.0%

Figure 6: Hydric Soils Map (NRCS – Web Soil Survey)

Prior to visiting the site, information is collected for the project area. Site aerials, proposed improvement plans, soils information from the NRCS Web Soil Survey, wetlands maps from the National Wetland Inventory, and quadrangle maps are reviewed to determine local site conditions. The aerials can be used to conclude if the site is inundated and if there are different plant communities in theproject area. The information collected from the Web Soil Survey can be used to determine if hydric soils may be present (Figure 6). The National Wetland Inventory maps give general locations of wetlands in the areas (Figure 3). Using these maps and the proposed project plan, baselines are laid out on the proposed project plan. The baselinesare placed parallel to the creek, and depending on the length of the baseline a baseline segment length is calculated. At the end of each segment, is a transect line which runs from the baseline to the stream (Figure 8).

Figure 7: Wetlands Map (National Wetlands Inventory)

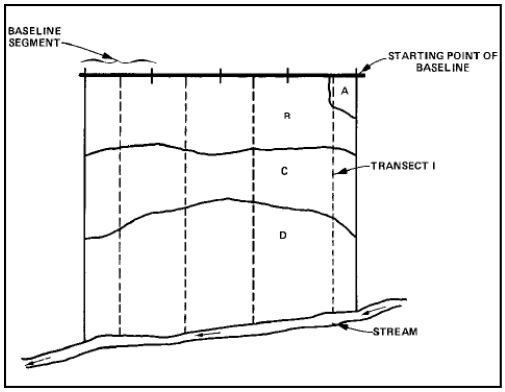

Figure 8: Baseline and Transect Layout Procedure (USACE 2010)

The sampling points along the transect line are determined based on plant community types and soil types. If there are several plant community types, a minimum of one sample shall be taken in each plant community, and a sample shall be taken in each soil type. In addition, the manual recommends a minimum number of sampling points for each transect, depending on its length. At each sampling point, hydrology conditions, plant types, and soil samples are evaluated and recorded on the Data Form. If at the baseline a point is determined to be a wetland, and at the stream the point is determined to be a wetland, then it is a reasonable assumption that the area between the baseline and the stream is a wetland along thattransect. If a point is taken at the baseline and it isdetermined to be a non-wetland, and a point is taken near the stream and determined to be a wetland, then additional points will be required along the transect to find the location of the transition between the wetland and non-wetland areas.

Hydrologic Indicators

Wetland hydrology occurs in areas which are either permanently or periodically inundated with water at less than or equal to 6.6 feet, or have completely saturated soils at some time during the dominant vegetation's growingseason. At each samplingpoint, the area is evaluated to determine if there is any observation of surface or groundwater (Group A), any evidence of flooding such as water marks (Group B), other evidence of saturated soil such as a sulfur smell (Group C), or other contemporary type features such geomorphic positioning which indicate wet conditions (Group D). Refer to Figure 10 for the types of hydrology indicators. Note that there are two main types of indicators under each group, primary and secondary. One primary indicator or two secondary indicators are requiredin order for an area to be classified as havingwetlandstype hydrology.

Figure 9: Water Marks on Trees (Turkey Creek, 2013)

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		___ Surface Soil Cracks (B6)
___ Surface Water (A1)	___ Aquatic Fauna (B13)	___ Sparsely Vegetated Concave Surface (B8)
___ High Water Table (A2)	___ Marl Deposits (B15) **(LRR U)**	___ Drainage Patterns (B10)
___ Saturation (A3)	___ Hydrogen Sulfide Odor (C1)	___ Moss Trim Lines (B16)
___ Water Marks (B1)	___ Oxidized Rhizospheres along Living Roots (C3)	___ Dry-Season Water Table (C2)
___ Sediment Deposits (B2)	___ Presence of Reduced Iron (C4)	___ Crayfish Burrows (C8)
___ Drift Deposits (B3)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Saturation Visible on Aerial Imagery (C9)
___ Algal Mat or Crust (B4)	___ Thin Muck Surface (C7)	___ Geomorphic Position (D2)
___ Iron Deposits (B5)	___ Other (Explain in Remarks)	___ Shallow Aquitard (D3)
___ Inundation Visible on Aerial Imagery (B7)		___ FAC-Neutral Test (D5)
___ Water-Stained Leaves (B9)		___ Sphagnum moss (D8) **(LRR T, U)**

Figure 10: Hydrology Indicators on Data Form

Hydrophytic Vegetation

Wetlands plants, called hydrophytes,must be able to survive in low oxygen environments and tolerate saturated conditions. These plants are usually poorly adapted and cannot compete with uplands type plants. Hydrophytes adapt to the environment morphologically (buttressed trunks – Cypress Trees), physiologically, or reproductively. There are three different type of plant indicators: obligate, facultative, and upland. Facultative indicators can be facultative wetland, facultative, or facultative upland. Hydrophytes are obligate, facultative wetland or facultative plants.

The USDA NRCS Wetlands Indicator Plant list shall be used to determine a plant's wetland indicator status, which is specific for each region. Upland plants in one region can be considered facultative plants in another region. Using the *Regional Supplement's*Dominance Method (50/20) rule, the plants are divided into trees, saplings/shrubs, herbs, and woody vine stratum. At each sampling point, each plant and its associated percent cover is recorded on the Data Form (Figure 12). For trees and shrubs, canopy cover is used. The dominant species exceeds 50% of the total stratum plus any species comprising of 20% or more of the stratum. If there aren't any species that cover 50% of the stratum, then add the most abundant species until 50% of the stratum is achieved. For example, if the two most abundant species in the sampling area are *Acer rubrum* (Red Maple) at 45% of the stratum, *Taxodiumdistichum* (Bald Cypress) at 30% of thestratum, and *Quercusvirginiana* (Live Oak) at

Figure 11:*TaxodiumDistichum*20%of the stratum, themaple and cypress add (Turkey Creek, 2014)up to75% of the stratum and are considered dominant species for the sampling point. In addition,since thelive oak exceeds 20% of the stratum it is considereddominant also. Each stratum shall be evaluated accordingly,and the total number of obligate, facultative wetland, and facultative dominant species shall be added across the all of the stratum. If the majority of the dominant species are hydrophytes (OBL, FACW, FAC), then the sampling point contains hydrophytic plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____

Figure 12: Vegetation Dominance Method on Data Form

Hydric Soil Indicators

Soils which are present in wetlands are generally saturated which causes them to develop reducing conditions. There are two types of hydric soils, drained and undrained. Drained soil conditions may or may not support hydrophytic vegetation; therefore, they may or may not be indicative of a wetlands.

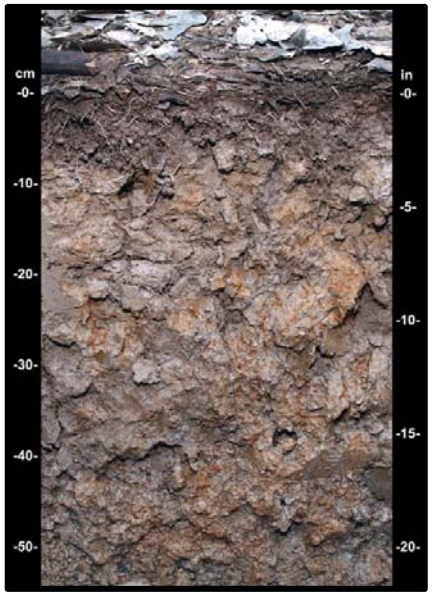

Figure 13: Example of a Hydric Soil with a Depleted Matrix (USACE, 2010)

There are many different indicators for hydric soils. Hydric soils indicators are usually formed in anerobic environment. In an area which has been saturated over a longer period of time, microorganisms consume the oxygen in the soils. The soils become anaerobic, and the oxygen (O^2), when consumed, releases its electrons. These free electrons react with minerals such as iron where ferric (Fe^{3+}) forms ferrous (Fe^{2+}) and manganese where manganic (Mn^{4+}) forms managanous (Mn^{2+}). An example of a common condition where iron has been reducedin a soil is called a depleted matrix. Areas in the soil where ironhas become reducedare grey in color. These grey areas are called redox depletions. Other areas where iron (ferric) concentrationsstill exist are still redor rust colored, and are called redox concentrations. Other indicators are formed by organic matter accumulation ora reduction of sulfur (SO_4^{2-} to H_2S) which produces a rotten egg odor.

Soils which have organic matter contain carbon compounds which are utilized by micro-organisms. In saturated conditions, organic carbon is consumed at a lower rate. The organic soils can beclassified as muck, mucky peat, or peat. When rubbed between thefingers, if the soil is greasy it is either muck or organic soil. Muck contains more broken down organic material, than peat which contains more organic material. Mucky peat is a condition between muck and peat.

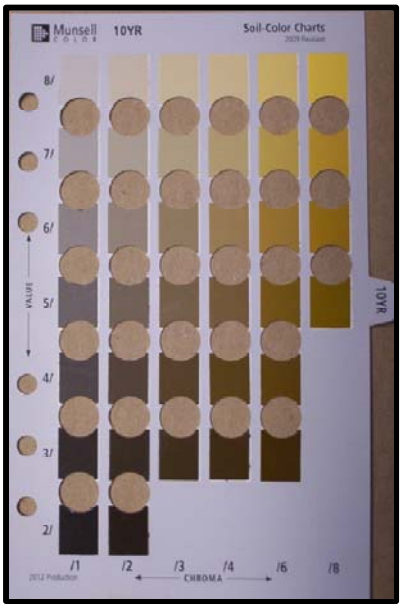

Figure 14: Munsell Soil Chart, 10YR (Munsell, 2009)

A soil sample shall be evaluated at each sampling point. The soils are evaluated in regards to texture and color at different depths. Some soils have a different top layer of soil than soil which is deeper in the hole. On the data form, the textures andcolors are recorded along with the associated depth. Colors of the soil are based on the *Munsell Soil Color Charts* (Munsell 2009). Each soil color has a hue, value and chroma. For example, in Figure 13, the soil has a depleted matrix with a thin dark top soil. The top layer will be recorded with a color and texture for the first 0" to 4", the next layer contains a greyish redox depletion with a high value and low chroma. The hue, value and chroma is recorded for the reduced layer along with

a percentage of the matrixwhich is reduced, texture, and type (in this case reduced matrix). The redox concentrations, which are rust or reddish brown areas with high chroma, are recorded with percentage of the matrix, texture, and type (in this case concentrations).

Based on the texture, depth of different layers, colors, and amount of organic compounds in the soil, the sample can be evaluated in comparison to the Hydric Soil indicators listed in Figure 15. The *Regional Supplement* describes each indicator in detail to assist in a determination. For example, the soil shown in Figure 13 is a Depleted Matrix Below a Dark Surface. For a clay, the sample should have a dark top layer of soil that shall have a value of 3 and a chroma of 2 or less (referring to the Munsell Soil Charts). The depleted/gleyed matrix (redox depletion) shall be 60% or more of the layer with a chroma of 2 or less starting within the top 12 in. of the soil and have a thickness of 6" or 2" if the soil contains fragmented material. More than 2 percent of the redox concentrations, including iron/manganese masses, pore linings or both are required in soils that have matrix values/chromas of 4/1, 4/2, and 5/2. Redox concentrations are not required for soils with matrix values of 5 or more and chroma of 1 or values of 6 or more and chromas of 2 or 1. The sample of soil could be recorded as follows:

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0"-3"	10YR 3/2							
3"-16"+	10 YR 5/2	60%					Clay	
			10YR 5/6	40%	C	M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Figure 15: Hydric Soil Indicators on Data Form

Prior Converted Areas

Some areas are more difficult to determine wetlands than others if the indicators for the characteristics are not easily discernible. Modifications to land, such as recent clearing or farm fields, or modifications to the hydrology of the drainage system can cause situations where indicators for wetlands characteristics cannot be found which is known as an “atypical situation”. In addition, variation in the normal growing season or conditions such as low rainfall can cause situations where indicators for wetlands characteristics cannotbe found. In these instances, additional information may be needed to determine wetlands.

The most common problematic condition occurs where wetlands are used for agriculture or silviculture. Plant species, soil conditions, and hydrology can potentially be manipulated in these conditions.

Vegetation

When a wetland has been cleared for agriculture or silviculture, a majority of the existing plants have been removed. Depending on the length of time that the site has been converted, some existing vegetation may still exist and emerge after a crop is harvested. An undisturbed area close to the site can be examined for reference.

Figure 16: Rice Fields (Tensas River Plantation, 2010)

If a site’s hydrology has not been altered survey and wetlands maps can be reviewed. The NRCS Web Soil Survey contains information on particular soil map units on the capability of specific types of trees to survive in the site’s soils. Reviewing the types of trees which can grow can help decide if a site could have hydrophytic vegetation, if it were not modified. Wetlands maps can indicate if the site was considered at some point in time a wetlands.

Soil

Tilling or grading of the soils over a long period of time may disturb and compact existing native soils. In most cases, a hydric soil may still be present on-site and can be determined using the standard examination and soil indicators.

Prior to visiting the site the NRCS Web Soil Survey can be used to determine if the site contains known hydric soils. An undisturbed area close to the site can be examined for reference.

Hydrology

Tilling or grading of the site can change the natural drainage. In order to verify that the hydrology has not been modified, examine the site to determine if there are any hydrology indicators.

In agricultural fields, a majority of the indicators which could be present either are either the primary indicators which deal with soils or secondary indicators. In crop fields, geomorphic position can be an indicator that is present. Low spots and drainage patterns can be seen in fields. Another indicator which can be present is a sparsely vegetated concave surface. Crops, such as soy beans, do not grow well in areas that are inundated with water. Lack of growth in crops in certain areas can indicate a concave surface is present.

Field Investigation

Site observations were made by McManus Consulting Engineers, Inc. the week of July 6, 2016. Wetlands identification procedures from the *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1* (USACE, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* (USACE, 2010) were used. A minimum of eight (8) transects in 17,755l.f. were planned.

Wetlands hydrology indicators include debris, sediment deposits on the trunks or exposed roots, water marks, or saturated soil pits dug for the hydric soil indicator. If the observation point contained indicators for all three wetlands characteristics, the point was identified as being located in awetlands and the information was recorded on the Data Form.

At each observation point, an assessment of the USACE wetland indicators for plants, soils, and hydrology was made. The indicator status of the plants identified was determined using the USDA NRCS Wetlands Indicator Plant list for the Region Atlantic and Gulf Coastal Plain Region. At each observation point a 30 ft. radius plot or a 20 ft. x 20 ft. plot was used, and the most abundant species of plants were recorded on a Data Form for all strata, tree, saplings/shrubs, herbs, and woody vines. Woody plants, excluding vines, which were 20 feet in height or had a 3" caliper or larger were considered in the tree stratum; those which were more than 20 feet in height but less than a 3" caliper were considered saplings; and those which were between 3 feet and 20 feet in height were considered shrubs. Non-woody plans which were less than 3 feet in height were considered herbs. The dominance test using the 50/20 rule described in the Regional Supplement was used to determine if the area contained hydrophytic plants. If more than 50% of the plants across all strata have an wetlands indicator of obligate (OBL), facultative wetland (FACW), or facultative (FAC), than the area sampled is considered to have wetlands vegetation. Definitions of these indicators can be found in Appendix A. Any morphological or physical adaptations such as buttressed trunks observed were recorded on the Data Form.

Soil samples were observed by digging a 1 ft. diameter hole at a minimum of 16 inches deep. Some holes were deeper in order to get beyond top horizons of the soil. Soil color, texture and soil features were than evaluated, recorded on the Data Form, and compared with the hydric soil indicators, as described in the Regional Supplement and *Field Indicators of Hydric Soils in the United States* (USDA, 2010). Soil colors were recorded on the Data Form based on the hue, chroma, and valuesfrom the Munsell Soil Charts (Figure 14).

Figure 17: Soil Sampling (Hurricane Creek, 2017)

Findings

According to the *Wetlands Delineation Manual*, a minimum of 8 transects are required for a project that is over 3.5 miles long. There were a total of13observation points in the main channel and 4 observation points along tributaries,that were sampled based on the proposed access road location for the improvements. Data Forms for each location can be found in Appendix C. Due to the length of the project (3.5 ± miles) and location of the access road, the baseline was placed 40 ft. off of the top bank, and transect segments were spaced approximately 2,000 ft. to 2,700 ft. apart, to have the minimum of 8 transects. The actual determination of transect numbers and spacing of observation points were based on site accessibility. Due to inaccessibility, there was one point that could not be sampled, as according to plan.Observation points were not taken within the bayou, only on the top bank or within 40 feet from the top bank.

Prior to the field observations, existing wetland maps and soil maps for the area were reviewed. According to the National Wetlands Inventory maps, the only wetlands present is the riverine type wetlands within the channel, R4SBC and R5UBH. A description of the wetlands classification definitions can be found in Appendix B. During the visit, the ground was not saturated at these locations. Soils maps for the area indicate that all of the points fall within an area that contains Savannah-sacul Association, Frizzell-Guyton Providence, and Guyton and Ouachita silt loams. The Guyton and Ouachita silt loams are predominantly hydric.Information in regards to the soils for the area can be found in Appendix D.

<u>Observation Point1 – LA 849</u>

The first observation point was taken just to the West of the creek, on the South side of the highway.The sampling point was on the bank of the creek, which was adjacent to a residential yard. Due to the developed nature of the area, the vegetation is considered disturbed.The point was found to be a non-wetlands.

Figure 18: Location of Point 849

The plants found in the area were FAC or FACU. There were a couple trees in the area Elm (*Ulmus Americana*) and Pecan (*Carya illinoinensis*).There was some St. Augustine grass (*Stenotaphrumsecundatum*), Poison Ivy (*Toxicodendronradicans*) and Fringed Greenbrier (*Smilax bona-nox*). Using the dominance test, a majority of the dominant species found were Faculative (FAC) plants. A hole was excavated down to a minimum of 16” with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depthof the hole. The soil was aloam with a color of4/6 (10YR)throughout the majority of the sample. This soil did not qualify as a hydric soil.Given that the site lacked hydrophytes and hydric soils, the point can be classified as a non-wetland.

Figure 19: Creek at LA 849

Observation Point 2 – Martin Luther 1

Figure 20: Location of PointML 1

The point was located South of Martin Luther St., on the West side of the creek, along the top bank.There were few trees in the area, and the vegetation can be considered disturbed. No primary hydrology indicators were found above the top bank. The dominance test concluded that the point had hydrophytic vegetation, with all species having FAC wetland indicators. Tree species found were Water Oak(*Quercusnigra*),Maple (*Acer rubrum)*, and Sweet Gum (*Liquidambar styraciflua)*. The herb stratum contained Peppervine (*Ampelopsis arborea*),Fringed Greenbrier (*Smilax bona-nox*), and Japanese Honeysuckle (*Lonciera japonica*). A hole was excavated down to a minimum of 16" with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depth of the hole. The sample contained a consistent colorthroughout the sample, which had 60% containing a value of 6 and achroma of 4 (10YR), with the remaining soil containing (10YR-8/3). Although there was a portion of the soil that was lighter throughout the matrix, it is not considered depleted, as the color change is faint and not distinct. This point cannot be considered wetlands due to it lacking hydric soils and hydrology indicators.

Observation Point 3 – Martin Luther 2

Figure 21: Location of PointML 2

Observation point3 was located in an area just to the South of Martin Luther 1, containing a different plant community and a lower elevation. Evidence of hydrology indicators were present with drift deposits and oxidized rhizospheres. Most of the area was covered in Giant Cane (*Arundinariagigantea*) with a few trees to the West as the lower area sloped upward toward the highway. Some Chinese Privet (*Ligustrumsinense*) and Peppervine (*Ampelopsis arborea*) were present. The majority of the dominant species were FAC and FACW. The soil sample taken at the point has a Depleted Matrix, with 35% being a darker color with a chroma of 5 and value of 4 (10YR), with a few redox concentrations with 5/6 (10YR) value/chroma and the majority of the matrix being depleted at8/1 (10YR). The area has all three major indicators for hydrology, plants, and soils, and can therefore be considered a wetlands.

Observation Point 4 – Martin Luther 3

Figure 22: Location of PointML 3

In an effort to determine where the extent of the wetlands, South of ML 2 stopped, additional points were taken. The first point, ML 3 was at the edge of the plant community with the abundance of Giant Cane. There were very few trees in this area, as most of the area was covered with cane, with a few outlying privets near the clearing in a residential yard. Since there was an abundance of cane, there were few woody vines, and no heraceous stratum were noted. The same plants from ML 2 were at this point, Giant Cane (*arundinariagigantea*), Chinese Privet (*Ligustrumsinense*) and Peppervine (*Ampelopsis arborea*). The soil was a Depleted Matrix, with 35% being a darker color with a chroma of 6 and value of 5 (10YR), with a few redox concentrations with a 5/6 (10YR) value/chroma and over 60% of the matrix being depleted at 8/1 (10YR). Evidence of hydrology indicators were present with oxidized rhizospheres along the roots. The area has all three major indicators for hydrology, plants, and soils, and can therefore be considered a wetlands.

Observation Point 5 – Martin Luther 4

Figure 23: Location of PointML 4

The last point taken in the area was located in an area that wasn't a wetland. This point was used to determine the transition from the upstream area that was wetlands, to an area that contains characteristics of more uplands type plants, different soils, and area where no hydrology indicators were found. There were very few cane, any cane that was present was very small. The trees found were Pecan (*Carya illinoinensis*), Water Oak (*Quercus nigra*), and Winged Elm (*Ulmus alata*). There was someChinese Privet (*Ligustrumsinense*), Horsebrier (*Smilax rotundifolia*) and Peppervine (*Ampelopsis arborea*). The soil had most of the matrix with a value/chroma of 6/3 (10YR), with a few small lighter spots value/chroma of 8/1 (10YR). The presence of the lighter spots were not enough to constitute a hydric soil. The area lacked hydrology and soil indicators, and could not be classified as a wetland.

See below for the extent of the wetlands found South of Martin Luther St. The project will stay clear of this area to avoid these wetlands. In the figures below, the cane field is noted in the aerial. The contrasting figure shows orange/red for higher elevations, yellow for a little lower in elevations, and blue/green represents the bottom of the creek. The wetlands occurs in the combination of the different plant community in the cane field with the lower area. The yellow continues South of the wetlands as the ground slope elevation continues to slope downward from the cane field toward Garsee Rd. However, only the area noted in Figure contains hydrophytes, wetlands hydrology and hydric soils.

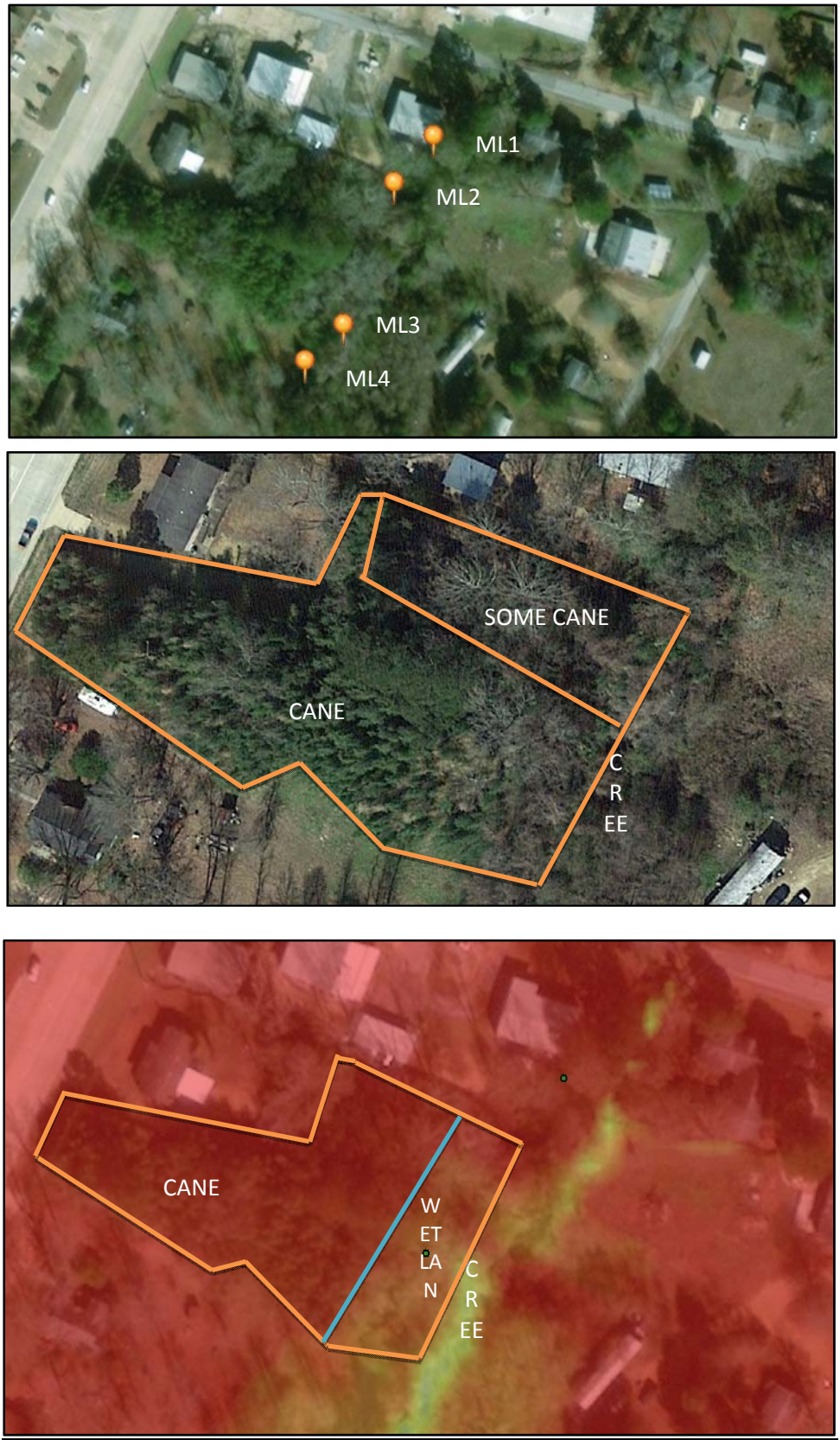

Figure 24: South of Martin Luther St.
Location of Points (Top)
Location of Cane on Aerial (Middle)
Location of Cane, Contrast of Low Area (Bottom)

Observation Point6 - Garsee

The observation point4 was located on the West side of the bayou, North of Garsee Rd. adjacent to the top bank of the creek. There were no hydrology indicators at this location. Vegetation was noted as disturbed, since the area is adjacent to a residential yard. Sweet Gum (*Liquidambar styraciflua*) and Great Ragweed (*Ambrosia trifida*)were two of the mainplants across all of the strata. The Dominance Test used the by the *Region* that there were hydrophytes (OBL, FACW, FAC)at this point.The soil sample taken had sandy loam with a chroma/value of 6/3 (10YR) and 8/3 (10YR). The soil did not have any hydric indicators. This observation point could not be considered in a wetlands.

