Rankin County

Watershed-Based Stormwater Assessment & Management Plan

WAGGONER

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February 2019

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Executive Summary

Background and Objectives

Rankin County enjoys a robust natural environment, abundant in water and other resources. In addition, the county is able to maintain a somewhat rural character even though located in direct proximity to the state's largest urban and employment center and seat of government. For decades these positive attributes have combined to make Rankin County a desired destination for those who wish to live, work and play. At the same time, these very attributes create challenges, not the least of which is balancing the sometimes competing interests of quality of life, economic viability, and environmental responsibility.

The county's relatively flat terrain and abundance of streams and rivers that drain into the Ross Barnett Reservoir, coupled with extensive residential and commercial development over recent decades have created numerous challenges and difficulties for stormwater management, specifically with regard to flood control and flood damage reduction.

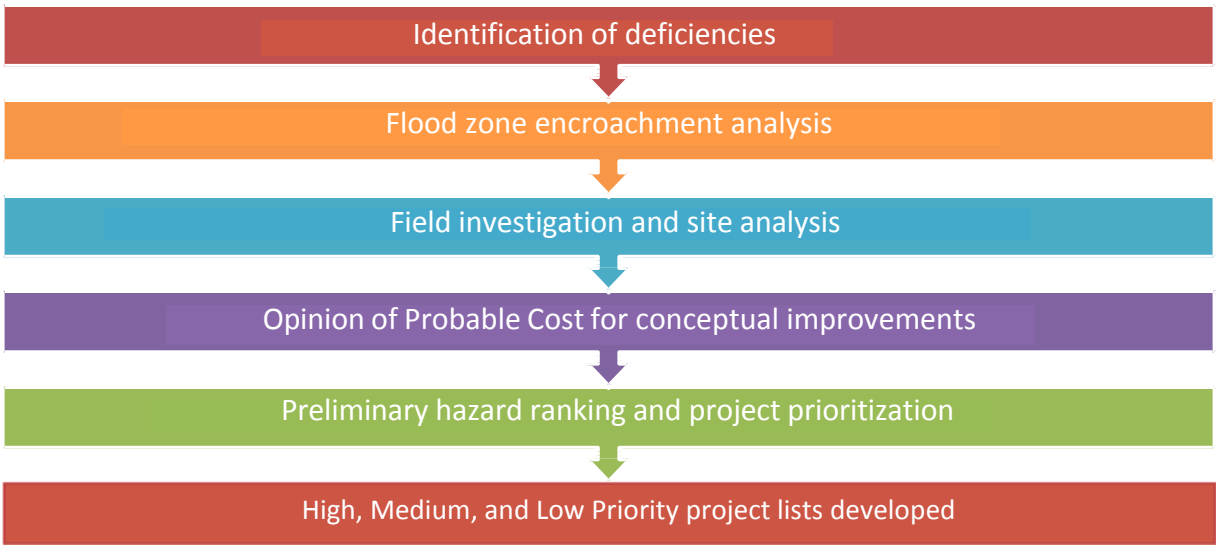
The challenge of this balancing act falls primarily to the Rankin County Board of Supervisors (RCBOS) who are responsible for the management of all county-owned infrastructure, properties, and waters of the State located within the County. As a demonstration of their commitment to proactive stormwater management, the Board undertook in 2017 preparation of a comprehensive, countywide stormwater assessment and management plan. The goal of the plan was to provide a strategic, watershed-based approach to the management of the County's challenging stormwater infrastructure.

Countywide Watershed Assessment

Approach to the Watershed Assessment

As a first step in the assessment process, individual supervisors and county staff compiled lists of known problem areas throughout the county. The lists were then consolidated by removing duplicate listings and combining others where appropriate. The Project Team then conducted a field review of the resulting sixty (60) sites and developed conceptual level recommendations for improvements to each. Each site was then evaluated in collaboration with county officials and staff, based on an array of criteria, to produce a preliminary hazard ranking and prioritization. Based on the results of this evaluation, projects were recommended implementation on a high-, medium-, or low-priority basis. Figure 1 demonstrates the overall process of watershed assessment.

Figure 1: Watershed Assessment Process



Findings of the Watershed Assessment

Subsequent sections of this document provide details of the countywide watershed assessment, including findings from interviews, site investigations, encroachment analyses and other evaluations, as well as summarizing the recommendations pertaining to program development and implementation. In addition, the appendices contain detailed descriptions of each watershed and each site-specific deficiency analyzed, hazard assessments of each site, and opinions of development costs for improvements.

Following is a summary of the key findings of the assessment process.

Flood Zone Encroachment

Twenty-two percent (22%), or over 115,000 acres of the land area in Rankin County is located in a regulatory flood zone, as prescribed on FEMA flood insurance rate maps and regulated by local flood plain management ordinances. Although development within flood zones is not necessarily prohibited (with the exception of areas defined as floodways) it should generally be regulated by specific policies that proscribe the types of development allowable and the conditions under which they are allowed.

With that said, it is common throughout the United States to find flood zones encroached upon by residential and commercial development. These encroachments have occurred over recent decades with the increase of economic growth and development around urban centers. An analysis of U.S. Census Bureau data revealed that between 2000 and 2016 the population living within a regulatory flood zone nationwide increased by 14%. During this same time, that number for Rankin County grew by 33%. A 2016 American

Community Survey (ACS) estimated that almost 15,400 people in Rankin County lived in a regulatory flood zone (the FEMA 100-year flood plain).

A flood zone encroachment analysis conducted as part of the current countywide watershed assessment determined the following, among other facts:

- 3% (3,142 acres) of the flood zones in Rankin County are encroached upon by residential and/or commercial development.
- The highest concentrations of stormwater problems in Rankin County (represented by the site-specific deficiencies inventoried in the countywide assessment) are located in watersheds that have experienced the greatest encroachment of development in the flood zones.
- 35.8 % (41,300 acres) of the additional, undeveloped flood zone property in Rankin County currently is zoned for residential and/or commercial development. In other words, under current land use and zoning allowances, there is the potential for an additional 41,300 acres of encroachment of regulatory flood zones.

Ordinance Review

Rankin County currently has in place ordinances that address policies and procedures related to development, zoning, stormwater management, and flood damage prevention. Each of these existing ordinances was evaluated in comparison to model ordinances promoted by USEPA, MEMA, and the American Planning Association. While Rankin County ordinances do address most of the critical model language evaluated, there are areas that could be strengthened, as detailed in a subsequent section of this document. Rankin County specific lacks ordinance language addressing aquatic buffers, stormwater operation and maintenance, post-construction stormwater management, source water protection, and smart growth principles.

Short-term Improvement Priorities

The hazard ranking and project prioritization process identified 20 locations for implementing improvements in the short term. These sites are found in Table 1. It is important to note that sires are not listed in order of priority but are grouped together by the Supervisor District they are located in and a randomly assigned site number.

Table 1: Locations Recommended for Short Term Capital Improvements

Site Number	District	Site Name/Description
1.01	1	Williams Road between Levy Lane and The North Road
1.04	1	Old Pearson Road at bend east of Highway 49

Site Number	District	Site Name/Description
1.05	1	Highway 49 at Highway 469 in Florence
1.06	1	Williams Road at Butler Creek in Florence
1.11	1	Highway 49 Commercial Area in Richland
1.14	1	Neely Road at Unnamed Pearl Tributary in Richland
2.01	2	Mill Creek between Highway 25 and The Reservoir
2.02	2	Pinebrook Subdivision between Farmington Circle and Spillway
3.01	3	Tara Road at Unnamed Tributary
3.02	3	Live Oaks Subdivision at Spanish Oak Drive
3.05	3	Windchase Subdivision in Brandon
4.01	4	Jims Road at Unnamed Tributary
4.05	4	Taylor Way Road at Unnamed Tributary of Riley Creek
4.06	4	Holly Bush Road between Sara Fox Drive and Rodeo Drive
4.07	4	Reservoir East Subdivision
4.09	4	Oakdale Road north of Baker Lane
4.12	4	Brush Creek in North Brandon Estates
4.13	4	Highway 80 at Highway 43 in Pelahatchie
5.01	5	Vernon Jones Avenue west of Old Fannin Road
5.09	5	Oakgrove Subdivision

Comprehensive Watershed Management Program

What follows in subsequent sections of this document is the basis for a Comprehensive Watershed Management Program (the Program), including an actionable plan for implementation, intended to give Rankin County a realistic path toward a sustainable program of stormwater management for the long term future.

The key components of the Program are summarized hereafter.

Institutional Framework for Governance

As detailed in the Implementation Plan section of this document, it is recommended that the RCBOS create the Rankin County Stormwater Management District (the District) under current Mississippi statutory authority. The primary role of the District would be to carry out the Program in accordance with the Five-Year Priority Implementation Plan, reviewed and updated on a regular basis. The District would have the authority countywide to raise revenue through enactment of any number of optional assessment methodologies, as well as obtain funding through other state and/or federal programmatic sources.

Policy Alignment

In order to achieve a truly watershed-based approach to long-term management of stormwater issues, the county should realign its existing policies in accordance with the principles of Integrated Stormwater Management (ISWM). Policies such as land use and zoning ordinances, subdivision ordinances, and floodplain management ordinances should reflect comprehensive watershed-based considerations. Such considerations take into account the reality that actions focused on social and quality of life issues, economic development, and environmental preservation are all interconnected throughout a given watershed. Floodplain occupancy, land use, economic development initiatives, and other human actions and interests impact and are impacted by the waterways and either add to or help mitigate risks. Each of these actions can be good things, on their own, but one action within the watershed ultimately impacts other potential actions and interests elsewhere in the watershed. Hence, management ordinances should be designed to consider the cumulative impacts of these various activities.

Sustainable Funding Strategy

Any comprehensive stormwater management program must include a sustainable, local revenue stream(s) to support program establishment and implementation and provide leverage for other programmatic state and federal funding sources for capital needs. Water and sewer utilities derive revenue through sales based on volumetric consumption of the water they produce. Stormwater utilities do not produce a product that can be measured and sold; rather, they provide a service that manages and mitigates risk to properties individually and collectively with a particular watershed. Since every property within the watershed contributes some portion of the overall volume of stormwater runoff through that watershed, it is reasonable to assess some portion of the cost of managing that runoff to each property.

A more detailed discussion of optional methods for assessment is included in the Implementation Plan section of this document; however, the method recommended for consideration by the RCBOS is based on impervious area. The concept is that each property within a watershed contributes runoff based on the amount of impervious area within the property. Based on the simple calculation of impervious area, each property is charged on the basis of a number of equivalent runoff units (ERU). Rates within a particular watershed are set and assessed by the governing entity on the basis of ERU. In a previous paragraph the countywide Rankin County Stormwater Management District was recommended as the entity to collect and manage such revenues.

As an element of the implementation plan, discussed in the next paragraph, it is recommended that the RCBOS evaluate the ERU methodology to determine the magnitude

of revenues that potentially could be raised on an annual basis to support the Comprehensive Stormwater Management Program.

The 5-Year Priority Implementation Plan

The centerpiece of the Comprehensive Stormwater Management Program is a 5-Year Priority Implementation Plan (the Plan) that identifies a prioritized schedule of activities and creates an iterative process that is transparent and adaptable to stakeholders. The Plan gives the RCBOS a tool for allocating stormwater revenues to specific needs on the basis of prioritized risk mitigation and prevention on a "rolling" five year cycle. It also represents a living testament to the Board's proactive vision and commitment to safeguard the health, safety, and the overall welfare of its citizens and their property.

The Plan is broken into two distinct, but necessary, phases, as illustrated on Figure 2. The initial phase covers establishing and maintaining the Rankin County Comprehensive Watershed Management Program while the second phase deals with site and watershed solution development and implementation. The Program Establishment phase necessarily precedes the Project Implementation phase, but, once established, both phases can run concurrently.

Next Steps

In order to effectively implement its Comprehensive Stormwater Management Program, it is recommended that the Rankin County Board of Supervisors undertake the following next steps.

Next Steps
• Adopt the recommended 5-Year Priority Implementation Plan, with annual reevaluation and update of program priorities as necessary
• Procure professional Program support services to assist in the implementation of the 5-Year Priority Implementation Plan and to provide overall watershed-based stormwater management program support to the County
• Develop watershed plans for the five targeted priority watersheds.
• Begin process necessary to create the Rankin County Stormwater Management District
• Develop and execute strategies for legislative support and funding assistance at both the state and federal levels, including research, drafting legislative language, and preparation and support for state and federal legislative visits
• Identify and evaluate best management practices (BMPs) at the micro and macro-level that can be implemented to promote watershed sustainability.
• Develop the necessary documentation to support the recommended funding approach, based on ERU including creation of watershed districts and plans for habitually problematic watersheds

Next Steps

- Develop an iSWM program incorporating green infrastructure and low impact development principles.
- Evaluate and implement new and revised ordinances and zoning classifications for County-wide implementation in alignment with principles of Integrated Watershed Management

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Table 2: Proposed 5-Year Priority Implementation Plan

	Year		1				2				3				4				5				Year 6 and Onward	Estimated Cost Years 1-5	Total Estimated Cost
	Quarter		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
Program Establishment	Create stormwater management district																							$400,000	
	Evaluate and propose new and revised ordinances/zoning																							$50,000	
	Annual Sustainable Revenue																								
	Program Support and Technical Assistance																							$500,000	$100,000/year
	Create watershed plan for Mill Creek - Pelahatchie Creek																							$200,000	
	Create watershed plan for Upper and Lower Richland Creek																							$200,000	
	Create watershed plan for Indian Creek - Steen Creek																							$200,000	
	Create watershed plan for Riley Creek - Pelahatchie Creek																							200,000	
Project Implementation	1.03	Gunter Road at Indian Creek																							
	2.01	Mill Creek between Highway 25 and The Reservoir																							
	4.10	Andrew Chapel Road at Bush Creek																							
	5.09	Oakgrove Subdivision																						$443,930	
	1.14	Neely Road @ Unnamed Pearl Tributary																						$121,000	$846,000
	2.01	Mill Creek																						$540,000	$3,293,000
	3.01	Tara Road																						$147,500	$935,500
	4.07	Reservoir East Subdivision																						$138,000	$1,022,000
	5.01	Vernon Jones Avenue west of Old Fannin Road																						$883,500	$883,500
	Upper and Lower Richland Creek Modeling																							$1,300,000	$1,300,000
		Estimated Annual Cost	$540,000				$410,000				$300,000				$1,924,000				$1,706,000						
	Total Estimated Cost																							$5,323,930	$10,030,000

Key: Planning | Hydraulics/Study | Engineering | Permits | Land Acquisition | Implementation | Revenue

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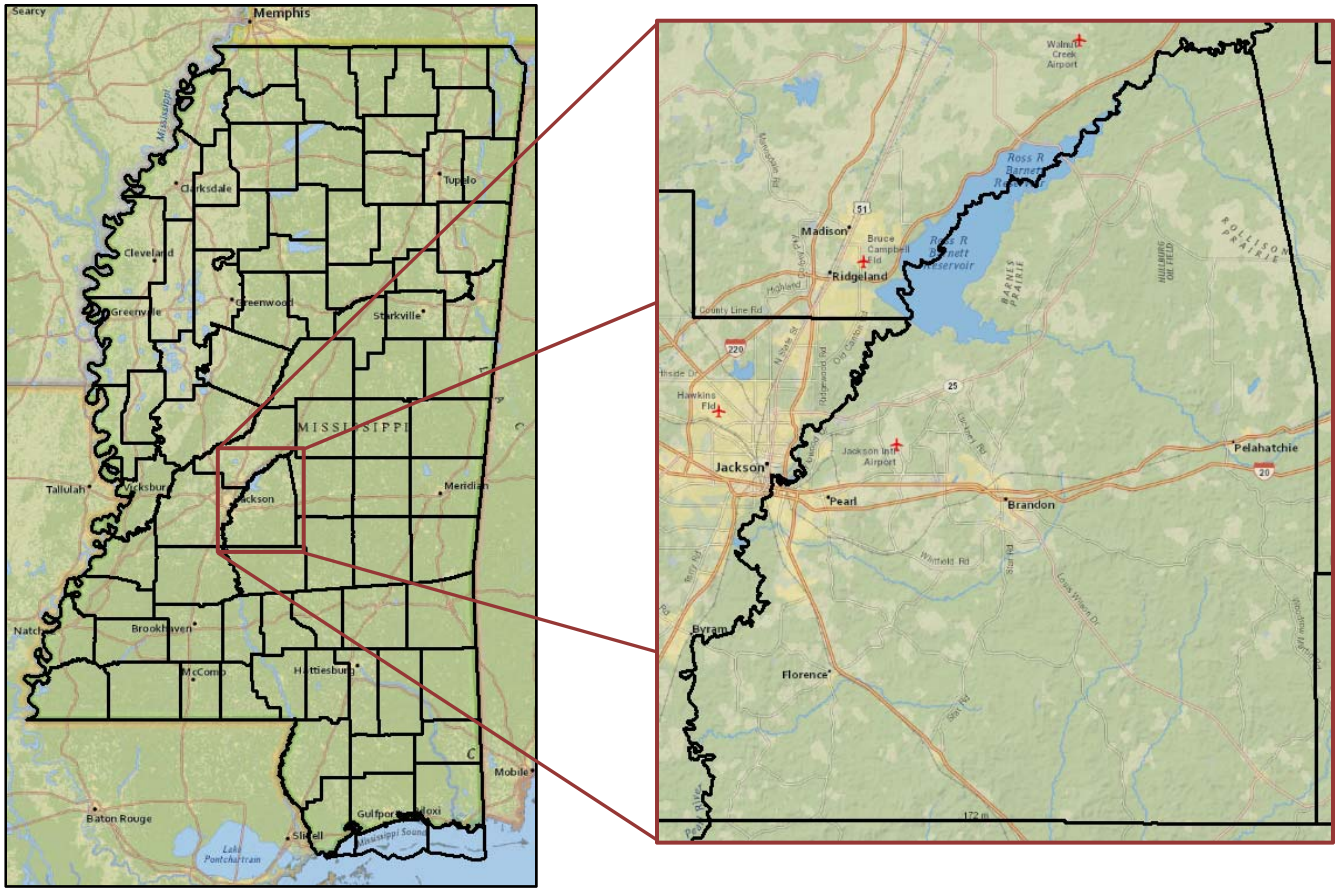
Introduction

Rankin County is located in central Mississippi. Rankin County is bordered by Scott and Smith Counties to the east, Simpson County to the south, and Hinds and Madison Counties to the west. The western border of Rankin County is formed by the Pearl River, the second largest river in the State of Mississippi, behind the Mississippi River. The Pearl River is dammed on the Rankin/Madison/Hinds County border to form the Ross Barnett Reservoir, a 33,000 acre man-made reservoir, which serves as the primary source of drinking water for the City of Jackson, Mississippi. The majority of the rivers and streams in Rankin County drain into the Ross Barnett Reservoir or the Pearl River below the Reservoir.

Figure 2: Location of Rankin County, Mississippi



During the 2010 Census, Rankin County was estimated to have a population of 141,617 persons. In July 2017, the U.S. Census Bureau estimated the population to have increased to 152,080 persons – a 7.4% increase in total population over seven years. This statistic makes Rankin County one of the fastest growing counties in the State of Mississippi on top of being the fourth most populated county in the State.

Rankin County is a half-rural/half-urban county with seven incorporated cities: Brandon, Florence, Flowood, Pearl, Pelahatchie, Puckett, and Richland. In addition to being home to the Ross Barnett Reservoir, the Pearl River, and numerous other streams, creeks, and rivers, Rankin County is bordered on the east by the Bienville National Forest. These natural resources serve to make Rankin County the place to go for outdoor and recreational activities.

Due to the relatively flat terrain, the extensive residential and commercial development over the past decade, and the abundance of streams and rivers along with numerous watersheds that drain into the Ross Barnett Reservoir, Rankin County is faced with numerous challenges and difficulties for stormwater management throughout the County. Managing the needs created by human occupancy within the natural environment is a difficult task, specifically with regards to flood control and flood damage reduction.

The Rankin County Board of Supervisors (RCBOS) hired Waggoner Engineering, Inc. in late 2017 to create a Watershed-Based Stormwater Assessment and Management Plan, which would identify both capital and maintenance requirements for addressing drainage-related deficiencies throughout the incorporated and unincorporated areas of the County.

The scope of the effort included the following areas:

- Identification of deficient areas by the RCBOS, staff, and Cities
- Field Investigations of identified areas
- Prioritization of Sites (deficient areas) to be addressed
    - To include a Preliminary Hazard Ranking
- Rankin County ordinance review
- Recommended improvements for areas with deficiencies
- Implementation strategy

While not included in the scope, the sites were analyzed through an integrated, holistic approach to addressing drainage problems in order to provide long-term, sustainable solutions for the County.

Identification of Areas with Deficiencies

Working with county and city officials and staff, a list of sixty (60) areas known to have drainage deficiencies was created. Of these sites, thirty-five (35) are located within city limits and twenty-five (25) are located in the county. Through individual interviews with county and city officials numerous sites were identified multiple times. For simplicity, duplicate sites were removed from the list.

The following table lists the consolidated sixty (60) sites. The initial number in the Site Number indicates the Supervisor District where the project is located. For example, Site 1.01 is located in District 1. Sites are not numbered in any particular order and are generally numbered in the order the county or city official named them in. In addition to the site number and the site name, the 12-digit Hydrologic Unit (HUC12) for each site was identified and is listed by name.

Table 3: Sites with Deficiencies Identified in Rankin County

Site Number	Site Name / Description	HUC 12
1.01	Williams Road between Levy Lane and The North Road	Indian Creek - Steen Creek
1.02	Pearson Road @ Unknown Tributary	Lower Richland Creek
1.03	Gunter Road @ Indian Creek	Indian Creek - Steen Creek
1.04	Old Pearson Road at bend east of Highway 49	Indian Creek - Steen Creek
1.05	Highway 49 @ Hwy 469 in Florence	Indian Creek - Steen Creek
1.06	Williams Road @ Butler Creek in Florence	Indian Creek - Steen Creek
1.07	Highway 49 Culvert @ Butler Creek in Florence	Indian Creek - Steen Creek
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	Indian Creek - Steen Creek
1.09	Highway 469 between West Main Street & White Street in Florence	Indian Creek - Steen Creek
1.1	Highway 469 @ Steen Creek in Florence	Indian Creek - Steen Creek
1.11	Highway 49 Commercial Area in Richland	Lower Richland Creek
1.12	Bud Street in Richland	Lower Richland Creek
1.13	Jones Street @ Old Hwy 49 South in Richland	Lower Richland Creek
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Cany Creek - Pearl River
1.15	Linda Jo Drive @ Lowe Circle in Richland	Cany Creek - Pearl River
1.16	Lowe Circle @ Southwind Apartments in Richland	Lower Richland Creek
1.17	End of Lewis Street in Richland	Cany Creek - Pearl River
1.18	East Harper Street @ Short Street in Richland	Lower Richland Creek
1.19	Richland East Circle in Richland	Lower Richland Creek
1.2	Furr Dr @ Richland Circle in Richland	Lower Richland Creek
2.01	Mill Creek between Highway 25 & The Reservoir	Mill Creek - Pelahatchie Creek

Site Number	Site Name / Description	HUC 12
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Mill Creek - Pelahatchie Creek
2.03	Church Road @ Unnamed Tributary	Mill Creek - Pelahatchie Creek
2.04	Manship Road @ Amethyst Drive	Mill Creek - Pelahatchie Creek
2.05	Mill Creek under Lakeland	Mill Creek - Pelahatchie Creek
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	Mill Creek - Pelahatchie Creek
2.07	Oakgrove Subdivision	Brashear Creek - Pearl River
3.01	Tara Road @ Unnamed Tributary	Upper Richland Creek
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Lower Richland Creek
3.03	Thomasville Road @ Unnamed Tributary	Lower Richland Creek
3.04	Puckett Park off Highway 18 in Puckett	Brushy Creek - Clear Creek
3.05	Windchase Subdivision in Brandon	Upper Richland Creek
3.06	Belle Oak Subdivision in Brandon	Upper Richland Creek
3.07	Greenfield Road @ Unnamed Tributary in Pearl	Terrapin Skin Creek
3.08	Meadowland Drive @ East Government Street in Brandon	Upper Richland Creek
4.01	Jims Road @ Unnamed Tributary	Deer Creek - Fannegusha Creek
4.02	Weaver Road @ Unnamed Tributary	Red Cane Creek - Fannegusha Creek
4.03	Gore Road @ Purnell Creek	Deer Creek - Fannegusha Creek
4.04	Lewis Prestage Road @ Rollison Creek	Red Cane Creek - Fannegusha Creek
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Riley Creek - Pelahatchie Creek
4.06	Holly Bush Road between Sara Fox Drive & Rodeo Drive	Riley Creek - Pelahatchie Creek
4.07	Reservoir East Subdivision	Riley Creek - Pelahatchie Creek
4.08	Holly Bush Road @ Riley Creek	Riley Creek - Pelahatchie Creek
4.09	Oakdale Road north of Baker Lane	Riley Creek - Pelahatchie Creek
4.10	Andrew Chapel Road @ Bush Creek	Riley Creek - Pelahatchie Creek
4.11	Barker Road @ Dry Creek Tributary	Hollybush Creek - Clear Creek
4.12	Brush Creek in North Brandon Estates	Riley Creek - Pelahatchie Creek
4.13	Highway 80 @ Hwy 43 in Pelahatchie	Snake Creek - Pelahatchie Creek
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	Terrapin Skin Creek
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	Terrapin Skin Creek
4.16	Grimes Street & Mimosa Avenue in Pelahatchie	Ashlog Creek - Pelahatchie Creek
5.01	Vernon Jones Avenue west of Old Fannin Road	Hog Creek - Pearl River

Site Number	Site Name / Description	HUC 12
5.02	Flowood Drive south of Lakeland in Flowood	Hog Creek - Pearl River
5.03	Laurel Park Apartments in Flowood	Hog Creek - Pearl River
5.04	Fox Hall Road west of Highway 475 in Flowood	Town Creek - Pearl River
5.05	Neely Creek between Nancy and Skylane in Pearl	Town Creek - Pearl River
5.06	Chicot Court @ Hwy 80 in Pearl	Neely Creek - Conway Slough
5.07	Tony Street between Old Country Club & Boehle	Neely Creek - Conway Slough
5.08	Old Country Club Road @ Louisa Street in Pearl	Neely Creek - Conway Slough
5.09	Buckingham Subdivision	Mill Creek - Pelahatchie Creek

60 Sites in 17 Watersheds

Additional information about each site can be found in Appendix A – Project Sheets. Additionally, each site is identified on the following map. Maps of the sites, broken down by supervisor district can be found in Appendix B – Sites by Supervisor District.

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Rankin County

Drainage Issue Site Map

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Legend

Drainage Issue Sites

- Drainage Issue Sites
- Supervisor Districts
- Streams (2435 miles)
- Waterbody
- County Boundary

District 1

District 2

District 3

District 4

District 5

Ross R Barnett Reservoir

1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20

2.01 2.02 2.03 2.04 2.05 2.06 2.07

3.01 3.02 3.03 3.04 3.05 3.06 3.07 3.08

4.01 4.02 4.03 4.04 4.05 4.06 4.07 4.08 4.09 4.10 4.11 4.12 4.13 4.14 4.15 4.16

5.01 5.02 5.03 5.04 5.05 5.06 5.07 5.08 5.09

Bear Creek, Sill Branch, French Branch, Indian Creek, Bone Creek, Pringle Branch, Neely Creek, Hog Creek, Mill Creek, Steen Creek, Sanders Creek, Dabbs Creek, Dry Creek, Wildcat Creek, Brushy Creek, Clear Creek, Walters Creek, Billy Creek, Ashlog Creek, Purvis Creek, Richland Creek, Snake Creek, Ward Branch, Big Branch, Mulberry Creek, Mink Branch, Dry Creek, Red Cane Creek, Hollybush Creek, Rollison Creek, Riley Creek, Baker's Creek, Clark Creek, Carter Creek, Purnell Creek, Deer Creek, Mill Creek

49, 468, 469, 471, 475, 481, 25, 20, 80, 43, 18, 13, 541

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0 1.75 3.5 7 Miles

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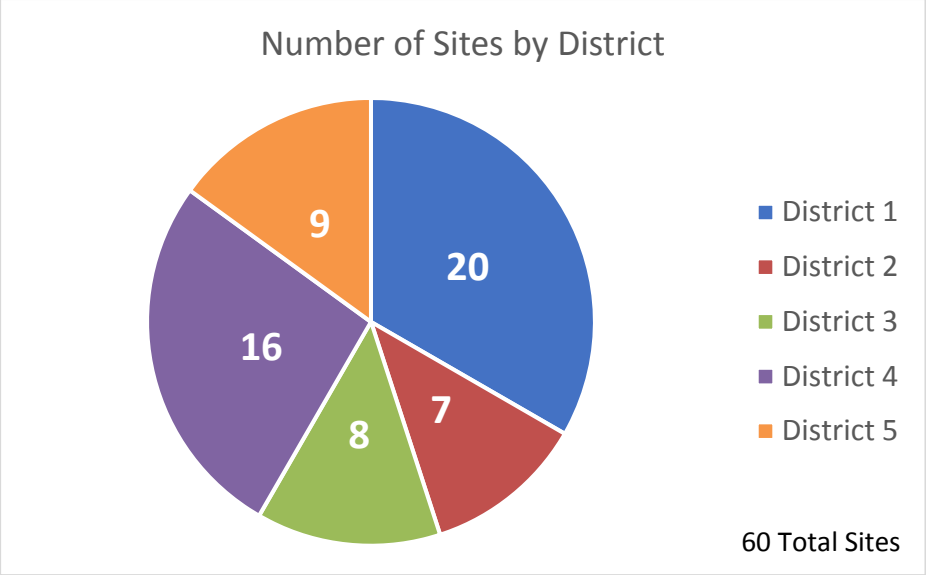
To better visualize the number of sites per supervisor district, the chart below depicts the total number of identified deficient sites per district.

Figure 3: Identified Sites with Deficiencies per Supervisor District



Additionally, it is important to identify watersheds with deficiencies. In order to do this, the 12-digit Hydrologic Unit Code (HUC12) for each site was identified and the total number of sites per HUC12 was calculated. A map showing the location of each problem site and the HUC12 it is located in is shown below. Additional information about each watershed can be found in Appendix C – Watershed Sheets.

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Rankin County

Drainage Issue Site Map

N

Legend

Drainage Issue Sites

- Drainage Issue Sites
- HUC12
- Streams (2435 miles)
- Waterbody
- County Boundary

WAGGONER

0 1.75 3.5 7 Miles

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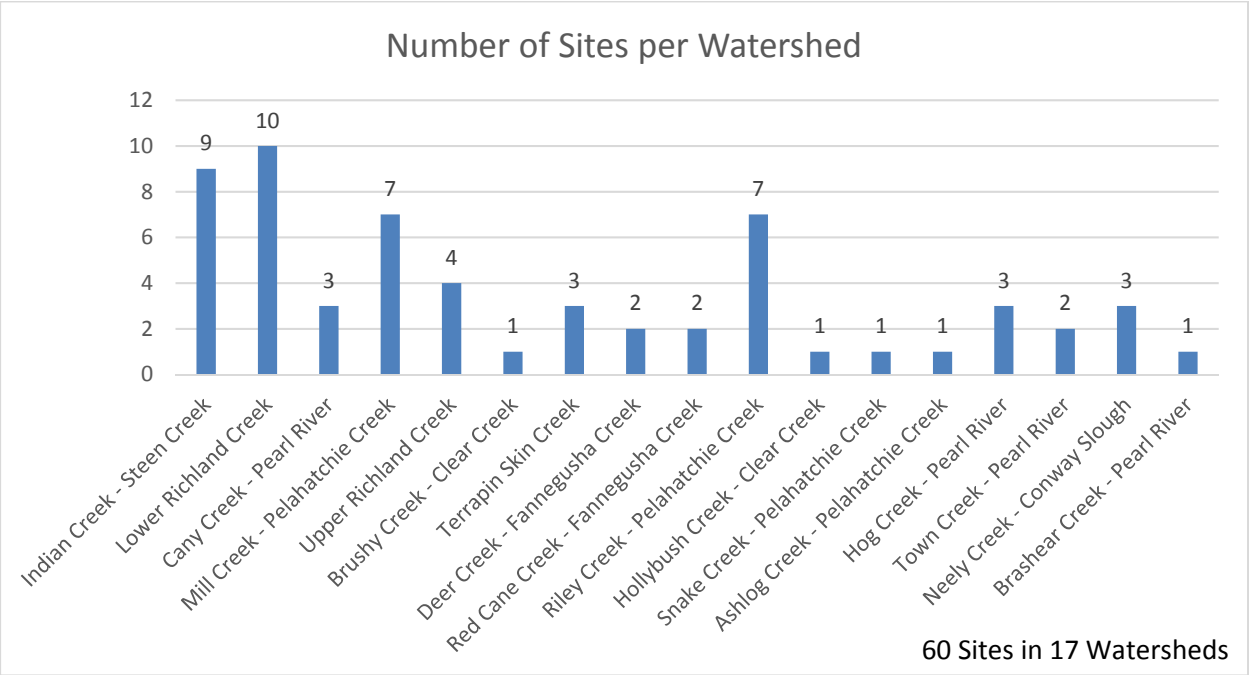
This information is useful in recommending holistic, watershed-based solutions which are presented later in this document, and tells if the site is an indicator of a larger watershed problem or simply a site-specific problem. The number of sites per HUC12 is shown in Figure 4 below.

Figure 4: Number of Sites per Watershed



In order to collect as much existing information as possible about each site, interviews were conducted with each Supervisor, the Rankin County Road Manager, and responsible parties in the Cities located in Rankin County. During these interviews the following information was requested for each site:

- Please describe the nature of the problem at this location.
- How long has this problem existed?
- Please provide the name, phone number, or other contact information for the person most familiar with this situation, for further interview.
- Have there been any previous investigative measures or studies performed that were intended to address this situation? If so, please provide the name and contact information of the responsible party.

This initial information was critical to the assessment. Field investigations were completed before identifying the deficiencies at each site. During the field investigations, engineers visited each site county and city officials had named as problem areas. The engineers walked around each site taking photographs and notes trying to identify any problems that could be

seen within each site. The extent of the investigation varied by site, depending upon the information provided by city and county officials beforehand, site access, and the ability to visually determine site deficiencies.

Typical Causes of Drainage Deficiencies

The sources of drainage deficiencies often include a variety of factors. However, typical causes include drainage structures that are undersized, lack of watershed-level detention to handle excess flow, and sediment and/or debris, also called siltation, within drainage structures.

Flood Zone and Floodway Encroachment

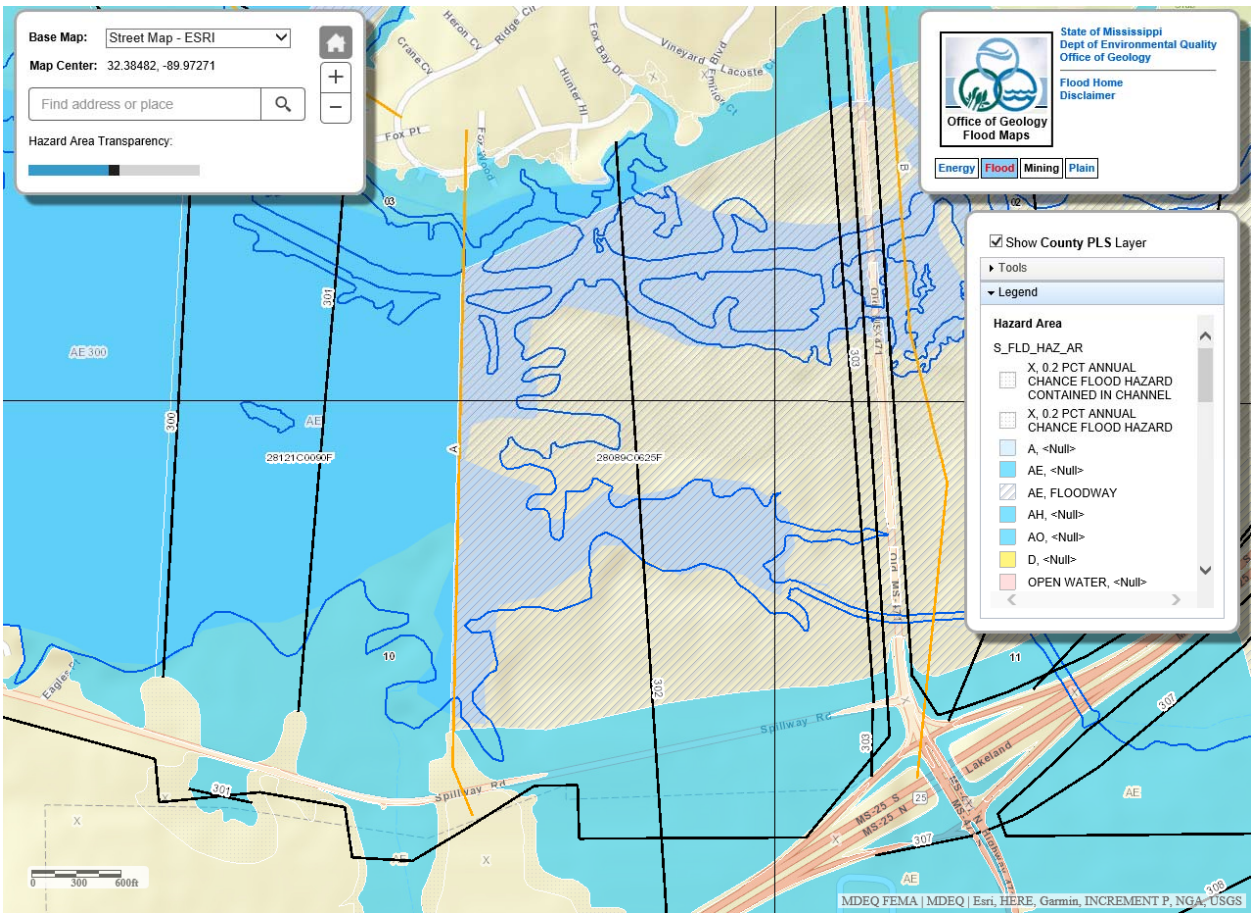
The evaluation of the impact of flood zone and floodway encroachments on water surface profiles can be of substantial interest to planners and engineers. Flood zone and floodway encroachment evaluations are the basis for floodplain management programs and can inform the preparation of specific county and city ordinances regarding zoning and development.

A flood zone is an area of low-lying ground adjacent to a river, or other similar body of water, that is subject to flooding by the 100-year storm event. Alternatively, the flood zone subject to flooding by the 100-year flood is also referred to as the floodplain. The Federal Emergency Management Agency (FEMA) identifies flood zones through the use of Digital Flood Insurance Rate Maps (DFIRMs). These areas are identified as Special Flood Hazard Areas (SFHA) which is defined as an area that will be inundated by the flood event having a one-percent chance of being equaled or exceeded in any given year. The one-percent annual chance flood is also referred to as the base flood or the 100-year flood. SFHAs can have multiple labels; however, in Rankin County Zone A, and Zone AE are the most common. Moderate flood hazard areas, labeled as Zone X (shaded) are also located in Rankin County, and are the areas between the limits of the base flood and the 0.2 percent annual chance (or 500 year) flood. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2 percent annual chance flood are labeled Zone X (unshaded) or simply, Zone X. No base flood elevations or depths are shown in Zone X.

A floodway is the channel of a river or stream and the parts of the floodplain adjoining the channel that are reasonably required to efficiently carry and discharge the flood water of the river or stream. FEMA 37 (Federal Emergency Management Agency, 11085) defines a floodway "…as a channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water-surface elevation by more than a designated height." Simply put, floodways are areas where fill and other development is likely to divert flow and contribute to increased water depths during a flood. In Rankin County the Flood Damage Prevention Ordinance expressly prohibits development in floodways; however, development in floodplains is not prohibited.

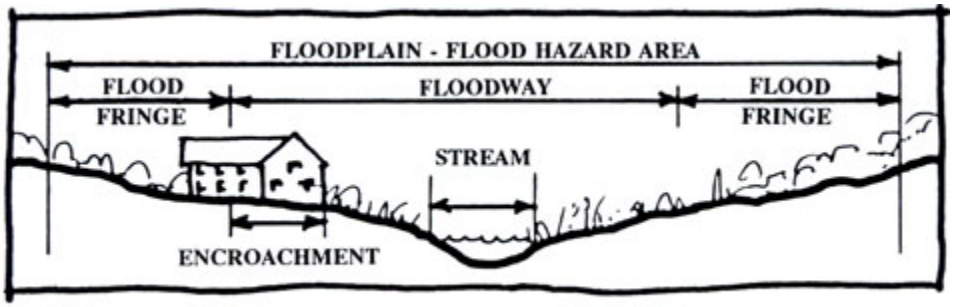
On DFIRMs, readily available online, floodways are represented with hatch marks while other flood zones are represented by solid colors. In the DFIRM excerpt below, the AE Floodway can be seen shaded by a hatched area. Zone AE is covered in solid blue. Areas that are not covered by hatches or a solid color are Zone X and located outside of the 100-year floodplain.

Figure 5: DFIRM Excerpt Map



Floodways are located within the flood zone, or the special flood hazard area, sometimes referred to as the floodplain, as seen in the figure below. Flood zone and floodway encroachments are defined as any development that could obstruct flood flows such as fill, a bridge, or a building as seen in Figure 6.

Figure 6: Flood Zone and Floodway Encroachment

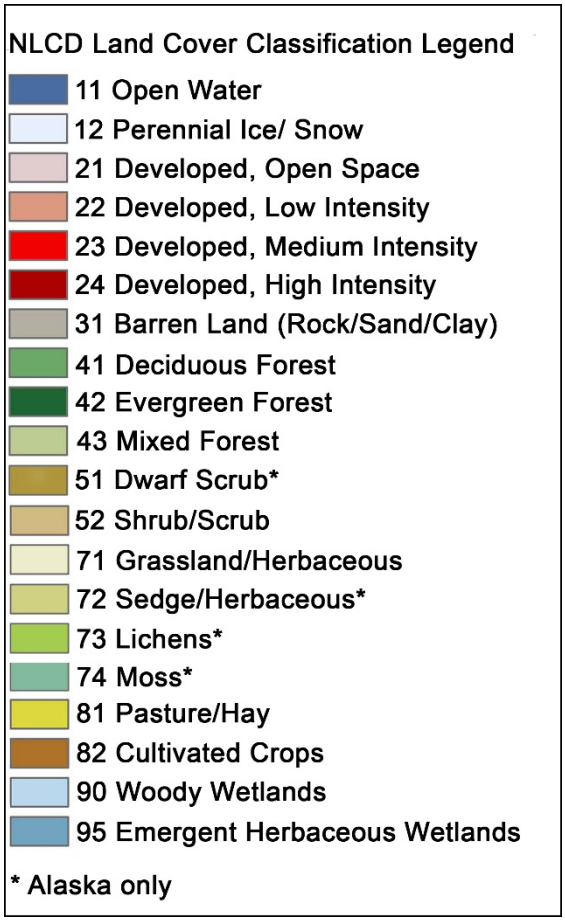


Source: Chester County Planning Commission, Rural Community Design Guide, 1995.

As previously stated, the quantification of flood zone and floodway encroachments can be of substantial interest to planners and engineers as these calculations are generally the basis for flood zone management programs and can dictate specific county and city ordinances regarding zoning and development. A flood zone and floodway encroachment analysis was conducted as part of the Rankin County Drainage Plan.

During the encroachment analysis, the National Land Cover Database 2011 (NLCD2011), created by the Multi-Resolution Land Characteristics Consortium, was used to identify different land cover classifications. NLCD2011 uses sixteen general land cover classifications as well as four additional classifications for Alaska. The NLCD Land Cover Classification legend can be found below.

Figure 7: NLCD Land Cover Classification Legend



The table below shows each classification and provides a description for each class. This information is taken directly from the National Land Cover Database 2011 website.

Table 4: National Land Cover Database 2011 Classification Descriptions

Class	Classification Description
	Water
11	**Open Water** - areas of open water, generally with less than 25% cover of vegetation or soil.
12	**Perennial Ice/Snow** - areas characterized by a perennial cover of ice and/or snow, generally great than 25% of total cover.
	Developed
21	**Developed, Open Space** - areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	**Developed, Low Intensity** - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% of total cover. These areas most commonly include single-family housing units.

Class	Classification Description
23	**Developed, Medium Intensity** - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
24	**Developed, High Intensity** - highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial areas. Impervious surfaces account for 80% to 100% of the total cover.
	Barren
31	**Barren Land (Rock/Sand/Clay)** - areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
	Forest
41	**Deciduous Forest** - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
42	**Evergreen Forest** - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	**Mixed Forest** - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
	Shrubland
51	**Dwarf Scrub** - Alaska only areas dominated by shrubs less than 20 centimeters tall with shrub canopy typically greater than 20% of total vegetation. This types is often co-associated with grasses, sedges, herbs, and non-vascular vegetation.
52	**Shrub/Scrub** - area dominated by shrubs less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
	Herbaceous
71	**Grassland/Herbaceous** - area dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
72	**Sedge/Herbaceous** - Alaska only areas dominated by sedges and forbs, generally greater than 80% of total vegetation. This type can occur with significant other grasses or other grass like plants, that includes sedge tundra, and sedge tussock tundra.
73	**Lichens** - Alaska only areas dominated by fruticose or foliose lichens generally greater than 80% of total vegetation.
74	**Moss** - Alaska only areas dominated by mosses, generally greater than 80% of total vegetation.
	Planted/Cultivated
81	**Pasture/Hay** - areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
82	**Cultivated Crops** - areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.

Class	Classification Description
	Wetlands
90	**Woody Wetlands** - areas where forested or shrubland vegetation accounts for 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
91	**Emergent Herbaceous Wetland** - area where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

After downloading the NLCD2011 dataset in image form, the dataset was converted into a Geographic Information System (GIS) polygon file for further use. Of the twenty classifications, three were used in the Rankin County encroachment study – "Developed, low intensity", "Developed, medium intensity", and "Developed, high intensity". These three classifications were used as they represent the areas with a majority of impervious surfaces. Impervious surfaces are those surfaces that are impenetrable by water, such as roads, sidewalks, buildings, and parking lots. An increase in impervious surfaces leads to an increase in stormwater runoff from an area which, in turn, can lead to drainage problems.

Using ArcMap, a GIS software, the NLCD2011 layers were overlaid with current DFIRM maps of Rankin County and HUC12 maps. Tools within ArcMap were utilized to identify areas where any of the three developed land cover classifications overlapped the flood zone, which included Zone A, Zone AE, Zone X (shaded), and the floodway. This overlap represents and area of flood zone encroachment and was quantified, in total acres, for each HUC12 basin in Rankin County.

Additionally, the probable encroachment for each watershed was calculated using zoning data obtained from the Central Mississippi Planning and Development District (CMPDD). The August 2017 Official Zoning Map lists twenty-one zones as shown below.

Table 5: Rankin County Zoning Classifications

Code	Classification
A-1	Agricultural General
A-2	Agricultural Intensive
RE-1	Residential Estate
RE-1A	Residential Estate Mix
R-1	Low Density Residential
R-1B	Medium Density Residential District
R-1C	Medium Density Residential District
R-1D	Patio Home Residential
R-3	Townhouse Residential
R-4	High Density Residential District

Code	Classification
MHP	Manufactured Home Park District
MHS	Manufactured Home Subdivision District
R-MX	Residential Mixed
P-1	Restricted Commercial District
C-2	General Commercial District
C-3	Major Thoroughfares Commercial District
C-4	Adult Entertainment District
I-1	Limited Industrial District
I-2	Heavy Industrial District
S-1	Special Use District
PUD	Planned Unit Development

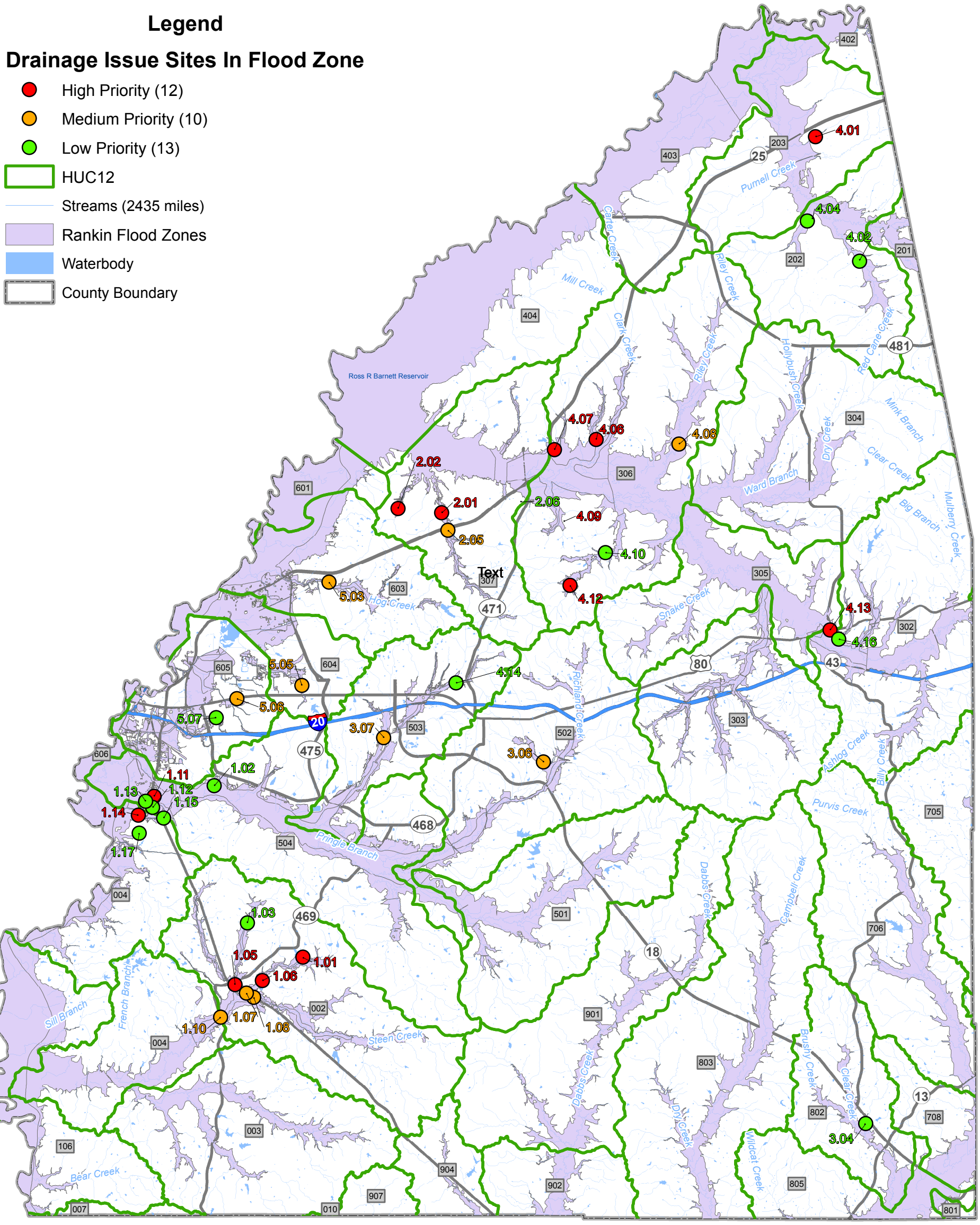
Of the twenty-one zoning classifications, fifteen (15) were used to calculate probable encroachments. These fifteen zoning classification are: R-1B, R-1C, R-1D, R-3, R-4, MHP, MHS, R-MX, P-1, C-2, C-3, C-4, I-1, I-2, and PUD.

The GIS data obtained from CMPDD was overlaid with DFIRM maps of Rankin County and HUC12 maps. Tools in ArcMap were used to identify where any of the fifteen zoning classifications listed above overlapped the flood zone. This overlap represents possible flood zone encroachment and was quantified in total acres for each HUC12 basin in Rankin County. The reason this quantification represents possible flood zone encroachment is because these areas, located in the flood zone, are zoned to allow residential and/or commercial development. The overlapping illustrates the extent of encroachment that would be experienced in a fully built-out scenario.

A map showing the flood zones in Rankin County as well as the sites within the flood zones is shown below.

Encroachments in the Flood Zone

Total Size of Flood Zones: 115,337 acres, 22.36% of Rankin County
Total Existing Encroachment: 3,142 acres, 2.72% of flood zone
Total Area Zoned for Development: 41,311 acres, 35.82% of flood zone



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The results of the encroachment study can be seen Table 6 below, which includes the following data:

- the forty one (41) HUC12 Basins located in Rankin County and the Watershed Code – the last three digits of the HUC12 code; the number of sites in the HUC12;
- the total area – in acres – located in the flood zone (Zone A, Zone AE, Zone X (shaded), and the floodway) for each HUC12;
- the total encroachment area, listed as "Total Developed Area in Flood Zone" – in acres and percent – for each HUC12 as calculated using the process outlined above;
- the probable future encroachment area, listed as "Total Developable Zoned Area of HUC in Flood Zone" – in acres and percent – for each HUC12.
- the number of sites located in each HUC12 is listed; and
- the number of sites per HUC12 in each flood zone.

The sixty (60) problem drainage sites are spread across seventeen (17) of the forty-one (41) HUC12s. These seventeen HUC12s are listed first in the table, indicated with italicized font, from the basin having the highest number of drainage sites to the basin having the lowest number of drainage sites. In instances where multiple HUC12s have the same number of drainage sites, the basins are listed in alphabetical order. Following the seventeen HUC12s with drainage sites, the remaining twenty-five basins are listed in descending order from the watershed having the highest percent of developable flood zone. Once again, in instances where multiple HUC12s have the same percent of developable flood zone, the basins are listed in alphabetical order.

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Table 6: Encroachment Analysis Results

Watershed Code	Rankin County HUC 12 Basin	Number of Sites in HUC	Number of Sites in the Flood Zone	Total Area of HUC in Rankin Co. (Ac.)	Total Area of HUC in Rankin Co. Flood Zone (Ac.)	Total Developed Area in Flood Zone (Ac.)	Total Developed Area in Flood Zone (%)	Total Developable Zoned Area of HUC in Flood Zone (Ac.)	Total Developable Zoned Area in Flood Zone (%)
504	***Lower Richland Creek***	10	4	27695.17	7079.77	367.11	5%	2505.56	35%
002	***Indian Creek-Steen Creek***	9	7	23757.70	2677.01	87.61	3%	1378.04	51%
306	***Riley Creek-Pelahatchie Creek***	7	5	33446.50	8175.55	187.87	2%	635.12	8%
307	***Mill Creek-Pelahatchie Creek***	7	3	18100.02	3844.98	156.94	4%	2995.83	78%
502	***Upper Richland Creek***	4	1	23493.95	2834.40	26.46	1%	911.62	32%
607	***Cany Creek-Pearl River***	3	3	9976.05	3044.95	40.35	1%	483.330	16%
603	***Hog Creek-Pearl River***	3	1	13038.85	4035.10	541.21	13%	3800.78	94%
605	***Neely Creek-Conway Slough***	3	2	10220.10	2965.43	783.76	26%	2963.98	100%
503	***Terrapin Skin Creek***	3	2	13300.67	2187.84	269.18	12%	1020.02	47%
203	***Deer Creek-Fannegusha Creek***	2	1	15105.12	3930.93	0.24	0%	55.80	1%
202	***Red Cane Creek-Fannegusha Creek***	2	2	13832.16	1791.59	1.47	0%	7.22	0%
604	***Town Creek-Pearl River***	2	1	7106.46	2711.06	426.14	16%	2701.41	100%
302	***Ashlog Creek-Pelahatchie Creek***	1	1	22819.57	3660.59	72.50	2%	1276.12	35%
601	***Brashear Creek-Pearl River***	1	0	3279.06	2625.21	46.79	2%	2043.06	78%
802	***Brushy Creek-Clear Creek***	1	1	10792.14	1352.95	7.81	1%	373.41	28%
304	***Hollybush Creek-Clear Creek***	1	0	23768.50	3827.89	4.37	0%	24.26	1%
305	***Snake Creek-Pelahatchie Creek***	1	1	14042.78	4451.90	19.43	0%	403.35	9%
602	**Hanging Moss Creek**	---	---	92.60	91.31	0.00	0%	91.31	100%*
404	**Mill Creek-Pearl River**	---	---	23381.10	14750.05	27.75	0%	13048.06	88%
403	**Cane Creek-Pearl River**	---	---	13200.80	7330.17	13.04	0%	3148.12	43%
606	**Lynch Creek-Pearl River**	---	---	569.66	545.67	6.67	1%	195.50	36%
007	**Rocky Creek-Pearl River**	---	---	796.98	14.06	0.22	2%	2.02	14%
303	**Eutacutachee Creek**	---	---	17847.34	2269.72	6.19	0%	292.47	13%

Watershed Code	Rankin County HUC 12 Basin	Number of Sites in HUC	Number of Sites in the Flood Zone	Total Area of HUC in Rankin Co. (Ac.)	Total Area of HUC in Rankin Co. Flood Zone (Ac.)	Total Developed Area in Flood Zone (Ac.)	Total Developed Area in Flood Zone (%)	Total Developable Zoned Area of HUC in Flood Zone (Ac.)	Total Developable Zoned Area in Flood Zone (%)
501	**Tumbaloo Creek**	---	---	18796.20	3005.55	8.04	0%	387.25	13%
904	**Sanders Creek**	---	---	4397.30	230.23	4.99	2%	22.33	10%
006	**Steen Creek-Pearl River**	---	---	12966.25	5371.13	11.38	0%	226.99	4%
805	**Crooked Creek-Strong River**	---	---	7252.61	1308.02	3.26	0%	39.72	3%
708	**Jump Creek-Strong River**	---	---	4946.52	1144.88	0.43	0%	35.60	3%
004	**Lower Steen Creek**	---	---	11733.54	3206.97	11.14	0%	105.86	3%
003	**Mountain Creek**	---	---	20382.17	2455.69	0.26	0%	71.26	3%
803	**Campbell Creek**	---	---	31262.18	3860.13	6.20	0%	27.37	1%
201	**Hurricane Creek-Fannegusha Creek**	---	---	2932.72	782.33	0.04	0%	4.37	1%
901	**Thompson Creek-Dabbs Creek**	---	---	23867.89	2964.15	1.75	0%	26.54	1%
402	**Lake Creek-Pearl River**	---	---	2188.94	1064.98	0.00	0%	0	0%
010	**Limestone Creek**	---	---	105.04	0.00	0.00	0%	0	0%
907	**Little Creek-Big Creek**	---	---	1956.98	0.71	0.00	0%	0	0%
902	**Lower Dabbs Creek**	---	---	6079.68	899.30	0.00	0%	0.03	0%
706	**Purvis Creek**	---	---	19208.66	2647.50	1.32	0%	6.94	0%
705	**Raspberry Creek**	---	---	7671.38	54.60	0.00	0%	0	0%
801	**Rocky Creek**	---	---	427.00	143.07	0.00	0%	0.47	0%
301	**Upper Pelahatchie Creek**	---	---	9.79	0.31	0.00	0%	0	0%

60 Sites in 17 Watersheds

*location of a WWTF lagoon. This is zoned commercial but will not be further developed in the future.

From Table 6 it can be seen that, typically, the watersheds that have a higher percentage of flood zone encroachment also have listed drainage problems. This indicates that flood zone encroachment does, in fact, lead to drainage problems in Rankin County as suspected.

Furthermore, the table can be used to identify watersheds that may have problem areas in the future. This is seen from the last column labeled "Total Developable Zoned Area in Flood Zone (%)". This number is the percent of the watershed in the flood zone that is zoned for residential or commercial development. If the entire zoned area is developed, most, if not all, of it will become impervious leading to problems in the future – even in watersheds that are not currently experiencing problems. It is reasonable to believe that the higher the potential for development in the flood zone, the higher the potential for problem sites to arise in that watershed.

There is one exception to that statement. The Hanging Moss Creek Watershed currently has no impervious surface in the watershed but is 100% zoned for development in the future, as it is zoned "commercial". This small area (92 acres) is currently occupied by a Rankin County WWTF lagoon and will continue to be occupied by the lagoon in the future. As such, the project team believes this watershed will not be developed with impermeable surface in the future.

The encroachment analysis showed the following:

- Of the 515,848 acres of land in Rankin County, 115,337 acres, or approximately 22% of the county is located within a flood zone.
- 3,142 acres are currently encroaching the flood zone in Rankin County which is
    - 0.61% of the total area located in the county and
    - 2.72% of area located in the flood zone.
- 41,311 acres within Rankin County's flood zone, or 8% of the total area in the county, are currently zoned for development in the future.
- 35.82% of total area in the flood zone is open to development in the future.
- Approximately 7% of the total developable area within the flood zone in Rankin County has been developed.
- This leaves 93% of areas within the flood zone currently zoned for development available for future development.

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Field Investigation and Site Analysis

A field investigation was conducted as a component of the existing conditions assessment for each site listed in Table 3. This investigation included the following steps:

- Conducting interviews with those familiar with the sites in an effort to verify and identify the concern/deficiency;
- Performing preliminary analyses of each site to determine potential solutions during field investigations;
- Visiting each site to gather as much information about the site as possible;
- Preparing written field notes and taking multiple pictures of each site; and
- Preparing a description for each site, which included a written narrative to describe and quantify the deficiency based on available information.

While attempts were made at each site to observe as many aspects or features as possible, no guarantee is made in this report that all features contributing to a site's deficiencies were identified. Such a detailed evaluation was outside the scope of this conceptual drainage assessment and plan. Additionally, no detailed field surveys were performed during the field investigation phase.

Further, it is recommended that prior to final design of any of the suggested improvements detailed drainage studies be completed to fully identify the contributing factors to a particular site's deficiencies.

Notes from interviews with city and county officials and field notes from each site can be found in Appendix D – Site Hazard Assessment Sheets.

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Prioritization Process

Each of the sixty (60) sites was initially evaluated for potential hazards. The criteria for the preliminary hazard ranking can be found below. After the sites were preliminarily ranked for potential hazards, discussions with the Rankin County Board of Supervisors were hosted to gather more information on their priorities. The sites were then prioritized into short-term and long-term lists for implementation. The prioritization process was developed by the Project Team with the following goals in mind:

- The County was open and honest in its prioritization.
- The County focused on choosing projects that have direct or measurable benefit to the community.
- The County kept all needed improvements "on the radar" regardless if they are a high priority project or not.

Selection criteria for the project prioritization process were identified to cover the following objectives:

- Regulatory and Compliance
- Optimized Life Cycle Costs
- Operational Efficiencies
- Growth & Economic Development
- Sustainability Initiatives
- Levels of Service/Flood Reductions
- Customer/Community Benefit
- Quality of Life
- System Design & Performance

Preliminary Hazard Ranking

A preliminary ranking of drainage issues based upon potential hazards posed to health, safety, and welfare was conducted using questionnaire responses and other acquired information.

The questionnaire was formulated based upon the objectives listed above and a numerical score was assigned for each possible answer. These scores were then summed to assign a total score for each site. These total site scores were then used to conduct a preliminary hazard ranking. Interviews with the Rankin County Road Manager were used to answer each of the questions. Questionnaires can be found in Appendix D – Site Hazard Assessment Sheets.

The questions and scoring criteria were as follows:

Immediate Priorities

1. Is the project required to address an imminent threat to healthy, safety, welfare, or prosperity?
    a. 0 = No
    b. 5 = Yes

An imminent threat to health, safety, welfare, or prosperity is a danger that puts the citizen at immediate risk of death or serious harm. These threats do not necessarily deal only with serious physical harm, but can also deal with financial harm through loss of property, investments, et cetera. Answering this question in the affirmative might indicate, for example, that there is only one way into and out of a subdivision, which becomes inundated during a heavy rain, stranding residents, or instances of frequent or recurrent flooding of residences.

This was the criteria that could award a site the most points – five points maximum as opposed to one point maximum for the other criteria. This is due to the fact that any site that posed an imminent threat to health, safely, welfare, or prosperity should be dealt with quickly to remove the potential hazard.

Levels of Service/Flood Reduction

1. Will the project result in significant reduction in property damage, increased function of transportation systems, and reduction of other costs due to flooding, relative to project costs?
    a. 0 = No increased function of systems or no reduction in property damage and other costs of flooding
    b. 0.5 = The project provides average reduction
    c. 1 = The project provides significant reduction
2. What is the approximate number of residences and/or businesses benefitted by the project?
    a. 0.2 = 0-25 residences and/or businesses
    b. 04. = 26-50 residences and/or businesses
    c. 0.6 = 51-75 residences and/or businesses
    d. 0.8 = 76-100 residences and/or businesses
    e. 1 = 100+ residences and/or businesses

The level of service provided, in regards to flood reduction, was included in the questionnaire using two questions. The first question was related to increasing the level of service provided by reducing flooding while the second question related to the number of people impacted by flooding.

The Rankin County Road Manager used his judgement and experience in answering these questions. When estimating the approximate number of residences and/or businesses that potentially would be benefitted by reducing flooding, the Road Manager estimated the number of vehicles that traversed the road in the case that a road was flooding.

These questions were asked in an effort to rank sites based upon the services they would provide to the County and her residents, if they were not flooded. Due to the way these criteria were ranked, sites that affect more people received a higher ranking than sites that only affected a few people or businesses. Additionally, sites that could potentially reduce the frequency and impacts of flooding more substantially were ranked higher than sites that might only reduce flooding frequency and severity by a small quantity.

Optimized Life Cycle Cost

1. Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?
    a. 0 = No substantial cost savings of doing project now versus future
    b. 0.25 = Some capital cost savings of doing project now but low economic consequences of waiting
    c. 0.5 = Some capital cost savings of doing project now and some reduction in "costs" of not doing project
    d. 0.75 = Some capital cost savings and significant "costs" of not doing project avoided
    e. 1 = Significant additional costs if project is put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Life cycle costs are those costs related to constructing, operating, and maintaining a project over its life. Decisions on which projects to implement and when they should be implemented need to be made based upon life cycle costs. The initial capital outlay is only a portion of the costs over an asset's (or project's) life cycle that need to be considered in making decisions on asset investment. The total cost of ownership is often far greater than the initial capital outlay cost and can vary significantly between alternative solutions. In this case, different projects can be implemented at different times; and the time of implementation can have a direct impact on life cycle cost.

This question was related to how long a project can be put off before impacting life cycle costs. If a project can be delayed without incurring negative impacts to the life cycle cost it receives a lower score than a project where the life cycle cost is negatively impacted due to putting the project off. The Rankin County Road Manager used his knowledge of the problems and possible solutions to respond to this question.

Growth & Economic Development

1. Will the project enhance property values in the area by:
   - Providing amenities?
   - Reducing nuisance flood risk?
     a. 0 = None of the above applies
     b. 0.5 = One of the above applies
     c. 1 = two of the above applies

Economic development is a term used to indicate an increase in citizens' quality of life and can be seen by an improvement in living standards. By asking whether reducing flooding will increase amenities or reduce nuisance flooding, the Project Team is trying to assess how reducing flooding in an area will increase citizens' quality of life. The Rankin County Road Manager used his knowledge of the sites to determine if amenities would be provided and/or if nuisance flood risk would be reduced.

Quality of Life

1. Has the County received complaints from citizens and/or businesses that the project is needed?
   a. 0 = No complaints from citizens and/or businesses
   b. 0.5 = Minimal complaints from citizens and/or businesses
   c. 1 = Extensive complaints from citizens and/or businesses

The standard of health, comfort, and happiness experienced by an individual or group is referred to as quality of life. Stress caused by circumstances out of our control can diminish our quality of life and can lead to complaints. Sites that have extensive complaints can indicate a diminished quality of life, especially if these complaints occur often with frequent rain events. Implementing solutions that could help alleviate flooding and reduce complaints would potentially increase the quality of life for citizens. The Rankin County Road Manager responded to this survey question using his history and knowledge of sites and complaints from his time working in Rankin County.

Preliminary Hazard Ranking Results

Following the preliminary hazard ranking interviews the sites were divided into three categories based upon the potential hazards they posed: high priority, medium priority, and low priority.

High priority sites were those that were determined to pose an imminent threat to human healthy, safety, and welfare. Medium priority sites scored between two and six points on the preliminary hazard ranking while low priority sites scored below two points. Seventeen sites were identified as high priority; nineteen sites were identified as medium priority; and twenty-four sites were identified as low priority.

The table below shows the site priority breakdown, as well as the answers to the ranking criteria questions. Please note that high priority sites are shown in red, medium priority sites are shown in orange, and low priority sites are shown in green. Additionally, the sites are not ranked. Rather, they are listed in numeric order for each priority level.

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Table 7: Preliminary Hazard Ranking

Preliminary Hazard Ranking Criteria		Immediate Priorities	Levels of Service/Flood Reduction		Optimized Lifecycle Cost	Growth & Economic Development		Quality of Life	Notes
		Is the project required to address an imminent threat to health, safety, or welfare?	Will the project result in significant reduction in property damage, function of transportation systems, and other costs of flooding relative to project costs?	What number of residences and/or businesses are benefited by the project?	Will the project lifecycle cost be less expensive if constructed or purchased at this time (economy with other projects, costs of not doing project, staff efficiency, equipment efficiency, etc?)	Will the project enhance property values in the area?		Has the County received complaints from citizens and/or businesses that the project is needed?	
Site Number	Site Name / Description					Provide amenities	Reduce nuisance flood risk		
1.01	Williams Road between Levy Lane and The North Road	Yes	Significant Reduction	0-25	Average Savings Average Benefit	Yes	Yes	Some Complaints	
1.05	Highway 49 @ Highway 469 in Florence	Yes	Significant Reduction	100+	Average Savings Above Average Benefit	Yes	Yes	Extensive Complaints	
1.06	Williams Road @ Butler Creek in Florence	Yes	Significant Reduction	100+	Average Savings Above Average Benefit	Yes	Yes	Extensive Complaints	
1.11	Highway 49 Commercial Area in Richland	Yes	Significant Reduction	26-50	Average Savings Average Benefit	Yes	Yes	Extensive Complaints	
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Yes	Significant Reduction	0-25	Average Savings Average Benefit	Yes	Yes	Extensive Complaints	
2.01	Mill Creek between Highway 25 & The Reservoir	Yes	Average Reduction	100+	Average Savings Above Average Benefit	No	No	Some Complaints	
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Yes	Significant Reduction	100+	Average Savings Above Average Benefit	Yes	Yes	Extensive Complaints	
3.01	Tara Road @ Unnamed Tributary	Yes	Significant Reduction	0-25	Average Savings Average Benefit	Yes	Yes	Extensive Complaints	
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Yes	Average Reduction	100+	Average Savings Average Benefit	Yes	Yes	Some Complaints	
3.05	Windchase Subdivision in Brandon	Yes	Significant Reduction	26-50	Average Savings Above Average Benefit	No	Yes	Extensive Complaints	
4.01	Jims Road @ Unnamed Tributary	Yes	Significant Reduction	0-25	Average Savings Average Benefit	Yes	Yes	Extensive Complaints	
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Yes	Average Reduction	0-25	Average Savings Average Benefit	Yes	Yes	Some Complaints	Two creek crossings. Couldn't get to one of them.
4.06	Holly Bush Road between Sara Fox Drive & Rodeo Drive	Yes	Average Reduction	26-50	Significant Savings & Benefits	Yes	Yes	Extensive Complaints	Area currently being developed
4.07	Reservoir East Subdivision	Yes	Significant Reduction	100+	Average Savings Above Average Benefit	Yes	Yes	Extensive Complaints	
4.09	Oakdale Road north of Baker Lane	Yes	Average Reduction	100+	Average Savings Average Benefit	Yes	Yes	Some Complaints	
4.12	Brush Creek in North Brandon Estates	Yes	Significant Reduction	100+	Average Savings Average Benefit	Yes	Yes	Some Complaints	
4.13	Highway 80 @ Highway 43 in Pelahatchie	Yes	Significant Reduction	100+	Low Savings Low Benefit	Yes	No	Some Complaints	
5.09	Oakgrove Subdivision	Yes	No/Minimal Reduction	76-100	Low Savings Low Benefit	No	No	Some Complaints	
1.04	Old Pearson Road at bend east of Highway 49	No	Average Reduction	51-75	Low Savings Low Benefit	Yes	Yes	Extensive Complaints	
1.07	Highway 49 Culvert @ Butler Creek in Florence	No	Average Reduction	100+	Low Savings Low Benefit	No	No	Some Complaints	
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	No	Average Reduction	100+	Low Savings Low Benefit	No	No	Some Complaints	

Preliminary Hazard Ranking Criteria		Immediate Priorities	Levels of Service/Flood Reduction		Optimized Lifecycle Cost	Growth & Economic Development		Quality of Life	Notes
Site Number	Site Name / Description	Is the project required to address an imminent threat to health, safety, or welfare?	Will the project result in significant reduction in property damage, function of transportation systems, and other costs of flooding relative to project costs?	What number of residences and/or businesses are benefited by the project?	Will the project lifecycle cost be less expensive if constructed or purchased at this time (economy with other projects, costs of not doing project, staff efficiency, equipment efficiency, etc?)	Will the project enhance property values in the area?		Has the County received complaints from citizens and/or businesses that the project is needed?	
						Provide amenities	Reduce nuisance flood risk		
1.09	Highway 469 between West Main Street & White Street in Florence	No	Average Reduction	51-75	Average Savings Average Benefit	No	No	Some Complaints	
1.10	Highway 469 @ Steen Creek in Florence	No	Average Reduction	76-100	Low Savings Low Benefit	No	No	Some Complaints	
1.16	Lowe Circle @ Southwind Apartments in Richland	No	Average Reduction	51-75	Low Savings Low Benefit	No	No	Extensive Complaints	
1.18	East Harper Street @ Short Street in Richland	No	Significant Reduction	26-50	Average Savings Above Average Benefit	No	Yes	Extensive Complaints	
1.19	Richland East Circle in Richland	No	Significant Reduction	26-50	Average Savings Above Average Benefit	No	Yes	Extensive Complaints	
2.05	Mill Creek under Lakeland	No	Average Reduction	100+	Average Savings Average Benefit	No	No	Some Complaints	
3.03	Thomasville Road @ Unnamed Tributary	No	Average Reduction	76-100	Low Savings Low Benefit	No	No	Some Complaints	
3.06	Belle Oak Subdivision in Brandon	No	Average Reduction	76-100	Average Savings Average Benefit	No	Yes	Some Complaints	
3.07	Greenfield Road @ Unnamed Tributary in Pearl	No	Average Reduction	76-100	Average Savings Average Benefit	No	No	Some Complaints	
4.08	Holly Bush Road @ Riley Creek	No	Average Reduction	100+	Average Savings Average Benefit	No	No	Some Complaints	
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	No	Average Reduction	51-75	Average Savings Average Benefit	No	Yes	Some Complaints	
5.01	Vernon Jones Avenue west of Old Fannin Road	No	Average Reduction	26-50	Low Savings Low Benefit	Yes	Yes	Extensive Complaints	
5.03	Laurel Park Apartments in Flowood	No	Significant Reduction	100+	Average Savings Average Benefit	No	Yes	Extensive Complaints	
5.05	Neely Creek between Nancy and Skylane in Pearl	No	Significant Reduction	26-50	Average Savings Average Benefit	No	Yes	Extensive Complaints	
5.06	Chicot Court @ Highway 80 in Pearl	No	Average Reduction	100+	Average Savings Average Benefit	No	No	Some Complaints	
5.08	Old Country Club Road @ Louisa Street in Pearl	No	Average Reduction	51-75	Average Savings Average Benefit	No	Yes	Some Complaints	
1.02	South Pearson Road @ Unknown Tributary	No	No/Minimal Reduction	0-25	No/Minimal savings	No	No	Some Complaints	
1.03	Gunter Road @ Indian Creek	No	Average Reduction	51-75	No/Minimal savings	No	Yes	Some Complaints	
1.12	Bud Street in Richland	No	Average Reduction	0-25	No/Minimal savings	No	Yes	Some Complaints	
1.13	Jones Street @ Old Highway 49 South in Richland	No	Average Reduction	0-25	Low Savings Low Benefit	No	No	Some Complaints	
1.15	Linda Jo Drive @ Lowe Circle in Richland	No	Average Reduction	26-50	Average Savings Average Benefit	No	No	Some Complaints	
1.17	End of Lewis Street in Richland	No	Average Reduction	0-25	Low Savings Low Benefit	No	Yes	Some Complaints	
1.20	Furr Drive @ Richland Circle in Richland	No	Average Reduction	26-50	Low Savings Low Benefit	Yes	No	Some Complaints	
2.03	Church Road @ Unnamed Tributary	No	No/Minimal Reduction	0-25	Significant Savings & Benefits	Yes	Yes	No/Minimal complaints	Will be developed to 300 homes in the next decade
2.04	Manship Road @ Amethyst Drive	No	Average Reduction	26-50	Low Savings Low Benefit	No	No	Some Complaints	

Preliminary Hazard Ranking Criteria		Immediate Priorities	Levels of Service/Flood Reduction		Optimized Lifecycle Cost	Growth & Economic Development		Quality of Life	Notes
Site Number	Site Name / Description	Is the project required to address an imminent threat to health, safety, or welfare?	Will the project result in significant reduction in property damage, function of transportation systems, and other costs of flooding relative to project costs?	What number of residences and/or businesses are benefited by the project?	Will the project lifecycle cost be less expensive if constructed or purchased at this time (economy with other projects, costs of not doing project, staff efficiency, equipment efficiency, etc?)	Will the project enhance property values in the area? Provide amenities	Will the project enhance property values in the area? Reduce nuisance flood risk	Has the County received complaints from citizens and/or businesses that the project is needed?	
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	No	Average Reduction	51-75	Low Savings Low Benefit	No	No	No/Minimal complaints	
2.07	Buckingham Subdivision	No	Average Reduction	26-50	Low Savings Low Benefit	No	No	No/Minimal complaints	
3.04	Puckett Park off Highway 18 in Puckett	No	No/Minimal Reduction	100+	Low Savings Low Benefit	No	No	No/Minimal complaints	
3.08	Meadowland Drive @ East Government Street in Brandon	No	Significant Reduction	26-50	Average Savings Average Benefit	No	No	Some Complaints	Work being done under E Government St in 3/18
4.02	Weaver Road @ Unnamed Tributary	No	Average Reduction	0-25	No/Minimal savings	No	Yes	Some Complaints	
4.03	Gore Road @ Purnell Creek	No	Average Reduction	0-25	No/Minimal savings	No	No	No/Minimal complaints	
4.04	Lewis Prestage Road @ Rollison Creek	No	Average Reduction	0-25	No/Minimal savings	No	No	No/Minimal complaints	
4.10	Andrew Chapel Road @ Bush Creek	No	No/Minimal Reduction	26-50	Low Savings Low Benefit	No	No	No/Minimal complaints	Expected to be subdivisions within the next 10 years
4.11	Barker Road @ Dry Creek Tributary	No	No/Minimal Reduction	76-100	Low Savings Low Benefit	No	No	Some Complaints	
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	No	Average Reduction	26-50	Low Savings Low Benefit	No	No	No/Minimal complaints	
4.16	Grimes Street & Mimosa Avenue in Pelahachie	No	Average Reduction	0-25	Average Savings Average Benefit	No	Yes	Some Complaints	
5.02	Flowood Drive south of Lakeland in Flowood	No	Average Reduction	76-100	Average Savings Average Benefit	No	No	No/Minimal complaints	
5.04	Fox Hall Road west of Highway 475 in Flowood	No	Average Reduction	76-100	Low Savings Low Benefit	No	No	No/Minimal complaints	
5.07	Tony Street between Old Country Club & Boehle	No	Average Reduction	26-50	Low Savings Low Benefit	No	Yes	Some Complaints	

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To help visualize the sites across Rankin County, two maps were created. The first map shows the location of each drainage issue across the county within the supervisor districts. The second map shows the location of each drainage issue site across the county within each watershed. To help identify the watershed, each watershed is labeled with the last three digits of the HUC12 code which can be seen in Table 6 above.