Figure 25: Location of PointGarsee

Figure 26: Creek at Garsee

Observation Point7 – 165-N

The creek, just South of Sidney Ln., turns West sharply, and enters into DOTD's box culverts which convey the creek to an underground storm drain system. No hydrology indicators could be found along the top bank. The area was located in a strip of woods adjacent to the creek. . Using the USACE Dominance Test, all of the dominant species were found to be hydrophytes. There were only a few trees, as the area suffers from erosion. The dominant shrub species was Chinese Privet (*Ligustrumsinense*). The herb stratum contained Peppervine (*Ampelopsis arborea*) and Great Ragweed (*Ambrosia trifida*). Both of which have Faculative indicators.There were 7 dominant species across all of the strata, and 6 of them were Faculative, indicating that the point had hydrophytic vegetation. The soils had a matrix with a chroma/value of 5/6 (10YR)in90% of the sample, and containedsome depletions7/2 (10YR) and 8/1 (10YR). The depletions were minimal and did not make up enough of the matrix to be considered hydric. This point was not located within a wetlands.

Figure 27: Location of Point 165-N

Figure 28: Creek at 165-N

Observation Point 8 – 165-S

Figure 29: Location of Point 165-S

The creek is conveyed through an underground storm drain system along the East side of U.S. 165 until just South of Collins Rd. The creek exits the system and heads straight East before making a sharp Southerly turn. The next observation point is located shortly before the creek heads South, behind a building for a business, along the top bank of the creek. Once again most of the vegetation was disturbed up to the bank. There were no hydrology indicators along the top bank. The main plant species present wereSweet Gum (*Ligquidambar styraciflua*), Chinese Privet (*Ligustrum sinense*), and St. Augustine Grass (*Stenotaphrum secundatum*. 9 of the 10 dominant species were hydrophytes with FAC indicators. The soil sample had chroma/value of 5/4 (10YR) and 7/3 (10YR). Since the sample did not have all three wetland indicators, it was not a wetland.

Figure 30: Just West of Point 165-S

Observation Point9 – Ray St.

The observation at Ray St. was along the top bank in a residential area, where the vegetation was disturbed up to the creek. There was no evidence of hydrology indicators along the top bank. The plants found were similar to those at the other locations with Sweet Gum (*Liquidambar styraciflua*) and Chinese Privet (*Ligustrumsinense*). There were Thoroughwort (*Euphatoriumserotinum*) and St. Augustine (*Stenotaphrum*secundatum) present in the herb stratum.

All the dominant plants had FAC indicators. There were some FACU type plants, but their numbers were not great enough to affect the Dominance Test. A hole was excavated down to a minimum of 16” with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depthof the hole. The soil was a silty loam with a color of 5/4 (10YR)and 8/3 (10YR). This soil did not qualify as a hydric soil. Given that the site lacked a hydrology indicator and hydric soils, the point can be classified as a non-wetland.

Figure 31: Location of Point Ray St.

Figure 32: Creek at Ray St.

Observation Point10–N. School

Figure 33: Location of PointN. School

The eighth observation point was taken, North of the school between an agricultural field and the creek, along the Western top bank. There were no hydrology indicators at this location. Vegetation was noted as disturbed, since the area is adjacent to an agricultural field. Sweet Gum (*Liquidambar styraciflua*), Water Oak (*Quercusnigra*), Peppervine (*Ampelopsis arborea*), Poison Ivy (*Toxicodendronradicans*) and St. Augustine Grass (*Stenotaphrumsecundatum*) were the main plants across the strata. The Dominance Test used the by the *Regional Manual* concludes that there were hydrophytes (OBL, FACW, FAC)at this point. The soil sample taken had silty loam texture with a chroma/value of 7/3 (10YR). The soil did not have any hydric indicators. This observation point could not be considered a wetlands.

Figure 34: Creek Just North of N. School

Observation Point 11 – High School

Figure 35: Location of Point High School

The creek wraps around the East side of Caldwell Parish High School. The next observation point was taken between the baseball field and the creek, along the West top bank. The creek is a good 10 feet deep at this location and no hydrology indicators along the top bank could be found. Most of the main plant species were similar to the other points with the exception of the presence of a few pine trees. The main plant species present were Sweet Gum (*Ligquidambar styraciflua*), Water Oak (*Quercus* nigra), Elm (*Ulmus* americana), Long Leaf Pine (*Pinus* palustris), Chinese Privet (*Ligustrum sinense*), and St. Augustine Grass (*Stenotaphrum secundatum*). 5 of the 7 dominant species were hydrophytes with FAC indicators. The soil sample had chroma/value of 7/3(10YR) in 90% of the soil and some depletions 8/1 (10YR), which does not indicate that it is hydric. Since the sample did not have all three wetland indicators, it was not a wetland.

Figure 36: Creek at High School

Observation Point12 – Central St.

Figure 37: Location of Point Central St.

The observation at Ray St. was along the top bank in a residential yard, where the vegetation was disturbed up to the creek. There was no evidence of hydrology indicators along the top bank. The plants found were similar to those at the other locations with Sweet Gum (*Liquidambar styraciflua*), Water Oak (*Quercusnigra*). T Muscadine (*Vitisrotundifolia*) and St. Augustine (*Stenotaphrum*secundatum) present in the herb stratum.

Figure 38: Muscadine at Central St. Point

All the dominant plants had FAC indicators. A hole was excavated down to a minimum of 16" with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depthof the hole. The soil was a silty loam with a color of 6/3 (10YR)and 7/3 (5YR). This soil did not qualify as a hydric soil. Given that the site lacked a hydrology indicator and hydric soils, the point can be classified as a non-wetland.

Observation Point 13 – 126

Figure 39: Location of Point126

The eleventh observation point was taken, North of LA 126 between an residential yard and the creek, along the Western top bank. There were no hydrology indicators at this location. Vegetation was noted as disturbed, since the area is adjacent to a maintained yard. Sweet Gum (*Liquidambar styraciflua*), Water Oak (*Quercusnigra*), Great Ragweed (*Ambrosia trifida*) and St. Augustine Grass (*Stenotaphrumsecundatum*) were the main plants across the strata. The Dominance Test used the by the *Regional Manual* concludes that there were hydrophytes (OBL, FACW, FAC)at this point. The soil sample taken had silty loam texture with a chroma/value of 6/3 (5YR) and 7/3 (10YR). The soil did not have any hydric indicators. This observation point could not be considered a wetlands.

Figure 40: Sample Vegetation at Point 126

Observation Point14 – Alternate 1-1

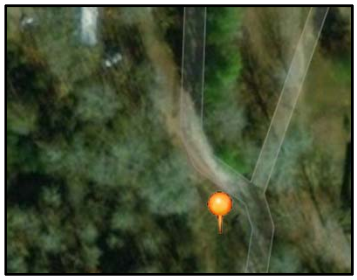

Figure 41: Location of Point Alt. 1-1

The observation Alternate 1-1 was at a location where Hanchey Rd. crosses a tributary of Hurricane Creek. Before this report, this tributary was to be an additive alternate to the project. Usually alternates are used to add or deduct from a project based on the received bids compared to the available funding. The observation point was to the South of the tributary and to the West of the road. In this location, it looks as though vegetation had been disturbed, as there were no trees or woody vines, few shrubs, and a majority of the plants were in the herb stratum. The most common plants were ragweeds (*Ambrosia trifida*and *artemisiifolia*), Virginia Creeper (*Parthenocissusquinquefolia*) and Tie Vine (*Ipomeacordatotriloba*). There was no evidence of hydrology indicators along the top bank. 3 of the 6 dominant species had FAC indicators, all other plants sampled were upland species. A hole was excavated down to a minimum of 16" with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depthof the hole. The soil was a silty loam with a color of 5/6 (5 YR)and 7/3 (10YR). This soil did not qualify as a hydric soil. Given that the site lacked a hydrology indicator and hydric soils, the point can be classified as a non-wetland.

Figure 42: Virginia Creeper and Tie Vine at Alternate 1-1

Observation Point15 – Alternate 1-2

Figure 43: Location of Point Alt. 1-2.

Figure 44: Black Willow at Alt. 1-2

The observation at Alternate 1-2 was at the second location where the tributary for Hurricane Creek crosses Hanchey Rd. The point was located North of the road and to the West of the creek, adjacent to a residential yard. The vegetation had some of the same species as some of the other points; however, the major difference was that the most prominent two species had FACW or OBL indicators. One of these species, Black Willow (*Salix nigra*) had not been seen at any of the other points. A hole was excavated down to a minimum of 16" with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depthof the hole. The soil was a silty loam, but had hydric indicators with a matrix color of 3/6 (10YR) for 40% of the soiland depletions 8/2 (10YR) for 60% of the soil. There were also quite a bit of oxidized rhizosperes along the living roots. These rhizosphers are considered a hydrology indicator. Given that the site had all three necessary indicators, the point can be classified as a wetland.

Figure 45 below shows the Lidar data in the area of the sampling point. All areas that are blue are at a lower elevation than the red, orange and yellow. The sampling point at Alt. 1-1 is at a higher elevation, where as Alt. 1-2 is at a lower elevation. It also appears that this elevation continues into the forested area to the West of Alt. 1-2, where the tributary flows towards Hurricane Creek. Based on this data, it is recommended that work not include this portion of the tributary. Any clearing in Alternate 1 shall be kept near the first crossing, which is not in a wetland.

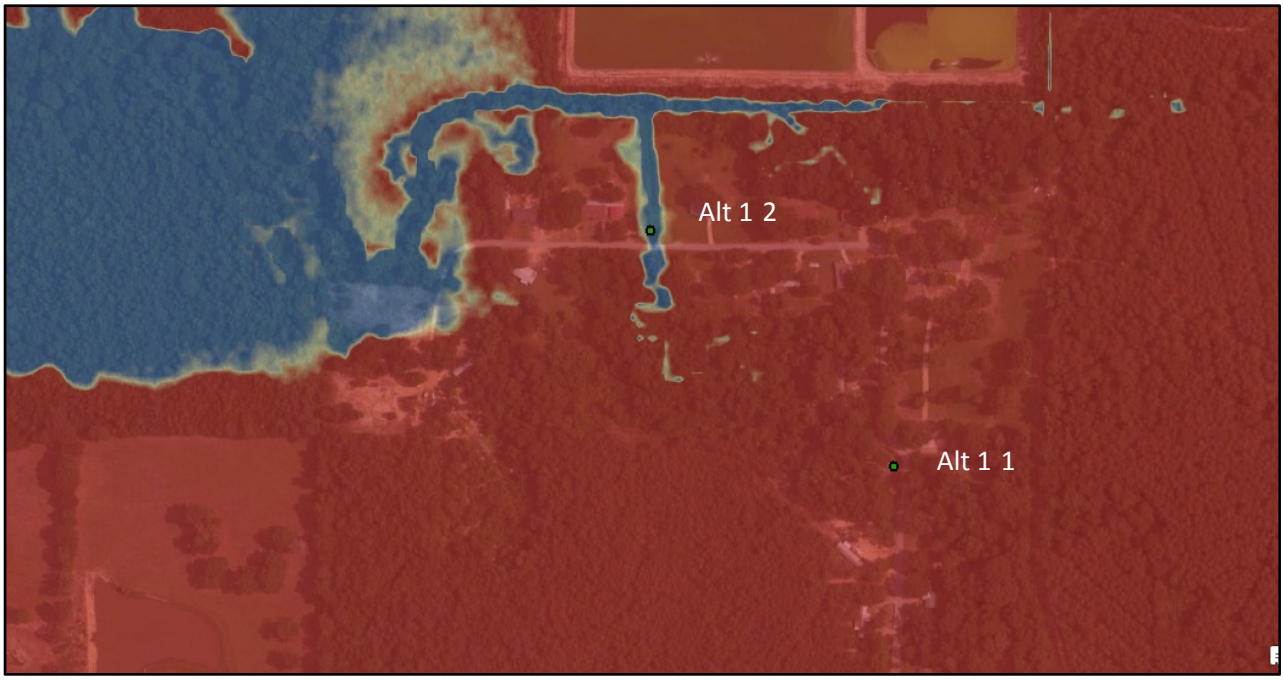

Figure 45: Lidar Data at Point Alt. 2-2

Observation Point16 – Alternate 2-1

The second alternate for the project is to clear debris out of a tributary that lies between the High School and U.S. 165. The tributary runs along an access road to the West of the school before outfalling into Hurricane Creek. The observation Alternate 2-1 was located along the Eastern top bank of the tributary, which is adjacent to the access gravel road. Before this report, this tributary was to be an additive alternate to the project. Due to the road, this vegetation has been disturbed up to just along the top bank of the creek. The most common plants were Water Oak (*Quercusnigra*), Sweet Gum (*Liquidambar styraciflua*) and greenbrier species (*Smilax bona-nox*and *rotundifolia*). 7 of the 7 dominant species had FAC indicators. A hole was excavated down to a minimum of 16" with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depth of the hole. The soil was a silty loam with a matrix color of 4/4 (10 YR), depletions 8/3 (10YR) and 2/1 (10YR). This soil did not contain enough depletion to be considered hydric. Given that the site lacked a hydrology indicator and hydric soils, the point can be classified as a non-wetland.

Figure 46: Location of Point Alt. 2-1

Figure 47: Tributary at Alternate 2-1

Observation Point17 – Alternate 2-2

Figure 48: Location of Point Alt. 2-2.

The observation at Alternate 2-2 was at the second location where the tributary for Hurricane Creek crosses in front of the High School. The point was located West of the access road and to the East of the creek. There were no hydrology indicators present. The dominant species were Sweet Gum (*Liquidambar styraciflua*), Water Oak (*Quercusnigra*), Peppervine (*Ampelopsis arborea*), and ragweeds (*Ambrosia trifida and artemisiifolia*). Using the dominance Test, 5 of the 6 dominant species were FAC, indicating that there was hydrophytic vegetation present. A hole was excavated down to a minimum of 16" with post hole diggers, and a sliver of sediment was taken off the side of the hole for the depthof the hole. The soil was a silty loam, but had hydric indicators with a matrix color of 7/3 (10YR)over 80% of the soil with some depletions in the matrix, at 8/2 and 3/2 (10YR). Given that the site did not have hydrology and hydric indicators, the point can be classified as a non-wetland.

Figure 49: Soil Sampling at Alt. 2-2

Conclusion

The project will remove impediments and rechannel Hurricane Creek in areas outside of wetlands from LA 849 down to LA 126. There are two areas that appear to be wetlands, one South of Martin Luther St., and one at Alt. 2-2. The project will stay clear of the wetlands found near Martin Luther St., and stay clear of all areas of Hanchey Road, Alternate 1, other than at the first crossing at point Alt. 1-1.

The work will be performed from a 20 ft. access road along the top bank of the creek. No sediment deposits will be placed within the creek or within a wetland. The access road will not be built up . The goal of the project is to remove impediments from the channel, and not disturb the forested wetlands.

A Nationwide Permit will be obtained from the USACE for the project. The project funding does not include any available mitigation funds.

References

Charles M. Allen, PhD, Dawn Allen Newman, M.S., and Harry H. Winters, M.D. *Trees, Shrubs, and Woody Vines of Louisiana.* Pitkin, LA: Allen's Native Adventures, LLC., 2002.

Cowardin, et al. *Classification of Wetlands and Deepwater Habitats of the United States*. 1979.

Ed. by L.M. Vasilas, G.W. Hurt, C.V. Noble, United States Department of Agriculture-National Resources Conservation Service. *Field Indicators of Hydric Soils in the United States*. NRCS National Forms Distribution and Publication Center, 2010.

Michael L. Schummer, Heath M. Hagy, Sarah Fleming, Joshua C.Chesier, and James T Callicutt. *A Guide to Moist-Soil Wetland Plants of the Mississippi Alluvial Valley*. Jackson, MS: University of Mississippi Press, 2012.

Munsell. *Munsell Soil Color Chart.* Grand Rapids, MI: Munsell Color, 2009.

United States Army Corps of Engineers. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0).* Vicksburg, MS: 2010.

United States Army Corps of Engineers. *Corps of Engineers Wetlands Delineation Manual, Wetlands Research Program Technical Report Y-87-1*. Vicksburg, MS: 1987.

United States Department of Agriculture-National Resources Conservation Service. *Web-Soil Survey*. 2012. www.websoilsurvey.usda.nrcs.gov.

United States Department of Agriculture-Soil Conservation Service-National Resources Conservation Service. *Plants Database – Wetland Indicator Status*. http://plants.usda.gov/core/wetlandSearch

United States Fish and Wildlife Service. *National Wetlands Inventory Map*. 2013.

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August 28, 2018

State of Louisiana
Governor's Office of Homeland
Security & Emergency Preparedness
1500 Main Street
Baton Rouge, LA 70802

email: roland.spano@la.gov

Attn: Roland Spano

Re: Caldwell Parish Police Jury
Hurricane Creek Drainage Improvements
HMGP #1603N-021-0005
FEMA-1603-DR-LA, Project #0363
Project No. 11-11-584E

Dear Mr. Spano:

In regard to the RFI from August 15, 2018, we offer the following responses.

1. Attached is the revised SOW and table showing lengths and widths of access areas.
2. We don't have access to LAHM for the project, and Ms. Wanda with the Police Jury is out of the office for an extended period of time. The May, 2014 plans are over 18 MB and can be emailed in 3 or 4 files if need be. There will be a couple minor revisions to reduce the scope on the plans as discussed in the SOW to reflect the final decision of the Corps of Engineers. The goal is to do as much work as possible without causing any mitigation credits. If the Corps decides some mitigation credits are required, then the scope may need to be revised again to keep the credits as low as possible.
3. The culvert replacement 198' North of Garsee Road is shown on plan sheet 7. The Corps of Engineers just wanted an aerial of each culvert replacement location, which was transmitted to them on 05/28/18. This wasn't revision to the permit application at the time, as it was a response to their request for more information. Attached are the Preliminary Jurisdictional Determinations from the Corps of Engineers, which was received on August 28, 2018. The maps show two areas of wetlands in the main channel.
4. The H&H Study is dated March 14, 2018.
5. Figure 45 should be labeled Point Alt. 1-2, which is on the Hanchey Road tributary.
6. The project manager has obtained temporary easement/access from the majority of land owners within the project area. For the couple properties that he doesn't have a signed agreement for, the Police Jury will be using the Louisiana Attorney General's opinion that allows for the Police Jury to maintain drainage channels with a 100 ft. access easement on each side of the creek.

Upon your review, should you have any additional questions, please feel free to contact us.

I remain sincerely,

McManus Consulting Engineers, Inc.

Cinnamon Gooding

Cinnamon Gooding, P.E.,
Chief Engineer

cc: Caldwell Parish Police Jury, c/o Ms. Wanda Stowe, P.O. Box 1737, Columbia, LA 71418 (w/encl.)
Mr. Bob Mears, 208 Littleton Loop Rd., Downsville, LA 71234 (w/ encl.)
File

HYDROLOGY AND HYDRAULIC STUDY

HURRICANE CREEK
CALDWELL PARISH, LOUISIANA

HMGP NO. 1603-N-021-0005

FEMA NO. 1603-DR-LA, PROJECT NO. 0363

PROJECT NO. 11-11-584E

APRIL, 2014

REVISED MARCH, 2015

PREPARED BY
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P.O. BOX 4318
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(318- 343-5600)

HYDROLOGY AND HYDRAULIC STUDY

HURRICANE CREEK
CALDWELL PARISH, LOUISIANA

HMGP NO. 1603-N-021-0005

FEMA NO. 1603-DR-LA, PROJECT NO. 0363

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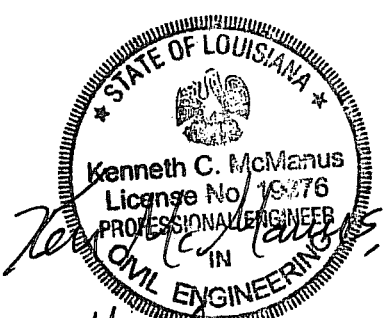
REVISED MARCH, 2015



Kenneth C. McManus, PE

March 9, 2015

PREPARED BY
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HYDROLOGY AND HYDRAULIC STUDY
FOR
HURRICANE CREEK
CALDWELL PARISH, LOUISIANA

APRIL, 2014
REVISED MARCH, 2015

TABLE OF CONTENTS

1.0 PURPOSE AND NEED FOR PROJECT

The proposed project will provide drainage improvements Hurricane Creek in Caldwell Parish, Louisiana for the Caldwell Parish Police Jury, and is being funded by a Hazard Mitigation Grant Program, (HMGP NO. 1603-N-021-0005, FEMA NO. 1603-DR-LA, PROJECT NO. 0363). The creek floods in relatively small storm events which cause unsafe conditions for the citizens who live near the creek.

Hurricane Creek is located in Caldwell Parish, starting in Bank Springs, through the Community of Grayson, crossing U.S. Highway 165, passing South of Clarks, and out falling into Castor Creek just West of the Community of Kelly. The creek is one of the largest drainage areas in Caldwell Parish and combines with Bushy Creek and Black Bayou drainage areas before contributing to Castor Creek.

Portions of the creek are located in residential areas and are prone to flooding in relatively small storm events. Thick brush and large trees have flourished within the main portions of the channel which severely restrict water flow causing the stream to back up and overtop the banks. As portions of the creek flood, erosion occurs, banks wash in and slough off. Trees and woody material fall in and wash into the channel. Silt bars appear, and the channel cross-section becomes altered and degraded, which further reduces the capacity of the channel. If not rechanneled and reshaped, flooding will increase in frequency and severity.

This project will address the portions of the creek starting in Bank Springs just North of Martin Luther Street and ending near Grayson, North of LA Hwy. 126. If funding allows, two tributaries of the creek located near Grayson will be included in this project, one near Spartan Dr. and U.S. Hwy 165 and the other near Hanchey Rd. and LA Hwy. 126. The proposed project will consist of rechanneling, reshaping and restoring approximately 22,214 L.F. of damaged channel. The proposed design will improve the current issues from flooding.

Other considerations in the design include requirements from the Louisiana Department of Environmental Quality (DEQ) and budget constraints. DEQ is requiring a minimum amount of disturbance, stabilization of disturbed banks, and replanting of access road with trees, where applicable, to reduce sediment deposits and restoration of any disturbed areas. These requirements are based on water quality restrictions in Castor Creek, of which Hurricane Creek is a major contributor. The project budget did not originally include these costs, and the scope of the project had to be reduced.

1.1 Project Description (Proposed Action)

The proposed project seeks to rechannel, reshape and restore approximately 22,214 L.F. of Hurricane Creek to reduce flooding. The width and depth of the channel vary. The North portion of the creek in Bank Springs (from North of

Martin Luther St. to U.S. Hwy. 165) has been designed for a 10 yr. storm event. The remaining portion of the creek will have one side of the creek cleared with a half bottom width which is equivalent to the projected bottom width of the 1976 LA DOTD design for the 10 yr. event. For example, behind the High School, in Grayson, the '76 DOTD design required a 14 ft. wide bottom. The creek will be cleared on one side in this area with a bottom width from the centerline out at 7' (one half of the '76 DOTD design).

The tributaries will have one side cleared from the centerline to the top bank. Areas near road crossing culverts, will have both sides cleared of debris. Bottoms of these areas will match existing, with a maximum of 2:1 side slopes. Side slopes of 2:1 were selected due to the adjacent locations of structures and houses. Side bank slopes will be stabilized with erosion control blankets and seeding.

Construction of the project will begin at the North of Martin Luther Street, in Bank Springs, and extend to the box culverts at U.S. Hwy. 165, South of Sidney Lane. The next area of the project will start at U.S. Hwy 165, extend South, beyond the High School, and end just North of LA Hwy. 126. If there is remaining funding, two tributaries of the creek are included in the project. One tributary crosses Spartan Dr. near Grayson at Caldwell Parish High School. The other tributary crosses Hanchey Rd. off of LA Hwy. 126 near Grayson.

On the North end of the project in Bank Springs, several culverts will be replaced. This area experiences significant flooding in relatively small storm events. The existing 54" diameter culvert at Martin Luther St. and the two 36" diameter culverts at the upstream private drive will be removed. The stream meanders at a sharp angle as it crosses Martin Luther St. hindering the capacity of the existing culvert system. These crossings will be replaced with an underground storm drain system consisting of two 54" diameter pipes. The existing 48" diameter culvert at Garsee Road appears to be undersized. The culvert will be replaced with a larger 60" diameter pipe. The existing 60" diameter culvert at Sidney Ln. is broken, and severe washout is occurring at the bank of the road. In addition to replacing the culvert, the culvert will be realigned to follow the flow of the creek.

Refer to Exhibit 1 for parish and quad maps showing the project location.

1.2 Purpose and Need of Project

Portions of the creek are located in residential areas and are prone to flooding in relatively small storm events. Thick brush and large trees have flourished within the main portions of the channel which severely restrict water flow causing the stream to back up and overtop the banks. As portions of the creek flood, erosion occurs, banks wash in and slough off. Trees and woody material fall in and wash into the channel. Silt bars appear, and the channel cross-section becomes altered and degraded, which further reduces the capacity of the channel. If the creek is not rechanneled and reshaped, flooding will increase in frequency and severity.