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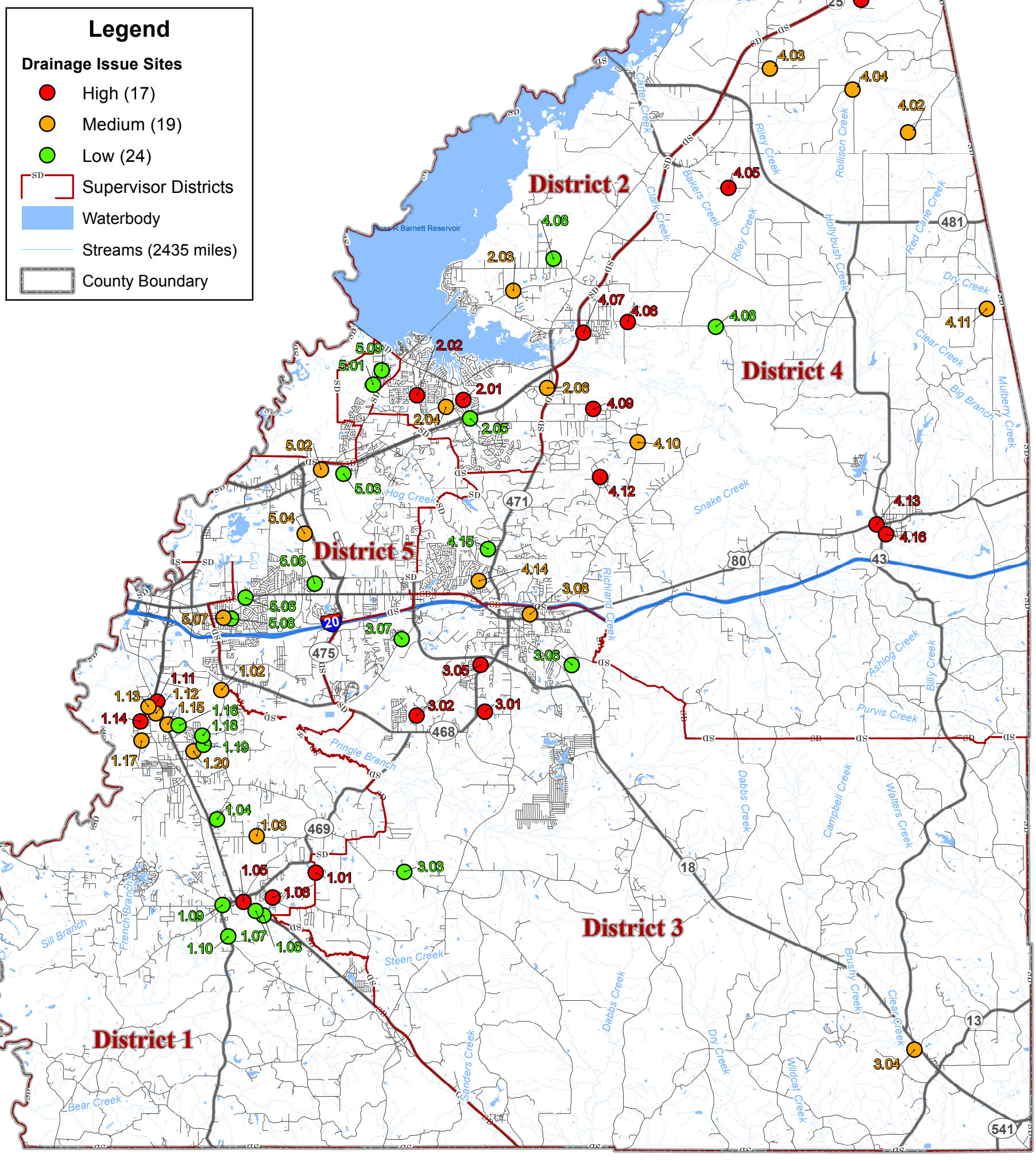
Rankin County

Drainage Issue Site Map



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Rankin County

Drainage Issue Site Map

Legend

Drainage Issue Sites

- High (17)
- Medium (19)
- Low (24)
- HUC12
- Waterbody
- Streams (2435 miles)
- County Boundary

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0 2 4 8 Miles

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Existing Ordinance Review

Sustainable development couples protection of the natural environment with economic growth. Many communities have struggled to achieve sustainable development and Rankin County is no different. In many cases, instituted codes, standards, and ordinances can work against efforts to achieve sustainable development. As such, it is important to periodically reevaluate local ordinances, codes, and standards to ensure they are meeting the needs of the community.

The Center for Watershed Protection, a nonprofit working to protect and restore streams, rivers, lakes, wetlands, and bays from the impacts of land use activities, convened a Site Planning Roundtable to develop model principles to promote environmentally sensitive and economically viable development. Their suggestions, which are not intended to be national design standards, focus on three main areas: residential streets and parking lots; lot development; and conservation of natural areas. The purpose of ordinances addressing residential streets and parking lots is to focus on codes, ordinances, and standards that determine the size, shape, and construction of parking lots, roadways, and driveways in built areas. Lot development regulations determine lot sizes, lot shape, housing density, and the appearance of neighborhoods. Codes and ordinances relating to the conservation of natural areas promote, or impede, the protection of existing natural areas and incorporation of open spaces in new development.

Rankin County maintains ordinances for zoning, development, flood damage prevention, and stormwater management that address requirement for stormwater management and infrastructure development. These ordinances address the following areas of emphasis:

- Erosion and sediment control through best management practices;
- Environmental and landscaping design and construction including open space requirements;
- Stormwater runoff and illicit discharges;
- Design and construction standards; and
- Allowable/unallowable development within special flood hazard areas.

Model ordinances, developed by the Environmental Protection Agency, the American Planning Association, and the Mississippi Emergency Management Agency, Floodplain Management Bureau were scoured and compared to Rankin County's existing ordinances. Twenty two model ordinances were reviewed and are briefly described and listed below.

- *Erosion and Sediment Control Ordinance*: These ordinances focus on reducing erosion and stormwater runoff from construction zones and built surfaces.

- *Aquatic Buffer Ordinance*: These ordinances establish the minimum acceptable requirements for buffers to protect streams, wetlands, and floodplains.
- *Open Space Ordinance:* Set aside unimproved areas dedicated, designed, or reserved for public use and enjoyment. Open space areas absorb stormwater and offer water quality, habitat, and aesthetic benefits.
- *Stormwater Operation and Maintenance Ordinance*: These are policies that assign operation and maintenance of stormwater features to an overseeing entity. They can also dictate the standards that must be met for the operation and maintenance of stormwater structures.
- *Illicit Discharges Ordinance:* These ordinances establish policies to prohibit direct and indirect non-storm water discharges from entering the stormwater system. Illicit connections include pipes, drains, open channels, and other means of conveyance.
- *Post-Construction Stormwater Ordinance*: Created to minimize increases in stormwater runoff from any development in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion while maintaining the stream channel.
- *Source Water Protection Ordinance*: Sets language for source water that addresses inspection, best management practices, and protection areas to ensure adequate protection of current or potential public water supply sources.
- *Landscaping and Tree Ordinance*: Focus on pre-construction efforts, mostly, and address everything from grading to tree removal, wildlife habitat to aquifer recharge. These ordinances often include provisions targeted at specific environmentally-sensitive areas in a community.
- *Smart Growth Ordinance*: Encourages a mix of uses, the preservation of open spaces and environmentally sensitive areas, a range of housing types and transportation options, and development review processes.
- *Detention/Retention Area Maintenance Ordinance*: Policies to assign developers, or others, maintenance duties for detention/retention areas in new and/or existing developments.
- *Special Flood Hazard Area Ordinance*: The Special Flood Hazard Area (SFHA) is the land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. Ordinances dealing with the SFHA can be put into place to promote health, safety, and general welfare while minimizing public and private losses due to flood conditions in these areas.
- *Community Flood Hazard Area Ordinance:* Community Flood Hazard Areas (CFHA) are areas that have been determined by the County Floodplain Administrator from available technical studies, historic information, and other available and reliable sources, which may be subject to periodic inundation by floodwater that can adversely affect the public health, safety, and welfare. This includes areas downstream from dams. Ordinances dealing with the CFHA can be put into place to

promote health, safety, and general welfare while minimizing losses due to flood condition in these areas.

- *Floodplain Development Permit Requirements:* Ordinances that require floodplain development permits can be developed and required for any development whose proposed location is in a floodplain. Floodplain development is usually defined as any man-made change to improved or un-improved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment and materials. Requirements for floodplain development permits are often included in broader floodplain ordinances.
- *Residential and Non-Residential Construction Ordinance*: These are ordinances that set requirements for stormwater mitigation and other impacts pre-, during, and post-construction of residential and non-residential areas. These ordinances can vary to fit the needs of the community and are usually included in more encompassing ordinances.
- *Manufactured Home and RV Ordinance:* Ordinances that address stormwater requirements for manufactured homes and RVs can be created to address things such as required tie downs and utility connections. These ordinances can be created to address the needs of the community and are often included in more encompassing ordinances.
- *Floodway Ordinance:* These ordinances typically either prohibit or restrict construction and other encroachments in the floodway. Ordinances that completely prohibit construction in the floodway are preferred as they have the least impact on the floodway and flood zone. Floodway ordinances are typically absorbed in a larger ordinance body.
- *Standards for Streams without Base Flood Elevations and Floodways:* When a stream lacks a base flood elevation or floodway determination, ordinances spelling out the standards for these streams are needed. These ordinances address development restrictions and allowances, encroachment allowances, and other restrictions as the county sees fit. These ordinances are usually rolled into more encompassing ordinances.
- *Subdivision and Land Development Ordinance*: These ordinances regulate how land and subdivisions can be divided and developed. They help protect against unwise, poorly planned growth and protect the property values of land owners and developers.
- *Critical Facilities Ordinance:* Critical facilities are facilities for which the effects of even slight flooding would cause great damage. Critical facilities include, but are not limited to, facilities critical to health and safety of the public such as public shelters, nursing homes, hospitals, police, fire and emergency response centers. Ordinances dealing with critical facilities generally restrict where these facilities can be located. Critical facilities ordinances are usually included in broader ordinances.
- *Freeboard Requirements:* Freeboard is a factor of safety, usually expressed in feet above the base flood elevation, which is applied for the purposes of floodplain management. Freeboard helps compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected flood and floodway conditions

such as wave action, bridge openings, and the effect of urbanization in the watershed. Ordinances addressing freeboard requirements are usually incorporated into other ordinances such as those dealing with development or construction.

- *Existing Structure Improvement Ordinance:* Ordinances that set requirements for stormwater impacts when making improvements to existing structures. These ordinances couple with construction and development ordinances to address existing structures.
- *Repetitive Loss Ordinances:* Repetitive loss means flood-related damages sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on average, equals or exceeds 25 percent of the market value of the structure before the damage occurred. Such establish allowable uses for these structures.

After reviewing the existing ordinances against model ordinances, Table 8 was constructed to show which model ordinances Rankin County currently has in place and which of their existing ordinances the language is located in. Rankin County's existing ordinances are listed along the top of the table while the model ordinances are listed on the far left of the table. In instances where Rankin County's ordinances address the model ordinances, a checkmark has been placed in the table. In some cases, a Rankin County ordinance may address the topics in the model ordinance, but may not be as stringent as model ordinances. In those cases, a checkmark is still present, but recommendations on ways to strengthen the existing ordinances are given below the table.

Table 8: Ordinance Review

	Development Ordinance	Zoning Ordinance	Stormwater Ordinance	Flood Damage Prevention Ordinance
Erosion and Sediment Control	✓	✓		
Aquatic Buffers				
Open Space	✓			
Stormwater Operation and Maintenance				
Illicit Discharges			✓	
Post-Construction Stormwater				
Source Water Protection				
Landscaping and Trees		✓		
Smart Growth				
Detention/Retention Area Maintenance	✓			
Special Flood Hazard Area				✓
Community Flood Hazard Area				✓
Floodplain Development Permit				✓
Residential and non-residential Construction				✓
Manufactured Homes and RVs				✓
Floodways				✓
Standards for Streams without Base Flood Elevations and Floodways				✓
Subdivison Development				✓
Critical Facilities				✓
Freeboard Requirements				✓
Existing Structure Improvement				✓
Repetitive Loss Structures				✓

While Rankin County does have most of the model ordinances suggested, it is lacking an aquatic buffer ordinance, a stormwater operation and maintenance ordinance, a post-construction stormwater ordinance, a source water protection ordinance, and a smart growth ordinance. Additionally, some of Rankin County's ordinances should be strengthened to more accurately reflect model ordinance language.

Recommendations

After reviewing the ordinances, it is recommended Rankin County proceed with the following actions.

- Update the current Flood Damage Prevention Ordinances to include:

- Higher standards for areas downstream from a dam. This would require a development permit for a building or associated fill downstream from a dam at any location where flooding can be reasonably anticipated from principal or emergency spillway discharges, or from overtopping and failure of the dam.

- Language that any addition to an existing structure, *even if it does not constitute a substantial improvement*, is considered "new construction" and must be evaluated to the base flood elevation, and, if in a flood zone, be set to a minimum of eighteen (18) inches above the base flood elevation.

- Language requiring development in Community Flood Hazard Areas (CFHAs) to comply with the same standards as Special Flood Hazard Areas (SFHA).

- Deed restrictions that would prohibit subsequent conversion of enclosed areas subject to flooding when flooding is greater than six feet in height. Disclosures to new owners would be required and restrictive declarations would be recorded in the Chancery Clerk's Office with the deed of the structure.

- Prohibition of all development within the floodway with the exception of permissible uses (i.e. general farming, wildlife sanctuaries, forestry, and other similar agricultural related uses).

- Update the Zoning Ordinance to include:

  - Language regarding aquatic buffers in specific zones.

- Update the Stormwater Ordinance to address:

  - Stormwater infrastructure operation. Currently, stormwater infrastructure maintenance is addressed in the current ordinances.

  - Source water protection for both groundwater and surface water sources.

- Update the Development Ordinance to contain:

  - Low impact development language.

  - Smart growth language.

References for model ordinance language for the suggested updates are provided in the references in Table 9.

Table 9: Model Ordinance Language Location

Ordinance Update Suggested	Model Ordinance Location
Aquatic Buffers	Environmental Protection Agency, Urban Runoff: Model Ordinances for Aquatic Buffers
Source Water Protection	Environmental Protection Agency, Urban Runoff: Model Ordinances for Source Water Protection
Low Impact Development	Environmental Protection Agency, Urban Runoff: Low Impact Development
Smart Growth	American Planning Association, Smart Growth Codes
Flood Damage Prevention Ordinances	Mississippi Model B-E Flood Damage Prevention Ordinance, April 2011

As with most municipalities, the challenge Rankin County faces is with the enforcement of existing ordinances. Updating existing ordinances to make them stricter can make enforcement even more difficult. Ordinances must not only be enforced during the planning stages of any development but ordinances addressing long-term infrastructure operation and maintenance must be enforced as well. This level of enforcement is where many municipalities struggle to balance the sometimes competing priorities of quality of life, environmental management, and economic development.

Although a thorough ordinance evaluation and a draft of updated ordinances is beyond the scope of this current work, it is recommended that Rankin County evaluate the effectiveness of its zoning, development, flood damage prevention, and stormwater management ordinances in the context of integrated watershed management. The basic concept is that floodplain occupancy, land use, economic development initiatives, and other human actions and interests impact and are impacted by the waterways and either add to or help mitigate risks. Each of these actions can be good things, on their own, but one action within the watershed ultimately impacts other potential actions and interests elsewhere in the watershed. Hence, the ordinances should be designed to take the cumulative impacts of these various activities into consideration.

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Recommended Improvements

After applying the project prioritization criteria, the sixty (60) project sites were divided into three (3) different categories, as follows:

- High Priority – the highest priority projects, planned for implementation with dedicated capital funds as soon as possible.
- Medium Priority – projects to be implemented with dedicated capital funding after the initial ten years of the program, or following implementation of high priority projects.
- Low Priority – projects to be implemented by County maintenance forces with annual maintenance funding on no specific timeline, as resources allow.

High Priority

Table 10 lists the projects that are recommended for completion as soon as possible. In addition to the seventeen (17) sites categorized as "high priority" during the preliminary hazard ranking, three (3) additional sites (1.04, 5.01, and 5.09) were added to the high priority list for short-term implementation.

Table 10: High Priority Implementation Sites

Site Number	Site Name/Description
1.01	Williams Road between Levy Lane and The North Road
1.04	Old Pearson Road at bend east of Highway 49
1.05	Highway 49 at Highway 469 in Florence
1.06	Williams Road at Butler Creek in Florence
1.11	Highway 49 Commercial Area in Richland
1.14	Neely Road at Unnamed Pearl Tributary in Richland
2.01	Mill Creek between Highway 25 and The Reservoir
2.02	Pinebrook Subdivision between Farmington Circle and Spillway
3.01	Tara Road at Unnamed Tributary
3.02	Live Oaks Subdivision at Spanish Oak Drive
3.05	Windchase Subdivision in Brandon
4.01	Jims Road at Unnamed Tributary
4.05	Taylor Way Road at Unnamed Tributary of Riley Creek
4.06	Holly Bush Road between Sara Fox Drive and Rodeo Drive
4.07	Reservoir East Subdivision
4.09	Oakdale Road north of Baker Lane
4.12	Brush Creek in North Brandon Estates

Site Number	Site Name/Description
4.13	Highway 80 at Highway 43 in Pelahatchie
5.01	Vernon Jones Avenue west of Old Fannin Road
5.09	Oakgrove Subdivision

A brief description of each high priority site is presented below, based on visual observation during the months of February and March 2018.

1.01 – Williams Road between Levy Lane and The North Road

Residents living along the north side of Butler Creek complain about periodic flooding of this area during storm events. Over the years, residents have constructed earthen levees between their homes and the creek to try to protect themselves from flooding. This site floods frequently even during small storm events. From site observations, it is easy to see the presence of overbank flooding both upstream and downstream of the Williams Road Bridge. Butler Creek upstream of the bridge (east side) is well-defined and appears to be clear of excess sediment and vegetation. Downstream (west side) is also well-defined and clear of sediment and vegetation; however there is other debris present. Both upstream and downstream of the bridge appear to be a little shallow. The channel appears to be rectangular in nature with very little bank area for excess water. The opening under the bridge is also clear of sediment and vegetation.

1.04 – Old Pearson Road at bend east of Highway 49

This site is located approximately 0.25 miles east of Highway 49 on Old Pearson Road in Florence. The area surrounding this site becomes inundated during large storm events. Frequently, flooding over the road becomes deep enough that the road must be closed to traffic. Field investigations revealed that there are no ditches or culverts on either side of Old Pearson Road around the curve east of Highway 49. On the west side of the curve of Old Pearson Road, there are ditches on the north and south side of the road; however, they are extremely overgrown and convey little, if any, water. The ditches become deeper and wider as they progress west toward Highway 49. However, even though these ditches are larger they are filled with vegetation and debris making it impossible for water to be conveyed through the ditch.

There is clear evidence that water runs over Old Pearson Road at several locations, trying to enter the ditches on either side of the road. Over the years, water running over the road has degraded the road and in some places is beginning to erode the roadbed.

1.05 – Highway 49 at Highway 469 in Florence

This site is located at the intersection of Highway 49 and Highway 469 in Florence. Three channels meet just southeast of the intersection before they traverse under Highway 49. Due to the configuration of the channels and the bridge on Highway 49, water backs up upstream of Highway 49. This is partially due to a large influx of water caused by the three creeks coming together, development upstream in the watershed, and the bridge opening size. Due to the fact that infrastructure and residents are south of the creek confluence, officials are concerned that increasing the bridge opening will cause flooding downstream.

In 2018, the Mississippi Department of Transportation began construction to widen Highway 49. A no-rise analysis performed during design concluded that flooding in the area should not become worse as a result of this project, but it will not be improved. As part of the widening project, the channel is being realigned.

1.06 – Williams Road at Butler Creek in Florence

During large rains, flooding occurs over the road limiting access to Florence High School via Williams Road. Site investigation showed channel degradation both upstream and downstream of the bridge on Williams Road, including bank cutting upstream of the bridge, close to bridge supports. There is also noticeable bank cutting and sever erosion downstream of the bridge. In some cases, the erosion was bad enough to erode the entire bank around mature trees causing them to fall into the creek.

In addition to bank cutting, the creek is severely silted upstream of the bridge. There is also vegetation and light debris along the channel, inhibiting flow. It is believed that the channel degradation and the flooding is due to excess water flowing through the channel during large storm events.

1.11 – Highway 49 Commercial Area in Richland

During storm events, water in Squirrel Branch rises quickly and floods multiple companies in the area. After the storm subsides, the water recedes back within the banks of Squirrel Branch within a few hours.

Site investigations revealed a channel that was deep and wide with water flowing through it at a quick velocity. It is easy to see that there is vegetation within the channel but it does not appear to be enough to severely restrict flow. Businesses are located on either side of Squirrel Branch, so adding additional storage by widening the banks is not an option in this instance.

At this site, it appears as if the problem is not localized but is more a watershed problem caused by a lack of storage to slow down and hold water when needed.

1.14 – Neely Road at Unnamed Pearl Tributary in Richland

During storm events, the road and bridge floods blocking emergency ingress and egress from the end of Neely Road; however, no houses have flooded to date. The County mentioned that when the railroad trestle is cleaned, the railroad company leaves the debris in the creek causing problems during storm events.

Field investigation of this area shows very serious channel degradation upstream and downstream of the bridge. Vegetation in the channel makes it difficult to determine the extent of the degradation. On the northeast side of the channel, there is serious degradation close to a culvert that needs to be remedied before infrastructure is lost. Additionally, there is evidence of roadbed degradation on the north side of the bridge where it meets the road. Finally, there is evidence of flooding on both the east and west side of the railroad track in the area.

2.01 – Mill Creek between Highway 25 and the Reservoir

Due to this site's proximity to the Ross Barnett Reservoir, Mill Creek tends to back up during large storm events which can cause flooding. During the April 2017 flood event, water inundated multiple roads in the subdivisions surrounding Mill Creek and multiple houses in the Mill Creek Subdivision were flooded. Apparently, water backed up from the Reservoir through a shallow channel/ditch running along the south side of the Mill Creek subdivision and the north side of Highway 25. This water then took the path of least resistance and flowed through the Mill Creek Subdivision flooding roads and homes.

Field investigations revealed channel degradation in multiple places along Mill Creek leading to suspicion of rapidly moving water in the recent past. The creek itself appears to be in good condition, other than degradation.

Currently, JWB is working in the subdivision to evaluate the drainage system and implement solutions to any problems found.

2.02 – Pinebrook Subdivision between Farmington Circle and Spillway

During rain events, water inundates the roads in Pinebrook Subdivision, severely limiting access. Water appears to back up through the curb and gutter system and does not appear to be a result of the creek running through the subdivision getting out of its banks.

Field investigations showed a very large creek running through the subdivision. The creek has evidence of aggradation and has vegetation and debris blocking part of the channel. The investigation also revealed that the exit points of the pipes draining the subdivision through the curb and gutter system are partially silted in and appear to be much lower than the entry point on the roads.

3.01 – Tara Road at Unnamed Tributary

Prior to 2016, NRCS funds were used to implement channel improvements – including clearing and snagging, regrading the banks, and riprapping the channel – north of Tara Road. However, no improvements were made south of Tara Road. As a result, the channel south of the bridge on Tara Road is very overgrown and the channel is narrow. The improvements to the channel cause water to run through the channel quickly until the bridge at Tara Road. Then, due to vegetation and sediment clogging the channel further south, water is drastically slowed down causing water to overtop the banks. This results in a house southeast of the Tara Road bridge flooding during rain events.

3.02 – Live Oaks Subdivision at Spanish Oak Drive

During heavy storm events, water rises around the houses in the subdivision and encroaches as close as inches from some houses. Site investigations revealed that the detention pond in the southwest corner of the subdivision has partially silted in and currently has a fraction of its originally planned storage volume. Also, the ditches within the subdivision are shallow and narrow causing them to fill up quickly which allows excess water to flood streets and yards.

3.05 – Windchase Subdivision in Brandon

During the flood in April 2017 (a 600-year event), three homes in Windchase flooded. Site investigation of this area shows that towards the south side of the subdivision (the entrance off of Whitfield Road), the channel is lined with gabions and is clear of vegetation and debris, but full of sediment. Towards the northern side of the subdivision (the entrance off of East Metro Access Road), the channel is not lined with gabions and is constricted, with heavy vegetation on each side. Additionally, the channel in this part of the subdivision is narrow and shallow, constricted with vegetation, debris, and sediment. Furthermore, the banks in this section of the stream show evidence of degradation and are in need of stabilization.

4.01 – Jims Road at Unnamed Tributary

During rain events, water flows over the road resulting in road closures and no access to the rest of Jims Road for emergency vehicles. During large rain events, water remains over the road for one to two days. During site investigations, it was noted that the culvert had recently been replaced with two new culverts that would allow more water to pass under Jims Road as opposed to over it.

4.05 – Taylor Way Road at Unnamed Tributary of Riley Creek

At this location, there is only one way to access homes down Taylor Way Road and during large storm events, water blocks this access. While no houses have flooded, water has encroached approximately six inches from houses. Site investigation

revealed that road work was recently performed to raise the elevation of the low-lying portion of the road. However, there is still evidence of water flooding the forested area and fields north and south of the road.

4.06 – Holly Bush Road between Sara Fox Drive and Rodeo Drive

Currently, this area is relatively undeveloped. However, multiple subdivisions are in the process of being built north of Holly Bush Road in this area. Water does not currently flood the road or houses. A site investigation revealed evidence of rapid development in the area which will exacerbate flooding issues in the future.

4.07 – Reservoir East Subdivision

During heavy rain events, the roads in the subdivision get a thin layer of water over them. Site investigation show that this development has over 100 houses in it and three detention ponds. All three detention ponds are very overgrown and silted, leading to little or no storage for stormwater. Additionally, the north part of the subdivision (older homes) has a mixture of drainage structures from no visible structures to ditches with culverts while the south part of the subdivision (newer homes) has a cub and gutter system in good repair.

4.09 – Oakdale Road north of Baker Lane

During heavy rains, flooding inundates yards in the area but has not yet entered houses. This area is being developed and the more development that happens the worst flooding is during storm events. Site investigation of this area revealed the stream is very silted in and there is only a maximum of two feet of clearance from the top of the water surface to the bottom of the bridge. Additionally, a new development is being built to the east of this site. The new development will drain into the existing creek, downstream of the exiting bridge.

4.12 – Brush Creek in North Brandon Estates

During the April 2017 flood (a 600 year event), a few houses in North Brandon Estates flooded. County officials noted that typically a significant rainfall is needed to affect this area. Site investigations revealed that the center prong of Brush Creek through North Brandon Estates is relatively narrow with little to no overbank area available. Additionally, the houses in this area are not much higher than the elevation of the creek. Two new 72 inch culverts were installed in early 2018 on the center prong of Brush Creek on Westerly Road.

4.13 – Highway 80 at Highway 43 in Pelahatchie

During heavy storm events, water inundates this intersection. During the site investigation, a local police officer reported water gets 12 inches to 18 inches deep during large rain events and can stay for up to two days.

5.01 – Vernon Jones Avenue west of Old Fannin Road

During storm events, water floods Vernon Jones road by the Hindu Temple Society of Mississippi and the adjacent trailer park. During a site investigation there was clear evidence of water flowing over the road from east to west. There was also clear evidence of channel degradation between the Hindu Temple and the trailer park. There was evidence that the culverts through the trailer park have been replaced recently to make them larger to convey more water. East of Vernon Jones Avenue is Oakgrove Subdivision (site 5.09). There is currently work being performed in the subdivision to help water exit the subdivision to the channel running under Vernon Jones. When this work is complete, flooding over Vernon Jones may worsen.

5.09 – Oakgrove Subdivision

During rain events the stormwater flows over roads in this subdivision, which includes a curb and gutter system. In 2018, Rankin County began a project to evaluate the condition of the stormwater piping network in the subdivision. In the project, pipes that do not meet specification will be replaced. The piping network will also be realigned to ensure proper grade throughout. There is no evidence of detention in the subdivision.

Ideally, all twenty high priority sites would be implemented within a short-term (0-5 years) time period; however, as Rankin County is in the beginning stages of establishing their comprehensive stormwater management program, designing, funding, and constructing all twenty projects within five years is an aggressive goal. As such, Rankin County has decided to establish their stormwater management program before initiating projects, and not all twenty projects will be implemented within the short-term period. Rankin County has decided to focus on implementation of six projects from the high hazard list shown in Table 10. These projects are:

- 1.14 – Neely Road @ Unnamed Pearl Tributary;
- 2.01 – Mill Creek;
- 3.01 – Tara Road;
- 4.07 – Reservoir East Subdivision;
- 5.01 – Vernon Jones Avenue west of Old Fannin Road; and
- Upper and Lower Richland Creek Modeling.

Additional information about each site can be found in Appendix A – Project Sheets.

Medium Priority

Table 11 lists the projects that are recommended for completion after the initial ten (10) years of the program, or after all of the high priority implementation sites have been

addressed. These seventeen (17) sites were all categorized as "medium priority" during the preliminary hazard ranking exercise.

Table 11: Medium Priority Implementation Sites

Site Number	Site Name/Description
1.07	Highway 49 Culvert at Butler Creek in Florence
1.08	Highway 49 Culvert at Unnamed Creek in Florence
1.09	Highway 469 between West Main and White Street in Florence
1.10	Highway 469 at Steen Creek in Florence
1.16	Lowe Circle at Southwind Apartments in Richland
1.18	East Harper Street at Short Street in Richland
1.19	Richland East Circle in Richland
2.05	Mill Creek under Lakeland
3.03	Thomasville Road at Unnamed Tributary
3.06	Belle Oak Subdivision in Brandon
3.07	Greenfield Road at Unnamed Tributary in Pearl
4.08	Holly Bush Road at Riley Creek
4.15	Tolleson Drive at Terrapin Skin Creek Tributary in Brandon
5.03	Laurel Park Apartments in Flowood
5.05	Neely Creek between Nancy and Skylane in Pearl
5.06	Chicot Court at Highway 80 in Pearl
5.08	Old Country Club Road at Louisa Street in Pearl

Due to the nature of the implementation plan, projects on the medium priority list should begin rolling onto the implementation plan – detailed below – within ten years of the establishment of the comprehensive stormwater management program.

Additional information about each site can be found in Appendix A – Project Sheets.

Low Priority

Table 12 lists the projects that are recommended for implementation by County maintenance forces with annual maintenance funding on no specific timeline and as resources allow. These twenty three (23) sites were all categorized as "low priority" during the preliminary hazard ranking exercise.

Table 12: Low Priority Implementation Sites

Site Number	Site Name/Description
1.02	South Pearson Road at Unknown Tributary
1.03	Gunter Road at Indian Creek
1.12	Bud Street in Richland
1.13	Jones Street at Old Highway 49 South in Richland
1.15	Lind Jo Drive at Lowe Circle in Richland
1.17	End of Lewis Street in Richland
1.20	Furr Drive at Richland Circle in Richland
2.03	Church Road at Unnamed Tributary
2.04	Manship Road at Amethyst Drive
2.06	Marshall Road between Palace Crossing and Westview Drive in Flowood
2.07	Buckingham Subdivision
3.04	Puckett Park off Highway 18 in Puckett
3.08	Meadowland Drive at East Government Street in Brandon
4.02	Weaver Road at Unnamed Tributary
4.03	Gore Road at Purnell Creek
4.04	Lewis Prestage Road at Rollison Creek
4.10	Andrew Chapel Road at Brush Creek
4.11	Barker Road at Dry Creek Tributary
4.14	Pecan Court at Terrapin Skin Creek in Brandon
4.16	Grimes Street and Mimosa Avenue in Pelahatchie
5.02	Flowood Drive south of Lakeland in Flowood
5.04	Fox Hall Road west of Highway 475 in Flowood
5.07	Tony Street between Old Country Club and Boehle

Due to the nature and scope of these projects, they may be constructed by County Road work crews during standard maintenance activities. While the projects listed above are the ones best eligible for completion as maintenance activities, they do not represent all the needed maintenance activities across the County. A Maintenance Plan utilizing best management practices (BMPs) for the drainage structures should be adopted and incorporated into current maintenance strategies. These practices will prolong the life of other projects as well as providing benefits directly. However, without the necessary access to the structures, the best maintenance plan will fail. Unfortunately, there are numerous locations throughout the County where the lack of adequate easements prevents the County from being able to adequately maintain the drainage structures.

Simple strategies to address these issues could include the following:

- Develop a routine inspection and repair program for drainage structures
- Develop a routine inspection and clearing program for existing ditches
- Develop a public outreach program to educate residents on how to prevent drainage problems and the importance of access easements
- Pursue legal options to obtain the necessary easements

Additional information about each site can be found in Appendix A – Project Sheets.

Potential Bundling of Projects for Hydraulic Modeling

To take advantage of economies of scale and maximize benefits to costs, the projects were evaluated for potential combination for needed hydraulic modeling. Sites were chosen for combination based upon their watershed connectivity and proximity to each other.

1.02, 1.11, 1.12, 1.13, 1.18, 1.19, and 3.03

Sites 1.02 (Pearson Road at Unknown Tributary), 1.11 (Highway 49 Commercial Area in Richland), 1.12 (Bud Street in Richland), 1.13 (Jones Street at Old Highway 49 South in Richland), 1.18 (East Harper Street at Short Street in Richland), 1.19 (Richland East Circle in Richland), and 3.03 (Thomasville Road at Unnamed Tributary) are all located within the Lower Richland Creek watershed. These sites can be modeled at the same time to reduce costs associated with surveying, modeling, and reporting. Site 1.11 is on the high priority list.

1.01, 1.05, 1.06, 1.07, 1.08, 1.09, and 1.10

Sites 1.01 (Williams Road between Levy Lane and The North Road), 1.05 (Highway 49 at Highway 469 in Florence), 1.06 (Williams Road at Butler Creek in Florence), 1.07 (Highway 49 Culvert at Butler Creek in Florence), 1.08 (Highway 49 Culvert at Unnamed Creek in Florence), 1.09 (Highway 469 between West Main Street and White Street in Florence), and 1.10 (Highway 469 at Steen Creek in Florence) are located within the Indian Creek – Steen Creek watershed. These sites can be modeled at the same time to reduce costs associated with surveying, modeling, and reporting. Sites 1.01, 1.05, and 1.06, are on the high priority list.

2.01, 2.05, 2.07

Sites 2.01 (Mill Creek between Highway 25 and The Reservoir), 2.05 (Mill Creek under Lakeland), and 2.07 (Buckingham Subdivision) are located within the Mill Creek – Pelahatchie Creek watershed and can be modeled at the same time to reduce costs associated with surveying, modeling, and reporting. Site 2.01 is on the high priority list.

4.05, 4.06, 4.08, and 4.12

Sites 4.05 (Taylor Way Road at Unnamed Tributary of Riley Creek), 4.06 (Holly Bush Road between Sara Fox Drive & Rodeo Drive), 4.08 (Holly Bush Road at Riley Creek), and 4.12 (Brush Creek in North Brandon Estates) are located within the Riley Creek – Pelahatchie Creek watershed. These sites can be modeled at the same time to reduce costs associated with surveying, modeling, and reporting. Sites 4.05, 4.06, and 4.12 are on the high priority list.

1.14 and 1.17

Sites 1.14 (Neely Road at Unnamed Pearl Tributary in Richland) and 1.17 (End of Lewis Street in Richland) are located within the Cany Creek – Pearl River watershed. These sites can be modeled at the same time to reduce costs. Site 1.14 is on the high priority list.

5.01, 5.02, and 5.03

Sites 5.01 (Vernon Jones Avenue west of Old Fannin Road), 5.02 (Flowood Drive south of Lakeland in Flowood), and 5.03 (Laurel Park Apartments in Flowood) are located in the Hog Creek – Pearl River watershed. These sites can be modeled at the same time to reduce costs associated with surveying, modeling, and reporting. Sites 5.01 is on the high priority list.

Conceptual Opinions of Probable Cost

Conceptual Opinions of Probable Cost (OPCs) were developed for both the program establishment and project implementation phases of the Program.

The OPC for the program establishment phase can be seen in Table 13. The OPC is based upon seven (7) distinct tasks needed within the first five (5) years to establish the program. Some of these tasks will be completed within the first five (5) years while other tasks – such as program support and technical assistance – will need to continue after the initial five (5) years of the Program.

Table 13: Conceptual Opinion of Probable Cost for Program Establishment

Task	Phase	OPC Total
Stormwater Management District Creation	Planning	$300,000
Stormwater Management District Creation	Implementation	$100,000
Evaluation and proposal of new and revised ordinances/zoning	Planning	$40,000
Evaluation and proposal of new and revised ordinances/zoning	Implementation	$10,000
Program Support and Technical Assistance	---	$500,000
Develop watershed plan for Mill Creek - Pelahatchie Creek	---	$200,000
Develop watershed plan for Upper and Lower Richland Creek	---	$200,000
Develop watershed plan for Indian Creek - Steen Creek	---	$200,000
Develop watershed plan for Riley Creek - Pelahatchie Creek	---	$200,000
Total opinion of cost		$1,750,000

Conceptual OPCs were developed for implementation of each project and can be found in Appendix A following their associated Project Sheet. When developing these conceptual OPCs, the following approach was used:

- Each project was priced as if bid independently.
  - While economies of scale can be accomplished by combining projects, at this time it is unknown how those combinations might take place.
  - Any project performed by County Maintenance crews will likely have lower unit prices for items such as asphalt due to existing large quantity purchase contracts. While projects are recommended to be completed by the County at this time, it is currently unknown which projects the County will be able to complete and at what time.

- As these are conceptual OPCs, unit prices were increased to accommodate additional items that might occur on a detailed bid form.

- The Engineering Costs (Design, Inspection, Construction, Testing, etc.) for each OPC were estimated to be fifteen percent of the total construction cost.

- The cost of land acquisition (right-of-way and easement acquisition) was estimated on a price per acre based on comparable parcels on the market in September 2018. Comparables were pulled for each city/town and area in Rankin County, although no actual appraisals or valuations were performed. The location of each site was identified within the county and the comparables from that area were used to estimate the cost of land acquisition. Note, the OPC does not include the estimated

cost for land acquisition as engineering design will dictate how much land needs to be acquired for each project.

- Permitting costs were estimated based upon engineering and construction probable costs and the initial estimated size and scope of the project. Permitting costs include costs for wetland delineation and permitting, creation and upkeep of a stormwater pollution prevention plan (SWPPP), and a construction general permit if needed. The actual permitting cost may vary greatly if additional permits are required.

- Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) regulatory updates were based upon the location and complexity of each site. CLOMR and LOMR regulatory updates include the cost of fees and paperwork. The cost associated with the required hydraulic model for CLOMRs and LOMRs was not included in this cost and can vary greatly from site to site.

- Due to the conceptual nature of these OPCs, a thirty-five percent (average) contingency was added for each project.

- The Regional Watershed OPC column addresses the need for regional stormwater detention/retention in each watershed. The detention/retention area needed was estimated to be one percent of each watershed. The average cost per acre was calculated based upon comprables in each watershed.

- The Hydraulic Analysis/Review OPC for each watershed only includes the modeling and analysis needed for each watershed. Any modeling or analysis needed for individual projects is shown for that individual project and not included in the watershed-level OPC.

- The Site Specific OPC Total sums the total cost for project development and implementation for all projects within the watershed. Hydraulic analysis/review for the watershed and regional detention/retention is not included in the OPC Total number.

While the total conceptual opinions of probable cost have been developed for each watershed, it is important to note that for each watershed and individual site, most of these projects can be separated into phases and spread across multiple years to relieve the burden of funding entire projects at one time.

Table 14 shows a breakdown of the OPC for each project, organized by watershed. Additionally, a total OPC for the watershed has been calculated. The watershed OPC includes:

- The cost associated with modeling that watershed, if a model is needed; and
- The sum of the OPCs for each site within the watershed.

Watersheds are represented in a grey line while sites within those watersheds are shown in blue and white alternating lines in Table 14.

Table 14: Conceptual Opinions of Probable Cost

Watershed Code or Site Number	Watershed or Site Name	Regional Watershed OPC	Site Specific OPC Total	Hydraulic Analysis / Review	Land Acquisition*	Permit(s)°	CLOMR and LOMR Regulatory Updates+	Engineering	Construction	Contingency
31800020504	***Lower Richland Creek***	**$2,770,000**	**$6,183,000**	**$700,000**						
1.02	Pearson Road @ Unknown Tributary		$812,000		$10,000/acre	$20,000	$25,000	$73,000	$483,000	$211,000
1.11	Hwy 49 Commercial Area in Richland		$1,240,000	$10,000	$10,000/acre	$20,000	$25,000	$113,000	$750,000	$322,000
1.12	Bud St in Richland		$262,000		$10,000/acre	$20,000	$25,000	$20,000	$129,000	$68,000
1.13	Jones St @ Old Hwy 49 S in Richland		$324,000		$10,000/acre	$20,000	$25,000	$26,000	$169,000	$84,000
1.16	Lowe Circle @ Southwind Apts in Richland		$118,500		$10,000/acre	$7,500	---	$11,000	$69,000	$31,000
1.18	E Harper St @ Short St in Richland		$740,500		$10,000/acre	$7,500	---	$71,000	$470,000	$192,000
1.19	Richland East Circle in Richland		$1,114,500		$10,000/acre	$7,500	---	$107,000	$711,000	$289,000
1.20	Furr Dr @ Richland Circle in Richland		$531,500		$10,000/acre	$7,500	---	$51,000	$335,000	$138,000
3.02	Live Oaks Subdivision @ Spanish Oak Dr		$516,500		$25,000/acre	$7,500	---	$49,000	$326,000	$134,000
3.03	Thomasville Rd @ Unnamed Tributary		$523,500	$10,000	$10,000/acre	$7,500	$25,000	$45,000	$300,000	$136,000
31800021002	***Indian Creek-Steen Creek***	**$2,380,000**	**$6,793,000**	**$600,000**						
1.01	Williams Rd between Levy Ln and The North Rd		$601,000		$10,000/acre	$20,000	$25,000	$53,000	$347,000	$156,000
1.03	Gunter Rd @ Indian Creek		---	---	---	---	---	---	---	---
1.04	Old Pearson Rd at bend east of Hwy 49		$496,500		$10,000/acre	$7,500	$25,000	$44,000	$291,000	$129,000
1.05	Hwy 49 @ Hwy 469 in Florence		$968,000	$10,000	$35,000/acre	$20,000	$25,000	$87,000	$575,000	$251,000
1.06	Williams Rd @ Butler Creek in Florence		$1,248,000	$10,000	$25,000/acre	$20,000	$25,000	$114,000	$755,000	$324,000
1.07	Hwy 49 Culvert @ Butler Creek in Florence		$509,000	$10,000	$35,000/acre	$20,000	$25,000	$42,000	$280,000	$132,000
1.08	Hwy 49 Culvert @ Unnamed Creek in Florence		$778,000	$10,000	$35,000/acre	$20,000	$25,000	$68,000	$453,000	$202,000
1.09	Hwy 469 between W Main St & White St in Florence		$836,500	$10,000	$25,000/acre	$7,500	$25,000	$76,000	$501,000	$217,000
1.10	Hwy 469 @ Steen Creek in Florence		$1,356,000	$10,000	$25,000/acre	$20,000	$25,000	$124,000	$825,000	$352,000
31800020307	***Mill Creek-Pelahatchie Creek***	**$13,575,000**	**$8,549,000**	**$475,000**						
2.01	Mill Creek between Hwy 25 & The Reservoir		$2,753,000	$10,000	$65,000/acre	$20,000	$25,000	$259,000	$1,725,000	$714,000
2.02	Pinebrook Subdivision between Farmington Circle & Spillway		$1,965,000		$65,000/acre	$20,000	$25,000	$184,000	$1,226,000	$510,000
2.03	Church Rd @ Unnamed Tributary		$1,336,500	$10,000	$65,000/acre	$7,500	---	$127,000	$845,000	$347,000
2.04	Manship Rd @ Amethyst Dr		$211,500		$65,000/acre	$7,500	---	$20,000	$129,000	$55,000
2.05	Mill Creek under Lakeland		$1,201,000	$10,000	$65,000/acre	20000	$25,000	$109,000	$725,000	$312,000
2.06	Marshall Rd between Palace Crossing & Westview Dr in Flowood		$685,500	$10,000	$100,000/acre	$7,500	---	$64,000	$426,000	$178,000
2.07	Buckingham Subdivision		$396,500		$60,000/acre	$7,500	---	$38,000	$248,000	$103,000
31800020306	***Riley Creek-Pelahatchie Creek***	**$5,010,000**	**$5,720,000**	**$850,000**						
4.05	Taylor Way Rd @ Unnamed Tributary of Riley Creek		$1,060,500	$10,000	$10,000/acre	$20,000	$7,500	$98,000	$650,000	$275,000
4.06	Holly Bush Rd between Sara Fox Dr & Rodeo Dr		$890,000	$10,000	$25,000/acre	$20,000	$25,000	$79,000	$525,000	$231,000
4.07	Reservoir East Subdivision		$1,022,000		$20,000/acre	$20,000	$25,000	$93,000	$619,000	$265,000
4.08	Holly Bush Rd @ Riley Creek		$1,045,000	$10,000	$25,000/acre	$20,000	$25,000	$94,000	$625,000	$271,000

Watershed Code or Site Number	Watershed or Site Name	Regional Watershed OPC	Site Specific OPC Total	Hydraulic Analysis / Review	Land Acquisition*	Permit(s)°	CLOMR and LOMR Regulatory Updates+	Engineering	Construction	Contingency
4.09	Oakdale Rd north of Baker Lane		$700,500		$20,000/acre	$7,500	---	$67,000	$444,000	$182,000
4.10	Andrew Chapel Rd @ Bush Creek		$0	---	---	---	---	---	---	---
4.12	Brush Creek in North Brandon Estates		$1,002,000	$10,000	$15,000/acre	$10,000	$25,000	$91,000	$606,000	$260,000
31800020502	***Upper Richland Creek***	**$7,050,000**	**$2,677,000**	**$600,000**						
3.01	Tara Rd @ Unnamed Tribuary		$935,500		$30,000/acre	$7,500	---	$90,000	$595,000	$243,000
3.05	Windchase Subdivision in Brandon		$1,271,500		$30,000/acre	$7,500	---	$130,000	$804,000	$330,000
3.06	Belle Oak Subdivision in Brandon		$470,000		$30,000/acre	$10,000	$25,000	$41,000	$272,000	$122,000
3.08	Meadowland Dr @ E Government St in Brandon		$0	---	---	---	---	---	---	---
31800020607	***Cany Creek-Pearl River***	**$1,000,000**	**$2,770,500**	**$300,000**						
1.14	Neely Rd @ Unnamed Pearl Tributary in Richland		$846,000		$10,000/acre	$20,000	$25,000	$76,000	$505,000	$220,000
1.15	Linda Jo Dr @ Lowe Circle in Richland		$1,406,000		$10,000/acre	$20,000	$25,000	$130,000	$866,000	$365,000
1.17	End of Lewis St in Richland		$518,500		$10,000/acre	$7,500	$25,000	$46,000	$305,000	$135,000
31800020603	***Hog Creek-Pearl River***	**$1,300,000**	**$4,493,500**	**$360,000**						
5.01	Vernon Jones Ave west of Old Fannin Rd		$883,500		$25,000/acre	$7,500	---	$90,000	$556,000	$230,000
5.02	Flowood Dr south of Lakeland in Flowood		$1,749,000	$10,000	$200,000/acre	$20,000	---	$165,000	$1,100,000	$454,000
5.03	Laurel Park Apartments in Flowood		$1,861,000	$10,000	$200,000/acre	$20,000	$25,000	$173,000	$1,150,000	$483,000
31800020605	***Neely Creek-Conway Slough***	**$5,100,000**	**$2,591,000**	**$325,000**						
5.06	Chicot Court @ Hwy 80 in Pearl		$1,715,000	$10,000	$100,000/acre	$10,000	$25,000	$160,000	$1,060,000	$450,000
5.07	Tony St between Old Country Club & Boehle		$411,000		$20,000/acre	$20,000	$25,000	$34,000	$225,000	$107,000
5.08	Old Country Club Rd @ Louisa St in Pearl		$465,000		$20,000/acre	$10,000	---	$44,000	$290,000	$121,000
31800020503	***Terrapin Skin Creek***	**$3,990,000**	**$2,085,500**	**$375,000**						
3.07	Greenfield Rd @ Unnamed Tributary in Pearl		$696,000	$10,000	$20,000/acre	20000	$25,000	$60,000	$400,000	$181,000
4.14	Pecan Court @ Terrapin Skin Creek in Brandon		$439,000		$30,000/acre	$20,000	$25,000	$37,000	$243,000	$114,000
4.15	Tolleson Dr @ Terrapin Skin Creek Tributary in Brandon		$950,500		$30,000/acre	$7,500	---	$91,000	$605,000	$247,000
31800020203	***Deer Creek-Fannegusha Creek***	**$1,510,000**	**$0**	**$400,000**						
4.01	Jims Rd @ Unnamed Tributary		$0	---	---	---	---	---	---	---
4.03	Gore Rd @ Purnell Creek		$0	---	---	---	---	---	---	---
31800020202	***Red Cane Creek-Fannegusha Creek***	**$1,380,000**	**$582,000**	**$375,000**						
4.02	Weaver Rd @ Unnamed Tributary		$582,000		$7,500/acre	$20,000	$25,000	$51,000	$335,000	$151,000
4.04	Lewis Prestage Rd @ Rollison Creek		$0	---	---	---	---	---	---	---
31800020604	***Town Creek-Pearl River***	**$2,840,000**	**$3,104,000**	**$250,000**						
5.04	Fox Hall Rd west of Hwy 475 in Flowood		$790,000		$60,000/acre	$20,000	---	$80,000	$480,000	$210,000
5.05	Neely Creek between Nancy and Skylane in Pearl		$2,314,000		$20,000/acre	$20,000	$25,000	$220,000	$1,449,000	$600,000
31800020302	***Ashlog Creek-Pelahatchie Creek***	**$2,280,000**	**$347,000**	**$575,000**						
4.16	Grimes St & Mimosa Ave in Pelahatchie		$347,000	$10,000	$10,000/acre	$20,000	$25,000	$27,000	$175,000	$90,000
31800020601	***Brashear Creek-Pearl River***	**$825,000**	**$1,556,000**	**$175,000**						
5.09	Oakgrove Subdivision		$1,556,000	$10,000	$25,000/acre	$20,000	---	$147,000	$975,000	$404,000

Watershed Code or Site Number	Watershed or Site Name	Regional Watershed OPC	Site Specific OPC Total	Hydraulic Analysis / Review	Land Acquisition*	Permit(s)°	CLOMR and LOMR Regulatory Updates+	Engineering	Construction	Contingency
31800020802	***Brushy Creek-Clear Creek***	**$3,780,000**	**$508,000**	**$325,000**						
3.04	Puckett Park off of Hwy 18 in Puckett		$508,000		$35,000/acre	$20,000	$25,000	$44,000	$287,000	$132,000
31800020304	***Hollybush Creek-Clear Creek***	**$2,380,000**	**$237,000**	**$600,000**						
4.11	Barker Rd @ Dry Creek Tributary		$237,000		$7,500/acre	$20,000	---	$21,000	$134,000	$62,000
31800020305	***Snake Creek-Pelahatchie Creek***	**$2,100,000**	**$503,000**	**$375,000**						
4.13	Hwy 80 @ Hwy 43 in Pelahatchie		$503,000	$10,000	$15,000/acre	$20,000	$25,000	$42,000	$275,000	$131,000

Total: **$97,399,500**

Notes

* estimated based off of MLS listings September 2018
° estimated based upon engineering and construction probable cost and initial estimated size/scope of project. Includes estimated cost for wetland delineation and permitting, SWPPP, and construction general permit (if needed). Costs will vary if additional permits are required.
+CLOMR and LOMR Regulatory Updates include the cost of fees and paperwork; the cost of updating the models is not included and can vary greatly.

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Implementation Plan

Previous sections of this report present the results of a conceptual assessment of sixty (60) sites across the county where drainage deficiencies have historically been reported. These sites currently pose threats to property, quality of life, and economic wellbeing. From this work, twenty (20) sites were identified as high priority, seventeen (17) as medium priority, and twenty three (23) as low priority. This present section presents an approach to program implementation, focused on the next five (5) years that will position Rankin County for long-term sustainable watershed management.

The 5-Year Priority Implementation Plan ("Implementation Plan") is broken into two (2) distinct, but necessary, phases. The initial phase covers establishing and maintaining the Rankin County Comprehensive Watershed Management Program while the second phase deals with site and watershed solution development and implementation. While the Program Establishment phase needs to begin prior to Project Implementation, after initial program establishment both phases can run concurrently.

The sections below delve more into the individual aspects of each Implementation Plan phase.

Program Establishment

The initial three (3) years of the Implementation Plan focus on the establishment of the Rankin County Comprehensive Watershed Management Program (Program). The first step in establishing the Program is deciding how the Program should be structured. Programs can be created on an individual watershed basis, either on the HUC12 or HUC10 level, or on a countywide basis. Due to the number of watersheds within Rankin County, it is recommended the Program be established on a countywide scale to simplify the governing structure and help the County better manage resources and projects.

Much of the following discussion pertains to existing or potential statutory authority and other matters of legality in Mississippi related to stormwater management. These discussions are based on common understanding of accessible statutes but do not purport to provide legal opinions or judgments. It is recommended that the County engage its legal professional(s) to provide further direction in relation to these issues.

Mississippi law notes that there is a need for proper planning, design, construction, operation, and maintenance of appropriate measures for stormwater management. Additionally, it recognizes there is a need to foster cooperation among local governments in addressing concerns related to stormwater management. As such, it may be necessary or desirable to create stormwater management districts in order to plan for, design, acquire,

construct, operate, and maintain appropriate measures for stormwater management. Current Mississippi law includes three main authorities under which an entity can be formed to address stormwater or watershed management. These authorities are:

- Drainage Districts with Local Commissioners (Miss. Code Ann. §51-29 (2017)),
- Drainage Districts with County Commissioners (Miss. Code Ann. §51-31 (2017)), and
- Storm Water Management Districts (Miss. Code Ann. §51-39 (2017)).

Based upon a review of these particular sections of Mississippi statutes, it would appear that creation of a Rankin County Storm Water Management District under Mississippi Code §51-39 best fits with Rankin County's goals for its Watershed Management Program.

Legally creating a Stormwater Management District is initiated by ordinance or resolution of the county's Board of Supervisors and may face hurdles along the way. Under Mississippi law, the ordinance or resolution must include the following components:

- The necessity for the proposed district;
- The primary function of the proposed district;
- The geographic boundaries of the proposed district within the jurisdiction of the unit of local government;
- The names and geographic boundaries of any other units of local government proposing to be in the district;
- The date upon which the governing body intends to create the district;
- The estimated cost of projects to be constructed and maintained by the district;
- The name of a designated representative of the local government to enter into incorporation agreements with other local governments, if applicable; and
- Any other information reasonably necessary to inform the constituency of the unit of local government of the purpose and proposed obligations of the unit of local government proposing to create the district.

Other information needed for the formation of the stormwater management district may include any sustainable funding strategies developed to generate local funds for implementation of projects listed within the Program.

Sustainable funding strategies, discussed in detail further below, can come from a variety of sources including, but not limited to, federal, state, and local sources. Federal and state sources are generally in the form of appropriations, grants, or loans. Properly identifying relevant funding sources for each project on the 5-Year Priority Implementation Plan, and preparing the necessary documents to apply for funding can take a while. As part of preparing necessary documents for funding, watershed plans for the four priority watersheds in Rankin County need to be developed as they are particularly helpful, and

sometimes required, when applying for federal grants. These priority watersheds are: Mill Creek – Pelahatchie Creek, Upper and Lower Richland Creek, Indian Creek – Steen Creek, and Riley Creek – Pelahatchie Creek. Due to the time lag between identifying funding sources and being awarded funding, the creation of watershed plans should occur as soon as possible to allow for project implementation as early as possible. The five (5) habitually problematic watersheds listed can be seen in the figure below.

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Habitually Problematic Watersheds

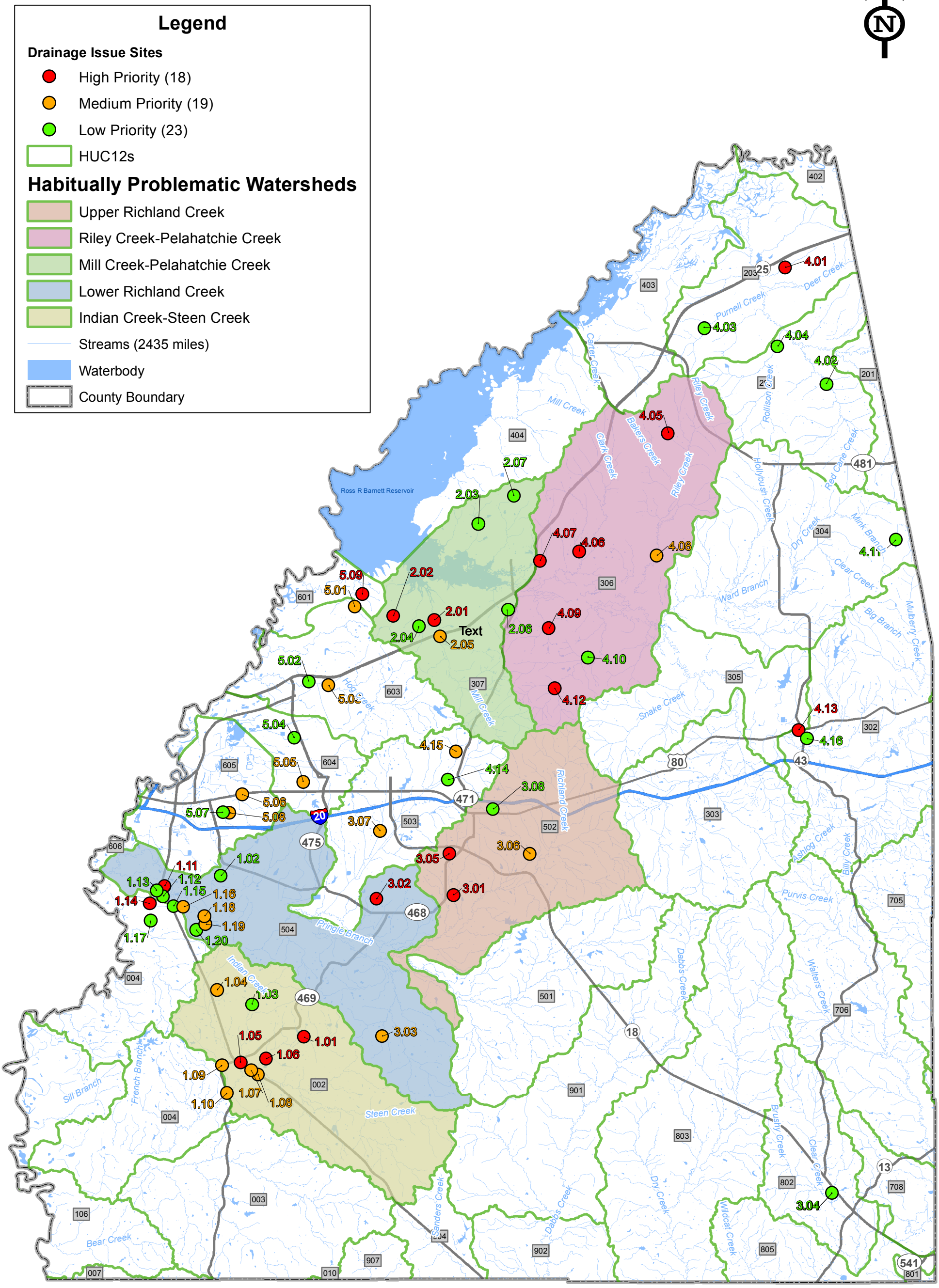
Legend

Drainage Issue Sites

- High Priority (18)
- Medium Priority (19)
- Low Priority (23)
- HUC12s

Habitually Problematic Watersheds

- Upper Richland Creek
- Riley Creek-Pelahatchie Creek
- Mill Creek-Pelahatchie Creek
- Lower Richland Creek
- Indian Creek-Steen Creek
- Streams (2435 miles)
- Waterbody
- County Boundary



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At the same time the stormwater management district is being established, new and revised ordinance and zoning language for the County should be evaluated and proposed for consideration by the Board of Supervisors. As part of this report, ordinances and zoning regulations were evaluated against model ordinances and regulations. After review, recommended changes to existing ordinances and regulations were presented. Further evaluating and then proposing new and revised ordinances and zoning regulations is recommended to take place within the first two (2) years of Program establishment. The purpose of these new and revised ordinances and regulations is to strengthen Rankin County's existing ordinances and regulations to match model ordinances where applicable while allowing the County to still respond to the needs of its citizens.

Sustainable Funding Strategies

Infrastructure funding sources have become more competitive as municipalities struggle to provide services during the distressed economic times of the recent past. In addition, drainage improvements are often more difficult to fund than transportation or water and sewer improvements.

Resources that support stormwater programs take many forms, ranging from developer-contributed capital facilities, to federal and state grants and loans, to maintenance of public drainage systems performed by homeowner's associations and private property managers, to land and easement dedications and other exactions. They also include a variety of funding mechanisms that are commonly used to structure how money and resources are applied to specific objectives, for example bond issues that are used to fund capital infrastructure and loans to meet temporary cash flow needs.

Resource Needs

Based upon the conceptual OPCs shown in Table 13 and Table 14, the anticipated Program cost is approximately $97,500,000. This cost is split between program establishment ($1,750,000) and project implementation ($95,750,000). It is important to note that the program establishment OPC is only based upon the initial five (5) years of the Program while the project implementation OPCs are based upon the entire duration of program implementation.

While the Program is estimated to cost $97,500,000, it is not expected that Rankin County will bear the entire cost of the Program. Instead, a cost share between the local, state, and federal government is anticipated for project implementation. Based upon experience, project type, and anticipated benefits, a cost share of 30% state/federal and 70% local, on average for the Program, is anticipated. Under this cost share, Rankin County's portion would be $68,250,000.

Federal and State Resources

Multiple federal and state agencies offer grants, loans, or cost shares to help fund stormwater and/or watershed improvements. Additionally, federal appropriations can occasionally be directed towards specific projects if and when a line-item is included in a budget bill passed by Congress, in any of its many forms.

A short discussion of existing grants or loans for the different agencies is offered below.

USACE

The U.S. Army Corps of Engineers (USACE) is the federal government's largest water resources development and management agency. Its responsibilities include flood risk management, improvements to river navigation, and ecosystem restoration.

At the request of local interests, USACE assistance in developing and implementing solutions to water resources problems is available under one of two Congressional authorities. Problems that are large in scope require Congressional authorization; however, in instances where the problems are generally small in scope, the USACE may act directly under its Continuing Authorities Program (CAP) or the "Small Projects Program".

Congressional authorization is typically through Section 219 of the Water Resource Development Act (WRDA) of 1992. This section allows Congress to provide assistance to non-Federal sponsors for water infrastructure improvements. On October 23, 2018, America's Water Infrastructure Act (AWIA) of 2018 reauthorized WRDA in Title I. Section 219 of the Water Resources Development Act of 1992, referenced above, was reauthorized in sections throughout AWIA until 2023.

The Section 219 (WRDA, 1992) program historically has provided funding authority for planning, design, and construction of water and sewer related environmental infrastructure and resource protection and development projects for local communities throughout the country. Main features of the program include:

- The USACE must use private firms to provide engineering, design, and construction services provided under this program.
- Cost sharing is 75 percent Federal and 25 percent non-Federal sponsor for services provided.
- Initial letter report developed at full Federal expense.
- The non-Federal sponsor can use real estate credit as part of their cost share requirement.
- The non-Federal sponsor is 100 percent responsible for operation and maintenance of the completed project.

With all CAP projects, the initial feasibility study is 100% federally funded up to $100,000. If the feasibility study exceeds $100,000, the sponsor must contribute 50 percent of the study cost exceeding the $100,000 limit. As favorable studies progress towards design and construction, project costs are shared with the local sponsor including any and all costs in excess of the Federal cost limits.

Applicable CAP funding areas include the following:

- Section 14 – Emergency Streambank and Shoreline Protection – This authority is intended to prevent erosion damage to highways, bridge approaches, public works, and other nonprofit public facilities by the emergency construction or repair of streambank and shoreline protection works.
    - 65%/35% Federal/Non-Federal
    - Maximum Federal Costs: $5 M
- Section 208 – Snagging and Clearing for Flood Control – This authority provides for local protection from flooding by channel clearing and excavation, with limited embankment construction by use of materials from the clearing operation only.
    - 65%/35% Federal/Non-Federal
    - Maximum Federal Costs: $0.5 M
- Section 205 – Small Flood Control – This authority provides for protection from flooding by the construction or improvement of flood control works.
    - 65%/35% Federal/Non-Federal
    - Maximum Federal Costs: $10 M
- Section 206 – Aquatic Ecosystem Restoration – This authority provides for the restoration and protection of aquatic ecosystems if the project will improve the environment and is in the public interest.
    - 65%/35% Federal/Non-Federal – 5% in cash
    - Maximum Federal Costs: $10 M

NRCS

The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection Program (EWP), which was established by Congress to respond to emergencies created by natural disasters. The Program is a recovery effort program aimed at relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences.

Public and private landowners are eligible for assistance, but must be represented by a project sponsor that must be a legal subdivision of the State, such as a city, county, township, or conservation district, Native American Tribe, or Tribal government.

NRCS may pay up to 75 percent of the construction cost of emergency measures. The remaining 25 percent must come from local sources and can be in the form of cash or in-kind services.

EPA and MDEQ

The U.S. Environmental Protection Agency (EPA) administers the Clean Water State Revolving Fund (CWSRF) through their state-level partners the Mississippi Department of Environmental Quality (MDEQ). The CWSRF was established by the 1987 amendments to the Clean Water Act (CWA) as a financial assistance program for a wide range of water infrastructure programs. Due to the fact the EPA provides CWSRF loans, states have the flexibility to fund a range of projects that address the state's highest priority water quality needs.

Projects eligible for CWSRF program loans include:

- Control of nonpoint source pollution;
- Assistance to entities for measures to manage, reduce, treat, or recapture stormwater or subsurface drainage water;
- Watershed pilot projects under Section 122 of the Clean Water Act;
- Creation of green infrastructure projects; and
- Funding other water quality projects.

Beginning with the FY-2010 Federal CWSRF Appropriations Act, Congress included the following provision with the appropriations language:

> *"Provided, that for fiscal year (Current Fiscal Year), to the extent there are sufficient eligible project applications, not less than (*) percent of the funds made available under this title to each State for Clean Water State Revolving capitalization grants shall be used by the State for projects to address green infrastructure, water, or energy efficiency improvements, or other environmentally innovative activities."*

*percentages were 30% for FY-2010 and FY-2011 and 10% for FY2012

CWSRF loans are typically 20 to 30 years in length with interest rates at or below market rate. Qualifying entities may receive principal loan forgiveness from MDEQ in years the State Legislature provides funding.

BP Economic Damages

Five years after the Deepwater Horizon oil spill of 2010, BP reached agreements to settle all federal and state claims arising from the event. The principal payments included $4.9 billion over 18 years to settle economic damages claims made by the five Gulf States. Of that, $750 million is expected to come to Mississippi. In a special session in 2018, the Mississippi legislature passed a bill that would dedicate 75% of the economic damages money to Hancock, Harrison, Jackson, and parts of George, Stone, and Pearl River counties. The remaining funds (25%) is to be split between the remaining 76 counties.

The Governor, Lieutenant Governor, and Speaker are working to appoint an advisory committee to oversee the Mississippi Development Authority's allocation of the75%. The state legislature will spend the remaining 25% (roughly $10 million per year until 2033) during the legislative session. As a result of this set up, Rankin County's legislators have the ability to work towards securing BP Economic Damages funding to dedicate to the county's Stormwater Management Implementation Plan.

More information about the BP Economic Damages funding and a news article regarding the Mississippi Legislature's actions can be found in Appendix E – BP Economic Damages

Local Resource Strategies

To help finance initiatives and achieve program goals, it is often advantageous to leverage funds from multiple federal, state, local, and private sector resources. In order to maximize fund potential, RCBOS should consider leveraging funding sources. Although multiple funding sources can have different requirements, the benefits of the additional funds and larger project scope can outweigh regulatory or other concerns.

After discussions with RCBOS and County officials, it was determined there is no dedicated funding stream for stormwater projects. Currently, stormwater projects are addressed in conjunction with county road projects. While this approach is ideal for maintenance of stormwater projects, it typically cannot sustain adequate levels of funding for large, capital projects. There are two principal categories of funding employed by stormwater management programs: expensed funding and debt funding. Most stormwater programs employ a mix of these.

Expensed funding is typified by "pay-as-you-go" strategies, in which expenditures are supported by a concurrent revenue stream. Costs are "expensed" as they are incurred.

Debt funding is typified by bond sales, which are most commonly used to fund major capital expenditures, but debt funding may also include intergovernmental loans, warrants, and other mechanisms. Debt is sometimes also used to fund utility start-up costs, undertake system-wide remediation, or to make funds available to cooperating entities in the form of grants or loans. In all these examples, borrowing is utilized to enable a stormwater program to expedite improvements or activities so as to accomplish its goals more quickly, thereby reducing the time of exposure to certain risks.

Service Fee Rate and Assessment Methodologies

Unlike water and sewer utilities, which generate revenue through consumption-based volumetric use charges, stormwater utilities must derive revenue through other types of assessments. Rate design conventions are emerging across the U.S. as stormwater management service charges and assessments become increasingly common. Assessments imposed on properties within a stormwater boundary or district typically are based on impervious area, gross area, percentage impervious, and land use, or combinations thereof.

The six most common stormwater rate methodologies are based on:

1. Impervious area;
2. A combination of impervious area and gross area;
3. Impervious area and the percentage of imperviousness;
4. Gross property area and the intensity of development;
5. Gross property area and the zoning classification; and
6. Ad-valorem tax assessment (millage).

This section will give a brief overview of the rate methodologies.

1. Impervious Area

Stormwater rate structures based solely on impervious area have been widely used, and are sometimes named "equivalent runoff unit" or ERUs. They are simple, the concept is easily understood by the general public, and is generally perceived as equitable. Impervious area rate methodology reflects a philosophy of allocating costs based on each property's contribution of runoff to the system. Large expanses of roofs and paving in shopping centers and other commercial and industrial business areas are highly visible to the general public, and most people understand the hydrologic impact of covering natural ground with paving and rooftops. The approach is generally consistent with local service fee rate practices for wastewater services, wherein fees are based on the amount of water used and strength of effluent discharged to the public treatment works.

An impervious area rate methodology is highly stable and insensitive to property alterations by ratepayers. The rate of revenue growth using an impervious area methodology would more or less correspond to the pace of development. Economic downturns would tend to

diminish the addition of new impervious area and the stormwater revenue growth, while rapid growth would add to it. Reductions in impervious coverage on individual properties are rarely justified merely to reduce stormwater fees. Alterations that would reduce stormwater fees are essentially infeasible under all the rate structure scenarios examined below.

Most impervious area rate structures include simplified single-family residential service fees, often applied as flat-rate charges. Charges to non-residential properties may be structured in a variety of ways under an impervious area methodology. In some cases, the single-family residential property, "equivalent unit" value, or ranges of impervious area (100, 500, or 1,000 square feet) are used as a billing unit.

Impervious area service fees are usually calculated by dividing the amount of impervious area on each parcel by an equivalent unit or a range value to determine the number of billing units and multiplying a charge per unit (hence the term equivalent runoff unit). Very few use the exact amount of impervious area on each property because the accuracy of the impervious area data typically available does not support such a precise calculation.

An impervious area rate methodology is not highly flexible or subject to judgement in its application to specific properties. It is based on a single parameter that can be accurately measured, although modifying factors might be applied to the basic rate calculation. Approaches based on parameters like intensity of development allow substantially more judgement to be applied, both in the design or the rate methodology and in its application to specific properties.

Other funding mechanisms can be blended with an impervious area service fee. For example, a system development charge could be adopted to recapture a system capitalization component from properties as they are developed. Another blended ERU system used in select areas includes overlaying ERU data with zoning or other classification data that determines the fee structure. In this case, one ERU could have a higher cost if it is in a floodplain or a heavily developed area as opposed to an ERU located in a very rural area.

Cities, counties, and drainage districts that use this method include Horn Lake Drainage District (Mississippi); South Burlington, Vermont; Stevens Point, Wisconsin; Edinburgh, Indiana; Anderson, South Carolina; and New Springfield, Missouri. More than 80% of drainage districts utilize the equivalent runoff unit/impervious area method.

ADVANTAGES:	DISADVANTAGES:
The relationship between impervious area and stormwater impact is relatively easy to explain to the public. The number of billable units can be determined by limiting the parcel area review to impervious area only. Because pervious area analysis is not required, this approach requires the least amount of time to determine the total number of billing units. This method can be blended to meet the needs of the County.	Because the potential impact of stormwater runoff from the pervious area of a parcel is not reviewed, this method is sometimes considered to be less equitable than other methods because runoff-related expenses are recovered from a smaller area base. This method could still be used to charge a fee to all parcels, pervious as well as impervious, to cover expenses not related to area, such as administration and regulatory compliance which may receive pushback from the public.

2. Impervious Area and Gross Area

Both total property area (gross area) and impervious coverage of properties influence amount, peak rate, and make up of stormwater discharged to public drainage systems. A combined impervious area and gross area rate methodology can account for both factors. Most stormwater rate methodologies utilize one or the other parameter in calculation of fees; however, this methodology uses both parameters. A few municipalities use both parameters to derive percentages or ratios used in rate calculations.

The concept underlying an impervious/gross area rate methodology is relatively easy to explain and grasp. It is consistent with the public's general understanding of hydrology and the impact that both gross area and impervious coverage have on stormwater runoff. This type of rate methodology tends to allocate more of the cost burden to lightly developed and undeveloped properties than methodologies that are based strictly on impervious area. Depending on the weighting factors and/or cost allocations, smaller properties that are almost entirely covered with impervious surfaces could conceivably be charged more than

larger properties that are undeveloped or very lightly developed with little impervious coverage.

An impervious/gross area rate methodology requires that the mix of impervious and gross area in the service fee calculation be "tuned" to properly reflect the significance accorded to each parameter. This can be achieved in at least two ways: 1) by applying weighting factors to gross and impervious area; or 2) by allocating certain costs of service to each parameter. Weighting assigned to gross and impervious area should be consistent with the local hydrologic conditions, patterns of development, program requirements, balance of stormwater quantity and quality program costs and the community's perceptions.

Rates could be structured in a variety of ways under this approach to reflect the importance assigned to each parameter. Units of gross area might be charged a basic rate, with a surcharge applied to units of impervious coverage. Alternatively, cost of service might be apportioned between impervious area and gross area instead of assigning specific costs to each parameter. For example, eighty (80) percent of total stormwater cost of service might be allocated to impervious area and twenty (20) percent to gross area. The significant influence of impervious coverage on peak runoff suggests that seventy-five (75) percent or more of the costs should be assigned to the impervious area component of the rate.

This approach is comparable to other rate structure options in its stability and insensitivity to external influences. Being based on gross area and impervious area, there is a little that can be done by a property owner to reduce parameters that drive the amount of the fee.

Applying weighting factors or allocating costs to gross area and impervious area makes this approach especially flexible. A broad range of weights could be assigned to gross area and impervious area to account for unusual conditions, presence of modifying considerations like on-site detention or water quality impacts, or runoff mitigation normally realized on large undeveloped tracts. System development charges and other secondary funding methods could also be coordinated with parameters used in this type of rate structure.

Cities, counties, and drainage districts that use this method include Denver, Colorado; Philadelphia, Pennsylvania; Peoria, Illinois; Nashville, Tennessee (modified); Beaufort County, South Carolina; Baltimore, Maryland; and Rock Island, Illinois.

ADVANTAGES:	DISADVANTAGES:
The number of billable units can be determined by limiting the parcel area review to impervious area only. The gross area of each parcel is easily obtained data using the County's GIS database. This rate methodology facilitates charging undeveloped properties a service fee. Charging undeveloped properties would broaden the rate base, especially if extensive rural areas were included. It would also enable some operating and capital expenses to be distributed among all properties. Potential revenue capacity of this type of rate structure is somewhat greater than the impervious area approach because it could conceivably charge both undeveloped and developed properties.	This method is sometimes considered to be more equitable than some other methods because runoff-related expenses are recovered from all users. Both gross area and impervious area data are needed for this methodology, adding to the cost of developing a master account file, although fee calculations could be relatively simple. Cost of implementation and upkeep of this type of rate methodology is influenced by the cost of assembling data for a master account file and the computer programming associated with billing/collection and billing inquiry processes. Using a flat-rate charge for one or more classes of properties would substantially reduce costs. Maintenance of information might also be simplified by requiring data from engineers when plans are submitted.

3. Impervious Area and Percentage of Impervious Coverage

Under this rate structure, the amount of impervious area and impervious percentage are both used to calculate service fees, dictating that data on both impervious and gross area be used. Gross area is not relevant to the service fee calculation, except that it is needed to determine the percentage of imperviousness. Under this approach impervious area of each property is charged at varying rates depending on the percentage of imperviousness of the subject property. Each square foot of impervious area is typically charged more as the percentage of imperviousness increases. Because this rate methodology is based on impervious area, undeveloped lands are often not charged.

Some anomalies may occur in service fees that result from this type of rate methodology. Consider two properties of different sizes with the same amount of impervious coverage. Because its percentage of imperviousness could be a lot higher, the smaller property could be charged more than a larger property.

The key determinant of charges to individual properties (and of overall revenue capacity) under this rate concept is the schedule of charges per unit of impervious coverage. Properties may be divided into several classes based on their percentage of imperviousness (referred to as "imperviousness classes"), and a varying rate per impervious area unit might be applied to each class. For example, properties having ten (10) percent imperviousness or less might be charged $0.06 per year for each 100 square feet of impervious coverage, while properties with eleven to twenty percent imperviousness might be charged $0.15 per year for each 100 square feet. Proportionately higher values are usually applied as the percentage of impervious coverage increases.

Being based on two parameters which are accurately measurable, impervious area and gross area, from which the percentage of imperviousness is calculated, this approach gives an impression of greater accuracy than some other options. Judgment is introduced to the service fee calculation in the form of different charges for various imperviousness classes.

A community's perception of equity resulting from this rate methodology may be mixed, and may depend on the number of classes or ranges used for percentage imperviousness and schedule of rates assigned to them. To the extent that a shift in the distribution of costs toward heavily developed properties benefits single-family residences, homeowners would likely see a lower bill than under other rate structures. They might view the balance of services and charges favorably. However, charges for intensely developed commercial properties would not be as favorable as they would bear a much higher proportion of cost of service.

A typical residential property has between twenty and forty percent impervious coverage. Some houses are much larger but have a much lower percentage of imperviousness because they are on very large parcel. Recent trends toward very large residential subdivisions with smaller lots and larger structures are resulting in much more intense residential development and increased stormwater runoff. This is being mitigated to some extent by the use of green design practices, such as retention of stormwater in rain gardens and detention ponds.

Obviously, care must be taken in designing the schedule of rates that ensure that appropriate allocations of cost of service result.

This rate concept would require that both gross area and impervious area data be gathered. Incorporating a simplified charge for single-family residences could significantly reduce the

number of properties requiring specific data. Future maintenance of data for developing properties could be accomplished by requiring that gross area and impervious area data is supplied by each developer's engineer or architect as part of project plans.

The stability and sensitivity of this rate methodology is consistent with the other options considered. Even using a highly progressive schedule of rates, the level of service fees would probably not induce property owners to remove impervious area from their properties. It simply is not cost-effective for most property owners to reduce the impervious area just to reduce a stormwater service charge.