According to the Benefit Cost Analysis (BCA) the expected Annual Damages prior to mitigation were $1,180,319. The storm event produced 5.86 in. of rain in a 24hr period and flood damages occurred to the Caldwell Parish High School, a dozen houses, and several businesses. The expected Annual Damages after mitigation will be $118,031.

2.0 PROPOSED DESIGN

In planning and developing this project, all valid alternates were evaluated using environmental consideration, technical and economic feasibility, reliability, complexity, and safety concerns. In addition, historical development in the creek was analyzed to determine the validity of the proposed design.

DESIGN CRITERIA AND ANALYSIS

The application for funding through the Louisiana Governor's Office of Homeland Security and Emergency Preparedness Hazard Mitigation Grant Program requires that the creek be designed for at minimum the 5 year storm event. The project was evaluated with several different methods to both conservatively predict estimated flow rates and follow the historical design of the creek.

In order to reduce the flooding in the residential area of Bank Springs, approximately 2,050 L.F. of creek was designed for the 10 yr. storm event. This particular area of the creek experiences flooding in relatively small storm events due to inadequate road crossings, reduced cross sections, and restrictions caused by heavy brush and trees. The proposed bottom width of the channel will vary between 6 ft. and 12 ft. with 2 to 1 side slopes. Several culvert crossings will be replaced to either rectify unfavorable creek alignment at the crossing, undersized culverts, or damaged culverts.

In 1976, LA DOTD cleared the creek and rechannelized the portion from Grayson, behind the high school, to LA Hwy. 165 and beyond. The creek was designed for the '76 10 yr. storm event. The existing bottom width of the creek still reflects this design. This portion of the creek will be cleared and regraded with a bottom width to match the existing design which varies from 14 ft. to 16 ft. The side slopes of the creek will be graded at a 2 to 1 slope. It should be noted that the DOTD design shows the creek overtopping the banks as it passes Zeagler Rd. in Clarks and approaches Bushy Creek. The water surface elevation exceeds the bank by up to 2.5 ft. in the Clarks area and 4 ft. as it approaches Bushy Creek. A copy of the 1976 DOTD design profile can be found in Exhibit No. 3

PROJECT'S USEFUL LIFE

The main focus on the project is to clear and regrade the creek. The Project Useful Life Summary Table does not contain any measurable amount for these improvements. The existing culverts will be replaced with larger culverts at most locations, which according to the table have a useful life of 10 years.

HYDROLOGY

The drainage area for the creek is larger than 2,000 acres; therefore, the USGS method using the Chapter 3 of the LA DOTD *Hydraulics Manual* was used to determine the runoff rates. The USGS method uses area, slope, land use, and lengths of sub-basins to calculate flowrates. Caldwell Parish, according to the manual, in the vicinity of the project has about 52 inches of mean rainfall a year (refer to Exhibit No. 2 for region map and precipitation curves). Using the quad maps, three sub-basin areas representing the North end and the South end of the project were assessed. In addition, drainage areas were calculated for those particular road crossings on the north end which are the focus of the project – Martin Luther St., Sydney Ln., Garsee Rd., and Spartan Dr. Using LA DOTD *Hydr 1130: Peak Runoff Program*, the following information was used:

Sub-basin I –
Area – 1.40 sq. mi. (900 acres)
Slope = 21.78 ft./mi.
Sub-basin II –
Area – 4.80 sq. mi. (3,065 acres)
Slope = 2.89 ft./mi.

Using the above design criteria with an urbanization factor of 1 and approximate stream lengths in each sub-basin, the following results were produced (see Exhibit No. 2 for the *Hydr 1130* results):

Table 1 – Current Runoff Flow Rates

Sub-basin	Q 2 yr. (cfs)	Q 5 yr. (cfs)	Q 10 yr. (cfs)	Q 25 yr. (cfs)	Q 50 yr. (cfs)	Q 100 yr. (cfs)
I	291	484	614	825	946	1,036
II	304	496	648	898	997	1,099
TOTAL	**595**	**980**	**1,262**	**1,723**	**1,943**	**2,135**

An urbanization factor of 1 was used do to the fact that the area is largely undeveloped in terms of drainage structures with minimum roads and impervious surfaces. The area is more rural than urban in terms of drainage conditions.

Historical Analysis

In 1976 the LA Department of Transportation (DOTD), proposed a design to clear out the creek and reroute certain portions from Bushy Creek to an area behind the existing Caldwell Parish High School. The design evaluated water surface elevations using the 2 yr., 5 yr., and 10 yr. storm events. The design used for construction was the 10 yr. event. In addition, the construction did not proceed down to Bushy Creek and ended just North of LA Hwy. 844.

The '76 design flow rates were compared with the current proposed flow rates. Flow rates shown below were taken at the location nearest to the sub-basin extents. The '76 design ended South of Clarks beyond the scope of this work. Refer to Exhibit No. 3 for the 1976 DOTD Design Profile.

Table 2 – '76 Runoff Flow Rates

Sub-basin	Q 2yr (cfs)	Q 5yr (cfs)	Q 10yr (cfs)
I +II	820	1,025	1,230

The flow rates shown in the table above are the cumulative rates at LA Hwy. 126. In comparison, the current analysis shows very similar results compared to the '76 design flow rates for the storm events.

Since the application requires the design to be at minimum for a 5 yr. event, using the existing DOTD design information for the channel width in the area should be sufficient. In addition, the proposed project would be consistent with the historical width of the creek. To reflect the difference between the existing conditions ('76 Design with '76 flow rates) and the proposed conditions, the Manning's coefficient was adjusted in the HEC-RAS model from a 0.120, for dense brush, to 0.035, for little or no brush with some grass.

Table 3 – Existing ('76 Design with '76 Flow Rates) and Current Flow Rates

Station	'76 DOTD Q 10yr (cfs)	Estimated Flow Depth (ft.)	Current Q 5yr (cfs)	Estimated Flow Depth (ft.)	Current Q 10yr (cfs)	Estimated Flow Depth (ft.)
100+00	1,230	10.95	980	4.39	1,262	6.46
137+08	875	12.44	707	11.62	906	13.83

HEC-RAS results showing the above analysis and Drainage Area map can be found in Exhibit No. 4.

FEMA Flood Plain Maps

Hurricane Creek is shown to be in flood plains classified as Zone A and Zone A2 in community panels 2200440020A and 2200440030A. The flood plain

delineation width increases as the creek continues downstream. Zone A flood plain designations are defined as areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones. Zone A2 flood plain designations are defined as Zone A areas which show the base flood elevation. A copy of the floodplain firmettes can be found in Exhibit No. 5.

HYDRAULICS

Culvert Analysis

Each of the crossings at Martin Luther St., Garsee Rd., and Sidney Ln. were analyzed using a combination of the above flow rates in proportion to the drainage area for each of the crossings.

Table 4 – Estimated Flow Rate Based on Drainage Area

Culvert Location	Estimated Drainage Area (acres)	Estimated Cumulative Drainage Area (acres)	Q 2yr (cfs)	Q 5yr (cfs)	Q 10yr (cfs)	Q 25yr (cfs)	Q 50yr (cfs)	Q 100yr (cfs)
North of Martin Luther King St.	93	93	29	48	62	83	95	104
Martin Luther King St.	93	93	29	48	62	83	95	104
Garsee Rd.	67	160	52	87	112	149	170	186
Sidney Ln.	15	175	58	97	123	165	189	207

Using HEC-RAS, the culverts were analyzed along with the stream conditions to determine approximate field conditions. Using the existing creek cross sections and a Manning's coefficient of 0.12 to represent a heavy brush, large tree condition in the creek, the results for the estimated water surface elevation and road elevations are shown below.

Table 5 – Estimated Flow Depth in Existing Culverts

Culvert Location	Size of Culverts	Road Surface Elevation (ft.)	Estimated Water Surface Elev. 2 yr. (ft.)	Estimated Water Surface Elev. 5 yr. (ft.)	Estimated Water Surface Elev. 10 yr. (ft.)	Estimated Water Surface Elev. 25 yr. (ft.)	Estimated Water Surface Elev. 50 yr. (ft.)	Estimated Water Surface Elev. 100 yr. (ft.)
North of Martin Luther King St.	(2) 36"Ø RCP	192.46	189.77	190.54	191.21	191.91	192.31	192.61
Martin Luther King St.	54"Ø CMP	190.61	189.32	190.16	190.70	191.08	191.23	191.33
Garsee Rd.	48"Ø CMP	184.44	183.09	185.27	185.80	186.41	186.70	186.91
Sidney Ln.	84"Ø CMP	182.26	181.24	182.99	183.29	183.72	183.94	184.09

The HEC-RAS model was then adapted to show the proposed channelization improvements and improved field conditions with a Manning's coefficient of 0.035 to represent the proposed future condition of the creek with minimal vegetation.

With the exception of Garsee Rd., the size of the culverts are not the main source of flooding issues in the area. The channel capacity is mainly affected by the reduced channel cross section between Martin Luther St. and Sidney Ln., the heavy brush and trees, and the meandering of the creek at Martin Luther St. and Sidney Ln.

The creek meanders just prior to entering the Martin Luther St. road crossing. The existing culvert is not lined up with the flow line of the creek which is causing stream bank erosion and flooding issues in the area. Given the congestion of the existing structures in the area and limited land availability, rerouting the channel or culvert properly is not an option. The proposed project will install (2) 54" diameter storm drains with several manholes which will start up stream of Martin Luther St., prior to the meandering of the stream behind the existing Family Dollar Store. The storm drain alignment will follow a similar route as the existing creek and outfall South of Martin Luther St. at the current downstream location of the existing culvert. The installation of the storm drains will allow more adequate drainage in the area. The storm drains were analyzed using the flow rates discussed above in Table 4 and the conduit system hydraulic equations from Chapter 8 of the *LA DOTD Hydraulic Design Manual.* A base hydraulic grade level elevation for each storm event was selected using the HEC-RAS proposed model with a two 54" diameter culvert (108" dia.) as shown in Exhibit No. 6. The hydraulic grade level will not exceed the crown elevations of the storm drains for the 10 yr. storm event. Storm drain calculations can be found in Exhibit No. 6.

Table 6 – Proposed Storm Drain Analysis at Martin Luther St.

Pipe/Structure	Length (ft.)	Slope (ft./ft.)	HGL Elev. 2 yr. (ft.)	HGL Elev. 5 yr. (ft.)	HGL Elev. 10 yr. (ft.)	HGL Elev. 25 yr. (ft.)	HGL Elev. 50 yr. (ft.)	HGL Elev. 100 yr. (ft.)
Inlet	34	0.0185	190.68	191.28	191.85	192.04	191.89	192.00
Manhole	-	-	190.39	190.98	191.22	191.73	191.58	191.69
(2) 54" Ø RCP	104	0.0184	190.39	190.97	191.20	191.71	191.54	191.64
Manhole	-	-	188.17	188.75	189.30	199.49	189.32	189.42
(2) 54" Ø RCP	108	0.0184	188.17	188.74	189.28	189.46	189.29	189.38
Manhole	-	-	186.27	186.84	187.29	187.56	187.39	187.48
(2) 54" Ø RCP	52	0.0187	186.26	186.83	187.27	187.53	187.36	187.44
Outlet	-	-	185.40	185.96	186.31	186.66	186.49	186.57

The culvert at Garsee Rd. will be replaced with a larger, 60" diameter pipe. The culvert at Sidney Ln. will be removed and realigned with the bottom of the creek which will reduce the erosion and flooding problems at the crossing. The culverts at Spartan Dr. will be replaced and installed at an elevation which will provide a more uniform flow line for the creek to improve the hydraulics. The HEC-RAS results showing the below analysis can be found in Exhibit No. 7.

Table 7 – Estimated Flow Depth in Proposed Culverts

Culvert Location	Size of Culverts	Road Surface Elevation (ft.)	Water Surface Elev. 2 yr. (ft.)	Water Surface Elev. 5 yr. (ft.)	Water Surface Elev. 10 yr. (ft.)	Water Surface Elev. 25 yr. (ft.)	Water Surface Elev. 50 yr. (ft.)	Water Surface Elev. 100 yr. (ft.)
Garsee Rd.	60"Ø CMP	184.44	181.27	182.40	183.14	184.27	184.97	185.28
Sidney Ln.	84"Ø CMP	182.26	179.24	180.24	180.81	181.66	182.10	182.41

Clearing out the channel and replacing the road crossings mentioned above shall improve the flooding issues in the area.

Channel Analysis

As discussed in the previous section, a HEC-RAS model was developed to show the different scenarios for the 1976 design with '76 flow rates for the 10 yr. storm event, current flow rates for the 5 yr. storm event, and current flow rates for the 10 yr. storm event. Results from Table 3 above are also shown below.

Table 8 - Existing ('76 Design with '76 Flow Rates) and Current Flow Rates

Station	'76 DOTD Q 10yr (cfs)	Estimated Flow Depth (ft.)	Current Q 5yr (cfs)	Estimated Flow Depth (ft.)	Current Q 10yr (cfs)	Estimated Flow Depth (ft.)
100+00	1,230	10.95	980	4.39	1,262	6.46
137+08	875	12.44	707	11.62	906	13.83

When analyzing proposed changes to an existing creek, a base scenario is used to determine the effects of the proposed improvements. A representative alignment was placed in HEC-RAS using the survey information as representative cross sections in the creek. A Manning's coefficient of 0.12 was used to represent a heavy brush, large tree condition in the creek. The flow rates used represent the 10 yr. storm event to which portions of the channel are being designed, as discussed. The existing scenario is then adapted to represent the proposed cross section and a Manning's coefficient of 0.035 was used to represent a future creek with less vegetation. Table 4 and 5 below show the portion of the channel which were not included in the 1976 DOTD design analysis. Stations 500+00 to 520+50 represent the creek from U.S. Hwy 165 South of Sidney Ln. to North of Martin Luther St. Stations 100+00 to 230+24 represent the creek from LA Hwy. 126, North to U.S. Hwy. 165, North of Rushing Street.

Table 9 – Estimated Flow Depth in Existing Channel

Station	Estimated Water Surface Elev. 2 yr. (ft.)	Estimated Water Surface Elev. 5 yr. (ft.)	Estimated Water Surface Elev. 10 yr. (ft.)	Estimated Water Surface Elev. 25yr. (ft.)	Estimated Water Surface Elev. 50yr. (ft.)	Estimated Water Surface Elev. 100 yr. (ft.)
504+02	180.50	182.14	182.33	182.63	182.79	182.90
506+87	182.23	183.60	184.03	184.64	184.96	185.18
509+36	183.28	185.43	186.00	186.68	187.01	187.25
519+10	191.05	191.45	191.83	192.41	192.75	193.01
225+00	169.71	171.73	173.02	175.45	175.99	176.32
202+15	166.97	167.82	167.19	166.45	167.23	168.17
170+00	162.30	162.93	163.75	165.65	166.86	167.97
140+00	157.86	160.32	162.32	165.31	166.68	167.85
115+00	156.11	159.59	161.81	165.06	166.50	167.70
100+00	143.39	144.66	145.46	146.65	147.16	147.58

HEC-RAS results showing the above analyses can be found in Exhibit No. 4.

It is important to note that the 1976 DOTD design reflects that as the creek proceeds downstream the water surface elevation exceeds the top bank by as

much as 4.5 feet. Since the 1976 design terminated at Bushy Creek and the water surface elevation is shown to steadily increase above the top bank at this point, it is not an unreasonable assumption that as the creek proceeds towards Castor Creek the water surface elevation continues to increase in relative height to the top bank. In addition, it is noted that the FEMA Flood Plain maps show this entire area in a Zone A floodplain.

The 1976 DOTD design started at Bushy Creek and continued North past LA Hwy. 126 and terminated behind the existing Caldwell Parish High School.

The proposed channel improvements in Bank Springs from Martin Luther St. to LA Hwy. 165 (Sta. 500+00 to 520+00) have been designed for a 10 yr. storm event. The proposed bottom widths of the channel vary from 6 feet wide from Martin Luther St. to 12 feet wide just South of Garsee Rd. These bottom widths mirror the existing bottom width conditions. Once the project proceeds beyond the High School in Grayson to LA Hwy. 126 (Sta. 100+00 to Sta. 137+08), the design will follow the 1976 LA DOTD design for the 10 yr. storm event. Bottom widths in these areas vary from 14 feet wide near Caldwell Parish High School to 16 feet wide at LA Hwy. 126. Results for the proposed cross sections can be found below.

Table 10 – Estimated Flow Depth in Proposed Channel

Station	Estimated Water Surface Elev. 2 yr. (ft.)	Estimated Water Surface Elev. 5 yr. (ft.)	Estimated Water Surface Elev. 10 yr. (ft.)	Estimated Water Surface Elev. 25yr. (ft.)	Estimated Water Surface Elev. 50yr. (ft.)	Estimated Water Surface Elev. 100 yr. (ft.)
504+02	177.75	178.37	178.73	179.28	179.72	180.04
506+87	179.33	180.32	180.88	181.72	182.16	182.46
509+36	181.34	182.45	183.19	184.31	184.99	185.31
519+10	190.24	190.46	190.58	190.76	190.85	190.91
225+00	165.55	166.74	167.41	168.37	168.90	169.19
202+15	162.70	163.97	164.69	165.67	166.81	166.50
170+00	157.95	159.04	159.64	160.51	162.03	161.16
140+00	154.47	155.48	156.06	156.71	157.23	157.29
115+00	149.65	151.46	152.73	154.10	154.76	155.30
100+00	142.66	143.83	144.66	145.59	146.04	146.41

Clearing out the creek and providing an adequate cross section in the northern portions of the creek shall improve the hydraulic conditions of the creek.

In addition to the above improvements, if funding allows, two tributaries will be cleared: a tributary in front of the High School near Grayson and a tributary which crosses Hanchey Rd. near Grayson will be cleared. Bottom widths of the creek will match existing conditions and the side slopes of the creek will be constructed at a 2 to 1 slope.

Areas which have a potential of high erosion will be protected with rip rap, reno mattresses, and erosion control mats to reduce future erosion issues.

3.0 ENVIRONMENTAL IMPACTS

Hurricane Creek flows into Castor Creek which is considered an impaired water. Post construction and construction best management practices will be implemented to reduce current sediment discharges into the creek. For each portion of the creek, once the area is brought to final grade, stabilization measures will be applied. A Stormwater Construction Permit will be filed with the LA Department of Environmental Quality prior to construction.

Construction will require a 404 permit with the U.S. Army Corps of Engineers (USACE), Vicksburg District prior to construction.

4.0 LAND REQUIREMENTS

Since construction will occur within the creek, and per state statutes the creek can be accessed for maintenance, no additional land is required.

5.0 CONSTRUCTION PROBLEMS

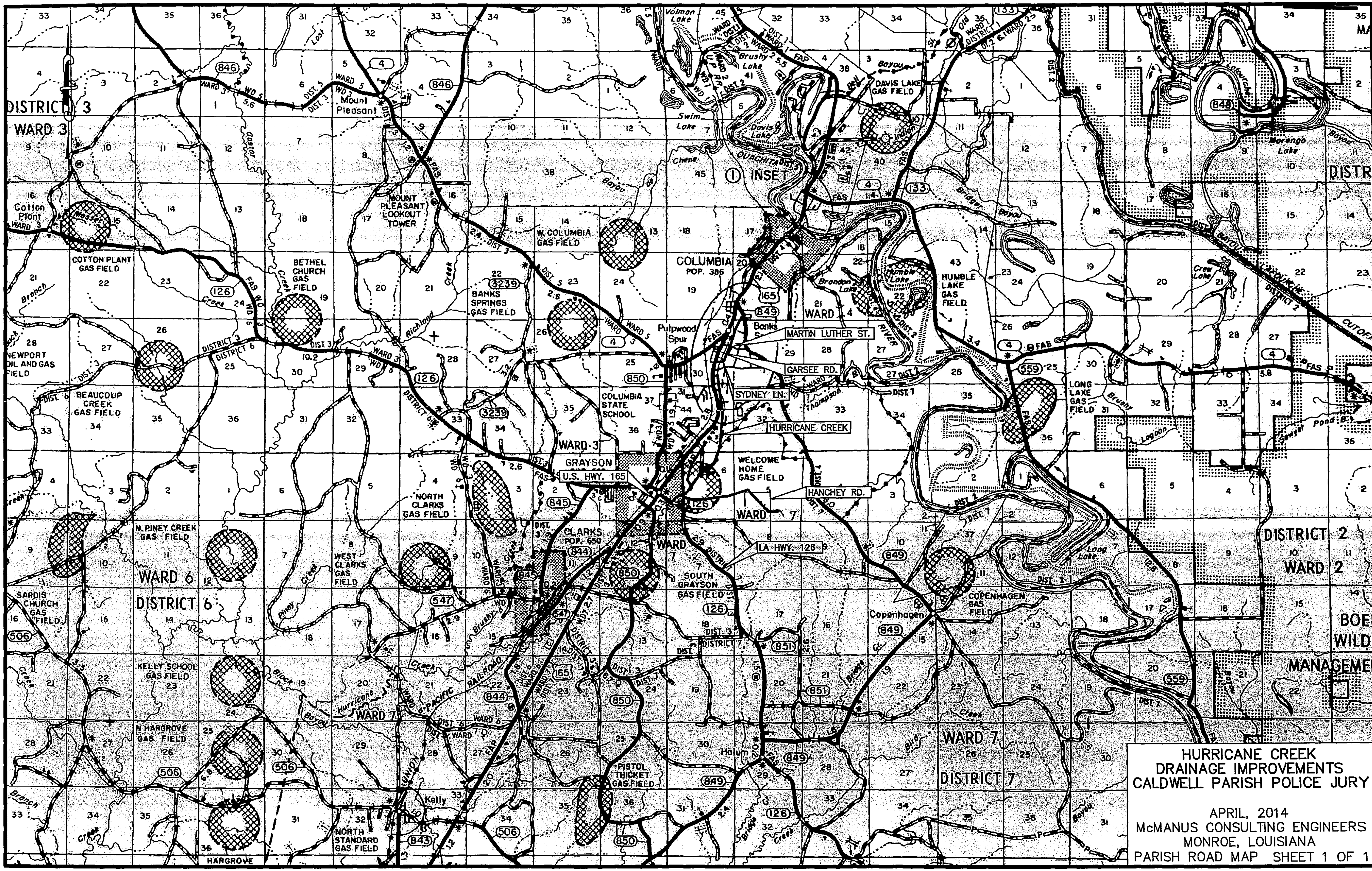
There are no anticipated construction problems with this project. Contractor shall stabilize areas once they reach final grade and shall take careful consideration for adjacent residential structures.

6.0 SUMMARY OF FINDINGS/CONCLUSION

1. Hurricane Creek drainage improvements will comply with the Hazard Mitigation Grant Program application requirements for a 5 yr. storm event design. The Northern portions of the creek and the area East of the High School has been designed for the 10 yr. storm event.
2. The proposed design will improve the drainage conditions of the creek from LA Hwy. 126 to Martin Luther St. by improving inadequate cross sections, replacing ineffective or damaged culverts, and removing the heavy brush and large trees from the creek.
3. Additional design considerations for rip rap stabilization will stabilize areas which are currently showing signs of erosion.
4. There are no additional land requirements. Construction will comply with the state Stormwater Construction Permit requirements and a 404 permit will be filed with the USACE prior to beginning construction.
5. The proposed project will have no adverse impacts upstream or downstream of the project.

APPENDIX

EXHIBIT NO. 1 – PARISH MAP



HURRICANE CREEK
DRAINAGE IMPROVEMENTS
CALDWELL PARISH POLICE JURY

APRIL, 2014
McMANUS CONSULTING ENGINEERS
MONROE, LOUISIANA
PARISH ROAD MAP SHEET 1 OF 1

EXHIBIT NO. 2 – *HYDR 1130:PEAK RUNOFF PROGRAM* USGS RESULTS

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT HYDR1130-071498
HYDRAULICS SECTION
DESIGNER: DATE: 03-02-2015
REMARKS: Hurricane Creek (April 2014)

STATE PROJECT NUMBER 11-11-584E

USGS PEAK DISCHARGE

STATION	50000	
DRAINAGE AREA (SQ. MI.)	1.40	
URBAN ADJUSTMENT RATIO	1.00	
SLOPE (FT./MI.)	21.78	
MEAN ANNUAL PRECIPITATION (IN.)	52.00	
Q2 (CFS)	291.	
Q5 (CFS)	484.	
Q10 (CFS)	614.	
Q25 (CFS)	825.	
Q50 (CFS)	946.	
Q100 (CFS)	1036.	

USGS PEAK DISCHARGE

STATION	10000	
DRAINAGE AREA (SQ. MI.)	4.80	
URBAN ADJUSTMENT RATIO	1.00	
SLOPE (FT./MI.)	5.00	(ADJ.)
MEAN ANNUAL PRECIPITATION (IN.)	52.00	
Q2 (CFS)	304.	
Q5 (CFS)	496.	
Q10 (CFS)	648.	
Q25 (CFS)	898.	
Q50 (CFS)	997.	
Q100 (CFS)	1099.	

Hydrology and Hydraulic Calculations for Hurricane Creek
Caldwell Parish Police Jury
Project No.: 11-11-584E

Given: It is known that the road crossings at Martin Luther St., Garsee Rd., Sydney Ln, and Spartan Dr. flood at relatively small storms. The DOTD design in 1976 Shows that the channel was reviewed for the 2yr, 5 yr, and 10 yr. storms. Using this information we will run the calculations for the 10 yr. storms.

Using the survey information and the 10 yr. storm event, we will create a base point at all of these major crossings at which the analysis of the culverts fail. Once this base point is established, we will run the design analysis with the channel and culvert improvements showing the design will improve the existing conditions.

Several field conditions present make it relatively difficult to predict the exact variables to enter at each culvert. These conditions are as follows: crossings at Martin Luther St. and Sydney Ln. have the culvert skewed from the thalweg of the channel, and between Martin Luther St. and Sydney Ln. the channel has many large trees and a lot of brush along the banks and in the middle of the channel.

In addition, to evaluate the drainage areas, the quad maps are being used. However, we have noted that at the southern portion of Hurricane Creek the quad map for the channel location is incorrect.

Entire Basin Runoff Calculation

According to Chapter 3 of the LADOTD Hydraulics Manual, for drainage areas greater than 2000 acres, the USGS method can be used to determine the runoff

Calculate Intensities

Caldwell Parish, according to Figure 3.4-1, in the vicinity of the project has about 52 inches of mean rainfall a year.

Using the quad maps, three su-basin areas representing the north end of the project, the middle of the project and the end of the project were assessed.

In addition, drainage areas were calculated for those particular road crossings on the north end which are the focus of the project - Martin Luther St., Sydney Ln, Garsee Rd, and Spartan Drive.

Crossings which have bridges such as Rushing Street, Anding Heights Rd, Center St, etc. were not evaluated.

Using LA DOTD Hydr 1130: Peak Runoff Program, the following information was used

Subbasin I -

Total Area - 1.40 sq. mi. (900 acres)

Areas to each road -

Martin Luther	93 ac. =	0.145313 sq. miles
Garsee Rd	160 ac. =	0.25 sq. miles
Sydney Ln	175 ac. =	0.273438 sq. miles

End Station = 500+00

Urbanization Factor = 1

Slope = 21.78 ft/mi.

Subbasin IIA -

Area - 4.80 sq. mi. (3,065 acres)
End Station = 100+00
Urbanization Factor = 1
Slope = 2.89 ft/mi.

Table 1: USGS Method - Flowrates

Subbasin	Q 2yr (cfs)	Q 5yr (cfs)	Q 10yr (cfs)	Q 25yr (cfs)	Q 50yr (cfs)	Q 100yr (cfs)
I	291	484	614	825	946	1036
II	304	496	648	898	997	1099

Analysis of Crossings

Since the drainage areas for the crossings are less than 200 acres, according to Chapter 3 of the LADOTD Hydraulics Manual, the rational method can be used to

Martin Luther Street

Rational Method

The drainage area for Martin Luther St. is approximately 93 acres. using the Rational Method we have the following flows.

$Q = CIA$

A = 93 acres, drainage area
C= run-off coefficient, using Chapter 3-Part C of the LADOTD Hydraulics Manual

Table 2 - Weighted Run-Off Coefficient

C	% of Drainage Area	Description of Area
0.3	35	Unimproved Area
0.4	55	Residental (Suburban)
0.7	10	Commercial

0.395 = Weighted C

I = in/hr, average rainfall intensity. See Table 1 below for values

$Tc = 0.7039\ (L^{0.3917})(C^{-1.1309})(S^{-0.1985})$

L=3,850 ft.
S=0.004 ft./ft.
Tc = 152.804227 min.
2.55 hr.

Calculate intensities

Caldwell Parish is in Region II according to Figure 3.4-2. Using Figure 3.4-4, the Rainfall Intensity Curve for Region II

Table 3: Rational Method - Rainfall Intensities

Period (yr)	Duration (hr)	Intensity (in./hr)	Rainfall Depth (in.)
2	3	0.81	2.42
5	3	1.07	3.22
10	3	1.27	3.82
25	3	1.56	4.68
50	3	1.80	5.39
100	3	2.05	6.16

Calculate run-off rates

Table 4: Rational Method - Run-off Rates

Period (yr)	Duration (hr)	Q, (cfs)
2	3	29.67
5	3	39.43
10	3	46.78
25	3	57.33
50	3	66.01
100	3	75.40

The DOTD design for rechanneling the creek decades ago analyzed the 10 yr, 5yr and 2yr hour storm events.

USGS Method

In order to verify the above rates in comparison to the the rates for the entire subbasin, the results chould be checked against the USGS Method. Using the USGS Method on this small area is not suggested. However, we do know that the drainage area for Subbasin I is 900 acres. Using this information, and the estimate size of drainage area for Martin Luther St. (93 acres), it is estimated that the draiange area for Martin Luther St. contains approximately 10% of the total Subbasin area.

Table 5: USGS Estimated Run-off Rates

Period (yr)	Q, (cfs)
2	29
5	48
10	62
25	83
50	95
100	104

Garsee Road

Rational Method

$Q = CIA$

A = 70 acres, drainage area
C= run-off coefficient, using Chapter 3-Part C of the LADOTD Hydraulics Manual

Table 6 - Weighted Run-Off Coefficient

C	% of Drainage Area	Description of Area
0.3	40	Unimproved Area
0.4	55	Residental (Suburban)
0.7	5	Commercial

0.375 = Weighted C

I = in/hr, average rainfall intensity. See Table 1 below for values

$Tc = 0.7039\ (L^{0.3917})(C^{-1.1309})(S^{-0.1985})$

L=4,775 ft.

S=0.004 ft./ft.

Tc = 176.312851 min.

2.94 hr.

Calculate intensities

Caldwell Parish is in Region II according to Figure 3.4-2. Using Figure 3.4-4, the Rainfall Intensity

Table 7: Rational Method - Rainfall Intensities

Period (yr)	Duration (hr)	Intensity (in./hr)	Rainfall Depth (in.)
2	3	0.81	2.42
5	3	1.07	3.22
10	3	1.27	3.82
25	3	1.56	4.68
50	3	1.80	5.39
100	3	2.05	6.16

Calculate run-off rates

Table 8: Rational Method - Run-off Rates

Period (yr)	Duration (hr)	Q, (cfs)
2	3	49.38
5	3	65.61
10	3	77.84
25	3	95.39
50	3	109.83
100	3	125.46

The DOTD design for rechanneling the creek decades ago analyzed the 10 yr, 5yr and 2yr hour storm events.

USGS Method

The drainage area flowing to Garsee Road is a total of 93 + 70 acres = 163 acres, which is approximately 18% of Subbasin I.

Table 9: USGS Estimated Run-off Rates

Period (yr)	Q_p (cfs)
2	52
5	87
10	112
25	149
50	170
100	186

Sydney Ln

Rational Method

$Q = CIA$

A = 15 acres, drainage area

C= run-off coefficient, using Chapter 3-Part C of the LADOTD Hydraulics Manual

Table 10 - Weighted Run-Off Coefficient

C	% of Drainage Area	Description of Area
0.3	90	Unimproved Area
0.4	10	Residental (Suburban)
0.7	0	Commercial

0.31 = Weighted C

I = in/hr, average rainfall intensity. See Table 1 below for values

$Tc = 0.7039\ (L^{0.3917})(C^{-1.1309})(S^{-0.1985})$

L=5,415 ft.

S=0.004 ft./ft.

Tc = 229.705627 min.

3.83 hr.

Calculate intensities

Caldwell Parish is in Region II according to Figure 3.4-2. Using Figure 3.4-4, the Rainfall Intensity Curve for Region II

Table 11: Rational Method - Rainfall Intensities

Period (yr)	Duration (hr)	Intensity (in./hr)	Rainfall Depth (in.)
2	4	0.63	2.52
5	4	0.85	3.40
10	4	1.02	4.07
25	4	1.26	5.04
50	4	1.46	5.84
100	4	1.68	6.71

Calculate run-off rates

Table 12: Rational Method - Run-off Rates

Period (yr)	Duration (hr)	Q, (cfs)
2	4	34.74
5	4	46.96
10	4	56.19
25	4	69.52
50	4	80.50
100	4	92.52

The DOTD design for rechanneling the creek decades ago analyzed the 10 yr, 5yr and 2yr hour storm events.

USGS Method

The drainage area flowing to Garsee Road is a total of 93 + 70 + 15 acres = 178 acres, which is approximately 20% of Subbasin I.

Table 13: USGS Estimated Run-off Rates

Period (yr)	Q_p (cfs)
2	58
5	97
10	123
25	165
50	189
100	207

Tributary at Caldwell Parish High School

Rational Method

$Q = CIA$

A = 75 acres, drainage area

C= run-off coefficient, using Chapter 3-Part C of the LADOTD Hydraulics Manual

Table 14 - Weighted Run-Off Coefficient

C	% of Drainage Area	Description of Area
0.3	10	Unimproved Area
0.4	85	Residental (Suburban)
0.7	5	Commercial (School)

0.405 = Weighted C

I = in/hr, average rainfall intensity. See Table 1 below for values

$Tc = 0.7039\ (L^{0.3917})(C^{-1.1309})(S^{-0.1985})$

L=6,500 ft.

S=0.004 ft./ft.

Tc = 182.368293 min.

3.04 hr.

Calculate intensities

Caldwell Parish is in Region II according to Figure 3.4-2. Using Figure 3.4-4, the Rainfall Intensity

Table 15: Rational Method - Rainfall Intensities

Period (yr)	Duration (hr)	Intensity (in./hr)	Rainfall Depth (in.)
2	3	0.81	2.42
5	3	1.07	3.22
10	3	1.27	3.82
25	3	1.56	4.68
50	3	1.80	5.39
100	3	2.05	6.16

Calculate run-off rates

Table 16: Rational Method - Run-off Rates

Period (yr)	Duration (hr)	Q, (cfs)
2	24	24.54
5	24	32.60
10	24	38.68
25	24	47.40
50	24	54.58
100	24	62.34

The DOTD design for rechanneling the creek decades ago analyzed the 10 yr, 5yr and 2yr hour storm events.

USGS Method

Using the USGS Method on this small area is not suggested. However, we do know that the drainage area is 3,629 acres for Subbasin II.
75 acres is 2% of Subbasin II.

Table 17: USGS Estimated Run-off Rates

Period (yr)	Q, (cfs)
2	6
5	10
10	13
25	18
50	20
100	22

Breakdown of Flowrates in Subbasin II

USGS Method

Using the USGS Method is suggested on large areas. However, we do
The drainage area is 3,629 acres for Subbasin II.
75 acres is 2% of Subbasin II.

Table 18: USGS Estimated Run-off Rates

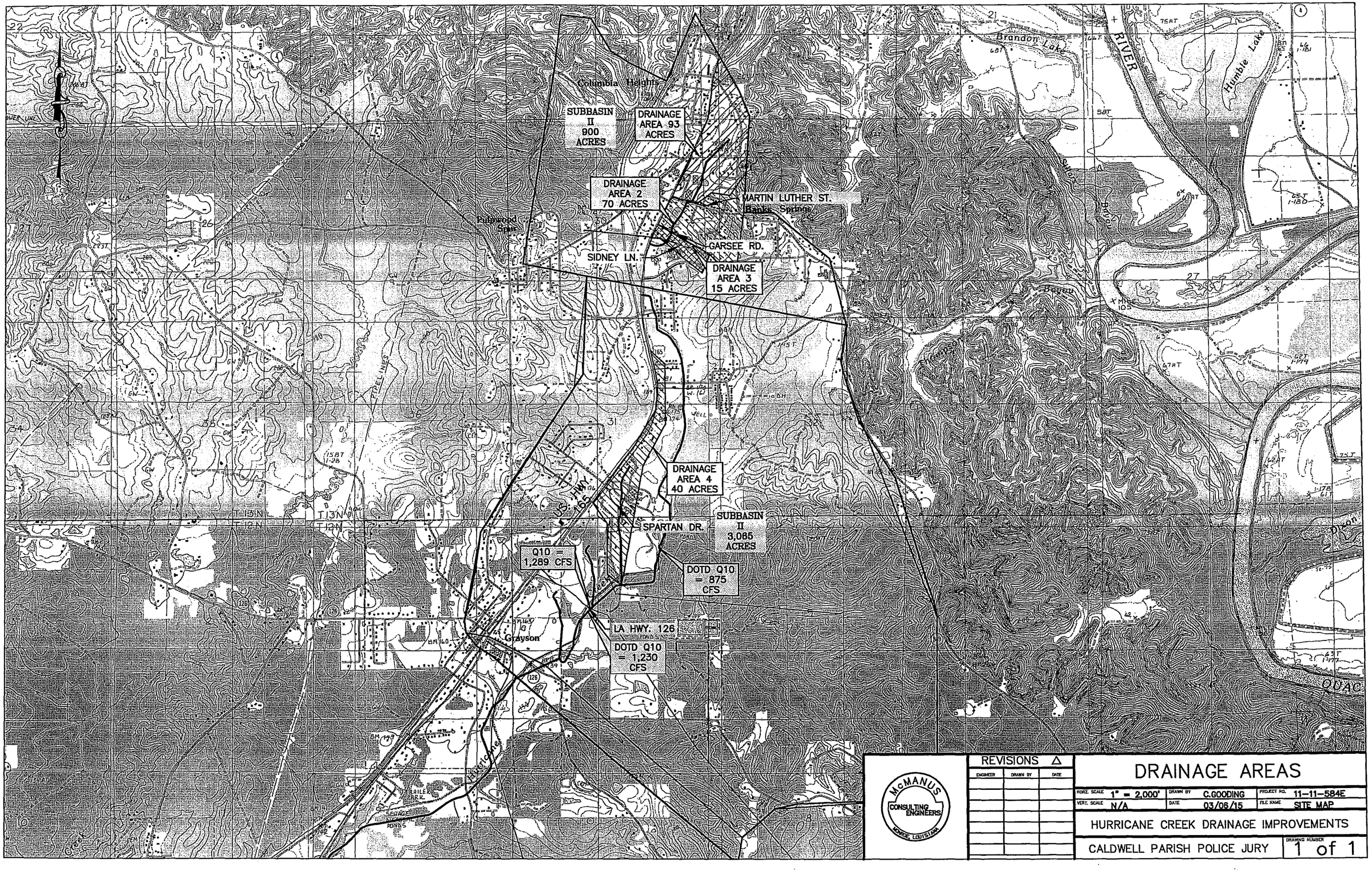
Station	% of Subbasin	2-yr, Q (cfs)	5-yr, Q (cfs)	10-yr, Q (cfs)	25-yr, Q (cfs)	50-yr, Q (cfs)	100-yr, Q (cfs)
23024	0%	291	484	614	825	946	1036
22500	0.5%	293	486	617	829	951	1041
20215	4%	303	504	641	861	986	1080
17400	29%	379	628	802	1085	1235	1355
14900	42%	419	692	886	1202	1365	1498
13708	45%	428	707	906	1229	1395	1531
11500	60%	473	782	1003	1364	1544	1695
11300	93%	574	945	1217	1660	1873	2058
10000	100%	595	980	1262	1723	1943	2135

Note: All of Subbasin 1 flows through Subbasin II in addition to its own area.

EXHIBIT NO. 3 – DOTD DESIGN PROFILE

Hurricane Creek
Drainage Improvement
Caldwell Parish Police Jury
Proj. No 11-11-584E
HMGP #1603N-021-0005
FEMA 1603-DR LA
Exist. Hydrology info on section W-40 of Creek

EXHIBIT NO. 4 – DRAINAGE AREA MAP AND HEC-RAS RESULTS FOR EXISTING AND PROPOSED CHANNEL CONDITIONS



McMANUS CONSULTING ENGINEERS, MONROE, LOUISIANA

REVISIONS △		
ENGINEER	DRAWN BY	DATE

DRAINAGE AREAS

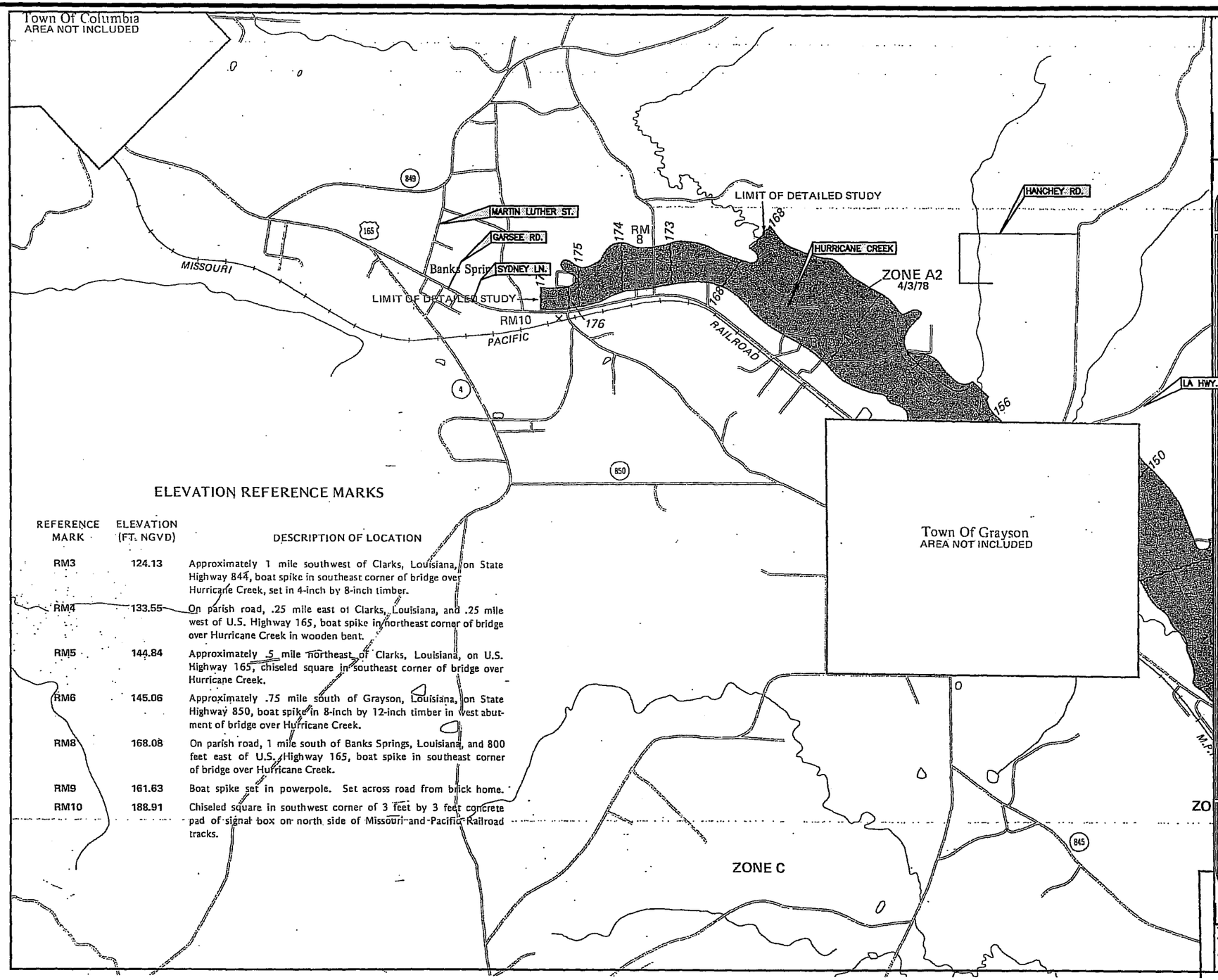
HORZ. SCALE 1" = 2,000'	DRAWN BY C.GOODING	PROJECT NO.	11-11-584E
VERT. SCALE N/A	DATE 03/06/15	FILE NAME	SITE MAP

HURRICANE CREEK DRAINAGE IMPROVEMENTS

CALDWELL PARISH POLICE JURY

DRAWING NUMBER 1 of 1

EXHIBIT NO. 5 – FLOOD PLAIN FIRMETTE MAPS



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM3	124.13	Approximately 1 mile southwest of Clarks, Louisiana, on State Highway 844, boat spike in southeast corner of bridge over Hurricane Creek, set in 4-inch by 8-inch timber.
RM4	133.55	On parish road, .25 mile east of Clarks, Louisiana, and .25 mile west of U.S. Highway 165, boat spike in northeast corner of bridge over Hurricane Creek in wooden bent.
RM5	144.84	Approximately .5 mile northeast of Clarks, Louisiana, on U.S. Highway 165, chiseled square in southeast corner of bridge over Hurricane Creek.
RM6	145.06	Approximately .75 mile south of Grayson, Louisiana, on State Highway 850, boat spike in 8-inch by 12-inch timber in west abutment of bridge over Hurricane Creek.
RM8	168.08	On parish road, 1 mile south of Banks Springs, Louisiana, and 800 feet east of U.S. Highway 165, boat spike in southeast corner of bridge over Hurricane Creek.
RM9	161.63	Boat spike set in powerpole. Set across road from brick home.
RM10	188.91	Chiseled square in southwest corner of 3 feet by 3 feet concrete pad of signal box on north side of Missouri and Pacific Railroad tracks.

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

CALDWELL PARISH, LOUISIANA
(UNINCORPORATED AREAS)

COMMUNITY-PANEL NUMBER
220044 0020 A

PAGE 20 OF 30
(SEE MAP INDEX FOR PAGES NOT PRINTED)

EFFECTIVE
APRIL 3, 1978

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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HURRICANE CREEK DRAINAGE IMPROVEMENTS CALDWELL PARISH POLICE JURY

APRIL, 2014
McMANUS CONSULTING ENGINEERS
MONROE, LOUISIANA
FLOOD PLAIN MAP SHEET 1 OF 1

Hurricane

Prepared by:

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AQUAVEO

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INTRODUCTION

Changes to Hurricane creek, located in Caldwell Parish, Louisiana have been proposed. The proposed changes lie within a special flood hazard area (SFHA) defined by the Federal Emergency Management Agency (FEMA) as an area of land covered by the floodwaters of the base flood. FEMA defines the base flood as the flood having a one percent chance of being equaled or exceeded in any given year. The base flood is also known as the 100-year flood. As the changes are within a SFHA, FEMA's comments, otherwise known as a Conditional Letter of Map Revision (CLOMR), must be requested since the proposed changes could have an effect on the existing regulatory floodway and effective base flood elevations (BFE). The purpose of this report is to document the methodology used for constructing the hydraulic model and results which will be submitted when requesting a CLOMR from FEMA.

BACKGROUND INFORMATION

Hurricane Creek originates from within the town of Bank Springs and discharges into Black Bayou roughly two miles northwest from the town of Kelly Louisiana. The extents of the proposed changes span hurricane creek from Bank Springs to its intersection with Louisiana Highway 126 located within the town of Grayson, LA as shown in Figure 1 in blue. Proposed changes include: 1) the widening and clearing of the bottom of the channel, 2) the replacement of culverts at Martin Luther Street, Garsee Road, and Sidney Lane, 3) the replacement of a bridge at Central Street, and 4) the addition of a storm drain pipe at Martin Luther street.

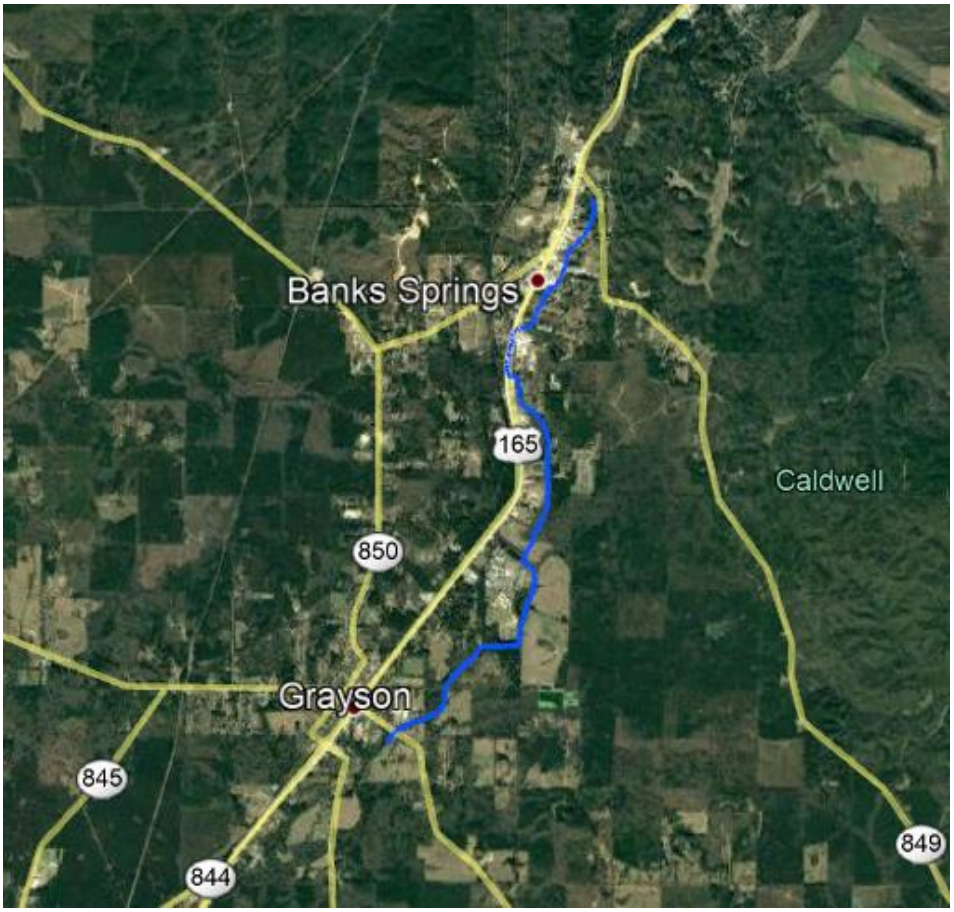

FIGURE 1. SPAN OF HURRICANE CREEK TO BE MODIFIED WITH PROPOSED CHANGES (BLUE)

METHODOLOGY

HYDROLOGY

A hydrologic analysis was not completed with this study. As stated in FEMA guidance documents and the instructions for completing the MT-2 forms a hydrologic study should only be revised and updated if a statistically significant difference can be found in the results of the new study. The proposed changes to Hurricane creek are not expected to have a large impact on the peak flows and volume of runoff for this area. In addition, no drastic changes to the land use have been made since the last study of Hurricane creek was performed. For this reason, the flow rates from the previous hydrologic study have been applied to the hydraulic model, as will be discussed later.

MODEL SELECTION

The effective FIS products for Hurricane creek, have reported BFEs which have been determined using HEC-2. In an effort to improve the study methods, a more recent model was selected to be used for computing the water surface elevations. The model that was selected was the one-dimensional Hydraulic Engineering Center's River Analysis System (HEC-RAS). Two hydraulic models were created. The first represents the existing conditions before the proposed changes are made and will be referred to as the existing model in this report. The second represents

the proposed conditions after changes to the channel and structures are implemented and will be known as the proposed model in this report.