Despite being based on two parameters, this rate concept retains a fair degree of flexibility. Flexibility is directly related to how classes of imperviousness are defined and the schedule of rates assigned. By tailoring number and size of the classes and schedule of rates, flexibility comparable to the other rate structures is achievable.

Cities, counties, and drainage districts that use this method include Denver County, Colorado; Chapel Hill, North Carolina; Palm Bay, Florida; and Lancaster, Pennsylvania.

ADVANTAGES:	DISADVANTAGES:
The number of billable units can be determined by limiting the parcel area review to impervious area only. The gross area of each parcel is easily obtained data using the County's GIS database. Revenue capacity of this type of rate structure is greater than most of the other options examined in this guidance, especially if a highly progressive schedule is used. In Denver, Colorado this methodology generates perhaps twice as much revenue per square miles as some of the other rate methodologies because the very heavy weighting applied to the percentage of imperviousness results in much higher charges for intensely developed properties.	This method is sometimes considered to be less equitable than some other methods because runoff-related expenses are recovered only from users with developed properties. This methodology can create anomalies relative to service fees as compared to other rate methods. Since calculations are a function of specific schedule of rates revenues could be changed by adjusting the schedule. This approach would require that the file record be larger than for some other options in order to accommodate use of two parameters. A rate methodology could be written to calculate percentage of imperviousness and assign a property to a classification based on the data. Some specialized programming might be required for this, or specific software packages could be purchased to conduct this analysis semi-automatically.

4. Gross Area and Intensity of Development

An intensity of development factor is usually very similar to the coefficient of runoff. The term "intensity of development" is more commonly used rather than a "coefficient of runoff", because the relationship of intensity of development to stormwater runoff is more easily grasped by the public.

If applied to every parcel, this type of rate methodology requires that gross area be determined for all residential as well as non-residential properties and an intensity of development rating be assigned to each. Most communities using this method have opted to apply a simplified service fee or schedule of fees to one or more categories of single-family

residential parcels, but there is no uniform practice. Non-residential properties are usually categorized into five to ten descriptive groups ranging from "undeveloped" to "very heavily developed". If a flat-rate residential charge is not used, all residential properties are typically assigned to one or two of the intensity of development categories.

Local development patterns may influence how residential properties are treated under this rate methodology. Only one residential intensity of development category might be needed in a community that has highly uniform residential development. More categories might be appropriate in another community that has residential lots ranging from 3,000 square feet to several acres.

Typically, the intensity of development values range from a low figure ranging between 0.02 and 0.20 for undeveloped or lightly developed properties up to 0.85 or even 0.95 for industrial and commercial uses. This approach groups similar properties and applies average values to all assigned to a given classification. For example, all apartments might be classified as multi-family residential with an intensity of development factor equal to 0.65 instead of assigning individual ratings ranging from 0.50 to 0.85 to individual apartment developments. The gross area parameter is the controlling element of rate calculation for all parcels in a given classification. An apartment building on 40,000 square feet of gross lot area would usually be billed one-half the amount charged to an equivalent apartment building on an 80,000 square foot property.

This approach allows service charges to undeveloped as well as developed properties. Even at relatively low rates, this could generate a substantial amount of additional revenue compared to the impervious area rate methodology applicable only to developed properties when used in jurisdictions with extensive undeveloped areas.

Flexibility of an intensity of development rate structure is equal to or somewhat better than other methods because of latitude available in defining categories and assigning intensity of development factors.

Cities, counties, and drainage districts that use this method include Bellevue, Washington; Tacoma, Washington; Cincinnati, Ohio, and Horry County, South Carolina.

ADVANTAGES:	DISADVANTAGES:
The perceived equity of this type of rate structure is normally equal to or greater than that of other approaches. Data requirements associated with this type of rate methodology would be less than for other options. Gross area information can often be extracted from existing databases and/or maps. This type of rate structure tends to push greater proportions of the cost of service onto residential and other lightly developed properties than methodologies based on impervious area, although the differential has diminished as average housing size has increased. Overall revenue capacity could be increased by also charging undeveloped properties. Like other stormwater rate structures examined, revenue capacity of the gross area/intensity of development approach is relatively stable and insensitive to external influences.	The methodology requires a careful explanation to the community. Simplifying terminology associated with the rate methodology is desirable. That is why many jurisdictions use a phrase like "intensity of development" factor. Assignment of an intensity of development factor would require that judgment be used in reviewing conditions on each parcel, possibly using aerial photographs. Some additional work would be needed in the event that undeveloped properties were to be charged. A great deal of engineering judgment is involved in determining the intensity of development (coefficient of runoff) of a parcel in a given situation, and the engineering literature offers rather broad ranges of development intensity values. For example, values from 0.25 to 0.45 are not unusual for single-family residential parcels.

5. Gross Area and Zoning Classification

In some instances, cities, counties, and drainage districts utilize zoning classification data in lieu of intensity of development. While zoning classification is very similar to intensity of development, it has subtle differences. While intensity of development requires a great deal of engineering judgment to create, most counties in the United States have already zoned all of the property within the county.

For zoning classification, development values can range from 0.02 to 0.20 for farming/open space/public park properties to 0.90 for heavy industrial zoned area. With this approach, similar properties are already grouped and each zoning classification is assigned a given

value. For example, if apartments are zoned as multi-family residential, this zoning classification may receive a rating of 0.65 while medium density single-family zoned areas may receive a rating of 0.40. The gross area parameter is the controlling element of the rate calculation for all parcels in a given zoning classification.

While there is some literature that shows a linkage between zoning classification and quantity of runoff, this does not always hold true. Take, for instance, a parcel of land that is zoned for heavy industrial use that has not been developed and an already developed parcel zoned for medium-density single-family homes. The heavy industrial parcel would incur a higher fee yet produce less runoff while the medium-density single-family parcel would incur a lower fee and produce more runoff, at least until the industrial parcel was developed.

This approach allows service charges to undeveloped as well as developed properties. Even at relatively low rates, this could generate a substantial amount of additional revenue compared to the impervious area rate methodology applicable only to developed properties when used in jurisdictions with extensive undeveloped areas.

Flexibility of an intensity of development rate structure is equal to or somewhat better than other methods because of latitude available in defining categories and assigning intensity of development factors.

Cities, counties, and drainage districts that use this method include West St. Paul, Minnesota; Yakima County, Washington (modified); Anne Arundel County, Maryland; Columbia, South Carolina; and Frederick County, Colorado.

ADVANTAGES:	DISADVANTAGES:
Data requirements associated with this type of rate methodology would be less than for other options. Gross area information can often be extracted from existing databases and/or maps. Like other stormwater rate structures examined, revenue capacity of the gross area/zoning classification approach is relatively stable and insensitive to external influences. As current zoning classifications would be used, this method can be easier to explain to the general public	This method is sometimes considered to be less equitable than some other methods because runoff-related expenses are recovered from all users. Zoning classification cannot be directly linked to the amount of stormwater runoff.

6. Ad Valorem Tax Assessment (Millage)

County governments in Mississippi generate revenue to fund their general operating budgets through assessment of taxes on properties within the county, based on the assessed value of those properties (ad valorem taxes). Boards of Supervisors set millage rates on the basis of projected revenues and needs. In addition to general operating budgets, incremental millage can be devoted to specific needs. For instance, millages are a relatively common way that communities raise revenue to support their priorities. Millages provide communities an opportunity to generate funding for programs and initiatives reflecting the priorities that communities may not otherwise have financial resources to support. In most instances, millages are used to fund facilities and initiatives that improve the quality of life of local communities. One mil is equal to one-tenth of one cent of a property's taxable value, which means that for every $100,000 in taxable value, one mill would generate $100 of revenue.

Collecting millage revenue could provide a sustainable source of funding to support watershed management and projects.

Under a millage system, the following considerations must be taken into account:

- Many properties are tax exempt for one reason or another.

- Parcels with higher taxable values would pay a much larger fee, even if the amount of rainwater runoff from their property is less than or equal to a property with a lower taxable value.
- Implementation of stormwater reduction technologies on property would go unrewarded and would not reduce the fee paid.
- In some locations, there is a cap on maximum millage rates, so increasing the millage to cover stormwater fees may not be possible.
- According to a Western Kentucky University Stormwater Utility Survey from 2013, stormwater utility fees are more popular than millage rate increases.

Cities, counties, and drainage districts that use this method include Stark County, Ohio; Citrus County, Florida; Polk County, Florida; Southwest Florida Water Management District; and St Johns Florida Water Management District. The Southwest Florida Water Management District and the St Johns Florida Water Management District cover the following cities in Florida: Astatula, Clermont, Eustis, Fruitland Park, Groveland, Howey in the Hills, Lady Lake, Leesburg, Mascotte, Minneola, Montverde, Mount Dora, Tavares, and Umatilla.

ADVANTAGES:	DISADVANTAGES:
This approach may be the most familiar with citizens and could be implemented through existing legislation. Additionally, research suggests that millages have a relatively high rate of approval. Due to their structure, funding through millage is relatively stable which can enhance long-term planning efforts	This method may require voter approval at the watershed or county level. Voters in Rankin County may be experiencing "millage fatigue" due to the many millages that have recently been considered. This method is less equitable than some as the fee is assessed based upon property value which does not correspond to runoff volume.

Extent of the Stormwater Management District

Any of the six stormwater rate methodologies discussed above can be implemented on a range of geographic scales. The two most common geographic scales for implementation of a stormwater utility is the county-wide level or the watershed level.

County-Level

As previously discussed, there are sixty (60) currently identified sites with problems related to drainage. As these sixty (60) sites are spread throughout the county, imposing fees and implementing the stormwater program across the entire county can make sense.

There are benefits to implementing the stormwater management district on a county-wide basis. First, implementation on a county-level can simplify how fees are levied and where funds can be spent. There is much legal precedent in the United States that states that fees must be spent where they are collected. If fees are levied across the entire county, then theoretically any projects within the county are eligible to use those fees for engineering, design, and construction. Second, implementation on a county-wide basis is more simplified for those in overseeing the stormwater management district.

There are, however, disadvantages to implementing a stormwater utility on a county-wide basis. Most notably, citizens that are far removed from problem areas will probably be less happy with paying a fee they feel does not benefit them. Additionally, fees that are not seen to benefit those who pay them face tough legal battles, as seen in other states. Finally, numerous state Supreme Courts have ruled that in order for fees, etc. to be levied, those paying the fee must benefit from it. If a county-level approach is pursued and it faces legal challenges, the entire system may be declared null even if some, or a majority of, citizens are receiving direct benefit from those fees.

Numerous counties operate their stormwater utilities on a county-wide scale. Some examples include Wake County, North Carolina; Kane County, Illinois; Knox County, Tennessee; and Beaufort County, South Carolina. It is important to note that in most instances, county-wide stormwater programs are in place in the case of combined sewer systems, or where the county is under a National Pollutant Discharge Elimination System (NPDES) permit.

Watershed Level

Another popular way to assess fees and implement a stormwater program is on a watershed level. Earlier in this report, the concept of watersheds (sometimes referred to as HUCs) and managing stormwater on a watershed-basis was introduced. As most problems arise within specific watersheds, managing the stormwater program on a watershed scale can allow the Board of Supervisors, or other governing entity, to set a fee schedule that can directly reflect the number, type, and severity of problems within a specific watershed.

In addition to being able to respond directly to the needs in a watershed, citizens may like this approach more as it is easier to see direct or indirect benefits realized from a watershed project from within that watershed than from a watershed on the other side of the county, as would happen using a county-level approach. This approach, due to the realization of

benefits within the watershed where fees are levied, might also reduce the number of legal challenges the fee could face.

However, there are also disadvantages to using a watershed level program management approach. In this report, the main focus has been on HUC 12s. There are forty-one (41) HUC 12s in Rankin County, and the sixty problem areas are spread across seventeen HUC12s. If implemented on a watershed level, the recommendation would be to create a Stormwater Management District in the five (5) habitually problematic watersheds mentioned previously. Using this approach, five (5) Stormwater Management Districts would be created where fees would be levied (and the fee schedules could vary drastically) and work would be performed. Additionally, funds could only be spent on projects within the watershed in which they were collected. To reduce the number of watersheds Stormwater Management Districts could be implemented on a HUC10 level as opposed to HUC12 level. Within Rankin County, there are ten (10) HUC10s and the sixty (60) problem areas are dispersed across six (6) HUC10 watersheds. This is opposed to forty-one (41) HUC12s where the sixty (60) problem areas are spread across seventeen HUC12s. Implementing the stormwater program on a HUC10 watershed level would also allow the Board of Supervisors and County officials more leeway with where projects, specifically storage projects, can be located.

There are numerous examples of managing problems on a watershed level. Examples of this include the Horn Lake Drainage District (MS); Portland, Oregon; and Austin, Texas. .

Other

Alternatively, geographic scales can be mixed and matched to fit the needs of the County. For example, in some areas, problem sites may be addressed on the HUC12 level whereas in other locations a HUC10 level may need to be used to address the problem areas. Geographic scales for implementation of stormwater management districts can be mixed and matched to best address the specific needs of the County.

Stormwater Management District Fee Design Considerations

There are many reasons for local governments to adopt fees to fund stormwater programs. These include: 1) generation of sufficient revenue to meet capitalization and operational expenses; 2) customizing the apportionment of costs among various segments of the community; 3) support a growth management strategy, facilitate life-cycle assessment management, or help segregate costs related to unfunded federal and/or state mandates; and 4) diminish a general revenue budget problem by moving stormwater off that source of funding and substituting service fees. Regardless of the specific motivation, the process of designing a stormwater utility funding strategy introduces the need for a higher level of analysis than that required for general fund revenue allocations.

Design of service charges must meet general and technical standards. A user fee rate structure that fits local practices and meets basic industry standards may serve a community better than a highly detailed, very expensive approach that is confusing to the public. In many cases, decisions are influenced by practical considerations like public perceptions of equity, implementation and upkeep costs, timing, and ease of understanding. The following considerations are among those commonly used to evaluate and select preferred methods for design of user fee rate structures:

- Legality
- Equity
- Revenue Sufficiency
- Flexibility
- Data Requirements

Legality

Twenty-two (22) percent of national respondents and fourteen (14) percent of southeast respondents indicated in 2014 and 2015 surveys by Black and Veatch (Appendix F) and Southeast Stormwater Association (Appendix G) that their stormwater utility funding decisions had been subjected to a legal challenge of some sort. That such a high percentage would be contested on legal grounds is probably not surprising given that the funding decisions and user fee rate structures involve money.

Stormwater management is clearly a function that falls within the general authority of the Rankin County Board of Supervisors, and the board has the latitude to adopt stormwater user fees to fund the management of that function. The courts in several states have determined that there are certain characteristics that determine whether a charge is a tax, service fee, special assessment, or exaction. Although the detailed findings in the various states differ, they are influenced by both intent of the legislative body and the structure and application of the funding methods and charging mechanisms. Procedural issues that may have an impact on the legality of service fees and assessments include the following:

- What was the intent of the jurisdiction in establishing the charge, and how are funds being used?
- Was the service fee adopted simply to counter a budget deficit, or was it predicated on meeting stormwater program costs?
- Does the rate structure satisfy general standards of how service fees should be applied to individual properties?
- Are similar fees charged to similarly-situated properties or customers?
- Are charges to disparate properties or parties consistent and balanced?

- Did the local board or council act with adequate knowledge and consideration of the issues?
- Were all procedural steps scrupulously followed?
- Was adequate publication of notice of intent given for all formal actions taken by elected officials?

Equity

Attainment of equity is a fundamental objective in the design of both fees and assessments, and one of the primary justifications commonly cited for establishing a stormwater management district. Equity has both technical and perceptual aspects. Service fee rate methodologies are designed to attain "equity" as a fair and reasonable apportionment of cost of providing the needed services and facilities. Fees are expected to have a substantial relationship to the cost of providing the services and facilities to each customer. In contrast, assessments seek to equitably apportion benefits derived from facilities or services as the means of applying the cost of them. Exactions, such as stormwater impact fees, are not necessarily required to meet standards applicable to fees or assessments, but must exhibit a rational nexus or linkage between the exaction and the purpose of the fee. Taxes generally have to meet only the standards contained in authorizing legislation.

Equity must be weighed against simplicity and clarity. The best utility rate structures generate charges that clearly and simply relate to the services and facilities being provided. A utility service fee rate structure might be highly equitable in terms of assigning costs according to service demands, yet still be deficient politically if it is too complex for the public to grasp the linkage between service, costs, and charges. In the case of stormwater management, most people can understand that replacing natural earth with impervious pavement or structures will diminish infiltration of water and increase runoff. Thus, rate structures based in some manner on impervious area and gross area are common.

Courts in most states have usually deferred to the judgement of local elected officials in determining what constitutes equity in local applications and have demonstrated a reluctance to intervene in the details of rate or assessment design. The courts in the State of Mississippi have not ruled on this, as no cases have been brought. Applications accepted by various courts suggest that the relationship must only be sufficient to satisfy reasonable common sense. This leaves the structure and level of service fees, assessments, and some exactions largely at the discretion of locally elected officials. As a result, details of service fee rate methodologies, assessment formulae, and some exaction charges can vary significantly.

Revenue Sufficiency

If a service charge is adopted, it is essential that the stormwater program provide visible results. A new fee that does not achieve a higher level of service, or solve a problem, is more likely to face opposition than one that provides demonstrable improvements.

Flexibility

A service fee (or service charge) offers extraordinary flexibility compared to other funding methods. Within reason, a rate structure can be designed to apportion costs as the Board of Supervisors wishes. There is no absolute prescription that must be followed. For example, some communities charge properties located in floodplain areas less than upland areas, but the City of Boulder, Colorado imposes a surcharge for floodplain properties. Some communities only charge developed properties, while others also charge service fees to undeveloped lands.

The latitude given to local elected officials to make various decisions regarding the design of a rate structure is a distinct contrast to taxation concepts based on property value and assessments based on benefit. Taxation methods generally allow little flexibility, and cannot be selectively applied or tailored to specific needs, except in the case of tax increment districts. Although assessment methodologies are generally more flexible than taxes, they must reflect direct and special benefit.

Data Requirements

The data requirements of various rate structures differ, sometimes significantly. Two general rules usually prevail: 1) new data costs more than existing data; and 2) each additional increment of precision costs more than the previous one. As a result, many communities prefer to use existing data and apply a rate structure that is relatively simple. The number of parameters necessary to calculate a service fee for each customer is an important cost consideration, but it is not necessarily less costly to use a single parameter rather than two or more. If complete and accurate data are readily available from an existing source, it does not necessarily cost more to assemble a master account file based on a more precise parameter or several parameters, though that is usually the case.

Industry standards for stormwater service fee rate structures have coalesced around a few data parameters that have a demonstrated relationship to the cost of stormwater service and facilities. Impervious area is a common parameter, not only because it is closely related to runoff but also because many communities already have that data in the form of planimetric polygons defining building footprints, and paving contained in their GIS system.

The data requirements associated with implementing and maintaining a stormwater service fee depend more on the subtleties of the rate methodology and the use of modifying factors than on the basic parameters selected. If an impervious area method were to be applied to all properties individually, impervious area information would have to be generated for residential as well as non-residential parcels. However, if a simplified residential service fee is utilized, data requirements and costs might be reduced by as much as 70 percent regardless of the type of rate methodology employed.

Implementation costs of a tiered residential rate structure are usually higher than for a single flat-rate residential service fee. A two-tier or three-tier simplified rate structure for residences requires some additional analysis of the residential housing stock subject to the change. If information available from other databases could be used to determine the proper assignment of residential properties to different tiers, the impervious area of individual properties would not have to be carefully measured. However, data shows that grouping residential properties is only slightly less demanding than precisely measuring the impervious area on each property.

The cost of implementing an impervious area rate structure is a function of the number of properties that must be measured, the accuracy standards adopted for data, and the measurement technique employed. The techniques available for determining the impervious area and gross area of individual properties range from very time-consuming and expensive on-site measurements to photo-interpretive methods using scaled aerial photographs or satellite imagery. In the United States Cost of developing impervious area data has ranged from less than $1 to over $6 per unit, depending primarily on whether or not a simplified residential rate is used.

A mistake sometimes made by counties and cities when they first adopt a rate structure is to use a parameter simply because they have an existing database, not because it correlates with the cost of stormwater services and facilities. This can lead to serious problems if the stormwater rate structure is challenged in court because there is little if any correlation between such factors and the cost of providing stormwater management.

Project Implementation

While Program Establishment is taking place in the 5-Year Priority Implementation Plan, ongoing and pre-planned stormwater projects will continue to be implemented in Rankin County. In the final two years of the 5-Year Priority Implementation Plan, new priority stormwater projects will begin to enter the planning, engineering, and implementation stages. Using a staggered schedule allows for the establishment of the Rankin County Comprehensive Watershed Management Program and the application for federal and state grants. This approach can reduce the County's cost-burden for project planning, engineering, and implementation.

Project Characterization Matrix

Table 15 provides a matrix for characterization of each project according to the following parameters:

Project Number: This is the project number determined in earlier sections of this report. The first number is the district in which the project is located while the last number is an arbitrary sequential number, indicated no particular order or priority.

Project Name: The name given to the project site.

Project Type: The project type is identified as the main activity type and includes the following:

- *Hydrologic Restoration* – installation and/or removal of features to restore natural hydrologic patterns that have been altered.
- *Bank Stabilization* – onshore placement of earthen fill, other stabilizing material, and vegetation to maintain bank stabilization.
- *Science and monitoring to support design and management*
- *Dredging and Clearing* – dredging or clearing of existing channels, ponds, or ditches to restore depth.
- *Channel Realignment* – realign existing channels to improve hydraulic efficiency.
- *Infrastructure Improvements* – installation of infrastructure improvements to help alleviate flooding and/or provide economic development opportunities. Infrastructure improvements include adding roadside ditches to existing roadway and improving existing stormwater infrastructure
- *Flood proofing* – community projects to mitigate infrastructure damages caused by flooding.
- *Flood protection* – the use of hard and/or soft measures to reduce flooding impacts that may include installation of backwater levees, flood walls, flood gates, and pump stations.
- *Land acquisition* – to aid in the development of other projects.
- *Data Collection and Model Development* – to establish a baseline for current conditions and test potential solutions prior to design, engineering, and construction.
- *Storage* – the addition or maintenance of detention or retention areas within the watershed.
- *Ordinance development* – the development and enforcement of stringent development ordinances to prevent future problems.

Timeline: broken into five distinct parts (study/model, design, permits, land acquisition, implementation), the timeline represents the estimated amount of time require to finish each of these tasks. Boxes listed as "U" represent a timeline that is unknown and cannot be estimated as further study or modeling is required to fully understand these issues and develop feasible solutions. A value of "---" represents an item that is not necessary.

Potential Funding: lists potential funding sources for planning and implementation other than any local sustainable funding. Potential funding sources are discussed more in detail below, but include U.S. Army Corps of Engineers, the Natural Resource Conservation Service,

the U.S. Environmental Protection Agency, the Mississippi Department of Environmental Quality, the Mississippi Department of Transportation, and the BP Economic Damages.

Permit(s) Required: a list of foreseeable permits required for project implementation. This includes local, state, and federal permits.

Ready for Construction: under this task there are four steps: *preliminary engineering, design, permits,* and *land acquisition*. If the box is yellow, this represents the step is in progress. A green box represents a completed step. Once all four steps are green, the project is ready for implementation, contingent upon funding.

Notes: this column provides any general notes for the site. Generally this section indicates if a CLOMR and/or LOMR is needed, identifies current projects and monitoring sites, and identifies the HUC12 code if a watershed model is needed.

Table 15: Project Characterization Matrix

Project Number	Project Name	Project Type	Timeline					Potential Funding	Permit(s) Required	Ready for Construction				Notes
			Model	Design	Permits	Land Acquisition	Implementation			Preliminary Engineering	Design	Permit Acquisition	Land Acquisition	
1.01	Williams Road between Levy Lane and The North Road	Dredging and clearing	n/a	3 mo	12 mo	3 mo	3 mo	USACE §205	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
1.02	Pearson Road @ Unknown Tributary	Storage	n/a	3 mo	12 mo	12 mo	3 mo	--	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
1.03	Gunter Road @ Indian Creek	Infrastructure improvements	n/a	--	--	--	--	--	--					current project
1.04	Old Pearson Road at bend east of Highway 49	Infrastructure improvements	n/a	6 mo	3 mo	3 mo	6 mo	MDOT	SWPPP, Construction					
1.05	Highway 49 @ Highway 469 in Florence	Model development	15 mo	--	--	--	--	--	--					002 watershed model
1.06	Williams Road @ Butler Creek in Florence	Model development	15 mo	--	--	--	--	--	--					002 watershed model
1.07	Highway 49 Culvert @ Butler Creek in Florence	Model development	15 mo	--	--	--	--	--	--					002 watershed model
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	Channel realignment	n/a	6 mo	12 mo	9 mo	6 mo	MDOT	Wetlands, SWPPP, Constuction					CLOMR, LOMR
1.09	Highway 469 between West Main Street & White Street in Florence	Infrastructure improvements	n/a	6 mo	6 mo	12 mo	6 mo	--	SWPPP, Construction					
1.10	Highway 469 @ Steen Creek in Florence	Model development	15 mo	--	--	--	--	--	--					002 watershed model
1.11	Highway 49 Commercial Area in Richland	Model development	18 mo	--	--	--	--	--	--					504 watershed model
1.12	Bud Street in Richland	Infrastructure improvements	n/a	3 mo	12 mo	3 mo	6 mo	--	Wetlands, SWPPP, NWP 41, Construciton					CLOMR, LOMR
1.13	Jones Street @ Old Highway 49 South in Richland	Infrastructure improvements	n/a	6 mo	12 mo	3 mo	9 mo	--	Wetlands, SWPPP, NWP 41, Construction					CLOMR, LOMR
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Bank stabilization	n/a	3 mo	12 mo	9 mo	6 mo	USACE §14	Wetlands, SWPPP, NWP 41, Construction					CLOMR, LOMR

Project Number	Project Name	Project Type	Timeline					Potential Funding	Permit(s) Required	Ready for Construction				Notes
			Model	Design	Permits	Land Acquisition	Implementation			Preliminary Engineering	Design	Permit Acquisition	Land Acquisition	
1.15	Linda Jo Drive @ Lowe Circle in Richland	Dredging and clearing	n/a	3 mo	12 mo	12 mo	3 mo	USACE §208	Wetlands, SWPPP, Construction					CLOMR, LOMR
1.16	Lowe Circle @ Southwind Apartments in Richland	Infrastructure improvements	n/a	3 mo	3 mo	3 mo	3 mo	--	SWPPP, Construction					
1.17	End of Lewis Street in Richland	Dredging and clearing	n/a	3 mo	12 mo	6 mo	3 mo	--	Wetlands, SWPPP, Construction					CLOMR, LOMR
1.18	East Harper Street @ Short Street in Richland	Infrastructure improvements	n/a	6 mo	3 mo	3 mo	6 mo	USACE §208	SWPPP, Construction					
1.19	Richland East Circle in Richland	Infrastructure improvements	n/a	9 mo	6 mo	12 mo	9 mo	--	SWPPP, Construction					
1.20	Furr Drive @ Richland Circle in Richland	Dredging and clearing	n/a	3 mo	6 mo	3 mo	3 mo	USACE §14	SWPPP, 404, Construction					
2.01	Mill Creek between Highway 25 & The Reservoir	Model development	12 mo	--	--	--	--	NRCS EWP; BP Economic Damages	--					307 watershed model
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Infrastructure improvements	n/a	9 mo	12 mo	12 mo	9 mo	USACE §208	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
2.03	Church Road @ Unnamed Tributary	Dredging and clearing	n/a	3 mo	3 mo	3 mo	3 mo	USACE §208	SWPPP, Construction					
2.04	Manship Road @ Amethyst Drive	Dredging and clearing	n/a	3 mo	3 mo	3 mo	3 mo	--	SWPPP, Construction					
2.05	Mill Creek under Lakeland	Model development	12 mo	--	--	--	--	NRCS EWP; BP Economic Damages	--					307 watershed model
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	Infrastructure improvements	n/a	3 mo	6 mo	3 mo	3 mo	--	SWPPP, Construction					
2.07	Oakgrove Subdivision	Infrastructure improvements	n/a	3 mo	6 mo	9 mo	6 mo	--	SWPPP, 404, Construction					
3.01	Tara Road @ Unnamed Tributary	Bank stabilization	n/a	6 mo	6 mo	12 mo	9 mo	USACE CAP; BP	SWPPP, 404					
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Dredging and clearing	n/a	3 mo	6 mo	9 mo	3 mo	--	SWPPP, 404, Construction					
3.03	Thomasville Road @ Unnamed Tributary	Channel realignment	18 mo	--	--	--	--	--	--					504 watershed model

Project Number	Project Name	Project Type	Timeline					Potential Funding	Permit(s) Required	Ready for Construction				Notes
			Model	Design	Permits	Land Acquisition	Implementation			Preliminary Engineering	Design	Permit Acquisition	Land Acquisition	
3.04	Puckett Park off Highway 18 in Puckett	Bank stabilization	n/a	3 mo	12 mo	3 mo	3 mo	MDOT	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
3.05	Windchase Subdivision in Brandon	Dredging and clearing	n/a	3 mo	3 mo	9 mo	6 mo	USACE §208	SWPPP, 404					
3.06	Belle Oak Subdivision in Brandon	Dredging and clearing	n/a	3 mo	6 mo	9 mo	9 mo	USACE §208	SWPPP, Construction					
3.07	Greenfield Rd @ Unnamed Tributary in Pearl	Model development	9 mo	--	--	--	--	--	--					503 watershed model
3.08	Meadowland Drive @ East Government Street in Brandon	Monitoring	--	--	--	--	--	--	--					monitoring
4.01	Jims Road @ Unnamed Tributary	Monitoring	--	--	--	--	--	--	--					monitoring
4.02	Weaver Road @ Unnamed Tributary	Dredging and clearing	n/a	3 mo	6 mo	3 mo	3 mo		SWPPP, 404					
4.03	Gore Road @ Purnell Creek	Monitoring	--	--	--	--	--	--	--					monitoring
4.04	Lewis Prestage Road @ Rollison Creek	Monitoring	--	--	--	--	--	--	--					monitoring
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Model development	21 mo	--	--	--	--	--	--					306 watershed model
4.06	Holly Bush Rd between Sara Fox Drive & Rodeo Drive	Model development	21 mo	--	--	--	--	--	--					306 watershed model
4.07	Reservoir East Subdivision	Dredging and clearing	n/a	3 mo	12 mo	9 mo	6 mo	--	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
4.08	Holly Bush Road @ Riley Creek	Model development	21 mo	--	--	--	--	--	--					306 watershed model
4.09	Oakdale Road north of Baker Lane	Storage	n/a	3 mo	3 mo	6 mo	9 mo	USACE §208	SWPPP, 404					
4.10	Andrew Chapel Road @ Bush Creek	Monitoring	n/a	Finished	6 mo	12 mo	start in Q2, 2019 (2 yr)	--	--					current project
4.11	Barker Road @ Dry Creek Tributary	Channel realignment	n/a	3 mo	9 mo	3 mo	3 mo	USACE §208	SWPPP, Construction					
4.12	Brush Creek in North Brandon Estates	Storage	n/a	6 mo	12 mo	9 mo	6 mo	USACE §208	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR

Project Number	Project Name	Project Type	Timeline					Potential Funding	Permit(s) Required	Ready for Construction				Notes
			Model	Design	Permits	Land Acquisition	Implementation			Preliminary Engineering	Design	Permit Acquisition	Land Acquisition	
4.13	Highway 80 @ Highway 43 in Pelahatchie	Model development	9 mo	--	--	--	--	NRCS EWP; BP Economic Damages	--					305 watershed model
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	Dredging and clearing	n/a	3 mo	12 mo	6 mo	3 mo	--	Wetlands, 404, SWPP, Construction					CLOMR, LOMR
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	Dredging and clearing	n/a	6 mo	3 mo	6 mo	6 mo	USACE §14	SWPPP, Construction					
4.16	Grimes Street & Mimosa Avenue in Pelahachie	Model development	15 mo	--	--	--	--	--	--					302 watershed model
5.01	Vernon Jones Avenue west of Old Fannin Road	Infrastructure improvements	n/a	3 mo	6 mo	3 mo	6 mo	--	SWPPP, Construction					
5.02	Flowood Drive south of Lakeland in Flowood	Model development	9 mo	--	--	--	--	--	--					603 watershed model
5.03	Laurel Park Apartments in Flowood	Model development	9 mo	--	--	--	--	--	--					603 watershed model
5.04	Fox Hall Rd west of Highway 475 in Flowood	Infrastructure improvements	n/a	3 mo	9 mo	9 mo	3 mo	MDOT	Wetlands, SWPPP, Construction					
5.05	Neely Creek between Nancy and Skylane in Pearl	Infrastructure improvements	n/a	6 mo	12 mo	12 mo	6 mo	--	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
5.06	Chicot Court @ Highway 80 in Pearl	Storage	n/a	9 mo	12 mo	9 mo	12 mo	--	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
5.07	Tony Street between Old Country Club & Boehle	Infrastructure improvements	n/a	6 mo	12 mo	9 mo	9 mo	--	Wetlands, 404, SWPPP, Construction					CLOMR, LOMR
5.08	Old Country Club Road @ Louisa Street in Pearl	Dredging and clearing	n/a	3 mo	6 mo	6 mo	3 mo	--	404, SWPPP, Construction					
5.09	Buckingham Subdivision	Model development	6 mo	--	--	--	--	--	--					601 watershed model

After projects were evaluated for their conceptual opinions of probable cost, anticipated completion timeline, relative importance to the community, and their constructability, the conceptual OPCs and the high hazard project characterization matrix were used to identify sites to be included in the 5-Year Priority Implementation Plan. Five sites and two watersheds were incorporated into the 5-Year Priority Implementation Plan.

Six projects were identified as "short-term" implementation sites for project planning and/or implementation within the first five years of the establishment of a Rankin County Comprehensive Watershed Management Program. The sites are distributed throughout the county in different Supervisor Districts and were selected based upon feedback from County officials and the overall project benefit to the County and its citizens. The figures below show the breakdown of the projects by district. Figure 8 shows the number of short-term projects in each district while

Figure 9 shows the conceptual opinion of probable cost of the short-term projects in each district.

Figure 8: Number of Short-Term Projects by District

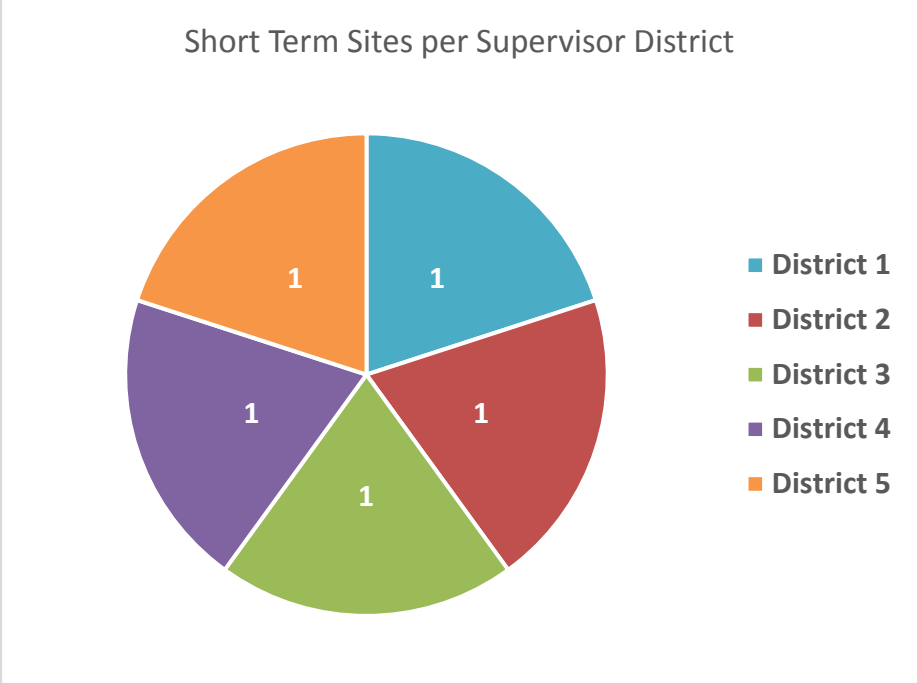
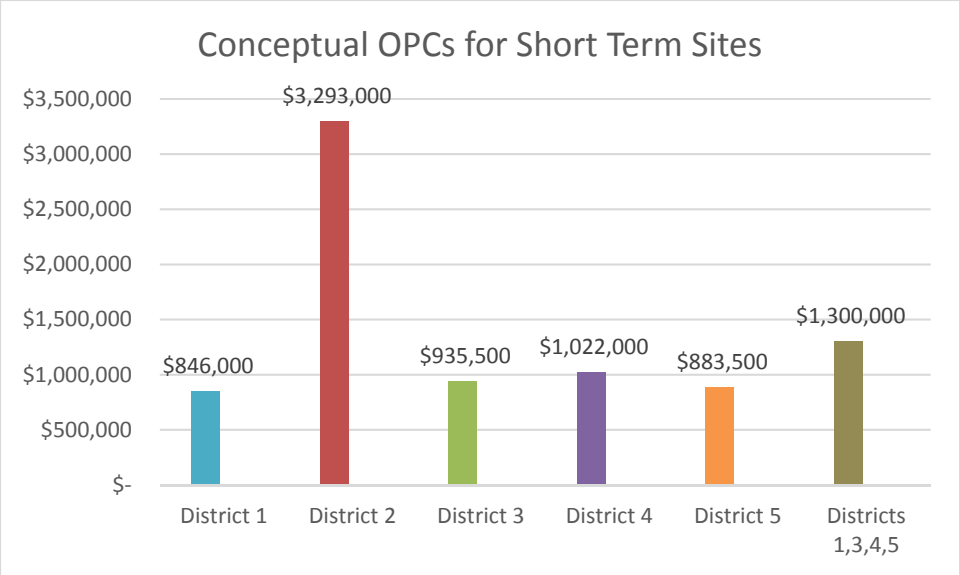


Figure 9: Conceptual Opinion of Probable Cost of Short-Term Projects by District



While the six short-term projects are the main focus of this portion of the document, the omission of a site from the initial implementation list does not preclude the addition of supplementary sites, as needed. In fact, adding sites to the list when major problems arise can be done quickly to allow for a fast response time, all while adhering to the true nature of the document.

Table 16 shows the project number, project name, and HUC for all six projects currently on the short-term implementation plan. Appendix A includes the project information sheets for each project site while Appendix C includes the watershed characterization sheets. The project sheets further identify and describe each site. Each project information sheet includes the project number and name, the location description, project coordinates, the HUC12 the site is located in, the project type, approximate range of residences or businesses benefitted, anticipated project benefits, implementation period, a suggested implementation timeline, conceptual opinion of project cost, location problems, and recommended solutions.

Table 16: Short-Term Implementation Project Numbers and Names

Site Number	Site Name/Description	Opinion of Probable Cost
1.14	Neely Road at Unnamed Pearl Tributary in Richland	$846,000
2.01	Mill Creek between Highway 25 and The Reservoir	$3,293,000
3.01	Tara Road at Unnamed Tributary	$935,500
4.07	Reservoir East Subdivision	$1,022,000
5.01	Vernon Jones Avenue west of Old Fannin Road	$883,500
Model	Upper and Lower Richland Creek Modeling	$1,300,000

The 5-Year Priority Implementation Plan is seen in Table 17 below. The table is delineated by quarter for the first five years of implementation. Each activity has a specific color associated with it. In instances where multiple activities are undertaken during the same quarter, both colors will be shown. The far right-hand column shows the conceptual opinion of cost for each project over the span of the five years. It is important to note that not all six projects will be completed within the initial five years, and as such, only the cost of the phase occurring within the five years is included in Table 17. Total project cost can be found in Appendix A – Project Sheets. It is also important to note that the timelines are anticipated timelines based upon best judgement and experience and that these activities may take more or less time than anticipated.

The 5-Year Priority Implementation Plan also shows ongoing stormwater projects in Rankin County. These ongoing projects are:

- 1.03 – Gunter Road at Indian Creek: Rankin County is currently widening Gunter Road and the bridge over Indian Creek. In preparation for this work, the ditches in the Shenandoah subdivision were cleaned out and deepened. The road widening project will include clearing the ditches along Gunter Road and making improvements to the Indian Creek channel.

- 2.01 – Mill Creek between Highway 25 and The Reservoir: During the April 2017 rain event, portions of Mill Creek subdivision, located just north of Lakeland Drive (Highway 25), were flooded when Mill Creek grew past its banks. Following the flooding, a stormwater infrastructure project in the subdivision began. This project inspects the stormwater infrastructure – pipes and inlets – in the subdivision to determine if they need to be replaced or rehabbed.

- 4.10 – Andrew Chapel Road at Bush Creek: During large precipitation events, Andrew Chapel Road can become inundated with water when the existing culverts under the road do not allow enough water to pass under the road. As such, Rankin County is designing a bridge to replace the culverts along Andrew Chapel Road at Bush Creek. The bridge would allow more water to flow safely underneath the road without causing flooding.

- 5.09 – Oakgrove Subdivision: During heavy precipitation events, the Oakgrove Subdivision, located west of Old Fannin Road, has reported problems of roads and yards flooding. In 2018, Rankin County began a project to evaluate the condition of the stormwater infrastructure – pipes and inlets – in the subdivision. Pipes that do not meet specification will be replaced.

The four ongoing projects address current stormwater management needs across the County. The work that has been completed on these sites thus far will not be halted during the Program Establishment phase. Rather, the projects will continue through the first three years of the 5-Year Priority Implementation Plan or until their completion.

During year three of the plan, revenue from local sustainable sources is anticipated while federal and state funding is anticipated to begin being awarded in the fourth year of the program. As such, new priority projects have been added to the 5-Year Priority Implementation Plan beginning in year 4 of the plan.

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Table 17: Proposed 5-Year Priority Implementation Plan

	Year		1				2				3				4				5				Year 6 and Onward	Estimated Cost Years 1-5	Total Estimated Cost
	Quarter		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
Program Establishment	Create stormwater management district																							$400,000	
	Evaluate and propose new and revised ordinances/zoning																							$50,000	
	Annual Sustainable Revenue																								
	Program Support and Technical Assistance																							$500,000	$100,000/year
	Create watershed plan for Mill Creek - Pelahatchie Creek																							$200,000	
	Create watershed plan for Upper and Lower Richland Creek																							$200,000	
	Create watershed plan for Indian Creek - Steen Creek																							$200,000	
	Create watershed plan for Riley Creek - Pelahatchie Creek																							200,000	
Project Implementation	1.03	Gunter Road at Indian Creek																							
	2.01	Mill Creek between Highway 25 and The Reservoir																							
	4.10	Andrew Chapel Road at Bush Creek																							
	5.09	Oakgrove Subdivision																						$443,930	
	1.14	Neely Road @ Unnamed Pearl Tributary																						$121,000	$846,000
	2.01	Mill Creek																						$540,000	$3,293,000
	3.01	Tara Road																						$147,500	$935,500
	4.07	Reservoir East Subdivision																						$138,000	$1,022,000
	5.01	Vernon Jones Avenue west of Old Fannin Road																						$883,500	$883,500
	Upper and Lower Richland Creek Modeling																							$1,300,000	$1,300,000
		Estimated Annual Cost	$540,000				$410,000				$300,000				$1,924,000				$1,706,000						
		Total Estimated Cost																						$5,323,930	$10,030,000

Key: Planning | Hydraulics/Study | Engineering | Permits | Land Acquisition | Implementation | Revenue

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The 5-Year Priority Implementation Plan was designed to establish Rankin County's Comprehensive Watershed Management Program and begin implementing short-term priority sites. It was constructed based upon the Characterization Matrix (Table 15), project bundling opportunities, and feedback received from County officials and the Board of Supervisors. The 5-Year Priority Implementation Plan also factors in hydraulic flow and connectivity in scheduling downstream sites before upstream sites to help prevent additional problems. Table 18 shows a breakdown of the number of implementation sites, by district, planned to begin each year in the 5-Year Priority Plan. Ongoing projects are listed in Year 1.

Table 18: District Sites per Plan Year

		District Number				
		1	2	3	4	5
Plan Year	1	1	0	0	1	0
	2	1	0	0	1	0
	3	0	0	0	1	0
	4	1	0	0	1	0
	5	1	0	0	1	0

The 5-Year Priority Implementation Plan is designed to establish a proposed targeted schedule for project implementation that provides a comprehensive view of all of the identified projects. The purposeful simplicity of the design allows the decision makers to easily track the progress of each project and coordinate the scheduling of existing and new projects in the five year period. It is recommended that the Plan be utilized on a 5-year (or other reasonable timeframe) rotating cycle that allows for the ongoing implementation of all the infrastructure stormwater related priorities for Rankin County. It is also recommended that the plan be reevaluated annually, in coordination with budget planning, to take into account funding fluctuations, other funding opportunities, changing infrastructure conditions, and other unforeseen circumstances.

Recommendations

Based upon the research performed for this report, both of Rankin County and for sustainable funding strategies, the following recommendations are made:

1. *Establish Watershed Management Districts for each habitually problematic watersheds under Mississippi Code §51-39.*
   The first, and probably most important, recommendation is to establish five stormwater management districts – one for each habitually problematic watershed

discussed. Details and complications that may arise during this process are discussed in the section addressing Program Establishment.

2. *Begin targeting funding strategies to five habitually problematic watersheds in Rankin County by creating watershed plans for these five watersheds.*
   The second recommendation is to target funding strategies initially to habitually problematic watersheds under the stormwater management districts. Habitually problematic watersheds are those watersheds having at least four sites located within them and/or have frequently reoccurring problem sites. Based upon this criteria, there are five habitually problematic watersheds within Rankin County: Lower Richland Creek, Indian Creek – Steen Creek, Mill Creek – Pelahatchie Creek, Riley Creek – Pelahatchie Creek, and Upper Richland Creek. More than fifty percent - thirty seven out of sixty – of the problem sites are located within these five watersheds.

3. *Conduct an in-depth analysis of the Impervious Area assessment methodology to determine if it properly addresses Rankin County's needs.*
   The third recommendation is for the Rankin County Board of Supervisors to conduct, either by themselves or through consultants, an in-depth analysis of the Impervious Area (or Equivalent Runoff Unit) fee rate and assessment methodology briefly discussed above. This in-depth analysis will help determine if this methodology will best serve the County's needs and can also be used to estimate the expected revenue generated for stormwater management. This analysis should present information on different stormwater fee types, stormwater service charge design considerations (such as legality, equity, and data requirements to name a few), and discuss legal and political barriers to creating a stormwater utility.

4. *Using the watershed management plans, begin the process of applying for state and federal grants/loans for qualifying sites.*
   Gathering the necessary documents to apply for federal and state grants and/or loans can sometimes take upwards of a year – especially in cases where a watershed management plan is required, as is the case for certain NRCS programs. Due to this lag time, it is recommended that the process of applying for grants and loans begin as soon as possible following program establishment. Additionally, it is strongly recommended that watershed plans for the five habitually problematic watersheds within Rankin County be developed to aid in applying for grants for projects in these areas.

5. *Continue implementing the four ongoing projects during the initial 5-Year Priority Implementation Plan until the conclusion of said projects.*
   There are four ongoing projects within Rankin County: 1.03 (Gunter Road at Indian Creek), 2.01 (Mill Creek between Highway 25 and The Reservoir), 4.10 (Andrew Chapel Road at Bush Creek), and 5.09 (Oakgrove Subdivision). These projects should continue during the first phase of the implementation plan until they are completed.

6. *Update this document every four years, minimum.*
   Due to the nature of this section of the report and the short-term implementation strategy, it is recommended that this document be updated every four years, minimum, to place completed projects on a maintenance schedule, add further sites to the implementation plan, and allow the implementation plan to evolve in such a way as to continually respond to the needs of Rankin County and its residents.

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Recommendations

Ordinance and Policy Recommendations

In a previous section of this report, Rankin County's existing ordinances dealing with zoning, development, flood damage prevention, and stormwater management were compared to model ordinances developed by the Environmental Protection Agency, the American Planning Association, and the Mississippi Emergency Management Agency, Floodplain Management Bureau. From the comparison it was seen that Rankin County has instituted at least some form of seventeen of the twenty-two model ordinances reviewed.

In order for Rankin County to continue moving towards a watershed-based approach for stormwater management, it is recommended that Rankin County add to and improve their existing ordinances based upon the ordinance review conducted. Specific recommendations are listed in Table 19.

Table 19: Ordinance and Policy Recommendations

Flood Damage Prevention Ordinance
Increase standards for areas downstream from a dam to require a development permit for any build or fill that can reasonably anticipate discharges due to principal or emergency spillway activity or failure of the dam.
Strengthen the definition of "new construction" to require that substantial improvements meet updated Flood Damage Prevention Ordinances
Require CFHAs to comply with the same standards as SFHAs
Institute deed restrictions to prohibit subsequent conversions of enclosed areas subject to six feet of flooding or greater; and, require that disclosures to new owners and restrictive declarations be filed with the property deed
Strengthen floodway development language to prohibit all development within the floodway
Zoning Ordinance
Include new language regarding aquatic buffers
Stormwater Ordinance
Expand the stormwater ordinance to include language related to the responsibility of stormwater infrastructure operation
Include new language regarding source water protection for both groundwater and surface water resources
Development Ordinance
Include new language regarding low impact development
Include new language regarding smart growth

Model language for the suggested updates can be found through the Environmental Protection Agency, the American Planning Association, and in Mississippi's Model Flood Damage Prevention Ordinance. Specific locations of model ordinance language for ordinance updates can be seen in Table 20.

Table 20: Model Ordinance Language Locations

Ordinance Update Suggested	Model Ordinance Location
Aquatic Buffers	Environmental Protection Agency, Urban Runoff: Model Ordinances for Aquatic Buffers
Source Water Protection	Environmental Protection Agency, Urban Runoff: Model Ordinances for Source Water Protection
Low Impact Development	Environmental Protection Agency, Urban Runoff: Low Impact Development
Smart Growth	American Planning Association, Smart Growth Codes
Flood Damage Prevention Ordinances	Mississippi Model B-E Flood Damage Prevention Ordinance, April 2011

Although a thorough ordinance evaluation and a draft of updated ordinances is beyond the scope of this current work, it is recommended that Rankin County evaluate the effectiveness of its zoning, development, flood damage prevention, and stormwater management ordinances in the context of integrated watershed management. The basic concept is that floodplain occupancy, land use, economic development initiatives, and other human actions and interests impact and are impacted by the waterways and either add to or help mitigate risks. Each of these actions can be good things, on their own, but one action within the watershed ultimately impacts other potential actions and interests elsewhere in the watershed. Hence, the ordinances should be designed to take the cumulative impacts of these various activities into consideration.

Implementation Plan Recommendations

Based upon the research performed for this report, both of Rankin County and for sustainable funding strategies, the following recommendations are made:

1. *Establish the Rankin County Watershed Management District under Mississippi Code §51-39*.
   The first, and probably most important, recommendation is to establish the Rankin County Watershed Management District. Details and complications that may arise during this process are discussed in the section addressing Program Establishment.

2. *Begin targeting funding strategies to four habitually problematic watersheds in Rankin County by creating watershed plans for these four watersheds.*
   The second recommendation is to target funding strategies initially to habitually problematic watersheds. Habitually problematic watersheds are those watersheds having at least four sites located within them and/or have frequently reoccurring problem sites. Based upon this criteria, there are five habitually problematic watersheds within Rankin County: Lower Richland Creek, Indian Creek – Steen Creek, Mill Creek – Pelahatchie Creek, Riley Creek – Pelahatchie Creek, and Upper Richland Creek. More than fifty percent - thirty seven out of sixty – of the problem sites are located within these five watersheds.

3. *Conduct an in-depth analysis of the Impervious Area assessment methodology to determine to determine if it properly addresses Rankin County's needs.*
   The third recommendation is for the Rankin County Board of Supervisors to conduct, either by themselves or through consultants, an in-depth analysis of the Impervious Area (or Equivalent Runoff Unit) fee rate and assessment methodology briefly discussed above. This in-depth analysis will help determine if this methodology will best serve the County's needs and can also be used to estimate the expected revenue generated for stormwater management. This analysis should present information on different stormwater fee types, stormwater service charge design considerations (such as legality, equity, and data requirements to name a few), and discuss legal and political barriers to creating a stormwater utility.

4. *Using the watershed management plans, begin the process of applying for state and federal grants/loans for qualifying sites.*
   Gathering the necessary documents to apply for federal and state grants and/or loans can sometimes take upwards of a year – especially in cases where a watershed management plan is required, as is the case for certain NRCS programs. Due to this lag time, it is recommended that the process of applying for grants and loans begin as soon as possible following program establishment. Additionally, it is strongly recommended that watershed plans for the five habitually problematic watersheds within Rankin County be developed to aid in applying for grants for projects in these areas.

5. *Continue implementing the four ongoing projects during the initial 5-Year Priority Implementation Plan until the conclusion of said projects.*
   There are four ongoing projects within Rankin County: 1.03 (Gunter Road at Indian Creek), 2.01 (Mill Creek between Highway 25 and The Reservoir), 4.10 (Andrew

Chapel Road at Bush Creek), and 5.09 (Oakgrove Subdivision). These projects should continue during the first phase of the implementation plan until they are completed.

6. *Update this document every four years, minimum.*
   Due to the nature of this section of the report and the short-term implementation strategy, it is recommended that this document be updated every four years, minimum, to place completed projects on a maintenance schedule, add further sites to the implementation plan, and allow the implementation plan to evolve in such a way as to continually respond to the needs of Rankin County and its residents.

Next Steps

While completion of the individual improvements represented by the sixty sites assessed in this document is important and needed to protect property and improve quality of life in Rankin County, a more holistic integrated watershed-based program management approach to promote the long term sustainability of these and other projects is also needed. Drainage projects are often only a "quick fix" for a reoccurring problem. Creation of Stormwater Management Districts and implementation of best management practices and other initiatives is needed to extend the life of the capital projects for as long as possible. This implementation plan should be considered as a comprehensive watershed-based stormwater management program that requires ongoing management and updates. To accomplish this the following initiatives are suggested in addition to the 5-Year Priority Implementation Plan.

Next Steps
• Adopt the recommended 5-Year Priority Implementation Plan.
• Update and reevaluate program priorities annually for proper incorporation into the implementation schedule.
• Procure professional Program support services to assist in the implementation of the 5-Year Priority Implementation Plan and to provide overall watershed-based stormwater management Program support to the County.
• Establish institutional solutions for sustainable funding, such as Stormwater Management Districts.
• Identify and evaluate best management practices (BMPs) at the micro and macro-level that can be implemented to promote project sustainability.
• Develop and execute strategies for legislative support at both the state and federal levels, including research, drafting legislative language, and preparation and support for state and federal legislative visits
• Develop the necessary documentation to support the recommended funding approach (impervious area), including creation of watershed districts and plans for habitually problematic watersheds.
• Evaluate and propose new and revised ordinances and zoning classifications for County-wide implementation.

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Appendix A – Project Sheets

Working with county and city officials and staff, a list of sixty (60) areas known to have drainage deficiencies was created. Of these sites, thirty-five (35) are located within city limits and twenty-five (25) are located in the county. Through individual interviews with county and city officials numerous sites were identified multiple times. For simplicity, duplicate sites were removed from the list.

The following table lists the consolidated sixty sites. The initial number in the Site Number indicates the Supervisor District where the project is located. For example, Site 1.01 is located in District 1. Sites are not numbered in any particular priority and are generally numbered in the order in which the county or city official identified them. In addition to the site number and the site name, the 12-digit Hydrologic Unit Code (HUC12) for each site was identified and is listed by name.

Table 1: Sites with Deficiencies Identified in Rankin County

Site Number	Site Name / Description	HUC 12
1.01	Williams Road between Levy Lane and The North Road	Indian Creek - Steen Creek
1.02	Pearson Road @ Unknown Tributary	Lower Richland Creek
1.03	Gunter Road @ Indian Creek	Indian Creek - Steen Creek
1.04	Old Pearson Road at bend east of Highway 49	Indian Creek - Steen Creek
1.05	Highway 49 @ Hwy 469 in Florence	Indian Creek - Steen Creek
1.06	Williams Road @ Butler Creek in Florence	Indian Creek - Steen Creek
1.07	Highway 49 Culvert @ Butler Creek in Florence	Indian Creek - Steen Creek
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	Indian Creek - Steen Creek
1.09	Highway 469 between West Main Street & White Street in Florence	Indian Creek - Steen Creek
1.1	Highway 469 @ Steen Creek in Florence	Indian Creek - Steen Creek
1.11	Highway 49 Commercial Area in Richland	Lower Richland Creek
1.12	Bud Street in Richland	Lower Richland Creek
1.13	Jones Street @ Old Hwy 49 South in Richland	Lower Richland Creek
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Cany Creek - Pearl River
1.15	Linda Jo Drive @ Lowe Circle in Richland	Cany Creek - Pearl River
1.16	Lowe Circle @ Southwind Apartments in Richland	Lower Richland Creek
1.17	End of Lewis Street in Richland	Cany Creek - Pearl River
1.18	East Harper Street @ Short Street in Richland	Lower Richland Creek
1.19	Richland East Circle in Richland	Lower Richland Creek
1.2	Furr Dr @ Richland Circle in Richland	Lower Richland Creek
2.01	Mill Creek between Highway 25 & The Reservoir	Mill Creek - Pelahatchie Creek

Site Number	Site Name / Description	HUC 12
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Mill Creek - Pelahatchie Creek
2.03	Church Road @ Unnamed Tributary	Mill Creek - Pelahatchie Creek
2.04	Manship Road @ Amethyst Drive	Mill Creek - Pelahatchie Creek
2.05	Mill Creek under Lakeland	Mill Creek - Pelahatchie Creek
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	Mill Creek - Pelahatchie Creek
2.07	Oakgrove Subdivision	Brashear Creek - Pearl River
3.01	Tara Road @ Unnamed Tributary	Upper Richland Creek
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Lower Richland Creek
3.03	Thomasville Road @ Unnamed Tributary	Lower Richland Creek
3.04	Puckett Park off Highway 18 in Puckett	Brushy Creek - Clear Creek
3.05	Windchase Subdivision in Brandon	Upper Richland Creek
3.06	Belle Oak Subdivision in Brandon	Upper Richland Creek
3.07	Greenfield Road @ Unnamed Tributary in Pearl	Terrapin Skin Creek
3.08	Meadowland Drive @ East Government Street in Brandon	Upper Richland Creek
4.01	Jims Road @ Unnamed Tributary	Deer Creek - Fannegusha Creek
4.02	Weaver Road @ Unnamed Tributary	Red Cane Creek - Fannegusha Creek
4.03	Gore Road @ Purnell Creek	Deer Creek - Fannegusha Creek
4.04	Lewis Prestage Road @ Rollison Creek	Red Cane Creek - Fannegusha Creek
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Riley Creek - Pelahatchie Creek
4.06	Holly Bush Road between Sara Fox Drive & Rodeo Drive	Riley Creek - Pelahatchie Creek
4.07	Reservoir East Subdivision	Riley Creek - Pelahatchie Creek
4.08	Holly Bush Road @ Riley Creek	Riley Creek - Pelahatchie Creek
4.09	Oakdale Road north of Baker Lane	Riley Creek - Pelahatchie Creek
4.10	Andrew Chapel Road @ Bush Creek	Riley Creek - Pelahatchie Creek
4.11	Barker Road @ Dry Creek Tributary	Hollybush Creek - Clear Creek
4.12	Brush Creek in North Brandon Estates	Riley Creek - Pelahatchie Creek
4.13	Highway 80 @ Hwy 43 in Pelahatchie	Snake Creek - Pelahatchie Creek
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	Terrapin Skin Creek
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	Terrapin Skin Creek
4.16	Grimes Street & Mimosa Avenue in Pelahatchie	Ashlog Creek - Pelahatchie Creek
5.01	Vernon Jones Avenue west of Old Fannin Road	Hog Creek - Pearl River

Site Number	Site Name / Description	HUC 12
5.02	Flowood Drive south of Lakeland in Flowood	Hog Creek - Pearl River
5.03	Laurel Park Apartments in Flowood	Hog Creek - Pearl River
5.04	Fox Hall Road west of Highway 475 in Flowood	Town Creek - Pearl River
5.05	Neely Creek between Nancy and Skylane in Pearl	Town Creek - Pearl River
5.06	Chicot Court @ Hwy 80 in Pearl	Neely Creek - Conway Slough
5.07	Tony Street between Old Country Club & Boehle	Neely Creek - Conway Slough
5.08	Old Country Club Road @ Louisa Street in Pearl	Neely Creek - Conway Slough
5.09	Buckingham Subdivision	Mill Creek - Pelahatchie Creek

60 Sites in 17 Watersheds

In order to collect as much existing information as possible about each site, interviews were conducted with each Supervisor, the Rankin County Road Manager, and responsible parties in the Cities located in Rankin County. During these interviews the following information was requested for each site:

- Please describe the nature of the problem at this location.
- How long has this problem existed?
- Please provide the name, phone number, or other contact information for the person most familiar with this situation, for further interview.
- Have there been any previous investigative measures or studies performed that were intended to address this situation? If so, please provide the name and contact information of the responsible party.

This initial information was critical to the assessment. Field investigations were completed before identifying the deficiencies at each site. During the field investigations, engineers visited each site county and city officials had named as problem areas. The engineers walked around each site taking photographs and notes trying to identify problems that could be seen within each site. The extent of the investigation varied by site, depending upon the information provided by city and county officials beforehand, site access, and the ability to visually determine site deficiencies.

Following field investigation and proposed solutions for the sites were identified, Conceptual Opinions of Probable Cost (OPCs) were developed for each project. When developing these conceptual OPCs, the following approach was used:

- Each project was priced as if bid independently.
    - While economies of scale can be accomplished by combining projects, at this time it is unknown how those combinations might take place.
    - Any project performed by County Maintenance crews will likely have lower unit prices for items such as asphalt due to existing large quantity purchase

contracts. While projects are recommended to be completed by the County at this time, it is currently unknown which projects the County will be able to complete and at what time.

- As these are conceptual OPCs, unit prices were increased to accommodate additional items that might occur on a detailed bid form.
- The Engineering Costs (Design, Inspection, Construction, Testing, etc.) for each OPC were estimated to be fifteen percent of the total OPC.
- The cost of land acquisition (right-of-way and easement acquisition) was estimated on a price per acre based on comparable parcels on the market in September 2018. Comparables were pulled for each city/town and area in Rankin County. The location of each site was identified within the county and the comparables from that area were used to estimate the cost of land acquisition.
- Permitting costs were estimated based upon engineering and construction probable costs and the initial estimated size and scope of the project. Permitting costs estimated include estimated cost for wetland delineation and permitting, creation and upkeep of a stormwater pollution prevention plan (SWPPP), and a construction general permit if needed. The actual permitting cost may vary greatly if additional permits are required.
- Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) regulatory updates were estimated upon the location and complexity of each site. CLOMR and LOMR regulatory updates include the cost of fees and paperwork. The cost associated with the required hydraulic model for CLOMRs and LOMRs was not included in this cost and can vary greatly from site to site.
- Due to the conceptual nature of these OPCs, a thirty-five percent (average) contingency was added for each project.

Project sheets were created to help summarize each site. Each project sheets includes:

- Project number
- Project name
- Location Description
- Project Coordinates
- HUC12
- Project Type
- Number of residences or businesses benefitted
- Anticipated project benefits
- Implementation Period broken into analysis, design, permits, land acquisition, and implementation phases
- If it is located in a flood zone

- Conceptual OPC
- Location problems
- Recommended solutions

Following each Project Sheet is a map of the area and an in-depth conceptual opinion of probable cost.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.01
Project Name	Williams Road between Levy Lane and The North Road
Location Description	This site is located on Williams Road where a bridge crosses Butler Creek, just south of Levy Lane.
Project Coordinates	32°9'49.16"N, 90°5'7.76"W
HUC12	031800021002 Indian Creek-Steen Creek
Project Type	Dredging and clearing; storage
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced flooding of homes in the area Possible creation of retention/detention area
Implementation Period	Analysis: N/A Design: 3 months Permits: 12 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$601,000
Location Problems	The houses that back the north side Butler Creek to the west of Williams Road have constructed earthen levees between their houses and Butler Creek to try to protect themselves from flooding. This site floods frequently and was flooded as recently as February 2018, during a 10-year storm event. From the site assessment, it is easy to see that there is overbank flooding both upstream and downstream of the bridge on Williams Road. Butler Creek upstream of the bridge (east side) is well-defined and appears to be clear of excess sediment and vegetation. Downstream (west side) is also well-defined and clear of sediment and vegetation; however there is other debris present. Both upstream and downstream of the bridge appear to be a little shallow. The channel appears to be rectangular in nature with very little bank area for excess water. The opening under the bridge is also clear of sediment and vegetation. This site is located upstream of sites 1.06, 1.07, and 1.10 on Butler Creek. 
Recommended Solution	This site needs additional in-stream storage. It is recommended to deepen and widen the channel to provide this extra storage. Additionally, it is recommended to include this site into a watershed model to determine if additional offline storage is needed upstream or downstream of this site.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.01 - WILLIAMS RD BETWEEN LEVY LN AND THE NORTH RD	1.01.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.01 - Williams Rd between Levy Ln and The North Rd

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	1,000	$ 21.00	$ 21,000.00
Removal of Excess Sediment From Open Channel	LF	1,000	$ 20.00	$ 20,000.00
Removal of Debris from Open Channel	LF	750	$ 20.00	$ 15,000.00
Select Fill	CY	7,200	$ 30.00	$ 216,000.00
Riprap (200# size)	Ton	1,000	$ 60.00	$ 60,000.00
Erosion Control	LS	1	$ 2,000.00	$ 2,000.00
Seeding and Mulch	SF	30,000	$ 0.10	$ 3,000.00
			Estimated Construction Costs	$ 347,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 53,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 156,000.00
			Total Estimated Project Cost	**$ 601,000.00**

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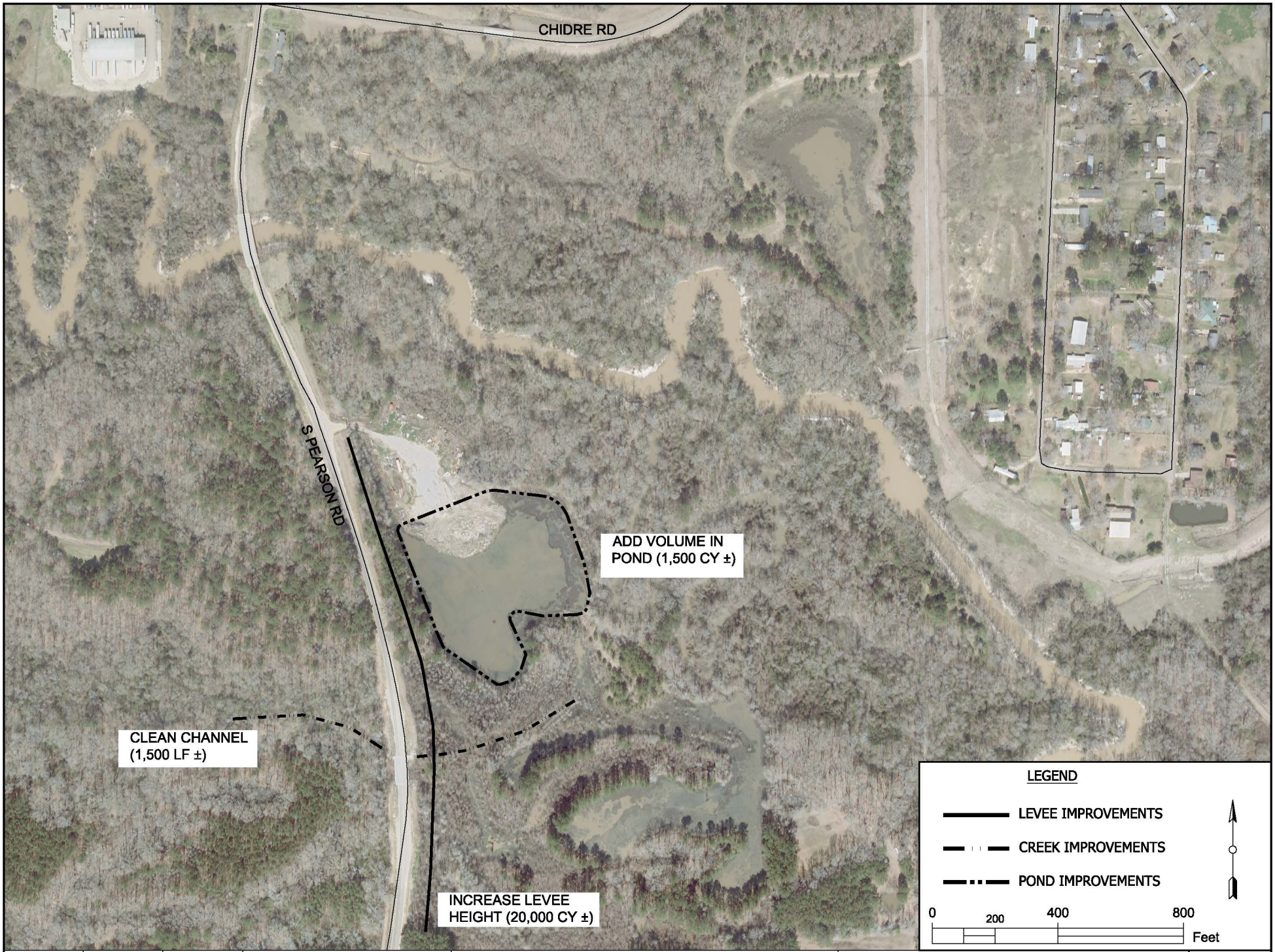
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.02
Project Name	Pearson Road at Unknown Tributary
Location Description	This site is located on Pearson Road, just south of St. Augustine at an unnamed tributary. There are two bridges – a 0.05 mile long bridge – adjacent to St. Augustine and a shorter bridge 0.5 miles south of St. Augustine. The bridge further south is the area with flooding problems.
Project Coordinates	32°14'37.53"N, 90°7'55.97"W
HUC12	031800020504 Lower Richland Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced flooding in the area and downstream Improved water quality downstream Reduced sedimentation
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 12 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$812,000
Location Problems	Pearson Road is elevated in this location. There is a bridge crossing the creek with two culverts, also under Pearson Road, just south of the bridge.  From field investigation, it appears as if the culverts allow water to flow west to east while water under the bridge runs east to west. Additionally, land on either side of Pearson Road in this area was wet with standing water. The culverts are partially silted in and have vegetation and debris blocking their entrances and exits preventing water from flowing through them. There are two ponds north of the tributary and east of Pearson Road that hold water. During large rain events, water enters the ponds and then flows out causing flooding over Pearson Road.
Recommended Solution	It is recommended to add storage volume to the pond. If additional storage is needed, it should be added to the tributary by widening the banks.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.02 - PEARSON ROAD @ UNKNOWN TRIBUTARY	1.02.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.02 - Pearson Road @ Unknown Tributary

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 15,000.00	$ 15,000.00
Clearing and Grubbing	AC	3	$ 10,000.00	$ 30,000.00
Removal of Excess Sediment From Open Channel	LF	1,500	$ 20.00	$ 30,000.00
Excess Excavation	CY	1,500	$ 15.00	$ 22,500.00
Select Fill	CY	20,000	$ 16.00	$ 320,000.00
Riprap (200# size)	Ton	1,000	$ 60.00	$ 60,000.00
Erosion Control	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 483,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 73,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contigency	$ 211,000.00
			Total Estimated Project Cost	**$ 812,000.00**

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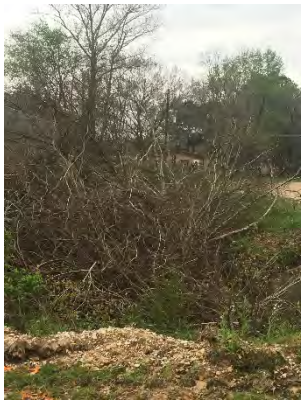
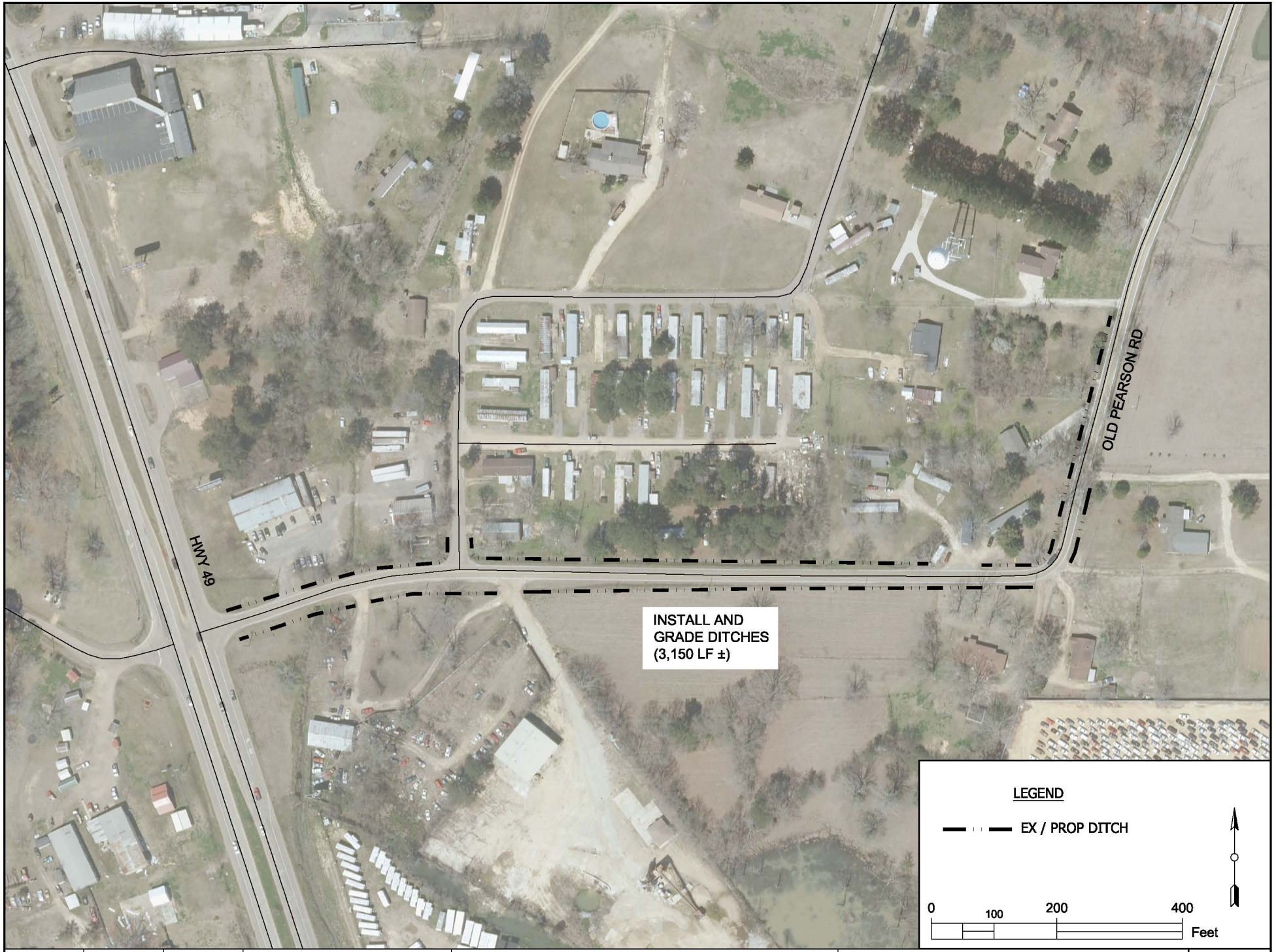
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.03
Project Name	Gunter Road at Indian Creek
Location Description	This site encompasses Shenandoah Subdivision and Indian Creek where it passes under Gunter Road.
Project Coordinates	32°10'52.22"N, 90°6'52.14"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Infrastructure improvements; Dredging and clearing
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Improved transportation access Reduced flooding in the area
Implementation Period	Study: N/A Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	- ongoing project -
Location Problems	During heavy rains, water builds up and overtops Shenandoah Road and Gunter Road. No houses have flooded as a result. Indian Creek is clear of vegetation and sediment both upstream and downstream of the bridge on Gunter Road. Additionally, the culverts into Indian Creek are clear of sediment, debris, and vegetation. In the first quarter of 2018, the ditches through Shenandoah Subdivision were cleaned out and new culverts were installed. Currently, Gunter Road is undergoing a widening project. With this widening project, changes will be made to Indian Creek including clearing, deepening, and widening the channel will occur. 
Recommended Solution	For this site, it is recommended to finish the Gunter Road widening project currently underway (2018). Upon completion of the project, monitor the area to observe for efficacy of the project in resolving flooding problems.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.03 - GUNTER RD AT INDIAN CREEK	1.03.01

RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.04
Project Name	Old Pearson Road east of Highway 49
Location Description	This site is located along both sides of Old Pearson Road, east of Highway 49 south.
Project Coordinates	32°11'18.36"N, 90°8'2.39"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Infrastructure improvements; Dredging and clearing
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Reduced flooding of the road Restore ditches to designed depth
Implementation Period	Study: N/A Design: 6 months Permits: 3 months Land Acquisition: 3 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$496,500
Location Problems	This area becomes inundated with water during large storm events. Frequently, the flooding over the road becomes so deep that the road must be closed. Field investigations revealed that there are no ditches or culverts on either side of Old Pearson Road around the curve east of Highway 49. On the west side of the curve of Old Pearson Road, there are ditches on the north and south side of the road; however, they are extremely overgrown and convey little, if any, water.   The ditches get larger as they progress west toward Highway 49. However, even though these ditches are larger – both wider and deeper – they are filled with vegetation and debris making it impossible for water to be conveyed through the ditch. There is clear evidence along Old Pearson Road where water runs over the road trying to enter the ditches on either side of the road. Over the years, water running over the road has degraded the road and in some places is beginning to erode the roadbed.
Recommended Solution	For this site, it is recommended to install ditches on both sides of Old Pearson Road to convey water; clean out the existing ditches; and check and correct the grade of the existing ditches to Highway 49.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.04 - OLD PEARSON RD AT BEND EAST OF HWY 49	1.04.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.04 - Old Pearson Rd at bend east of Hwy 49

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	3,150	$ 21.00	$ 66,150.00
Removal of Excess Sediment From Open Channel	LF	3,150	$ 20.00	$ 63,000.00
Removal of Debris from Open Channel	LF	2,000	$ 20.00	$ 40,000.00
RCP Drainage Pipe	LF	280	$ 75.00	$ 21,000.00
Grate Inlet	EA	2	$ 3,500.00	$ 7,000.00
Select Fill	CY	100	$ 30.00	$ 3,000.00
Asphalt Roadway Repair	SF	450	$ 50.00	$ 22,500.00
Gravel Roadway Repair	SF	950	$ 25.00	$ 23,750.00
Erosion Control	LS	1	$ 2,000.00	$ 2,000.00
Seeding and Mulch	SF	63,500	$ 0.50	$ 31,750.00
			Estimated Construction Costs	$ 291,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 44,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 129,000.00
			Total Estimated Project Cost	**$ 496,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.05
Project Name	Highway 49 at Highway 469 in Florence
Location Description	This site is located on Indian Creek where it crosses under Highway 49 just southeast of the intersection Highway 49 and Highway 469. Three creeks meet here before going under Highway 49.
Project Coordinates	32°9'15.87"N, 90°7'26.50"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 15 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$968,000
Location Problems	Three channels meet just southeast of the intersection of Highway 49 and Highway 469 before they traverse under Highway 49. Due to the configuration of the channels and the bridge on Highway 49, water backs up upstream of Highway 49. This is partially due to a large influx of water caused by the three creeks coming together, development upstream in the watershed, and the bridge opening size. Due to the fact that infrastructure and residents are south of the creek confluence, officials are concerned that increasing the bridge opening will cause flooding downstream. Currently, the Mississippi Department of Transportation is working to widen Highway 49. A no-rise analysis was performed during design meaning that flooding in the area should not become worse as a result of this project, but it will not be improved. As part of the widening project, the channel is being realigned. 
Recommended Solution	The recommendation for this site includes adding storage upstream of the confluence to reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.05 - HWY 49 AT HWY 469 IN FLORENCE	1.05.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.05 - Hwy 49 @ Hwy 469 in Florence

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 35,000.00	$ 175,000.00
High Priority Drainage Improvements	AC	200	$ 2,000.00	$ 400,000.00
			Estimated Construction Costs	$ 575,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 87,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 251,000.00
			Total Estimated Assessment Cost	**$ 968,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.06
Project Name	Williams Road at Butler Creek in Florence
Location Description	This site is located less than a half mile southeast of Florence High School on Williams Road on Butler Creek. At this site, Butler Creek crosses under a two lane bridge on Williams Road.
Project Coordinates	32°9'19.77"N, 90°6'24.86"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 15 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$1,248,000
Location Problems	 During large rains, flooding occurs over the road limiting access to Florence High School via Williams Road. Site investigation showed channel degradation both upstream and downstream of the bridge on Williams Road. There is bank cutting upstream of the bridge, close to bridge supports. Downstream of the bridge is noticeable bank cutting and sever erosion. In some cases, the erosion was bad enough to erode the entire bank around mature trees causing them to fall over and into the creek. In addition to bank cutting, the creek is severely silted upstream of the bridge. There is also vegetation and light debris along the channel, inhibiting flow. It is believed that the channel degradation and the flooding is due to excess water flowing through the channel during large storm events.
Recommended Solution	The recommendation for this site includes adding storage upstream in the watershed to reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE.