ELEVATION DATA USED FOR GEOMETRY

HEC-RAS geometry is stored in cross sections located at different stations along the study reach. The ground elevations at each cross section for the existing model were extracted from a Triangulated Irregular surface (TIN) that was prepared by combining the National Elevation Dataset (NED) 1/9th arc second resolution DEM (U.S. Geological Survey 2011) with survey data. The survey data was taken at different stations located along the creek and then interpolated from one to another to create a continuous bathymetric surface along Hurricane creek. Figure 2 displays the locations where survey data was collected and used along Hurricane creek, stationing in Figure 2 does not correspond to the stationing found in the HEC-RAS models. The survey data was taken within the main channel and is meant to supplement the NED with a bathymetric surface since the channel bathymetry is not represented well in the NED data. After the two pieces of elevation data were merged together to form the existing conditions surface, cross section elevations were then extracted from this surface.

The ground elevations for the cross sections of the existing model were extracted from a TIN surface that was prepared in a similar manner. A surface was prepared using the NED 1/9th arc second data and a geometric surface representing the west bank and channel bottom for the proposed conditions. The eastern bank is to remain undisturbed. The geometric surface representing the proposed channel was created using the SMS feature stamping tool. After the geometric surface was created, it was then merged into the NED data to complete the proposed conditions surface. Cross section elevations were then extracted from this surface.

When the elevation data was being selected, there were two possible sources for the overbank and floodplain areas, one was the NED 1/9th arc second data and the other was processed LiDAR data from a GIS repository on the Louisiana State University (LSU) website. After analyzing the two which had nearly the same resolution it was found that the LSU LiDAR contained inconsistencies or possible errors in how it was processed or collected. After comparing the NED data with the LSU data, there were tiles which had matching elevations to the NED data on the eastern side of the tile, but moving westward along the tile, the elevations gradually transitioned to elevations about 1 ft. lower than the NED data elevations. Since the differences corresponded to the boundaries of the LiDAR tiles it was determined that the error was with the LSU LiDAR elevations.

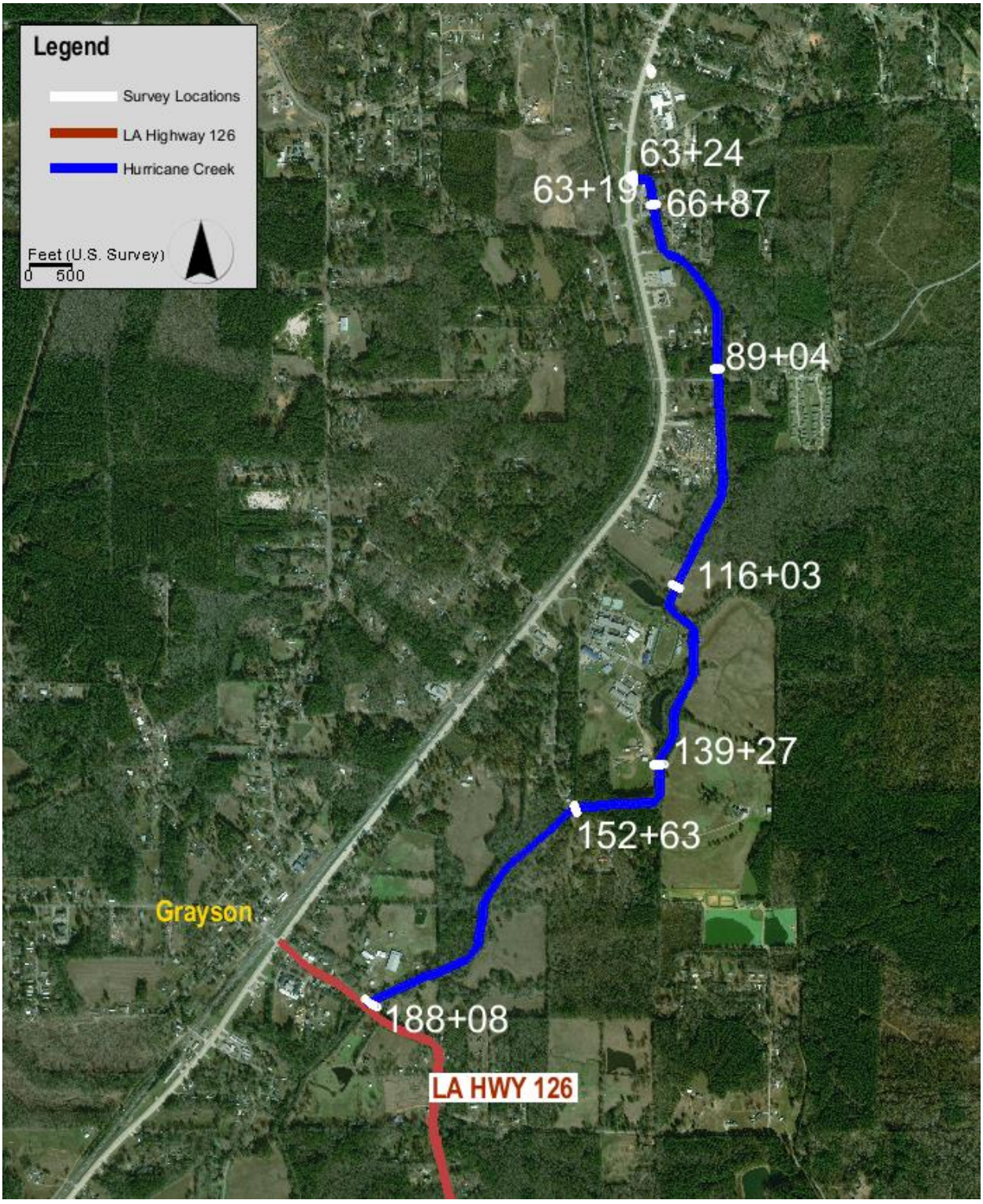

FIGURE 2 LOCATIONS OF FIELD SURVEY USED FOR CREATING THE BATHYMETRIC CHANNEL SURFACE

MANNING'S N VALUE ASSIGNMENTS

Manning's n Values for the models were determined based on a combination of studying aerial imagery and mapping street view products as well as studying the proposed condition plans near and within the channel. Figure 3 shows the classified zones used to assign the Manning's n values.

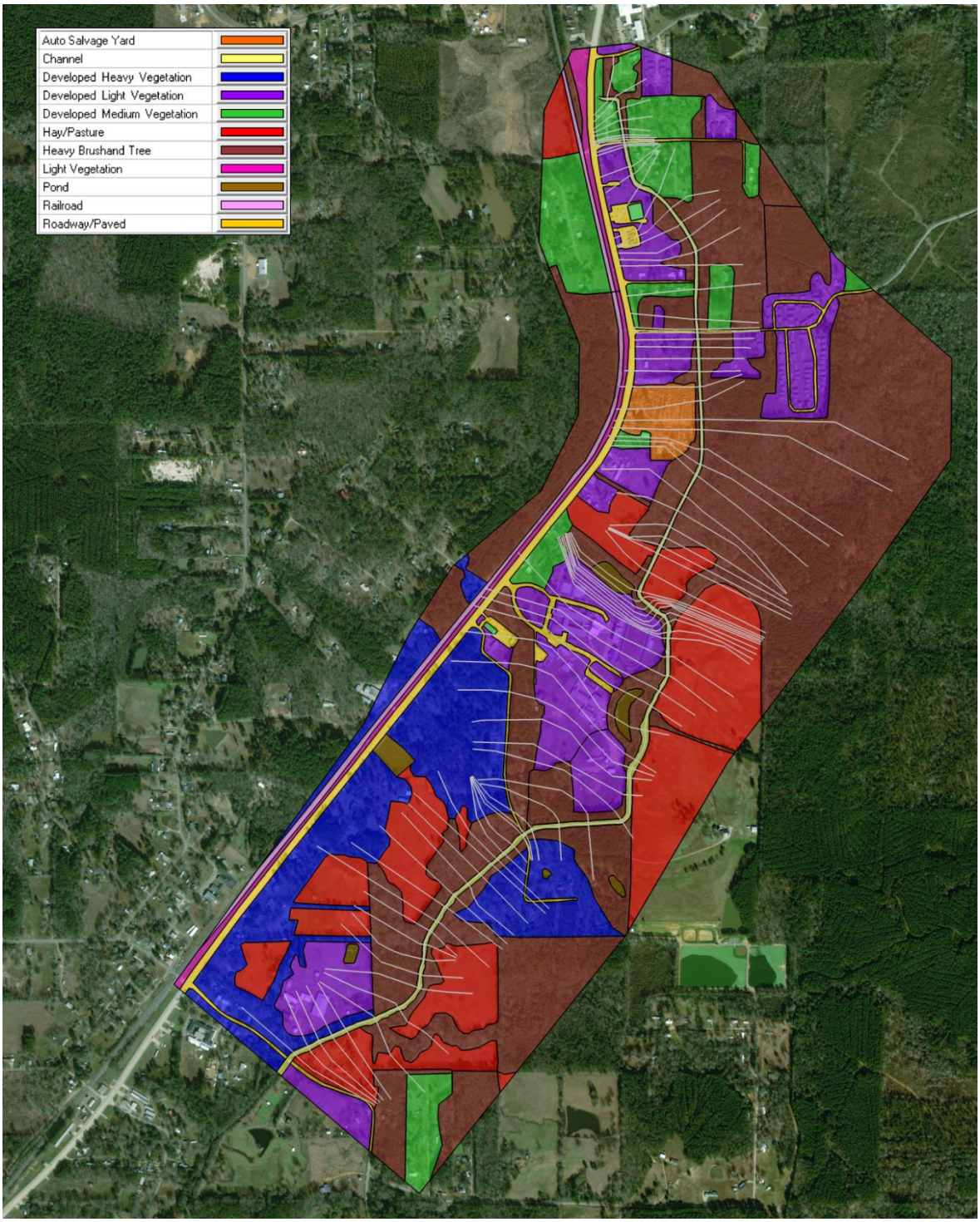

FIGURE 3. CLASSIFIED ZONES FOR ASSIGNING MANNING'S N VALUES TO THE CROSS SECTIONS

Using the classified zones from Figure 3 cross sections extracted were overlaid as shown in Figure 3 and Manning's n values were assigned to the different zones. Table 1 displays the Manning's n value assignments for each of the classified zones. The Manning's values were selected with guidance from an FHWA hydraulics publication. (Schall 2008)

TABLE 1. MANNING'S N ASSIGNMENTS

	Manning's n value	
Material Zone	Existing	Proposed
Auto Salvage Yard	0.12	0.12
Channel	0.052	0.05
Developed-Heavy Vegetation	0.08	0.08
Developed-Light Vegetation	0.036	0.036
Developed-Medium Vegetation	0.064	0.064
Hay/Pasture	0.032	0.032
Heavy Brush and Tree	0.16	0.16
Light Vegetation	0.0336	0.0336
Pond	0.02	0.02
Railroad	0.032	0.032
Roadway/Paved	0.012	0.012

STARTING WATER SURFACE ELEVATION

HEC-RAS requires a starting water surface elevation which is applied on the furthest downstream cross section. Since only a portion of Hurricane Creek is being restudied, the model must tie into the existing floodplain boundaries. Published BFEs were included near Louisiana Highway 126 of 155 ft. on the upstream side and 154 ft. on the downstream side. Starting water surface elevations between these two BFEs were varied until the results tied into the effective FIS products. The final selected WSE for the 100yr flood was 154.85 ft. The starting water surface elevation for the 500yr year flood was selected to be 155.1 ft. This was determined after reviewing the table of values from the HEC-2 study. The WSE for the 10yr and the 50yr events were estimated based on normal depths at the downstream cross section as this also agreed well with the previous HEC-2 study.

APPLIED FLOW RATES

Flow rates from the original HEC-1 analysis were applied to the RAS model for the 10, 50, 100 and 500 year events. To apply the flow rates in the same manner they were applied for the effective HEC-2 study, the table of results provided by FEMA was used as a guide. In that table stationing along Hurricane Creek is listed alongside the applied model flow rates. The stationing was correlated to geographic locations along Hurricane creek by using the lettered GIS cross section shapefile, downloaded with the effective data, and the lettered stations in the table of HEC-2 results. As shown in Figure 4, a station, cross section letter, and corresponding flowrates are all reported in the table. The locations where flows changed were corresponded to model cross sections and applied as flow changes in HEC-RAS.

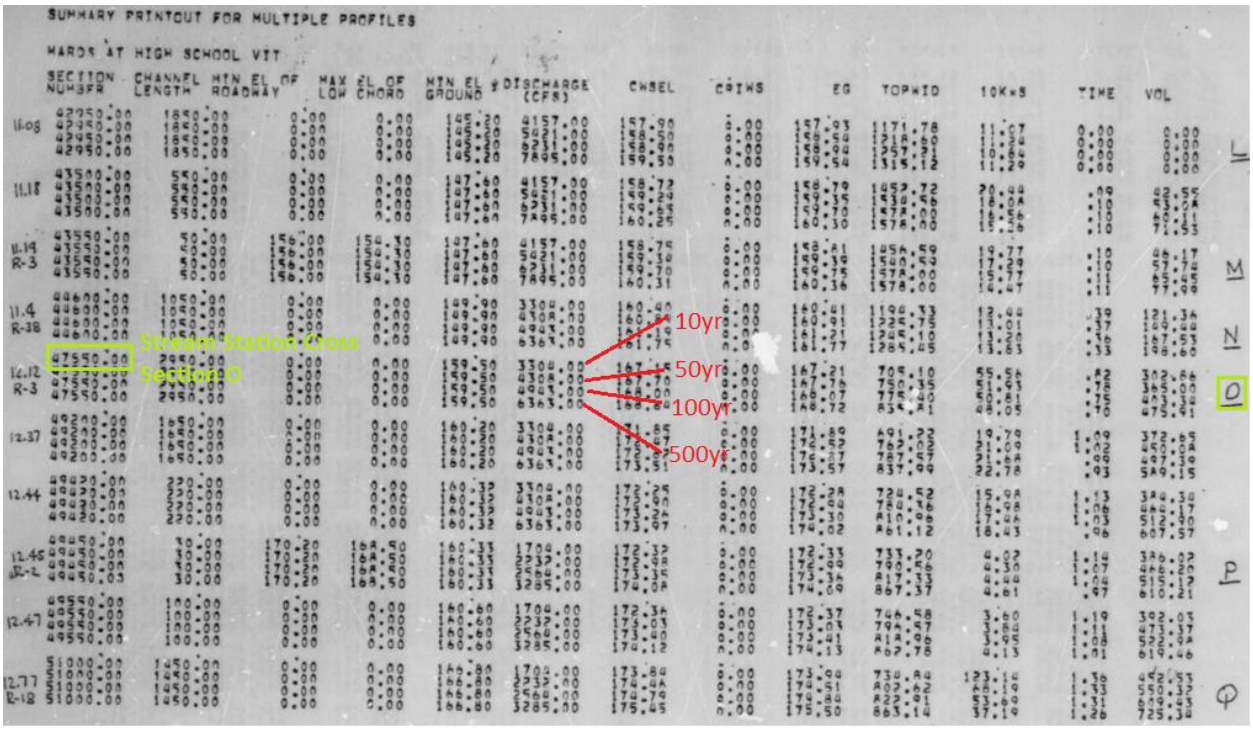

FIGURE 4. HEC-2 RESULTS TABLE FROM EFFECTIVE HEC-2 STUDY ALONG HURRICANE CREEK

Within the extents of the model, there were four flow locations denoted by F1, F2, F3 and F4 in Figure 5. Also shown in Figure 5 are the HEC-RAS cross sections in red and the effective HEC-2 lettered cross section locations. Table 2 displays the cross section station where flow changes were applied (does not correspond to the stationing found in the HEC-2 results table) along with the 10, 50, 100 and 500yr flow magnitudes.

TABLE 2. FLOW CHANGE LOCATIONS AND MAGNITUDES

Flow Change Name	RAS Flow Change Cross Section Station	Q-10yr (cfs)	Q-50yr (cfs)	Q-100yr (cfs)	Q-500yr (cfs)
F1	12711.29	1704	2232	2564	3285
F2	11477.37	3304	4308	4943	6363
F3	8222.465	4157	5421	6231	7895
F4	466.992	4745	6188	7120	9104

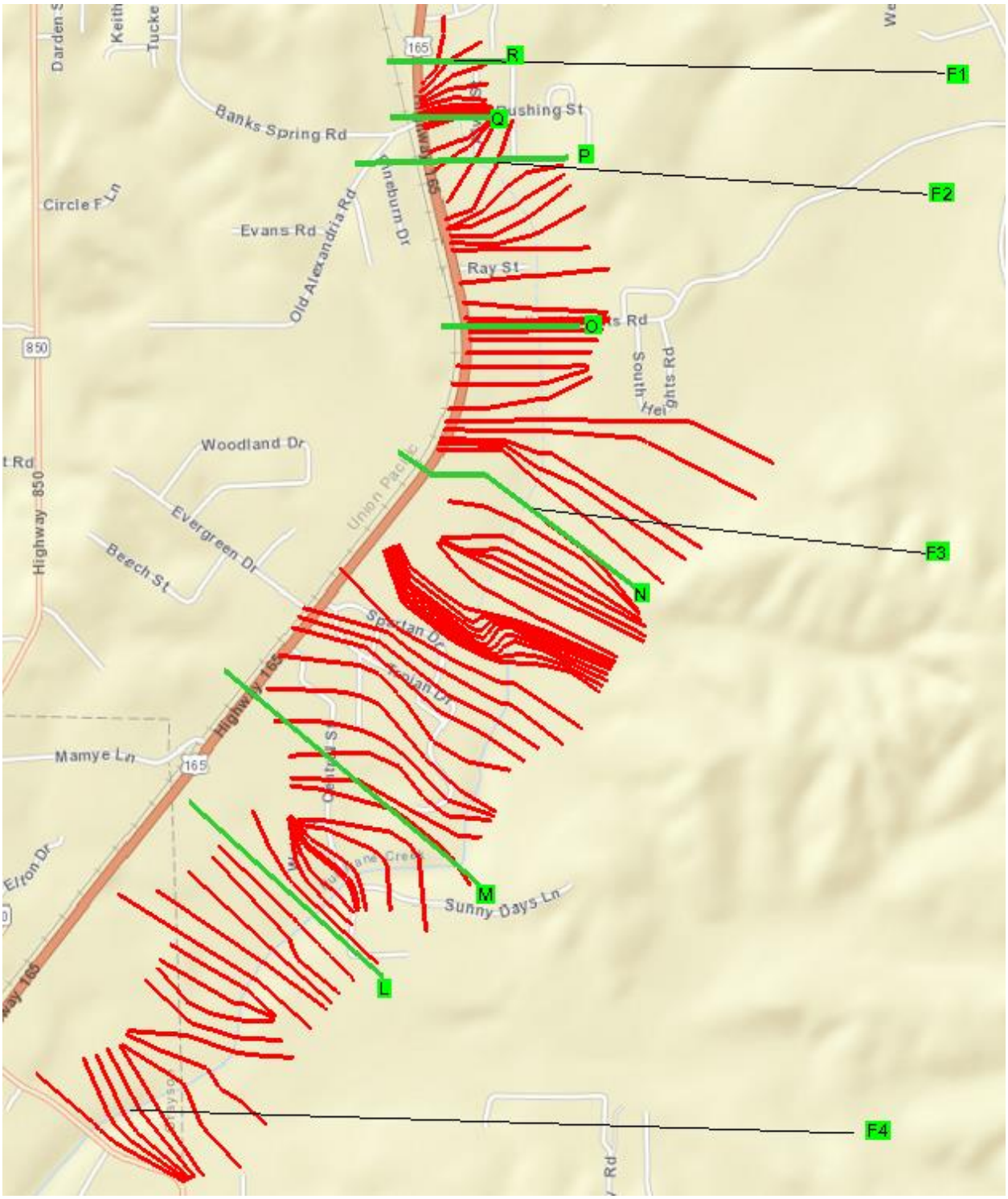

FIGURE 5. FLOW CHANGE LOCATIONS, HEC-RAS CROSS SECTIONS (RED), AND EFFECTIVE HEC-2 CROSS SECTIONS (GREEN)

STRUCTURES

Three roadway crossing bridges were included in the model. These included crossings at Central Street, Anding Heights Road, and Rushing Street. The bridge crossing deck high chord was extracted from the NED 1/9th arc second elevation data by placing a centerline and extracting the elevation values. The deck low chord was determined by subtracting the deck thickness, as scaled from engineering drawings, from the high chord elevations. Bridge spans and pier centerlines were all also scaled from engineering drawings and built into the bridge geometry in the model. Figure 6 and Figure 7 show the existing Central Street bridge drawing and bridge definition in RAS respectively.

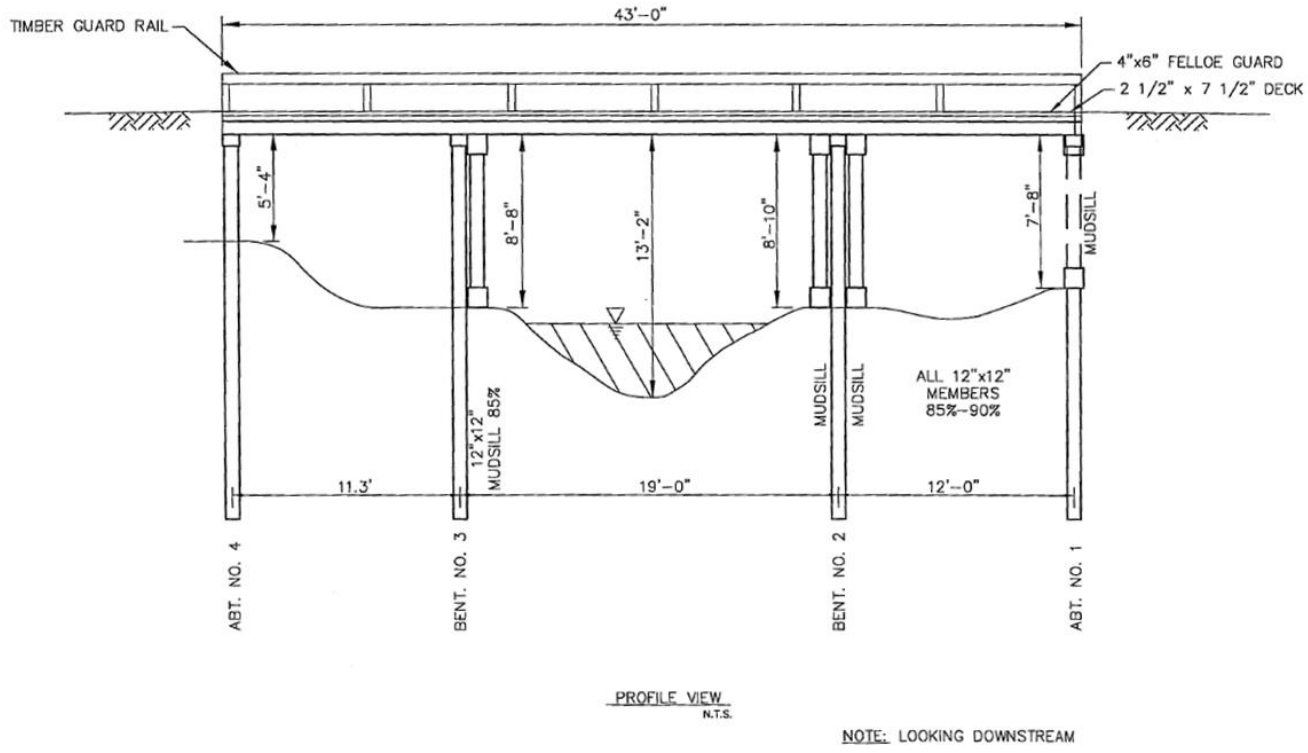

FIGURE 6. EXISTING CENTRAL STREET BRIDGE DRAWING

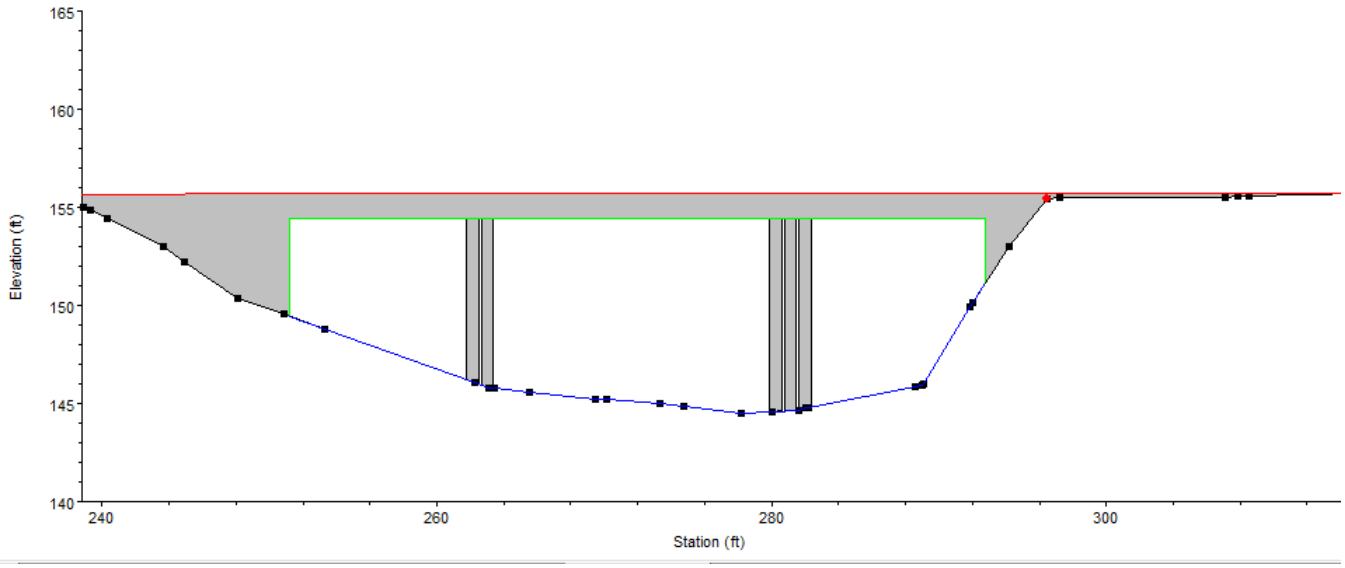

FIGURE 7. EXISTING CENTRAL STREET BRIDGE AS DEFINED IN RAS

FLOODWAY

The floodway was delineated as per the prescribed FEMA process. First, a new floodway profile was defined in the RAS model and the starting water surface elevation for the profile was set to be 1 foot higher than the base 100yr profile. Next, HEC-RAS encroachments were run on the floodway profile by choosing the HEC-RAS encroachment method 4 and running the model. Encroachment method 4 works by setting a target rise, in this case 1 foot, and letting it compute an equal reduction in conveyance from the right and left overbanks. Once HEC-RAS has computed this initial encroachment estimate, then the encroachment values that were calculated are then transferred to the HEC-RAS encroachment method 1 which allows the modeler to specify encroachment stations on the right and left overbanks.

The process then involved starting on the downstream end and modifying the encroachment stations ensuring that floodway width transitions from cross section to cross section are smooth. It also involves increasing or decreasing the floodway width so as to not “squeeze” the floodplain too much and cause adjacent upstream cross sections to surcharge greater than 1 foot.

While going through this process, the original floodway extents were used as a guide and where possible the newly computed floodway was kept within or equal to the locally accepted floodway extents. In a few areas the new floodway is wider than the old floodway. This was necessary to comply with the FEMA regulation that surcharges caused by encroachments which are greater than 1 foot are not in compliance. In these areas, land use was considered and areas that were less developed or more naturally undisturbed were selected for the increased width. This analysis was performed on the existing conditions model. The computed floodway from the existing conditions model was then applied to the proposed condition model without any additional changes.

FLOODPLAIN BOUNDARIES

In order to delineate the floodplain, the HEC-RAS computed water surface elevations (WSE) were imported into the Watershed Modeling System (WMS) software along with the same TIN surface that was used to extract the

cross section elevations. Within WMS, the WSE values were interpolated to the TIN surface creating flood depth and WSE datasets. The flood depth datasets were then converted to boundary lines at the 0 ft. depth contour.

SENSITIVITY AND CALIBRATION

Several variations of the Manning's n roughness values were utilized for different runs to understand how the model's level of sensitivity to that parameter. The model was determined to be fairly sensitive to the changes as water surface elevations would rise with higher roughness values and lower with lower roughness values.

There was not any measured calibration data that could be used to calibrate the model, such as a USGS streamflow station, however, as variations to the Manning's roughness values were made, comparisons were made to the reported water surface elevations found in the effective flood insurance study (FIS) report for the lettered cross sections. Ultimately, a set of Manning's n values were selected which yielded water surface elevations matching the water surface elevations in the FIS as close as possible. Comparisons between the reported water surface elevations in the FIS and corresponding computed water surface elevations from the existing and proposed HEC-RAS models can be seen in the following section of the discussion of results.

RESULTS

The existing and proposed models were both run for the 10%, 2%, 1% and 0.2% flood events. The results were analyzed and floodplains and floodways were delineated based on those results. A table of reported and computed water surface elevations can be seen in Table 3. As seen in the table, most of the computed existing conditions WSE are within at least 0.6 ft. of the reported WSE from the effective FIS report. The one exception is cross section P and cross section 11477.377, which differs by 1.9 ft. Without detailed information about the setup of the HEC-2 model, it is difficult to explain why this area is drastically different. It is likely that differences in the channel or floodplain for this area existed when the HEC-2 model was created back in the 70's, such as different amounts of vegetation in the floodplain or different channel configuration.

TABLE 3. REPORTED AND COMPUTED WSE COMPARISONS

Effective Lettered Cross Section Name	Corresponding Model Cross Section	100yr WSE Reported in Effective FIS (ft.)	100yr WSE Computed in Existing Model (ft.)	100yr WSE Computed in Proposed Model (ft.)
L	3046.557	158.8	158.2	158.0
M	4529.759	161.1	160.5	160.3
N	8222.466	167.9	168.1	168.0
O	9938.179	173.2	172.3	172.2
P	11477.377	174.7	176.6	176.4
Q	12124.864	177.3	176.9	176.8
R	12644.166	178.1	178.0	177.9

Table 3 also lists the computed 100yr proposed water surface elevations. As shown, the proposed WSEs in the table were, on average, about 0.15 ft. lower than the existing conditions model. A detailed set of tables for the existing and proposed model results can be found looking at the summary tables in the HEC-RAS models.

As mentioned in the methodology section a floodway encroachment analysis was performed on the existing and proposed models. A summary of their results can be seen in Table 4. As shown for the existing model, the differences in reported WSE for these cross sections between the normal and floodway encroachment run are around 0.9 ft. higher. Differences between the normal proposed run and the floodway encroachment run are slightly lower, with most around 0.8 ft. higher. See the HEC-RAS summary table called "Encroachment 1" within the HEC-RAS model to find a more complete table of results for both the existing and proposed conditions for all cross sections in the model. As required, the floodway encroachment run for both the existing and proposed models do not have greater than a 1.0 ft. rise at any cross section.

TABLE 4. TABLE OF COMPUTED VALUES COMPARED TO THE FLOODWAY ENCROACHMENT RUNS

HEC-RAS Model Cross Section	100yr WSE Computed in Existing Model (ft.)	100yr WSE Computed in Existing Model Floodway Run (ft.)	Difference (ft.)	100yr WSE Computed in Proposed Model (ft.)	100yr WSE Computed in Proposed Model Floodway Run (ft.)	Difference (ft.)
3046.557	158.2	158.9	0.7	158.0	158.6	0.7
4529.759	160.5	161.3	0.8	160.3	161.1	0.8
8222.466	168.1	168.8	0.7	168.0	168.6	0.6
9938.179	172.3	172.7	0.4	172.2	172.5	0.3
11477.377	176.6	177.4	0.8	176.4	177.2	0.8
12124.864	176.9	177.8	0.9	176.8	177.6	0.8
12644.166	178.0	178.4	0.4	177.9	178.2	0.3

Floodplain boundaries were delineated, and floodplain extent maps were created. Four maps were created for the CLOMR submittal request to FEMA which include two annotated flood insurance rate maps (FIRM) and two topographic maps displaying all the required information. Figure 8 and Figure 9 show a view of one of the completed FIRMs and one of the completed topographic maps. To see all four maps at a higher resolution/level of detail, please refer to the separate PDF maps that were generated and delivered to McManus engineering with this report. The FIRM maps show the delineated boundaries from the proposed model along with reported BFEs from the proposed model. The topographic maps show the contours of the proposed conditions surface TIN, as well as the floodplain extents for the Effective 100yr and 500yr models, and the Existing, and Proposed 10, 50, 100 and 500yr models. It also includes the channel thalweg/profile baseline, as well as the HEC-RAS cross sections with stationing listed.

As noted in the topographic maps, the derived floodway extents are different than the effective floodway extents in several areas. Through the middle of the proposed changes, the floodway tends to bulge out much wider than the previously accepted floodway. There are also areas where the floodway is a bit narrower than the previously accepted floodway. Care was taken to try and remain within the effective floodway boundaries; however, to comply with the no rise criteria, the floodway had to be extended further into the floodplain to keep the WSE surcharges down below 1 foot.

The existing and proposed base flood floodplain extents are also a bit wider than the effective base flood boundaries in some areas on the northern part of the model. This is due to higher water surface elevations that were computed through this area. As previously discussed, a sensitivity/calibration effort was taken to try and

match the computed existing water surface elevations as close as possible to the reported water surface elevations in the FIS report.

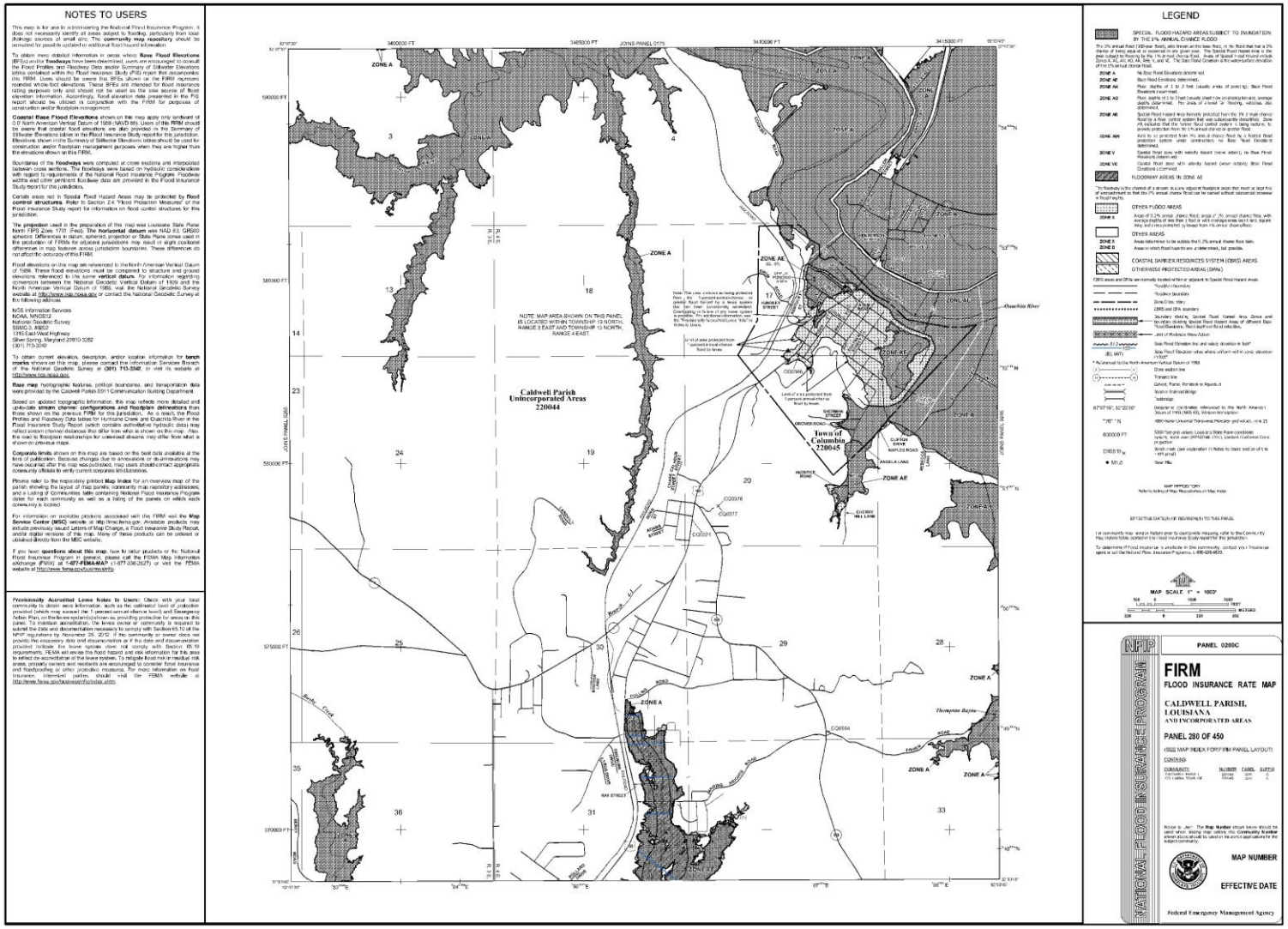

FIGURE 8. VIEW OF ONE OF THE TWO COMPLETED FIRM MAPS

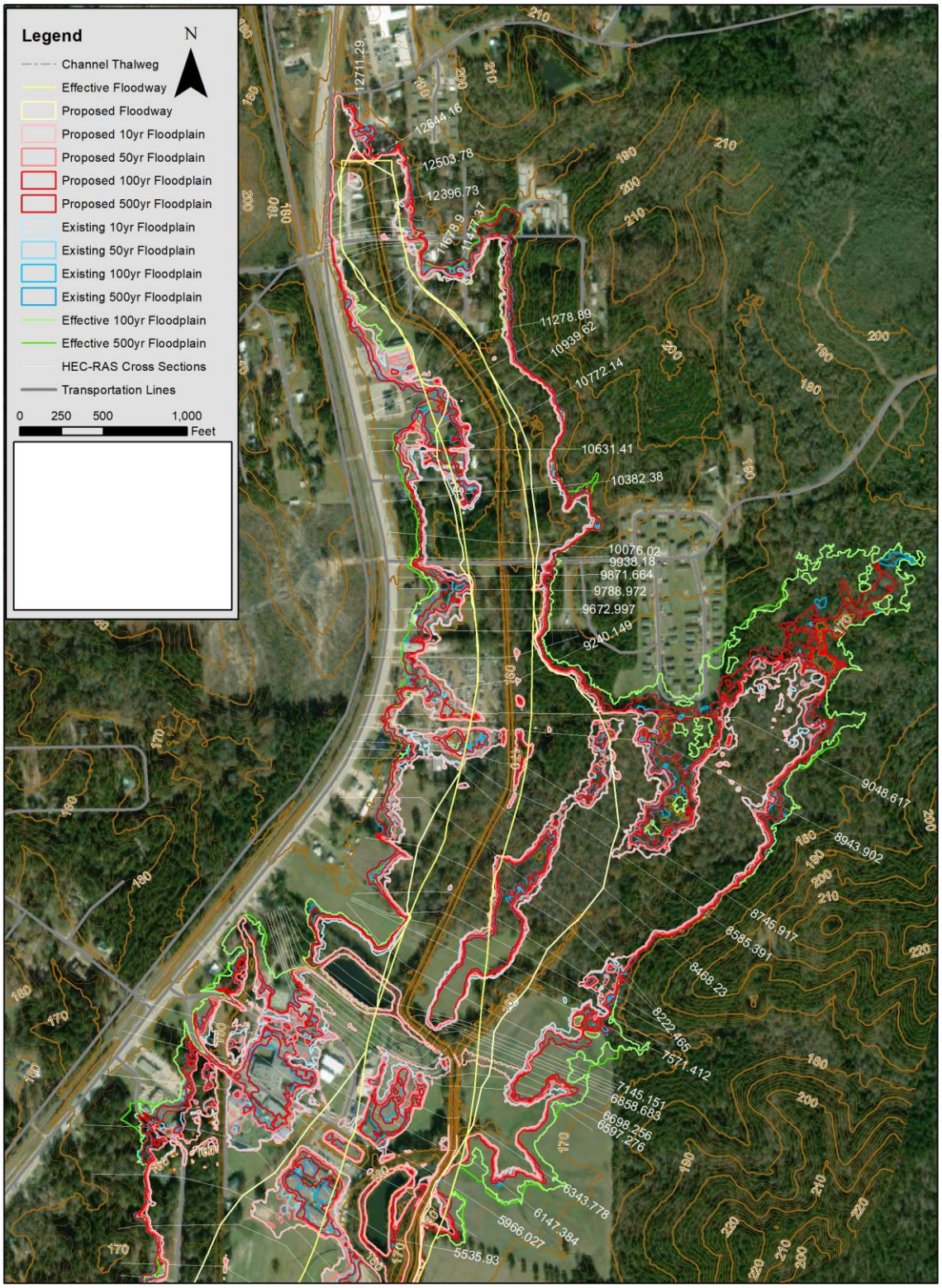

FIGURE 9. VIEW OF ONE OF THE TWO COMPLETED TOPOGRAPHIC MAPS

CONCLUSION

A 1D analysis was performed following the described methodology in this report for the purpose of analyzing the hydraulic conditions along Hurricane creek which could result from the planned and designed proposed changes to the channel and some of the structures. Annotated FIRMs and topographic maps with floodway and floodplain extents have been created to provide McManus engineering with the necessary data files to submit a request for a CLOMR from FEMA. Additional steps may be required as the proposed floodway and floodplain boundaries differ from the previously accepted FIS.

Tony Melcher, P.E., Ph.D.

REFERENCES

Schall, J. D., Richardson, E. V., & Morris , J. L. (2008). Introduction to Highway Hydraulics Hydraulic Design Series Number 4, Fourth Edition. Report No. FHWA-NHI-08-090 (HDS-4)

HEC-RAS (Hydrologic Engineering Center-River Analysis System Version 5.0.3) [Computer software]. Released September 2016. U.S. Army Core of Engineers Hydrologic Engineering Center

WMS (Watershed Modeling System Version 10.1) [Computer software]. Retrieved November 9, 2017, from http://www.aquaveo.com/software/wms-watershed-modeling-system-introduction

SMS (Surface Water Modeling System Version 12.2) [Computer software]. Retrieved December 19, 2017, from http://www.aquaveo.com/software/sms-surface-water-modeling-system-introduction

U.S. Geological Survey (2011). USGS NED ned19_n32x00_w092x25_la_statewide_east_2008 1/9 arc-second 2011 15 x 15 minute IMG. Raster Digital Data. Reston, VA. U.S. Geological Survey. http://ned.usgs.gov/

APPENDIX A. RESPONSE TO REVISIONS

Please find below our (Aquaveo) response to items 3, 5, and 6 from the reviewers. Our responses are given in red:

3a)

Subparagraph 65.6 (a)(8) of the National Flood Insurance Program (NFIP) regulations states that the revised conditions hydraulic analysis for a flooding source with established elevations of the 1-percent-annual-chance (base) flood must include an evaluation of the same recurrence intervals studied in the effective Flood Insurance Study (FIS), such as the base flood along with the 10-percent-, 2-percent-, and 0.2-percent-annual-chance floods, and of the regulatory floodway.

Please revise the submitted existing conditions and proposed conditions hydraulic models to include all of the above-referenced intervals. In the floodway analysis, please ensure that the surcharges do not exceed the 1.0-foot maximum allowed and there are no surcharges that are less than 0.0 feet. Also, please ensure that the encroachment stations are located in the flood fringe, the area between the channel banks and the boundary of the base floodplain.

Both the proposed and the existing models now include the 10, 50, 100, and 500yr floods in the analysis. Those flood profiles are contained within the "MultipleProfiles" plan for the both existing and proposed models. Care was taken to ensure that surcharges in the floodway analysis are between 0 and 1 foot. Additionally, it was verified that encroachment stations were located between channel banks and the base flood (100yr) floodplain extent.

3b)

Our review revealed that the encroached (floodway) profile is included with the multiple profile plan. Please create two separate plans; the multiple profile plan and the floodway plan. The floodway plan should only include the encroached (floodway) and unencroached (natural) base flood profiles. The unencroached and encroached profiles for the proposed conditions floodway plan should use the geometry file from the existing conditions multiple profile plan along with the base flood discharge from the proposed conditions multiple profile plan.

The existing and proposed models now each contain two HEC-RAS plans: "MultipleProfiles" and "Floodway". The MultipleProfiles plan contains the 10, 50, 100, and 500yr flow profiles. The "Floodway" plan contains the "100yr_BaseFlood" (unencroached) and "100yr_Encroached" (encroached) flow profiles.

3c)

Typically, culvert Section 2 is located a short distance downstream of the culvert outlet, and culvert Section 3 is located a short distance upstream of the culvert inlet. Please revise Sections 2 and 3, which occurs at Cross Section 3514.409, 9938.180, 9973.175, 12167.75 and 12196.70 or insert a new cross section, so that it is located at an appropriate distance from the culvert outlet, or provide an explanation why this section is set far from the culvert outlet.

The location of the above mentioned cross sections has been changed to be closer to the culvert outlet. Cross sections 12196.70 and 12167.75 are located 1.93 feet upstream and downstream of the bridge respectively. Cross sections 9973.175 and 9938.180 are located 2.5 feet upstream and downstream of the bridge. Cross sections 3514.409 and 3482.303 are located 2.05 feet upstream and downstream of the bridge respectively.

3d)

Bridge modeling at the proposed culverts located at Cross Sections 3509, 9970, 12191 do not follow the bridge modeling as described in the HEC-RAS Hydraulic Reference Manual. For example, the manual recommends use of ineffective flow areas upstream and downstream of a bridge. Please revise the model to incorporate modeling recommendations in the manual.

The above mentioned bridges now contain ineffective flow areas in cross sections 12196.70 and 12167.75, 9973.175 and 9938.180, and 3514.409 and 3482.303. The ineffective flow areas were computed according to guidance provided in the HEC-RAS Hydraulic Reference Manual.

3e)

According to the HEC-RAS Hydraulic Reference Manual, the typical contraction and expansion loss coefficients are equal to 0.3 and 0.5, respectively, at bridge and culvert Sections 2, 3, and 4 and are equal to 0.1 and 0.3, respectively, at all other sections including bridge and culvert Sections 1 and 5. Please revise the submitted proposed conditions hydraulic model so that the contraction and expansion loss coefficients are equal to 0.3 and 0.5, respectively, at Cross Sections 9938.18, 3482.303, 9973.175, 3514.409, 12220.42, 10076.02, and 3595.591; and also 0.1 and 0.3, respectively, at Cross Section 12243.62 or provide an explanation of why the contraction and expansion loss coefficients used in the model were chosen.

The models now use contraction and expansion loss coefficients of 0.3 and 0.5 respectively at bridge and culvert crossings. Contraction and expansion loss coefficients of 0.1 and 0.3 are used at all other cross sections.

3f)

The channel bank stations must be selected so that a relatively flat overbank area exists outside the channel banks at or below the 1-percent-annual-chance water-surface elevation (WSEL). Please revise the overbank stations to reflect the natural channel banks at Cross Sections 5007.026, 5203.672 and 5535.93, or provide an explanation why the channel bank stations used in the model were chosen.

The channel banks have been modified for cross sections 5007.026 and 5535.93 in the existing conditions model so that the overbank areas are a bit flatter where possible. Channel banks have been modified for cross sections 5007.026, 5203.672, and 5535.93 in the proposed model.

3g)

Our review revealed discrepancies in the locations of the encroachment stations along the revised reach of Hurricane Creek. Please revise the proposed conditions hydraulic model for Hurricane Creek, so that the encroachment stations are located at the bank stations or in the floodway fringe, the area between the channel bank station and the limits of the 1-percent-annual-chance (base) floodplain, at Cross Sections 3336.858, 5203.672, 5966.027, 6698.256, 6969.485, 7062.365, 7145.151, 7655.159, 9384.613, 11096.61, 12644.16 and 12711.29.

Aquaveo has verified that all encroachment stations are located within the floodway fringe.

5)

5. The topwidths of the base floodplain and floodway computed in the proposed conditions hydraulic model match do not match the floodplain and floodway topwidths shown on the topographic work map at the cross sections listed below. Please revise the work map or hydraulic model as appropriate to resolve these discrepancies. The geometry of the cross sections in the proposed conditions hydraulic model should reflect the topography shown on the work map.

Hurricane Creek	Base Floodplain Topwidth (feet)	
Cross Section	Model	Map (approximate)
2545.298	868	673
8943.902	1715	1829
10772.14	684	879
10939.62	613	706
11096.61	491	587
Hurricane Creek	Floodway Topwidth (feet)	
Cross Section	Model	Map (approximate)
2545.298	540	620
10772.14	359	492
10939.62	365	443

Care has been taken to make sure that mapped top widths throughout the model are the same as the topwidths reported in the existing and proposed conditions models. As a result, the delineated floodplains contain islands and gaps, whereas previously they were removed.

6)

6. Please continue to show the flow line (profile baseline) used in the hydraulic model. Our review revealed discrepancies between the reach lengths shown on the topographic work map and the reach lengths used in the submitted hydraulic HEC-RAS models at the following cross sections. Please resolve these discrepancies and submit revised topographic work maps or revised models as appropriate. Please ensure that the reach lengths between cross sections shown on the work map match the reach lengths given in the submitted hydraulic models.

Hurricane Creek	Reach Length (feet)	
Cross Section	Model	Map (approximate)
321.683	283	129
619.237	289	151
1800.908	298	171
2101.634	301	157
2396.306	295	177
2728.682	332	195
3046.559	318	147
3216.102	170	98

We have ensured that reach lengths reported in the existing and proposed models agree with the reach lengths displayed in the topographic work maps.

McMANUS CONSULTING ENGINEERS

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February 27, 2020

State of Louisiana
Governor's Office of Homeland
Security & Emergency Preparedness
1500 Main Street
Baton Rouge, LA 70802

email: roland.spano@la.gov

Attn: Roland Spano

Re: Caldwell Parish Police Jury
Hurricane Creek Drainage Improvements
HMGP #1603N-021-0005
FEMA-1603-DR-LA, Project #0363
Project No. 11-11-584E

Dear Mr. Spano:

The proposed above project will be removing debris, trees, sediment from Hurricane Creek and reshaping one bank of the channel; thereby, reducing the water surface elevations and reducing flooding. A public notice is about to be issued as a part of the Conditional Letter of Map Revision (CLOMR) process to inform land owners of the changes to the Flood Insurance Rate Maps (FIRM) for the proposed project. Prior to the submission of the CLOMR , we wanted all parties to be aware of the significance of the request for the CLOMR process.

Please note, the attached *FEMA Hydraulic Analysis* report shows the changes to these maps are caused by the differences in modeling between 1970's Flood Insurance Study (FIS) model and "existing" conditions. The maps have changed between the 1970's and proposed conditions for two reasons. The survey data from lidar is more accurate compared to land topographic surveys in the 1970's. Second, the channel has filled in over the years, and this project will not be able to return the channel back to its 1970's cross-section.