0 400 800 1600 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.06 - WILLIAMS RD AT BUTLER CREEK IN FLORENCE	1.06.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.06 - Williams Road @ Butler Creek in Florence

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 25,000.00	$ 125,000.00
High Priority Drainage Improvements	AC	420	$ 1,500.00	$ 630,000.00
Estimated Construction Costs				$ 755,000.00
H&H Technical Review				$ 10,000.00
Engineering Costs (Design, Inspection, Construction Testing, etc.)				$ 114,000.00
CLOMR and LOMR Regulatory Updates				$ 25,000.00
Permitting				$ 20,000.00
35% Contingency				$ 324,000.00
Total Estimated Assessment Cost				**$ 1,248,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.07
Project Name	Highway 49 Culvert at Butler Creek in Florence
Location Description	This site is located on Highway 49 south in Florence approximately 0.6 miles south of the intersection of Highway 49 and Highway 469. Butler Creek crosses under Highway 49 at this site.
Project Coordinates	32°9'6.74"N, 90°7'12.24"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 15 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$509,000
Location Problems	This area becomes inundated with water during storm events. Water does not cover the road, but site investigations show clear evidence of high water under the bridges on Highway 49 south. Just southwest of Highway 49, Butler Creek converges with Indian Creek and Steen Creek before continuing to the Pearl River. While this site does not pose problems to human health and safety, it is upstream and downstream of sites that do pose a threat to health and safety. 
Recommended Solution	The recommendation for this site includes adding storage upstream in the watershed to reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.07 - HWY 49 CULVERT AT BUTLER CREEK IN FLORENCE	1.07.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.07 - Hwy 49 culvert at Butler Creek in Florence

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 35,000.00	$ 175,000.00
Medium Priority Drainage Improvements	AC	105	$ 1,000.00	$ 105,000.00
			Estimated Construction Costs	$ 280,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 42,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 132,000.00
			Total Estimated Assessment Cost	**$ 509,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.08
Project Name	Highway 49 Culvert at Unnamed Creek in Florence
Location Description	This site is located on Highway 49 south in Florence approximately 0.95 miles south of the intersection of Highway 49 and Highway 469. An unnamed tributary of Steen Creek passes under Highway 49 through a double box culvert at this location.
Project Coordinates	32°9'0.08"N, 90°6'58.04"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Channel realignment and clearing; model development; storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Possible creation of retention/detention area Increased hydraulic efficiency
Implementation Period	Study: N/A Design: 6 months Permits: 12 months Land Acquisition: 9 months Implementation: 6 months
In flood zone?	Yes
Estimated Project Cost	$778,000
Location Problems	 This area becomes inundated with water during storm events. Water does not cover the road, but site investigations show clear evidence of high water under Highway 49 south. There is also evidence of creek degradation along the banks. Site investigation also revealed that there is vegetation, sediment, and debris along the channel both upstream and downstream of the culverts. One culvert under the highway has accumulated between 2 and 3 feet of sediment in it. The flow path appears to only utilize one half of the culvert. Just southwest of Highway 49, Butler Creek converges with Indian Creek and Steen Creek before continuing to the Pearl River. While this site does not pose problems to human health and safety, it is upstream and downstream of sites that do pose a threat to health and safety.
Recommended Solution	The recommendation for this site includes clearing the western side of the culvert of sediment and vegetation; reshaping the channel north of the culvert to force water flow to both sides of the culvert; and adding storage upstream in the watershed to reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.08 - HWY 49 CULVERT AT UNNAMED CREEK IN FLORENCE	1.08.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.08 - Hwy 49 culvert at unnamed creek in Florence

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 15,000.00	$ 15,000.00
Clearing and Grubbing	AC	1	$ 10,000.00	$ 10,000.00
Removal of Excess Sediment From Open Channel	LF	1,200	$ 40.00	$ 48,000.00
Erosion Control	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	5	$ 35,000.00	$ 175,000.00
Medium Priority Drainage Improvements	AC	200	$ 1,000.00	$ 200,000.00
			Estimated Construction Costs	$ 453,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 68,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 202,000.00
			Total Estimated Assessment Cost	**$ 778,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.09
Project Name	Highway 469 between West Main Street and White Street in Florence
Location Description	Located in Florence, this site stretches along Highway 469/North Church Street from Main Street to White Street.
Project Coordinates	32°9'7.44"N, 90°7'53.26"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Infrastructure improvements; model development; storage
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Reduced flooding in downtown Florence Possible creation of detention/retention area Improved water quality downstream
Implementation Period	Study: N/A Design: 6 months Permits: 6 months Land Acquisition: 12 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$836,500
Location Problems	During storm events, water quickly rises over North Church Street before receding quickly after the event is over. Site investigations revealed that between Main Street and Lewis Street there is no conveyance system for water to the Steen Creek tributary west of Church Street. South of Lewis Street to White street there are currently ditches and drop inlets with culverts allowing water conveyance to the tributary. This tributary crosses under Highway 469/Church Street just south of White Street. There is clear evidence downstream of the culvert of erosion – some of it severe. Previous projects have been implemented to try to prevent ongoing erosion. Evidence shows there is ongoing erosion in these areas. Some of the erosion on the east side of Highway 469/Church Street is close to the road bed and other infrastructure. This erosion indicates that water downstream of the culvert becomes backed up and very high. 
Recommended Solution	The recommendation for this site includes installing ditches between Lewis Street and Main Street as well as adding storage in the watershed to reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.09 - HWY 469 BETWEEN MAIN ST AND WHITE ST IN FLORENCE	1.09.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.09 - Hwy 469 between W Main St & White St in Florence

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
RCP Drainage Pipe	LF	500	$ 75.00	$ 37,500.00
Grate Inlet	EA	6	$ 3,500.00	$ 21,000.00
Diversion Channels	LF	1,150	$ 50.00	$ 57,500.00
Land Acquisition	AC	5	$ 25,000.00	$ 125,000.00
Medium Priority Drainage Improvements	AC	250	$ 1,000.00	$ 250,000.00
			Estimated Construction Costs	$ 501,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 76,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 217,000.00
			Total Estimated Assessment Cost	**$ 836,500.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.10
Project Name	Highway 469 at Steen Creek in Florence
Location Description	This site is located where Steen Creek crosses under Highway 469 south by the City of Florence's wastewater treatment facility.
Project Coordinates	32°8'21.35"N, 90°7'43.85"W
HUC12	031800021002 Indian Creek – Steen Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 15 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$1,356,000
Location Problems	 A very large bridge crosses Steen Creek on Highway 469 south in this location. The height and length of the bridge allows plenty of flow space for the creek below to grow out of its banks during heavy storm events. Right before crossing under the Highway, three creeks converge into Steen Creek to pass under Highway 469. Due to this, during large storm events, water in the three tributaries can back up causing flooding issues upstream. While increasing the conveyance area in the three tributaries and under the bridge will help with flooding upstream, it will lead to more flooding downstream.
Recommended Solution	The recommendation for this site includes adding storage in the watershed to help reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.10 - HWY 469 AT STONE CREEK IN FLORENCE	1.10.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 1.10 - Hwy 469 at Stone Creek in Florence

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 25,000.00	$ 125,000.00
Medium Priority Drainage Improvements	AC	700	$ 1,000.00	$ 700,000.00
			Estimated Construction Costs	$ 825,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 124,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 352,000.00
			Total Estimated Assessment Cost	**$ 1,356,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.11
Project Name	Highway 49 Commercial Area in Richland
Location Description	This site covers a commercial area in Richland along the east side of Highway 49 where Squirrel Branch crosses under Highway 49. Companies affected by flooding include Lyle Machinery, Bobcat, ADT Tire Company, and Utility Trailers.
Project Coordinates	32°14'42.65"N, 90°9'48.44"W
HUC12	03180002050 Lower Richland Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 18 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$1,240,000
Location Problems	During storm events, water in Squirrel Branch rises quickly and floods multiple companies in the area. After the storm subsides, the water recedes back within the banks of Squirrel Branch within a few hours. Site investigations revealed a channel that was deep and wide with water flowing through it at a quick velocity. It is easy to see that there is vegetation within the channel but it does not appear to be enough to severely restrict flow. Businesses are located on either side of Squirrel Branch, so adding additional storage by widening the banks is not an option in this instance.  At this site, it appears as if the problem is not localized but is more a watershed problem caused by a lack of storage to slow down and hold water when needed.
Recommended Solution	The recommendation for this site includes adding storage in the watershed to help reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE.

0 150 300 600 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.11 - HWY 49 COMMERCIAL AREA IN RICHLAND	1.11.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost of Lower Richland Creek — Nov. 2018

Site 1.11 - Hwy 49 Commercial Area in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
High Priority Drainage Improvements	AC	350	$ 2,000.00	$ 700,000.00
			Estimated Construction Costs	$ 750,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 113,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 322,000.00
			Total Estimated Assessment Cost	**$ 1,240,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.12
Project Name	Bud Street in Richland
Location Description	This site is located along Bud Street in Richland, west of Highway 49. The main problems with this site occur at the 90 degree curve in Bud Street and north to where the road dead ends.
Project Coordinates	32°14'0.30"N, 90°9'53.61"W
HUC12	03180002050 Lower Richland Creek
Project Type	Dredging and clearing; Infrastructure improvements; Storage
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced flooding in the area Improved environmental quality due to reduction in stagnant water Possible creation of retention/detention area
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 3 months Implementation: 6 months
In flood zone?	Yes
Estimated Project Cost	$262,000
Location Problems	 Flooding occurs at the end of Bud Street following rain events. To date, no houses have flooded, but yards flood and water gets close to flooding houses. The ditches along Bud Street are narrow and shallow. As Bud Street progresses away from Highway 49, the ditches open up to become deeper and wider until the ditch on the east side of Bud Street meets a tributary of Squirrel Branch before it crosses under Highway 49. Field investigations revealed that water was standing in the ditches and the tributary with no sign of movement. There is very little to no overflow area along the ditches and creek. Additionally, there does not appear to be a way for water from the western ditch to either enter the eastern ditch or the tributary, leading to problems.
Recommended Solution	Recommendations for this site include adding storage in the watershed; checking and correcting the grade on the current ditches along Bud Street; and adding piping or ditches to allow water from the western ditch to enter the tributary.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.12 - BUD ST IN RICHLAND	1.12.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.12- Bud St in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 20,000.00
Ditch Clearing & Snagging	LF	1,150	$ 25.00	$ 28,750.00
Widen Ditch	LF	1,150	$ 40.00	$ 46,000.00
Erosion Control Mat	SF	3,500	$ 10.00	$ 35,000.00
Excess Excavation	CY	400	$ 15.00	$ 6,000.00
Corrugated Polyethylene Pipe	LF	100	$ 100.00	$ 10,000.00
Errosion Control	LS	1	$ 3,000.00	$ 3,000.00
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
Low Priority Drainage Improvements	AC	50	$ 500.00	$ 25,000.00
			Estimated Construction Costs	$ 129,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 20,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 68,000.00
			Total Estimated Assessment Cost	**$ 262,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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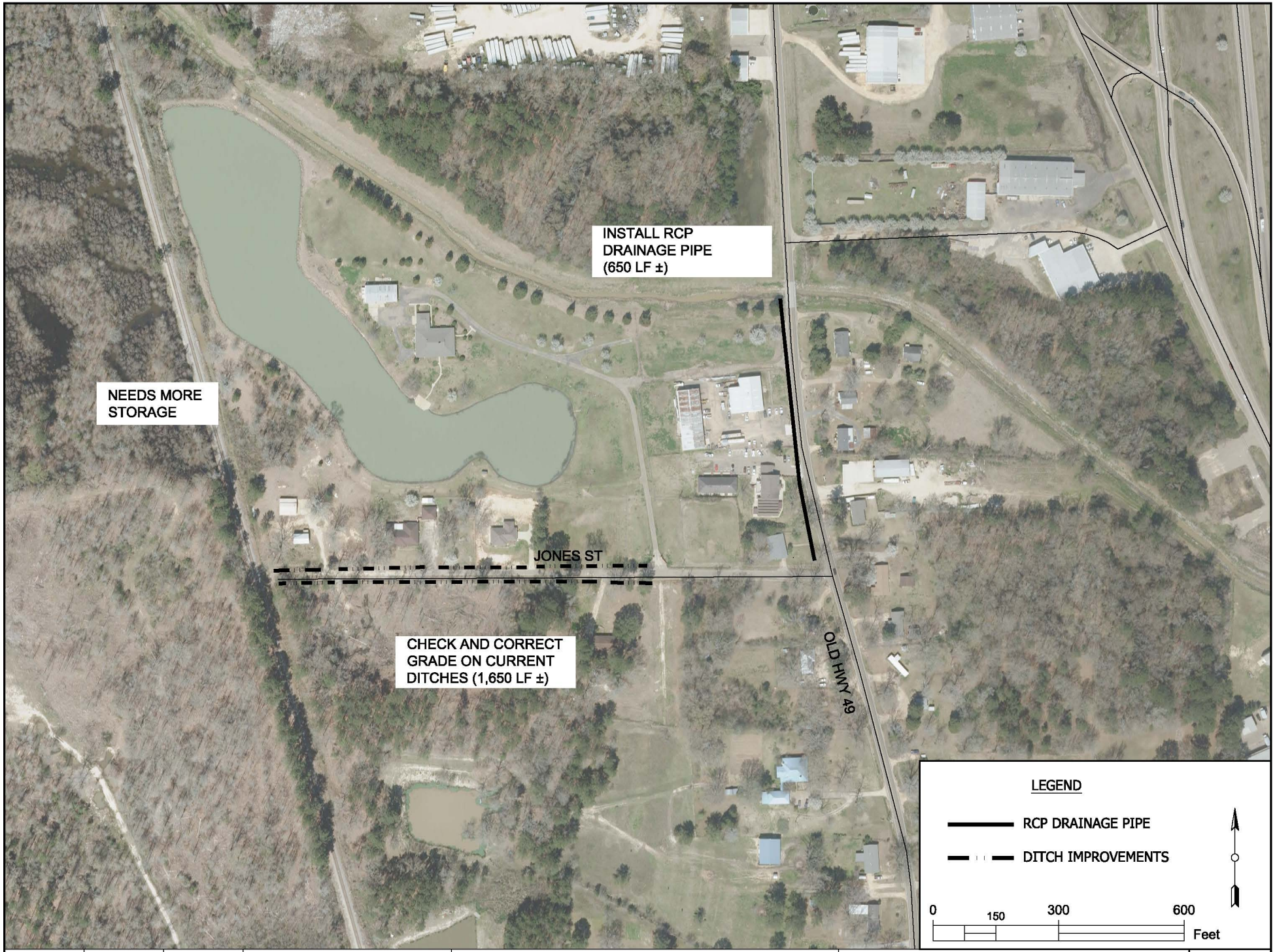
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.13
Project Name	Jones Street at Old Highway 49 South in Richland
Location Description	This site is located along both sides of Jones Street from where it intersects Old Highway 49 until it dead ends, 0.25 miles to the west.
Project Coordinates	32°14'9.61"N, 90°10'5.00"W
HUC12	03180002050 Lower Richland Creek
Project Type	Infrastructure improvements
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced flooding in the area Improved environmental quality due to reduction in stagnant water Possible creation of retention/detention areas
Implementation Period	Study: N/A Design: 6 months Permits: 12 months Land Acquisition: 3 months Implementation: 9 months
In flood zone?	Yes
Estimated Project Cost	$324,000
Location Problems	This area floods when Richland Creek gets high. The flooding in the area is quick. The flooding recedes within hours of the storm event ceasing. The elevation of Jones Street is lower than Old Highway 49 in this area. There are well-defined ditches on both the north and south side of Jones Street. Field investigation revealed standing, stagnant water in the ditches on both sides of the street. It appears as if there is little to no grading along the channel bottom the length of Jones Street causing standing water. This would also make it difficult for water to drain during storm events. 
Recommended Solution	Recommendations for this site include adding storage in the watershed; and checking and correcting the grade on the current ditches along Jones Street.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.13 - JONES ST AT OLD HWY 49 IN RICHLAND	1.13.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.13 - Jones St @ Old Hwy 49 S in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
RCP Drainage Pipe	LF	650	$ 75.00	$ 48,750.00
Grate Inlet	EA	6	$ 3,500.00	$ 21,000.00
Select Fill	CY	100	$ 30.00	$ 3,000.00
Grade Ditches	LF	1,650	$ 25.00	$ 41,250.00
Asphalt Repair	LF	500	$ 85.00	$ 42,500.00
Concrete Repair	LF	100	$ 50.00	$ 5,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
Low Priority Drainage Improvements	AC	50	$ 500.00	$ 25,000.00
			Estimated Construction Costs	$ 169,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 26,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 84,000.00
			Total Estimated Assessment Cost	**$ 324,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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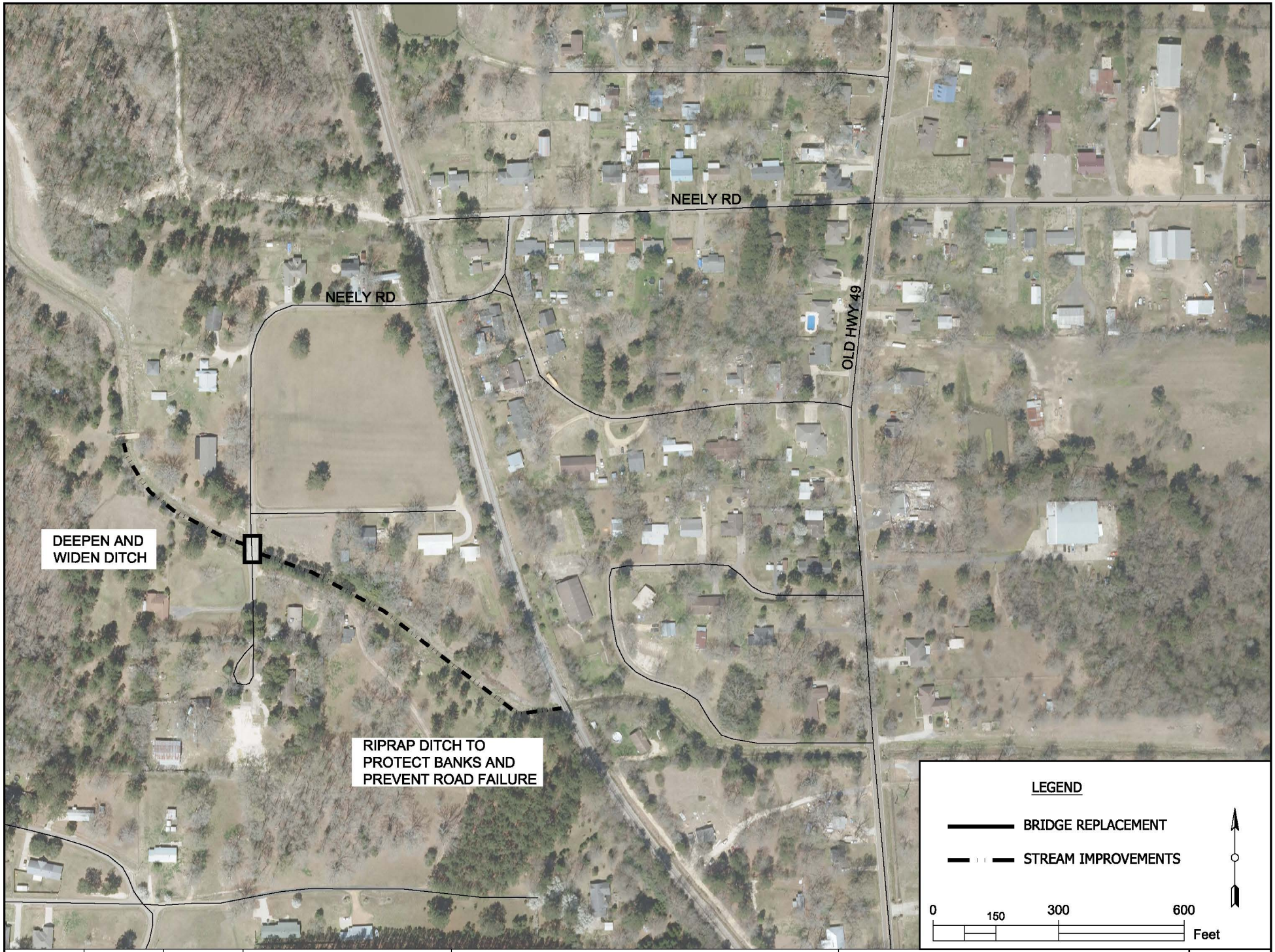
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.14
Project Name	Neely Road at Unnamed Pearl Tributary in Richland
Location Description	This site is located on Neely Road just south of Beck Road where a single span bridge crosses a tributary of the Pearl River.
Project Coordinates	32°13'46.80"N, 90°10'20.15"W
HUC12	031800020607 Cany Creek – Pearl River
Project Type	Bank stabilization; Dredging and clearing
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced sedimentation Improved water quality downstream Restore channel to natural depth
Implementation Period	Study: N/a Design: 3 months Permits: 12 months Land Acquisition: 9 months Implementation: 6 months
In flood zone?	Yes
Estimated Project Cost	$846,000
Location Problems	 During storm events, the road and bridge floods blocking emergency entrance and egress from the end of Neely Road. To date, no houses have gotten stormwater in them. The County mentioned that when the railroad trestle is cleaned, the railroad company leaves the debris in the creek causing problems during storm events. Field investigation of this area shows very serious channel degradation upstream and downstream of the bridge. Vegetation in the channel makes it difficult to determine the extent of the degradation. On the northeast side of the channel, there is serious degradation close to a culvert that needs to be remedied before infrastructure is lost. Additionally, there is evidence of roadbed degradation on the north side of the bridge where it meets the road. Finally, there is evidence of flooding on both the east and west side of the railroad tracks in the area.
Recommended Solution	The recommended solutions for this site include cleaning, deepening and widening the channel to add in-stream storage, and to riprap the ditch to protect the bank and prevent road failures. Additionally, current erosion problems should be addressed to ensure existing infrastructure is not lost.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.14 - NEELY RD AT UNNAMED PEARL TRIBUTARY IN RICHLAND	1.14.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.14 - Neely Rd @ Unnamed Pearl Tributary in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	750	$ 21.00	$ 15,750.00
Removal of Bridge	LS	1	$ 50,000.00	$ 50,000.00
Pre-cast Concrete Slab Simple Span	LS	1	$ 300,000.00	$ 300,000.00
Select Fill	CY	100	$ 30.00	$ 3,000.00
Asphalt Repair	LF	120	$ 50.00	$ 6,000.00
Concrete Repair	LF	40	$ 50.00	$ 2,000.00
Removal of Excess Sediment / Debris From Open Channel	LF	1,250	$ 30.00	$ 37,500.00
Excess Excavation	CY	5,000	$ 15.00	$ 75,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 505,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 76,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 220,000.00
			Total Estimated Project Cost	**$ 846,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.15
Project Name	Linda Jo Drive at Lowe Circle in Richland
Location Description	This site is located along Lowe Circle, east of Highway 49 to Linda Jo Drive.
Project Coordinates	32°13'42.12"N, 90°9'30.26"W
HUC12	031800020607 Cany Creek – Pearl River
Project Type	Dredging and clearing; Infrastructure improvements
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced flooding in the area Increased local stormwater storage Improved hydraulic efficiency
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 12 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$1,406,000
Location Problems	During large rain events, water gets close to overtopping Lowe Circle. To date, water has never overtopped Lowe Circle, Highway 49, or Linda Jo Drive in this area. From field investigations it can be seen that the ditches on the north and south side of Lowe Circle have excess vegetation in them that may prohibit some flow. Additionally, the culvert under Highway 49 appears to be one to two feet too high to adequately convey water from Lowe Circle under Highway 49 to a tributary of the Pearl River. This would cause water to build up in the ditch during periods of no stormwater flow reducing the capacity of the system during storm events.  The Mississippi Department of Transportation is aware of this issue and has been working with the County to come to a resolution.
Recommended Solution	Recommendations for this site include cleaning the ditches of sediment and vegetation and lowering the culverts under Highway 49.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.15 - LINDA JO DR AT LOWE CIRCLE IN RICHLAND	1.15.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.15 - Linda Jo Dr at Lowe Circle in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
RCP Pipe	LF	140	$ 65.00	$ 9,100.00
Precast Box Culvert	LF	375	$ 2,000.00	$ 750,000.00
Grate Inlet	EA	6	$ 3,500.00	$ 21,000.00
Widen Ditch	LF	400	$ 30.00	$ 12,000.00
Grade Ditches	LF	400	$ 30.00	$ 12,000.00
Asphalt Repair	LF	500	$ 85.00	$ 42,500.00
Concrete Repair	LF	80	$ 50.00	$ 4,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 866,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 130,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 365,000.00
			Total Estimated Project Cost	**$ 1,406,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.16
Project Name	Lowe Circle at Southwind Apartments in Richland
Location Description	This site is located at Southwind Apartments off of Lowe Circle, just west of Squirrel Branch.
Project Coordinates	32°13'42.03"N, 90°9'14.02"W
HUC12	03180002050 Lower Richland Creek
Project Type	Infrastructure improvements
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Reduced localized flooding Improved hydraulic efficiency
Implementation Period	Study: N/A Design: 3 months Permits: 3 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$118,500
Location Problems	 During large storm events, water inundates the entrance to Southwind Apartments off of Lowe Circle. The water depth can reach a couple of inches, but water has never gotten into any apartments. From filed investigations, it appears as if the drop inlets and the pipes in the apartment complex have standing water in them. Additionally, the culvert under the Southwind Apartment driveway appears to be too small to accommodate the water volume necessary to efficiently move water to Squirrel Branch less than 0.1 miles east. Additionally, the driveway is a low spot and other than the drop inlets and pipe, has no other conveyance system. Water has built up in a low lying area next to the driveway with no way to flow to Squirrel Branch or enter the drop inlet. During a site visit in March 2018, contractors were observed digging trenches along the driveway. These could be for stormwater management or for utilities.
Recommended Solution	Recommendations for this site include cleaning out the piping and inlet structures and installing a properly sized culvert under the Southwind Apartments driveway.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.16 - LOWE CIRCLE AT SOUTHWIND APARTMENTS IN RICHLAND	1.16.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.16 - Lowe Circle @ Southwind Apartments

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 5,000.00
Ditch Clearing & Grubbing	CY	150	$ 125.00	$ 18,750.00
Concrete Arch Pipe, Class A III	LF	250	$ 90.00	$ 22,500.00
Concrete Arch Pipe End Section	EA	3	$ 1,500.00	$ 4,500.00
Concrete Driveway Repair	SY	45	$ 60.00	$ 2,700.00
Select Fill	CY	100	$ 20.00	$ 2,000.00
Geotextile Fabric	SY	400	$ 1.50	$ 600.00
Crushed Limestone	CY	6	$ 150.00	$ 900.00
Riprap (200# size)	Ton	115	$ 60.00	$ 6,900.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 69,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 11,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 31,000.00
			Total Estimated Project Cost	**$ 118,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.17
Project Name	End of Lewis Street in Richland
Location Description	This site is located at the west end of Lewis Street west of Old Highway 49 where the street dead ends.
Project Coordinates	32°13'18.89"N, 90°10'19.36"W
HUC12	031800020607 Cany Creek – Pearl River
Project Type	Dredging and clearing
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced localized flooding Improved environmental conditions due to reduction in stagnant water Improved hydraulic efficiency
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 6 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$518,500
Location Problems	During heavy rains, water inundates yards along Lewis Street. Field investigations revealed standing, stagnant water in ditches along Lewis Street from Old Highway 49 to the dead end. At the end of Lewis Street, there appears to be a small creek for WHICHthe ditches to drain to. The ditches along Lewis Street appear to be very shallow and filled with vegetation, impeding water flow. Additionally, the ditches are at or slightly below the grade of the yards. 
Recommended Solution	For this site, recommendations include cleaning, deepening, and widening the ditches along Lewis Street. During this work, the grade of the ditches needs to be checked and corrected to allow water to flow out of the ditch after storm events pass.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.17 - END OF LEWIS ST IN RICHLAND	1.17.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.17 - End of Lewis St in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Remove Bridge	LS	1	$ 50,000.00	$ 50,000.00
Pre-cast Concrete Slab Simple Span	LS	1	$ 200,000.00	$ 200,000.00
Select Fill	CY	150	$ 30.00	$ 4,500.00
Asphalt Repair	LF	40	$ 85.00	$ 3,400.00
Grade Ditches	LF	1,250	$ 25.00	$ 31,250.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 305,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 46,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 135,000.00
			Total Estimated Project Cost	**$ 518,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.18
Project Name	East Harper Street at Short Street in Richland
Location Description	This site is located where East Harper Street meets Short Street to Pearson Road.
Project Coordinates	32°13'25.54"N, 90°8'28.52"W
HUC12	03180002050 Lower Richland Creek
Project Type	Dredging and clearing; Infrastructure improvements; Model development; Storage
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced localized flooding Possible creation of retention/detention area
Implementation Period	Study: N/A Design: 6 months Permits: 3 months Land Acquisition: 3 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$740,500
Location Problems	During heavy rains, water floods yards but does not enter houses. Site investigation revealed that ditches and culverts are lacking in this area. Where there are ditches and/or culverts, they are severely overgrown to the point of not being usable. 
Recommended Solution	It is recommended to clean out and/or add ditches along this section of road. It is also recommended to model this area to ensure additional storage is not needed to resolve the flooding issues in this area.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.18 - E HARPER ST AT SHORT ST IN RICHLAND	1.18.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.18 - E Harper St @ Short St in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Ditching	LF	5,600	$ 25.00	$ 140,000.00
Reinforced Concrete Pipe	LF	1,000	$ 55.00	$ 55,000.00
Grate Inlet	EA	6	$ 3,500.00	$ 21,000.00
Reinforced Concrete End Section	EA	20	$ 1,500.00	$ 30,000.00
Driveway Repair	SY	100	$ 60.00	$ 6,000.00
Geotextile Fabric	SY	1,500	$ 1.50	$ 2,250.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
Medium Priority Drainage Improvements	AC	150	$ 1,000.00	$ 150,000.00
			Estimated Construction Costs	$ 470,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 71,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 192,000.00
			Total Estimated Project Cost	**$ 740,500.00**

NOTE:
H&H analyses are included in the Watershed costs.

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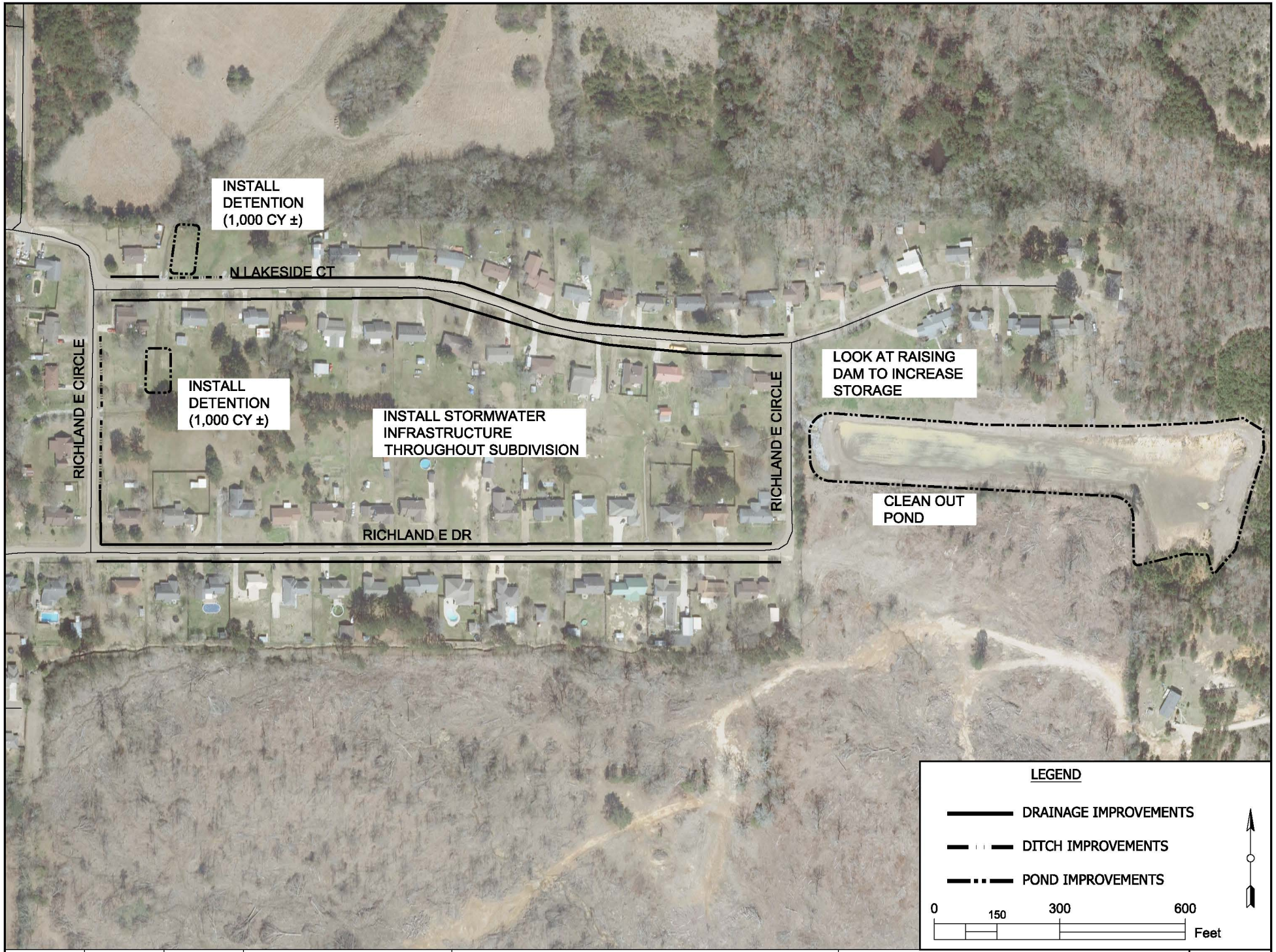
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.19
Project Name	Richland East Circle in Richland
Location Description	This site is located on Richland East Circle south of Harper. The site encompasses all of Richland East Circle.
Project Coordinates	32°13'11.97"N, 90°8'26.96"W
HUC12	03180002050 Lower Richland Creek
Project Type	Storage; Infrastructure improvements
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced localized flooding Addition of local storage Improved stormwater infrastructure
Implementation Period	Study: N/A Design: 9 months Permits: 6 months Land Acquisition: 12 months Implementation: 9 months
In flood zone?	No
Estimated Project Cost	$1,114,500
Location Problems	There are two tributaries of Squirrel Branch that run through Richland East. During storm events, this area floods but no water has inundated houses yet. Throughout the subdivision, ditches along the road vary in size from no ditches at all – with no evidence of curb and gutter systems – to up to 4 feet deep. Other areas of the subdivision have curb and gutter systems in good repair. The ditches that do exist appear to be vegetated and have standing water in them. There is a retention pond on the southeast corner of North Lakeside Circle and Richland East Circle. During a site visit in late March 2018, the pond was dry but does not appear to be very deep. 
Recommended Solution	There are two main recommendations for this site. They include dredging the retention pond to allow it to hold water when needed. Additionally, stormwater infrastructure – in the form of ditches, piping, and/or curb and gutter systems – needs to be installed throughout the subdivision. Existing infrastructure needs to be cleaned out.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.19 - RICHLAND EAST CIRCLE IN RICHLAND	1.19.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.19 - Richland East Circle in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	1,300	$ 20.00	$ 26,000.00
RCP Drainage Pipe	LF	6,500	$ 75.00	$ 487,500.00
Grate Inlet	EA	25	$ 3,500.00	$ 87,500.00
Driveway Repair	SY	150	$ 75.00	$ 11,250.00
Ditching	LF	500	$ 25.00	$ 12,500.00
Excess Excavation	CY	2,000	$ 10.00	$ 20,000.00
Geotextile Fabric	SY	2,000	$ 3.00	$ 6,000.00
Retaining Wall System, Modular Block	SF	1,000	$ 40.00	$ 40,000.00
Seeding and Mulch	LS	1	$ 10,000.00	$ 10,000.00
			Estimated Construction Costs	$ 711,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 107,000.00
			Permitting	$ 7,500.00
			35% Contigency	$ 289,000.00
			Total Estimated Project Cost	**$ 1,114,500.00**

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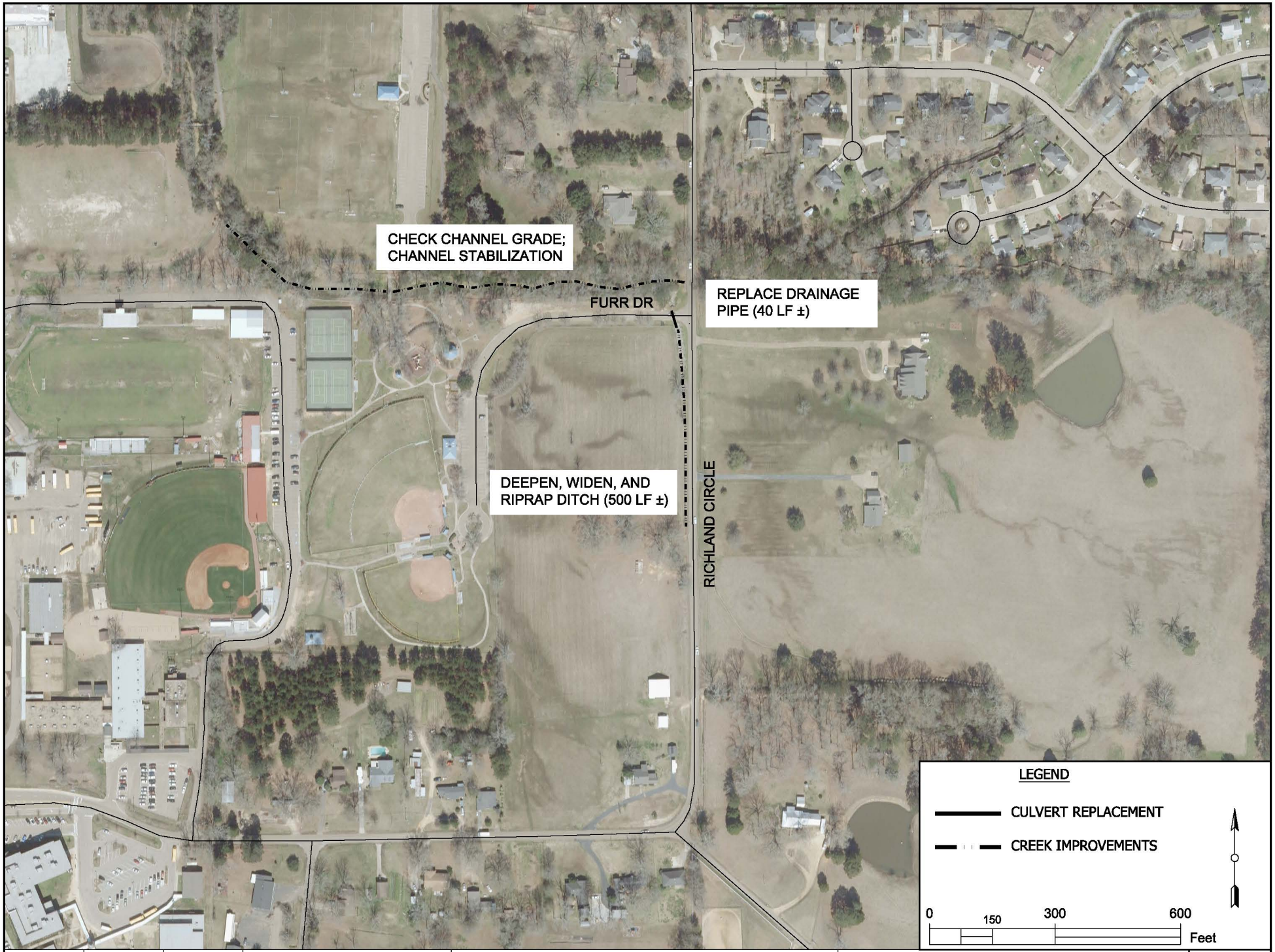
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	1.20
Project Name	Furr Drive at Richland Circle in Richland
Location Description	This site is located at the Richland East Side Park where Squirrel Branch crosses under Richland Circle.
Project Coordinates	32°13'2.48"N, 90°8'45.07"W
HUC12	03180002050 Lower Richland Creek
Project Type	Dredging and clearing; Infrastructure improvements; Bank stabilization
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced localized flooding Improved stormwater infrastructure Reduced sedimentation Improved water quality downstream
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$531,500
Location Problems	During very heavy storm events, water inundates the road in multiple places. The ditches on the north and south side of Richland Circle are narrow and shallow. There is evidence along Squirrel Branch and the ditches into Squirrel Branch of severe degradation. Some of this has been dealt with previously using riprap. The large box culvert under Richland Circle appears to be in good shape and clear of sediment, debris, and vegetation upstream. Downstream, part of the box culvert is silted in, restricting flow. In this area, Squirrel Branch is very deep and narrow, carrying large quantities of water when necessary. 
Recommended Solution	Recommendations for this site include deepening and widening the ditches entering Squirrel Branch to allow them to convey more water to the creek. This would also require replacing the existing culverts. Within the ditches and Squirrel Branch, channel stabilization needs to be added.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 1.20 - FURR DRIVE AT RICHLAND CIRCLE IN RICHLAND	1.20.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 1.20 -Furr Dr @ Richland Circle in Richland

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Ditch Clearing & Grubbing	LF	500	$ 30.00	$ 15,000.00
Concrete Arch Pipe, Class A III	LF	40	$ 200.00	$ 8,000.00
Concrete Arch Pipe End Section	EA	2	$ 3,000.00	$ 6,000.00
Asphalt Repair	SY	40	$ 60.00	$ 2,400.00
Excess Excavation	CY	200	$ 20.00	$ 4,000.00
Riprap (200# size)	Ton	4,000	$ 60.00	$ 240,000.00
Geotextile Fabric	SY	2,500	$ 1.50	$ 3,750.00
Erosion Control Mat	CF	4,000	$ 10.00	$ 40,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 335,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 51,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 138,000.00
			Total Estimated Project Cost	**$ 531,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.01
Project Name	Mill Creek between Highway 25 and The Reservoir
Location Description	This site is located along Mill Creek from Highway 25/Lakeland Drive north 1.25 miles to the Ross Barnett Reservoir at Spillway Road.
Project Coordinates	32°22'0.16"N, 90°0'25.21"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Model development; Infrastructure improvements; bank stabilization
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area Reduced sedimentation
Implementation Period	Study: 18 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$2,753,000
Location Problems	During the April 2017 flood event, water inundated multiple roads in the subdivisions surrounding Mill Creek. In addition to flooding roads, multiple houses in the Mill Creek Subdivision were flooded in April 2017. During the April 2017 flood, water backed up from the Reservoir through a shallow channel/ditch running along the south side of the Mill Creek subdivision and the north side of Highway 25. This water then took the path of least resistance and flowed through the Mill Creek Subdivision flooding roads and homes.  Field investigations revealed channel degradation in multiple places along Mill Creek leading to suspicion of rapidly moving water in the recent past. The creek itself appears to be in good condition, other than degradation. Current work is going on in the subdivision to evaluate the drainage system and implement solutions to any problems found.
Recommended Solution	Due to this site's proximity to the Ross Barnett Reservoir, Mill Creek tends to back up during large storm events which can cause flooding. Recommendations for this site include adding storage in the watershed in the form of detention/retention ponds. To determine the best location for storage and the volume needed, a hydraulic model is recommended. Additionally, current erosion problems should be addressed. Additional recommendations include completing the existing Mill Creek Subdivision stormwater infrastructure project and placing erosion control along the creek downstream of Lakeland Drive.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE.

0 500 1000 2000 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.01 - MILL CREEK BETWEEN HWY 25 AND THE RESERVOIR	2.01.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost of Mill Creek - Pelahatchie Creek Model Nov. 2018

Site 2.01 -Mill Creek between Hwy 25 & The Reservoir

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 65,000.00	$ 325,000.00
High Priority Drainage Improvements	AC	700	$ 2,000.00	$ 1,400,000.00
			Estimated Construction Costs	$ 1,725,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 259,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 714,000.00
			Total Estimated Assessment Cost	**$ 2,753,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.02
Project Name	Pinebrook Subdivision between Farmington Circle & Spillway
Location Description	This site encompasses Pinebrook Subdivision which is located east of Hugh Ward Boulevard.
Project Coordinates	32°22'10.89"N, 90°1'59.24"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Infrastructure improvements; Dredging and clearing
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding in the subdivision Improved hydraulic efficiency Reduced sedimentation Improved water quality downstream
Implementation Period	Study: N/A Design: 9 months Permits: 12 months Land Acquisition: 12 months Implementation: 9 months
In flood zone?	Yes
Estimated Project Cost	$1,965,000
Location Problems	 During rain events, water inundates the roads in Pinebrook Subdivision, severely limiting access to the subdivision. During storm events, water appears to back up through the curb and gutter system and does not appear to be a result of the creek running through the subdivision getting out of its banks. Field investigations showed a very large creek running through the subdivision. The creek has evidence of aggradation and has vegetation and debris blocking part of the channel. The investigation also revealed that the exit points of the pipes draining the subdivision through the curb and gutter system are partially silted in and appear to be much lower than the entry point on the roads.
Recommended Solution	Recommendations for this site include adding in-stream storage through deepening and widening the stream; cleaning the stream of sediment, vegetation, and debris; and checking and correcting the grade of the curb and gutter system.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.02 - PINEBROOK SUBDIVISION BETWEEN FARMINGTON CIRCLE AND SPILLWAY	2.02.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 2.02 - Pinebrook Subdivision between Farmington Circle & Spillway

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	5	$ 12,000.00	$ 60,000.00
Removal of Excess Veget. From Open Channel	LF	4,300	$ 21.00	$ 90,300.00
Removal of Excess Sediment From Open Channel	LF	4,300	$ 20.00	$ 86,000.00
Removal of Debris from Open Channel	LF	4,300	$ 20.00	$ 86,000.00
Excess Excavation	CY	1,500	$ 10.00	$ 15,000.00
Geotextile Fabric	SY	6,000	$ 3.00	$ 18,000.00
Riprap (200# size)	Ton	6,000	$ 60.00	$ 360,000.00
Retaining Wall System, Modular Block	SF	2,000	$ 40.00	$ 80,000.00
High Priority Drainage Improvements	AC	200	$ 2,000.00	$ 400,000.00
Seeding and Mulch	LS	1	$ 10,000.00	$ 10,000.00
			Estimated Construction Costs	$ 1,226,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 184,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contigency	$ 510,000.00
			Total Estimated Project Cost	**$ 1,965,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.03
Project Name	Church Road at Unnamed Tributary
Location Description	This site is located approximately 0.30 miles east of Flowers Lane where an unnamed tributary of the Ross Barnett Reservoir crosses under Church Road.
Project Coordinates	32°24'42.73"N, 89°59'8.79"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Dredging and clearing; Ordinance development; model development; storage
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Increased hydraulic efficiency Reduced likelihood of future flooding issues
Implementation Period	Study: N/A Design: 3 months Permits: 3 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$1,336,500
Location Problems	 Currently, during large storm events, water overtops Church Road at the stream crossing which is a low-lying area of the road. Currently, the water over the road does not get deep enough to require closing the road. There are developers in the area working on finalizing plans to add a subdivision north of Church Road that would accommodate over 300 homes within the next decade. When this subdivision gets built, it will increase the runoff into the creek which will affect the road flooding in this area. Field investigations of the creek revealed a narrow and shallow creek with a much larger bank area for flooding. The banks of the thalweg are steep and lined with vegetation on the top. In the first quarter of 2018, new culverts were installed beneath Church Road.
Recommended Solution	It is recommended to clean the current channel and widen the thalweg to increase in-stream storage. In the future, stringent development ordinances will need to be enforced for the new development to prevent future problems. Additionally, the area needs to be modeled before development to determine how much and where storage needs to be added within the watershed.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.03 - CHURCH RD AT UNNAMED TRIBUTARY	2.03.01

Rankin County Drainage Plan

Conceptual Opinion of Probable Cost — Nov. 2018

Site 2.03 - Church Rd @ Unnamed Tributary

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Sediment From Open Channel	LF	4,000	$ 20.00	$ 80,000.00
Excess Excavation	CY	4,000	$ 15.00	$ 60,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	5	$ 65,000.00	$ 325,000.00
Low Priority Drainage Improvements	AC	750	$ 500.00	$ 375,000.00
			Estimated Construction Costs	$ 845,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 127,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 347,000.00
			Total Estimated Assessment Cost	**$ 1,336,500.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.04
Project Name	Manship Road at Amethyst Drive in Flowood
Location Description	This site is located on either side of Manship Road between Amethyst Drive and Amethyst Lane.
Project Coordinates	32°21'48.44"N, 90°1'9.61"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Dredging and clearing
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Improved hydraulic efficiency Improved water quality downstream
Implementation Period	Study: N/A Design: 3 months Permits: 3 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$211,500
Location Problems	During rain events, the area on the north side of Manship Road is inundated with water. The houses in the area and the road do not flood. During field investigations, the land owner spoke with engineers regarding the situation. The landowner stated that the power lines north of Manship Road were cleared and the vegetation debris was left, impeding water flow. Additionally, the heavy equipment filled in the ditches on the north side of the road. The engineers' observation verified these comments and also noticed that the culverts under Manship Road were full of sediment and debris. 
Recommended Solution	The recommended solution for this site includes reestablishing the ditches on the north side of Manship Road and ensuring the culverts under Manship Road are cleared of sediment and debris to allow water to flow through them.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.04 - MANSHIP RD AT AMETHYST DR	2.04.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 2.04 - Manship Rd at Amethyst Dr

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Ditch Clearing & Grubbing	LF	1,800	$ 30.00	$ 54,000.00
Drainage Pipe	LF	40	$ 200.00	$ 8,000.00
Asphalt Repair	SY	40	$ 100.00	$ 4,000.00
Excess Excavation	CY	500	$ 15.00	$ 7,500.00
Erosion Control Mat	CF	4,000	$ 10.00	$ 40,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 129,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 20,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 55,000.00
			Total Estimated Project Cost	**$ 211,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.05
Project Name	Mill Creek under Lakeland Drive in Flowood
Location Description	This site is located where Mill Creek crosses under Highway 25/Lakeland Drive in Flowood. It is approximately 0.30 miles east of Castlewoods Boulevard and 0.07 miles west of Eastside Drive/Vine Drive.
Project Coordinates	32°21'32.64"N, 90°0'28.18"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Model development; storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 12 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$1,201,000
Location Problems	This site is just upstream of Site 2.10. During the April 2017 flood event, water inundated multiple roads in the subdivisions surrounding Mill Creek. In addition to flooding roads, multiple houses in the Mill Creek Subdivision were flooded in April 2017. During the April 2017 flood, water backed up from the Reservoir through a shallow channel/ditch running along the south side of the Mill Creek subdivision and the north side of Highway 25. This water then took the path of least resistance and flowed through the Mill Creek Subdivision flooding roads and homes. Field investigations revealed channel degradation in multiple places along Mill Creek leading to suspicion of rapidly moving water in the recent past. The creek itself appears to be in good condition, other than degradation. 
Recommended Solution	The recommendation for this site includes adding storage in the watershed to help reduce flooding. In order to accurately assess how much storage is needed and where, a hydraulic model is recommended to help with computations and design of the storage area.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A MEDIUM PRIORITY SITE.

0 200 400 800 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.05 - MILL CREEK UNDER LAKELAND	2.05.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost of Lower Richland Creek — Nov. 2018

Site 2.05 - Mill Creek under Lakeland Dr in Flowood

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 65,000.00	$ 325,000.00
Medium Priority Drainage Improvements	AC	400	$ 1,000.00	$ 400,000.00
			Estimated Construction Costs	$ 725,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 109,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 312,000.00
			Total Estimated Assessment Cost	**$ 1,201,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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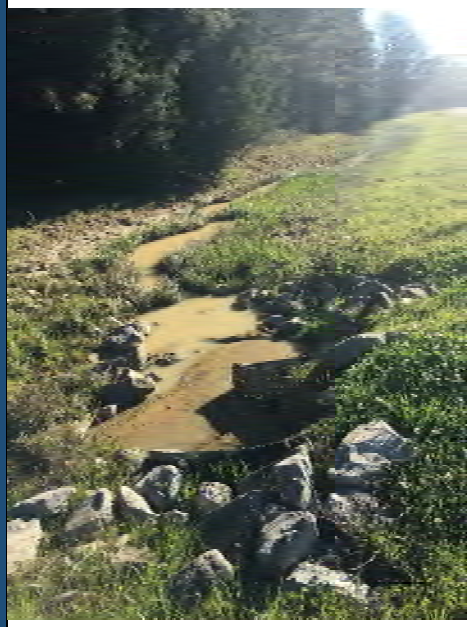
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.06
Project Name	Marshall Road between Palace Crossing and Westview Drive in Flowood
Location Description	This site is located on the north side of Marshall Road between Palace Crossing to the west and Westview Drive to the east.
Project Coordinates	32°22'16.38"N, 89°58'13.06"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Dredging and clearing; Infrastructure improvements; Ordinance development
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Reduce local road flooding Increase local storage Reduced likelihood of future flooding issues
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$685,500
Location Problems	 This portion of Marshall Road – between Palace Crossing and Westview Drive – floods regularly during storm events. Field investigation revealed very shallow ditches on the south side of Marshall Road. Additionally, the culvert under Marshall Road that drains the subdivision is small and may be undersized. The culvert under Marshall Road has a small storage area south of the road where water is collected before it traverses north of the road to a wooded area. This collection area shows signs of degradation and has been riprapped to try to prevent further erosion.
Recommended Solution	Recommendations for this site include deepening the ditch on the south side of Marshall Road to allow for more in-stream storage and evaluating the culvert under Marshall Road to ensure it is the proper size. Additionally, as the area north of Marshall Road is currently undeveloped but may be developed in the future. Stringent development ordinances will need to be enforced to prevent future problems.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A LOW PRIORITY SITE.

0 150 300 600 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.06 - MARSHALL RD BETWEEN PALACE CROSSING AND WESTWOOD DR IN FLOWOOD	2.06.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 2.06 - Marshall Rd between Palace Crossing and Westwood Dr in Flowood

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Ditch Clearing & Grubbing	LF	600	$ 30.00	$ 18,000.00
Asphalt Repair	SY	40	$ 60.00	$ 2,400.00
Excess Excavation	CY	200	$ 15.00	$ 3,000.00
Erosion Control Mat	CF	4,000	$ 10.00	$ 40,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	3	$ 100,000.00	$ 300,000.00
Low Priority Drainage Improvements	AC	150	$ 500.00	$ 75,000.00
			Estimated Construction Costs	$ 426,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 64,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 178,000.00
			Total Estimated Assessment Cost	**$ 685,500.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	2.07
Project Name	Buckingham Subdivision
Location Description	This site, Buckingham Subdivision, is located north of Fannin-Landing Circle. The entrance of the subdivision is located approximately 0.71 miles west of the intersection of Old Highway 471 and Fannin-Landing Circle.
Project Coordinates	32°25'40.66"N, 89°57'58.82"W
HUC12	031800020601 Brashear Creek – Pearl River
Project Type	Bank stabilization; Infrastructure improvements; Dredging and clearing
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced flooding in the subdivision Improved hydraulic efficiency downstream of levee
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 9 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$396,500
Location Problems	During storm events, water overfills the lakes in Buckingham Subdivision and backs up over the roads in the subdivision and into yards. Previous work a few years ago was performed to lower the water level in the lakes by lowering the discharge point.  Site investigation revealed that drainage systems throughout the subdivision look good and are well-maintained. The levee shows slight signs of erosion and the channel downstream of the two outlet points is overgrown.
Recommended Solution	The recommendation for this site includes armoring the levee shoreline to protect it from erosion and lowering at least one spillway to allow water to exit the pond more quickly during storm events.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 500'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 2.07 - OAKGROVE SUBDIVISION	2.07.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 2.07 - Buckingham Subdivision

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Ditch Clearing & Grubbing	LF	300	$ 30.00	$ 9,000.00
Outlet Structure	LS	1	$ 150,000.00	$ 150,000.00
Excess Excavation	CY	250	$ 15.00	$ 3,750.00
Erosion Control Mat	CF	1,000	$ 10.00	$ 10,000.00
Riprap (200# size)	Ton	1,000	$ 60.00	$ 60,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 248,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 38,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 103,000.00
			Total Estimated Project Cost	**$ 396,500.00**

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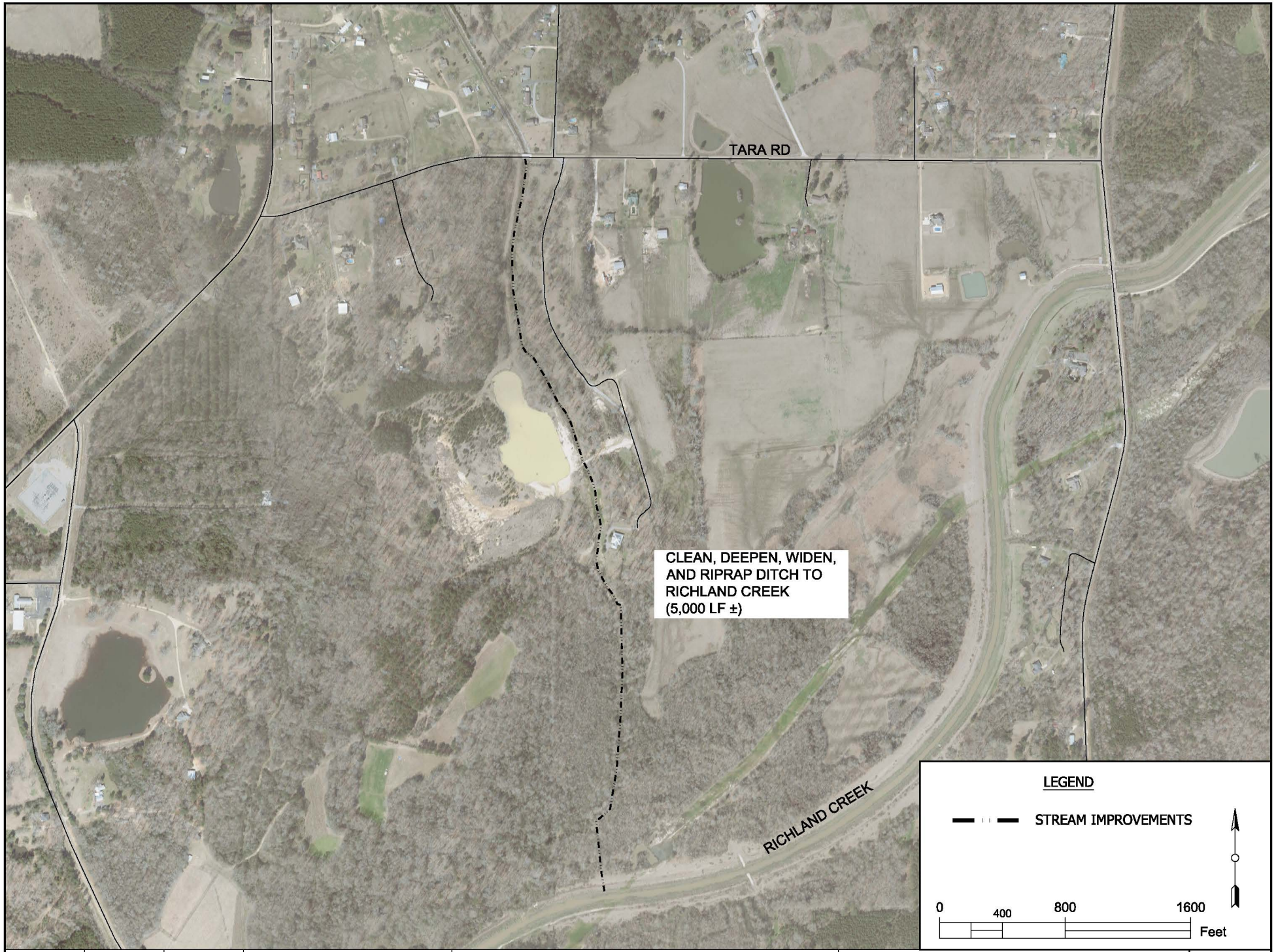
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.01
Project Name	Tara Road at Unnamed Tributary
Location Description	This site is located on Tara Road approximately 0.35 miles east of Highway 468 where an unnamed tributary of Richland Creek passes under Tara Road.
Project Coordinates	32°13'57.90"N, 89°59'59.80"W
HUC12	031800020502 Upper Richland Creek
Project Type	Dredging and clearing; Bank stabilization
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced flooding downstream of bridge Improved hydraulic efficiency Improved water quality downstream Reduced sedimentation
Implementation Period	Study: N/A Design: 6 months Permits: 6 months Land Acquisition: 9 months Implementation: 9 months
In flood zone?	No
Estimated Project Cost	$935,500
Location Problems	Prior to 2016, NRCS funds were used to implement channel improvements – including clearing and snagging, regrading the banks, and riprapping the channel – north of Tara Road. However, no improvements were made south of Tara Road. As a result, the channel south of the bridge on Tara Road is very overgrown and the channel is narrow. The improvements to the channel cause water to run through the channel quickly until the bridge at Tara Road. Then, due to vegetation and sediment clogging the channel further south, water is drastically slowed down causing water to overtop the banks. This results in a house southeast of the Tara Road bridge flooding during rain events.  
Recommended Solution	The recommended solution for this site is to clean, deepen, widen, and riprap the ditch from the bridge at Tara Road south to Richland Creek.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.01 - TARA RD AT UNNAMED TRIBUTARY	3.01.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 3.01 -Tara Rd @ Unnamed Tributary

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	7	$ 12,000.00	$ 84,000.00
Removal of Excess Veget. From Open Channel	LF	5,000	$ 20.00	$ 100,000.00
Removal of Excess Sediment From Open Channel	LF	2,800	$ 20.00	$ 56,000.00
Removal of Debris from Open Channel	LF	5,000	$ 20.00	$ 100,000.00
Excess Excavation	CY	100	$ 10.00	$ 1,000.00
Grading	SY	15,000	$ 5.00	$ 75,000.00
Geotextile Fabric	SY	6,000	$ 3.00	$ 18,000.00
Riprap (200# size)	Ton	1,800	$ 60.00	$ 108,000.00
Seeding and Mulch	LS	1	$ 3,000.00	$ 3,000.00
Land Acquisition	AC	1	$ 30,000.00	$ 30,000.00
			Estimated Construction Costs	$ 595,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 90,000.00
			Permitting	$ 7,500.00
			35% Contigency	$ 243,000.00
			Total Estimated Project Cost	**$ 935,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.02
Project Name	Live Oaks Subdivision at Spanish Oak Drive
Location Description	This site encompasses the Live Oaks subdivision north of Highway 468 in Brandon. The entrance to the subdivision is located on Highway 468 between Greenfield Road and Greenfield Circle. Multiple tributaries of Pringle Branch run through and around the subdivision.
Project Coordinates	32°13'45.63"N, 90°2'39.05"W
HUC12	031800020504 Lower Richland Creek
Project Type	Dredging and clearing
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced subdivision flooding Increased stormwater detention Improved water quality downstream Reduced sedimentation
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$516,500
Location Problems	During heavy storm events, water rises around the houses in the subdivision and gets a couple of inches from some houses. Site investigations revealed that the detention pond in the southwest corner of the subdivision has partially silted in and currently has a fraction of its originally planned storage volume. Also, the ditches within the subdivision are shallow and narrow causing them to fill up quickly which allows excess water to flood streets and yards. 
Recommended Solution	The recommended solution for this site includes removing vegetation and excess sediment from the detention pond and to deepen and widen the roadside ditches. Both recommendations are aimed at adding more storage volume to hold excess water to prevent flooding of roads and houses.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.02 - LIVE OAKS SUBDIVISION AT SPANISH OAK DR	3.02.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 3.02 - Live Oaks Subdivision @ Spanish Oak Dr

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	15	$ 6,000.00	$ 90,000.00
Removal of Excess Veget. From Open Channel	LF	2,000	$ 20.00	$ 40,000.00
Removal of Excess Sediment From Open Channel	LF	2,000	$ 20.00	$ 40,000.00
Excess Excavation	CY	3,000	$ 10.00	$ 30,000.00
Geotextile Fabric	SY	6,000	$ 3.00	$ 18,000.00
Riprap (200# size)	Ton	1,000	$ 60.00	$ 60,000.00
Seeding and Mulch	LS	1	$ 3,000.00	$ 3,000.00
Land Acquisition	AC	1	$ 25,000.00	$ 25,000.00
			Estimated Construction Costs	$ 326,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 49,000.00
			Permitting	$ 7,500.00
			35% Contigency	$ 134,000.00
			Total Estimated Project Cost	**$ 516,500.00**

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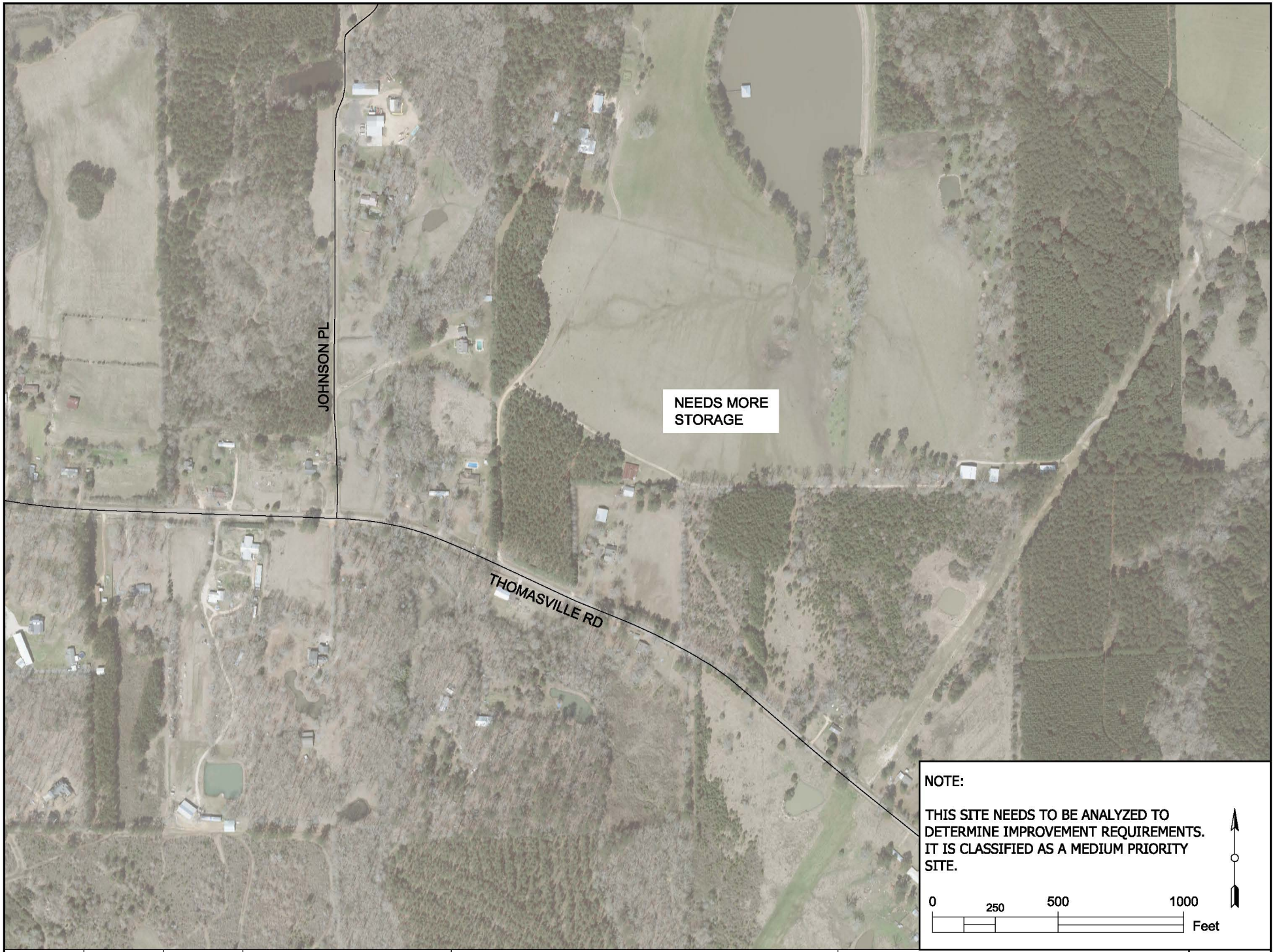
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.03
Project Name	Thomasville Road at Unnamed Tributary
Location Description	This site is located on Thomasville Road, just east of Johnson's Road where an unnamed tributary of Richland Creek crosses under the road. This site is located approximately 2.85 miles east of Highway 469 on Thomasville Road in Florence.
Project Coordinates	32°9'54.34"N, 90°2'21.61"W
HUC12	031800020504 Lower Richland Creek
Project Type	Channel realignment; storage
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Reduced flooding in area Possible addition of retention/detention area Reestablishment of natural flow paths
Implementation Period	Study: 18 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	No
Estimated Project Cost	$523,500
Location Problems	 During large rain events, water floods Thomasville Road necessitating closing the road to traffic. While the road floods, no houses in this area have flooded. There are two stream crossings less than 0.1 mile apart from each other in this location. On the south side of the road, the channel is not very visible until it approaches the culvert under Thomasville Road. The stream, where visible, is very narrow and shallow. Site investigation revealed that water is pooled on the south side of the road in the forest and is slowly flowing north toward Richland Creek.
Recommended Solution	This site needs additional storage. It is recommended to study the area further to determine where the thalweg of the channel is and reestablish it and potentially add more storage in the form of a storage pond south of Thomasville Road.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 500'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.03 - THOMASVILLE RD AT UNNAMED TRIBUTARY	3.03.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost of Indian Creek - Steen Creek Model — Nov. 2018

Site 3.03 - Thomasville Rd @ Unnamed Tributary

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
Medium Priority Drainage Improvements	AC	250	$ 1,000.00	$ 250,000.00
			Estimated Construction Costs	$ 300,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 45,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 136,000.00
			Total Estimated Assessment Cost	**$ 523,500.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.04
Project Name	Puckett Park off of Highway 18 in Puckett
Location Description	This site is located in Puckett Park where a tributary of Clear Creek crosses under Highway 18, approximately 0.15 miles north of Warren Hill Road.
Project Coordinates	32°5'26.01"N, 89°47'15.79"W
HUC12	031800020802 Brushy Creek – Clear Creek
Project Type	Bank stabilization
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced sedimentation and channel degradation Improved water quality downstream
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$508,000
Location Problems	During large rains, the tributary floods out of its banks. Site investigation shows evidence of channel degradation in the stream. No houses or roads flood when the stream gets out of its banks as this site is located in a public park. Work has been previously conducted to stabilize the channel within Puckett Park. However, work may need to be done further upstream to further stabilize the channel and prevent degradation downstream. 
Recommended Solution	This site needs further maintenance, in the form of channel stabilization, to prevent degradation in the stream.

NOTE:

THIS SITE NEEDS FURTHER MAINTENANCE IN THE FORM OF CHANNEL STABILIZATION TO PREVENT DEGRADATION IN THE STREAM.