Table 3 on page 11 of the report shows the following:

Effective Lettered Cross Section Name	Corresponding Model Cross Section	100yr WSE Reported in Effective FIS (ft.)	100yr WSE Computed in Existing Model (ft.)	100yr WSE Computed in Proposed Model (ft.)
L	3046.557	158.8	158.7	158.2
M	4529.759	161.1	160.6	160.2
N	8222.466	167.9	168.4	168.2
O	9938.179	173.2	172.7	172.4
P	11477.377	174.7	177.0	176.6
Q	12124.864	177.3	177.3	176.9
R	12644.166	178.1	178.2	177.9

The differences between the 1970's FIS model and "existing" conditions are as follows:

- Increase in Base Flood Elevations (BFEs) at the location of Rushing Street (Cross Section P).
- Decrease in BFEs in various locations between Anding Heights Road and LA 126.
- Increase in floodway width up to 645 ft. North of Spartan Drive, and a decrease in floodway width of 290 ft. just North of LA 126.

These differences will cause the landowners, in some areas, increases in their flood insurance rates and affect how they can build on their land; thereby, causing a heated issue between the public and the Police Jury. Even though the proposed improvements remove trees, debris and sediment from the channel and improve the water surface elevations, the existing FIRM map results cannot be copied in a hydraulic model or achieved, which is affectively what is driving the revision to the FIRM maps.

In addition, the CLOMR process requires certain steps if the BFEs increase between existing conditions and post conditions. Please note that even though the BFEs are increasing at one location, they increase between the 1970s model and the existing conditions. The post condition water surface elevations are lower than the pre-conditions. Therefore, the project will be submitted showing a "Not Applicable" for this step.

Attached are the existing FIRM maps with the proposed conditions overlayed, *FEMA Hydraulic Analysis* report, the 1970s FIS data received from FEMA, and the CLOMR submittal checklist. Upon your review, should you have any additional questions, please feel free to contact us.

I remain sincerely,

McManus Consulting Engineers, Inc.

Cinnamon Gooding, P.E.,
Chief Engineer

cc: Caldwell Parish Police Jury, c/o Ms. Cheryl Lively, email: cherylcppj@att.net (w/ enclosures)
Mr. Bob Mears, email: bobmears37@msn.com (w/o enclosures)
File (w/ enclosures)

MT-2 REVISION REQUEST SUBMITTAL CHECKLIST

PART A: GENERAL REQUIREMENTS

ELEMENTS	Yes	N/A
NARRATIVE: Please provide a written description of the purpose of the request, the scope of the proposed/as-built project, and the methodology used to analyze the project effects.	✓	
MT-2 APPLICATION FORMS: Please provide completed forms applicable to your request. Ensure that MT-2 Form 1 was signed by the requester, certifying engineer, and each community affected by the revision.	✓	
HYDROLOGIC ANALYSIS: If applicable, please provide a FEMA-acceptable hydrologic analysis in digital format, a drainage area map, and associated backup information (e.g., calculations used to determine lag time, CN, and loss values, as well as land use and soil maps). FEMA-acceptable models can be accessed at https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/numerical-models-meeting-minimum-requirements.	✓	
HYDRAULIC ANALYSIS: Please provide a FEMA-acceptable hydraulic analysis in digital format. Information on FEMA-acceptable models can be accessed at https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/numerical-models-meeting-minimum-requirements.	✓	
CERTIFIED TOPOGRAPHIC WORK MAP: Please provide a certified topographic work map that meets the mapping requirements outlined in MT-2 Form 2. If available, please provide spatially referenced Geographic Information System (GIS) data. If GIS data are not available, you may submit digital Computer-Aided Design (CAD) data.	✓	
ANNOTATED FIRM: Please submit a revised Flood Insurance Rate Map (FIRM), at the scale of the effective FIRM, which shows the revised boundary delineation of the base (1-percent-annual-chance) floodplain, 0.2-percent-annual-chance floodplain, and regulatory floodway and how it ties into the boundary delineation shown on the effective FIRM at the downstream and upstream ends of the revised reach.	✓	
REVIEW FEE PAYMENT: Please include the appropriate review fee payment. The current fee schedule is available on the FEMA website at https://www.fema.gov/flood-map-related-fees.	✓	
MEET 65.10 REQUIREMENT: If you intend to show that a berm/levee/floodwall reduces the flood hazard, please submit all the NFIP data requirements outlined in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR §65.10).		✓
OPERATION AND MAINTENANCE PLAN: If the request involves a berm, levee, floodwall, dam, and/or detention basin project, please submit an officially adopted operation and maintenance plan.		✓
o**PROPOSED/AS-BUILT PLANS:** Please submit proposed/as-built plans, certified by ao registered Professional Engineer, for all project elements for which this applies.		✓
FLOODWAY NOTICE: If the revision results in changing or establishing regulatory floodway boundaries, please provide a floodway public notice or a statement by your community that it has notified all affected property owners, in compliance with the National Flood Insurance Program (NFIP) regulations at 44 CFR §65.7(b)(1).	✓	
PROPERTY OWNER NOTIFICATION: If the revision results in any widening/shifting/establishing of a base floodplain and/or any increasing/establishing of Base Flood Elevations (BFEs), please provide copies of the individual legal notices sent to all property owners affected by increased flood hazards.	✓	

PART B: CONDITIONAL LETTER OF MAP REVISION (CLOMR) - SPECIFIC REQUIREMENTS

ENDANGERED SPECIES ACT (ESA) COMPLIANCE: Please submit documentation of compliance with the ESA requirements. To learn more about ESA compliance, please see page 28 of the MT-2 instructions.	✓	
REGULATORY REQUIREMENTS OF 44 CFR §65.12: If the proposed project results in BFE increases between the pre-project (existing) conditions and the proposed conditions, and they are more than 0.00 foot as a result of encroachment within a regulatory floodway, or more than 1.0 foot in a Zone AE area that has no regulatory floodway, please submit: (a) certification that no structures are affected by the increased BFE; (b) documentation of individual legal notices sent to all affected property owners, explaining the impact of the proposed action on their property; and (c) an evaluation of alternatives that would not result in a BFE increase.		✓

Note: Applicants are encouraged to submit their Letter of Map Change (LOMC) revision request using the Online LOMC tool. To learn more about the Online LOMC tool, please visit the FEMA website at https://www.fema.gov/online-lomc.

Page 1 of 6	Issue Date: May 28, 2021	Case No.: 20-06-3058R	CLOMR-APP

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT

COMMUNITY INFORMATION		PROPOSED PROJECT DESCRIPTION	BASIS OF CONDITIONAL REQUEST
COMMUNITY	Caldwell Parish (Unincorporated Areas) Louisiana	BRIDGE CHANNELIZATION	1D HYDRAULIC ANALYSIS FLOODWAY UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 220044		
IDENTIFIER	Hurricane Creek	APPROXIMATE LATITUDE AND LONGITUDE: 32.060, -92.095 SOURCE: Other DATUM: NAD 83	

AFFECTED MAP PANELS			
TYPE: FIRM*	NO.: 22021C0280C	DATE: September 5, 2012	* FIRM - Flood Insurance Rate Map
TYPE: FIRM	NO.: 22021C0290C	DATE: September 5, 2012	

FLOODING SOURCE AND REACH DESCRIPTION

Hurricane Creek – from the upstream side of State Highway 126 to the downstream side of U.S. Route 165

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
Hurricane Creek	New 70' Steel Bridge	Approximately 100 feet downstream of the confluence of Branch 3-2
	Channelization	from the upstream side of State Highway 126 to the downstream side of U.S. Route 165

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
Hurricane Creek	Zone AE	Zone AE	Yes	Yes
	BFEs*	BFEs	Yes	Yes
	Floodway	Floodway	Yes	Yes
	Zone X (shaded)	Zone X (shaded)	Yes	Yes
	Zone A	Zone A	None	Yes

* BFEs - Base (1-percent-annual-chance) Flood Elevations

COMMENT

This document provides the Federal Emergency Management Agency's (FEMA's) comment regarding a request for a CLOMR for the project described above. This document is not a final determination; it only provides our comment on the proposed project in relation to the flood hazard information shown on the effective National Flood Insurance Program (NFIP) map. We reviewed the submitted data and the data used to prepare the effective flood hazard information for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. Your community is responsible for approving all floodplain development and for ensuring that all permits required by Federal or State/Commonwealth law have been received. State/Commonwealth, county, and community officials, based on their knowledge of local conditions and in the interest of safety, may set higher standards for construction in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood). If the State/Commonwealth, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Page 1 of Conditional Letter of Map Revision (20-06-3058R) for Community No. 220044 (Caldwell Parish, LA; Unincorporated Areas) affecting FIRM Panels 22021C0280C and 22021C0290C, dated September 5, 2012. Comment document shows the summary of impacts to the flood hazard data for Hurricane Creek.

Page 1 of 6	Issue Date: May 28, 2021	Case No.: 20-06-3058R	CLOMR-APP

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT

COMMUNITY INFORMATION		PROPOSED PROJECT DESCRIPTION	BASIS OF CONDITIONAL REQUEST
COMMUNITY	Village of Grayson Caldwell Parish Louisiana	BRIDGE CHANNELIZATION	1D HYDRAULIC ANALYSIS FLOODWAY UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 220329		
IDENTIFIER	Hurricane Creek	APPROXIMATE LATITUDE AND LONGITUDE: 32.060, -92.095 SOURCE: Other DATUM: NAD 83	

AFFECTED MAP PANELS			
TYPE: FIRM*	NO.: 22021C0290C	DATE: September 5, 2012	* FIRM - Flood Insurance Rate Map

FLOODING SOURCE AND REACH DESCRIPTION

Hurricane Creek – from the upstream side of State Highway 126 to the downstream side of U.S. Route 165

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
Hurricane Creek	New 70' Steel Bridge	Approximately 100 feet downstream of the confluence of Branch 3-2
	Channelization	from the upstream side of State Highway 126 to the downstream side of U.S. Route 165

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
Hurricane Creek	Zone AE	Zone AE	Yes	Yes
	BFEs*	BFEs	None	Yes
	Floodway	Floodway	None	Yes
	Zone X (shaded)	Zone X (shaded)	Yes	Yes

* BFEs - Base (1-percent-annual-chance) Flood Elevations

COMMENT

This document provides the Federal Emergency Management Agency's (FEMA's) comment regarding a request for a CLOMR for the project described above. This document is not a final determination; it only provides our comment on the proposed project in relation to the flood hazard information shown on the effective National Flood Insurance Program (NFIP) map. We reviewed the submitted data and the data used to prepare the effective flood hazard information for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. Your community is responsible for approving all floodplain development and for ensuring that all permits required by Federal or State/Commonwealth law have been received. State/Commonwealth, county, and community officials, based on their knowledge of local conditions and in the interest of safety, may set higher standards for construction in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood). If the State/Commonwealth, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

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Page 1 of Conditional Letter of Map Revision (20-06-3058R) for Community No. 220329 (Village of Grayson, Caldwell Parish, LA) affecting FIRM Panel 22021C0290C, dated September 5, 2012. Comment document shows the summary of impacts to the flood hazard data for Hurricane Creek.

Appendix E

Other Information (Public Notice, 8-Step Process, & FONSI)

FEMA PUBLIC NOTICE OF AVAILABILITY FOR THE DRAFT ENVIRONMENTAL ASSESSMENT AND DRAFT FINDING OF NO SIGNIFICANT IMPACT FOR THE PROPOSED CALDWELL PARISH POLICE JURY HURRICANE CREEK, CALDWELL HIGH SCHOOL TRIBUTARY, AND HANCHEY ROAD TRIBUTARY DRAINAGE IMPROVEMENTS, BANKS SPRINGS TO THE VILLAGE OF GRAYSON, LOUISIANA

Interested parties are hereby notified that the Federal Emergency Management Agency (FEMA) has prepared a draft Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) in compliance with the National Environmental Policy Act (NEPA). The purpose of the draft EA is to assess the effects on the human and natural environment from improvements to the capacity of Hurricane Creek and two of its tributaries, Caldwell High School Tributary and Hanchey Road Tributary in Caldwell Parish, Louisiana.

The Caldwell Parish Police Jury, through the Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), applied for funding under FEMA's Hazard Mitigation Grant Program (HMGP) to reduce localized flooding during and after major storm events in Hurricane Creek. The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. In accordance with the HMGP, the Caldwell Parish Police Jury proposes to reduce the impacts of flooding during rain events in the proposed project area by implementing hazard mitigation measures.

The specific need of this project is to effectively alleviate localized flooding experienced during and after storm events. Portions of the creek are located in residential areas and are prone to flooding in relatively small storm events. The existing site conditions within the four (4) project areas include inadequate culverts, ineffective culverts, heavy brush and large trees, and inadequate cross sections. Thick brush and large trees have flourished within the main portions of the channel which restrict water flow causing the stream to back up and overtop the banks. As portions of the creek flood, erosion occurs, and banks wash in and slough off. Woody material falls in, washes in, or blows into the channel reducing the capacity of the channel. To address these issues, the Subrecipient proposes to improve existing drainage by expanding the capacity of the inadequate and ineffective culverts and cross sections and clear portions of the creek to allow better drainage and reduce the negative impacts of bank erosion and sediment discharges downstream. The proposed project is essential to the mitigation of the ongoing flooding of residences, businesses, schools, and public buildings served by Hurricane Creek.

The purpose of the draft EA is to analyze the potential environmental impacts associated with the Preferred Action and Alternatives. The draft EA evaluates a No Action Alternative; the Preferred Action Alternative, which would re-channel, reshape, and restore approximately 3.5 miles of bank line, replace existing culverts, and install a new railroad flat car bridge to mitigate the flood damage to homes, schools, and businesses affected by the flooding in the Hurricane Creek; and a Considered Action Alternative which would straighten and widen the creek for stormwater

drainage. The draft FONSI is FEMA's finding that the Preferred Action would not have a significant effect on the human and natural environment.

The draft EA and draft FONSI are available for review at the following location: Caldwell Parish Library, at 211 Jackson Street, Columbia, LA – Mondays through Fridays 8:00am to 5:00pm; and Saturdays 8:30am to 12:00pm. This public notice will run in the journal of record, The Caldwell Watchman, for three (3) days on Wednesdays, August 17, 2022; August 24, 2022; and August 31, 2022; and in The Shreveport Times for five (5) days on Monday, August 15, 2022, through Friday, August 19, 2022. The document can also be downloaded from FEMA's website at http://www.fema.gov/resource-document-library. There will be a 30-day comment period beginning on August 8, 2022 and concluding on September 5, 2022 at 4 p.m. Written comments may be mailed to: DEPARTMENT OF HOMELAND SECURITY-FEMA EHP – Caldwell Parish Hurricane Creek Drainage Improvements, 1500 MAIN STREET, BATON ROUGE, LOUISIANA, 70802. Comments may be emailed FEMA-NOMA@fema.dhs.gov or faxed to 225-346-5848. Verbal comments will be accepted or recorded at 225-267-2962. If no substantive comments are received, the draft EA and associated draft FONSI will become final.

EXECUTIVE ORDER 11988/11990

FLOODPLAIN MANAGEMENT/WETLANDS – CHECKLIST (44 CFR Part 9)

APPLICANT:	**Caldwell Parish Police Jury**
COUNTY/STATE:	**Caldwell Parish/Louisiana**
COORDINATES:	**Hurricane Creek Northern Segment (Project Area 1)** Start: 32.082166°, -92.097768° End: 32.078417°, -92.094816° **Hurricane Creek Southern Segment (Project Area 2)** Start: 32.074965°, -92.095524° End: 32.047914°, -92.105708° **Caldwell Parish High School Tributary (Project Area 3)** Start: 32.060018°, -92.097715° End: 32.054397°, -92.097768° **Hanchey Road Tributary (Project Area 4)** Start: 32.047295°, -92.090252° End: 32.047361°, -92.090431°
PROPOSED ACTION: *(Provide a brief scope of work)*	Improve drainage of Hurricane Creek and two (2) of its tributaries, Caldwell High School Tributary and Hanchey Road Tributary, located approximately 1.5 mile south of the town of Columbia, Louisiana near the communities of Banks Springs and Grayson in Caldwell Parish. Improvements include rechanneling, reshaping, and restoring approximately 3.5 miles of bank line, replacement of existing culverts under private driveways and under Martin Luther Street, Garsee Road, and Sidney Lane, and installation of a new railroad flat car bridge at the Central Street crossing.

APPLICABILITY: Actions which have the potential to affect floodplains/wetlands or their occupants, or which are subject to potential harm by location in floodplains/wetlands.

☒**YES** ☐**NO** The proposed action could potentially adversely affect the floodplain/wetlands.

Remarks: Portions of the proposed project are in the 100-year floodplain and in a designated floodway. Jurisdictional wetlands identified in portions of Hurricane Creek and Hanchey Road Tributary.

Compliance with 44 CFR 65.12, revisions of flood insurance rate maps to reflect BFE caused by proposed encroachments, was achieved on 5/28/2021, per CLOMR 20-06-3058-R.

☐**YES** ☒**NO** The proposed action could potentially be adversely affected by the floodplain/wetlands.

Remarks: Nationwide Permit No. 3 (USACE Reference Number MVK-2011-1213) issued on 10/19/2018.

ACTION:

☐ **Review against 500 Year floodplain (for Critical Action)**

☒ **Review against 100 Year floodplain**

☐ **Not Applicable (for actions located in wetland only)**

STEP NO. 1 — Determine whether the proposed action is located in the 100-year floodplain (500-year floodplain for critical actions) and/or wetland; (44 CFR §9.7).

Caldwell Parish enrolled in the NFIP on 04/30/1978 and the Village of Grayson enrolled in the NFIP on 07/09/1981. According to the National Flood Insurance Program's (NFIP) Flood Insurance Rate Map (FIRM) Panel 22021C0280C, dated 9/5/2012, the proposed project site for Project Area 1 (PA 1), the northern portion of Hurricane Creek, is located within Zone X, outside the special flood hazard area (SFHA). Per the FEMA FIRM Panels 22021C0280C and 22021C0290C, dated 9/5/2012, the proposed project site for Project Area 2 (PA 2), the southern portion of Hurricane Creek, is located within Zone X, outside the SFHA, and Zone AE, which is the 100-year floodplain or an area subjected by the 1% annual chance flood with BFE determined. Portions of this section are also located within a designated floodway. For Project Area 3 (PA 3), the Caldwell High School Tributary, the proposed project site is located within Zone AE per the FEMA FIRM Panel 22021C0290C, dated 9/5/2012. Portions of this site are also located within a designated floodway. For Project Area 4 (PA 4), the Hanchey Road Tributary, the proposed project site is located within Zone X, outside the SFHA, and Zone AE, per the FEMA FIRM Panel 22021C0290C, dated 9/5/2012. Portions of this section are also located within a designated floodway. Even though portions of the project area are not in the flood zone, they are still subjected to local flooding.

A review of the National Wetland Inventory (NWI) online mapper queried on 10/17/2017, for the proposed sites indicates that mapped riverine wetlands are present in the project areas. Jurisdictional wetland areas were identified at two (2) locations in the proposed work areas: an area approximately 180 ft. south of Martin Luther St. between Martin Luther St. and Garsee Rd. and another wetland area along the Hanchey Rd. Tributary where Hurricane Creek crosses under Hanchey Rd. Proposed project work in these areas would be avoided to the extent practicable. In addition, the USACE supplied preliminary jurisdictional determination information, dated May 1, 2018, showing an area of wetlands along Hurricane Creek just south of LA Hwy. 849. This portion of the project is included in the Parish SOW which extends approximately 1,300 LF upstream from just north of Martin Luther St. (also north of PA 1). This portion was to extend to LA Hwy. 849; however, the Parish SOW would not be performed in the wetland area. A Department of the Army Nationwide Permit No. 3 (NWP 3) maintenance permit (ID No. MVN-2011-1213) was issued on October 19, 2018. Per the USACE documents, approximately 0.69 ac. of wetlands within the project site would be avoided and a mitigation credit purchase would not be required.

STEP NO. 2 — Notify the public at the earliest possible time of the intent to carry out an action in a floodplain/wetland, and involve the affected and interested public in the decision-making process; (44 CFR §9.8)

☒ Notice was provided as part of a disaster cumulative notice:

Newspaper: A cumulative public notice concerning the Hazard Mitigation Grant Program (HMGP) Assistance in floodplain and wetland areas was published in the New Orleans Times Picayune, Baton Rouge Advocate, Lafayette Daily Advertiser, Lake Charles American Press, Hammond Star, Monroe News-Star,

Shreveport Times, and the Alexandria Daily Town Talk.

Date: 11/7/2005 to 11/9/2005

☒ Project Specific Notice (e.g. EA, newspaper, public meeting, etc):

Type of Public Notice: The Shreveport Times and the Caldwell Watchman

Date: August 8-12, 2022 & August 10, 17, and 24, 2022, respectively.

STEP NO. 3 Identify and evaluate practicable alternatives to locating the proposed action in a floodplain/wetland (including alternatives sites, actions and the "no action" option). (44 CFR §9.9)

Alternative Options

☐**YES** ☒**NO** Is there a practicable alternative site location outside of the floodplain/wetland?

If yes, provide the site location:

☐**YES** ☒**NO** Is there a practicable alternative action outside of the floodplain/wetland that will not affect the floodplain/wetland?

If yes, describe the alternative action:

☐**YES** ☒**NO** Is the NO Action alternative the most practicable alternative?

If a practicable alternative exists outside the floodplain/wetland, FEMA must locate the action at the alternative site.

REMARKS:

Alternative 1 (No Action): Implementation of the No Action Alternative would entail no hazard mitigation measures or enhanced flood reduction at the project sites. Consequently, this alternative would not provide any type of protection to residents of the area during peak flow events, future storms, or other emergency situations. Under this alternative, flooding would not be abated or improved and would likely continue to occur and both insured and uninsured losses would be expected. Homes and businesses previously flooded would continue to experience flood damage. The condition of the drainage channel would continue to deteriorate, and the flooding would increase. The resulting potential for hazardous conditions would affect not only the residents of Caldwell Parish, but also businesses and emergency responders who utilize the roadways and live in the area.

Alternative 2 (Proposed Alternative): The Proposed Alternative would be to improve the drainage of Hurricane Creek and two (2) of its tributaries, Caldwell High School Tributary and Hanchey Road Tributary, located approximately 1.5 mile south of the town of Columbia, Louisiana, near the communities of Banks Springs and Grayson in Caldwell Parish. Portions of the creek are in residential areas and are prone to flooding in relatively small storm events. Thick brush and large trees have flourished within the main portions of the channel, which restrict water flow, causing the stream to back up and overtop the banks. As portions of the creek flood, erosion occurs, and banks wash in and slough off. Woody material falls in, washes in, or blows into the channel reducing the capacity of the channel. The proposed improvements would entail rechanneling, reshaping, and restoring approximately 3.5 miles of bank line, replacing existing culverts, and installing a new railroad flat car bridge.

Alternative 3 (Considered Alternative): The Considered Alternative includes straightening the drainage channel by removing the meanders of the natural flow path of Hurricane Creek and widening the channel to make it a true canal for stormwater drainage. This alternative would require the purchase of new, wider ROWs as well as houses

or other structures that currently flood and whose locations lie close to the creek. The proposed channel is approximately 11 miles long. Estimated home and ROW purchase requirements are that at least 10 homes would be purchased and removed, and 50' of ROW would be purchased from approximately 50 landowners.

STEP NO. 4 **Identify the potential direct and indirect impacts associated with the occupancy or modification of floodplains/wetlands and the potential direct and indirect support of floodplain/wetlands development that could result from the proposed action; (44 CFR §9.10)**

☒**YES** ☐**NO** Is the proposed action in compliance with the NFIP (see 44 CFR Part 59 seq.)?

☐**N/A** Remarks:

☐**YES** ☒**NO** Does the proposed action increase the risk of flood loss?

☐**YES** ☒**NO** Will the proposed action result in an increased base discharge or increase the flood hazard potential to other properties or structures?

☒**YES** ☐**NO** Does the proposed action minimize the impact of floods on human health, safety and welfare?

☐**YES** ☒**NO** Will the proposed action induce future growth and development, which will potentially adversely affect the floodplain/wetland?

☒**YES** ☐**NO** Does the proposed action involve dredging and/or filling of a floodplain/wetlands?

☐**YES** ☒**NO** Will the proposed action result in the discharge of pollutants into the floodplain/wetlands?

☒**YES** ☐**NO** Does the proposed action avoid long and short-term adverse impacts associated with the occupancy and modification of floodplains/wetlands?

☐**N/A** Remarks:

☒**YES** ☐**NO** Will the proposed action result in any indirect impacts that will affect the natural values and functions of floodplains/wetlands?

☐**YES** ☒**NO** Will the proposed action forego an opportunity to restore the natural and beneficial values served by floodplains/wetlands?

☐**N/A** Remarks:

☒**YES** ☐**NO** Does the proposed action restore and/or preserve the natural and beneficial values served by floodplains/wetlands?

☐**N/A** Remarks:

☒**YES** ☐**NO** Will the proposed action result in an increase to the useful life of a structure or facility?

REMARKS:

The proposed action complies with National Flood Insurance Program (NFIP) regulations, promulgated at 44 CFR Part 59, et seq., because the proposed action improves drainage of surface water to reduce flooding in known flood risk areas, and the proposed action therefore does not increase the risk of flood loss. The proposed action decreases the flood hazard potential to other properties or structures, by increasing the flow capacity of drainage canals specifically designed to remove flood water from the watersheds served by the drainage canals improved by the proposed action. Accordingly, the proposed action minimizes the impact of floods on human health, safety and welfare. The proposed action will not directly induce future growth and development, which may have the potential to adversely affect the floodplain/wetland. The proposed action involves dredging and/or filling of a floodplain/wetlands, but will not result in the discharge of pollutants into the floodplain/wetlands. The proposed action avoids long- and short-term adverse impacts associated with the occupancy and modification of floodplains/wetlands because the proposed action is specifically designed to reduce adverse impacts to the floodplain in which it is located. The proposed action may result in indirect impacts that may positively affect the natural values and functions of floodplains/wetlands by improving drainage of the floodplain in which it is located. The proposed action does not forego an opportunity to restore the natural and beneficial values served by floodplains/wetlands, because the proposed action is designed to improve the beneficial values of the floodplain.

The proposed action restores the beneficial values served by floodplains/wetlands through improved drainage capacity of the canals affected by the proposed action. Moreover, the proposed action will result in an increase to the useful life of the drainage structures/facilities affected by the proposed action (i.e., the Hurricane Creek portions of the Caldwell Parish drainage system). A more detailed analysis of the impacts and mitigation efforts for this project are in Section 4.0 of the EA.

The September 2021 hydraulic study report was prepared to support a proposed CLOMR and the results were submitted to FEMA. Based on the results comparing existing conditions with the project's proposed conditions shown in Tables 5 and 6, in all circumstances upon completion of the project the proposed elevation of the 1% flood would decrease, and by pre-adopting the revised flood risks per 44 CFR 65.12, the community would be keeping their floodway and floodplains properly managed per FEMA regulation 44 CFR 9.11(d)(4). The proposed project satisfies the requirements of 44 CFR Section 65.12 of the NFIP regulations. A request for conditional approval of map change was initiated on July 21, 2020. Compliance with 44 CFR 65.12, revisions of flood insurance rate maps to reflect BFE caused by proposed encroachments, was achieved with the CLOMR on May 28, 2021. The flood hazard information along Hurricane Creek would be revised with a CLOMR 20-06-3058-R.

The Subrecipient proposed no compensatory mitigation for the unavoidable loss of wetlands and water of the U.S. at the project sites as the areas containing wetlands would be avoided. The Subrecipient must comply with all the Special, General, and Regional Conditions listed in the required NWP 3 (MVK-2011-1213) issued on October 19, 2018, which will expire on March 18, 2022. The Subrecipient must provide a signed certification of compliance stating that the authorized work was completed in accordance with the terms and conditions of the said permit including any required mitigation. The Subrecipient is required to coordinate with the local floodplain administrator regarding floodplain permit(s) prior to the start of any activities. The Subrecipient must coordinate with the local floodplain administrator, obtain required permits prior to initiating work, and comply with any conditions of the permit to ensure harm to and from the floodplain is minimized. The Subrecipient shall ensure that best management practices are implemented to prevent erosion and sedimentation to surrounding, nearby or adjacent wetlands. This includes equipment storage and staging of construction to prevent erosion and sedimentation to ensure that wetlands are not adversely impacted per the Clean Water Act and Executive Order 11990. Per 44 CFR 9.11(d), mitigation or minimization standards must be applied, where possible. Per 44 CFR 9.11(d)(4), there shall be no encroachments, including fill, new construction, substantial improvements of structures or facilities, or other development within a designated regulatory floodway that would result in any increase in flood levels within the community during the occurrence of the base flood discharge. Until a regulatory floodway is designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within the base floodplain unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation (WSE) of the base flood more than 1 ft. at any point within the community. Per 44 CFR 9.11(d)(6), no project should be built to a floodplain management standard that is less protective than what the community has adopted in local ordinances through their participation in the NFIP. Should the site plans (including drainage design) change, the Subrecipient must submit changes to FEMA-EHP for review and approval prior to the start of construction. New construction must be compliant with current codes and standards. All coordination pertaining to these activities and Subrecipient

compliance with any conditions should be documented and copies forwarded to GOHSEP and FEMA as part of the permanent project files.

STEP NO. 5 **Minimize the potential adverse impacts and support to or within floodplains/wetlands to be identified under Step 4, restore and preserve the natural and beneficial values served by floodplains/wetlands; (44 CFR §9.11)**

☒**YES** ☐**NO** Were flood hazard reduction techniques applied to the proposed action to minimize the flood impacts if site location is in the 100- or 500-Year floodplain/wetlands?

☐**N/A** Remarks:

☒**YES** ☐**NO** Were avoidance and minimization measures applied to the proposed action to minimize the short and long term impacts on the 100-Year floodplain/wetlands?

If no, identify measures required as a condition of the grant:

☐**N/A** Remarks:

☒**YES** ☐**NO** Were measures implemented to restore and preserve the natural and beneficial values of the floodplain/wetlands.

If no, identify measures required as a condition of the grant:

☐**N/A** Remarks:

☒**YES** ☐**NO** Is new construction or substantial improvement in a floodway, and new construction in a coastal high hazard area proposed?

If YES: Is the activity considered as functionally dependent use or a structure or facility which facilitates an open space use?

☒**YES** ☐**NO**

The preferred action alternative would lower the BFEs from the existing conditions and reduce flood risk in comparison to the current conditions. Appropriate sediment and erosion control devices would be utilized to protect all wetlands and waters of the U.S. during the construction phase of the project.

STEP NO. 6 **Reevaluate the proposed action to determine first, if it is still practicable in light of its exposure to flood hazards, the extent to which it will aggravate the hazards to others, and its potential to disrupt floodplain/wetlands values and second, if alternatives preliminarily rejected at Step 3 are practicable in light of the information gained in Steps 4 and 5. (44 CFR §9.9)**

☒**YES** ☐**NO** The action is still practicable at a floodplain/wetland site in light of the exposure to flood risk and ensuing disruption of natural values;

☒**YES** ☐**NO** The floodplain/wetlands site is the only practicable alternative.

☒**YES** ☐**NO** There is no potential for limiting the action to increase the practicability of previously rejected non-floodplain/wetlands sites and alternative actions.

☒YES ☐NO Minimization of harm to or within the floodplain/wetlands can be achieved using all practicable means.

☒YES ☐NO The action in a floodplain/wetland clearly outweighs the requirement of E.O. 11988/11990.

FEMA shall not act in a floodplain/wetland unless it is the only practicable location.

STEP NO. 7 **Prepare and provide the public with a finding and public explanation of any final decision that the floodplain/wetland is the only practicable alternative; and (44 CFR §9.12)**

☐ Check if the Initial Public Notice serves as the Final Public Notice or a Cumulative Public Notice was published. No condition required.

☐ Check if the condition was added to the REC indicating that "For actions located in the floodplain and/or wetlands, the applicant must issue a final public notice per 44 CFR Part 9.12(e) at least 15 days prior to the start of work. The final notice shall include the following: (1) A statement of why the proposed action must be located in an area affecting or affected by a floodplain or a wetland; (2) A description of all significant facts considered in making this determination; (3) A list of the alternatives considered; (4) A statement indicating whether the action conforms to applicable state and local floodplain protection standards; (5) A statement indicating how the action affects or is affected by the floodplain and/or wetland, and how mitigation is to be achieved; (6) Identification of the responsible official or organization for implementation and monitoring of the proposed action, and from whom further information can be obtained; and (7) A map of the area or a statement that such map is available for public inspection, including the location at which such map may be inspected and a telephone number to call for information."

☒ Project Specific Notice (e.g. EA, newspaper, public meeting, etc):

Type of Public Notice:	The Shreveport Times and the Caldwell Watchman
Date:	August 8-12, 2022 & August 10, 17, and 24, 2022, respectively.

EA Notice of Availability will serve as the Final Public Notice.

STEP NO. 8 **Review the implementation and post - implementation phases of the proposed action to ensure that the requirements stated in Section 9.11 are fully implemented. Oversight responsibility shall be integrated into existing processes. (44 CFR §9.11)**

☒YES ☐NO Was Grant conditioned on review of implementation and post-implementation phases to insure compliance of EO 11988?

Failure to comply with conditions enumerated in the Record of Environmental Consideration may jeopardize federal funding.

U.S. Department of Homeland Security
Federal Emergency Management Agency
Region VI
Louisiana Integration and Recovery Office
1500 Main Street
Baton Rouge, Louisiana 70802

DRAFT FINDING OF NO SIGNIFICANT IMPACT FOR THE CALDWELL PARISH POLICY JURY HURRICANE CREEK, CALDWELL HIGH SCHOOL TRIBUTARY, AND HANCHEY ROAD TRIBUTARY DRAINAGE IMPROVEMENTS LOCATED IN CALDWELL PARISH, LOUISIANA HAZARD MITIGATION GRANT PROGRAM

HMGP 1603-0363/DR-1603-LA

BACKGROUND

The Caldwell Parish Police Jury (Subrecipient), through the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) (Recipient), has requested federal funding through the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) to improve the capacity of Hurricane Creek and two of its tributaries, Caldwell High School Tributary and Hanchey Road Tributary. Improvements proposed to four project areas in Caldwell Parish, Louisiana include rechanneling, reshaping, and restoring approximately 3.5 miles of bank line, replacing existing culverts, and installing a new railroad flat car bridge to mitigate the flood damage to homes, schools, and businesses affected by the flooding in the Hurricane Creek.

Hurricane Creek floods adjacent areas during relatively small storm events due to inadequate culverts, ineffective culverts, heavy brush and large trees, and inadequate cross sections. Portions of the creek are in residential areas and are prone to flooding in relatively small storm events. Thick brush and large trees have flourished within the main portions of the channel which restrict water flow causing the stream to back up and overtop the banks. As portions of the creek flood, erosion occurs, and banks wash in and slough off. Woody material falls in, washes in, or blows into the channel reducing the capacity of the channel. The proposed project is essential to the mitigation of the ongoing flooding of residences, businesses, schools, and public buildings served by Hurricane Creek.

The specific need of this project is to effectively alleviate localized flooding experienced during and after major storm events due to insufficient culverts, inadequate cross sections, and heavy brush and large trees. The alternatives considered include: 1) No Action Alternative, 2) Hurricane Creek Drainage Improvements to Improve the System Hydraulics and Reduce Water Surface Flooding and Water Surface Elevations (Preferred Action Alternative) and 3) Straighten and Widen Hurricane Creek for Stormwater Drainage (Considered Action Alternative).

The Preferred Action Alternative would increase the drainage capacity of Hurricane Creek by re-channeling, reshaping, and restoring approximately 3.5 miles of bank line, replacing existing culverts, and installing a new railroad flat car bridge. The EA also analyzed a No Action Alternative and a Considered Action Alternative. The Considered Action Alternative proposes to straighten the drainage channel by removing the meandering of the natural flow of Hurricane Creek and widening the channel to make it a true canal for stormwater drainage. A complete description of these alternatives is included in the EA, which is incorporated by reference in this document.

An Environmental Assessment (EA) was prepared in accordance with FEMA Instruction 108-1-1 and the Department of Homeland Security (DHS) Instruction 023-01-001-01, pursuant to Section 102 of the National Environmental Policy Act of 1969 (NEPA), as implemented by the regulations promulgated by the President's Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR], Parts 1500-1508). The purpose of the EA was to analyze the potential environmental impacts associated with the proposed work and alternatives, and to determine whether to prepare an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI).

FINDINGS

FEMA has evaluated the proposed project for significant adverse impacts to geology and soils, water resources (surface water and water quality, groundwater, and wetlands), hydrology and floodplains, coastal resources, air quality, biological resources (vegetation and wildlife, Federally-listed threatened or endangered species and critical habitats), cultural resources, environmental justice and socioeconomic resources, traffic and transportation, public safety and access, resource conservation and recovery, noise, and hazardous materials and toxic waste. The results of these evaluations as well as consultations and input from other federal and state agencies are presented in the EA.

CONDITIONS AND MITIGATION MEASURES

The following conditions must be met as part of the implementation of the project. Failure to comply with these conditions may jeopardize federal funds.

- The Subrecipient is required to obtain and comply with all local, state, and federal permits, approvals, and requirements prior to initiating work on this project. All coordination pertaining to these activities and Subrecipient compliance with any conditions should be documented and copies forwarded to correspondence to the GOHSEP and FEMA as part of the permanent project files. Should the site plans (including drainage design) change, the Subrecipient must submit those changes to FEMA-EHP for review and approval prior to the start of construction.

- Implement construction stormwater BMPs; install silt fences/straw bales to reduce sedimentation. Area soils would be covered and/or wetted during construction. If fill is stored on site, the contractor would be required to appropriately cover it.

- The Subrecipient is required to coordinate with the local floodplain administrator, obtain required permits prior to initiating work, and comply with any conditions of the permit to ensure harm to and from the floodplain is minimized.

- Per 44 CFR 9.11(d), mitigation or minimization standards must be applied, where possible.

- Per 44 CFR 9.11(d)(4), there shall be no encroachments, including fill, new construction, substantial improvements of structures or facilities, or other development within a designated regulatory floodway that would result in any increase in flood levels within the community during the occurrence of the base flood discharge. Until a regulatory floodway is designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within the base floodplain unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the WSE of the base flood more than 1 ft. at any point within the community.

- Per 44 CFR 9.11(d)(6), no project should be built to a floodplain management standard that is less protective than what the community has adopted in local ordinances through their participation in the NFIP.

- Should the site plans (including drainage design) change, the Subrecipient must submit changes to FEMA-EHP for review and approval prior to the start of construction.

- New construction must be compliant with current codes and standards. All coordination pertaining to these activities and Subrecipient compliance with any conditions should be documented and copies forwarded to GOHSEP and FEMA as part of the permanent project files.

- Any changes or modifications to the proposed project will require a revised wetland jurisdictional determination.

- Off-site locations of activities such as borrow, disposals, haul-and detour-roads and work mobilization site developments may be subject to the Department of the Army regulatory requirements and may have an impact to a Department of Army project.

- The project is in close proximity or directly adjacent to wetlands. Extreme care should be taken during the construction process through the appropriate use and maintenance of BMPs. Erosion Control Devices (ECDs) such as silt fencing, hay bales, sediment traps, etc., must be used and maintained extensively to prevent any potential direct or indirect adverse impacts to nearby wetland areas, per Clean Water Act (CWA) and EO 11990. Potential concerns include but are not limited to silting-in and contamination from spills. Proper signage is required to clearly identify the adjacent wetland boundaries to avoid potentially adverse impacts from construction vehicles/equipment/supplies that accidentally leave the boundaries of the approved ROW. Any adverse impacts to adjacent wetlands resulting from the construction of this project would jeopardize receipt of federal funding.

- If any of the proposed work is located in wetlands or other areas subject to the jurisdiction of the USACE, the Subrecipient should contact the USACE directly regarding permitting issues. If a USACE permit is required, part of the application process may involve a water quality certification from LDEQ.

- The Subrecipient shall ensure that BMPs are implemented to prevent erosion and sedimentation to surrounding, nearby or adjacent wetlands. This includes equipment storage and staging of construction to prevent erosion and sedimentation to ensure that wetlands are not adversely impacted per the CWA and E.O. 11990.

- The Subrecipient must comply with all the Special, General, and Regional Conditions listed in the required USACE Permit (MVK-2011-1213) authorized under NWP 3 issued on October 19, 2018, which will expire on March 18, 2022, and the State of Louisiana NWP Regional Conditions (February 2017). The Subrecipient must coordinate with USACE for reinstatement of NWP 3. The Subrecipient must provide a signed certification of compliance stating that the authorized work was completed in accordance with the terms and conditions of the said permit including any required mitigation.

- All coordination pertaining to these activities and Subrecipient compliance with any conditions should be documented and copies forwarded to GOHSEP and FEMA as part of the permanent project files.

- Erosion Control Devices (ECDs) such as silt fencing, hay bales, sediment traps, etc. must be used and maintained extensively to prevent any potential direct or indirect adverse impacts to nearby waterways.

- If the project results in a discharge to waters of the State, submittal of a Louisiana Pollutant Discharge Elimination System (LPDES) application may be necessary. All precautions should be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas greater than or equal to one (1) acre. The Subrecipient must contact the LDEQ Water Permits Division at (225) 219-9371 to determine if the proposed project requires a permit. If the project results in a discharge of wastewater to an existing wastewater treatment system, that wastewater treatment system may need to modify its LPDES permit before accepting additional wastewater.

- If the project will include a sanitary wastewater treatment facility, a Sewage Sludge and Biosolids Use or Disposal Permit is required. An application of Notice of Intent will be required if the sludge management practice includes preparing biosolids for land application or preparing sewage sludge to be hauled to a landfill. Additional information: (http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx) or by contacting the LDEQ Water Permits Division at (225) 219-9371.

- Water softeners generate wastewaters that may require special limitations depending on local water quality considerations. If water system improvements include water softeners, contact LDEQ Water Permits to determine if special water quality-based limitations will be necessary.

- All precautions should be observed to protect the groundwater of the region. BMPs should be implemented to ensure groundwater is protected.

- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents.

- Vehicle operation times would be kept to a minimum. Area soils must be covered and/or wetted during construction to minimize dust (i.e., particulate air emissions).

- To reduce potential short-term effects to air quality from construction-related activities, the contractor would be responsible for using BMPs to reduce fugitive dust generation and diesel emissions. Emissions from the burning of fuel by internal combustion engines would temporarily increase the levels of some of the criteria pollutants, including carbon dioxide (CO_2), nitrogen dioxide (NO_2), Ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}), and non-criteria pollutants such as Volatile Organic Compounds (VOCs). To reduce these emissions, running times for fuel-burning equipment should be kept to a minimum and engines should be properly maintained.

- If at any time Heritage tracked species are encountered within the project area, please contact the Louisiana Natural Heritage Program (LNHP), now known as LDWF's Wildlife Diversity Program (WDP), Data Manager at 225-765-2643.

- The Subrecipient must comply with the State of Louisiana NWP Regional Conditions (February 2017), Regional Condition 9, Supplement to General Condition 2 - Aquatic Life Movement. To support compliance with General Condition 2 of the NWPs, culverts must be sufficiently sized to maintain expected high-water flows and be installed at a sufficient depth to maintain low flows to sustain the movement of aquatic species.

- To ensure continued ESA compliance, the Subrecipient must stop work and contact FEMA-EHP if 1) new information reveals that the action may affect listed species or designated critical habitat, 2) the action is modified in a manner that causes effects to listed species or designated critical habitat, or 3) a new species is listed or critical habitat designated. Additional consultation as a result of any of the above conditions or for changes not covered in the consultation should occur before changes are made and or finalized.

- The Subrecipient must conduct activities outside of the NLEB active season (April 1 to October 31) in areas where NLEBs are known to roost.

- Monitors during AST Nesting period of April 30th – July 31st: occurs at muddy and/or sandy-silt banks near water's edge and consists of woody debris, undercut banks, aquatic structures (e.g., tree root masses, stumps, submerged trees, etc.) and a riparian canopy. Incubation period for alligator snapping turtle nests is approximately 98 to 130 days.

- No removal of vegetation, deadheads/snags, or woody debris from either banks or undercut banks due to species selects areas with more aquatic structures to support important feeding areas for AST hatchlings & juveniles (i.e., tree root masses, stumps, submerged trees, etc.). Deadhead logs and fallen riparian woody debris, where present, provide refugia during low-water periods and resting areas for all life stages.

- Because of AST proclivity for bottom-dwelling - no waterway obstructions (i.e., no channelization which may reduce water-flows). However, a buffer might be considered per USFWS recommendations/suggestions

- During the project impact analysis process developers should identify project-related impacts to migratory birds and the conservation measures that will be used to mitigate them. For additional Migratory Bird Conservation recommendations, guidance and tools to help reduce impacts to birds and their habitats please visit the LESO webpage: https://www.fws.gov/southeast/lafayette/migratory-birds/ and the Service's Migratory Bird Program Webpage (https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php).

- The Subrecipient must review the National Bald Eagle Management (NBEM) Guidelines is available at: http://www.fws.gov/migratorybirds/pdf/management/nationalbaldeaglenanagementguidelines.pdf to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the Bald and Golden Eagle Protection Act (BGEPA).

- If a bald eagle nest occurs or is discovered within 660 ft. of the proposed project area, then USFWS requires an evaluation to be performed to determine whether the project is likely to disturb nesting bald eagles. The Subrecipient is required to conduct the evaluation on-line at: https://www.fws.gov/southeast/our-services/eagle-technical-assistance. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. All coordination pertaining to these activities and Subrecipient compliance with any conditions should be documented and copies forwarded to correspondence to GOHSEP and FEMA as part of the permanent project files.

- Projects proposed in areas of the state that are inhabited by Black Bears should be designed to avoid adversely affecting this subspecies or its habitat. (A current Louisiana black bear breeding area map is located at: https://www.fws.gov/Lafayette/pdf/LA_Black_Bear_Breeding_Habitat_Map.pdf). For additional information regarding the Louisiana black bear and project-specific conservation measures that may be required by the LDWF, please contact Maria Davidson (Large Carnivore Program Manager) at (337) 262-2080 or mdavidson@wlf.la.gov.

    - Conservation measures for the Louisiana black bear include 1) reducing the footprint of proposed actions to the maximum extent feasible, 2) avoiding impacts to potential den trees that are 36 in. or more in diameter at breast height implementing programs to prevent the habituation of bears to human-associated food sources (e.g., use of "bear-proof" waste disposal containers or daily removal of food and garbage), and 3) avoiding

vegetative clearing during the black bear denning season (i.e., December 1 through April 30).

- The U.S. Fish and Wildlife Service (USFWS) recommends that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season because some waterbird colonies may change locations year-to-year. To minimize disturbance to colonial nesting birds please refer to the colonial nesting waterbird guidance on the Louisiana Ecological Services Office (LESO) Webpage https://www.fws.gov/southeast/pdf/guidelines/colonial-water-birds-and-wading-birds-louisiana.pdf).

- Louisiana Unmarked Human Burial Sites Preservation Act: If human bone or unmarked grave(s) are present within the project area, compliance with the Louisiana Unmarked Human Burial Sites Preservation Act (Revised Statue [RS] 8:671, et seq.) is required. The Subrecipient shall notify the law enforcement agency of the jurisdiction where the remains are located within 24 hours of the discovery. The Subrecipient shall also notify FEMA and the Louisiana Division of Archaeology (LDOA) at 225-342-8170 within 72 hours of the discovery.

- Inadvertent Discovery Clause: If during the course of work, archaeological artifacts (prehistoric or historic) are discovered, the Subrecipient shall stop work in the vicinity of the discovery and take all reasonable measures to avoid or minimize harm to the finds. The Subrecipient shall inform their GOSHEP State Applicant Liaison and Hazard Mitigation Assistance contacts at FEMA, who will in turn contact FEMA Historical Preservation (HP) staff. The Subrecipient will not proceed with work until FEMA HP completes consultation with the SHPO, and others as appropriate.

- All borrow or fill material must come from pre-existing stockpiles, material reclaimed from maintained roadside ditches (provided the designed width or depth of the ditch is not increased), or commercially procured material from a source existing prior to the event. For any FEMA-funded project requiring the use of a non-commercial source or a commercial source that was not permitted to operate prior to the event (e.g. a new pit, agricultural fields, road ROWs, etc.) in whole or in part, regardless of cost, the Subrecipient must notify FEMA and the Recipient prior to extracting material. FEMA must review the source for compliance with all applicable federal environmental planning and historic preservation laws and executive orders prior to a Subrecipient or their contractor commencing borrow extraction. Consultation and regulatory permitting may be required. Non-compliance with this requirement may jeopardize receipt of federal funding. Documentation of borrow sources utilized is required at closeout.

- The Subrecipient must take any necessary steps to obtain and/or update all necessary approvals and environmental permits regarding this proposed project.

- Unusable equipment, debris and material shall be disposed of in an approved manner and location. In the event significant items (or evidence thereof) are discovered during implementation of the project, the Subrecipient shall handle, manage, and dispose of

petroleum products, hazardous materials and toxic waste in accordance to the requirements and to the satisfaction of the governing local, state and federal agencies.

- All debris would be disposed of at a permitted landfill.
- Mitigation and abatement measures will be required to reduce the noise levels to a range that would be considered acceptable. The Subrecipient must comply with any applicable local noise ordinances.
- The contractor must place fencing around the work area perimeters to protect nearby residents from vehicular traffic.
- To minimize worker and public health and safety risks from project construction and closure, all construction and closure work must be done using qualified personnel trained in the proper use of construction equipment, including all appropriate safety precautions. Additionally, all activities must be conducted in a safe manner in accordance with the standards specified in OSHA regulations and the USACE safety manual.
- The contractor must post appropriate signage and fencing to minimize potential adverse public safety concerns.
- Appropriate signage and barriers should be in place, as appropriate, prior to construction activities to alert pedestrians, motorists, and nearby residents of project activities and to protect them from traffic pattern changes.
- The contractor should implement traffic control measures, as necessary.
- The Subrecipient is required to protect existing individual trees through project design and implementation. If tree removal is unavoidable, the Subrecipient is required to plant two new trees for every one removed.
- The construction contractor shall comply with CERCLA hazardous substance release reporting requirements if an applicable release should occur.
- If an oil discharge to water occurs, the construction contractor must notify the National Response Center (NRC) at 800-424-8802.
- Any renovation or remodeling must comply with Louisiana Administrative Code (LAC) 33:III.Chapter 28, Lead-Based Paint Activities; LAC 33:III.Chapter 27, Asbestos-Containing Materials in Schools and State Buildings (includes all training and accreditation); and LAC 33:III.5151, Emission Standard for Asbestos for any renovations or demolitions.
- If hazardous materials are unexpectedly encountered in the project area during the proposed construction operations, appropriate measures for the proper assessment, remediation, management, and disposal of the contamination would be initiated in accordance with applicable federal, state, and local regulations. The contractor would be

required to take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction area.

- The LDNR Office of Conservation should be contacted at 225-342-5540 if any unregistered wells of any type are encountered during construction work.
- Louisiana One Call should be contacted at 800-272-3020 at least 48 hours prior to commencing any subsurface operations.

CONCLUSIONS

Based upon the incorporated EA, and in accordance with Presidential Executive Orders 12898 (Environmental Justice), 11988 (Floodplain Management), and 11990 (Wetland Protection), FEMA has determined that the implementation of the proposed action with the conditions and mitigation measures outlined above and in the EA would not result in significant adverse effects on the quality of the natural and human environment. In addition, the proposed project does not appear to have the potential for significant cumulative effects when combined with past, present, and reasonably foreseeable future actions. As a result of this FONSI, an Environmental Impact Statement (EIS) will not be prepared (FEMA Instruction 108-1-1) and the preferred action alternative as described in the EA may proceed.

APPROVALS

Jerame J. Cramer Date
FEMA Region VI
EHP Program Lead
Louisiana Integration & Recovery Office

Brianne Schmidtke Date
FEMA Region VI
HMA Branch Chief-Mitigation