0 150 300 600 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.04 - PUCKETT PARK OFF HWY 18 IN PUCKETT	3.04.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 3.04 - Puckett Park off of Highway 18 in Puckett

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	5	$ 12,000.00	$ 60,000.00
Removal of Excess Veget. From Open Channel	LF	1,000	$ 21.00	$ 21,000.00
Removal of Excess Sediment From Open Channel	LF	1,000	$ 20.00	$ 20,000.00
Removal of Debris from Open Channel	LF	1,000	$ 20.00	$ 20,000.00
Excess Excavation	CY	1,000	$ 10.00	$ 10,000.00
Geotextile Fabric	SY	2,000	$ 3.00	$ 6,000.00
Riprap (200# size)	Ton	2,000	$ 60.00	$ 120,000.00
Seeding and Mulch	LS	1	$ 10,000.00	$ 10,000.00
			Estimated Construction Costs	$ 287,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 44,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contigency	$ 132,000.00
			Total Estimated Project Cost	**$ 508,000.00**

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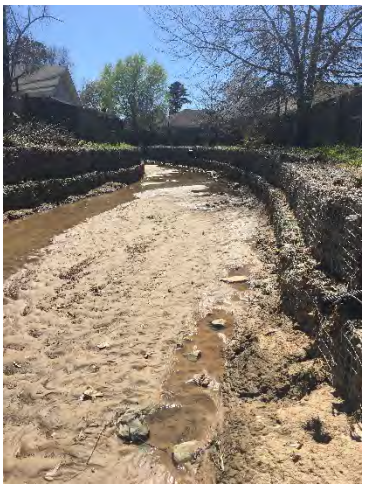
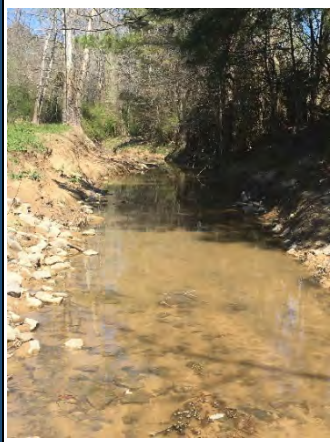
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.05
Project Name	Windchase Subdivision in Brandon
Location Description	This site is located in Windchase Subdivision in Brandon. An unnamed tributary of Richland Creek runs along the east side of the subdivision parallel to Windchase Drive.
Project Coordinates	32°15'10.31"N, 90°0'14.57"W
HUC12	031800020502 Upper Richland Creek
Project Type	Dredging and clearing; bank stabilization
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Increased channel area Improved hydraulic efficiency Reduced sedimentation Improved water quality downstream
Implementation Period	Study: N/A Design: 3 months Permits: 3 months Land Acquisition: 9 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$1,271,500
Location Problems	During the flood in April 2017 (a 600-year event), three homes in Windchase flooded. Site investigation of this area shows that towards the south side of the subdivision (the entrance off of Whitfield Road), the channel is lined with gabions and is clear of vegetation and debris, but full of sediment. Towards the northern side of the subdivision (the entrance off of East Metro Access Road), the channel is not lined with gabions and is constricted, with heavy vegetation on each side. Additionally, the channel in this part of the subdivision is narrow and shallow, constricted with vegetation, debris, and sediment. Furthermore, the banks in this section of the stream show evidence of degradation and in need of stabilization.  
Recommended Solution	The recommendation for this site includes removing the excess sediment/sand from the channel, stabilizing, and cleaning the upstream portion of the channel.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 500'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.05 - WINDCHASE SUBDIVISION IN BRANDON	3.05.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 3.05 - Windchase Subdivision in Brandon

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	2	$ 12,000.00	$ 24,000.00
Removal of Excess Veget. From Open Channel	LF	1,300	$ 21.00	$ 27,300.00
Removal of Excess Sediment From Open Channel	LF	2,300	$ 20.00	$ 46,000.00
Removal of Debris from Open Channel	LF	1,250	$ 20.00	$ 25,000.00
Excess Excavation	CY	5,000	$ 10.00	$ 50,000.00
Geotextile Fabric	SY	6,000	$ 3.00	$ 18,000.00
Riprap (200# size)	Ton	8,500	$ 60.00	$ 510,000.00
Retaining Wall System, Modular Block	SF	2,000	$ 40.00	$ 80,000.00
Seeding and Mulch	LS	1	$ 3,000.00	$ 3,000.00
			Estimated Construction Costs	$ 804,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 130,000.00
			Permitting	$ 7,500.00
			35% Contigency	$ 330,000.00
			Total Estimated Project Cost	**$ 1,271,500.00**

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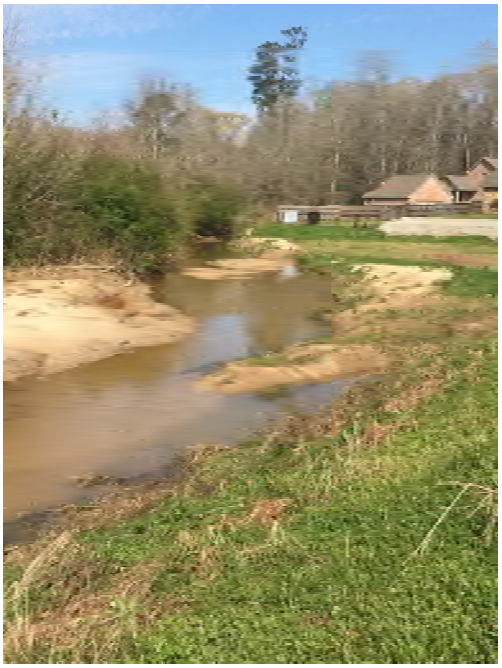
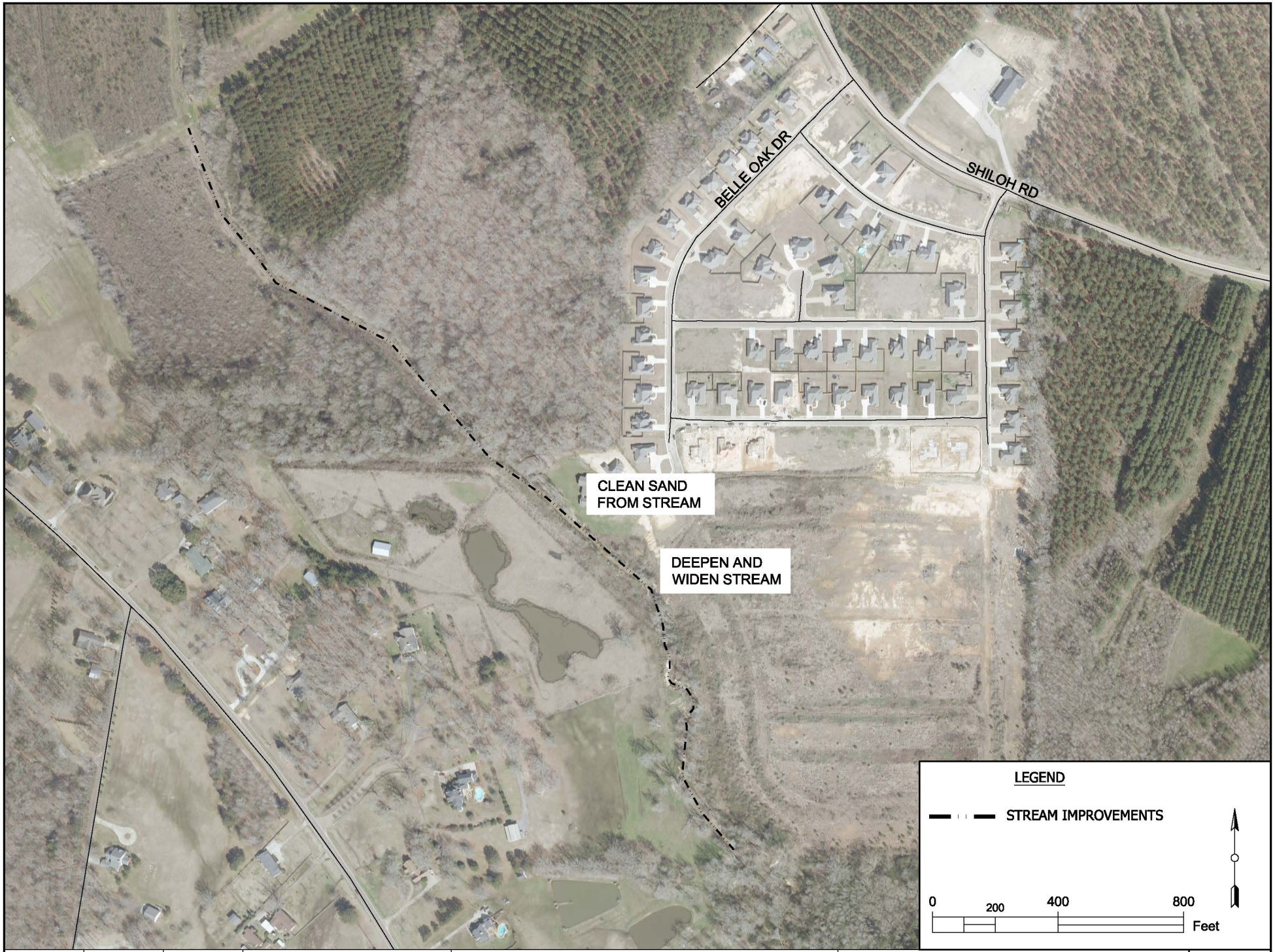
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.06
Project Name	Belle Oak Subdivision in Brandon
Location Description	This site encompasses Belle Oak Subdivision in Brandon. The entrance to the subdivision is approximately 1.90 miles from the intersection of Shelton Street and 427/Shiloh Road east down Shiloh Road.
Project Coordinates	32°15'15.97"N, 89°57'21.11"W
HUC12	031800020502 Upper Richland Creek
Project Type	Dredging and clearing
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Increased channel area Improved hydraulic efficiency Reduced sedimentation Improved water quality downstream
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 9 months Implementation: 9 months
In flood zone?	Yes
Estimated Project Cost	$470,000
Location Problems	During heavy storm events, water floods the streets in Belle Oak Subdivision. Water, however, has not flooded any houses yet. A tributary of Richland Creek runs through the subdivision. From site investigations, it appears as if high water in the tributary prevents water from flowing through the curb and gutter system causing road flooding. The tributary is relatively wide, but very shallow with numerous sand bars throughout the portion running through/behind the subdivision causing the flow area to be relatively narrow. There is evidence of water leaving the main channel to run over the sand bars. 
Recommended Solution	The recommendations for this site include clearing the channel of excess sediment and vegetation and deepening the channel to provide more in-stream storage.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.06 - BELLE OAK SUBDIVISION IN BRANDON	3.06.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 3.06 - Belle Oak Subdivision in Brandon

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Ditch Clearing & Grubbing	LF	3,800	$ 30.00	$ 114,000.00
Excess Excavation	CY	5,500	$ 15.00	$ 82,500.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	2	$ 30,000.00	$ 60,000.00
			Estimated Construction Costs	$ 272,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 41,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 10,000.00
			35% Contingency	$ 122,000.00
			Total Estimated Project Cost	**$ 470,000.00**

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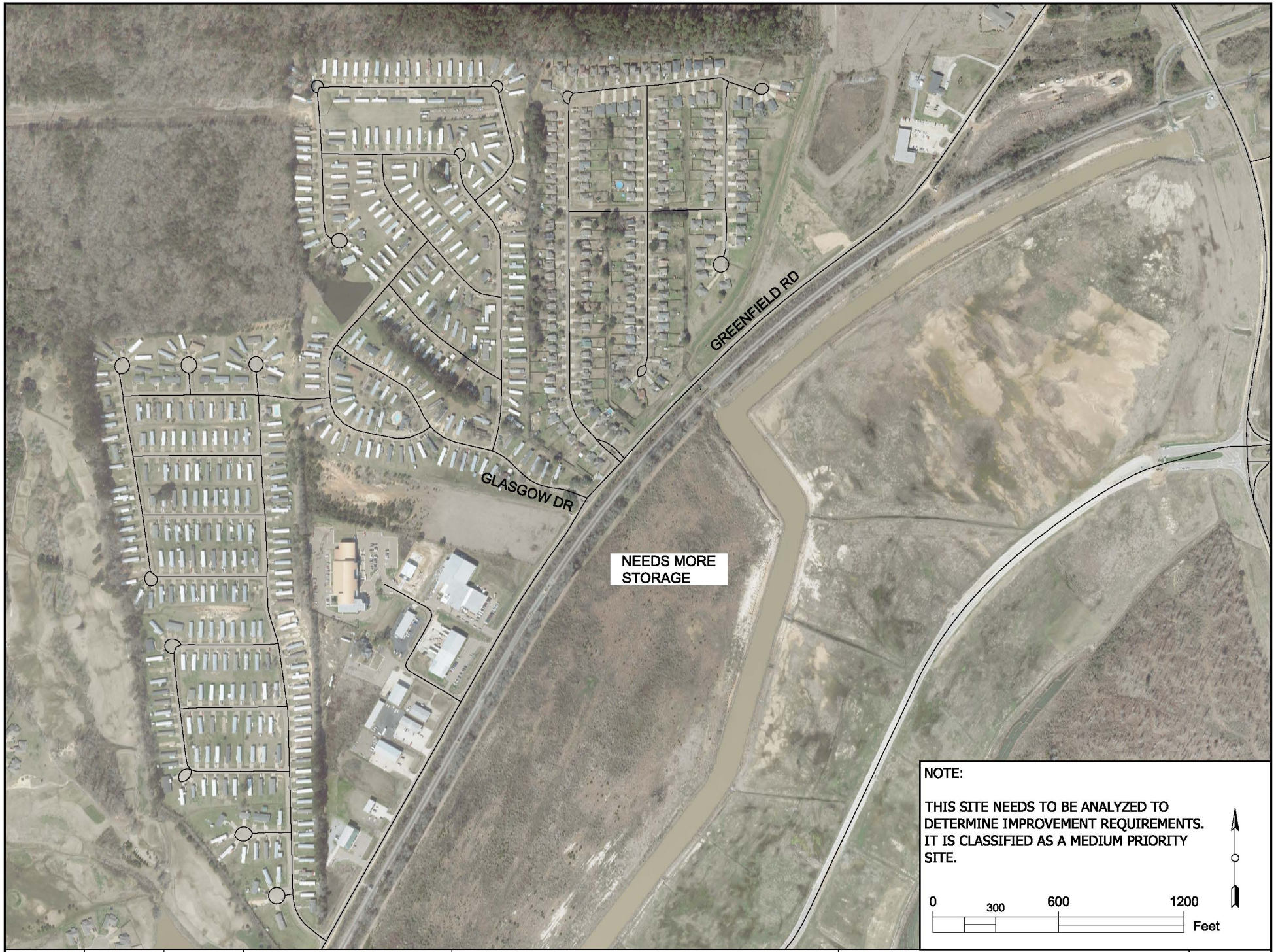
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.07
Project Name	Greenfield Road at Unnamed Tributary in Pearl
Location Description	This site is located on Greenfield Road where a tributary of Terrapin Skin Creek crosses under the road and subsequently a railroad track.
Project Coordinates	32°15'52.73"N, 90°2'31.72"W
HUC12	031800020503 Terrapin Skin Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Reduced flooding upstream and downstream Possible creation of retention/detention area
Implementation Period	Study: 9 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$696,000
Location Problems	During 50-year storm events or greater, water gets close to and over Greenfield Road. Site investigations revealed a channel that is very well-established with a deep thalweg and broad bank area past the thalweg. There is clear evidence of work being performed on the ditch between Interstate 20 and Greenfield Road to widen the bankful flood area. The opening under the Greenfield Road bridge is very large and riprapped to protect it from degradation. Immediately after passing under Greenfield Road, the stream crosses under a railroad track. Due to heavy traffic on the road and trains continuously utilizing the railroad track along with deep water in the channel, the opening under the railroad track was not investigated. A local resident stated that the water in the ditch gets very high and she feels as if the problem is from upstream and not blockages downstream. 
Recommended Solution	This area needs more storage to prevent flooding in the future. Due to the location and complexity of this site, constructing a model to determine the size and location for storage is recommended.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 600'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.07 - GREENFIELD RD AT UNNAMED TRIBUTARY IN PEARL	3.07.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost of Indian Creek - Steen Creek Model — Nov. 2018

Site 3.07 - Greenfield Rd @ Unnamed Tributary in Pearl

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 20,000.00	$ 100,000.00
Medium Priority Drainage Improvements	AC	300	$ 1,000.00	$ 300,000.00
			Estimated Construction Costs	$ 400,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 60,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 181,000.00
			Total Estimated Assessment Cost	**$ 696,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	3.08
Project Name	Meadowland Drive at East Government Street in Brandon
Location Description	This site is located where Meadowland Drive meets East Government Street. At this location, a tributary of Richland Creek passes under Meadowland Drive.
Project Coordinates	32°16'22.94"N, 89°58'48.93"W
HUC12	031800020502 Upper Richland Creek
Project Type	Monitoring
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Ensure the installed solution provides the anticipated benefits to the community of reduced flooding, improved water quality, and reduced sedimentation
Implementation Period	Study: --- Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	No
Estimated Project Cost	- monitoring -
Location Problems	During heavy rain storms, water would flow over East Government Street. In the first quarter of 2018, the old bridge structure was replaced by two eight foot by eight foot box culverts under East Government Street to help alleviate the flooding problem. During site investigations the field foreman was spoken to. He said that during heavy rains following the box culvert installation water in the creek gets deep but that water stays in the creek. He has not seen any houses or yards flood. Additionally, the foreman noted that it usually takes a day or two for the water in the creek to recede to normal levels, but this is not a problem. 
Recommended Solution	Due to the fact that this site recently had improvements made, the recommendation is to monitor the site to determine efficacy of the installed solution. If additional problems are noted, the site should be further evaluated.

NOTE:

MONITOR THE SITE TO DETERMINE THE EFFICACY OF RECENT IMPROVEMENTS.

0 200 400 800 Feet

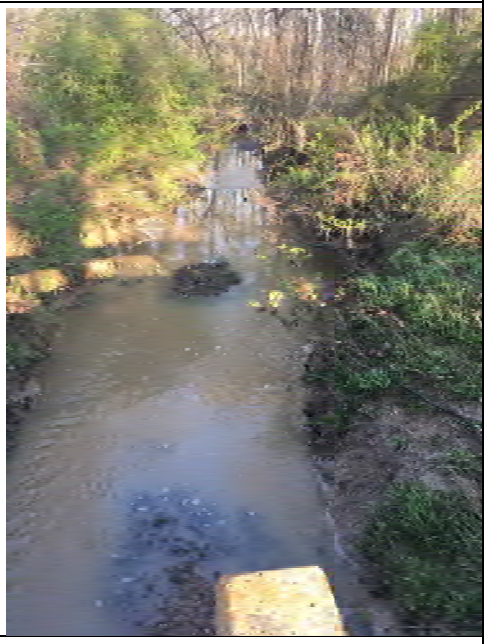
PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 3.08 - MEADOWLANE DR AT E GOVERNMENT ST IN BRANDON	3.08.01

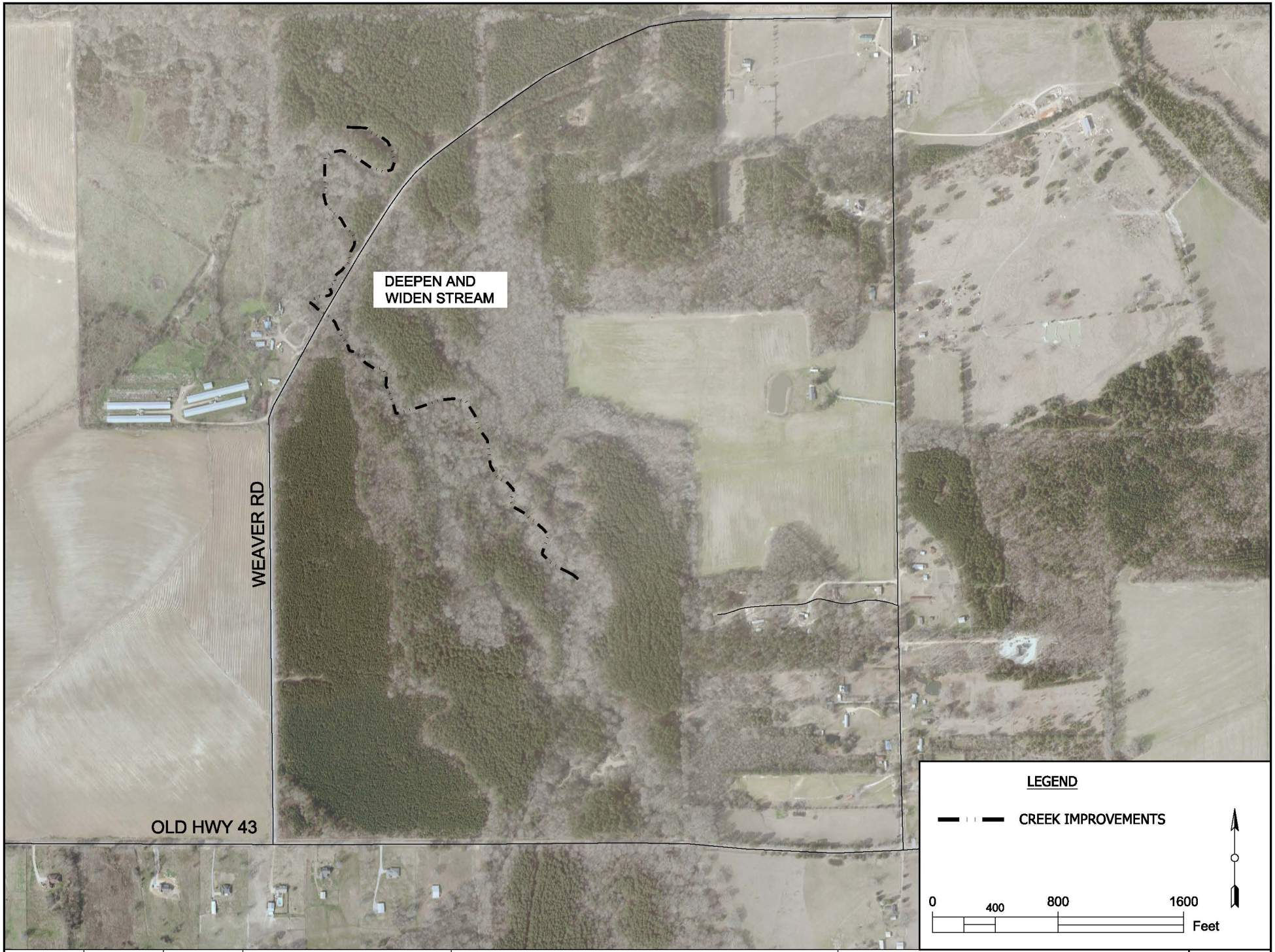
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.01
Project Name	Jims Road at Unnamed Tributary
Location Description	This site is located where a tributary of Fannegusha Creek crosses under Jims Road, approximately 0.47 miles east of Highway 25 in Lena.
Project Coordinates	32°32'4.22"N, 89°48'43.44"W
HUC12	031800020203 Deer Creek – Fannegusha Creek
Project Type	Monitoring
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Ensure the installed solution provides the anticipated benefit to the community of reduced flooding
Implementation Period	Study: --- Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	- monitoring -
Location Problems	 During rain events, water flows over the road resulting in road closures and no access to the rest of Jims Road for emergency vehicles. During large rain events, water remains over the road for one to two days. During site investigations, it was noted that the culvert had recently been replaced with two new culverts that would allow more water to pass under Jims Road as opposed to over it.
Recommended Solution	Due to the fact that this site recently had improvements made, the recommendation is to monitor the site to determine efficacy of the installed solution. If additional problems are noted, the site should be further evaluated.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 600'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.01 -JIMS ROAD AT UNNAMED TRIBUTARY	4.01.01

RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.02
Project Name	Weaver Road at Red Cane Creek
Location Description	This site is located where Red Cane Creek crosses under Weaver Road, approximately 0.64 miles north of Red Oak Road/Old Highway 43.
Project Coordinates	32°28'42.52"N, 89°47'20.52"W
HUC12	031800020202 Red Cane Creek – Fannegusha Creek
Project Type	Dredging and clearing
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced local flooding Improved hydraulic efficiency
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$582,000
Location Problems	During heavy storm events, water floods the roads. No houses have been flooded yet. Site investigation of this area reveal that the creek north and south of Weaver Road is silted in and full of debris. Additionally, there are multiple places where water is in the Creek but a berm has been built up – either naturally or anthropogenically – causing water to build up before it can continue flowing downstream. 
Recommended Solution	It is recommended that this creek be deepened and widened as well as cleaned of excess sediment and vegetation.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.02 - WEAVER RD AT UNNAMED TRIBUTARY	4.02.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 4.02 - Weaver Road at Red Cane Creek

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	5,000	$ 21.00	$ 105,000.00
Removal of Excess Sediment From Open Channel	LF	5,000	$ 20.00	$ 100,000.00
Removal of Debris from Open Channel	LF	5,000	$ 20.00	$ 100,000.00
Excess Excavation	CY	1,000	$ 15.00	$ 15,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 335,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 51,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 151,000.00
			Total Estimated Project Cost	**$ 582,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.03
Project Name	Gore Road at Purnell Creek
Location Description	This site is located where Purnell Creek crosses Gore Road, approximately 0.58 miles east of intersection of Sandhill Road and Gore Road in Lena.
Project Coordinates	32°30'20.20"N, 89°51'27.02"W
HUC12	031800020203 Deer Creek – Fannegusha Creek
Project Type	Monitoring
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Ensure the installed solution provides the anticipated benefit to the community of reduced flooding
Implementation Period	Study: --- Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	No
Estimated Project Cost	- monitoring -
Location Problems	During heavy rains, Gore Road gets water over it in this low-lying area. In March 2018, the old twelve inch culvert was replaced with two new, larger culverts to allow more water to flow through the culverts under Gore Road. 
Recommended Solution	Due to the fact that this site recently had improvements made, the recommendation is to monitor the site to determine efficacy of the installed solution. If additional problems are noted, the site should be further evaluated.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.03 - GORE RD AT PURNELL CREEK	4.03.01

RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.04
Project Name	Lewis Prestage Road at Rollison Creek
Location Description	This site is located where Rollison Creek crosses Lewis Prestage Road, located approximately 2 miles north of Old Highway 43/Red Oak Road in Lena.
Project Coordinates	32°29'46.68"N, 89°49'0.16"W
HUC12	031800020202 Red Cane Creek – Fannegusha Creek
Project Type	Monitoring
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Ensure the installed solution provides the anticipated benefits to the community of reduced flooding
Implementation Period	Study: --- Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	- monitoring -
Location Problems	During large rains, water would flood the road in low-lying areas but no houses were flooded. In the first quarter of 2018, the old culvert was replaced with two 84 inch culverts and the creek was cleared of debris and excess vegetation. 
Recommended Solution	Due to the fact that this site recently had improvements made, the recommendation is to monitor the site to determine efficacy of the installed solution. If additional problems are noted, the site should be further evaluated.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.04 - LEWIS PRESTAGE RD AT ROLLISON CREEK	4.04.01

RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.05
Project Name	Taylor Way Road at Unnamed Tributary of Riley Creek
Location Description	This site is located where an unnamed tributary of Riley Creek crosses under Taylor Way Road, approximately 0.55 miles west of the Taylor Way Road/Stump Ridge Road intersection.
Project Coordinates	32°27'17.46"N, 89°52'34.90"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Reduced flooding in the area and downstream Potential addition of detention/retention areas Improved water quality downstream
Implementation Period	Study: 21 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	No
Estimated Project Cost	$1,060,500
Location Problems	 At this location, there is one way to access homes down Taylor Way Road and during large storm events, water gets over the road blocking access. While no houses have flooded, water gets approximately six inches from houses. Site investigation revealed that road work was recently performed to raise the road elevation in the low-lying area of the road. However, there is still evidence of water flooding the forested area and fields north and south of the road.
Recommended Solution	For this site, the recommendation is to add more storage within the watershed to help prevent flooding. Modeling the area is recommended to determine how much storage and its location is needed to alleviate flooding.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE.

0 500 1000 2000 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.05 - TAYLOR WAY RD AT UNNAMED TRIBUTARY OF RILEY CREEK	4.05.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 4.05 - Taylor Way Rd @ Unnamed Tributary of Riley Creek

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
High Priority Drainage Improvements	AC	300	$ 2,000.00	$ 600,000.00
			Estimated Construction Costs	$ 650,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 98,000.00
			CLOMR and LOMR Regulatory Updates	$ 7,500.00
			Permitting	$ 20,000.00
			35% Contingency	$ 275,000.00
			Total Estimated Assessment Cost	**$ 1,060,500.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.06
Project Name	Holly Bush Road between Sara Fox Drive and Rodeo Drive
Location Description	This site is located on Holly Bush Road between Sara Fox Drive and Rodeo Drive. In this location, two branches of Clark Creek cross under Holly Bush Road. This area is a low-lying area.
Project Coordinates	32°23'54.01"N, 89°55'42.84"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Model development; Storage; Ordinance development
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Potential addition of detention/retention to reduce flooding Reduced likelihood of future flooding issues
Implementation Period	Study: 21 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$890,000
Location Problems	 Currently, this area is relatively undeveloped. However, multiple subdivisions are in the process of being built north of Holly Bush Road in this area. Water does not currently flood the road or houses. A site investigation revealed evidence of rapid development in the area which will exacerbate flooding issues in the future.
Recommended Solution	The recommendations for this site are two-fold. The first prong is to add more storage north of Holly Bush Road. To effectively do this, a model is recommended to determine how much storage and its location. The second prong is to develop and enforce strict development ordinances for future developments.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE. FOR FUTURE DEVELOPMENTS, ENFORCE STRICT DEVELOPMENT ORDINANCES.

0 400 800 1600 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.06 - HOLLY BUSH RD BETWEEN SARA FOX DR AND RODEO DR	4.06.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 4.06 - Holly Bush Rd between Sara Fox Dr and Rodeo Dr

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 25,000.00	$ 125,000.00
High Priority Drainage Improvements	AC	200	$ 2,000.00	$ 400,000.00
Estimated Construction Costs				$ 525,000.00
H&H Technical Review				$ 10,000.00
Engineering Costs (Design, Inspection, Construction Testing, etc.)				$ 79,000.00
CLOMR and LOMR Regulatory Updates				$ 25,000.00
Permitting				$ 20,000.00
35% Contingency				$ 231,000.00
Total Estimated Assessment Cost				**$ 890,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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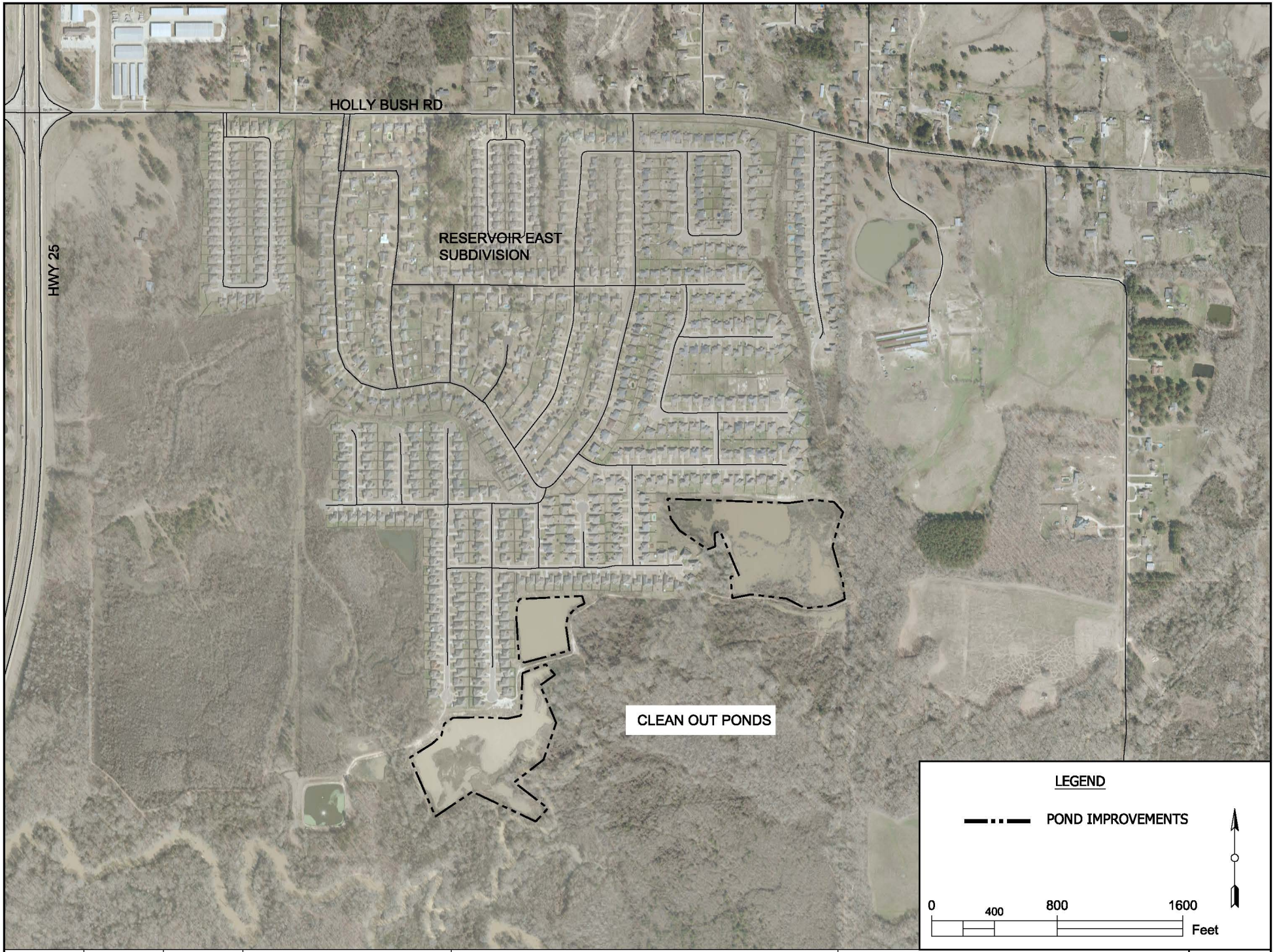
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.07
Project Name	Reservoir East Subdivision
Location Description	This site encompasses Reservoir East Subdivision off of Holly Bush Road. The western entrance to the subdivision is located approximately 0.37 miles east of the Highway 25/Holly Bush Road intersection while the eastern entrance to the subdivision is located approximately 0.72 miles east of the same intersection.
Project Coordinates	32°23'37.92"N, 89°56'37.57"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Dredging and clearing; Ordinance development
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding in the subdivision Reduced likelihood of future flooding issues caused by sedimentation Increased stormwater storage
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 9 months Implementation: 6 months
In flood zone?	Yes
Estimated Project Cost	$1,022,000
Location Problems	During heavy rain events, the roads in the subdivision get a thin layer of water over them. Site investigations show that this development has over 100 houses in it and three detention ponds. All three detention ponds are very overgrown and silted in leading to little or no storage for stormwater. Additionally, the north part of the subdivision (older homes) has a mixture of drainage structures from no visible structures to ditches with culverts while the south part of the subdivision (newer homes) has a curb and gutter system in good repair. 
Recommended Solution	For this site, it is recommended that the ponds be cleaned of sediment and vegetation to increase storage. Additionally, it is recommended that an entity be established to take responsibility for maintaining the ponds to prevent this problem from occurring in the future. This is usually best done through development and enforcement of new ordinances.



PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver.	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.07 - RESERVOIR EAST SUBDIVISION	4.07.01

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Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 4.07 - Reservoir East Subdivision

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	4	$ 12,000.00	$ 48,000.00
Removal of Excess Veget. From Open Channel	LF	2,800	$ 20.00	$ 56,000.00
Removal of Excess Sediment From Open Channel	LF	2,800	$ 20.00	$ 56,000.00
Removal of Debris from Open Channel	LF	2,800	$ 20.00	$ 56,000.00
Excess Excavation	CY	30,000	$ 10.00	$ 300,000.00
Geotextile Fabric	SY	6,000	$ 3.00	$ 18,000.00
Riprap (200# size)	Ton	1,000	$ 60.00	$ 60,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 619,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 93,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 265,000.00
			Total Estimated Assessment Cost	**$ 1,022,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.08
Project Name	Holly Bush Road at Riley Creek
Location Description	This site is located approximately 3.95 miles east of the Holly Bush Road/Highway 25 intersection where Riley Creek crosses under Holly Bush Road.
Project Coordinates	32°23'47.04"N, 89°53'9.88"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Model development; Storage; Ordinance development
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Potential addition of detention/retention to reduce flooding Reduced likelihood of future flooding issues
Implementation Period	Study: 21 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$1,045,000
Location Problems	During heavy storm events, flooding occurs across this low-lying are on Holly Bush Road. In very heavy storm events, water floods the road; however, flooding is most likely to occur in the overbank area of the channel on the north and south sides of the road. Site investigations revealed that the area north of Holly Bush (upstream in the creek) appears to hold water which can lead to flooding problems in the area. Currently, this area does not pose an imminent threat as this area is undeveloped. Developers are targeting the area north of Holly Bush Road to begin building developments within the next few years. 
Recommended Solution	The recommendations for this site are two-fold. The first prong is to add more storage north of Holly Bush Road. To effectively do this, a model is recommended to determine how much storage and its location. The second prong is to develop and enforce strict development ordinances for future developments.

NOTES:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A MEDIUM PRIORITY SITE.

FOR FUTURE DEVELOPMENTS, ENFORCE STRICT DEVELOPMENT ORDINANCES.

0 200 400 800 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.08 - HOLLY BUSH RD AT RILEY CREEK	4.08.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 4.08 - Holly Bush Rd @ Riley Creek

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 25,000.00	$ 125,000.00
Medium Priority Drainage Improvements	AC	500	$ 1,000.00	$ 500,000.00
			Estimated Construction Costs	$ 625,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 94,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 271,000.00
			Total Estimated Assessment Cost	**$ 1,045,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.09
Project Name	Oakdale Road north of Baker Lane
Location Description	This site is located on Oakdale Road approximately 1.21 miles east of the Highway 471/Oakdale Road intersection where a tributary of Clark Creek crosses under the road.
Project Coordinates	32°21'49.68"N, 89°56'56.94"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Model development; Storage; Ordinance development
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Potential addition of detention/retention to reduce flooding Reduced likelihood of future flooding issues
Implementation Period	Study: N/A Design: 3 months Permits: 3 months Land Acquisition: 6 months Implementation: 9 months
In flood zone?	Yes
Estimated Project Cost	$700,500
Location Problems	During heavy rains, flooding inundates yards in the area but has not entered houses yet. This area is being developed and the more development that happens the worse flooding is during storm events. Site investigation of this area revealed the stream is very silted in and there is only a maximum of two feet of clearance from the top of the water surface to the bottom of the bridge. Additionally, a new development is being built to the east of this site. The new development will drain into the existing creek, downstream of the existing bridge. 
Recommended Solution	The recommendations for this site are two-fold. The first prong is to add more storage in the creek by deepening, widening, and removing excess sediment from the creek. The second prong is to develop and enforce strict development ordinances for future developments.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.09 - OAKDALE RD NORTH OF BAKER LANE	4.09.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 4.09 - Oakdale Rd north of Baker Lane

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	3	$ 10,000.00	$ 30,000.00
Removal of Excess Veget. From Open Channel	LF	3,750	$ 21.00	$ 78,750.00
Removal of Excess Sediment From Open Channel	LF	3,750	$ 20.00	$ 75,000.00
Removal of Debris from Open Channel	LF	3,750	$ 20.00	$ 75,000.00
Excess Excavation	CY	2,000	$ 10.00	$ 20,000.00
Riprap (200# size)	Ton	1,000	$ 60.00	$ 60,000.00
Retaining Wall System, Modular Block	SF	2,000	$ 40.00	$ 80,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 444,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 67,000.00
			Permitting	$ 7,500.00
			35% Contingency	$ 182,000.00
			Total Estimated Assessment Cost	**$ 700,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.10
Project Name	Andrew Chapel Road at Bush Creek
Location Description	This site is located where Bush Creek crosses Andrew Chapel Road in Brandon. This site is located approximately 0.21 miles south of where Baker Road dead-ends at Andrew Chapel Road.
Project Coordinates	32°20'50.94"N, 89°55'27.61"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Infrastructure improvements; Monitoring
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Ensure the installed solution provides the anticipated benefits to the community of reduced flooding, increased hydraulic efficiency, and improved water quality downstream
Implementation Period	Study: N/A Design: Finished Permits: 6 months Land Acquisition: 12 months Implementation: Start in 2nd Quarter – 2019 (2 years)
In flood zone?	Yes
Estimated Project Cost	- ongoing project and monitoring -
Location Problems	During storm events, the area around the creek floods. The roads and houses in the area do not currently flood. The stream in this location is narrow and shallow with evidence of sediment aggradation in-stream. Site investigations revealed that an old culvert was replaced in early 2018 with a new culvert. During discussion with Rankin County officials, it was noted that the County is working to replace the culvert with a bridge to allow more water to flow under the road. Finally, this area is prime for development within the next ten years and will need to be monitored for future potential problems. 
Recommended Solution	Recommendations for this site include moving forward with the County's planned improvements and monitoring the site after for efficacy. Additionally, the County needs to develop and enforce strict development ordinances for future developments.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.10 - ANDREW CHAPEL RD AT BUSH CREEK	4.10.01

RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.11
Project Name	Barker Road at Dry Creek Tributary
Location Description	This site is located where Dry Creek Tributary crosses Barker Road, approximately 0.54 miles north west of Cricket Lane.
Project Coordinates	32°24'12.43"N, 89°44'55.97"W
HUC12	031800020304 Hollybush Creek – Clear Creek
Project Type	Channel realignment; Dredging and clearing
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Reduced flooding in the area Improved hydraulic efficiency
Implementation Period	Study: N/A Design: 3 months Permits: 9 months Land Acquisition: 3 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$237,000
Location Problems	During heavy rains, flooding occurs over Barker Road in this area. Site investigations revealed that this is a low-lying area with a very narrow and shallow creek/ditch to convey water. In addition to the ditch being narrow and shallow, it is also full of debris and sediment. 
Recommended Solution	For this site, the recommendation includes re-establishing the channel, deepening and widening the channel, and clearing the channel of debris and excess vegetation.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 300'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.11 - BARKER RD AT DRY CREEK TRIBUTARY	4.11.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 4.11 - Barker Road at Dry Creek Tributary

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	1,500	$ 21.00	$ 31,500.00
Removal of Excess Sediment From Open Channel	LF	1,500	$ 20.00	$ 30,000.00
Removal of Debris from Open Channel	LF	1,500	$ 20.00	$ 30,000.00
Excess Excavation	CY	1,800	$ 15.00	$ 27,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 134,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 21,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 62,000.00
			Total Estimated Project Cost	**$ 237,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.12
Project Name	Brush Creek in North Brandon Estates
Location Description	This site encompasses North Brandon Estates. Three branches of Brush Creek run through this subdivision at various locations. The entrance of North Brandon Estates is located approximately 1.38 miles north of Highway 463 on North Brandon Boulevard.
Project Coordinates	32°19'50.82"N, 89°56'36.75"W
HUC12	031800020306 Riley Creek – Pelahatchie Creek
Project Type	Dredging and clearing; Storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding in the subdivision Increase in-stream storage Improve water quality downstream Reduce sedimentation
Implementation Period	Study: N/A Design: 6 months Permits: 12 months Land Acquisition: 9 months Implementation: 6 months
In flood zone?	Yes
Estimated Project Cost	$1,002,000
Location Problems	 During the April 2017 flood (a 600 year event), a few houses in North Brandon Estates flooded. County officials noted that typically a significant rainfall is needed to affect this area. Site investigations revealed that the center prong of Brush Creek through North Brandon Estates is relatively narrow with little to no overbank area available. Additionally, the houses in this area are not much higher than the elevation of the creek. Two new 72 inch culverts were installed in early 2018 on the center prong of Brush Creek on Westerly Road.
Recommended Solution	The recommendation for this site is to install more in-stream storage in Brush Creek. This can be done multiple ways, but the suggested approach is to widen the creek and provide overbank storage area for flood waters.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 1000'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.12 - BRUSH CREEK IN NORTH BRANDON ESTATES	4.12.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 4.12 - Brush Creek in North Brandon Estates

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Removal of Excess Veget. From Open Channel	LF	1,000	$ 21.00	$ 21,000.00
Removal of Excess Sediment From Open Channel	LF	1,000	$ 20.00	$ 20,000.00
Excess Excavation	CY	5,000	$ 15.00	$ 75,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
Land Acquisition	AC	5	$ 15,000.00	$ 75,000.00
High Priority Drainage Improvements	AC	200	$ 2,000.00	$ 400,000.00
			Estimated Construction Costs	$ 606,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 91,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 10,000.00
			35% Contingency	$ 260,000.00
			Total Estimated Assessment Cost	**$ 1,002,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.13
Project Name	Highway 80 at Highway 43 in Pelahatchie
Location Description	This site surrounds the intersection of Highway 80 and Highway 43 in Pelahatchie as well as the immediate area.
Project Coordinates	32°18'44.32"N, 89°48'16.36"W
HUC12	031800020305 – Snake Creek – Pelahatchie Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Addition of retention/detention areas Reduced flooding in the area
Implementation Period	Study: 9 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$503,000
Location Problems	During heavy storm events, water inundates this intersection. During site investigation, a local police officer was interviewed. He said water gets 12 inches to 18 inches deep during large rain events and can stay for up to two days. 
Recommended Solution	More storage needs to be added within the watershed to help alleviate this problem. To effectively do this, a model is recommended to determine how much storage and its location.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE.

0 200 400 800 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver.	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.13 - HWY 80 AT HWY 43 IN PELAHATCHIE	4.13.01

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Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 4.13 - Hwy 80 @ Hwy 43 in Pelahatchie

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 15,000.00	$ 75,000.00
High Priority Drainage Improvements	AC	100	$ 2,000.00	$ 200,000.00
			Estimated Construction Costs	$ 275,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 42,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 131,000.00
			Total Estimated Assessment Cost	**$ 503,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.14
Project Name	Pecan Court at Terrapin Skin Creek in Brandon
Location Description	This site is located at Pecan Court in Brandon. The entrance to the subdivision is located on Value Road between Highway 80 and Highway 471.
Project Coordinates	32°17'16.84"N, 90°0'18.15"W
HUC12	031800020503 Terrapin Skin Creek
Project Type	Dredging and clearing
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced flooding in the area Increased storage within the subdivision Improved water quality downstream Reduced sedimentation downstream Improved hydraulic efficiency of stream
Implementation Period	Study: N/A Design: 3 months Permits: 12 months Land Acquisition: 6 months Implementation: 3 months
In flood zone?	Yes
Estimated Project Cost	$439,000
Location Problems	During heavy storm events, water floods the roads in the subdivisions but does not flood homes. During site investigations it was found that the detention pond on the western side of the subdivision is overgrown and silted in. Additionally, the culvert from the detention pond to the creek is blocked by a large amount of debris and vegetation. It appears as if water enters the curb and gutter system in the subdivision and fills the detention pond. However, when water cannot exit the detention pond into the creek water begins to back up in the curb and gutter system causing flooding. 
Recommended Solution	The recommendation for this site includes clearing the detention pond exit culvert of debris and vegetation to allow water to flow into the creek. Additionally, it is recommended to reestablish the detention pond to its original design by deepening the pond.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver.	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.14 - PECAN COURT AT TERRAPIN SKIN CREEK TRIBUTARY IN BRANDON	4.14.01

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Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 4.14 - Pecan Court at Terrapin Skin Creek Tributary in Brandon

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Clearing and Grubbing	AC	3	$ 25,000.00	$ 75,000.00
Removal of Excess Sediment From Open Channel	LF	1,000	$ 20.00	$ 20,000.00
Excess Excavation	CY	4,500	$ 25.00	$ 112,500.00
Erosion Control	LS	1	$ 20,000.00	$ 20,000.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 243,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 37,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 114,000.00
			Total Estimated Project Cost	**$ 439,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.15
Project Name	Tolleson Drive at Terrapin Skin Creek Tributary in Brandon
Location Description	This site is located where a Terrapin Skin Creek Tributary crosses under Tolleson Drive, approximately 0.24 miles west of Highway 471 and continues south along the tributary approximately 0.5 miles to Luckney Rd.
Project Coordinates	32°18'9.22"N, 89°59'53.30"W
HUC12	031800020503 Terrapin Skin Creek
Project Type	Dredging and clearing; Bank stabilization
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Reduced flooding in the area Improved water quality Reduced sedimentation
Implementation Period	Study: N/A Design: 6 months Permits: 3 months Land Acquisition: 6 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$950,500
Location Problems	During heavy storm events, flooding occurs along the tributary in this stretch. Flooding does not affect houses or roads but does flood yards. Site investigation revealed that along this stretch, the creek is very narrow and is overgrown with little to no overbank area to flood. There is also evidence of channel degradation – some of it pretty severe. 
Recommended Solution	The recommendation for this site is to clean out, deepen, widen, and riprap the channel to Luckney Road.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.15 - TOLLESON DR AT TERRAPIN SKIN CREEK TRIBUTARY IN BRANDON	4.15.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 4.15 - Tolleson Dr at Terrapin Skin Creek Tributary in Brandon

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 15,000.00	$ 15,000.00
Clearing and Grubbing	AC	2	$ 10,000.00	$ 20,000.00
Removal of Excess Sediment From Open Channel	LF	4,000	$ 20.00	$ 80,000.00
Excess Excavation	CY	12,000	$ 15.00	$ 180,000.00
Riprap (200# size)	Ton	5,000	$ 60.00	$ 300,000.00
Erosion Control	LS	1	$ 10,000.00	$ 10,000.00
			Estimated Construction Costs	$ 605,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 91,000.00
			Permitting	$ 7,500.00
			35% Contigency	$ 247,000.00
			Total Estimated Project Cost	**$ 950,500.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	4.16
Project Name	Grimes Street & Mimosa Avenue in Pelahatchie
Location Description	This site is located at the intersection of Grimes Street and Mimosa Avenue in Pelahatchie, approximately 0.14 miles east of Highway 43. This site is located behind East Rankin Academy.
Project Coordinates	32°18'29.05"N, 89°48'2.37"W
HUC12	031800020302 Ashlog Creek – Pelahatchie Creek
Project Type	Model development; Storage
Number of residences or businesses benefitted	0-25
Anticipated Project Benefits	Possibly install retention/detention in watershed Reestablish channel thalweg to increase hydraulic efficiency
Implementation Period	Study: 15 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$347,000
Location Problems	During large rain events, three houses close to this intersection flood. The West Rankin field on the south west side of the intersection becomes a lake during rain events. Site investigation revealed a small retention area on the northwest side of the intersection that is very small. From the site investigation, it was seen that water flows from north and east of the intersection over the West Rankin field and into a channel that crosses under Highway 43. The drainage path to the channel is not well defined. 
Recommended Solution	Recommendations for this site include reestablishing a defined channel for water flow to the main channel for conveyance and adding storage in the watershed. To effectively do this, a model is recommended to determine how much storage and its location.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A LOW PRIORITY SITE.

0 100 200 400 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 4.16 - GRIMES ST AND MISOSA AVE IN PELAHACHIE	4.16.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 4.16 - Grimes St. and Misosa Ave. in Pelahachie

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 10,000.00	$ 50,000.00
Low Priority Drainage Improvements	AC	250	$ 500.00	$ 125,000.00
			Estimated Construction Costs	$ 175,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 27,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 90,000.00
			Total Estimated Assessment Cost	**$ 347,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.01
Project Name	Vernon Jones Avenue west of Old Fannin Road
Location Description	This site is located on Vernon Jones Avenue, approximately 0.30 miles northwest of Old Fannin Road, next to the Hindu Temple Society of Mississippi.
Project Coordinates	32°22'19.44"N, 90°3'21.28"W
HUC12	031800020603 Hog Creek – Pearl River
Project Type	Bank stabilization; Infrastructure improvements
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced local flooding Improved water quality downstream Reduced sedimentation
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 3 months Implementation: 6 months
In flood zone?	No
Estimated Project Cost	$883,500
Location Problems	 During storm events, water floods Vernon Jones road by the Hindu Temple Society of Mississippi and the adjacent trailer park. During a site investigation there was clear evidence of water flowing over the road from east to west. There is also clear evidence of channel degradation between the Hindu Temple and the trailer park. There is evidence that the culverts through the trailer park have been replaced recently to make them larger to convey more water. East of Vernon Jones Avenue is Oakgrove Subdivision (Site 5.09). There is currently work being performed in the subdivision to help water exit the subdivision to the channel running under Vernon Jones. When this work is complete, flooding over Vernon Jones may worsen.
Recommended Solution	Recommendations for this site include stabilizing the channel between the Hindu Temple and the trailer park and replacing the degraded culverts.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver.	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.01 - VERNON JONES AVE WEST OF OLD FANNIN RD	5.01.01

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Opinion of Probable Cost — Nov. 2018

Site 5.01 - Vernon Jones Ave west of Old Fannin Rd

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	1	$ 12,000.00	$ 12,000.00
53"x40" CPP	LF	80	$ 110.00	$ 8,800.00
Select Fill	CY	2,500	$ 30.00	$ 75,000.00
Excess Excavation	CY	1,000	$ 30.00	$ 30,000.00
Geotextile Fabric	SY	7,000	$ 1.50	$ 10,500.00
Crushed Limestone	CY	625	$ 150.00	$ 93,750.00
HMA (All Courses)	TON	2,000	$ 150.00	$ 300,000.00
Riprap (200# size)	Ton	10	$ 60.00	$ 600.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 556,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 90,000.00
			Permitting	$ 7,500.00
			35% Contigency	$ 230,000.00
			Total Estimated Project Cost	**$ 883,500.00**

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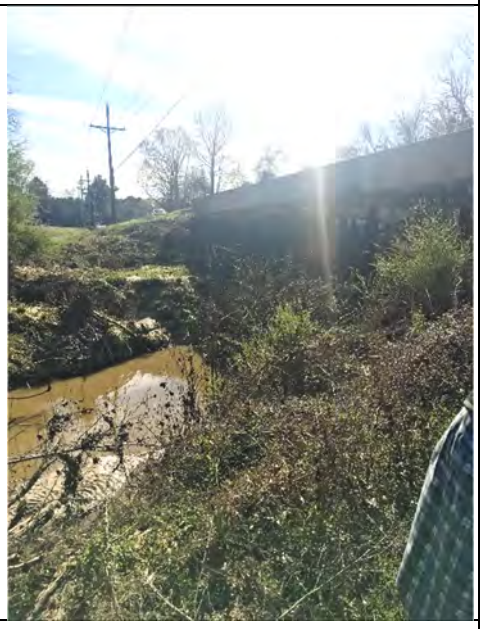
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.02
Project Name	Flowood Drive south of Lakeland Drive in Flowood
Location Description	This site is located where Hog Creek passes under Flowood Drive. This is located approximately 0.52 miles east of the Highway 475/Flowood Drive intersection.
Project Coordinates	32°20'0.45"N, 90°5'1.80"W
HUC12	031800020603 Hog Creek – Pearl River
Project Type	Model development; Storage
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Possibly increasing retention/detention in the area Improved water quality downstream
Implementation Period	Study: 9 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	No
Estimated Project Cost	$1,749,000
Location Problems	This site becomes inundated with water over the road multiple times per year due to rainfall. The entire area is low-lying upon Hog Creek, an unimproved creek in Rankin County. The majority of Hog Creek passes through the City of Flowood and the City has determined, at this time, that it will do nothing to improve Hog Creek. During site investigation, it was seen that the channel experiences both aggradation and degradation leading to parts of the channel having excess sediment in it. 
Recommended Solution	Due to the City's resistance to improving Hog Creek, alternative solutions must be sought for this site. As such, installing off-line retention is the recommended solution. To determine the needed storage amount and the best location for the storage, a model is recommended.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 600'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.02 - FLOWOOD DR SOUTH OF LAKELAND IN FLOWOOD	5.02.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 5.02 - Flowood Dr south of Lakeland in Flowood

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 200,000.00	$ 1,000,000.00
Low Priority Drainage Improvements	AC	200	$ 500.00	$ 100,000.00
			Estimated Construction Costs	$ 1,100,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 165,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 454,000.00
			Total Estimated Assessment Cost	**$ 1,749,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.03
Project Name	Laurel Park Apartments in Flowood
Location Description	This site encompasses Laurel Park Apartments in Flowood. The entrance to the apartment complex is located on Laurel Park Drive, approximately 0.10 miles from Highway 25/Lakeland Drive. The entire apartment complex is included in this site, but the southern portion of the apartment complex is the main focus of this site.
Project Coordinates	32°20'7.27"N, 90°4'17.79"W
HUC12	031800020603 Hog Creek – Pearl River
Project Type	Model development; storage
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Possibly increasing retention/detention in the area Improved water quality downstream
Implementation Period	Study: 9 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	Yes
Estimated Project Cost	$1,861,000
Location Problems	During the April 2017 storm event, a 600-year flood event, the southern half (also referred to as the "back half") of the apartment complex flooded. This apartment complex abuts Hog Creek as it passes though Flowood. The majority of Hog Creek passes through the City of Flowood and the City has determined, at this time, it does not wish to improve Hog Creek. During site investigation, it was seen that the channel experiences both aggradation and degradation leading to parts of the channel having excess sediment in it. The main Hog Creek channel in this area is very well-established and is deep and wide making it capable of conveying large quantities of water. 
Recommended Solution	Due to the City's resistance to improving Hog Creek alternative solutions must be sought for this site. As such, installing off-line retention is the recommended solution. To determine the needed storage amount and the best location for the storage, a model is recommended.

NOTE:

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A MEDIUM PRIORITY SITE.

0 200 400 800 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.03 - LAUREL PARK APARTMENTS IN FLOWOOD	5.03.01

Conceptual Opinion of Probable Cost — Nov. 2018

Site 5.03 - Laurel Park Apartments in Flowood

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 200,000.00	$ 1,000,000.00
Medium Priority Drainage Improvements	AC	150	$ 1,000.00	$ 150,000.00
			Estimated Construction Costs	$ 1,150,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 173,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 483,000.00
			Total Estimated Assessment Cost	**$ 1,861,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.04
Project Name	Fox Hall Road west of Highway 475 in Flowood
Location Description	This site is located on Fox Hall Road approximately 0.22 miles southwest of the Highway 475/Fox Hall Road intersection. At this location, a tributary of Neely Creek crosses Fox Hall Road.
Project Coordinates	32°18'28.89"N, 90°5'26.20"W
HUC12	031800020604 Town Creek – Pearl River
Project Type	Infrastructure improvements
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Reduced flooding over the road Improved hydraulic efficiency
Implementation Period	Study: N/A Design: 3 months Permits: 9 months Land Acquisition: 9 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$790,000
Location Problems	This site becomes flooded during rain events. Site investigations revealed the culvert under Fox Hall Road appears to be located higher than the stream leading to water flooding the road. 
Recommended Solution	The recommended solution for this site is to lower the culvert under Fox Hall Road and to check the culvert inverts to ensure the culvert is properly sloped to allow flow through it.

NOTE:

LOWER CULVERT AND CORRECT SLOPE.

0 250 500 1000 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 500'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.04 - FOX HALL RD WEST OF HWY 475 IN FLOWOOD	5.04.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 5.04 - Fox Hall Rd west of Hwy 475 in Flowood

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	1	$ 12,000.00	$ 12,000.00
Culvert Replacement	LF	70	$ 110.00	$ 7,700.00
Excess Excavation	CY	1,000	$ 30.00	$ 30,000.00
Geotextile Fabric	SY	7,000	$ 1.50	$ 10,500.00
Crushed Limestone	CY	625	$ 150.00	$ 93,750.00
HMA (All Courses)	TON	2,000	$ 150.00	$ 300,000.00
Riprap (200# size)	Ton	10	$ 60.00	$ 600.00
Seeding and Mulch	LS	1	$ 5,000.00	$ 5,000.00
			Estimated Construction Costs	$ 480,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 80,000.00
			Permitting	$ 20,000.00
			35% Contigency	$ 210,000.00
			Total Estimated Project Cost	**$ 790,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.05
Project Name	Neely Creek between Nancy Street and Skylane Drive in Pearl
Location Description	This site is located in Pearl. It is bound to the north by Old Brandon Road, Highway 80 to the south, Skylane Drive to the east, and Nancy Street to the west.
Project Coordinates	32°17'16.13"N, 90°5'7.03"W
HUC12	031800020604 Town Creek – Pearl River
Project Type	Dredging and clearing; Infrastructure improvements
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced flooding in the neighborhood Improved stormwater infrastructure
Implementation Period	Study: N/A Design: 6 months Permits: 12 months Land Acquisition: 12 months Implementation: 6 months
In flood zone?	Yes
Estimated Project Cost	$2,314,000
Location Problems	During heavy rain storms, the roads in this area flood. In the April 2017 flood, a 600-year event, two houses got flood water in them. During site investigations, there was clear evidence that water stands on portions of the roads. There are gutters located throughout the neighborhood that appear to be in good condition. However, the drainage structures do not appear to be on grade and appear higher than they should be for effective and efficient drainage. Additionally, the creek that runs through the neighborhood appears to be narrow and shallow making it unable to hold and convey the necessary quantities of water. 
Recommended Solution	Recommendations for this site include deepening and widening the channel, checking and correcting the grade of the drainage structures as well as cleaning the drainage structures. Alternatively, upon in-depth inspection of stormwater infrastructure, it may become necessary to replace the infrastructure instead of rehabilitate it.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 400'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.05 - NEELY CREEK BETWEEN NANCY AND SKYLANE IN PEARL	5.05.01

Rankin Conceptual Drainage Assesment

Opinion of Probable Cost — Nov. 2018

Site 5.05 - Neely Creek between Nancy and Skylane in Pearl

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 20,000.00	$ 20,000.00
Clearing and Grubbing	AC	1	$ 12,000.00	$ 12,000.00
Removal of Excess Veget. From Open Channel	LF	2,000	$ 21.00	$ 42,000.00
Removal of Excess Sediment From Open Channel	LF	2,000	$ 20.00	$ 40,000.00
Excess Excavation	CY	2,500	$ 30.00	$ 75,000.00
Clean and Inspect Drainage Infrastructure	LF	10,000	$ 25.00	$ 250,000.00
Drainage Structure Replacement	EA	50	$ 5,000.00	$ 250,000.00
RCP Repair / Replacement	LF	5,000	$ 150.00	$ 750,000.00
Seeding and Mulch	LS	1	$ 10,000.00	$ 10,000.00
			Estimated Construction Costs	$ 1,449,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 220,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contigency	$ 600,000.00
			Total Estimated Project Cost	**$ 2,314,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.06
Project Name	Chicot Court at Highway 80 in Pearl
Location Description	This site is located at the Roses Discount Store in Pearl between Highway 80 and Old Brandon Road.
Project Coordinates	32°16'51.42"N, 90°7'12.06"W
HUC12	031800020605 Neely Creek – Conway Slough
Project Type	Model development; storage; dredging and clearing
Number of residences or businesses benefitted	100+
Anticipated Project Benefits	Reduced flooding in downtown Pearl Improve hydraulic efficiency Increase retention/detention in the watershed
Implementation Period	Study: N/A Design: 9 months Permits: 12 months Land Acquisition: 9 months Implementation: 12 months
In flood zone?	Yes
Estimated Project Cost	$1,715,000
Location Problems	During storm events the Roses parking lot acts as a detention pond and becomes flooded. During site investigations, it is seen that there are ditches along three sides of the parking lot but that there are berms between the parking lot and the ditches impeding water flow into the ditches. Additionally, the main ditches along Highway 80 are partially silted in. The Mississippi Department of Transportation is planning to clean the ditches along Highway 80 of excess sediment and vegetation during the summer of 2018. A large storm event in 2018 resulted in major flooding in this area. Site reconnaissance following the event showed a lack of storage within the watershed above this location. 
Recommended Solution	The recommendation for this site is to install flow paths from the parking lot to the ditches to allow water to exit the parking lot. Alternatively, underground storage underneath the parking lot may be added to help reduce flooding. Additional storage should also be added within the watershed to help reduce flooding requiring a model to identify proper locations for this storage.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 600'	WAGGONER Inspire. Engage. Deliver. Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.06 - CHICOT COURT AT HWY 80 IN PEARL	5.06.01

Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 5.06 - Chicot Court at Hwy 80 in Pearl

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Parking Lot Drainage	LS	1	$ 250,000.00	$ 250,000.00
Land Acquisition	AC	5	$ 100,000.00	$ 500,000.00
Medium Priority Drainage Improvements	AC	300	$ 1,000.00	$ 300,000.00
			Estimated Construction Costs	$ 1,060,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 160,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 10,000.00
			35% Contigency	$ 450,000.00
			Total Estimated Project Cost	**$ 1,715,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.07
Project Name	Tony Drive between Old Country Club and Boehle
Location Description	This site is located along Tony Drive between Old Country Club Road and Bohele Road, south of Old Brandon Road.
Project Coordinates	32°16'24.59"N, 90°7'50.84"W
HUC12	031800020605 Neely Creek – Conway Slough
Project Type	Infrastructure improvements
Number of residences or businesses benefitted	26-50
Anticipated Project Benefits	Reduced street flooding Increased hydraulic efficiency
Implementation Period	Study: N/A Design: 6 months Permits: 12 months Land Acquisition: 9 months Implementation: 9 months
In flood zone?	Yes
Estimated Project Cost	$411,000
Location Problems	During storm events, the area surrounding Tony Drive becomes flooded. Site investigation revealed a lack of ditches and/or flow paths other than the road for water to flow through. There are ditches close to Tony Drive in which stormwater currently flows. 
Recommended Solution	For this site, the recommendation is to install ditches along Tony Drive and any adjacent streets lacking ditches so that water can flow to already established ditches on Old County Club Road.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.07 - TONY ST BETWEEN OLD COUNTRY CLUB AND BOEHLE	5.07.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 5.07 - Tony Drive between Old Country Club and Boehle Rd

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Excess Excavation	CY	3,000	$ 30.00	$ 90,000.00
RCP Drainage Pipe	LF	500	$ 75.00	$ 37,500.00
Grate Inlet	EA	2	$ 3,500.00	$ 7,000.00
Asphalt Roadway Repair	SF	500	$ 50.00	$ 25,000.00
Gravel Roadway Repair	SF	1,000	$ 25.00	$ 25,000.00
Erosion Control	LS	1	$ 5,000.00	$ 5,000.00
Seeding and Mulch	SF	50,000	$ 0.50	$ 25,000.00
			Estimated Construction Costs	$ 225,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 34,000.00
			CLOMR and LOMR Regulatory Updates	$ 25,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 107,000.00
			Total Estimated Project Cost	**$ 411,000.00**

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.08
Project Name	Old County Club Road at Louisa Street in Pearl
Location Description	This site is located at the intersection of Old Country Club Road and Louisa Street in Pearl. This site also includes the area surrounding the intersection.
Project Coordinates	32°16'23.56"N, 90°7'37.03"W
HUC12	031800020605 Neely Creek – Conway Slough
Project Type	Dredging and clearing
Number of residences or businesses benefitted	51-75
Anticipated Project Benefits	Reduced flooding in neighborhood Increased in-stream storage Improved water quality downstream
Implementation Period	Study: N/A Design: 3 months Permits: 6 months Land Acquisition: 6 months Implementation: 3 months
In flood zone?	No
Estimated Project Cost	$465,000
Location Problems	 From local knowledge, it is historically true that a one inch rainfall in one hour will cause the road here to flood. When rainfall exceeds four inches in six hours water starts to flow under houses in the area with conventional foundations. From site investigation it was seen that the drainage ditch in this area is very silted in and overgrown leaving little to no space for water to be retained in-stream. Due to the relatively flat terrain, when water leaves the ditch it floods the immediate area which includes houses with conventional foundations.
Recommended Solution	The recommendation for this site is to clean, deepen, and widen the ditches in the area to allow for in-stream storage.

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 200'	WAGGONER Inspire. Engage. Deliver.	Jackson, MS • Hernando, MS • Gulfport, MS Ruston, LA • New Orleans, LA www.waggonereng.com 1-800-661-3733	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.08 - OLD COUNTRY CLUB RD AT LOUISA ST IN PEARL	5.08.01

Rankin County Drainage Plan

Opinion of Probable Cost — Nov. 2018

Site 5.08 - Old Country Club Rd. at Louisa St. in Pearl

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Mobilization	LS	1	$ 10,000.00	$ 10,000.00
Excess Excavation	CY	2,500	$ 30.00	$ 75,000.00
RCP Drainage Pipe	LF	1,000	$ 75.00	$ 75,000.00
Grate Inlet	EA	5	$ 3,500.00	$ 17,500.00
Asphalt Roadway Repair	SF	1,000	$ 50.00	$ 50,000.00
Gravel Roadway Repair	SF	500	$ 25.00	$ 12,500.00
Erosion Control	LS	1	$ 5,000.00	$ 5,000.00
Seeding and Mulch	SF	50,000	$ 0.50	$ 25,000.00
Land Acquisition	AC	1	$ 20,000.00	$ 20,000.00
			Estimated Construction Costs	$ 290,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 44,000.00
			Permitting	$ 10,000.00
			35% Contingency	$ 121,000.00
			Total Estimated Project Cost	**$ 465,000.00**

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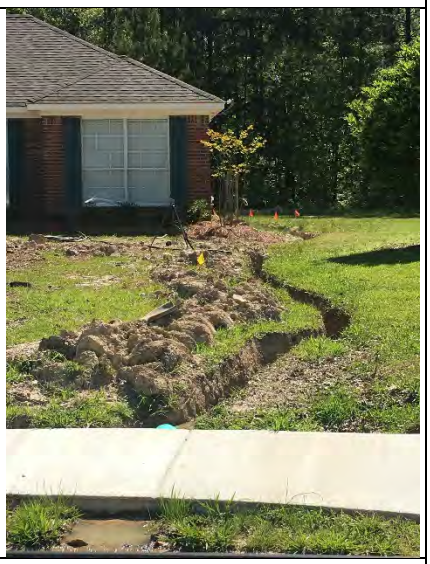
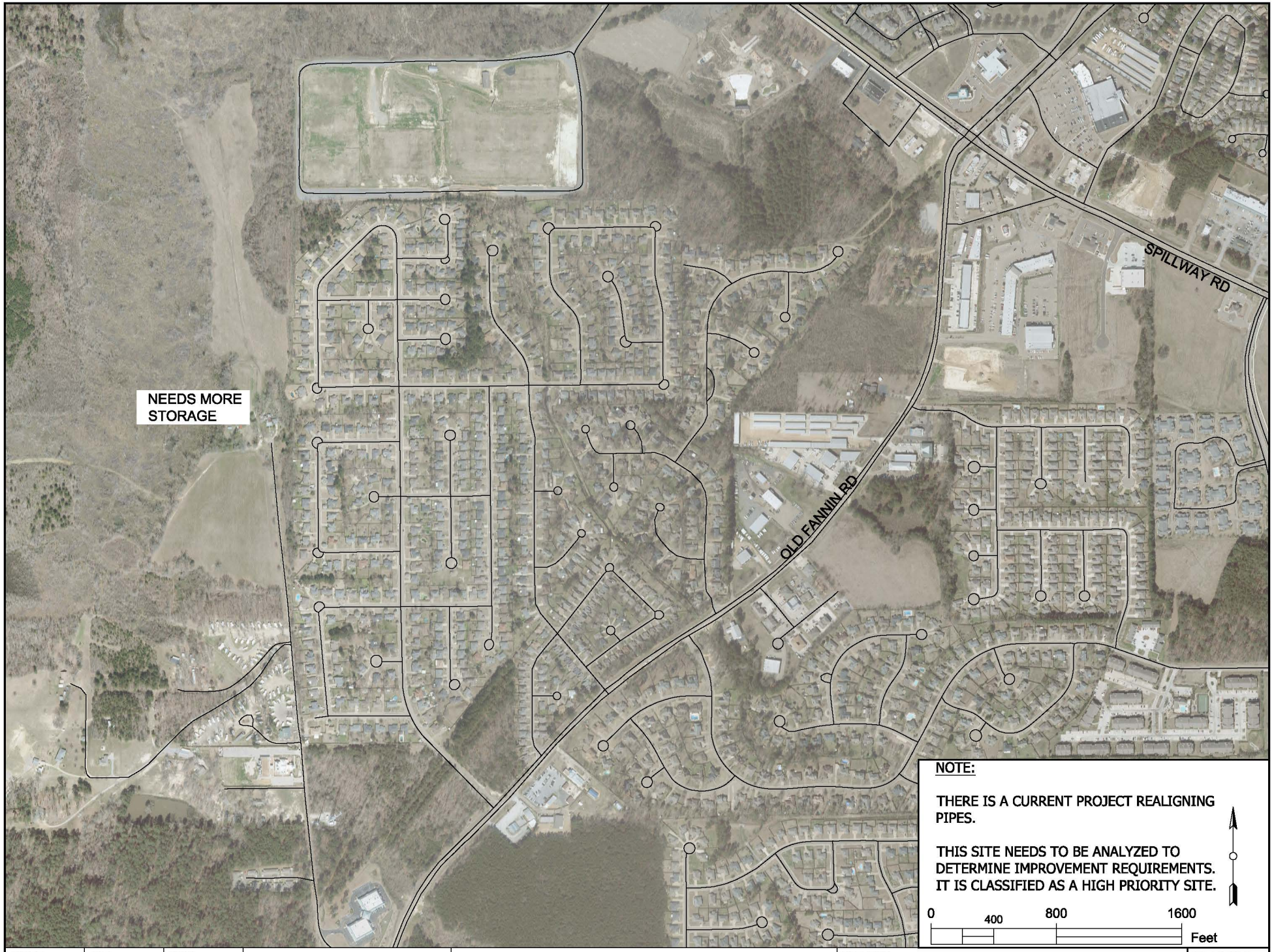
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
PROJECT INFORMATION SHEET

Project Number	5.09
Project Name	Oakgrove Subdivision
Location Description	The site encompasses the Oakgrove Subdivision located off of Old Fannin Road.
Project Coordinates	32°22'42.86"N, 90°3'4.35"W
HUC12	031800020307 Mill Creek – Pelahatchie Creek
Project Type	Infrastructure improvements; Model development; Storage
Number of residences or businesses benefitted	76-100
Anticipated Project Benefits	Improved stormwater infrastructure Increased retention/detention storage in the watershed
Implementation Period	Study: 6 months Design: --- Permits: --- Land Acquisition: --- Implementation: ---
In flood zone?	No
Estimated Project Cost	$1,556,000
Location Problems	During rain events the roads in this subdivision have stormwater flow over them. Site investigation revealed a curb and gutter system. In 2018, Rankin County began a project to check the condition of the stormwater piping network in the subdivision. In the project, pipes that do not meet specification will be replaced. The piping network will also be realigned to ensure proper grade throughout. There is no evidence of detention in the subdivision. 
Recommended Solution	In addition to the 2018 project, it is recommended that detention needs to be added within the watershed east of Vernon Jones Avenue. To effectively do this, a model is recommended to determine how much storage is needed and its location.



NOTE:

THERE IS A CURRENT PROJECT REALIGNING PIPES.

THIS SITE NEEDS TO BE ANALYZED TO DETERMINE IMPROVEMENT REQUIREMENTS. IT IS CLASSIFIED AS A HIGH PRIORITY SITE.

0 400 800 1600 Feet

PROJECT:	DATE:	SCALE:			SHEET NAME:	SHEET NUMBER:
P016080.000	NOV - 2018	1" = 800'	WAGGONER Inspire. Engage. Deliver.	RANKIN CO BOARD OF SUPERVISORS COMPREHENSIVE DRAINAGE MASTER PLAN	SITE 5.09 - BUCKINGHAM SUBDIVISION	5.09.01

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Rankin Conceptual Drainage Assesment

Conceptual Opinion of Probable Cost — Nov. 2018

Site 5.09 - Oakgrove Subdivisions

Pay Item	Unit	Quantity	Unit Cost	Total Cost
Land Acquisition	AC	5	$ 25,000.00	$ 125,000.00
High Priority Drainage Improvements	AC	425	$ 2,000.00	$ 850,000.00
			Estimated Construction Costs	$ 975,000.00
			H&H Technical Review	$ 10,000.00
			Engineering Costs (Design, Inspection, Construction Testing, etc.)	$ 147,000.00
			Permitting	$ 20,000.00
			35% Contingency	$ 404,000.00
			Total Estimated Assessment Cost	**$ 1,556,000.00**

NOTE:
H&H analyses are included in the Watershed costs.

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Appendix B – Sites by Supervisor District

Working with county and city officials and staff, a list of sixty (60) areas known to have drainage deficiencies was created. Of these sites, thirty-five (35) are located within city limits and twenty-five (25) are located in the county. Through individual interviews with county and city officials numerous sites were identified multiple times. For simplicity, duplicate sites were removed from the list.

The following table lists the consolidated sixty sites. The initial number in the Site Number indicates the Supervisor District where the project is located. For example, Site 1.01 is located in District 1. Sites are not numbered in any particular priority and are generally numbered in the order in which the county or city official identified them. In addition to the site number and the site name, the 12-digit Hydrologic Unit Code (HUC12) for each site was identified and is listed by name.

Table 1: Sites with Deficiencies Identified in Rankin County

Site Number	Site Name / Description	HUC 12
1.01	Williams Road between Levy Lane and The North Road	Indian Creek - Steen Creek
1.02	Pearson Road @ Unknown Tributary	Lower Richland Creek
1.03	Gunter Road @ Indian Creek	Indian Creek - Steen Creek
1.04	Old Pearson Road at bend east of Highway 49	Indian Creek - Steen Creek
1.05	Highway 49 @ Hwy 469 in Florence	Indian Creek - Steen Creek
1.06	Williams Road @ Butler Creek in Florence	Indian Creek - Steen Creek
1.07	Highway 49 Culvert @ Butler Creek in Florence	Indian Creek - Steen Creek
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	Indian Creek - Steen Creek
1.09	Highway 469 between West Main Street & White Street in Florence	Indian Creek - Steen Creek
1.1	Highway 469 @ Steen Creek in Florence	Indian Creek - Steen Creek
1.11	Highway 49 Commercial Area in Richland	Lower Richland Creek
1.12	Bud Street in Richland	Lower Richland Creek
1.13	Jones Street @ Old Hwy 49 South in Richland	Lower Richland Creek
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Cany Creek - Pearl River
1.15	Linda Jo Drive @ Lowe Circle in Richland	Cany Creek - Pearl River
1.16	Lowe Circle @ Southwind Apartments in Richland	Lower Richland Creek
1.17	End of Lewis Street in Richland	Cany Creek - Pearl River
1.18	East Harper Street @ Short Street in Richland	Lower Richland Creek
1.19	Richland East Circle in Richland	Lower Richland Creek
1.2	Furr Dr @ Richland Circle in Richland	Lower Richland Creek
2.01	Mill Creek between Highway 25 & The Reservoir	Mill Creek - Pelahatchie Creek

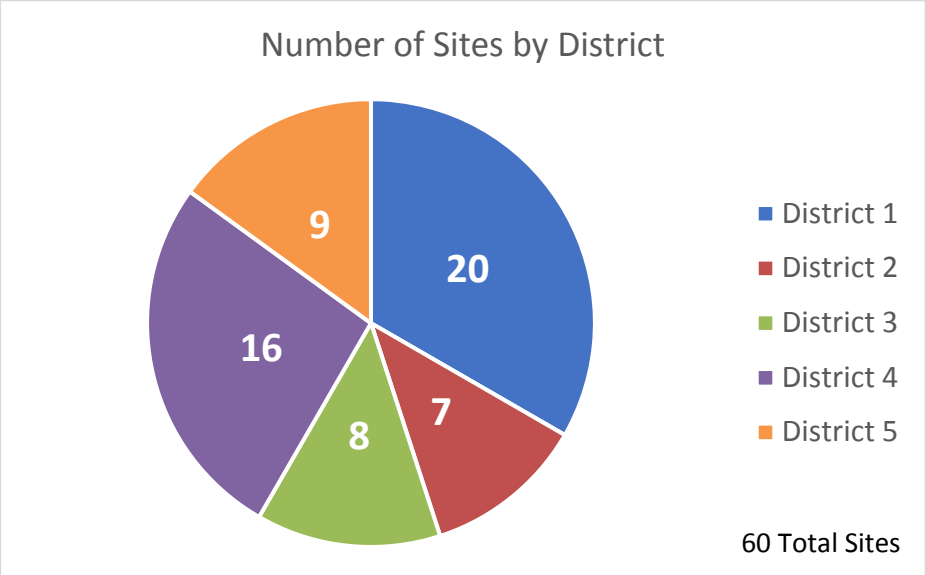
Site Number	Site Name / Description	HUC 12
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Mill Creek - Pelahatchie Creek
2.03	Church Road @ Unnamed Tributary	Mill Creek - Pelahatchie Creek
2.04	Manship Road @ Amethyst Drive	Mill Creek - Pelahatchie Creek
2.05	Mill Creek under Lakeland	Mill Creek - Pelahatchie Creek
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	Mill Creek - Pelahatchie Creek
2.07	Oakgrove Subdivision	Brashear Creek - Pearl River
3.01	Tara Road @ Unnamed Tributary	Upper Richland Creek
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Lower Richland Creek
3.03	Thomasville Road @ Unnamed Tributary	Lower Richland Creek
3.04	Puckett Park off Highway 18 in Puckett	Brushy Creek - Clear Creek
3.05	Windchase Subdivision in Brandon	Upper Richland Creek
3.06	Belle Oak Subdivision in Brandon	Upper Richland Creek
3.07	Greenfield Road @ Unnamed Tributary in Pearl	Terrapin Skin Creek
3.08	Meadowland Drive @ East Government Street in Brandon	Upper Richland Creek
4.01	Jims Road @ Unnamed Tributary	Deer Creek - Fannegusha Creek
4.02	Weaver Road @ Unnamed Tributary	Red Cane Creek - Fannegusha Creek
4.03	Gore Road @ Purnell Creek	Deer Creek - Fannegusha Creek
4.04	Lewis Prestage Road @ Rollison Creek	Red Cane Creek - Fannegusha Creek
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Riley Creek - Pelahatchie Creek
4.06	Holly Bush Road between Sara Fox Drive & Rodeo Drive	Riley Creek - Pelahatchie Creek
4.07	Reservoir East Subdivision	Riley Creek - Pelahatchie Creek
4.08	Holly Bush Road @ Riley Creek	Riley Creek - Pelahatchie Creek
4.09	Oakdale Road north of Baker Lane	Riley Creek - Pelahatchie Creek
4.10	Andrew Chapel Road @ Bush Creek	Riley Creek - Pelahatchie Creek
4.11	Barker Road @ Dry Creek Tributary	Hollybush Creek - Clear Creek
4.12	Brush Creek in North Brandon Estates	Riley Creek - Pelahatchie Creek
4.13	Highway 80 @ Hwy 43 in Pelahatchie	Snake Creek - Pelahatchie Creek
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	Terrapin Skin Creek
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	Terrapin Skin Creek
4.16	Grimes Street & Mimosa Avenue in Pelahatchie	Ashlog Creek - Pelahatchie Creek
5.01	Vernon Jones Avenue west of Old Fannin Road	Hog Creek - Pearl River

Site Number	Site Name / Description	HUC 12
5.02	Flowood Drive south of Lakeland in Flowood	Hog Creek - Pearl River
5.03	Laurel Park Apartments in Flowood	Hog Creek - Pearl River
5.04	Fox Hall Road west of Highway 475 in Flowood	Town Creek - Pearl River
5.05	Neely Creek between Nancy and Skylane in Pearl	Town Creek - Pearl River
5.06	Chicot Court @ Hwy 80 in Pearl	Neely Creek - Conway Slough
5.07	Tony Street between Old Country Club & Boehle	Neely Creek - Conway Slough
5.08	Old Country Club Road @ Louisa Street in Pearl	Neely Creek - Conway Slough
5.09	Buckingham Subdivision	Mill Creek - Pelahatchie Creek

60 Sites in 17 Watersheds

To better visualize the number of sites per supervisor district, the chart below depicts the total number of identified deficient sites per district.

Figure 10: Identified Sites with Deficiencies per Supervisor District



While the majority of this report focuses on a watershed approach to managing these sites, knowing what supervisor district they are located in is also important.

The county map below shows the outline of the supervisor districts and the location of the sixty sites. The maps that follow show the individual supervisor districts with the sites located in each district.

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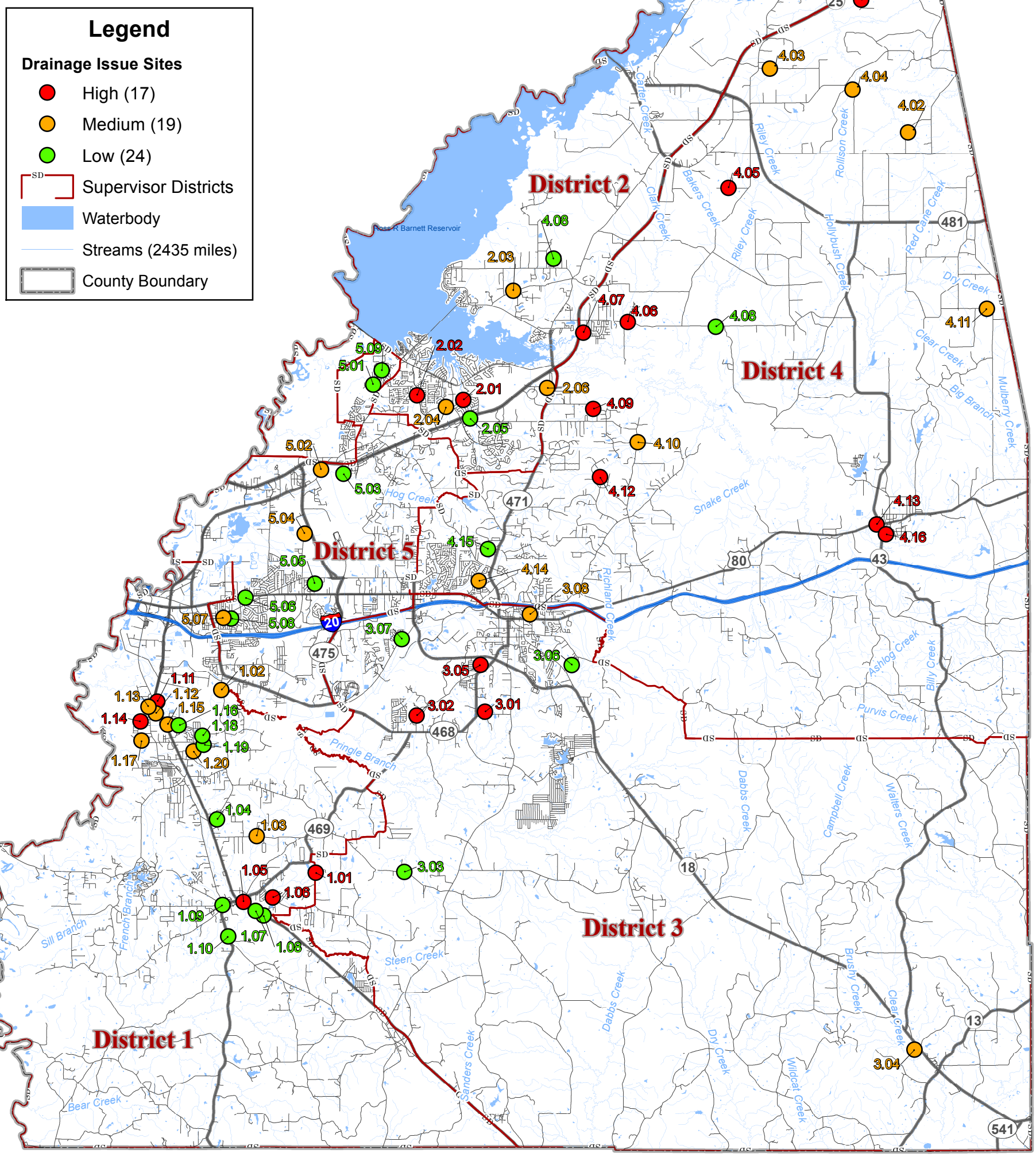
Rankin County

Drainage Issue Site Map



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Rankin County

Supervisor District 1 Map

Legend

Drainage Issue Sites

- High Priority (18)
- Medium Priority (19)
- Low Priority (23)
- HUC12
- Supervisor Districts
- Streams (2435 miles)
- Waterbody
- County Boundary

WAGGONER

0 0.75 1.5 3 Miles

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Rankin County

Supervisor District 2 Map

N

Legend

Drainage Issue Sites

- High Priority (18)
- Medium Priority (19)
- Low Priority (23)
- HUC12
- Supervisor Districts
- Streams (2435 miles)
- Waterbody
- County Boundary

5.01 5.09 5.03 3.07 2.02 2.01 2.04 2.05 2.06 2.07 2.03 4.15 4.14 3.08 4.07 4.06 4.08 4.09 4.10 4.12 4.05 4.03 4.04 4.02 4.01 4.13 4.16

Text

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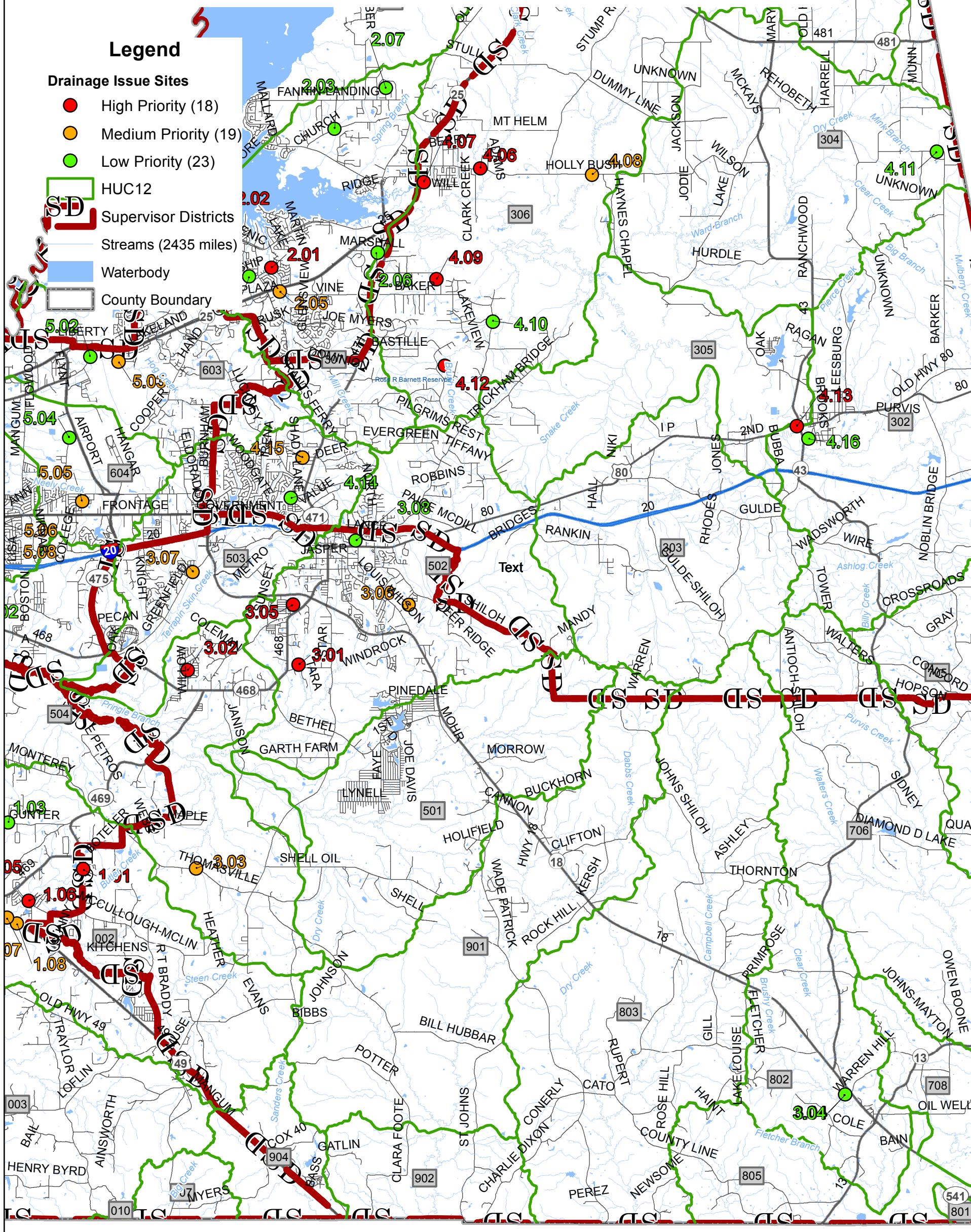
Rankin County

Supervisor District 3 Map



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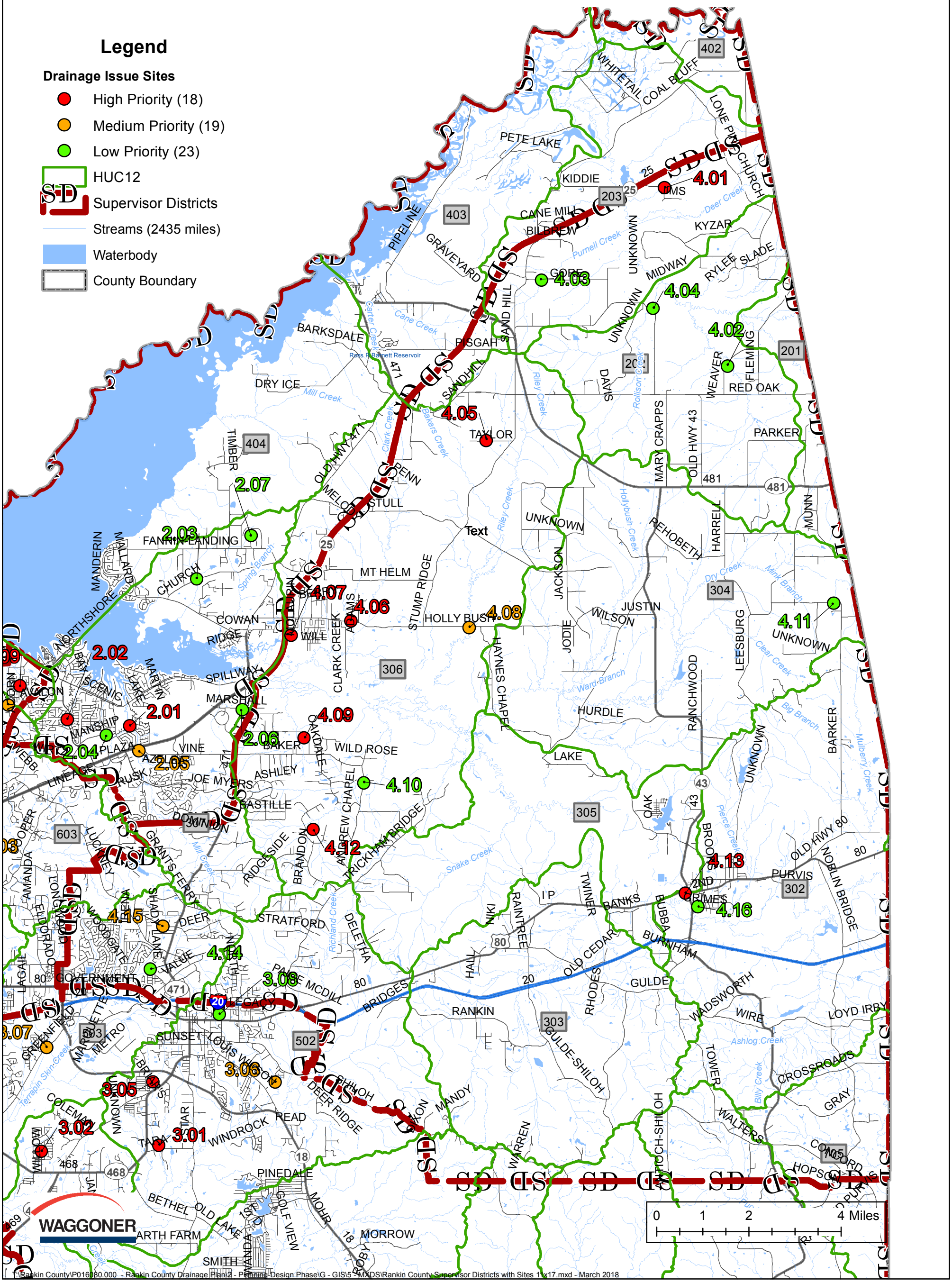
Rankin County

Supervisor District 4 Map

Legend

Drainage Issue Sites

- High Priority (18)
- Medium Priority (19)
- Low Priority (23)
- HUC12
- Supervisor Districts
- Streams (2435 miles)
- Waterbody
- County Boundary



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Rankin County

Supervisor District 5 Map

Legend

Drainage Issue Sites

- High Priority (18)
- Medium Priority (19)
- Low Priority (23)
- HUC12
- Supervisor Districts
- Streams (2435 miles)
- Waterbody
- County Boundary

5.09
5.01
2.02
5.02
5.03
603
5.04
Text
4.15
5.05
604
605
601
2.04
5.06
5.07
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503
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Appendix C – Watershed Sheets

Working with county and city officials and staff, a list of sixty (60) areas known to have drainage deficiencies was created. Of these sites, thirty-five (35) are located within city limits and twenty-five (25) are located in the county. Through individual interviews with county and city officials numerous sites were identified multiple times. For simplicity, duplicate sites were removed from the list.

The following table lists the consolidated sixty sites. The initial number in the Site Number indicates the Supervisor District where the project is located. For example, Site 1.01 is located in District 1. Sites are not numbered in any particular priority and are generally numbered in the order in which the county or city official identified them. In addition to the site number and the site name, the 12-digit Hydrologic Unit Code (HUC12) for each site was identified and is listed by name.

Table 1: Sites with Deficiencies Identified in Rankin County

Site Number	Site Name / Description	HUC 12
1.01	Williams Road between Levy Lane and The North Road	Indian Creek - Steen Creek
1.02	Pearson Road @ Unknown Tributary	Lower Richland Creek
1.03	Gunter Road @ Indian Creek	Indian Creek - Steen Creek
1.04	Old Pearson Road at bend east of Highway 49	Indian Creek - Steen Creek
1.05	Highway 49 @ Hwy 469 in Florence	Indian Creek - Steen Creek
1.06	Williams Road @ Butler Creek in Florence	Indian Creek - Steen Creek
1.07	Highway 49 Culvert @ Butler Creek in Florence	Indian Creek - Steen Creek
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	Indian Creek - Steen Creek
1.09	Highway 469 between West Main Street & White Street in Florence	Indian Creek - Steen Creek
1.1	Highway 469 @ Steen Creek in Florence	Indian Creek - Steen Creek
1.11	Highway 49 Commercial Area in Richland	Lower Richland Creek
1.12	Bud Street in Richland	Lower Richland Creek
1.13	Jones Street @ Old Hwy 49 South in Richland	Lower Richland Creek
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Cany Creek - Pearl River
1.15	Linda Jo Drive @ Lowe Circle in Richland	Cany Creek - Pearl River
1.16	Lowe Circle @ Southwind Apartments in Richland	Lower Richland Creek
1.17	End of Lewis Street in Richland	Cany Creek - Pearl River
1.18	East Harper Street @ Short Street in Richland	Lower Richland Creek
1.19	Richland East Circle in Richland	Lower Richland Creek
1.2	Furr Dr @ Richland Circle in Richland	Lower Richland Creek
2.01	Mill Creek between Highway 25 & The Reservoir	Mill Creek - Pelahatchie Creek

Site Number	Site Name / Description	HUC 12
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Mill Creek - Pelahatchie Creek
2.03	Church Road @ Unnamed Tributary	Mill Creek - Pelahatchie Creek
2.04	Manship Road @ Amethyst Drive	Mill Creek - Pelahatchie Creek
2.05	Mill Creek under Lakeland	Mill Creek - Pelahatchie Creek
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	Mill Creek - Pelahatchie Creek
2.07	Oakgrove Subdivision	Brashear Creek - Pearl River
3.01	Tara Road @ Unnamed Tributary	Upper Richland Creek
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Lower Richland Creek
3.03	Thomasville Road @ Unnamed Tributary	Lower Richland Creek
3.04	Puckett Park off Highway 18 in Puckett	Brushy Creek - Clear Creek
3.05	Windchase Subdivision in Brandon	Upper Richland Creek
3.06	Belle Oak Subdivision in Brandon	Upper Richland Creek
3.07	Greenfield Road @ Unnamed Tributary in Pearl	Terrapin Skin Creek
3.08	Meadowland Drive @ East Government Street in Brandon	Upper Richland Creek
4.01	Jims Road @ Unnamed Tributary	Deer Creek - Fannegusha Creek
4.02	Weaver Road @ Unnamed Tributary	Red Cane Creek - Fannegusha Creek
4.03	Gore Road @ Purnell Creek	Deer Creek - Fannegusha Creek
4.04	Lewis Prestage Road @ Rollison Creek	Red Cane Creek - Fannegusha Creek
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Riley Creek - Pelahatchie Creek
4.06	Holly Bush Road between Sara Fox Drive & Rodeo Drive	Riley Creek - Pelahatchie Creek
4.07	Reservoir East Subdivision	Riley Creek - Pelahatchie Creek
4.08	Holly Bush Road @ Riley Creek	Riley Creek - Pelahatchie Creek
4.09	Oakdale Road north of Baker Lane	Riley Creek - Pelahatchie Creek
4.10	Andrew Chapel Road @ Bush Creek	Riley Creek - Pelahatchie Creek
4.11	Barker Road @ Dry Creek Tributary	Hollybush Creek - Clear Creek
4.12	Brush Creek in North Brandon Estates	Riley Creek - Pelahatchie Creek
4.13	Highway 80 @ Hwy 43 in Pelahatchie	Snake Creek - Pelahatchie Creek
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	Terrapin Skin Creek
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	Terrapin Skin Creek
4.16	Grimes Street & Mimosa Avenue in Pelahatchie	Ashlog Creek - Pelahatchie Creek
5.01	Vernon Jones Avenue west of Old Fannin Road	Hog Creek - Pearl River

Site Number	Site Name / Description	HUC 12
5.02	Flowood Drive south of Lakeland in Flowood	Hog Creek - Pearl River
5.03	Laurel Park Apartments in Flowood	Hog Creek - Pearl River
5.04	Fox Hall Road west of Highway 475 in Flowood	Town Creek - Pearl River
5.05	Neely Creek between Nancy and Skylane in Pearl	Town Creek - Pearl River
5.06	Chicot Court @ Hwy 80 in Pearl	Neely Creek - Conway Slough
5.07	Tony Street between Old Country Club & Boehle	Neely Creek - Conway Slough
5.08	Old Country Club Road @ Louisa Street in Pearl	Neely Creek - Conway Slough
5.09	Buckingham Subdivision	Mill Creek - Pelahatchie Creek

60 Sites in 17 Watersheds

It is important to identify watersheds with deficiencies. In order to do this, the 12-digit Hydrologic Unit Code (HUC12) for each site was identified and the total number of sites per HUC12 was calculated. A map showing the location of each problem site and the HUC12 it is located in is shown below.

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Rankin County

Drainage Issue Site Map

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Legend

Drainage Issue Sites

- High (17)
- Medium (19)
- Low (24)
- HUC12
- Streams (2435 miles)
- Waterbody
- County Boundary

Ross R Barnett Reservoir

WAGGONER

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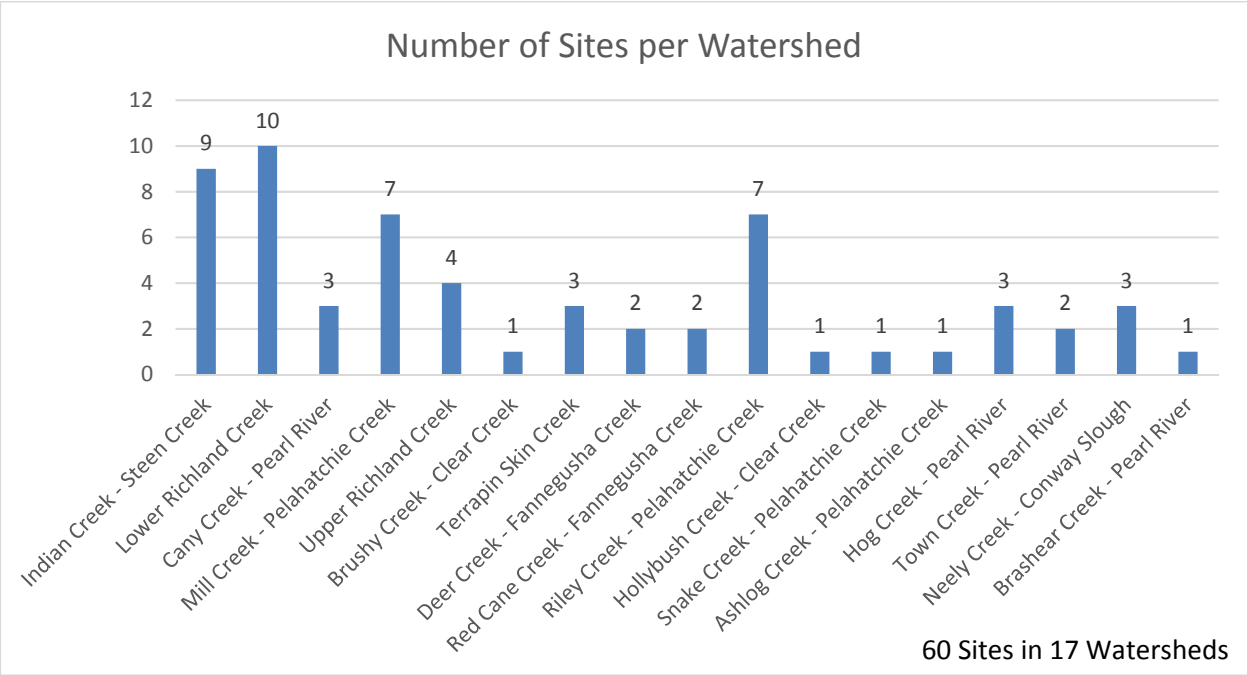
This information is useful in recommending holistic, watershed-based solutions which are presented later in this document, and tells if the site is an indicator of a larger watershed problem or simply a site-specific problem. The number of sites per HUC12 is shown in Figure 41 below.

Figure 1: Number of Sites per Watershed



In order to collect as much existing information as possible about each site, interviews were conducted with each Supervisor, the Rankin County Road Manager, and responsible parties in the Cities located in Rankin County. During these interviews the following information was requested for each site:

- Please describe the nature of the problem at this location.
- How long has this problem existed?
- Please provide the name, phone number, or other contact information for the person most familiar with this situation, for further interview.
- Have there been any previous investigative measures or studies performed that were intended to address this situation? If so, please provide the name and contact information of the responsible party.

This initial information was critical to the assessment. Field investigations were completed before identifying the deficiencies at each site. During the field investigations, engineers visited each site county and city officials had named as problem areas. The engineers walked around each site taking photographs and notes trying to identify any problems that could be

seen within each site. The extent of the investigation varied by site, depending upon the information provided by city and county officials beforehand, site access, and the ability to visually determine site deficiencies.

Watershed sheets were created to help summarize the sites, deficiencies, and solutions for each watershed. Each watershed sheet includes:

- Watershed number (the USGS assigned HUC12)
- Watershed name
- Watershed code
- The number of sites in the watershed
- The number of sites in the flood zone in that watershed
- The sites in the watershed
- The total watershed area in Rankin County
- The total watershed area in the flood zone in Rankin County
- The total developed area of the flood zone in Rankin County
- The total developable (through zoning classification) area of the flood zone in Rankin County
- The watershed location
- Where the watershed drains to
- The types of projects in the watershed
- The total conceptual OPC for all of the projects in the watershed
- Problems within the watershed
- Recommended solutions

Following each Watershed Sheet is a conceptual opinion of probable cost. In-depth site-specific conceptual opinions of probable cost are located in Appendix A – Project Sheets.

RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020504
Watershed Name	Lower Richland Creek
Watershed Code	504
Number of Sites in the Watershed	10
Number of Sites in the Flood Zone	4
Sites in Watershed	1.02 – Pearson Road @ Unknown Tributary; 1.11 – Highway 49 Commercial Area in Richland; 1.12 – Bud St in Richland; 1.13 – Jones St @ Old Highway 49 South; 1.16 – Lowe Circle @ Southwind Apartments in Richland; 1.18 – E Harper St @ Short St; 1.19 – Richland East Circle; 1.20 – Furr Dr @ Richland Circle; 3.02 – Live Oaks Subdivision @ Spanish Oak Dr; 3.03 – Thomasville Rd @ Unnamed Tributary
Total Area in Rankin Co	27,695.17 Acre
Total Area in Flood Zone	7,079.77 Acre
Total Developed Area in Flood Zone	367.11 Acre; 5%
Total Developable Area in Flood Zone	2,505.56 Acre; 35%
Watershed Location	The Lower Richland Creek Watershed is located in western Rankin County and includes portions of southern Pearl and central Richland within its boundaries. This watershed drains directly into the Pearl River.
Drains Into	The Pearl River below The Ross Barnett Reservoir
Project Types	Model development; Storage; Dredging and clearing; Infrastructure improvements; Bank stabilization; Channel realignment
Estimated Watershed Project Cost	H&H Analyses: $700,000; Construction: $6,183,000 Watershed Retention/Detention: $2,770,000
Watershed Problems	While there are ten different problem areas in the Lower Richland Creek watershed, there are only four main problems associated with those sites. Multiple sites have detention/retention ponds that have become silted in which can drastically reduce the stormwater storage volume. In other locations ditches lining the streets are retaining water during dry spells indicating a problem with the grades of the ditches or sediment buildup blocking the drainage path. Additionally, at some of the sites there are no ditches present to move water away from roads and yards. Finally, experience has shown that in the Lower Richland Creek watershed as a whole, there is a lot of water moving through the watershed that backs up when the Pearl River becomes swollen with stormwater. Due to the large quantities of stormwater, there is not enough storage within the watershed which results in flooding.
Recommended Solutions	As the entire watershed is lacking in stormwater storage volume, it is recommended that storage be added at strategic locations throughout the watershed. In order to identify appropriate locations for storage, a hydraulic model of the watershed is recommended. Additional solutions within the watershed include dredging sediment out of the ponds, checking and correcting the grade of ditches not draining properly, and installing ditches and drainage features along roads where there are currently none.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800021002
Watershed Name	Indian Creek – Steen Creek
Watershed Code	002
Number of Sites in the Watershed	9
Number of Sites in the Flood Zone	7
Sites in Watershed	1.01 – Williams Road between Levy Lane and The North Road; 1.03 – Gunter Road @ Indian Creek; 1.04 – Old Pearson Road at bend east of Highway 49; 1.05 – Highway 49 @ Highway 469 in Florence; 1.06 – Williams Road @ Bulter Creek in Florence; 1.07 – Highway 49 Culvert @ Butler Creek in Florence; 1.08 – Highway 49 Culvert @ Unnamed Creek in Florence; 1.09 – Highway 469 between W Main Street & White Street in Florence; 1.10 – Highway 469 @ Steen Creek in Florence
Total Area in Rankin Co	23,757.70 Acre
Total Area in Flood Zone	2,677.01 Acre
Total Developed Area in Flood Zone	87.61 Acre; 3%
Total Developable Area in Flood Zone	1,378.04 Acre; 51%
Watershed Location	The Indian Creek – Steen Creek watershed is located in western Rankin County. The majority of the City of Florence is located within its boundaries as is the southern-most portion of Richland along Highway 49. This watershed drains into the Lower Steen Creek watershed before eventually draining into the Pearl River at the very southern border of Rankin County.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Dredging and clearing; Storage; Infrastructure improvements; Model development; Storage; Channel realignment;
Estimated Watershed Project Cost	H&H Analyses: $600,000; Construction: $6,793,000 Watershed Retention/Detention: $2,380,000
Watershed Problems	There are three main watershed problems have been noted across the watershed. As with other watersheds in Rankin County, the Indian Creek – Steen Creek watershed has a lot of water moving through the watershed that backs up when the river becomes swollen with stormwater. Due to the large quantities of stormwater there is not enough storage within the watershed. Additional problems in the watershed include silted in ditches and culverts that need to be cleaned out, ditches retaining water during dry spells indicating a problem with the grade, and at some of the sites there are no ditches present to move water away from roads and yards.
Recommended Solutions	As the entire watershed is lacking in stormwater storage volume, it is recommended that storage be added at strategic locations throughout the watershed. In order to identify appropriate locations for storage, a hydraulic model of the watershed is recommended. Additional solutions within the watershed include dredging sediment out of the ponds, checking and correcting the grade of ditches not draining properly, and installing ditches and drainage features along roads where there are currently none

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020306
Watershed Name	Riley Creek – Pelahatchie Creek
Watershed Code	306
Number of Sites in the Watershed	7
Number of Sites in the Flood Zone	5
Sites in Watershed	4.05 – Taylor Way Road @ Unnamed Tributary of Riley Creek; 4.06 – Holly Bush Road between Sara Fox Drive & Rodeo Drive; 4.07 – Reservoir East Subdivision; 4.08 – Holly Bush Road @ Riley Creek; 4.09 – Oakdale Road north of Baker Lane; 4.10 – Andrew Chapel Road @ Bush Creek; 4.12 – Brush Creek in North Brandon Estates
Total Area in Rankin Co	33,446.50 Acre
Total Area in Flood Zone	8,175.55 Acre
Total Developed Area in Flood Zone	187.87 Acre; 2%
Total Developable Area in Flood Zone	635.12 Acre; 8%
Watershed Location	The Riley Creek – Pelahatchie Creek watershed is located in north-central Rankin County. It is located completely within the county and extends along Highway 25 from its intersection with Highway 471 to Clark Creek. This watershed drains directly into Pelahatchie Bay, a portion of the Reservoir.
Drains Into	The Ross Barnett Reservoir
Project Types	Model development; Storage; Ordinance development; Dredging and clearing; Infrastructure improvements; Monitoring
Estimated Watershed Project Cost	H&H Analyses: $850,000; Construction: $5,720,000 Watershed Retention/Detention: $5,010,000
Watershed Problems	While this watershed is rural, there are seven problem sites in the watershed. Two main problems have been identified within this watershed. These include the need for more storage in the watershed to prevent flooding and the need to clean out retention/detention ponds and ditches/streams to allow for more storage in existing structures. Additionally, this watershed is a rapidly developing area in Rankin County.
Recommended Solutions	Recommendations for this watershed include identifying locations throughout the watershed to place additional stormwater storage (including a hydraulic model to identify these locations) and cleaning existing retention/detention ponds and ditches/stream of sediment and debris. Additionally, the Riley Creek – Pelahatchie Creek watershed is a rapidly developing area in Rankin County. While development is good for the county as a whole, it can be detrimental to watershed management, if not planned for appropriately. In order to continue planning for the future in a holistic, watershed approach, updating the county's existing ordinances to include model ordinance language and then enforcing those ordinances is highly recommended.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020307
Watershed Name	Mill Creek – Pelahatchie Creek
Watershed Code	307
Number of Sites in the Watershed	7
Number of Sites in the Flood Zone	3
Sites in Watershed	2.01 – Mill Creek between Highway 25 & The Reservoir; 2.02 – Pinebrook Subdivision between Farmington Circle & Spillway; 2.03 – Church Road @ Unnamed Tributary; 2.04 – Manship Road @ Amethyst Drive; 2.05 – Mill Creek under Lakeland; 2.06 – Marshall Road between Palace Crossing & Westview Drive in Flowood; 2.07 – Buckingham Subdivision
Total Area in Rankin Co	18,100.02 Acre
Total Area in Flood Zone	3,844.98 Acre
Total Developed Area in Flood Zone	156.94 Acre; 4%
Total Developable Area in Flood Zone	2,995.83 Acre; 78%
Watershed Location	The Mill Creek – Pelahatchie Creek watershed is located in north western Rankin County close to the Reservoir. A very small portion of Brandon's northern edge is located within the watershed as well as recently-annexed areas of northeastern Flowood bordering Highway 25/Lakeland. This watershed drains directly into Pelahatchie Creek, a portion of the Reservoir.
Drains Into	The Ross Barnett Reservoir
Project Types	Model development; Infrastructure improvements; Bank stabilization; Dredging and clearing; Ordinance development;
Estimated Watershed Project Cost	H&H Analyses: $475,000; Construction: $8,549,000 Watershed Retention/Detention: $13,575,000
Watershed Problems	Within the Mill Creek-Pelahatchie Creek watershed there are a myriad of issues that can be addressed with varying solutions. These problems include the need for more storage within the watershed, erosion and channel degradation throughout the watershed, channels choked by sediment and other debris, and incorrectly sized or sloped stormwater piping systems and culverts. Additionally, within the Buckingham Subdivision in north-central Rankin County, the subdivision lake can fill up which results in flooding throughout the subdivision.
Recommended Solutions	Recommendations for this watershed include identifying locations throughout the watershed to place additional stormwater storage (including a hydraulic model to identify these locations), checking/correcting the grade of existing stormwater infrastructure, cleaning ditches/stream of sediment and debris, and possibly lowering the spillway of the pond in Buckingham Subdivision. Additionally, this watershed is a rapidly developing area. In order to continue planning for the future in a holistic, watershed approach, updating the county's existing ordinances to include model ordinance language and then enforcing those ordinances is highly recommended.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020502
Watershed Name	Upper Richland Creek
Watershed Code	502
Number of Sites in the Watershed	4
Number of Sites in the Flood Zone	1
Sites in Watershed	3.01 – Tara Road @ Unnamed Tributary; 3.05 – Windchase Subdivision in Brandon; 3.06 – Belle Oak Subdivision in Brandon; 3.08 – Meadowland Drive @ E Government Street in Brandon
Total Area in Rankin Co	23,493.95 Acre
Total Area in Flood Zone	2,834.40 Acre
Total Developed Area in Flood Zone	26.46 Acre; 1%
Total Developable Area in Flood Zone	911.62 Acre; 32%
Watershed Location	The Upper Richland Creek watershed is located in central Rankin County and encompasses the eastern half of Brandon as well as unincorporated areas of the County. This watershed drains into the Lower Richland Creek watershed where water eventually reaches the Pearl River.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Dredging and clearing; Bank stabilization; Monitoring
Estimated Watershed Project Cost	H&H Analyses: $600,000; Construction: $2,677,000 Watershed Retention/Detention: $7,050,000
Watershed Problems	The sites within the Upper Richland Creek all have similar problems – the stormwater conveyance systems have become choked with sediment, vegetation, and debris. This causes the areas upstream of the blockages to become flooded with stormwater. Correctly re-establishing system conveyance could help move stormwater downstream more quickly reducing flooding in the upper portions of the watershed.
Recommended Solutions	Recommended solutions for this watershed include removing sediment, vegetation, and debris from choked channels to re-establish conveyance. Additionally, some channels may need the sides to be regraded and widened to provide extra in-stream storage. In cases where channel degradation is observed, channel sides may need to be riprapped to prevent erosion in the future. Finally, the box culvert under East Government Street at Meadowland Drive was replaced in early 2018 to help with identified problems. This installed solution should be monitored for efficacy to determine if the new box culvert improves the problem.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020607
Watershed Name	Cany Creek – Pearl River
Watershed Code	607
Number of Sites in the Watershed	3
Number of Sites in the Flood Zone	3
Sites in Watershed	1.14 – Neely Road @ Unnamed Pearl Tributary in Richland; 1.15 – Linda Jo Drive @ Lowe Circle in Richland; 1.17 – End of Lewis Street in Richland
Total Area in Rankin Co	9,976.05 Acre
Total Area in Flood Zone	3,044.95 Acre
Total Developed Area in Flood Zone	40.35 Acre; 1%
Total Developable Area in Flood Zone	483.33 Acre; 16%
Watershed Location	The Cany Creek – Pearl River watershed is located on the western edge of Rankin County by the Pearl River and encompasses the southern half of Richland. The southern and western parts of the watershed are in the unincorporated area of the County.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Bank stabilization; Dredging and clearing; Infrastructure improvements
Estimated Watershed Project Cost	H&H Analyses: $300,000; Construction: $2,770,500 Watershed Retention/Detention: $1,000,000
Watershed Problems	 Within the Cany Creek – Pearl River watershed, there are a few main problems that are consistent throughout the problem sites. Within the watershed, there is a lack of storage – either in channels or in retention/detention basins. Due to the lack of storage, during heavy storm events water has no place to flow causing flooding across the watershed. Additionally, multiple channels in this watershed have become choked with sediment and debris which can also lead to flooding during heavy rains due to reduced volume in the channel. The final common problem in this watershed is drainage structures – such as culverts – being constructed on the incorrect grade which can lead to stagnant or back flowing water and eventually flooding.
Recommended Solutions	Recommendations within this watershed include deepening and widening ditches to provide more in-stream storage for stormwater; riprapping ditches to protect channel banks from erosion; removing excess sediment, vegetation, and debris from channels; checking and correcting the grade on existing ditches and drainage structures; and increasing storage at strategic locations within the watershed. In order to identify appropriate locations for storage, a hydraulic model of the watershed is recommended.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020603
Watershed Name	Hog Creek – Pearl River
Watershed Code	603
Number of Sites in the Watershed	3
Number of Sites in the Flood Zone	1
Sites in Watershed	5.01 – Vernon Jones Avenue west of Old Fannin Road; 5.02 – Flowood Drive south of Lakeland in Flowood; 5.03 – Laurel Park Apartments in Flowood
Total Area in Rankin Co	13,038.85 Acre
Total Area in Flood Zone	4,035.10 Acre
Total Developed Area in Flood Zone	541.21 Acre; 13%
Total Developable Area in Flood Zone	3,800.78 Acre; 94%
Watershed Location	The Hog Creek – Pearl River watershed is located in western Rankin County along the Pearl River. A large portion of Flowood – especially bordering Highway 25/Lakeland is located within this watershed. Additionally, the northern half of the Jackson-Medgar Wiley Evers International Airport, a small portion of northeastern Pearl, and a very small portion of northwestern Brandon are also located within this watershed.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Bank stabilization; Infrastructure improvements; Model development; Storage
Estimated Watershed Project Cost	H&H Analyses: $360,000; Construction: $4,493,500 Watershed Retention/Detention: $1,300,000
Watershed Problems	Due to its proximity to the Pearl River south of the Ross Barnett Reservoir, the Hog Creek – Pearl River watershed experiences problems with flooding due to water backing into creeks and rivers in the watershed when the Pearl becomes swollen with floodwaters. The major creek draining this watershed is Hog Creek which runs primarily through the City of Flowood. While Hog Creek is very deep and wide, allowing it to accommodate large quantities of stormwater, the creek is unimproved and the City has no intention of improving the creek; as such, innovative solutions must be pursued. Other problems within this watershed include incorrect ditch grades; incorrectly sized culverts in certain locations; and erosion problems.
Recommended Solutions	Solutions within this watershed mainly focus on providing more retention/detention storage in the watershed. However, hydraulic models of the area need to be utilized to identify appropriate locations for this storage. Other micro-site specific solutions within the watershed include replacing existing culverts with properly sized culverts, checking and correcting ditch grades to ensure water moves through ditches to the Pearl River, and rip rapping ditches that experience erosion problems.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020605
Watershed Name	Neely Creek – Conway Slough
Watershed Code	605
Number of Sites in the Watershed	3
Number of Sites in the Flood Zone	2
Sites in Watershed	5.06 – Chicot Court @ Highway 80 in Pearl; 5.07 – Tony Street between Old Country Club & Boehle; 5.08 – Old Country Club Road @ Louisa Street in Pearl
Total Area in Rankin Co	10,220.10 Acre
Total Area in Flood Zone	2,965.43 Acre
Total Developed Area in Flood Zone	783.76 Acre; 26%
Total Developable Area in Flood Zone	2,963.98 Acre; 100%
Watershed Location	The Neely Creek – Conway Slough is located in western Rankin County along the Pearl River. The western half of Pearl, a northern portion of Richland, and a southwestern portion of Flowood is located within this watershed.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Model development; Storage; Dredging and clearing; Infrastructure improvements
Estimated Watershed Project Cost	H&H Analyses: $325,000; Construction: $2,591,000 Watershed Retention/Detention: $5,100,000
Watershed Problems	The Neely Creek – Conway Slough is located close to the Pearl River south of the Ross Barnett Reservoir. Due to its location, this watershed experiences flooding when stormwater is unable to flow into the Pearl River when the Pearl is swollen with floodwaters. The three problem areas within the watershed all experience flooding problems. Additionally, there are other problems within this watershed. While the entirety of the watershed is located within the city limits, there are multiple places in the watershed where there are no road-side ditches or drainage structures to convey water to streams or creeks. In places where ditches are present, some are choked with sediment, vegetation, and debris that restrict stormwater conveyance.
Recommended Solutions	Recommended solutions for this watershed include adding ditches throughout the watershed where there currently are none and cleaning, deepening, and widening existing ditches to allow efficient stormwater conveyance. As previously stated, due to this watershed's proximity to the Pearl River, flooding occurs throughout the watershed due to a lack of space in which to store stormwater. This indicates the need for additional retention/detention storage within the watershed. In order to determine appropriate locations for watershed storage, a hydraulic model is highly recommended.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020503
Watershed Name	Terrapin Skin Creek
Watershed Code	503
Number of Sites in the Watershed	3
Number of Sites in the Flood Zone	2
Sites in Watershed	3.07 – Greenfield Road @ Unnamed Tributary in Pearl; 4.14 – Pecan Court @ Terrapin Skin Creek in Brandon; 4.15 – Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon
Total Area in Rankin Co	13,300.67 Acre
Total Area in Flood Zone	2,187.84 Acre
Total Developed Area in Flood Zone	269.18 Acre; 12%
Total Developable Area in Flood Zone	1,020.02 Acre; 47%
Watershed Location	The Terrapin Skin Creek watershed is located in central Rankin County. It encompasses the eastern-most edge of Pearl and the western half of Brandon as well as some unincorporated areas at the southern edge of the watershed. This watershed flows into the Lower Richland Creek watershed before moving on to the Pearl River.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Model development; Storage; Dredging and clearing; Bank stabilization
Estimated Watershed Project Cost	H&H Analyses: $375,000; Construction: $2,085,500 Watershed Retention/Detention: $3,990,000
Watershed Problems	The Terrapin Skin Creek watershed, like most other sub-watersheds within the Richland Creek watershed, has flooding problems during storm events. When the Pearl River becomes swollen with floodwaters, Richland Creek backs up causing backups in the Terrapin Skin Creek watershed. Other than a general lack of storage volume within the watershed, other problems have been identified. These problems include erosion in ditches and creeks at different locations throughout the watershed and channels choked with sediment, vegetation, and debris which inhibits stormwater conveyance. Finally, the retention/detention pond located in Pecan Court in Brandon has become silted in. As such, it no longer detains stormwater prior to it entering Terrapin Skin Creek.
Recommended Solutions	Recommended solutions for this watershed include adding retention/detention storage within the watershed. In order to determine appropriate locations for watershed storage, a hydraulic model is highly recommended. Other recommendations for the watershed include cleaning out the retention/detention pond in Pecan Court and any additional work needed to make the pond fully functional; clearing creeks and ditches of excess sediment, debris, and vegetation; deepening and widening ditches where needed to add in-stream storage; and riprapping creeks and ditches as needed to prevent further erosion.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020203
Watershed Name	Deer Creek – Fannegusha Creek
Watershed Code	203
Number of Sites in the Watershed	2
Number of Sites in the Flood Zone	1
Sites in Watershed	4.01 – Jims Road @ Unnamed Tributary; 4.03 – Gore Road @ Purnell Creek
Total Area in Rankin Co	15,105.12 Acre
Total Area in Flood Zone	3,930.93 Acre
Total Developed Area in Flood Zone	0.24 Acre; 0%
Total Developable Area in Flood Zone	55.80 Acre; 1%
Watershed Location	The Deer Creek – Fannegusha Creek watershed is located in northeastern Rankin County and does not encompass any incorporated parts of Rankin County.
Drains Into	The Pearl River above the Ross Barnett Reservoir
Project Types	Monitoring
Estimated Watershed Project Cost	H&H Analyses: $400,000; Construction: $0 Watershed Retention/Detention: $1,510,000
Watershed Problems	The Deer Creek – Fannegusha Creek watershed is located in a relatively undeveloped area of Rankin County and as such, is not covered with impervious surfaces that cause drastic flooding. The watershed does still experience flooding occasionally – usually in low-lying areas. However, as this part of the county is relatively hilly, low-lying areas do not occur frequently. Both of the problem sites in this watershed manifest in the same way – flood waters inundating a road for a short period of time flowing a storm events. 
Recommended Solutions	During late 2017 and early 2018, the culverts at both problem sites were replaced with larger culverts to allow more water to flow under the road as it makes it ways to Deer Creek. As such, the recommended solution within this watershed is to monitor both sites for the effectiveness of the installed solution.

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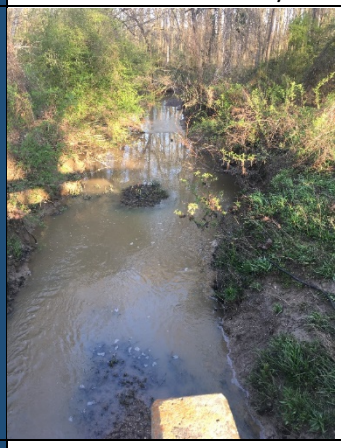
RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020202
Watershed Name	Red Cane Creek – Fannegusha Creek
Watershed Code	202
Number of Sites in the Watershed	2
Number of Sites in the Flood Zone	2
Sites in Watershed	4.02 – Weaver Road @ Unnamed Tributary; 4.04 – Lewis Prestage Road @ Rollison Creek
Total Area in Rankin Co	13,832.16 Acre
Total Area in Flood Zone	1,791.59 Acre
Total Developed Area in Flood Zone	1.47 Acre; 0%
Total Developable Area in Flood Zone	7.22 Acre; 0%
Watershed Location	The Red Cane Creek – Fannegusha Creek watershed is located in northeastern Rankin County. There entire watershed is composed of unincorporated parts of the County. This watershed flows into the Deer Creek – Fannegusha Creek watershed prior to entering the Pearl River.
Drains Into	The Pearl River above Ross Barnett Reservoir
Project Types	Dredging and clearing; Monitoring
Estimated Watershed Project Cost	H&H Analyses: $375,000; Construction: $582,000 Watershed Retention/Detention: $1,380,000
Watershed Problems	 The Red Cane Creek – Fannegusha Creek watershed is located in a relatively undeveloped area of Rankin County and as such, is not covered with impervious surfaces that cause drastic flooding. The watershed does still experience flooding occasionally – usually in low-lying areas. However, as this part of the county is relatively hilly, low-lying areas do not occur frequently. Both of the problem sites in this watershed manifest in the same way – flood waters inundating a road for a short period of time flowing a storm events.
Recommended Solutions	While with problems sites manifest in the same manner, the solutions for the sites are different. Rollison Creek crosses under Lewis Prestage Road through a culvert. In early 2018, the culvert under the road was replaced and upsized allowing more water to flow under the road, thus reducing flooding. The installed solution at this site needs to be monitored for efficacy. At the other site, a low lying bridge becomes inundated with water during very large rain storms. For this site the recommended solution is to remove the channel blockages that have built up over time to allow water to flow unimpeded through the channel. Additionally, the stream can be deepened and widened to allow for more in-stream storage if needed.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020604
Watershed Name	Town Creek – Pearl River
Watershed Code	604
Number of Sites in the Watershed	2
Number of Sites in the Flood Zone	1
Sites in Watershed	5.04 – Fox Hall Road west of Highway 475 in Flowood; 5.05 – Neely Creek between Nancy and Skylane in Pearl
Total Area in Rankin Co	7,106.46 Acre
Total Area in Flood Zone	2,711.06 Acre
Total Developed Area in Flood Zone	426.14 Acre; 14%
Total Developable Area in Flood Zone	2,701.41 Acre; 100%
Watershed Location	The Town Creek – Pearl River watershed is located in central Rankin County on the western border with the Pearl River. The watershed encompasses the southern half of the Jackson-Medgar Wiley Evers International Airport, a portion of Flowood south of Highway 25/Lakeland as well as a small portion of north-central Pearl.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Infrastructure improvements; Dredging and clearing
Estimated Watershed Project Cost	H&H Analyses: $250,000; Construction: $3,104,000 Watershed Retention/Detention: $2,840,000
Watershed Problems	As with other watersheds located within densely populated areas, the problems in the Town Creek – Pearl River watershed are manifested when flooding occurs following a rain event. This flooding, however, is caused by a myriad of reasons. In this watershed, the problem areas flood due to drainage structures not being installed at the correct elevation or grade and due to sediment, vegetation, and debris choking the channel and slowing down water conveyance.
Recommended Solutions	Recommended solutions for this watershed include deepening and widening creeks as necessary while removing sediment, excess vegetation, and debris; checking and correcting the grade of drainage structures throughout the watershed to allow water to be conveyed downstream; and lower the culvert under Fox Hall Road so the bottom of the culvert is in line with the creek bed and not above it.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020302
Watershed Name	Ashlog Creek – Pelahatchie Creek
Watershed Code	302
Number of Sites in the Watershed	1
Number of Sites in the Flood Zone	1
Sites in Watershed	4.16 – Grimes Street & Mimosa Avenue in Pelahatchie
Total Area in Rankin Co	22,819.57 Acre
Total Area in Flood Zone	3,660.59 Acre
Total Developed Area in Flood Zone	72.50 Acre; 2%
Total Developable Area in Flood Zone	1,276.12 Acre; 35%
Watershed Location	This watershed is located in central Rankin County on its border with Scott county. A majority of the Town of Pelahatchie is located within this watershed. This watershed flows into Snake Creek-Pelahatchie Creek then Riley Creek – Pelahatchie Creek before flowing into Pelahatchie Bay, a portion of the Reservoir.
Drains Into	The Ross Barnett Reservoir
Project Types	Model development; Storage
Estimated Watershed Project Cost	H&H Analyses: $575,000; Construction: $347,000 Watershed Retention/Detention: $2,280,000
Watershed Problems	 The Ashlog Creek – Pelahatchie Creek watershed is relatively undeveloped and thus does not have many problem areas. The problem area within this watershed is located on the eastern edge of the watershed. Following heavy rains, the area at the intersection of Grimes Street and Mimosa Avenue becomes flooded until water recedes a few hours later.
Recommended Solutions	Following site investigations, it appears as if Highway 43 and Highway 80 are both acting as a dam restricting water flow down creek. Additionally, site investigation revealed that part of the natural structure of the stream has been removed and there are places in the stream that are disconnected from the main stream. Due to these problem, recommended solutions for this watershed include modeling the system to determine the best way to reestablish the channel and add retention/detention storage in the watershed if needed.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020601
Watershed Name	Brashear Creek – Pearl River
Watershed Code	601
Number of Sites in the Watershed	1
Number of Sites in the Flood Zone	0
Sites in Watershed	5.09 – Oakgrove Subdivision
Total Area in Rankin Co	3,279.06 Acre
Total Area in Flood Zone	2,625.21 Acre
Total Developed Area in Flood Zone	46.79 Acre; 2%
Total Developable Area in Flood Zone	2,043.06 Acre; 78%
Watershed Location	This watershed is located on the western edge of Rankin County, immediately downstream of the Reservoir. The north-central portion of Flowood is located within this watershed. A portion of unincorporated Rankin County, located below the Reservoir is also located in this watershed.
Drains Into	The Pearl River below the Ross Barnett Reservoir
Project Types	Infrastructure improvements; Model development; Storage
Estimated Watershed Project Cost	H&H Analyses: $175,000; Construction: $1,556,000 Watershed Retention/Detention: $825,000
Watershed Problems	 The Brashear Creek – Pearl River watershed is located just downstream of the Ross Barnett Reservoir As with most other watersheds located south of the Reservoir in Rankin County, this watershed experiences flooding following rain events. The site in this watershed is no different and, in fact, experience severe flooding following heavy rains making the roads impassable to safety and rescue crews.
Recommended Solutions	The recommended solution for this watershed includes installing retention/detention throughout the watershed in strategic locations to help reduce and eliminate flooding. In order to appropriately identify these locations, a hydraulic model of the watershed is highly recommended. Additionally, in 2018 the Oakgrove Subdivision has undergone a project to study and realign the drainage pipes within the subdivision to help reduce flooding within the subdivision.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020802
Watershed Name	Brushy Creek – Clear Creek
Watershed Code	802
Number of Sites in the Watershed	1
Number of Sites in the Flood Zone	1
Sites in Watershed	3.04 – Puckett Park off of Highway 18 in Puckett
Total Area in Rankin Co	10,792.14 Acre
Total Area in Flood Zone	1,352.95 Acre
Total Developed Area in Flood Zone	7.81 Acre; 1%
Total Developable Area in Flood Zone	373.41 Acre; 28%
Watershed Location	The Brushy Creek – Clear Creek watershed is located in southeastern Rankin County and encompasses almost the entirety of the Town of Puckett. This watershed drains into the Crooked Creek – Strong River watershed prior to entering the Strong River south of Rankin County.
Drains Into	The Strong River
Project Types	Bank stabilization
Estimated Watershed Project Cost	H&H Analyses: $325,000; Construction: $508,000 Watershed Retention/Detention: $3,780,000
Watershed Problems	 The problems within the Brushy Creek – Clear Creek are relatively minor and related to maintenance as opposed to the creation of impervious surfaces. The site within the Brushy Creek – Clear Creek floods following particularly large precipitation events. Field investigations showed that the site is well equipped to handle storm events but does exhibit signs of needing additional maintenance work performed.
Recommended Solutions	The recommendation for this site is to increase maintenance to stabilize the stream to prevent erosion and to work with the Mississippi Department of Transportation to increase stream maintenance at the Highway 18 bridge just east of this site. Work has been conducted previously to stabilize a portion of the channel within Puckett Park by adding rip rap. The rip rap needs to be extended further along the channel to help stabilize it.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020304
Watershed Name	Hollybush Creek – Clear Creek
Watershed Code	304
Number of Sites in the Watershed	1
Number of Sites in the Flood Zone	0
Sites in Watershed	4.11 – Barker Road @ Dry Creek Tributary
Total Area in Rankin Co	23,768.50 Acre
Total Area in Flood Zone	3,827.89 Acre
Total Developed Area in Flood Zone	4.37 Acre; 0%
Total Developable Area in Flood Zone	24.26 Acre; 1%
Watershed Location	The Hollybush Creek – Clear Creek watershed is located in central-eastern Rankin county. Its eastern edge meets up with Rankin County's border with Scott County. The entirety of this watershed is located within the unincorporated area of Rankin County. This watershed drains into the Riley Creek – Pelahatchie Creek watershed before flowing into Pelahatchie Bay, a portion of the Reservoir.
Drains Into	The Ross Barnett Reservoir
Project Types	Channel realignment; Dredging and clearing
Estimated Watershed Project Cost	H&H Analyses: $600,000; Construction: $237,000 Watershed Retention/Detention: $2,380,000
Watershed Problems	 The Hollybush Creek – Clear Creek watershed is relatively undeveloped compared to other watersheds within Rankin County. Problems in this watershed stem from channels becoming choked with sediment, vegetation, and debris, or being filled in through human means.
Recommended Solutions	The recommended solution for this watershed includes clearing out and reestablishing the channel. Site investigation of this site revealed that overtime the channel has become filled with sediment through either natural or human means. In order to be able to convey stormwater without flooding roads or adjacent areas, the channel needs to be reestablished.

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RANKIN COUNTY COUNTYWIDE DRAINAGE MASTER PLAN IMPLEMENTATION
WATERSHED INFORMATION SHEET

Watershed Number	031800020305
Watershed Name	Snake Creek – Pelahatchie Creek
Watershed Code	305
Number of Sites in the Watershed	1
Number of Sites in the Flood Zone	1
Sites in Watershed	4.13 – Highway 809 @ Highway 43 in Pelahatchie
Total Area in Rankin Co	14,042.78 Acre
Total Area in Flood Zone	4,451.90 Acre
Total Developed Area in Flood Zone	19.43 Acre; 0%
Total Developable Area in Flood Zone	403.35 Acre; 9%
Watershed Location	The Snake Creek – Pelahatchie Creek watershed is located in central-eastern Rankin County. The western-most portions of Pelahatchie are located within this watershed but the majority of the watershed lies in unincorporated portions of the county. This watershed drains into the Riley Creek – Pelahatchie Creek watershed before flowing into Pelahatchie Bay, a portion of the Reservoir.
Drains Into	The Ross Barnett Reservoir
Project Types	Model development; Storage
Estimated Watershed Project Cost	H&H Analyses: $375,000; Construction: $503,000; Watershed Retention/Detention: $2,100,000
Watershed Problems	 The problems in the Snake Creek – Pelahatchie Creek watershed are manifested through flooding of the Highway 80 – Highway 43 intersection in Pelahatchie. The flooding at this intersection happens quickly during heavy rains and can inundate the intersection for days during particularly heavy precipitation events. Site investigations do not reveal an easily-recognized cause for this problem. As such, the overarching problem for this watershed is a lack of retention/detention storage.
Recommended Solutions	The recommended solution for the Snake Creek – Pelahatchie Creek watershed is to add retention/detention at strategic locations throughout the watershed. In order to properly identify these strategic locations, the use of a hydraulic watershed model is highly recommended.

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Appendix D – Site Hazard Assessment Sheets

Working with county and city officials and staff, a list of sixty (60) areas known to have drainage deficiencies was created. Of these sites, thirty-five (35) are located within city limits and twenty-five (25) are located in the county. Through individual interviews with county and city officials numerous sites were identified multiple times. For simplicity, duplicate sites were removed from the list.

The following table lists the consolidated sixty sites. The initial number in the Site Number indicates the Supervisor District where the project is located. For example, Site 1.01 is located in District 1. Sites are not numbered in any particular priority and are generally numbered in the order in which the county or city official identified them. In addition to the site number and the site name, the 12-digit Hydrologic Unit Code (HUC12) for each site was identified and is listed by name.

Table 1: Sites with Deficiencies Identified in Rankin County

Site Number	Site Name / Description	HUC 12
1.01	Williams Road between Levy Lane and The North Road	Indian Creek - Steen Creek
1.02	Pearson Road @ Unknown Tributary	Lower Richland Creek
1.03	Gunter Road @ Indian Creek	Indian Creek - Steen Creek
1.04	Old Pearson Road at bend east of Highway 49	Indian Creek - Steen Creek
1.05	Highway 49 @ Hwy 469 in Florence	Indian Creek - Steen Creek
1.06	Williams Road @ Butler Creek in Florence	Indian Creek - Steen Creek
1.07	Highway 49 Culvert @ Butler Creek in Florence	Indian Creek - Steen Creek
1.08	Highway 49 Culvert @ Unnamed Creek in Florence	Indian Creek - Steen Creek
1.09	Highway 469 between West Main Street & White Street in Florence	Indian Creek - Steen Creek
1.1	Highway 469 @ Steen Creek in Florence	Indian Creek - Steen Creek
1.11	Highway 49 Commercial Area in Richland	Lower Richland Creek
1.12	Bud Street in Richland	Lower Richland Creek
1.13	Jones Street @ Old Hwy 49 South in Richland	Lower Richland Creek
1.14	Neely Road @ Unnamed Pearl Tributary in Richland	Cany Creek - Pearl River
1.15	Linda Jo Drive @ Lowe Circle in Richland	Cany Creek - Pearl River
1.16	Lowe Circle @ Southwind Apartments in Richland	Lower Richland Creek
1.17	End of Lewis Street in Richland	Cany Creek - Pearl River
1.18	East Harper Street @ Short Street in Richland	Lower Richland Creek
1.19	Richland East Circle in Richland	Lower Richland Creek

Site Number	Site Name / Description	HUC 12
1.2	Furr Dr @ Richland Circle in Richland	Lower Richland Creek
2.01	Mill Creek between Highway 25 & The Reservoir	Mill Creek - Pelahatchie Creek
2.02	Pinebrook Subdivision between Farmington Circle & Spillway	Mill Creek - Pelahatchie Creek
2.03	Church Road @ Unnamed Tributary	Mill Creek - Pelahatchie Creek
2.04	Manship Road @ Amethyst Drive	Mill Creek - Pelahatchie Creek
2.05	Mill Creek under Lakeland	Mill Creek - Pelahatchie Creek
2.06	Marshall Road between Palace Crossing & Westview Drive in Flowood	Mill Creek - Pelahatchie Creek
2.07	Oakgrove Subdivision	Brashear Creek - Pearl River
3.01	Tara Road @ Unnamed Tributary	Upper Richland Creek
3.02	Live Oaks Subdivision @ Spanish Oak Drive	Lower Richland Creek
3.03	Thomasville Road @ Unnamed Tributary	Lower Richland Creek
3.04	Puckett Park off Highway 18 in Puckett	Brushy Creek - Clear Creek
3.05	Windchase Subdivision in Brandon	Upper Richland Creek
3.06	Belle Oak Subdivision in Brandon	Upper Richland Creek
3.07	Greenfield Road @ Unnamed Tributary in Pearl	Terrapin Skin Creek
3.08	Meadowland Drive @ East Government Street in Brandon	Upper Richland Creek
4.01	Jims Road @ Unnamed Tributary	Deer Creek - Fannegusha Creek
4.02	Weaver Road @ Unnamed Tributary	Red Cane Creek - Fannegusha Creek
4.03	Gore Road @ Purnell Creek	Deer Creek - Fannegusha Creek
4.04	Lewis Prestage Road @ Rollison Creek	Red Cane Creek - Fannegusha Creek
4.05	Taylor Way Road @ Unnamed Tributary of Riley Creek	Riley Creek - Pelahatchie Creek
4.06	Holly Bush Road between Sara Fox Drive & Rodeo Drive	Riley Creek - Pelahatchie Creek
4.07	Reservoir East Subdivision	Riley Creek - Pelahatchie Creek
4.08	Holly Bush Road @ Riley Creek	Riley Creek - Pelahatchie Creek
4.09	Oakdale Road north of Baker Lane	Riley Creek - Pelahatchie Creek
4.10	Andrew Chapel Road @ Bush Creek	Riley Creek - Pelahatchie Creek
4.11	Barker Road @ Dry Creek Tributary	Hollybush Creek - Clear Creek
4.12	Brush Creek in North Brandon Estates	Riley Creek - Pelahatchie Creek
4.13	Highway 80 @ Hwy 43 in Pelahatchie	Snake Creek - Pelahatchie Creek
4.14	Pecan Court @ Terrapin Skin Creek in Brandon	Terrapin Skin Creek
4.15	Tolleson Drive @ Terrapin Skin Creek Tributary in Brandon	Terrapin Skin Creek

Site Number	Site Name / Description	HUC 12
4.16	Grimes Street & Mimosa Avenue in Pelahatchie	Ashlog Creek - Pelahatchie Creek
5.01	Vernon Jones Avenue west of Old Fannin Road	Hog Creek - Pearl River
5.02	Flowood Drive south of Lakeland in Flowood	Hog Creek - Pearl River
5.03	Laurel Park Apartments in Flowood	Hog Creek - Pearl River
5.04	Fox Hall Road west of Highway 475 in Flowood	Town Creek - Pearl River
5.05	Neely Creek between Nancy and Skylane in Pearl	Town Creek - Pearl River
5.06	Chicot Court @ Hwy 80 in Pearl	Neely Creek - Conway Slough
5.07	Tony Street between Old Country Club & Boehle	Neely Creek - Conway Slough
5.08	Old Country Club Road @ Louisa Street in Pearl	Neely Creek - Conway Slough
5.09	Buckingham Subdivision	Mill Creek - Pelahatchie Creek

60 Sites in 17 Watersheds

In order to collect as much existing information as possible about each site, interviews were conducted with each Supervisor, the Rankin County Road Manager, and responsible parties in the Cities located in Rankin County. During these interviews the following information was requested for each site:

- Please describe the nature of the problem at this location.
- How long has this problem existed?
- Please provide the name, phone number, or other contact information for the person most familiar with this situation, for further interview.
- Have there been any previous investigative measures or studies performed that were intended to address this situation? If so, please provide the name and contact information of the responsible party.

This initial information was critical to the assessment. Field investigations were completed before identifying the deficiencies at each site. During the field investigations, engineers visited each site county and city officials had named as problem areas. The engineers walked around each site taking photographs and notes trying to identify any problems that could be seen within each site. The extent of the investigation varied by site, depending upon the information provided by city and county officials beforehand, site access, and the ability to visually determine site deficiencies.

The site hazard assessment sheets are below. These sheets include the interview questions posed to the Supervisors, the Rankin County Road Manager, and the responsible parties in the Cities. Following the interview questions are handwritten notes taken during follow-up interviews with the County Road Manager as well as handwritten notes taken during field investigations.

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Visited 3/15/18

Project Prioritization Notes

Site Number: 1.01

Site Name: Williams Road between Levy Ln and The North Rd

HUC 12: 031800021002 Indian Creek - Steen Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [x] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- two ways in + out
- few homes got water (Apr. 17). got water in Feb. 18
- water on road on 3/5/18
- don't know if this problem can be fixed. It has been flooding his whole life. → Mike's

---

- looks like homes on Levy Ln have built a levee to try to protect their homes (photo)
- very obvious overbank flooding u/s & d/s of bridge
- include in model to determine if storage would help. where, how much, etc.
- This spot is u/s of 1.06, 1.07, & 1.10

Visited 2/21/18

Project Prioritization Notes

Site Number: 1.02

Site Name: ~~South~~ **Pearson Rd @ Unnamed Tributary**

HUC 12: 031800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

State aid - creek sitsmt

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☒ No reduction in property damage or increased function of systems and other costs of flooding
- ☐ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☒ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☒ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

-flooding crossed road

- road is pretty high. Probably doesn't flood often
- 2 culverts just S of a bridge allow water to flow w/e when creek runs low which may cause problems.
- Not sure what to recommend here.

all water in creek coming out of pond. Raise levee on pond or deepen pond

Visited 3/2/18

Project Prioritization Notes

Site Number: 1.03

Site Name: Gunter Rd @ Indian Creek ~~Shadow Creek Subdivision~~

HUC 12: 031600021002 Indian Creek - Steen Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☒ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☒ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- two ways in & out
- no homes flooded
- water over road
- not much rush to do this project now.

- Shawendosah Subdivision: ditches recently cleaned and new culverts installed throughout. Seem these repairs help at flooding
- maybe fix grade where Shawendosah & Center meet to allow for better flow to creek?

Visited 3/20/18

Site Number: 1.04

Site Name: Old Pearson Rd at bend east of Hwy 49

HUC 12: 031800021002 Indian Creek - Steer Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [X] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [X] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [X] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [X] Some capital cost savings of doing project now but low economic consequences of waiting
- [ ] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [X] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [X] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding across road
- closed road on 3/5/18 due to flooding
- two ways in/out

- No ditches/culverts around curve on road
- W. of curve is a ditch where road drains. This ditch drains W to a larger ditch on N&S of Old Pearson Rd which drains to ditch on E side of Hwy 495. The ditch N&S of Old Pearson Rd is very overgrown (see last photo)
- appears as if water in ditch ~~on~~ behind curve backs up due to obstructions & then gets over road.
- Resident said they (Franklin Co.) had discussed redoing road & taking out the 90° curve due to accidents but it hasn't happened.
- Resident also said that water gets pretty deep on road here & people can't drive over/through it.

Florence

Visited 3/15/18

Project Prioritization Notes

Site Number: 1.05

Site Name: Hwy 49 @ Hwy 469 @ Indian Creek

HUC 12: 031800021002 Indian Creek - Stem Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [x] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- three channels/creeks meet here - south of Hwy 469 & east of Hwy 49S. The creeks come together right before going under Hwy 49S. A lot of water backs up due to this
- County & city believe that making culvert larger will only cause problems downstream & will not fix problem.
- recommend hydraulic model to determine best location for retention/detention in area.

- Channel realignment is happening now w/ the 49S widening project.
- can't really see any problems w/ area but there may just be too much watershed during heavy rains.

Florence

Visited 3/15/18

Project Prioritization Notes

Site Number: 1.06

Site Name: Williams Road @ Butler Creek

HUC 12: 031900021002 Indian Creek - Storm Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
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- [x] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding over road by school
- ~~out~~ two way in & out

- channel degradation both u/s & d/s of bridge
- include this in hydraulic model to determine storage need, placement, etc

Florence

Visited 3/15/18

Project Prioritization Notes

Site Number: 1.07

Site Name: Hwy 49 Culvert @ Butler Creek

HUC 12: 103160002 1002 Indian Creek-Steen Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- culvert under Hwy 445 @ [illegible]
- see some flooding u/s of ~~culvert~~ bridge

- everything looks good depending on total flow due to rain.
- rec. hydraulic model to determine what is happening here & if storage is needed u/s of ~~culv~~ bridge

visited 8/15/18

Florence

Project Prioritization Notes

Site Number: 1.08

Site Name: Hwy 49 Culvert @ Unnamed Creek

HUC 12: 031600024002 Indian Creek - Steen Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- Culvert under Hwy 495
- see some flooding w/s of culvert

- looks pretty good
- W side of culvert is partially silted as is approach & end. Clear this out
- model area to determine where storage needs to be located.

Florence

Visited 9/15/18

Project Prioritization Notes

Site Number: 1.09

Site Name: Hwy 469 between W Main St & White St

HUC 12: 031800021002 Indian Creek-Stein Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☒ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding over road
- water comes up & recedes quickly after rain stops

- btwn Main St & Lewis St. there is really no way for water to enter creek that parallels Hwy on west side.
- S of Lewis to white there are ditches & inlets of culverts for water to flow
- brx culvert under Hwy 469 is large & d/s there is evidence of erosion. This needs to be protected before it fails. Adding storage u/s of 1.10 (where this enters Stevs Creek) should help water move more quickly

Visited 3/15/18

Florence

Project Prioritization Notes

Site Number: 1.10 469

Site Name: ~~Hwy 468 north of Erlich Rd~~ @ Steen Creek

HUC 12: 031800021002 Indian Creek - Steen Creek / 031800021004 Lower Steen Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- 3 creeks meet before going under Hwy 469S here.
- flooding u/s of ~~culvert~~ bridge

- large bridge w/ lots of flow space
- tons of overbank flow area u/s & d/s of bridge
- if there needs to be more space probably need model to tell where to put storage u/s to help prevent flooding

Richland

Visited 3/21/18

Project Prioritization Notes

Site Number: 1.11

Site Name: Hwy 49 Commercial Area in Richland

HUC 12: 031800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
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- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding @ Lyle Machinery/Bobcat, ADT Tire Co., & Utility Trailers
- water ~~goes~~ rises quickly & falls 1-2 hrs. later after rain stops

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- hard to get photos/obscure site due to Hwy 49 widening
- appears as if channel gets high causing flooding.
- Channel is deep & wide already
- all about adding storage u/s to help problem

Visited 3/20/19

Richland

Project Prioritization Notes

Site Number: 1.12

Site Name: Bud St

HUC 12: 030800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [x] No substantial cost savings of doing project now versus future
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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding @ end of Ford Street
- no homes flood but water gets close
- water could be from Pearl River backwater

- don't think it's due to backwater
- ditches along Bond St. are narrow & shallow opening up more toward the end of the St. where it meets a creek that goes under 49S.
- water standing in ditches & creek w/ no signs of movement.
- very little overflow area for ditches/creek.
- does not appear to be a way for water from W side of road to enter ditch on E side where it goes into creek

Visited 3/21/18

Richland

Project Prioritization Notes

Site Number: 1.13

Site Name: Jones St @ Old Hwy 49 S

HUC 12: 031800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☒ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☒ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- may be caused by Pearl River backwaters?
- floods when Pinhead Creek gets high
- flooding is quick - rises & falls quickly after rain stops

- Jones Rd is lower than old Hwy 49 which may be part of the problem.
- ditches on either side of Jones have standing, stagnant water. Appears to have little to no grade along ditches to move water. This appears to be the case along the length of Jones.

Richland

Visited 3/21/13

Project Prioritization Notes

Site Number: 1.14

Site Name: Neely Rd @ Unnamed Pearl Tributary

HUC 12: 031800020607 Caney Creek - Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [x] No one way in/out

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [x] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- ~~End of Lewis St.~~
- flooding over road blocks emergency access in/out
- no homes flooded yet
- believes this flooding may be caused by railroad ~~restr~~. Old ties thrown in river/creek, limbs in ditches, etc.
- School bus ~~unable~~ unable to drop kids off @ home when flooding occurred after VK company ~~cleared~~ "cleared" limbs & left debris in the creek

---

- signs of pretty serious channel degradation U/S & D/S of bridge. Hard to see as plants/grass have grown over most of it.
- ditch on one side has v. serious degradation by a culvert. This needs to be fixed.
- channel is overgrown & appears to have aggradation under & D/S of bridge indicating an unstable channel U/S
- evidence of road washing away where it meets the bridge on the N side.
- evidence of flooding on E & W sides of RR tracks. Maybe due to lack of space in ditches?

Visited 3/20/18

Richland

Project Prioritization Notes

Site Number: 1.15

Site Name: Linda Jo Dr @ Lowe Cricle

HUC 12: 031800020607 Caney Creek-Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☒ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- close to Lowe Circle @ Hwy 49
- waters gets close to/over road
- culvert under Hwy 49 is ≈ 2' too high. MDOT is looking into lowering the culvert which would help the situation.

- agree that culvert is too high by 1'- 2' (on both sides but particularly on SE side)
- area on NW side of Lowe & 49 is high & there is no flow path to ditch.

visited 3/20/18

Kirkland

Project Prioritization Notes

Site Number: 1.16

Site Name: Lowe Circle @ Southwind Cove Apartments

HUC 12: 031900020504 Lower Kirkland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☒ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☒ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☒ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☐ Minimal complaints from citizens and/or businesses
- ☒ Extensive complaints from citizens and/or businesses

Additional Notes:

- water over road (couple inches deep) but no water in apartments.
- from photos looks like a sag in the road here.

- apts are all built up w/ low spots btwn buildings w/ little to no conveyance to drainage.
- drop inlets & pipes appear to have standing water. Maybe clean them out?
- appear to be trying to dig a ditch (none presently) to existing ditch on Lone Creek. See how this helps problem.
- road through apt. seems to be low spot.
- Culvert under Dove to church ditch appears to be too small to convey water causing water over drive

Visited 3/20/18

Richland

Project Prioritization Notes

Site Number: 1.17

Site Name: End of Lewis St

HUC 12: 031800020607 Canyon Creek - Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☒ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☒ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- Caused by Pearl River backwaters. don't know if there's any way to fix/solve this problem.

- area is pretty flat
- there is water standing in ditches from Old Hwy 49S to end of Lewis St. Grade may be incorrect to allow drainage?
- @ end of St. there is a creek but it appears very shallow

visited 3/20/18

Richland

Project Prioritization Notes

Site Number: 1.18

Site Name: E Harper St @ Short St ~~Richland East Subdivision North~~

HUC 12: 031800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [ ] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [x] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- no flooding in houses yet but water up to the door in previous rains

---

- pretty hilly area
- @ Ethapen St & Short it's on a hill w no ditches & overgrown culverts. Ethapen St. appears pretty low which may cause flooding
- need to see where flooding occurs as I can't pinpoint a probable problem area (except those mentioned above which would not cause high water on road)

Visited 3/20/18

Richland

Project Prioritization Notes

Site Number: 1.19

Site Name: Richland East Circle Richland East Subdivision Section

HUC 12: 031300020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☐ The project provides average reduction
- ☒ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☒ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☐ Minimal complaints from citizens and/or businesses
- ☒ Extensive complaints from citizens and/or businesses

Additional Notes:

- no flooding in houses yet but water gets close

- wet/det pond on SE corner of N. Lakeside Circle & Richland East Circle. Was dug in 3/2018 but may not be deep enough? Hard to tell w/ all the grass that was growing in it
- ditches vary in size in subdivision from ≈ 3'-4' deep to no ditches. Maybe water can't get to main ditch through subdivision?
- maybe raise outlet on pond to hold more water & check ditches for flow paths to main channel. There were places in subdivision where water was standing in ditches in subdivision.

Visited 3/20/18

Richland

Project Prioritization Notes

Site Number: 1.20

Site Name: Furr Dr @ Richland Circle

HUC 12: 031800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☑ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

-Water over road in multiple places along stretch of road in 4pm. 17 flood

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- Water on w/d sides flows N to N side of park where it meets creek
- flow creek N & S, ditches on either side of road get narrow & shallow quickly.
- appear to be some quality issues but they are slight & not what would cause water over road.
- evidence along creek & ditches of localized degradation leading to suspicions of very quick water flow recently.

Visited 3/8/18

Site Number: 2.01

Site Name: Mill Creek between Hwy 25 & The Reservoir

HUC 12: 031800020307 Mill Creek - Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes per Zoffee Dahmash; he believes this site is an imminent threat.
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [x] Some capital cost savings of doing project now but low economic consequences of waiting
- [ ] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [x] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [x] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- only flooded Apr. 2017
- very loud complaints in Apr. 2017 but no complaints other times
- has backwater from Rez during large rain
- recommend adding detention/retention to hold some flood water

Visited 3/16/18

Site Number: 2.02

Site Name: Pinebrook Subdivision between Farmington Circle & Spillway

HUC 12: 031800020307 Mill Creek – Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [X] Yes
- [X] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [X] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [X] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [X] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [X] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [X] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [X] Extensive complaints from citizens and/or businesses

Additional Notes:

- highest impacted area re: residents
- one way in & one way out
- no flooding in homes
- no emergency access
- when creek gets full it floods the roads
- all the west side streets get flooded.
- might be able to add in-stream detention may have problem under Spillway preventing water from flowing d/s.

- recommend clearing at channel & checking inverts of pipes into channel
- Mike says water comes onto roads from curb & gutter system which indicates low inverts & backups from channel

Visited 3/14/18

Project Prioritization Notes

Site Number: 2.03

Site Name: Church Rd @ Unnamed Tributary

HUC 12: 031600020307 Mill Creek – Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☒ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

will be 100+ in a few years

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☒ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☐ One of the above
- ☒ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- low road
- adding 300 + homes in area which will cause problems in the future

---

- new culvert recently put in, needs riprap around it to protect washout. Can already see some degradation
- channel U/S needs to be cleared of downed trees
- no apparent problems right now but need to ensure plenty of storage, retent/det when new subdivision is built (ordinances)

visited 3/6/18

Project Prioritization Notes

Site Number: 2.04

Site Name: Manship Rd @ Amethyst Dr

HUC 12: 031800020307 Mill Creek – Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☒ Some capital cost savings of doing project now but low economic consequences of waiting
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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- water on n. side of road. problem flooding in a trailer park

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Suggestions

- land owner said that when the power lines were cleared there was a lot of debris left & ruts were done that really impaired flow.

  * thinks it just needs to be cleaned out.

visited 3/6/18

Site Number: 2.05

Site Name: Mill Creek under Lakeland

HUC 12: 031600020307 Mill Creek – Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☒ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- calls from 2017 April flood

Visited 3/14/18

Flowood

Project Prioritization Notes

Site Number: 2.06

Site Name: Marshall Rd between Palace Crossing & Westview Dr

HUC 12: 031800020307 Mill Creek-Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [x] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [x] Some capital cost savings of doing project now but low economic consequences of waiting
- [ ] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [x] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- road floods regularly in a portion of the road.
- City believes the culvert under Marshall @ Kensington is undersized

---

- water flows S→N under Marshall Rd.
- Culvert under Kensington may be undersized ☆ N side of Marshall Rd is currently wooded ☆ undeveloped so can handle flooding but slopes may be incorrect to allow flowing water.
- Can install instream det. wtl on S side of Marshall Rd. ☆ W. of Palace (Kensington entrance). Currently ~0 ≃ 1 ft. deep

Visited 4/12/18

207

Site Number:	Buckingham 2-08 (Buckingham Place → road name)
Site Name:	
HUC 12:	

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
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- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

One place where water enters a lake. When lake gets full it backs up over the road

@ entrance two double barrel pipes w/ lake on left

previous work done. no houses flooded. yards flooded.
↳ lowered standing water in lake. upsize culverts
↳ by lowering discharge point

- drainage looks good. probably need more storage in lakes
- recommend lowering spillway on W side of W lake. maybe asymmetrical V notch weir?
- also recommend protective level shoreline maybe with willows & other natural protection as opposed to rock
- d/s of outlets is very overgrown. Try to leave to help slow down water & re-evaluate after a few storms

Visited 3/14/18

Project Prioritization Notes

Site Number: 3.01

Site Name: Tara Rd @ Unnamed Tributary

HUC 12: 031800020502 Upper Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
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- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- one house gets flooded after drainage improvements north of her.
- road holds/dams water which causes flooding

- channel u/s of bridge (from Windchase Subdivision) is improved, cleared, & lined
- channel d/s is unimproved & v. overgrown causing a house nearby to flood
- maybe make channel improvements d/s & add drops to later slow down the water?

Visited 3/14/18

Project Prioritization Notes

Site Number: 3.02

Site Name: Live Oaks Subdivision @ Spanish Oak Dr

HUC 12: 031300020504 Tonyes Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

impacts roads in homes

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [x] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding gets 1" from houses
- widen ditch (overflow area) to keep water out of street
- clean out retention pond

- ~~ret~~/det pond or ditch (hard to tell which) or both are very overgrown & need to be cleared. This runs behind houses ~~on~~ between Spanish Oak dr & Post Oak Place

Visited 3/15/18

Site Number: 3.03

Site Name: Thomasville Rd @ Unnamed Tributary

HUC 12: 031800020504 Lower Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- flood over road
- sometimes have to close road
- no houses flooded in area

- @ large culvert w/ stream water flows S→N. on U/S side of culvert on E side there is standing water but I'm not sure where it's coming from. Stream picks up on N side but not present on S side. Was it filled in? Stream looks good but natural. maybe clear some sediment deposits?

- @ smaller culvert N of larger culvert by ~ 0.1 mi stronger evidence that this one goes under water flows S→N. with pooled in forest on S side slowly making it's way north. No sign of stream on S side of road. On N side of road the stream is pretty narrow & shallow and it probably gets out of its banks quickly to flood forest area. looks like this area has been cleared within last couple of years

Visited 3/14/18

Puckett

Project Prioritization Notes

Site Number: 3.04

Site Name: Hwy 18 @ Warren Hill Rd (Puckett Park)

HUC 12: 031B0002080 2 Brushy Creek - Clear Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☒ No reduction in property damage or increased function of systems and other costs of flooding
- ☐ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☒ No complaints from citizens and/or businesses
- ☐ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

Ditch located at city park req. Maintenance to prevent flooding.

- creek flows E → W through park
- Some creek degradation between two bridges. If it needs further storage rec. addl. at here.
- Some degradation d/s of last bridge in unlined channel
- Make improvements to trib. from pipes on north side. Do not appear to have appropriate slopes.

Visited 5/14/18

Brandon

Project Prioritization Notes

Site Number: 3.05

Site Name: Windchase Subdivision

HUC 12: 031800020502 Upper Litt Land Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [X] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [X] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [X] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [X] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [X] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [X] Minimal complaints from citizens and/or businesses
- [X] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding in ditch behind Windchase
- has flooded 3 homes (in Apr. 2017)

- trib is nice & clean @ front of subdivision but undived further back of natural channel
- resident says a lot of sand has been deposited recently (Apr. 17 flood?). I could walk pretty far on sand deposits, 4/5 ind/s.
- resident says water comes up to grass line (photo) & back down quickly after rain stops
- line @ Briars bend & windchase intersection
- undived as it goes back windchase rd

Brendan

Visited 3/15/18

Project Prioritization Notes

Site Number: 3.06

Site Name: Belle Oak Subdivision

HUC 12: 031800020502 Upper Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [x] 51-75
- [x] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- water over streets
- no houses flooded
- City believes tributary is the problem - not Richland Creek

---

- looks as if when water in trib is high water from Curb & gutter can't get in as the outlet is completely submerged
- clean trib of sand bar
- deepen & widen trib for more in stream retention

Visited 3/14/18

Pearl Branch

Project Prioritization Notes

Site Number: 3.07

Site Name: Greenfield Rd @ Unnamed Tributary

HUC 12: 031800020503 Terrapin Skin Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- water sets over road during a 10 year flood

- Channel looks good. has evidence of already being widened in past
- body looks good. problem could be caused by a flow restriction caused by RR tracks. Flow goes under road then immediately under RR. Could not see RR xing as was road on that side of RR tracks & water in ditch was high

Visited 3/13/18

Brandon

Project Prioritization Notes

Site Number: 3.08

Site Name: Meadowlane Dr @ E Government St

HUC 12: 031800020502 Upper Richland Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [x] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

sub site notes
- water gets out of ditch & floods under homes with conventional foundations

notes for SD8
- clean ditch & establish continuous slope. Remove large deposits of sediment. widen stream & deepen stream to create more in-stream storage.
- monitor SD8 during rain events. (multiple manholes along stream)

- 2 8'x8' box culverts just replaced a bridge
- foreman says after 4" rain water gets high in creek but steep in creek & hasn't seen any houses flooded
- foreman (Hunter Suggins) says it takes 1-2 days for creek levels to go down to normal again

Visited 3/13/18

Project Prioritization Notes

Site Number: 4.01

Site Name: Jims Rd @ Unnamed Tributary

HUC 12: 031B0002020203 Deer Creek - Fannegusha Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
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- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

flood over road. One way in. One way out.
no ways for emergency vehicles

water comes over road. Culvert in 90° bend. Culvert drains large area. Upsizing culvert will impact others downstream
water stays over road for 1-2 days sometimes

- Culvert (48"; 60") recently replaced with two new culverts.
- see how this works in next rain
- located in localized low spot

Visited 3/13/18

Project Prioritization Notes

Site Number: 4.02

Site Name: Weaver Rd @ Unnamed Tributary

HUC 12: 030800020202 Red Cane Creek - Fannegusha Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [x] No – two ways into subdivision

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [x] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [ ] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

flooded road on 3/5/18 (5yr. event)
no houses flooded

- make sure ditches n/s of road are clear of debris & sediment build
- multiple places where there is water in a ditch but does not connect to culvert due to berm
- local low spot in road. Could build it higher

Visited 3/13/18

Project Prioritization Notes

Site Number: 4.03

Site Name: Gore Rd @ ~~Unnamed Tributary~~ Purnell Creek

HUC 12: 031800020203 Deer Creek - Fannegusha Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No two ways in 1 mt

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☒ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☒ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

Road floods in "bottom" area

- deepen ½ to width ditches on N ½ S side to provide more storage
- make sure ditches go to a culvert. There are multiple places where water stays in the ditch but it's not connected to a culvert
- clean debris from culverts / ditches
- Old built road 1-2 ft. higher

Co. put new culverts in in late March 2018.

Remain site

visited 3/13/15

Project Prioritization Notes

Site Number: 4.04

Site Name: Lewis Prestage Rd @ Rollinson Creek

HUC 12: 031B0002020202 Red Cane Creek – Fannegusha Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No two ways in & out

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☒ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☒ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

no houses flooding.

flooding due to creek bottom crossing

- two stream crossings very close (~1000 apart) with culverts in fields / forest between them
- 2-84" RCPs were recently installed & all ties were removed
- all flows are perennial

Visited 3/13/18

Site Number: 4.05

Site Name: Taylor Way Rd @ Unnamed Tributary of Riley Creek

HUC 12: 031B000203OC Riley Creek - Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes Taylor Way Rd
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [x] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [x] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [x] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- no houses flooded yet. it gets close to houses now.
- one way in & one way out
- water gets 4"-6" from entering houses.

- road work recently done
- no observed problems
- there are two creeks but one (probably problem creek) is on posted private property & I was unable to visit it.

Visited 3/14/18

Project Prioritization Notes

Site Number: 4.06

Site Name: Holly Bush Rd between Sara Fox Dr & Rodeo Dr

HUC 12: 031800020301a Riley Creek - Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
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- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [x] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- building $500K+ house subdivisions in there now.
- may put detention above area to help prevent flooding. timber co. selling land off in pieces

---

- area looks good and until large rain it's hard to tell if it will have drainage problems but there is currently detention and pond that has worn. Don't know if it will stay after construction
- Holly Bush looks pretty good but due to rapid development, may want to install storm water in Holly Bush if possible as there have been reported problems S. of Holly Bush

Visited 3/14/18

Site Number: 4.07

Site Name: Reservoir East Subdivision

HUC 12: 031800020301a Riley Creek-Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- $100K - $500K home subdivision
- retention ponds need to be cleaned
  - who owns retention pond? not county
- directly impacted by Pelahatchie Creek

- world photos of creek behind Grant Fox
- 1st water photos of small pond between Frisky & Grant Fox very overgrown & shallow
- 2nd water photos of natural pond @ end of Frisky
- 3rd water photos of large pond between Katie Lofton & will needs to be cleaned
- 4th water photos of v. large pond behind Red Cedar V. overgrown
- front of subdivision (older?) has mix of ditches & culverts w/ no visable drainage structures (no ditches, etc.)
- back of subdivision (newer?) has curb & gutter in good condition

Visited 3/19/18

Project Prioritization Notes

Site Number: 4.08

Site Name: Holly Bush Rd @ ~~Unnamed Tributary west of Haynes Chapel Rd~~ Riley Creek

HUC 12: 031800020306 Riley Creek - Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☐ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☒ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- in creek bottom crossing
- water over road
- probably going to build subdivisions north of Holly Bush Rd.

- low lying area. water in creek appears to flood overbank area during 5 yr or 10 yr storm event but does not appear to go over the road
- area north (u/s) of bridge holds water (several pics) which might be the problem of water flooding road in this area.

Visited 3/14/18

Project Prioritization Notes

Site Number: 4.09

Site Name: Oakdale Rd north of Baker Lane

HUC 12: 031800020306 Riley Creek - Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding going to get worse as they are building more houses south of area.
- don't know how much help can be given due to houses already in area.
- flooding in yards - not in houses

- houses are lower than road elev.
- Stream is very silted. Remove some sed in edges to make stream wider & add in-stream ret/det
- only 1'-2' from wsel to bridge → its V. low
- new development just east of site (will drain into creek) currently being built. Saw no ret/det pond but could be phased for later. This will make flooding worse

Visited 3/14/18

Project Prioritization Notes

Site Number: 4.10

Site Name: Andrew Chapel Rd @ Bush Creek

HUC 12: 031600020306 Riley Creek - Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No flooding across road

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☒ No reduction in property damage or increased function of systems and other costs of flooding
- ☐ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- area not built up yet but will probably be subdivisions with next 10 years.
- almost to add bridge w/ large opening to help some flooding.
- two ways in & out

- first stream x-ing (bridge) has sediment in it & some trees across stream but everything looks okay. there is land clearing SE of stream & road crossing but not sure for what (no sign)
- second stream x-ing has a newly replaced culvert. new culvert is 6'-8' in diameter. not sure what it replaced. This flows from E → W & there is little storage area for water on E side of road. if this is where majority of flooding occurs, add storage?

Visited 3/13/18

Site Number: 4.11

Site Name: Barker Rd @ Dry Creek Tributary

HUC 12: 031800020304 Hollybush Creek - Clear Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☒ No reduction in property damage or increased function of systems and other costs of flooding
- ☐ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☒ Some capital cost savings of doing project now but low economic consequences of waiting
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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- road funds
- two ways in & out

- debris blocking path to culvert
- low lying area
- no signs of problems other than area is low
- could raise road or widen ditch to make room for in-stream vegetation

Visited 3/14/18

Site Number: 4.12

Site Name: Brush Creek in North Brandon Estates

HUC 12: 031800020301e Riley Creek-Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [ ] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

- area mostly built out already
- a few houses have flooded (Apr. 2017)
- needs significant rainfall to affect this area
- one / two areas impacting whole thing

- Storage are d/s of flooded area but not u/s
- creek is pretty narrow w/ little to no overbank flooding area available
- id'ed 3 potential residences that flooded in 4/17 due to less gn. event. Their elevations are not much higher than the creek elevations
- 2 new 72" culverts just installed. No idea what they replaced.

Visited 3/15/18

Project Prioritization Notes

Site Number: 4.13

Site Name: Hwy 80 ~~west of~~ @ Hwy 43

HUC 12: 031800020305 Snake Creek-Pelahatchie Creek & 031800020302 Ashley Creek-Pelahatchie Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [ ] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [x] Some capital cost savings of doing project now but low economic consequences of waiting
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- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [x] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

4.16 - 031800020302 Ashley Creek-Pelahatchie Creek
→ Mimosa Ave & Grimes St. in Pelahatchie

Additional Notes:

- a few homes get flooded but mostly water is over the road

- Hwy 80 & Hwy 43 intersection floods when it rains a lot in the watershed.
- Police officer said water can get 12"-18" deep and stay for 1-2 days after a large rain event
- 4.16 – Officer mentioned ~3 houses behind West Parker that flood. Got pictures + marked on map
- maybe create more storage around intersection?
- Small detention area added on NW side of street → too small
- Field on SW side is like a lake
- 4.16 – can't tell which way water flows → to the west to get to creek
- need to clear path to creek & grade properly & hope so water gets to creek.

Brandon

Visited 3/14/18

Project Prioritization Notes

Site Number: 4.14

Site Name: Pecan Court @ Terrapin Skin Creek Tributary

HUC 12: 031800020503 Terrapin Skin Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding occurs in streets but does not flood homes

- ret/det pond is a little overgrown & sedimented in
- access from pond to creek is blocked by debris
- water probably backs up from pond into curb & gutter system than into road
- re deepening / cleaning ret/det pond as a first effort

Visited 3/14/18

Brandon

Project Prioritization Notes

Site Number: 4.15

Site Name: Tolleson Dr @ Terrapin Skin Creek Tributary

HUC 12: 030600205O3 Terrapin Skin Creek

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☒ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☐ Some capital cost savings of doing project now but low economic consequences of waiting
- ☒ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

-flooding occurs along the creek from Lockney to Pecan Ridge
-no houses flooded

- Creek is pretty narrow (less than 10') & overgrown with little to no overbank area to flood before entering yards.
- evidence of degradation in channel. some of it is pretty severe

visited 3/8/18

Project Prioritization Notes

Site Number: 5.01

Site Name: Vernon Jones Ave west of Old Fannin Rd

HUC 12: 031800020603 Hog Creek-Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☒ 26-50
- ☐ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☐ One of the above
- ☒ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☐ Minimal complaints from citizens and/or businesses
- ☒ Extensive complaints from citizens and/or businesses

Additional Notes:

- flooding by Hindu temple & trailer park

- ~~Ogle~~

- suggested building Vernon Jones Rd. up a little more to hold water

- water over road
- channel degradation on east side by culvert due to water flow (FIX!)
- recommend building Vernon Jones Rd a little higher to act as dam to hold water on undeveloped land next to road

Visited 3/8/18

Flowood

Project Prioritization Notes

Site Number: 5.02

Site Name: Flowood Dr south of Lakeland

HUC 12: 031800020603 Hog Creek – Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☑ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☑ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☑ 76-100
- ☑ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☑ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☑ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- this area goes under water (the road) every 4 months or so.
- flooding occurs on the west side of Howard drive

very low lying area along unimproved Hog Creek
City will not improve Hog Creek

Visited 3/6/18

Flowed

Project Prioritization Notes

Site Number: 5.03

Site Name: Laurel Park Apartments

HUC 12: 031800020603 Hog Creek - Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [ ] 26-50
- [ ] 51-75
- [ ] 76-100
- [x] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [x] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- back half of apts flooded during Apr. 2017 (100yr event)
- along Hog Creek which is unimproved. City says Hog Creek will remain unimproved

Visited 3/8/18

Flwood

Project Prioritization Notes

Site Number: 5.04

Site Name: ~~North~~ Fox Hall Rd west of Hwy 475

HUC 12: 031B000206O4 Town Creek – Pearl River

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- ☐ No substantial cost savings of doing project now versus future
- ☒ Some capital cost savings of doing project now but low economic consequences of waiting
- ☐ Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- ☐ Some capital cost savings and significant "costs" of not doing project avoided
- ☐ Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- culvert too high for ditch

- this area goes under water (the road) frequently

Visited 3/8/18

Pearl

Project Prioritization Notes

Site Number: 5.05

Site Name: ~~Old Brandon Rd between Rope St & Pearlwood Dr~~ Pearl River

HUC 12: 031600020604 Town Creek-Pearl River

Neely Creek town Varnado in Stoneland.

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [x] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [ ] The project provides average reduction
- [x] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

- [ ] No substantial cost savings of doing project now versus future
- [ ] Some capital cost savings of doing project now but low economic consequences of waiting
- [x] Some capital cost savings of doing project now and some reduction in "costs" of not doing project
- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [ ] Minimal complaints from citizens and/or businesses
- [x] Extensive complaints from citizens and/or businesses

Additional Notes:

- drainage structures not in grade
- roads flood.
- 2 houses have gotten water in them (Apr. 17)

Visited 3/6/18

Pearl

Project Prioritization Notes

Site Number: 5.06

Site Name: Chicot Court @ ~~Mary Ann Dr~~ Hwy 80 (closed)

HUC 12: 031800020605 Neely Creek - Conway Slough

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
- ☒ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☒ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- ~~East pipe pinched → maybe 6" available for flow & silted~~
- ~~west pipe → maybe 1/4 silted in~~
- Foxes parking lot acts like retention/detention pond
- MDOT coming to clean ditches in Summer 2018 to try to help problem

- culverts silted partially in
- parking lot acts sort of like a pond – it's lower than the sides of ditches

visited 3/20/18

Project Prioritization Notes

Site Number: 5.07

Site Name: Tony St btwn Old Country Club & Boehle

HUC 12: 031800020605 Neely Creek-Conway Slough

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- [ ] Yes
- [x] No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- [ ] No reduction in property damage or increased function of systems and other costs of flooding
- [x] The project provides average reduction
- [ ] The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- [ ] 0-25
- [x] 26-50
- [ ] 51-75
- [ ] 76-100
- [ ] 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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- [ ] Some capital cost savings and significant "costs" of not doing project avoided
- [ ] Significant additional costs if project put off (e.g. additional channel degradation, need to redesign due to expected changes over time, high costs of not doing project)

Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- [ ] None of the above
- [x] One of the above
- [ ] Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- [ ] No complaints from citizens and/or businesses
- [x] Minimal complaints from citizens and/or businesses
- [ ] Extensive complaints from citizens and/or businesses

Additional Notes:

flooding in water over road

- little to no ditches or paths for water to move away from road
- intersection had some water on it from rain on 3/10/18. Easy to see how this intersection can flood.
- provide path for water to move off of road to a wall/channel either through drop inlets, ditches, etc. or some other method
- there is a riprapped ditch on Old Country Club Rd.

Visited 3/8/18

Pearl

Project Prioritization Notes

Site Number: 5.08

Site Name: Old Country Club Rd @ Louisa St

HUC 12: 031800020605 Neely Creek - Conway Slough

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☐ No reduction in property damage or increased function of systems and other costs of flooding
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What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☒ 51-75
- ☐ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☐ None of the above
- ☒ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- clean ditches of sediment, deepen, widen

- road floods
- 1" in 1 hr area/roads flood
- 4" in 4 hrs water gets up to houses

interview notes:

water gets out of ditch & floods under homes with conventional foundations

Site visit notes:

- clean ditch & establish contours. Remove large sediment deposits. widen stream & deepen stream to create more in stream storage
- monitor SSOs during rain events (multiple manholes located in stream)

Visited 4/6/15

Project Prioritization Notes

Site Number:	Oak Grove 5.09 (Oak grove → road name)
Site Name:	
HUC 12:	

PROJECT PRIORITIZATION

Immediate Priorities

Is the project required to address an imminent threat to health, safety, welfare, or prosperity?

- ☐ Yes
- ☒ No

Levels of Service/Flood Reduction

Will the project result in significant reduction in property damage, increased function of transportation systems, and other costs of flooding relative to project costs?

- ☒ No reduction in property damage or increased function of systems and other costs of flooding
- ☐ The project provides average reduction
- ☐ The project provides above-average reduction

What is the approximate number of residences and/or businesses benefitted by the project?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75
- ☒ 76-100
- ☐ 100+

Optimized Lifecycle Cost

Will the project lifecycle cost be less if constructed or purchased at this time (economy with other projects, costs of not doing projects, staff efficiency, equipment efficiency, etc.)?

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Growth & Economic Development

Will the project enhance property values in the area by providing amenities or reducing nuisance flood risk?

- ☒ None of the above
- ☐ One of the above
- ☐ Two of the above

Quality of Life

Has the County received complaints from citizens and/or businesses that the project is needed?

- ☐ No complaints from citizens and/or businesses
- ☒ Minimal complaints from citizens and/or businesses
- ☐ Extensive complaints from citizens and/or businesses

Additional Notes:

- working on drainage study to realign pipe in
  (replace pipes
  → currently (4/18)

- No retention/detention in subdivision. Need to add some.
- infrastructure that can be seen from road looks good.

Appendix E – BP Economic Damages

Multiple federal- and state-level funding sources were identified to help leverage funding to design and implement the projects in this report. While most of the funding sources, such as U.S. Army Corps of Engineers Continuing Authorities Program and the NRCS Emergency Watershed Protection program, are traditionally thought of, one new potential funding source can be found in the BP Economic Damages monies awarded to the State of Mississippi.

Five years after the Deepwater Horizon oil spill of 2010, BP reached agreements to settle all federal and state claims arising from the event. The principal payments included $4.9 billion over 18 years to settle economic damages claims made by the five Gulf States. Of that, $750 million is expected to come to Mississippi. In a special session in 2018, the Mississippi legislature passed a bill that would dedicate 75% of the economic damages money to Hancock, Harrison, Jackson, and parts of George, Stone, and Pearl River counties. The remaining funds (25%) are able to be split between the remaining 76 counties.

The Governor, Lieutenant Governor, and Speaker are working to appoint an advisory committee to oversee the Mississippi Development Authority's spend of the75%. The state legislature will spend the remaining 25% (roughly $10 million per year until 2033) during each legislative session. As a result of this set up, Rankin County's legislators have the ability to work towards securing BP Economic Damages funding to dedicate to the county's Stormwater Management Implementation Plan.

Two articles and the bill text can be found below. The first is a press release from BP from July 2015, detailing BP's settlement of federal, state, and local claims totaling $18.7 billion to be dispersed over 18 years. The second is an Associated Press article from August 2018 that describes where the Mississippi Legislature decided to funnel the BP economic damages monies. Finally, Senate Bill No. 2002 (As Sent to Governor) is shown.

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BP to settle federal, state and local Deepwater Horizon claims for up to $18.7 billion with payments to be spread over 18 years

Release date: **2 July 2015**

The Disclosure and Transparency Rules ("DTR") made by the Financial Conduct Authority govern amongst other matters the disclosure of inside information. Accordingly in compliance with Rule 2.2, BP plc makes the following announcement

Five years on from the Deepwater Horizon accident and spill in 2010, BP has reached agreements in principle to settle all federal and state claims arising from the event.

BP today announced that its US Upstream subsidiary, BP Exploration and Production Inc (BPXP) has executed the agreements with the US federal government and five Gulf Coast states.

The agreement with the states of Alabama, Florida, Louisiana, Mississippi and Texas also includes settlement of claims made by more than 400 local government entities.

The principal payments are as follows:

- BPXP is to pay the United States a civil penalty of $5.5 billion under the Clean Water Act (CWA) - payable over 15 years.
- BPXP will pay $7.1 billion to the United States and the five Gulf states over 15 years for natural resource damages (NRD). This is in addition to the $1 billion already committed for early restoration. BPXP will also set aside an additional amount of $232 million to be added to the NRD interest payment at the end of the payment period to cover any further natural resource damages that are unknown at the time of the agreement.
- A total of $4.9 billion will be paid over 18 years to settle economic and other claims made by the five Gulf Coast states.
- Up to $1 billion will be paid to resolve claims made by more than 400 local government entities.

The expected impact of these agreements would be to increase the cumulative pre-tax charge associated with the Deepwater Horizon accident and spill by around $10 billion from $43.8 billion at the end of the first quarter. Separately to these agreements, the total charge reported in BP's second quarter results will also reflect other items including charges for additional business economic loss determinations.

The principal payments arising from the agreements will be made over extended periods of time as set out in the attached schedule of payments.

NRD and CWA payments are scheduled to start 12 months after the agreements becomes final. Total payments for

NRD and CWA payments are scheduled to start 12 months after the agreements become final. Total payments for NRD, CWA and State claims will be made at a rate of around $1.1 billion a year for the majority of the payment period.

Carl-Henric Svanberg, BP's chairman, said: "Five years ago we committed to restore the Gulf economy and environment and we have worked ever since to deliver on that promise. We have made significant progress, and with this agreement we provide a path to closure for BP and the Gulf. It resolves the company's largest remaining legal exposures, provides clarity on costs and creates certainty of payment for all parties involved.

"In deciding to follow this path, the Board has balanced the risks, timing and consequences associated with many years of litigation against its wish for the company to be able to set a clear course for the future.

"The Board therefore believes that this agreement is in the best long-term interest of BP and its shareholders. The Board set out its position on the dividend at the first quarter and this remains unchanged by the agreement."

Bob Dudley, BP's group chief executive, said: "This is a realistic outcome which provides clarity and certainty for all parties.

"For BP, this agreement will resolve the largest liabilities remaining from the tragic accident and enable BP to focus on safely delivering the energy the world needs.

"For the United States and the Gulf in particular, this agreement will deliver a significant income stream over many years for further restoration of natural resources and for losses related to the spill.

"When concluded, this will resolve not only the Clean Water Act proceedings but also the Natural Resource Damage claims as well as other claims brought by Gulf States and local government entities."

BP's chief financial officer, Brian Gilvary, said: "The negotiations were carried out with the goal of reaching a collective solution that would be acceptable for all parties. For BP this will provide certainty with respect to BP's financial obligations for the matters settled, particularly with the ability to spread payments smoothly over many years.

"The impact of the settlement on our balance sheet and cashflow will be manageable and enables BP to continue to invest in and grow its business, underpinned by a resilient and robust financial framework."

The agreements in principle are subject to execution of definitive agreements. These will comprise a Consent Decree with the United States and Gulf states with respect to the civil penalty and natural resource damages, a settlement agreement with five Gulf states with respect to State and local claims for economic and property losses, and release agreements with local government entities.

The Consent Decree will be subject to public comment and final court approval. The Consent Decree and settlement agreement with the Gulf states are conditional upon each other and neither will become effective unless (1) there is final court approval for the Consent Decree and (2) local government entities execute releases to BP's satisfaction.

The agreements do not cover the remaining costs of the 2012 class action settlements with the Plaintiffs' Steering Committee for economic and property damage and medical claims. They also do not cover claims by individuals and businesses that opted out of the 2012 settlements and/or whose claims were excluded from them. BP will continue to defend those claims vigorously. Today's agreements in principle also do not resolve private securities litigation pending in MDL 2185.

Payment schedule

Year after consent decree	Civil Penalty payments	Natural Resource Damages (NRD) payments	NRD additional final payment	State Claims payments
0				$1,000,000,000
1	$379,310,345	$489,655,172		
2	$189,655,712	$244,827,586		

2	[illegible]	[illegible]		
3	$379,310,345	$489,655,172		$260,000,000
4	$379,310,345	$489,655,172		$260,000,000
5	$379,310,345	$489,655,172		$260,000,000
6	$379,310,345	$489,655,172		$260,000,000
7	$379,310,345	$489,655,172		$260,000,000
8	$379,310,345	$489,655,172		$260,000,000
9	$379,310,345	$489,655,172		$260,000,000
10	$379,310,345	$489,655,172		$260,000,000
11	$379,310,345	$489,655,172		$260,000,000
12	$379,310,345	$489,655,172		$260,000,000
13	$379,310,345	$489,655,172		$260,000,000
14	$379,310,345	$489,655,172		$260,000,000
15	$379,310,345	$489,655,172		$260,000,000
16			$232,000,000	$260,000,000
17				$260,000,000
Totals for years 1 to 17	Total = $5.50 billion	Total = $7.10 billion	Total = $0.23 billion	Total = $4.90 billion

Notes

Interest will accrue at a fixed rate on the unpaid balance of the civil penalty and natural resource damages payments, compounded annually and payable in years 15 (CWA) and 16 (NRD).

The interest rate will be fixed at the average market yield on U.S. Treasury securities at 2-year and 3-year constant maturities, quoted on an investment basis by the US Federal Reserve (H.15 Release), for the period from 28 May 2014 to 27 May 2015.

To address possible natural resource damages unknown at the time of the settlement, beginning ten years after the settlement, the federal government and the Gulf states may request accelerated payment of accrued but unpaid interest on the natural resource damages payments.

Parent company guarantees for these payments will be provided by BP Corporation North America Inc. as the primary guarantor and BP p.l.c. as the secondary guarantor.

The federal government and the Gulf states may jointly elect to accelerate the civil penalty and natural resource damages payments in the event of a change of control or insolvency of BP p.l.c.

In addition to these agreed settlement payments, set out in the table above and the payment of up to $1 billion for local government claims, BPXP has also agreed to pay $350 million to cover outstanding NRD assessment costs and $250 million to cover the full settlement of outstanding response costs, claims related to the False Claims Act and royalties owed for the Macondo well. These additional payments will be paid over nine years, beginning in 2015.

The Deepwater Horizon Trust Fund, established to meet claims in 2010 after the oil spill, is expected to be used to make payments (other than CWA fines and penalties), including $1 billion of state claims and up to $1 billion to settle local claims.

Cautionary statement

This press release contains certain forward looking statements including statements regarding expectations with respect to finalizing the Consent Decree, timing of court approval, schedule of payments under the agreement and financial impact of the settlement on BP. By their nature forward looking statements involve risk and uncertainty because they relate to future events and depend on circumstances that will or may occur in the future and are outside the control of BP. Actual results may differ from those expressed in such statements depending on a variety of factors including those discussed in this release.

Further enquiries:

BP Press Office, London
Phone: +44 (0)207 496 4076
Email: bppress@bp.com

BP Press Office, US
Phone: +1 281 366 4463
Email: uspress@bp.com

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Senate Approves Bill Dividing $700M in Oil Spill Damages

Mississippi's lawmakers still have more to consider before concluding a special session, with Gov. Phil Bryant asking them to agree on dividing $700 million in oil spill damages.

Aug. 29, 2018, at 12:38 a.m.

(https://w

Rep. Ashley Henley, R-Southaven, works on her laptop as she and the rest of the Legislature wait on the possibility of Gov. Phil Bryant, unseen, expanding the call of the Special Session of the Legislature to deal with the BP economic damages settlement, Tuesday, Aug. 28, 2018, at the Capitol in Jackson, Miss. (AP Photo/Rogelio V. Solis) The Associated Press

AP

By JEFF AMY, Associated Press

JACKSON, Miss. (AP) — Mississippi (/news/best-states/mississippi) senators late Tuesday approved a bill to divide up $700 million in oil spill damages, setting aside more than $100 million overall for special projects.

The Senate voted 42-8 in favor of the bill after only brief debate that included one senator reading the entire list of 128 earmarked projects. The measure moves to the House for more debate, likely on Wednesday.

"I think it's safe to say the majority of benefits are to the coast," said Senate Finance Committee Chairman Joey Fillingane, a Sumrall Republican.

The subject became part of the special session when Gov. Phil Bryant widened the agenda to include it after lawmakers passed bills to send transportation aid to cities and counties and create a state lottery to add funding to the state Transportation Department for the next 10 years.


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BROWSE RINGS

BP PLC is paying a total of $750 million to Mississippi through 2033 to make up for lost tax revenue from the 2010 Deepwater Horizon oil spill in the Gulf of Mexico. Lawmakers have already spent $52.4 million of the money, but nearly $100 million is sitting in the bank and 15 yearly payments of $40 million a year will begin in 2019.

Overall, Mississippi is likely to get more than $2.4 billion from all sources to pay for environmental and economic damages from the spill.

The Legislature has been stymied in previous attempts to divide the damage money, with one proposal collapsing at the end of the regular session earlier this year when House and Senate negotiators couldn't agree.

Senate Bill 2002 would give at least 72 percent of money to Hancock, Harrison, Jackson, and parts of George, Stone and Pearl River counties and the rest to the remaining 76 counties.

The plan would take $53 million of the $100 million in BP money in the bank, and combine it with $50 million borrowed earlier and set aside to spend on special projects that some deride as pork. It would also set aside $9 million in BP money for railroad and railroad crossing improvements statewide.

Some of those special projects are on the Gulf Coast but most are spread elsewhere across the state. Senators representing Jackson complained the bill includes only two projects worth a little more than $1 million total. The largest projects include new roads in Rankin and Madison counties, at $8 million each. Many projects are in the districts of influential committee chairmen.

Some of the special project money may have been promised to lawmakers in exchange for support on special session issues.

"These projects are being decided based on backroom deals, and all so this bill will pass," said Sen. David Blount, a Jackson Democrat who opposed the bill.

Of the remainder of the $100 million, about $27 million would go to coast projects, while $9 million would remain in a state savings account for lawmakers to spend later.

However, some House lawmakers oppose the division, arguing the coast has no special claim to the money, since it was supposed to replace lost tax revenue that would have been spent in state budgets.

Republican Rep. Tracy Arnold of Booneville is circulating a proposal to divide the money among counties and cities based on their share of Mississippi's population. He said his proposal is getting "overwhelming support" and predicted senators would feel pressure from city and county officials to approve it.

"I'm not going to settle for crumbs," Arnold said, when asked about whether legislative leaders were using special projects to get non-coastal lawmakers to vote for the bill. "My people sent me down here to sit at the table."

Coast leaders have repeatedly called for some way to make sure the money is used for high-impact projects. Gulf Coast Business Council CEO Ashley Edwards, for example, is critical of the decision to finance the state's bicentennial celebration out of BP money.

The Mississippi Development Authority would run an application process for the Gulf Coast money, prioritizing projects that would create jobs. Lawmakers would approve grants recommended by MDA each year. MDA could approve loans.

Wiggins said lawmakers had refused to put some other body outside of state government in charge of the coast's portion of the money.

"I think that ship has sailed," Wiggins said.

Lawmakers would control the non-coast money directly each year.

—

Follow Jeff Amy on Twitter at http://twitter.com/jeffamy . Read his work at https://www.apnews.com/search/By%20Jeff%20Amy .

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sys.com/serving/adServer.bs?cn=trd&mc=click&pli=25998471&PluID=0&ord=-2143471950&rtu=https:/
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Appendix F – 2014 Stormwater Utility Survey by Black & Veatch

Conducted in 2014, the Black & Veatch Stormwater Utility Survey is a bi-annual survey intended to assess and share insights on stormwater management, financing, governance, and other trends in the United States. The report can be found below.

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2014
STORMWATER UTILITY SURVEY

A BLACK & VEATCH REPORT

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Cover photo courtesy Wes Peck

INTRODUCTION

Welcome to the 2014 Black & Veatch *Stormwater Utility Survey*. We initiated the bi-annual survey in 1991 to assess and share insights on stormwater management, financing, governance and other evolving trends. We have continued that tradition, and this year we are proud to share our tenth stormwater utility survey.

This survey reports on the continuing trends in stormwater utility organization, planning, and financing; the persistent funding challenges; the issues that utility managers perceive to be the most important; and the priorities that drive capital investment decisions.

In stormwater industry parlance, the phrase "Stormwater Utility" refers to three primary elements, namely, a Program that defines stormwater operations and management, an Organization that is responsible for governance, and a Funding approach that provides dedicated financing.

Stormwater is increasingly beginning to be perceived as a resource to be protected and managed similar to drinking water resources. To do so effectively, the Program, Organization, and Funding aspects have to be aligned and holistically addressed, as it is done in the water and wastewater sectors of the utility industry.

To assess the current trends in all these three elements, and especially the funding aspect, this survey was only administered to those municipalities and/or entities that already have established stormwater user charge programs. A "stormwater user charge" is similar to a water or sewer user charge in that the user fee or charges have some key characteristics including the following:

- The charges are assessed for stormwater service that is provided, and hence has a reasonable nexus to the costs incurred in providing that service;
- The revenues from stormwater charges are dedicated to stormwater management, in other words to the purpose for which it is assessed;
- The charges assessed are proportional to the property's contribution and impact of stormwater runoff;
- The charges assessed are "voluntary" in that the user has the opportunity to limit the use of the service; and
- The fee or charge is non-discriminatory.

SURVEY HIGHLIGHTS

The survey results again affirm the following key facts about the state of the stormwater utility industry:

Prevalence of Stormwater Utilities:
There continues to be a prevalence of individual municipally governed stormwater utilities rather than regional stormwater authorities. Consequently, even though stormwater issues such as surface water quality and habitat degradation typically do not follow jurisdictional boundaries, municipalities are limited to focusing on and managing stormwater issues only within their geographical jurisdictional authority.

Stormwater Industry Priorities:
In this year's survey, we added a new question on industry priorities to garner perspectives on what utility managers perceive to be the issues of importance in the stormwater industry. We asked, and utility managers responded! The three (3) issues that respondents ranked in the order of importance are: (i) availability of adequate funding, (ii) enhancing public awareness and support for stormwater management, and (iii) management of the expanding regulatory requirements.

A highlight of this response is that this is the first time since the inception of this bi-annual survey, that "public awareness and support" has been cited as the second most important issue. These stormwater issues of importance that respondents cited are closely aligned with those from the water industry, which we recently published in our "*2014 Strategic Directions: U.S. Water Industry*".

Infrastructure Investment Drivers:
In response to our new question on what drives infrastructure investment planning and decisions, utility managers responded by selecting Regulatory Compliance; Flood Control; and Safety and Reliability as the top three drivers in the order listed.

Proactive Planning:
Balancing the competing goals of achieving regulatory compliance, providing the level of service that the community desires, and maintaining affordable rates requires effective planning and innovative approaches. This balancing act applies not only to stormwater utilities but also to wastewater utilities, and especially to those communities that have combined sewer systems. Therefore, in this survey, we continued to assess the type of integrated planning that utilities engage in. The survey indicates that while a majority of the participants has developed individual planning documents such as stormwater master plans and stormwater management plans, only 12% of the respondents have developed *integrated wet weather management plans* to address water resources issues more comprehensively.

Funding Adequacy:
Lack of adequate funding continues to plague even those municipalities that have a dedicated stormwater user fee. Out of a total of 78 respondents that participated in this survey and indicated having a stormwater user fee, 62% did not have adequate funding to meet most of their utility needs. The survey continues to highlight a growing funding gap. Despite funding inadequacy, 31% of the respondents indicated not having any rate increases since 2004, which can further exacerbate the funding gap.

The interdependencies among service level needs, regulatory requirements, asset management, innovation, and financing significantly increase the complexity of stormwater utility management. To effectively address multiple needs and challenges, utilities have to engage in more holistic solutions that include integrated planning, green infrastructure solutions, a strong public awareness and education campaign, public-private partnerships, and regional collaborations to achieve cost efficiencies and regional solutions.

SURVEY OVERVIEW

The 2014 *Stormwater Utility Survey* reports the results of six functional areas:

Section 1: Organization and Operations
Provides a profile of the respondents including population served, size of service areas, the characteristics of the service area, and type of utility governance.

Section 2: Planning
Provides insights in to what utility managers perceive to be most important industry issues and the infrastructure investment drivers. This section also highlights the types of permit requirements that utilities have to comply with and the types of planning utilities have engaged in to address stormwater management.

Section 3: Finance and Accounting
Reviews stormwater utility revenues, expenditures, sources of capital improvement and O&M financing, and the adequacy of stormwater utility funding to meet utility obligations.

Section 4: Stormwater Rate Structure and Billing
Evaluates the types of costs recovered through user fees, the fee methodology used in setting rates, the rate structures, and the average monthly residential rate of each utility that participated in the survey. Information on the billing frequency and types of exemptions and discounts that utilities offer, and insights on legal challenges are also provided.

Section 5: Stormwater Credits and Incentives
Offers insights in to the types of credits, criteria used in offering credits, credits for "green initiatives", and any innovative programs such as credits trading and banking.

Section 6: Public Information/Education
Assesses the level of importance respondents attribute to public information/education and the methods of education and multi-media sources used in educating and in disseminating information.

PROFILE OF RESPONDENTS

This year's nationwide survey was conducted online during March and April 2014. A total of 78 participants completed the online questionnaire.

- The participants spanned 25 states. All of these participants fund stormwater management in whole or in part through stormwater user fees.
- This year's participants reflect a much different mix of utilities with a larger participation from smaller utilities, and 25 first time participants and 53 repeat participants.
- Eighty seven percent of the respondents serve a city, rather than a county or region.
- The population served by the respondents ranges from 9,785 (Cottage Grove, OR) to 1.5 million people (Philadelphia, PA); the areas served varies from 3 to 1,020 square miles.
- For those utilities that base charges on gross property area, an Equivalent Residential Unit (ERU) ranged from 2,105 square feet to 22,500 square feet of total parcel area, with a median of 8,000 square feet.
- For those utilities that base charges on impervious area, an ERU ranged from 794 square feet to 7,500 square feet of impervious area, with a median of 2,368 square feet.

COMPARATIVE RESULTS

Black & Veatch has been assessing stormwater utility financing and management trends since 1991 through the use of this bi-annual, nationwide survey. Comparisons of current and prior survey results provide insights into possible industry changes. Please note, however, that these comparisons are not necessarily indicative of trends, because the survey respondents may be different between the current and prior surveys.

It is our hope that the information provided in this report will be a valuable resource to those involved in the stormwater industry. We welcome your questions and comments regarding this survey report and/or Black & Veatch services. You can reach us at **Stormwater@bv.com.**

ORGANIZATIONAL INFORMATION

Nationwide, stormwater management responsibility resides with individual municipal entities rather than with a multi-jurisdictional stormwater authority. The traditional approach of each municipality managing its own stormwater system and obligations affords greater asset ownership, budget control, and program flexibility to meet service level needs. However, such an approach also impacts economies of scale, creating operational inefficiencies, funding challenges, and significant disparities in stormwater management standards, even within a small geographic region or within a watershed.

This survey affirms the continuing trend of stormwater user fee programs ("utility") being more prevalent in cities rather in counties or special districts. Eighty seven percent of the participants reported serving a city jurisdictional area, with three participants representing a regional authority. These trends have remained fairly consistent since 2007.

This year's survey participants included a greater participation from smaller stormwater utilities when compared with our previous 2012 survey. While the median number of stormwater customers at the participating utilities is 36,000, which is fairly consistent with the previous stormwater surveys, the percentage of participants that identified themselves as stand-alone utilities has increased from 46% to 55%.

FIGURE 1
FOR MS4 PERMITTING PURPOSES ARE YOU CLASSIFIED AS: *(Select one)*

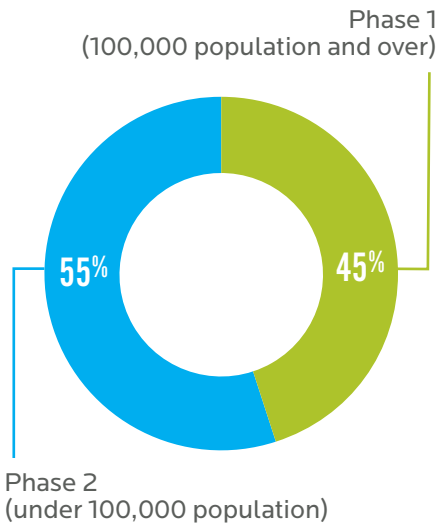


FIGURE 2
WHAT JURISDICTIONAL AREA IS YOUR STORMWATER UTILITY RESPONSIBLE FOR? *(Select one)*

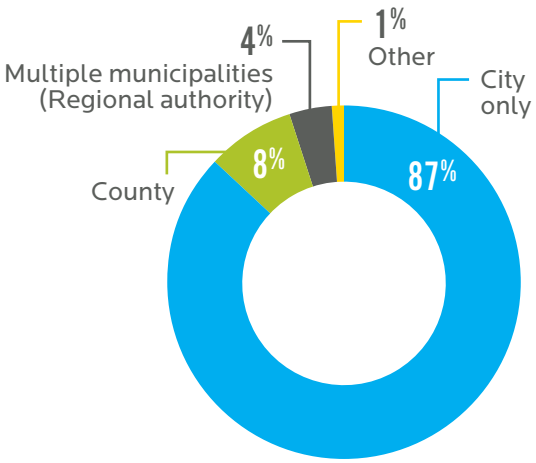


FIGURE 3

WHAT IS THE CHARACTERISTIC OF YOUR SERVICE AREA? *(Select one)*

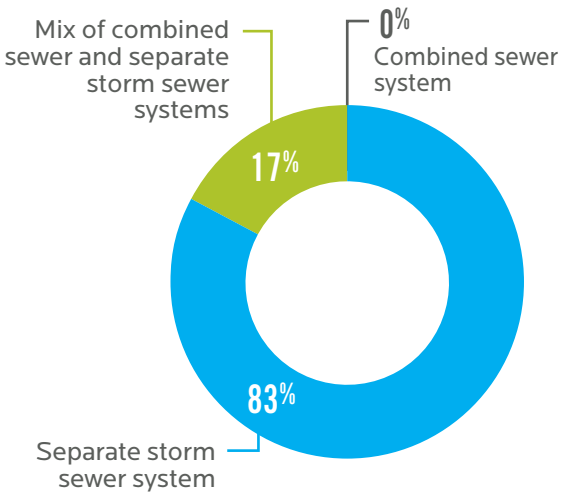


FIGURE 4

IF YOU SELECTED "MIX OF COMBINED SEWER AND SEPARATE STORM SEWER SYSTEMS" IN THE PREVIOUS QUESTION, INDICATE THE PERCENTAGE OF COMBINED SEWER VERSUS SEPARATE STORM SEWER SERVICES.

Combined sewer	Over 75%	50% – 75%	25% – 50%	Less than 25%
Separate storm sewer	Less than 25%	25% – 50%	50% – 75%	Over 75%
Number of utilities	0	4	5	4
Percentage*	0%	31%	38%	31%

**Based on number of utilities that selected "Mix of Combined Sewer and Separate Storm Sewer Systems" in the previous question.*

FIGURE 5

IS YOUR UTILITY UNDER CONSENT ORDER FOR COMBINED SEWER OVERFLOW ISSUES?

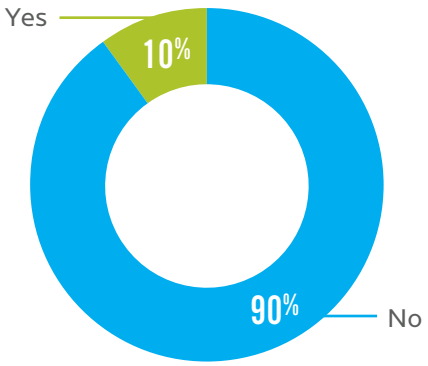


FIGURE 6

PLEASE INDICATE HOW YOUR CURRENT STORMWATER OPERATIONS ARE GOVERNED. *(Select one)*

	2014	2012
Stand-alone stormwater utility	55%	46%
Combined with Department of Public Works (Nonwater/wastewater utility)	25%	28%
Combined with water and/or wastewater utility	19%	21%
Other (Multiple city departments)	1%	5%

PLANNING

Utilities currently face the challenge of complying with multiple discharge permits including the National Pollutant Discharge Elimination System (NPDES) and the Municipal Separate Storm Sewer System (MS4) permits to meet the Clean Water Act (CWA) obligations. The survey indicates the continuing trend of municipalities generally focusing on individual permit requirements, rather than comprehensively planning for multiple permit obligations, even though many of these permits have overlapping requirements. Integrated strategic and tactical planning enables municipalities to effectively leverage available resources to fulfill multiple regulatory requirements and public needs concurrently.

This survey finds that while 73% of the respondents have to comply with both NPDES and MS4 permit requirements, only 12% of respondents have developed any type of integrated wet weather or water resources plan.

Especially with a growing funding gap where utilities need to consistently do more with less resources, utilities need to proactively develop and deploy integrated planning and foster the idea of "one water". Such an approach would better position the utility to achieve the triple bottom line - economic, environmental, and community benefits.

With respect to stormwater rate setting, in the case of combined sewer systems, utilities continue to grapple with the policy issue of whether to allocate a portion of the combined sewer system and CSO mitigation O&M and capital costs to the stormwater utility. The survey indicates that while some CSO communities, such as Philadelphia, allocate a portion of the combined sewer system costs to stormwater utility, many others do not. Such differences in methodology directly impact the magnitude of stormwater rates that utilities define.

FIGURE 7

WHAT REGULATORY PERMIT REQUIREMENTS DO YOU CURRENTLY HAVE TO COMPLY WITH?

MS4 permit	91%
NPDES permit	79%
Total maximum daily load (TMDL)	50%
CSO program	14%
Other	4%

Percentage based on number of utilities that responded to the question.

FIGURE 8

WHAT TYPES OF PLANS HAS YOUR UTILITY DEVELOPED?

(Select all that apply)

Stormwater/watershed management plan	73%
Stormwater master plan	72%
Long-term control plan (LTCP)	17%
Integrated wet weather management plan (to support wastewater and stormwater requirements)	12%
Integrated water resources plan	9%
Other	1%

Percentage based on number of utilities that responded to the question.

FIGURE 9

PLEASE RANK ON A SCALE OF 1 TO 5, THE IMPORTANCE OF EACH OF THE ISSUES LISTED BELOW TO THE STORMWATER INDUSTRY. *(1: Least important; 5 = Most important)*

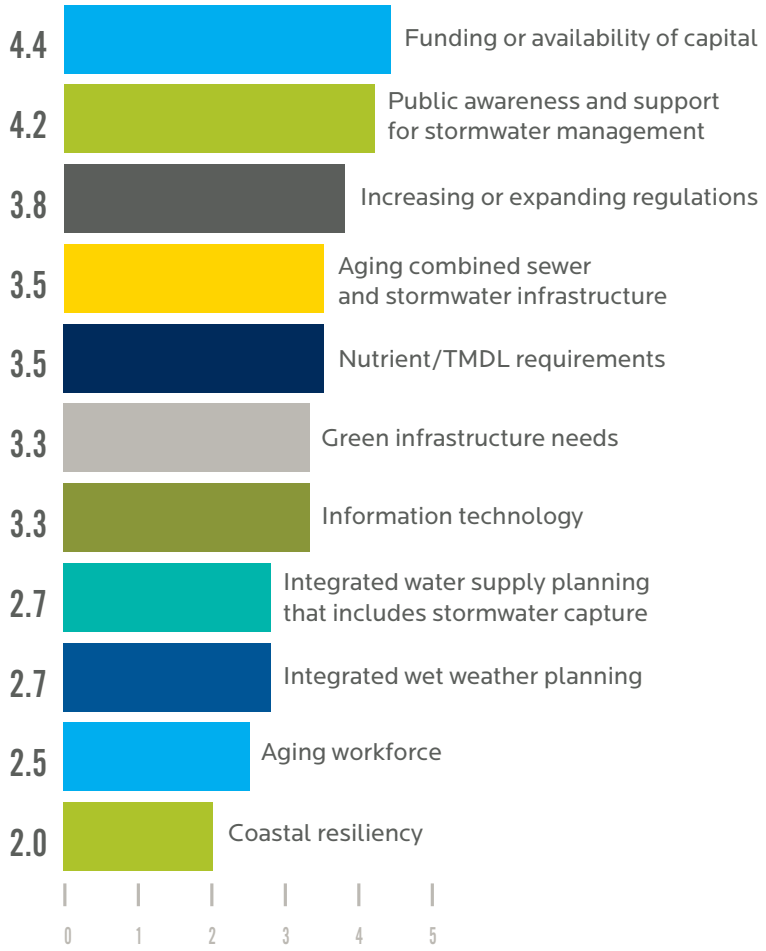
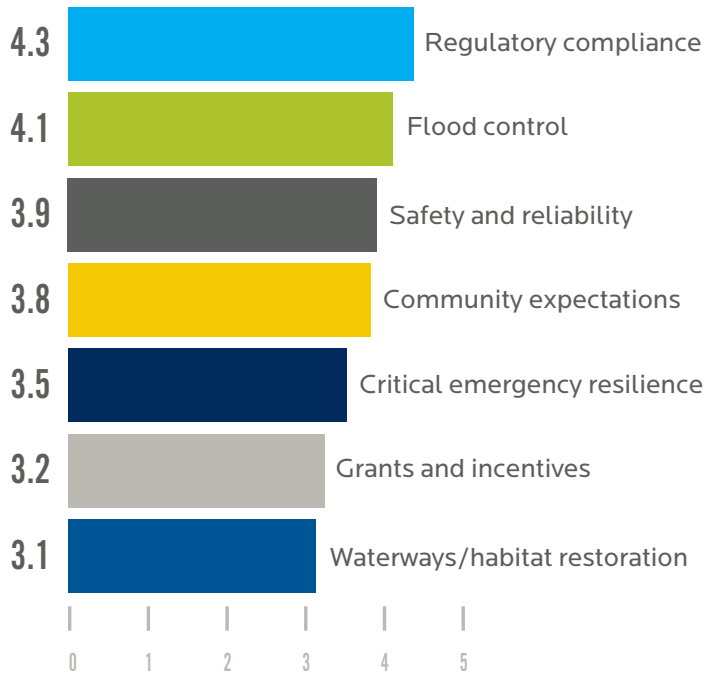


FIGURE 10

PLEASE RANK ON A SALE OF 1 TO 5, HOW THE FOLLOWING ISSUES DRIVE INFRASTRUCTURE INVESTMENT PLANNING AND DECISIONS WITHIN YOUR STORMWATER UTILITY. *(1: Very weak; 5 = Very strong)*



FINANCING AND ACCOUNTING

A user fee funding mechanism typically provides revenue stability, certainty, and a dedicated funding stream. However, even in a user fee funded program, diligent annual financial planning and rate adjustments are necessary to maintain revenue sufficiency, build financial resiliency to meet changing needs, and provide for long term financial viability. In the current environment, utilities are under pressure to keep rates low while maintaining or enhancing the level of service.

Stormwater utilities continue to fund capital program primarily through cash financing as opposed to debt financing. As Figure 13a indicates, 85% of the participants indicate cash financing as the primary source of capital funding, and the trend of funding capital program through user fee generated cash revenues seems to continue. In the absence of a balanced funding mix of debt and cash financing, utilities that rely solely on cash financing of capital program, face capital funding challenges if they are unable to raise the rates. Consistent with the last survey, only 32 % of the participants indicate funding is adequate for meeting most needs. In this survey that 17% of the participants indicate that funding is not sufficient to meet even the "most urgent" needs indicating a growing funding adequacy gap at a time when regulatory requirements and asset management needs are increasing..

Utilities need to engage in more robust and continuous public education to enhance understanding of the stormwater management needs and financial issues in conjunction with integrated planning. These measures will likely help utilities chart a more financially viable path and enhance equity in cost recovery. Ninety six percent of the utilities reported having a user fee that is supported by a State enabling legislation.

FIGURE 11

PLEASE INDICATE THE PERCENTAGE OF YOUR STORMWATER BUDGET THAT IS ATTRIBUTABLE TO CSO MITIGATION ISSUES. *(Select one)*

0%, stormwater budget does not include expenditures related to combined sewer overflow (CSO) issues	46%
1% – 10%	23%
11% – 20%	16%
21% – 30%	0%
31% – 50%	0%
Over 50%	15%

FIGURE 12

WHAT IS THE ESTIMATED 2014 ANNUAL STORMWATER CAPITAL IMPROVEMENT PROGRAM BUDGET?

Minimum	$30,000
Maximum	$72,000,000
Average	$7,082,127

FIGURE 13

PLEASE PROVIDE AN APPROXIMATE PERCENTAGE OF FUNDING FROM EACH SOURCE.

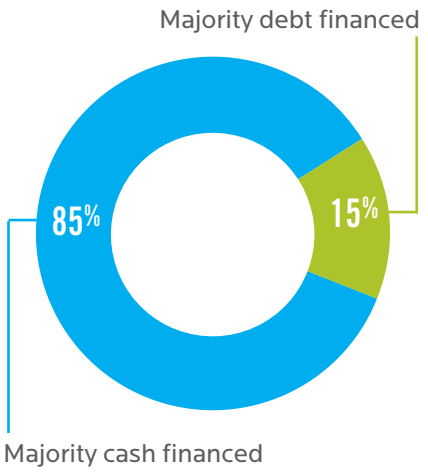


FIGURE 13A

PLEASE PROVIDE AN APPROXIMATE PERCENTAGE OF FUNDING FROM ONE OR MORE OF THE FOLLOWING SOURCES THAT ARE USED TO FINANCE YOUR UTILITY'S STORMWATER CAPITAL IMPROVEMENT PROGRAM (CIP).

Debt financed	15%
Stormwater revenue bonds	17%
General obligation (tax) bonds	8%
Sales tax bonds	1%
Combined stormwater/other bonds	1%
Benefit district bonds	0%
Other debt	5%

Cash financed	85%
Stormwater user fees	92%
Grants	27%
Ad valorem taxes	4%
Permitting and other taxes	18%
Sales taxes	5%
Special tax districts	8%
New development impact fees	8%
Other cash	12%

Percentage based on number of utilities that responded to the question.

FIGURE 14

PLEASE PROVIDE AN APPROXIMATE PERCENTAGE OF REVENUE FROM ONE OR MORE OF THE FOLLOWING SOURCES.

	Over 75%	50% – 75%	25% – 50%	Less than 25%
Stormwater user fees	87%	5%	5%	3%
Taxes	0%	13%	13%	74%
Grants	28%	0%	43%	29%
Other	5%	5%	0%	90%

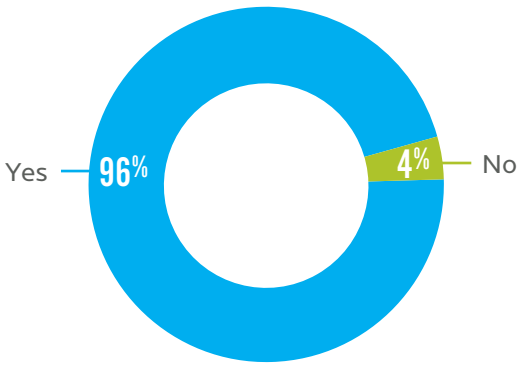
FIGURE 15

PLEASE INDICATE THE LEVEL OF ADEQUACY OF AVAILABLE STORMWATER FUNDING.

	2014	2012	2010	2007
Adequate to meet all needs	6%	18%	7%	8%
Adequate to meet most needs	32%	31%	36%	39%
Adequate to meet most urgent needs	45%	40%	47%	40%
Not adequate to meet urgent needs	17%	11%	10%	13%

FIGURE 16

DOES YOUR STATE HAVE ENABLING LEGISLATION THAT AUTHORIZES MUNICIPALITIES TO CHARGE A STORMWATER USER FEE?



STORMWATER USER FEES AND BILLING

A user fee needs to reflect a reasonable nexus between the costs incurred in providing services and the magnitude of charges that are defined for the rate payer. As it is not practical to measure stormwater runoff, stormwater charges are established based on surrogate measures such as a property's pervious and/or impervious areas. Over 90% of the participants have indicated that they use actual and/or effective impervious area as the basis of charges.

As service levels may differ among the various geographical areas, utilities often have to contend with the policy issue of whether to set rates that reflect service level differences. While zone-based rates may provide for equity in cost recovery, they can be administratively more burdensome and have the potential to create economic disparities among zones.

With respect to rate setting, affordability is key to enabling stakeholder buy-in. The survey indicates that a majority of the participants (78%) do not offer any type of discounts, and only 11% offer low income discount. The survey also indicates that 30% of the participants had not adjusted the rates in over 10 years. Instead of having a long hiatus from implementing requisite rate adjustments, utilities should consider the feasibility of implementing consistent rate adjustments to maintain financial viability while concurrently exploring mechanisms such as low income assistance programs to help with affordability.

The risk of legal challenges could be a potential barrier to establishing stormwater user fees. Seventy-eight percent of the utilities that responded in this survey had not faced any legal challenges to their fees. Of those that faced a legal challenge, the challenge primarily seems to have been either due to lack of authority to assess fees or on the grounds of constitutionality.

FIGURE 17

PLEASE INDICATE THE YEAR WHEN YOUR UTILITY'S CURRENT STORMWATER USER RATE SCHEDULE BECAME EFFECTIVE.

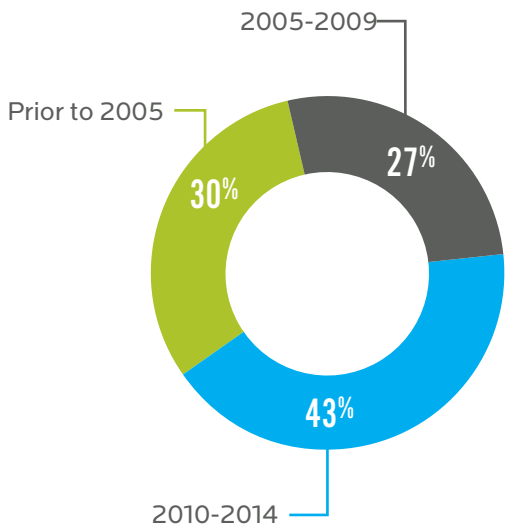
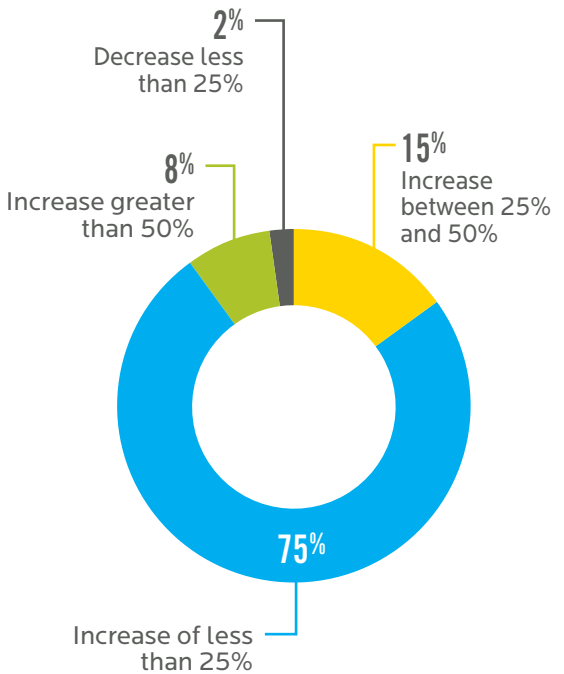


FIGURE 18

WHAT WAS THE MAGNITUDE OF YOUR UTILITY'S LAST CHANGE IN FEES?



Percentage based on number of utilities that responded to the question.

FIGURE 19

IS YOUR STORMWATER USER FEE BASED ON SOME FORM OF PARCEL AREA SUCH AS GROSS AND/OR IMPERVIOUS AREA?

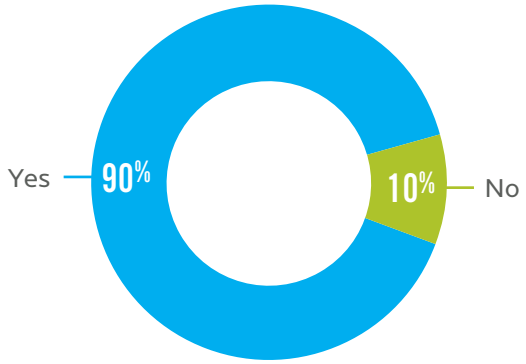
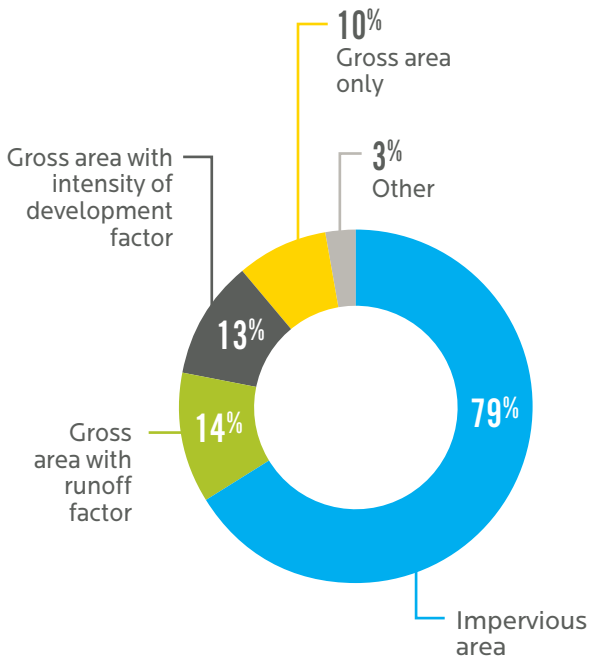


FIGURE 20

WHAT IS THE BASIS FOR CALCULATING YOUR PARCEL AREA BASED STORMWATER USER FEES?

(Select all that apply)



84% of respondents use only one method.

FIGURE21

WHAT IS YOUR UTILITY'S AVERAGE SINGLE FAMILY RESIDENTIAL PARCEL SQUARE FOOTAGE? *(Include attached residential up to four dwelling units)*

Average Gross Area	Square feet
Minimum	2,105
Maximum	22,500
Median	8,000
Average Impervious Area	
Minimum	794
Maximum	7,500
Median	2,368

FIGURE 22

WHAT TYPE OF RATE STRUCTURE DOES YOUR UTILITY HAVE FOR THE SINGLE FAMILY RESIDENTIAL PARCELS?

(Select all that apply)

Uniform flat fee	67%
Tiered rates	28%
Individually calculated	6%

FIGURE 23

IF YOU HAVE A TIERED RESIDENTIAL RATE STRUCTURE, PLEASE INDICATE THE TOTAL NUMBER OF TIERS.

Percentage based on number of utilities that indicated they had tiered rates.

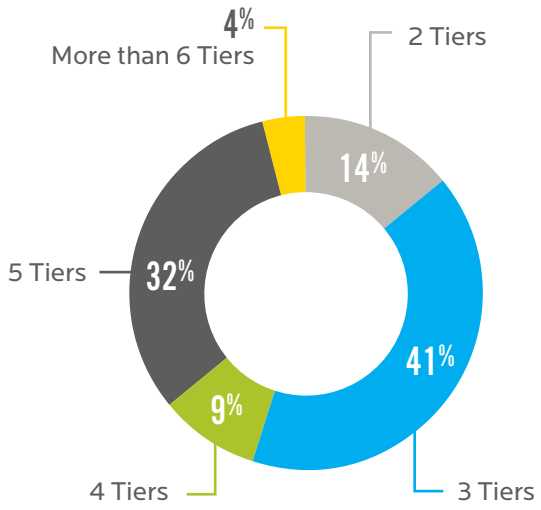


FIGURE 24

IF YOU HAVE A TIERED RESIDENTIAL RATE STRUCTURE, WHAT IS THE BASIS OF THE TIERS? *(Select one)*

Impervious area tiers only	59%
Gross area tiers only	32%
Tiers for impervious area and gross area	9%

FIGURE 25

DOES YOUR STORMWATER RATE STRUCTURE INCLUDE A SEPARATE BILLING/COLLECTION OR SERVICE CHARGE?

Yes	12%
No	88%

FIGURE 26
AVERAGE MONTHLY SINGLE-FAMILY RATE

City/County	State	2014 Average Monthly Residential Charge
Seattle	WA	26.58
Fort Collins	CO	14.26
Philadelphia	PA	13.45
Everett	WA	13.19
Longmont	CO	13.05
Appleton	WI	12.92
Naples	FL	12.80
Lubbock	TX	12.00
Palo Alto	CA	11.99
Orlando	FL	11.00
Gresham	OR	9.84
Bremerton	WA	9.83
Austin	TX	9.20
Loveland	CO	9.10
Hamilton County	TN	9.00
Pierce County	WA	8.83
Gainesville	FL	8.56
Aurora	CO	8.16
Edgewater	FL	8.00
Charlotte	NC	7.89
Cottage Grove	OR	7.47
Denver	CO	7.38
Hampton	VA	6.99
St. Paul	MN	6.83
Titusville	FL	6.62
Duluth	MN	6.08
Charleston	SC	6.00
Lakeland	FL	6.00
Cocoa Beach	FL	6.00
Oakland Park	FL	6.00
Cocoa	FL	5.75
Wooster	OH	5.75
Bloomington	MN	5.72
Dubuque	IA	5.60
Olathe	KS	5.55
Tulsa	OK	5.43
Dayton	OH	5.42
Fort Worth	TX	5.40
Satelite Beach	FL	5.33

City/County	State	2014 Average Monthly Residential Charge
Roseburg	OR	5.00
San Clemente	CA	5.00
Cedar Rapids	IA	4.90
Northen Kentucky Sanitation District No. 1	KY	4.80
Griffin	GA	4.79
Niceville	FL	4.51
Haines City	FL	4.50
Topeka	KS	4.25
Summerville	SC	4.00
Lawrence	KS	4.00
Raleigh	NC	4.00
Richmond	VA	3.75
Ellicott City	MD	3.75
Wichita Falls	TX	3.55
Cincinnati	OH	3.54
Mesquite	TX	3.50
Billings	MT	3.01
Arnold	MO	3.00
Forest Park	OH	3.00
Fayetteville	NC	3.00
McKinny	TX	2.75
Clark County	WA	2.75
Modesto	CA	2.73
Littleton	CO	2.50
Contra Costa County	CA	2.50
Ashville	NC	2.34
Overland Park	KS	2.00
Frisco	TX	2.00
Lakewood	CO	1.98
Moline	IL	1.94
Santa Clarita	CA	1.87
Santa Cruz	CA	1.75
Shelby County	TN	1.50
Springfield	OH	1.30
Elkhart	IN	1.25
Columbia	MO	1.15
Hillsborough County	FL	1.00
Omaha	NE	0.64
St. Louis	MO	0.24

FIGURE 27

IN YOUR STORMWATER RATE STRUCTURE, DO YOU HAVE RATES THAT DIFFER BY SERVICE AREAS/ZONE OR WATERSHEDS?

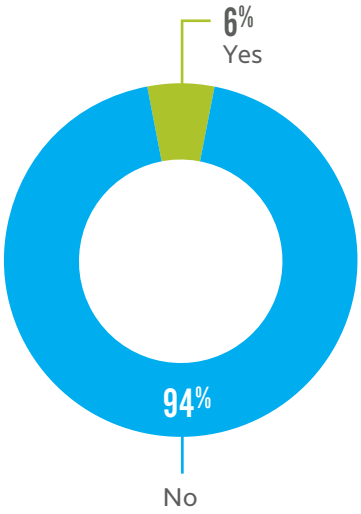


FIGURE 28

ARE ONE-TIME IMPACT/CAPITAL RECOVERY FEES APPLIED TO NEW STORMWATER UTILITY CUSTOMERS OR NEW DEVELOPMENTS?

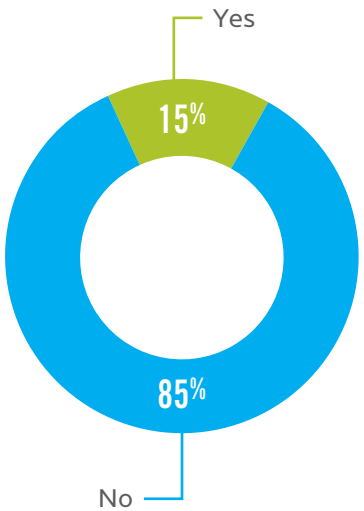


FIGURE 29

HOW FREQUENTLY DOES YOUR UTILITY UPDATE CUSTOMER PARCEL INFORMATION, SUCH AS CUSTOMER CLASSES AND GROSS AND IMPERVIOUS AREAS SPECIFIC TO STORMWATER BILLING? *(Select One)*

No specified frequency/as needed	70%
Annually	14%
Monthly	9%
Quarterly	4%
Other	3%

FIGURE 30

HOW ARE STORMWATER USER FEES BILLED? *(Select One)*

Included with Other Utility Bill (Water/Sewer/Electric/Gas)	71%
Included with tax bills	24%
Separate stormwater bill	5%

FIGURE 31

DOES YOUR UTILITY OFFER ANY OF THE FOLLOWING STORMWATER DISCOUNTS? *(Select all that apply)*

No discounts offered	78%
Low-income discount	11%
Other	8%
Elderly/senior citizen discount	7%
Educational institutions discount	5%
Disabled discount	1%

FIGURE 32

WHAT OF THE FOLLOWING CLASSES OF PROPERTIES ARE CURRENTLY EXEMPT FROM STORMWATER USER FEES? *(Select all that apply)*

Public streets/roads/median /public-right-of-way	63%
Undeveloped land	54%
Rail rights-of-way	41%
Public parks	27%
Government	24%
Agricultural land	21%
School districts	19%
Cemeteries	13%
Colleges/universities	12%
No properties are exempt	12%
Other	10%
Airports	9%
Religious organizations	5%
Direct discharge to water body	3%

FIGURE 33

WHO IS RESPONSIBLE FOR PAYMENT OF STORMWATER USER FEES? *(Select One)*

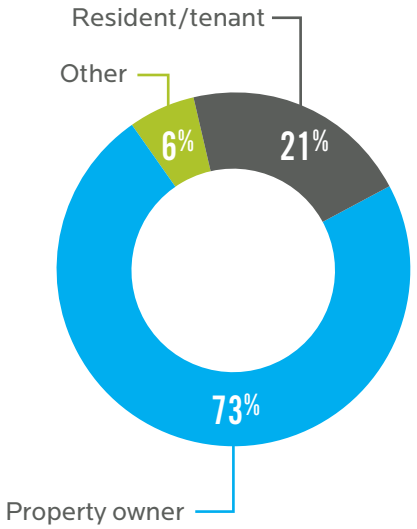


FIGURE 34

HOW IS PAYMENT ENFORCED? *(Select all that apply)*

Water/electric service shutoff	51%
Lien on property	47%
Collection agency	27%
Other	10%
Sheriff's sale	4%

FIGURE 35

HAVE YOUR STORMWATER USER FEES EVER FACED A LEGAL CHALLENGE?

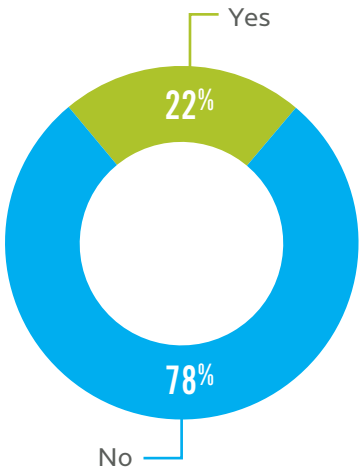


FIGURE 36

PLEASE INDICATE THE CUSTOMER/CLASS THAT CHALLENGED YOUR STORMWATER USER FEE.

(Select all that apply)

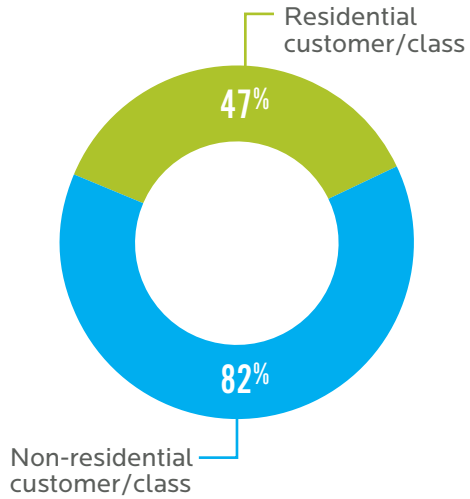


FIGURE 37

WHAT WAS THE BASIS OF THE CHALLENGE?

(Select all that apply.)

Tax and not a user fee	59%
Constitutionality	35%
Lack of authority to assess stormwater fees	29%
Equity and fairness	12%
Rate methodology	12%
Other	6%

STORMWATER CREDITS AND INCENTIVES

Stormwater incentives can be defined as one-time monetary assistance or other rewards that municipalities offer to encourage property owners to support community goals such as engaging in sustainable development practices or protecting water quality. Incentives can be used as a mechanism to foster public-private partnerships in stormwater management.

Stormwater credits are ongoing reductions to a property's calculated stormwater charges that are given to properties that either reduce demand on the stormwater system and/or reduce the utility's cost of service through functional stormwater management practices and Best Management Practices (BMPs). Stormwater credit serves a key role in enhancing the perception of "user fees" by affording the customers opportunities to reduce the magnitude of the user fees commensurate with extent of onsite stormwater management.

As Figure 38 indicates, 44% of the respondents offer some type of credits and only 15% to 18% percent offer some type of incentives. The most common criteria for offering credits are volume reduction and peak flow reduction. Even in utilities that offer credits, the actual number of parcels that seek credits is relatively low at four percent. This is to some extent due to the fact that onsite stormwater management is capital intensive yielding low return on investment, which in turn impacts the economics of engaging in onsite stormwater management.

FIGURE 38

DOES YOUR UTILITY HAVE A STORMWATER CREDIT PROGRAM?

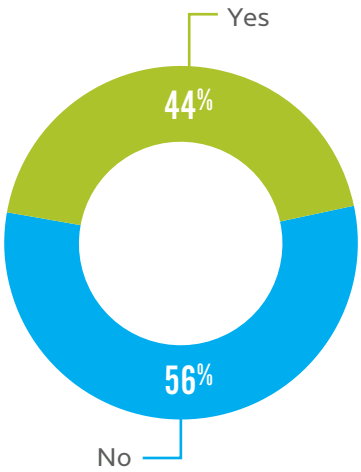


FIGURE 39

PLEASE INDICATE THE CLASSES OF PARCELS THAT ARE OFFERED STORMWATER CREDITS. *(Select one)*

Nonresidential only (includes multifamily and condos)	53%
Both residential and nonresidential	47%

FIGURE 40

DO YOU OFFER CREDITS FOR ANY OF THE FOLLOWING STORMWATER MANAGEMENT ACTIONS? *(Select all that apply)*

Volume reduction	65%
Peak flow reduction	59%
Water quality control	50%
Direct discharge to a surface water body (without using a municipal stormwater system)	41%
Good housekeeping practices (sweeping, oil separation, etc.)	21%
Education	18%
NPDES permit compliance	15%
Other	3%

FIGURE 40A

PLEASE INDICATE THE MAXIMUM ALLOWABLE CREDIT FOR EACH ACTION SELECTED.

	Maximum allowance credit			
	Over 75%	**50% – 75%**	**25% – 50%**	**Less than 25%**
Volume reduction	37%	38%	25%	0%
Peak flow reduction	26%	20%	27%	27%
Water quality control	14%	22%	43%	21%
NPDES Permit Compliance	0%	0%	0%	100%
Education	0%	50%	17%	33%
Direct discharge to a surface water body (without using a municipal stormwater system	50%	10%	10%	30%
Good housekeeping practices (sweeping, oil separation, etc.)	20%	0%	20%	60%
Other	0%	0%	0%	100%

FIGURE 41

IS THERE A CAP FOR THE TOTAL AMOUNT OF CREDITS THAT ARE OFFERED?

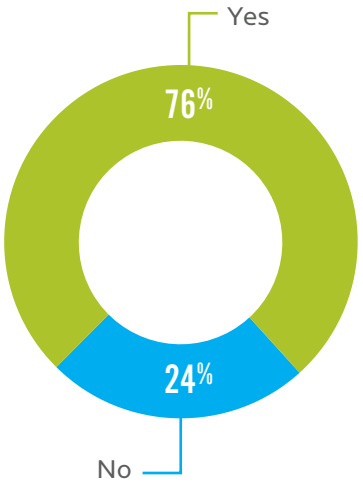


FIGURE 41A

IF YES, WHAT IS THE MAXIMUM STORMWATER FEE REDUCTION?

Maximum stormwater fee reduction		
>75%	**50 – 75%**	**25 – 50%**
32%	40%	28%

FIGURE 42

DO YOU OFFER CREDITS FOR ANY OF THE FOLLOWING TO ENCOURAGE "GREEN" OR LOW IMPACT DEVELOPMENT (LID) STORMWATER MANAGEMENT PRACTICES? *(Select all that apply.)*

None of the above	61%
Porous/permeable surfaces	36%
Rain gardens	27%
Green roofs	21%
Rain barrels	9%
Other	6%

Percentage based on number of responses

FIGURE 43

DOES YOUR UTILITY OFFER ANY TYPE OF STORMWATER CREDITS TRADING/BANKING PROGRAM?

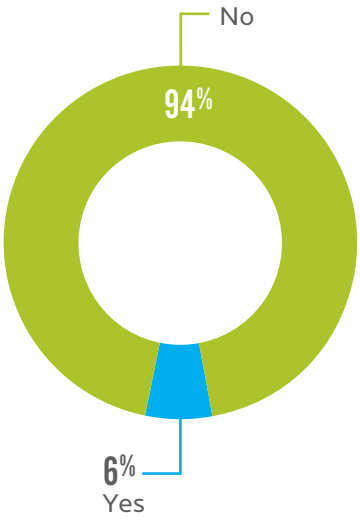


FIGURE 44

DO YOU OFFER ANY OF THE FOLLOWING INCENTIVE PROGRAMS? *(Select all that apply)*

Site assessment/BMP design assistance	18%
Stormwater grants	15%
Cost sharing	15%
BMP installation cost rebates	6%

PUBLIC INFORMATION/EDUCATION

Majority of the participants consider educating the public and the policy makers on stormwater management and engaging them in developing integrated solutions as essential outreach tasks to sustaining stormwater utilities. Public education and outreach is also one of the MS4 permit requirements which with utilities have to comply. As indicated in Figure 45, 96% of the respondents view ongoing public education as either "helpful" or "essential" to the success of their use fee-funded stormwater utility.

To better understand how utilities are engaging stakeholders, respondents were asked to rate the effectiveness of various stakeholder engagement activities that they have conducted. Consistent with the previous survey, direct and targeted interface with the customers through community events/presentations continues to rank the highest and interestingly social media had the lowest ranking. Utilities continue to view leveraging schools, to educate on stormwater management, as important a channel as print/TV media.

And, with all large-scale public information and educational campaign, the key to effective communication is the use of multiple communications channels frequently and consistently to ensure stakeholders see and remember the education campaign.

FIGURE 45

HOW IMPORTANT IS AN ORGANIZED, ONGOING PUBLIC INFORMATION/EDUCATION EFFORT TO CONTINUED SUCCESS OF USER FEE-FUNDED STORMWATER UTILITY? *(Select one)*

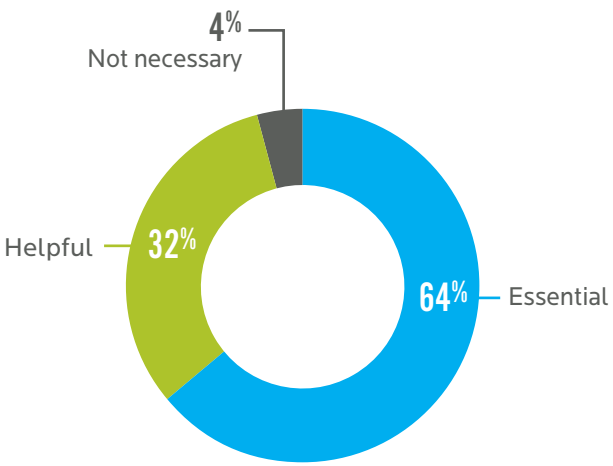
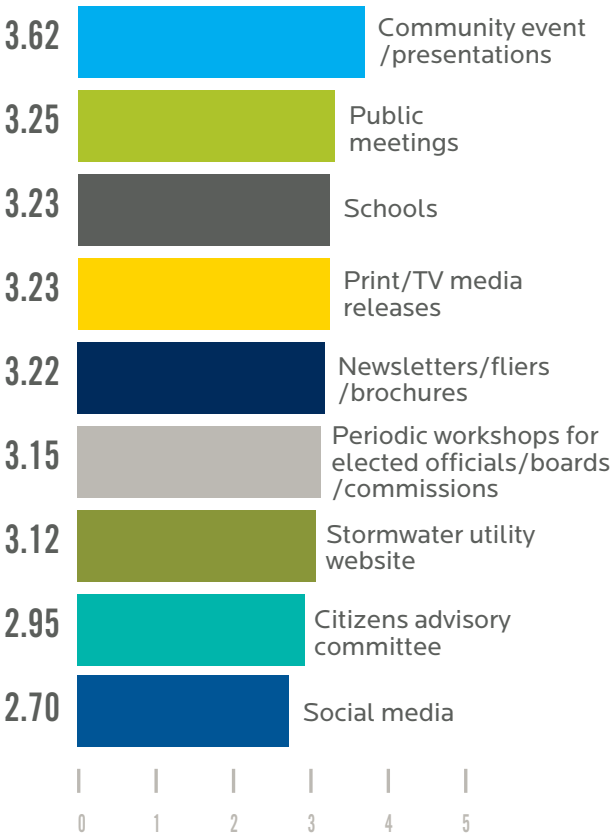


FIGURE 46

PLEASE RANK ON A SCALE OF 1 TO 5, THE EFFECTIVENESS OF THE SPECIFIC ACTIVITIES YOU HAVE UNDERTAKEN TO SECURE STAKEHOLDER APPROVAL AND SUPPORT FOR STORMWATER USER FEES. *(1: Least Effective, 5: Most Effective)*



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BLACK & VEATCH
Management Consulting
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11401 Lamar Avenue, Overland Park, KS 66211
P +1 913-458-2000 | **W** bv.com

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Appendix G – 2015 Southeast Stormwater Utility Survey

The Southeast Stormwater Association (SESWA) was formed in 2005 to assist professionals with problems associated with surface water quality and stormwater. SESWA is made up of representatives from Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. The 2015 Southeast Stormwater Utility Survey is the fifth biennial survey of stormwater utilities in the southeastern United States conducted by SESWA. SESWA surveyed 116 jurisdictions in the 2015 survey. The results can be found below.

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SeSwA Southeast Stormwater Association

2015

Southeast Stormwater

UTILITY SURVEY

Celebrating our 10th Anniversary

The Southeast Stormwater Association

The Southeast Stormwater Association (SESWA) was formed in 2005 to assist professionals in the public and private sectors as they seek to address problems associated with surface water quality and stormwater management. SESWA's boundaries are co-terminus with those of EPA Region 4 and include the states of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee.

SESWA is dedicated to improving surface water quality and advancing the interests of stormwater professionals and programs. Industry-leading services provided include:

- Advocating for the interests of stormwater programs in the decision-making processes of regulatory agencies and the courts.
- Providing the best-of-the-best in conferences, seminars and other educational programs for stormwater professionals.
- Researching, collecting and disseminating information about stormwater management practices, stormwater utilities and funding strategies, and environmental programs.

Southeast Stormwater Association, Inc.
719 East Park Avenue
Tallahassee, FL 32301
www.seswa.org

(866) FOR-SESWA (367-7379)
FAX: (850) 222-4124
SESWA@ksanet.net

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David Mason, PE, D.WRE, Principal Engineer
CDM Smith
Six Corporate Centre, 830 Crescent Centre Drive, Ste 400
Franklin, TN 37067
615-807-7815 | masond@cdmsmith.com

Michael A. Hanson, PE, LEED AP, Senior Associate
Dewberry
25 West Cedar Street, Suite 110
Pensacola, FL 32502
919-424-3716 | mhanson@dewberry.com

T. Luke Owen, President/ Principal Consultant
NPDES Stormwater Training Institute
1000 Peachtree Industrial Blvd, Suite 6
Suwanee, GA 30024
678-372-6968 | tlowen@npdestraining.com

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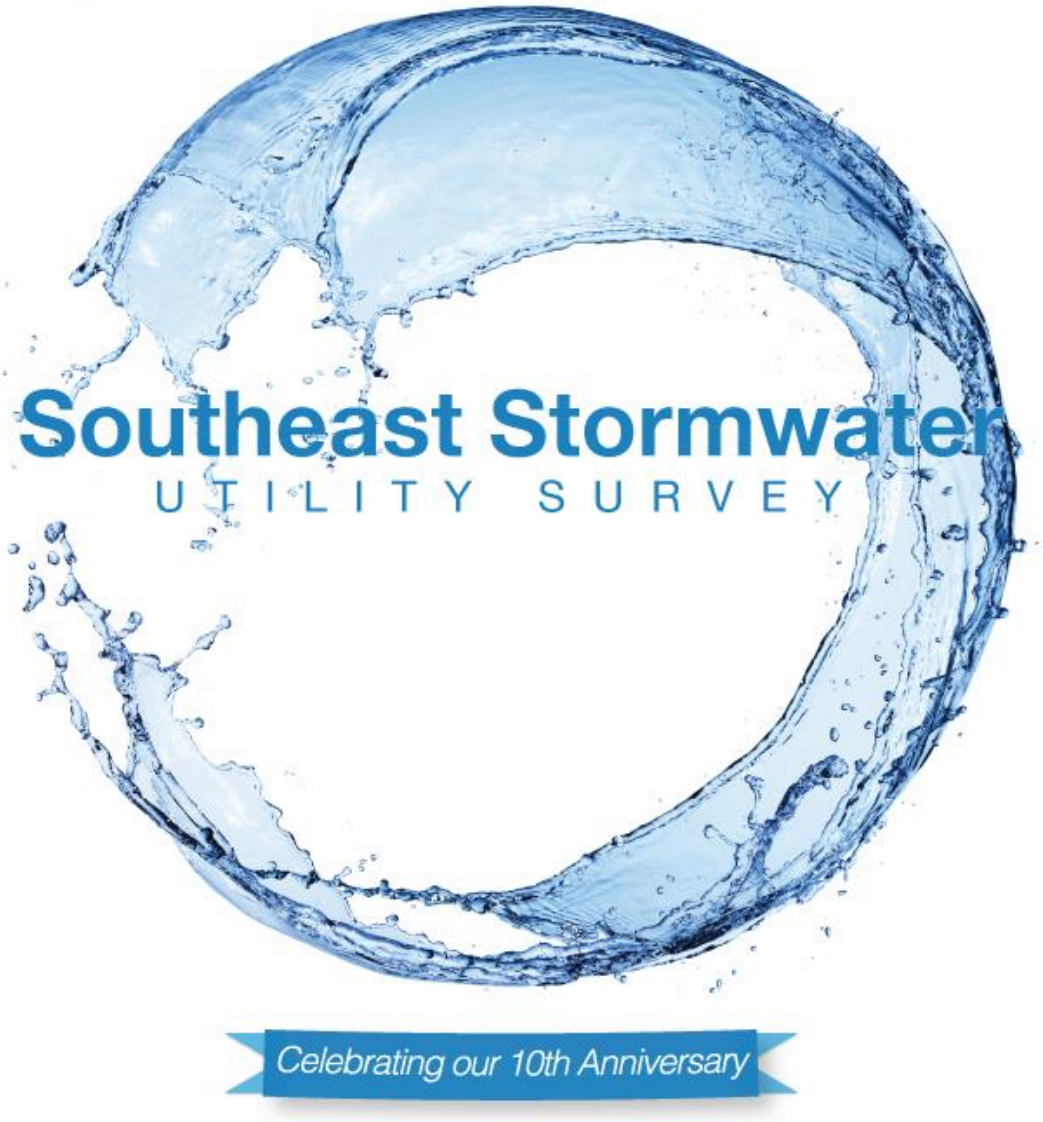

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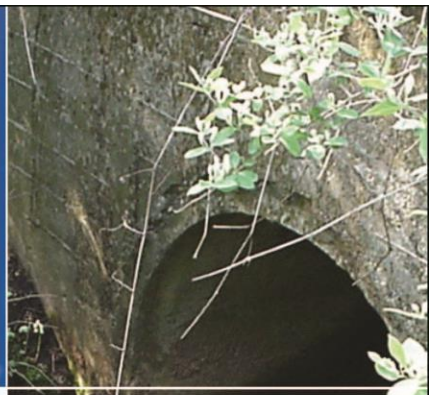

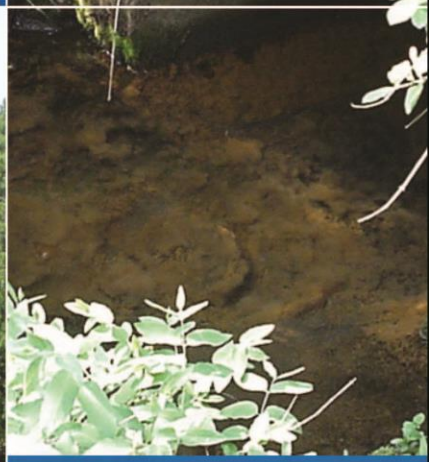

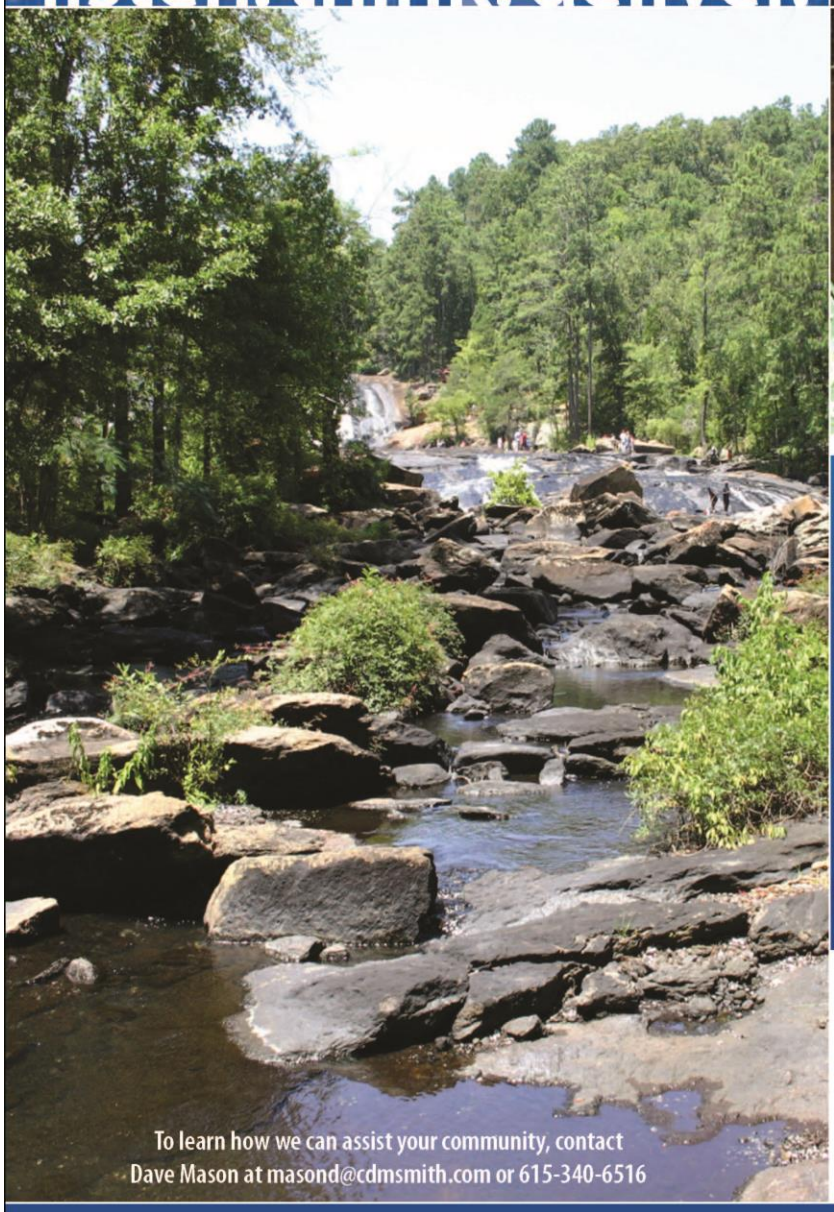

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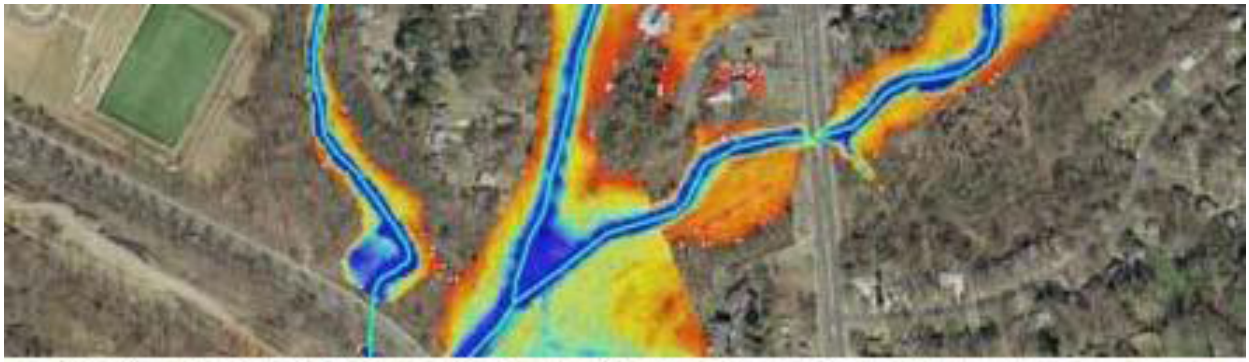

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NPDES Stormwater Training Institute

MS4 Compliance & Enforcement Certified Inspector

The MS4 Compliance and Enforcement Certified Inspector (MS4 CECI) Seminar is a 2-day training experience designed to credential Municipal Separate Storm Sewer Systems (MS4) staff and contracted personnel to perform MS4 permit compliance and enforcement responsibilities.

DAY 1
CLASSROOM TRAINING:

- Clean Water Act Fundamentals
- National Stormwater History
- Urban Stormwater Impacts
- MS4 Permit Compliance and Enforcement Basics

* USEPA, state and/or local government personnel will present on subjects related to Waters of the US, state waters, MS4 program audits, preferred enforcement protocol, etc.

DAY 2
CLASSROOM TRAINING:

- Role of the MS4 Inspector
- IDDE Outfall Reconnaissance & Investigations
- Industrial General Facility Inspections

FIELD SIMULATION TRAINING:

- Outfall Reconnaissance, Inventory & Water Sampling Protocol
- Illicit Discharge Detection & Elimination
- Industrial Facility Investigations

Course modules have been prepared and reviewed by stormwater consulting professionals as well as state and local regulatory personnel with over 100 years of combined experience.

MS4Stormwatertraining.com - 678-469-5120 - registration@npdestraining.com

Table of Contents

Introduction

The Southeast Stormwater Association was created to assist professionals in the public and private sectors seeking to address problems associated with surface water quality and stormwater management. Researching, collecting and disseminating information about stormwater utilities and stormwater management practices is one of the services that SESWA provides.

This Report presents the results of the fifth biennial survey of stormwater utilities in the southeastern United States conducted by SESWA. Its purpose is to provide useful information for managers and policy-makers concerning practices and trends in this important financing tool.

Stormwater regulations, policies and technologies are constantly changing. Stormwater utilities are a viable "user fee" funding option for cities and counties to consider. Stormwater utility fees can be used to help fund administrative costs, operations and maintenance, retrofits and capital improvements.

SESWA has identified a form of 163 organizations with stormwater utilities for the 2015 response, an increase of 47 over that which was reported in 2013. Of those, 76 respondents, representing 116 jurisdictions, completed and returned the survey.

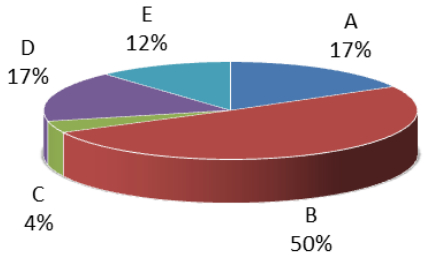
The southeast presents many unique challenges for collecting data in the region as there are many variables in the way stormwater utility fees are structured, administered and collected. Some of the information reported (e.g. fees or ERU size) may have been adjusted so that a common basis of display of the information can be shown in this Report.

We hope you find this Report to be a valuable resource. A list of respondents may be found in the appendix. For more information on SESWA, or to order additional reports, please contact us at www.SESWA.org or (866) 367-7379.

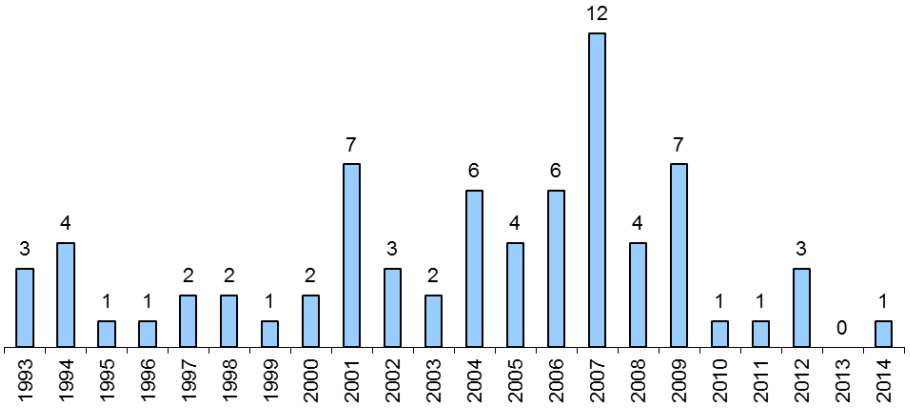
Utility Characteristics

1-1. How is your utility organized?

A. Separate Department of Local Government (13)
B. Combined with Department of Public Works (39)
C. Combined with Wastewater Utility (3)
D. Combined with other department (13)
E. Authority or district separate from local government (9)

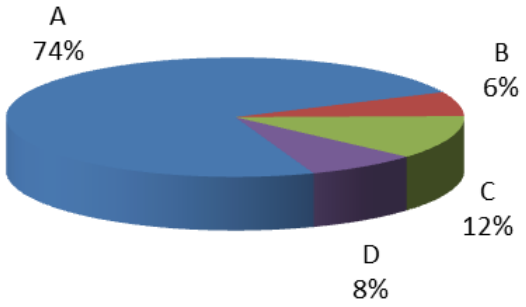


1-2. What year was your stormwater utility established?



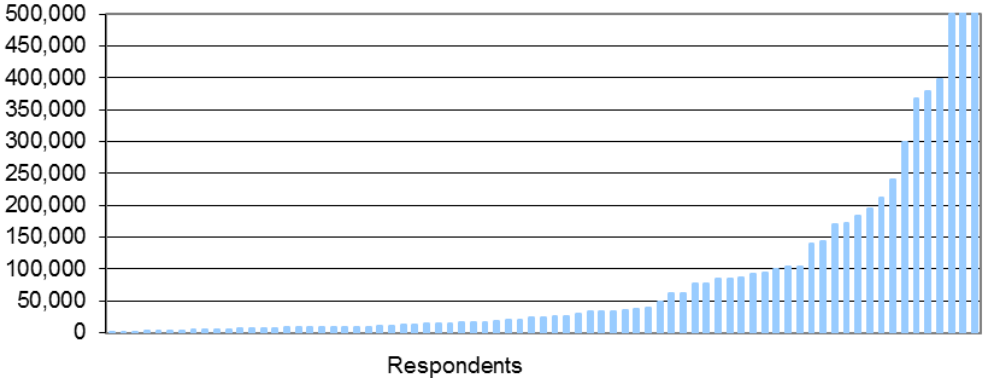
1-3. What jurisdiction does your utility serve?

A. City only (56)
B. City and unincorporated county (5)
C. Unincorporated county only (9)
D. Other (watershed, other defined area) (6)



1-4. What is the physical area served by your utility?

Average area of respondents is 86,200 acres. (2013 average 64,696 acres; 2011 average 83,592 acres; 2009 average was 102,173; 2007 average was 119,746).



*Georgetown County (520,960 acres) and Horry County (803,200 acres) were not included in the chart.

Utility Characteristics

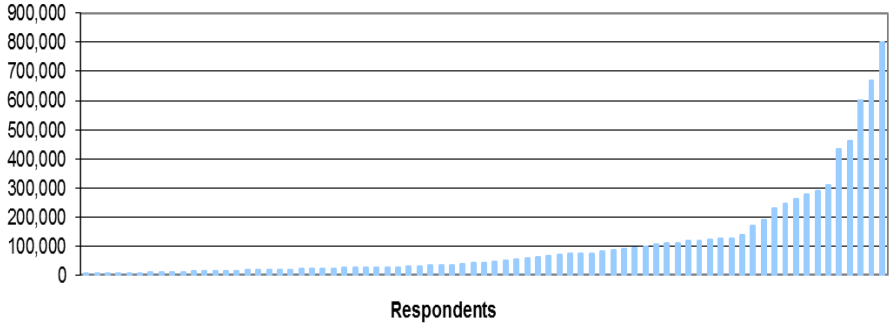
Respondents – Physical Area Served

Jurisdiction	Acres	Jurisdiction	Acres
Barrow County	104,217	City of Peachtree City	16,000
Beaufort County	379,407	City of Powder Springs	7
Charleston County	240,000	City of Raleigh	143,865
City of Aiken	10,240	City of Snellville	25,894
City of Anderson	9,000	City of Stuart	4,220
City of Archdale	5,184	City of Sumter	21,000
City of Asheville	29,268	City of Valdosta	23,040
City of Athens/Clarke County	77,440	City of Warner Robins	23,315
City of Austell	3,840	City of Wilmington	32,640
City of Belmont	7,300	City of Winston-Salem	84,736
City of Birmingham	95,010	Clayton County Water Authority	92,000
City of Bristol	20,921	Columbia County	170,000
City of Charleston	100,000	DeKalb County	171,520
City of Charlotte	194,000	Dorchester County	368,000
City of Chattanooga	86,528	Georgetown County	520,960
City of Concord	38,438	Greenville County	500,000
City of Conway	14,378	Gwinnett County	212,430
City of Covington	9,108	Hamilton County	102,700
City of Decatur	2,816	Horry County	803,200
City of Dunwoody	8,476	Jefferson County	396,831
City of Fayetteville	61,070	Lexington Fayette County	182,733
City of Florence	6,598	Mecklenburg County	61,440
City of Folly Beach	13,200	Rockdale County	76,800
City of Garden City	9,344	Sanitation District #1	139,300
City of Goodlettsville	9,600	Town of Bluffton	33,500
City of Greensboro	85,056	Town of Chapel Hill	13,504
City of Griffin	9,558	Town of Hilton Head Island	33,280
City of High Point	35,520	Town of Indian Trail	16,640
City of Holly Springs	4,309	Town of James Island	6,160
City of Isle of Palms	3,200	Town of Lincolnville	700
City of Lawrenceville	8,352	Town of Matthews	11,000
City of Maryville	8,960	Town of Morrisville	6,272
City of Monroe	18,963	Town of Mount Pleasant	25,880
City of Murfreesboro	37,313	Town of Port Royal	12,200
City of Norcross	4,800	Town of Sullivan's Island	2,100
City of North Augusta	16,344	Town of Wrightsville Beach	433
City of North Charleston	49,405	Warren County	300,000
City of North Myrtle Beach	13,558		

Utility Characteristics

1-5. What is the population served by your utility?

Average population is 103,535
2013 average population was 97,513
2011 average population was 101,566
2009 average population was 120,695
2007 average population was 135,392

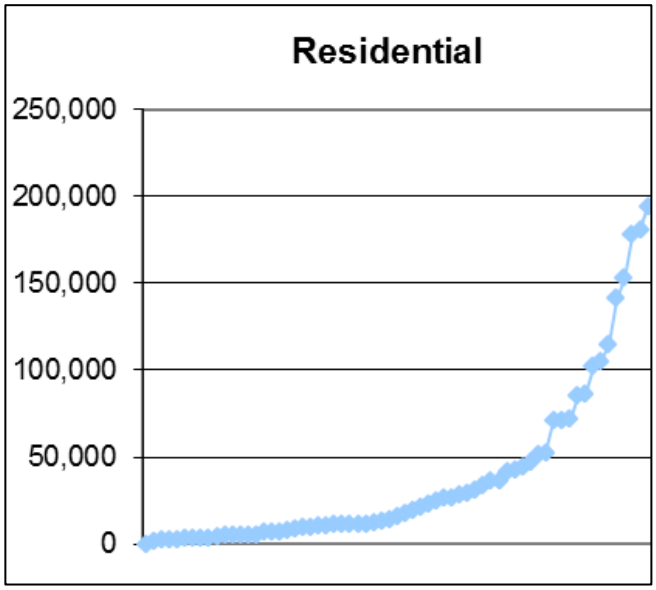


Respondents – Population Served

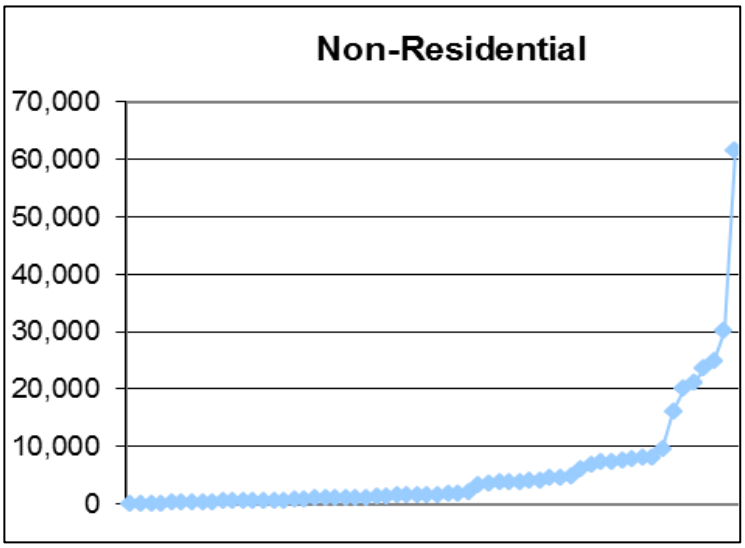
Jurisdiction	Population	Jurisdiction	Population
Barrow County	69,367	City of Peachtree City	34,363
Beaufort County	94,311	City of Powder Springs	14,253
Charleston County	65,000	City of Raleigh	432,000
City of Aiken	29,524	City of Snellville	20,076
City of Anderson	26,700	City of Stuart	15,814
City of Archdale	11,466	City of Sumter	42,700
City of Asheville	87,236	City of Valdosta	54,518
City of Athens/Clarke County	121,265	City of Warner Robins	72,600
City of Austell	6,700	City of Wilmington	106,500
City of Belmont	10,264	City of Winston-Salem	227,000
City of Birmingham	242,820	Clayton County Water Authority	26,413
City of Bristol	26,626	Columbia County	118,000
City of Charleston	124,000	Davidson County/City of Nashville	NR
City of Charlotte	800,000	DeKalb County	600,000
City of Chattanooga	170,136	Dorchester County	136,555
City of Concord	79,673	Georgetown County	55,797
City of Conway	19,300	Greenville County	461,000
City of Covington	14,712	Gwinnett County	667,455
City of Decatur	18,942	Hamilton County	124,852
City of Dunwoody	46,000	Horry County	260,000
City of Fayetteville	187,752	Jefferson County	85,000
City of Florence	31,423	Lexington Fayette County	308,000
City of Folly Beach	2,600	Mecklenburg County	115,000
City of Garden City	8,904	Rockdale County	71,301
City of Goodlettsville	16,000	Sanitation District #1	287,500
City of Greensboro	277,080	Town of Bluffton	13,600
City of Griffin	23,464	Town of Chapel Hill	59,653
City of High Point	107,652	Town of Hilton Head Island	39,412
City of Holly Springs	9,189	Town of Indian Trail	39,000
City of Isle of Palms	4,100	Town of James Island	11,000
City of Lawrenceville	25,000	Town of Lincolnville	1,150
City of Maryville	26,000	Town of Matthews	29,500
City of Monroe	34,000	Town of Morrisville	21,000
City of Murfreesboro	109,031	Town of Mount Pleasant	71,875
City of Norcross	15,500	Town of Port Royal	11,542
City of North Augusta	21,348	Town of Sullivan's Island	1,800
City of North Charleston	97,600	Town of Wrightsville Beach	2,800
City of North Myrtle Beach	15,376	Warren County	50,000

Utility Characteristics

1-6. How many accounts does the utility serve?



Residential
Average is 37,268 accounts
2013 average was 30,651
2011 average was 33,279
2009 average was 37,844
2007 average was 35,232

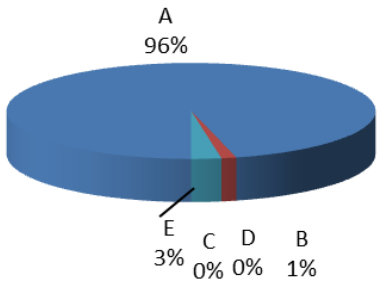


Non Residential
Average is 5,597 accounts
2013 average was 3,789
2011 average was 2,654
2009 average was 5,732
2007 averagewas 5,312

Utility Fees and Rates

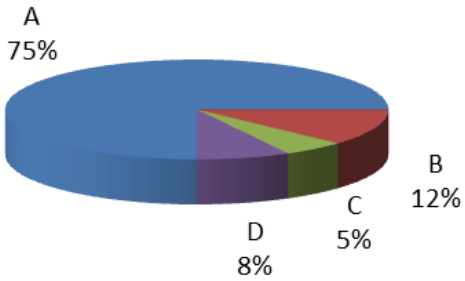
2-1. What is the basic methodology used for your revenue generation?

A. User Fee (73)
B. Non-ad valorem or special assessment (1)
C. Ad valorem tax (0)
D. Sales Tax (0)
E. Other (2)



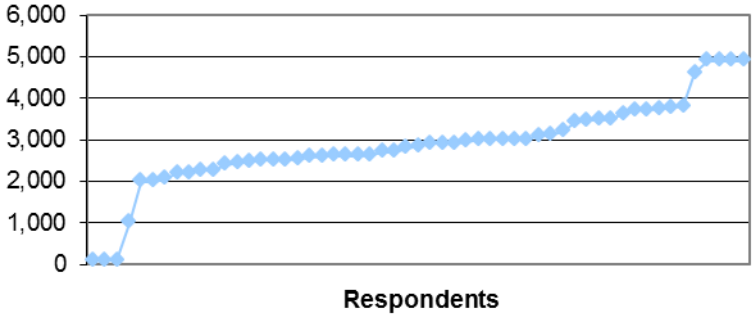
2-2. What is the general basis for your fee?

A. Impervious area (57)
B. Both gross area and impervious area (9)
C. Gross area with intensity of development factor (4)
D. Other (6)



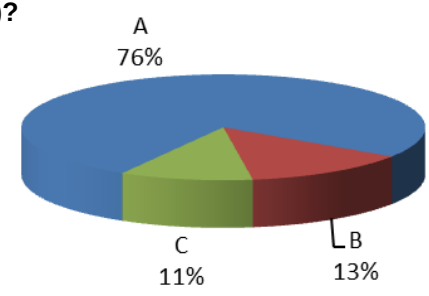
2-3. If impervious area is the fee basis, what is the square footage of your average billing unit (ERU or similar designation) ?

Average is 2,852 square feet.
2013 was 3,502
2011 was 2,940
2009 was 2,766
2007 was 3,253



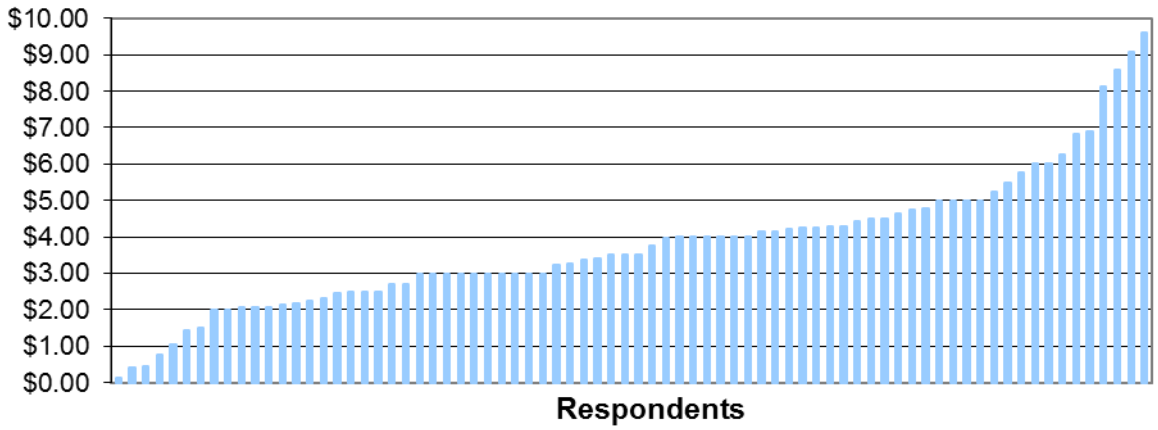
2-4. Is the "average billing unit" based upon single-family units only or on all residential types (e.g. single and multi-family, condominiums, mobile omes, etc.)?

A. Single-family (57)
B. All residential types (10)
C. Other (8)



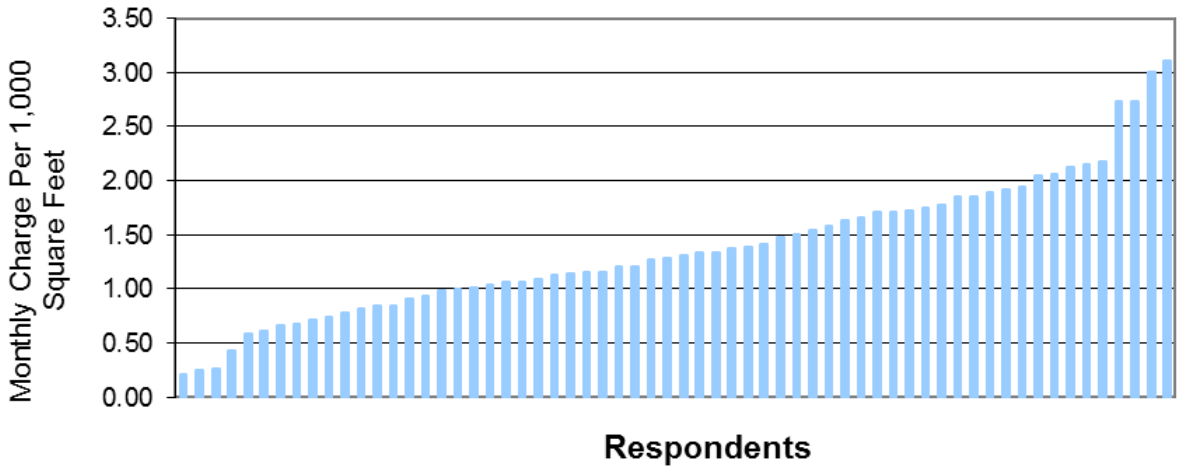
2-5. What is your current stormwater utility rate per month?

Average rate is $3.77. Average rate was $3.59 in both, 2013 and 2011. The average rate in 2009 was $3.22 and the average rate in 2007 was $3.18.



Comparative Monthly Stormwater Rates Based on Standardized Billing Area

Standardizing the billing area to 1,000 square feet alters the average for 2015 to be $1.37. (2013 was $1.73; 2011 was $1.69; 2009 was $1.31 and 2007 was $1.20).



Utility Fees and Rates

Current Stormwater Utility Rates per Month

Utility Rate Range
Low = $.12 High = $9.60

Jurisdiction	Rate	ERU	Jurisdiction	Rate	ERU
Barrow County	$1.50	3,478	City of Peachtree City	$6.89	4,600
Beaufort County	$4.16	4,906	City of Powder Springs	$3.00	2,840
City of Archdale	$5.00	3,612	City of Raleigh	$4.00	2,260
City of Asheville	$4.00	2,442	City of Snellville	$2.33	3,800
City of Athens/Clarke County	$3.51	2,628	City of Stuart	$4.01	3,707
City of Austell	$3.50	3,100	City of Valdosta	$2.50	3,704
City of Belmont	$3.00	2,500	City of Warner Robins	$4.25	3,000
City of Bristol	$2.00	3,000	City of Wilmington	$6.83	2,500
City of Charleston	$6.00	2,200	City of Winston-Salem	$4.25	2,000
City of Charlotte	$8.13	2,613	Clayton County Water Authority	$3.75	2,950
City of Chattanooga	$9.60	3,200	Columbia County	$0.12	100
City of Concord	$4.30	3,120	Davidson County/City of Nashville	$3.00	N/A
City of Conway	$5.25	2,700	DeKalb County	$4.00	3,000
City of Decatur	$6.25	2,900	Dorchester County	$2.16	3,735
City of Dunwoody	$5.75	3,000	Georgetown County	$4.30	3,770
City of Fayetteville	$3.50	2,266	Greenville County	$2.25	2,477
City of Garden City	$4.75	3,000	Gwinnett County	$2.05	1,000
City of Goodlettsville	$5.50	2,900	Lexington Fayette County	$4.63	2,500
City of Greensboro	$2.70	2,543	Mecklenburg County	$2.12	2,613
City of Griffin	$4.79	2,200	Rockdale County	$3.39	3,420
City of High Point	$2.00	2,588	Sanitation District #1	$4.44	2,600
City of Holly Springs	$4.00	2,700	Town of Bluffton	$8.60	5
City of Maryville	$3.97	2,400	Town of Chapel Hill	$2.06	1,000
City of Monroe	$4.50	2,618	Town of Hilton Head Island	$9.06	4,906
City of Murfreesboro	$3.25	3,470	Town of Indian Trail	$2.70	2,060
City of Norcross	$1.04	1,000	Town of Matthews	$1.42	2,000
City of North Charleston	$3.36	2,900	Town of Morrisville	$2.08	2,800
City of North Myrtle Beach	$6.00	3,500	Town of Port Royal	$4.16	4,906
			Warren County	$4.00	N/A

Comparative Monthly Stormwater Rates

The table compares rates from jurisdications that reported in 2007, 2009, 2011, 2013 or 2015. Change calculated only if jurisdiction responded for both 2013 and 2015.

Jurisdiction	2007	2009	2011	2013	2015	Change
Average	**$3.18**	**$3.22**	**$3.66**	**$3.60**	**$3.77**	**$0.42**
Jurisdiction	**2007**	**2009**	**2011**	**2013**	**2015**	**Change**
Barrow County			$1.50	$1.50	$1.50	$0.00
Beaufort County	$3.69		$4.16	$4.16	$4.16	$0.00
Charleston County	$3.00	$3.00	$3.00	$3.00	$3.00	$0.00
City of Aiken	$3.22				$3.22	
City of Anderson				$4.00	$4.50	$0.50
City of Archdale	$5.00		$5.00	$5.00	$5.00	$0.00

Comparative Monthly Stormwater Rates (continued)

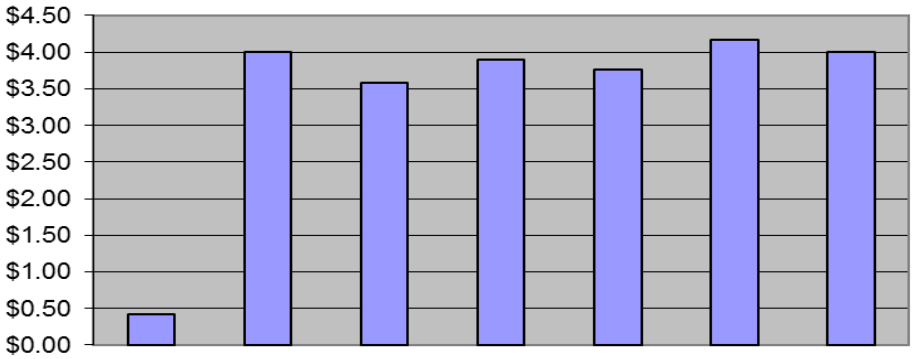
Jurisdiction	2007	2009	2011	2013	2015	Change
City of Asheville				$2.34	$4.00	$1.66
City of Athens/Clarke County	$3.50	$3.51	$3.51	$3.51	$3.51	$0.00
City of Austell				$3.50	$3.50	$0.00
City of Belmont		$3.00			$3.00	
City of Bessemer City	$2.07	$2.07	$2.07		$2.07	
City of Birmingham					$0.43	$0.43
City of Bristol					$2.00	$2.00
City of Burlington	$2.00	$2.00	$2.00		$2.00	$0.00
City of Charleston	$6.00	$6.00	$6.00	$6.00	$6.00	$0.00
City of Charlotte	$5.15	$5.90	$6.63	$7.48	$8.13	$0.65
City of Chattanooga	$2.50	$2.50	$9.60	$9.60	$9.60	$0.00
City of Columbia	$3.95					
City of Concord			$4.30	$4.30	$4.30	$0.00
City of Conway	$5.25	$5.25		$5.25	$5.25	$0.00
City of Conyers	$3.33					
City of Covington	$3.23	$3.00	$3.00	$3.00	$3.00	$0.00
City of Decatur			$6.25		$6.25	
City of Doraville	$4.00		$4.00	$4.00	$4.00	$0.00
City of Douglasville/Douglas Cnty	$4.00	$4.00	$4.00			
City of Dunwoody				$5.75	$5.75	$0.00
City of Easley	$2.00	$2.00	$2.00	$2.00	$2.00	$0.00
City of Fairburn	$4.00	$4.00	$4.00	$4.08	$4.08	$0.00
City of Fayetteville, GA	$2.95	$2.95	$2.95	$2.95		
City of Fayetteville, NC			$3.00	$3.00	$3.50	$0.50
City of Florence	$3.34	$2.50	$2.50		$2.50	$0.00
City of Folly Beach		$3.00	$3.00	$3.00	$3.00	$0.00
City of Franklin	$3.65	$3.65	$3.65	$3.65		
City of Garden City			$4.75	$4.75	$4.75	$0.00
City of Gastonia	$2.75					
City of Goodlettsville				$2.00	$5.50	$3.50
City of Greensboro	$2.70	$2.70	$2.70	$2.70	$2.70	$0.00
City of Greenville	$2.85	$2.85	$2.85			
City of Griffin	$3.50	$4.39	$4.33	$4.65	$4.79	$0.14
City of HighPoint				$2.00	$2.00	$0.00
City of Holly Springs				$4.00	$4.00	$0.00
City of Hopkinsville			$3.00	$3.00		
City of Isle of Palms		$3.00	$3.00	$3.00	$3.00	$0.00
City of Lawrenceville		$4.20	$4.20	$4.20	$4.20	$0.00
City of Loganville		$5.00	$5.00			
City of Maryville			$3.97	$3.97	$3.97	$0.00
City of Monroe		$4.00	$4.00	$4.00	$4.50	$0.50
City of Morristown		$1.00	$1.00			
City of Murfressboro			$3.25	$3.25	$3.25	$0.00
City of Myrtle Beach			$5.25	$5.25		
City of Norcross		$0.10			$1.25	$1.15
City of North Augusta	$4.00	$4.00	$4.00	$4.00	$5.00	$1.00
City of North Charleston			$3.00	$3.00	$3.36	$0.36
City of North Myrtle Beach	$6.00	$6.00	$6.00	$6.00	$6.00	$0.00
City of Oxford	$2.00	$2.00	$2.00			
City of Peachtree City			$3.95	$3.95	$6.89	$2.94

Comparative Monthly Stormwater Rates (continued)

Jurisdiction	2007	2009	2011	2013	2015	Change
City of Powder Springs				$3.00	$3.00	$0.00
City of Radcliff	$4.00	$4.50	$4.62	$4.62	$4.62	$0.00
City of Raleigh	$4.00	$4.00	$4.00	$4.00	$4.00	$0.00
City of Rocky Mount		$3.75	$4.25	$4.25		
City of Snellville				$2.33	$2.33	$0.00
City of Stuart			$3.76	$3.89	$4.01	$0.12
City of Sumter				$2.50	$2.50	$0.00
City of Valdosta	$2.50	$2.50	$2.50	$2.50	$2.50	$0.00
City of Warner Robins				$4.25	$4.25	$0.00
City of Wilmington	$5.00	$5.00	$5.30	$6.09	$6.83	$0.74
City of Winston-Salem		$4.25	$4.25	$4.25	$4.25	$0.00
City of Woodstock			$4.20	$4.20		
Clayton County Water Authority		$3.75	$3.75		$3.75	
Columbia County	NR	$0.09	$0.09	$0.09	$0.12	$0.03
Cumberland County/Fayetteville	$1.00	$3.00				
Davidson Count/City of Nashville			$3.00	$3.00	$3.00	$0.00
DeKalb County	$4.00		$4.00	$4.00	$4.00	$0.00
Dorchester County	$2.43	$2.43	$3.73	$3.73	$2.16	$1.57
Georgetown County	NR	$4.30	$4.30		$4.30	
Greenville County				$2.25	$2.25	$0.00
Gwinnett County	$0.06	$0.21	$2.46	$2.46	$2.46	$0.00
Hamilton County			$0.75	$0.75	$0.75	$0.00
Henry County	$2.83	$2.83	$3.32			
Horry County		$2.45	$2.45		$2.45	$0.00
Jefferson County				$0.42	$0.42	$0.00
Lexington Fayette Urban CntyGov				$4.49	$4.63	$0.14
Louisville/Jefferson County Metro		$5.35				
Mecklenburg County	$3.18	$2.12	$2.12	$2.12	$2.12	$0.00
Rockdale County	$3.38			$3.39	$3.39	$0.00
Sanitation District #1	$4.02	$4.30	$4.44	$4.44	$4.44	$0.00
Spartanburg County	$4.00	$4.00				
Town of Bluffton					$8.60	$8.60
Town of Chapel Hill			$3.25		$2.06	
Town of Hilton Head Island			$9.06	$9.06	$9.06	$0.00
Town of Hope Mills		$3.00	$3.00	$4.00		
Town of Indian Trail		$2.70	$2.70	$2.70	$2.70	$0.00
Town of James Island			$3.00	$3.00	$3.00	$0.00
Town of Kernersville			$3.29			
Town of Landis		$5.00	$5.00			
Town of Lincolnville		$3.00	$3.00	$3.00	$3.00	$0.00
Town of Matthews	$1.42	$1.42	$1.42	$1.42	$1.42	$0.00
Town of Morrisville				$1.92	$2.08	$0.16
Town of Mount Pleasant				$2.50	$5.00	$2.50
Town of Port Royal					$4.16	
Town of Signal Mountain				$0.01		
Town of Smyrna		$3.47	$3.47			
Town of Sullivan's Island		$3.00	$3.00	$3.00	$3.00	$0.00
Town of Wrightsville Beach	$0.00	$0.00	$0.00	$0.00	$5.00	$5.00
Warren County				$4.00	$4.00	$0.00

Utility Fees and Rates

Average Monthly Utility Rate Comparison by State



State:	AL	FL	GA	KY	NC	SC	TN
Rate:	$0.43	$4.01	$3.58	$3.89	$3.76	$4.17	$4.01
ERU:	N/A	3,707	2,661	2,520	2,443	5,229	3,095

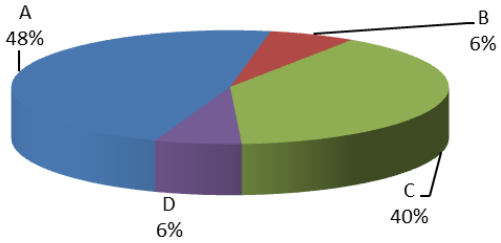
2-6. How are the majority of your stormwater charges invoiced?

A. Combined on monthly bill for other utility services (37)

B. Separate Mailing (5)

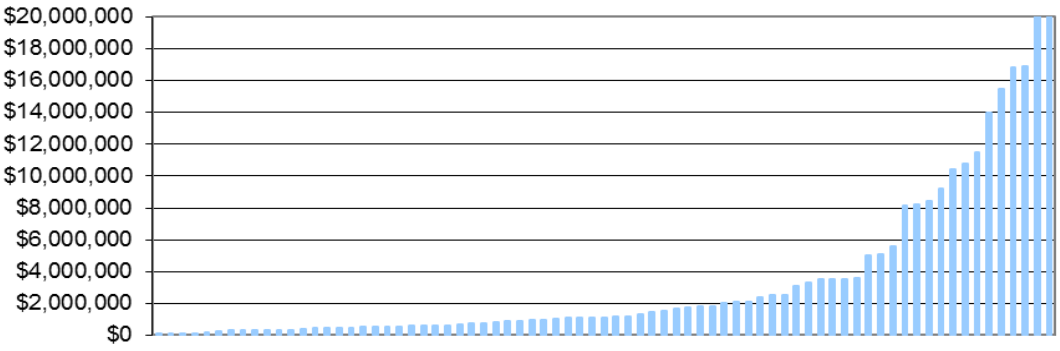
C. Placed on annual property tax bill (31)

D. Other (including combinations of the above) (5)



2-7. What is the total annual revenue generated by the utility fee?

Average revenue generated is $4,546,334
2013 was $3,964,422
2011 was $4,192,942
2009 was $4,198,811
2007 was $3,586,837



The City of Charlotte, NC ($59,000,000) & Gwinnet County, GA ($30,862,028) were not included in the graph above.

Total Annual Revenue generated by utility fee (sorted by jurisdiction)

Jurisdiction	2015 Revenue	Jurisdiction	2015 Revenue
Barrow County	$425,000	City of Peachtree City	$2,300,000
Beaufort County	$3,131,107	City of Powder Springs	$352,579
City of Aiken	$884,000	City of Raleigh	$16,200,000
City of Anderson	$1,170,000	City of Snellville	$535,775
City of Archdale	$480,000	City of Stuart	$680,473
City of Asheville	$4,782,372	City of Sumter	$505,000
City of Athens/Clarke	$3,500,000	City of Valdosta	$1,200,000
City of Austell	$444,348	City of Warner Robins	$2,457,149
City of Belmont	$406,293	City of Wilmington	$6,982,279
City of Birmingham	$591,455	City of Winston-Salem	$10,400,000
City of Bristol	$600,000	Clayton County Water Authority	$9,200,000
City of Charleston	$5,600,000	Columbia County	$2,500,000
City of Charlotte *	$59,000,000	Davidson County/City of Nashville	$14,000,000
City of Chattanooga	$16,858,235	DeKalb County	$15,000,000
City of Concord	$3,600,000	Dorchester County	$1,468,045
City of Conway	$950,900	Georgetown County	$1,672,736
City of Covington	$725,000	Greenville County	$8,000,000
City of Decatur	$825,000	Gwinnett County*	$30,862,028
City of Dunwoody	$1,800,000	Hamilton County	$655,266
City of Fayetteville, NC	$6,204,349	Horry County	$4,800,000
City of Florence	$621,852	Jefferson County	$420,000
City of Garden City	$880,000	Lexington Fayette County	$13,500,000
City of Goodlettsville	$300,000	Mecklenburg County	$850,000
City of Greensboro	$10,290,382	Rockdale County	$1,800,000
City of Griffin	$2,200,000	Sanitation District #1	$12,740,000
City of High Point	$2,693,380	Town of Bluffton	1,150,00
City of Holly Springs	$327,000	Town of Chapel Hill	$2,190,778
City of Lawrenceville	$684,000	Town of Hilton Head Island	$3,500,000
City of Maryville	$1,200,000	Town of Indian Trail	$1,200,000
City of Monroe	$2,080,000	Town of Matthews	$590,000
City of Murfreesboro	$2,750,000	Town of Morrisville	$501,000
City of Norcross	$750,000	Town of Mount Pleasant	$2,100,000
City of North Augusta	$738,045	Town of Port Royal	$164,837
City of North Charleston	$3,767,000	Town of Wrightsville Beach	$137,000
City of North Myrtle Bch	$2,072,371	Warren County	900,000.00

Comparative Annual Revenues

The table below compares annual revenues generated only from those jurisdictions that reported in 2007, 2009 2011, 2013 or 2015. Change calculated only if jurisdiction responded for both 2013 and 2015.

Jurisdiction	2007	2009	2011	2013	2015	Change
Barrow			$480,000	$350,000	$425,000	75,000
Beaufort County*	4,700,000		$7,058,116	$8,145,808	$3,131,107	(5,014,701)
City of Aiken	655,000				$884,000	
City of Anderson				$920,000	$1,170,000	250,000
City of Archdale		480,000	480,000	480,000	480,000	0
City of Asheville				3,107,993	4,782,372	1,674,379
City of Athens/Clarke County	3,400,000	3,500,000	3,500,000	3,500,000	3,500,000	0
City of Austell				370,141	444,348	74,207
City of Belmont		370,000			$406,293	
City of Bessemer City	60,000	$66,000	$67,000		$67,000	
City of Birmingham					$591,455	
City of Bristol					$600,000	
City of Burlington	420,000	$420,000	$420,000			
City of Charleston	6,336,000	5,600,000	5,600,000	5,600,000	5,600,000	0
City of Charlotte	32,500,000	36,600,000	46,800,000	51,000,000	59,000,000	8,000,000
City of Chattanooga	5,000,000	5,000,000	16,335,278	16,858,235	16,858,235	0
City of Columbia	3,500,000					
City of Concord			$3,500,000	$3,600,000	$3,600,000	0
City of Conway	888,000	888,000		950,000	950,900	900
City of Conyers	413,000					
City of Covington	900,000	725,000	725,000	725,000	725,000	0
City of Decatur			825,000		825,000	
City of Doraville	495,442		$485,000	$485,000		
City of Douglasville/Douglas County	4,000,000	4,000,000	4,500,000			
City of Dunwoody				1,800,000	1,800,000	0
City of Easley	300,000	300,000	300,000	300,000		
City of Fairburn	450,000	450,000	450,000	450,000		
City of Fayetteville, GA	500,000	500,000	500,000	500,000		
City of Fayetteville, NC			5,100,000	5,100,000	6,204,000	1,104,000
City of Florence	1,010,079	621,852	621,852		621,852	
City of Folly Beach		NR	0	91,000		
City of Franklin	1,400,000	1,900,000	2,085,900	2,085,900		
City of Garden City			940,000	940,000	880,000	(60,000)
City of Gastonia	2,000,000					0
City of Goodlettesville				$300,000	$300,000	
City of Greensboro	8,500,000	9,450,000	9,450,000	9,241,665	10,290,382	1,048,717
City of Greenville	2,806,221	2,983,242	3,096,468	2,100,000		
City of Griffin	1,700,000	1,700,000	1,700,000		2,200,000	
City of High Point				2,400,000	2,693,380	293,380
City of Holly Springs				319,000	327,000	8,000
City of Hopkinsville			1,100,000	1,100,000		
City of Isle of Palms		NR	0	185,000		
City of Lawrenceville		684,000	684,000	684,000	684,000	0
City of Loganville		400,000	400,000			
City of Louisville/Jefferson		31,107,000				
City of Maryville			1,200,000	1,200,000	1,200,000	0
City of Monroe		1,600,000	1,700,000	1,820,000	2,080,000	260,000
City of Morristown		590,000	590,000	2,500,000		
City of Murfreesboro			0	1,500,000	2,750,000	1,250,000
City of Myrtle Beach			1,500,000			
City of Norcross		819,000			750,000	
City of North Augusta	511,500	610,324	562,021	577,236	738,045	160,809
City of North Charleston			3,300,000	3,300,000	3,767,000	467,000

Comparitve Annual Revenues (continued)

Jurisdiction	2007	2009	2011	2013	2015	Change
City of North Myrtle Beach	1,400,000	1,950,000	1,975,000	2,009,474	2,072,371	62,897
City of Oxford	135,000	135,000	135,000			
City of Peachtree City			1,300,000	1,300,000	2,300,000	1,000,000
City of Powder Springs				324,123	352,579	28,456
City of Radcliff	677,000	750,000	770,000	770,000		
City of Raleigh	12,169,757	13,000,000	13,500,000	15,500,000	16,200,000	700,000
City of Rocky Mount		3,000,000	3,200,000	3,500,000		
City of Snellville				541,088	535,775	(5,313)
City of Stuart			540,000	540,000	680,473	140,473
City of Sumter				505,000	505,000	0
City of Valdosta	1,200,000	1,100,000	1,200,000	1,200,000	1,200,000	0
City of Warner Robbins				2,500,000	2,457,149	(42,851)
City of Wilmington	6,200,000	6,200,000	7,020,000	8,441,379	6,982,279	(1,459,100)
City of Winston-Salem		8,601,060	8,601,060	10,400,000	10,400,000	0
City of Woodstock			1,077,215	1,077,215		
Clayton County Water Authority		8,700,000	8,700,000		9,200,000	
Columbia County	1,300,000	1,300,000	1,300,000	1,715,649	2,500,000	784,351
Davidson County/City of Nashville			14,000,000	14,000,000	14,000,000	0
DeKalb County	17,500,000		16,900,000	16,900,000	15,000,000	(1,900,000)
Dorchester County		1,437,078	1,437,078	1,437,078	1,468,045	30,967
Georgetown County	unknown	1,672,736	1,672,736		1,672,736	
Greenville County		7,000,000	7,000,000	8,200,000	8,000,000	(200,000)
Gwinnett County	8,300,000	30,381,000	31,373,817	31,420,057	30,862,028	(558,029)
Hamilton County			588,881	626,937	655,266	28,329
Henry County	2,000,000	3,000,000	2,600,000			
Horry County		4,300,000	4,750,000		4,800,000	
Jefferson County				5,000,000	420,000	(4,580,000)
Lexington Fayett Urban County Gov.				11,500,000	13,500,000	2,000,000
Mecklenburg County	3,500,000	$800,000	$800,000	$800,000	$850,000	50,000
Rockdale County	2,000,000			$1,700,000	$1,800,000	100,000
Sanitation District #1	8,000,000	10,000,000	10,800,000	10,800,000	12,740,000	1,940,000
Spartanburg County	650,000	650,000				
Storm Water Management Authority	2,400,000	2,068,494				
Town of Bluffton					$115,000	
Town of Chapel Hill			1,770,000		2,190,778	
Town of Hilton Head Island			3,500,000	3,500,000	3,500,000	0
Town of Hope Mills		375,000	422,000	634,000		
Town of Indian Trail		1,000,000	1,000,000	1,000,000	1,200,000	200,000
Town of James Island			0	320,000		
Town of Kernersville			752,743			
Town of Landis		94,000	94,000			
Town of Lincolnville		NR	0	14,750		
Town of Matthews	520,000	520,000	562,000	590,000	590,000	0
Town of Morrisville				440,000	501,000	61,000
Town of Mount Pleasant				1,100,000	2,100,000	1,000,000
Town of Port Royal					$164,837	
Town of Signal Mountain				260,000		
Town of Smyrna		1,000,000	1,200,000			
Town of Sullivan's Island		NR	0	41,000		
Town of Wrightsville Beach	137,000	137,000	137,000	137,000	137,000	0
Warren County		900,000		900,000	900,000	0
Year	**2,007**	**2,009**	**2,011**	**2,013**	**2,015**	**Change**
Total	**$150,396,999**	**$219,398,786**	**$275,397,165**	**$295,152,728**	**$313,878,685**	**$8,972,871**
Average	**$3,759,925**	**$4,387,976**	**$3,991,263**	**$4,157,081**	**$4,420,827**	**$160,230**

* Beaufort County previously reported for multiple jurisdictions, 2015 is the first year they report as a single entity.

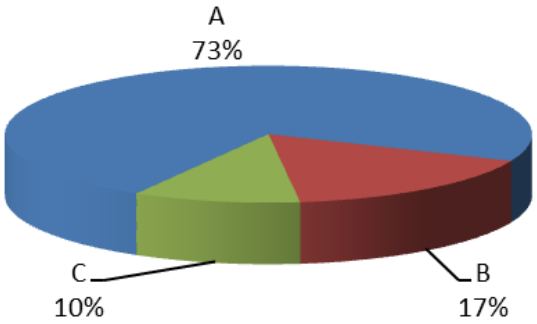
Utility Fees and Rates

2-8. Who is responsible for paying your utility fee?

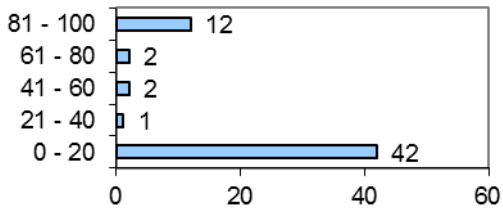
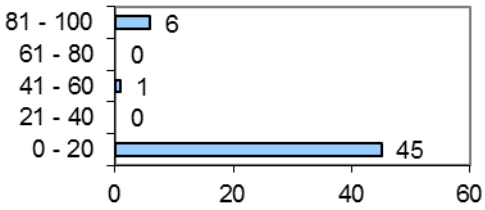
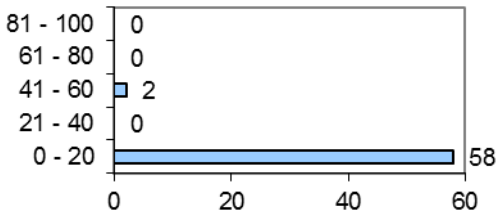
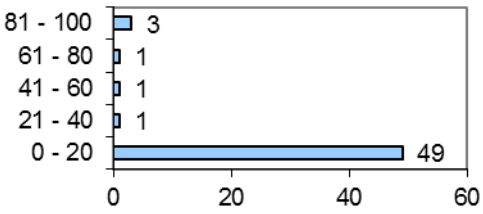
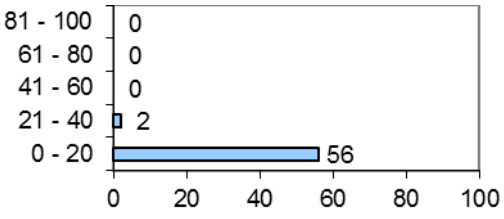
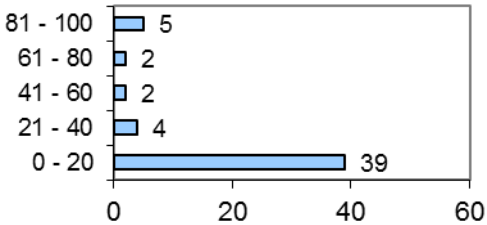
A. Property owner (57)

B. Occupant (13)

C. Other (8)

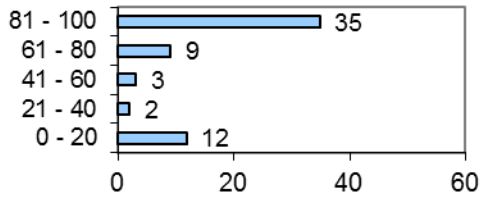
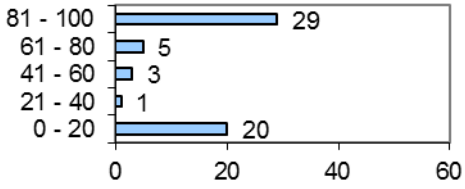
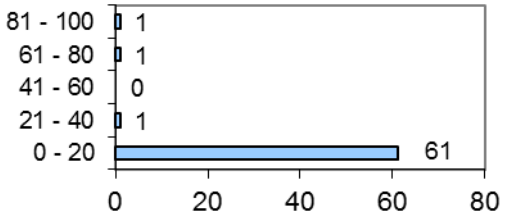
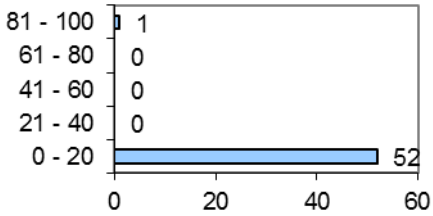


2-9. For properties that are charged a fee based on actual, on-site impervious area (i.e. *not* a customer class average) please estimate how a majority of this information was *initially collected* and how it is *maintained* for your billing database?

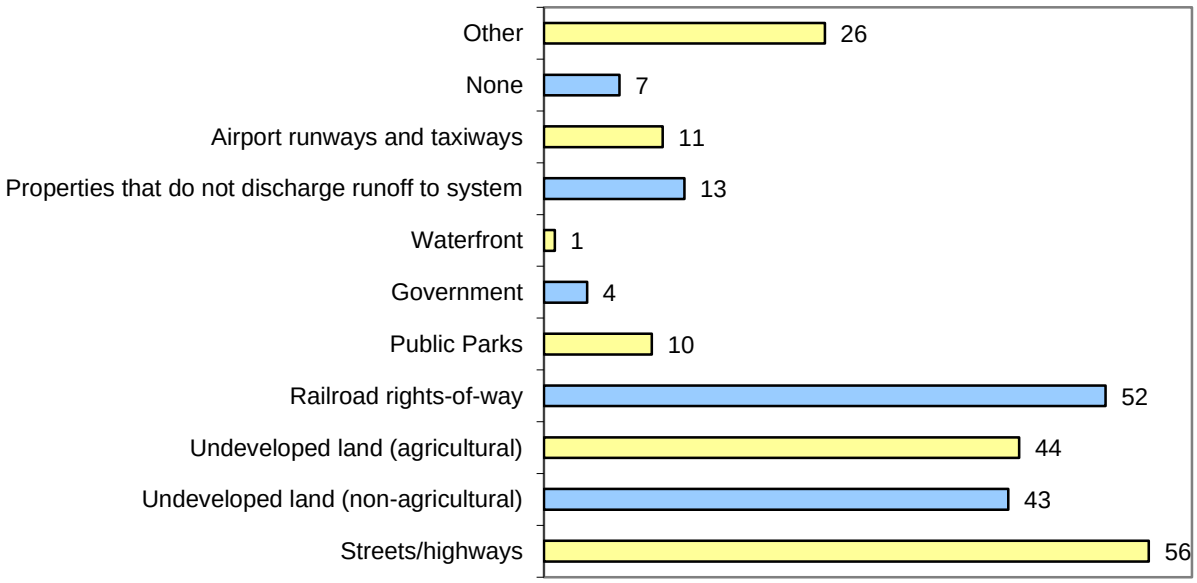
Percent of Parcel Data Acquired from	Initially Collected	Maintained
Property Appraiser's Records		
Physical On-Site Measurement		
Permit Records		

Utility Fees and Rates

2-9. For properties that are charged a fee based on actual, on-site impervious area (i.e. *not* a customer class average) please estimate how a majority of this information was ***initially collected* and how it is ***maintained*** for your billing database? (continued)**

Percent of Parcel Data Acquired from	Initially Collected	Maintained
Air Photos		
Other Sources		

2-10. What properties are exempt from your user fees?



Utility Fees and Rates

2-11. Please indicate your billing practices with regard to the following governmentally owned properties:

	Exempt	Bill and collect	Bill but don't collect	Not billed
Federal	2	55	7	2
State	3	56	6	4
County	2	68	2	0
City	4	60	2	2
School District	4	66	1	1
Special District	1	43	0	2

2-12. Of those accounts that receive credits, what is the average percent reduction in the utility fee?

Average reduction = 24.6%

2-13. Of the total number of stormwater utility accounts, what percentage receive credits?

Reported number of accounts that receive credits = 81.85
Average number of accounts that receive credits = 2.15 %

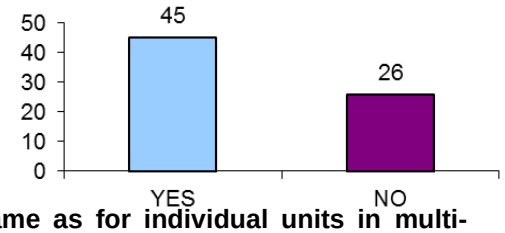
2-14. Of those accounts that receive credits, what is the range in possible percent reductions in stormwater utility fees?

Reported range of possible reductions is 0% to 100%
Average percent reduction is 52.

2-15. Are credits provided for private detention/retention facilities?

A. Yes = 46 (63%)

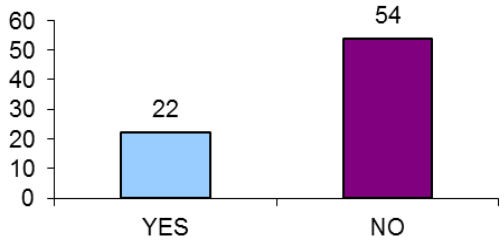
B. No = 25 (37%)



2-16. Are user fees for single-family detached dwellings the same as for individual units in multi-family (e.g. apartments, condominiums)?

A. Yes = 23 (29%)

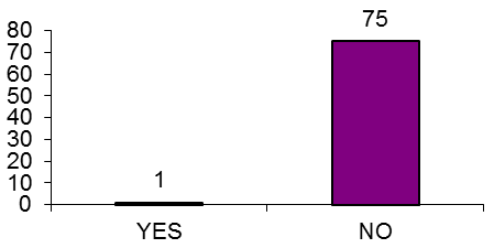
B. No = 52 (71%)



2-17. Do user fees vary by watershed?

A. Yes = 1 (1%)

B. No = 74 (99%)

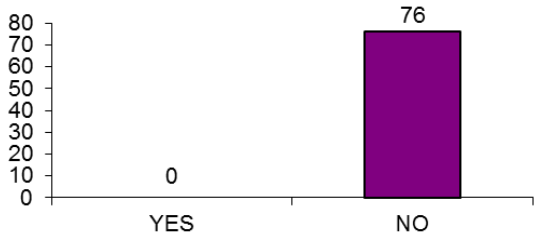


Utility Fees and Rates

2-18. Are different fees charged within the "zone-of-benefit" of specific capital projects to account for differences in capital costs?

A. Yes = 0 (0%)

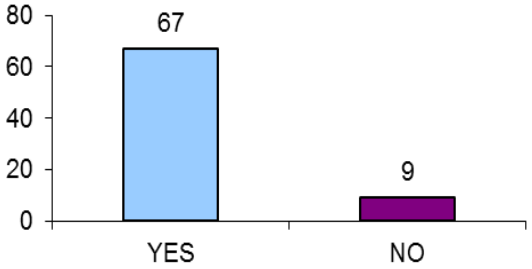
B. No = 75 (100%)



2-19. Does your local code require private detention/retention facilities?

A. Yes = 65 (88%)

B. No = 10 (12%)



2-20. How is payment of the utility charge enforced?

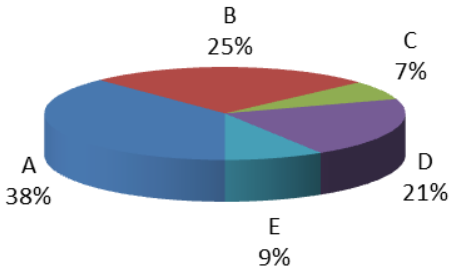
A. Shut off other utility service (34)

B. Place Lien on Property (23)

C. Tax Certificate (Auction) Process (6)

D. Refer to collection agency (19)

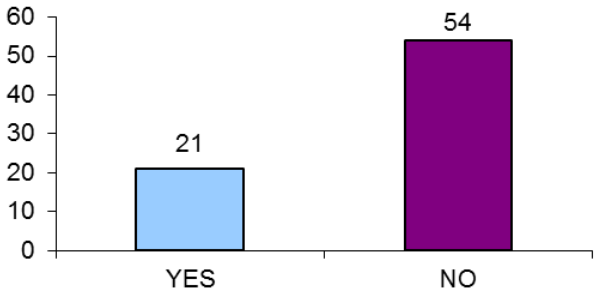
E. Other (8)



2-21. Were interim rates established during the formation of the utility prior to adoption of a permanent rate format?

A. Yes = 20 (28%)

B. No = 55 (72%)

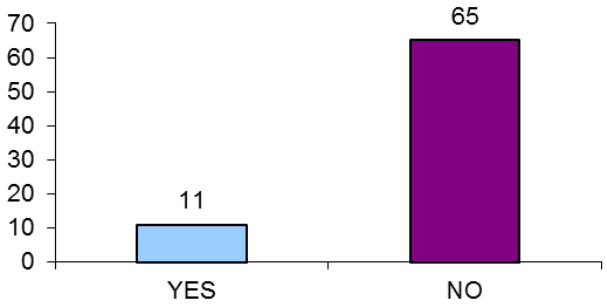


Utility Fees and Rates

2-22. Have your stormwater fees or assessments faced a legal challenge in court?

A. Yes = 10 (14%)

B. No = 65 (86%)



2-23. If your charges have been challenged in court, what was the outcome?

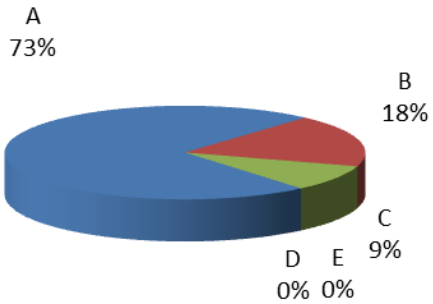
A. Fee Sustained (8)

B. Settlement Reached (2)

C. Pending (1)

D. Fees Not Sustained (0)

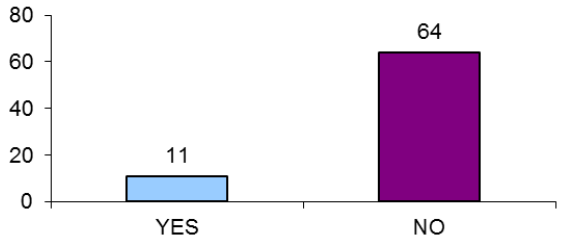
E. Other (0)



2-24. Has your jurisdiction modified your stormwater utility rate structure to take into account new water quality requirements and corresponding costs as a result of the TMDL program?

A. Yes = 11 (15%)

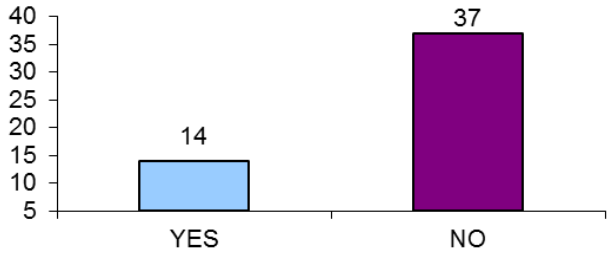
B. No = 64 (85%)



If not, are you actively considering such modifications?

A. Yes = 11 (27%)

B. No = 36 (73%)

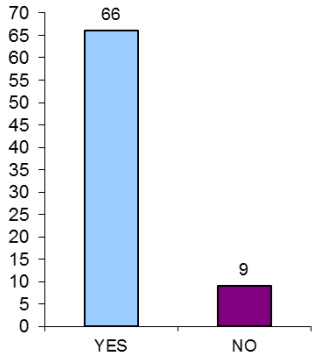


Stormwater Program

3-1. Does your utility use operation and maintenance permits (or other enforcement methods) to require private owners to maintain their on-site stormwater facilities?

A. Yes = 66 (88%)

B. No = 9 (12%)



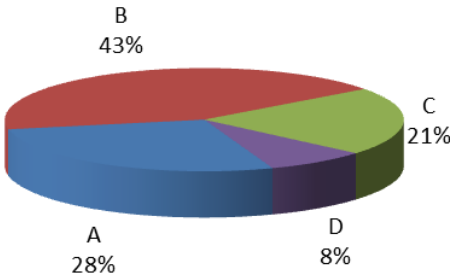
3-2. Does your jurisdiction charge a fee for:

A. Stormwater management permits (27)

B. Stormwater management site plan review (42)

C. Stormwater inspection during construction (21)

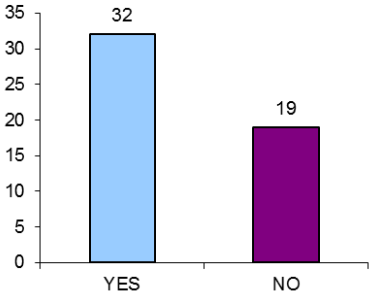
D. Stormwater inspection after construction (O&M) (8)



3-3. If your jurisdiction does charge fees for any of the services in question 3-2, does your stormwater utility receive some or all of these revenues?

A. Yes = 32 (63%)

B. No = 19 (37%)



3-4. Is your stormwater capital construction program funded only from stormwater fee revenue, or are non-fee funds utilized?

A. Stormwater fees only (43%)

B. Stormwater fees and non-fee funds (57%)

3-5. If non-fee funds are used for capital construction, what is the source of the revenue?

A. Ad Valorem (8)

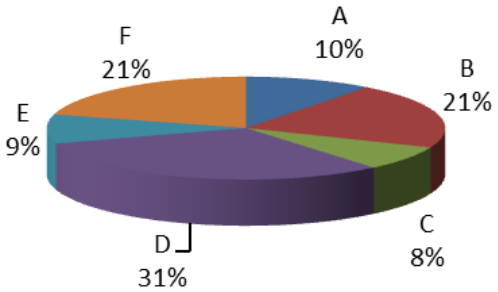
B. Sales Tax (16)

C. Gas Tax (6)

D. Grants (24)

E. Loans (7)

F. Other (16)



Stormwater Program

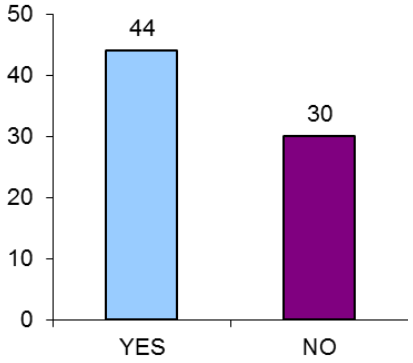
3-6. Please estimate your jurisdiction's capital improvement needs for stormwater management over the following periods of time.

Period of Time	Estimated Need (Total)	Average Need	# of Respondents
Next 5 Years	$1,393,428,297	$24,024,626	58
Next 10 Years	$2,638,234,000	$53,841,510	49
Next 20 Years	$5,454,650,000	$136,366,250	40

3-7. Does your jurisdiction have an adopted stormwater master plan?

A. Yes = 44 (59%)

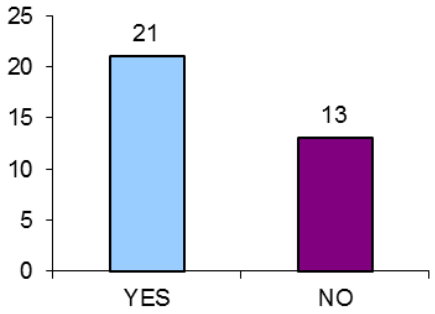
B. No = 30 (41%)



3-8. If your jurisdiction does not have an adopted stormwater master plan (i.e. you answered "No" to question 3-7) is the establishment of such a plan under active consideration?

A. Yes = 21 (62%)

B. No = 13 (38%)

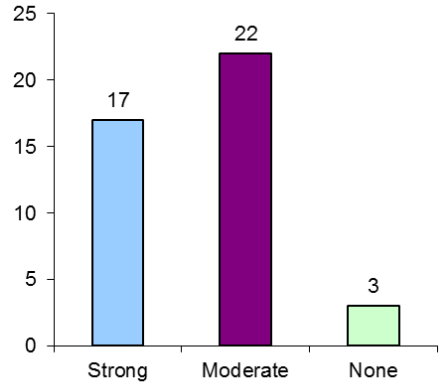


3-9. If your jurisdiction does have an adopted stormwater master plan (i.e. you answered "Yes" to question 3-7), does your jurisdiction make an effort to coordinate your Local Government Comprehensive Plan with your stormwater Master Plan and NPDES Program concepts?

A. Strong Effort (40%)

B. Moderate Effort (52%)

C. No Effort (7%)

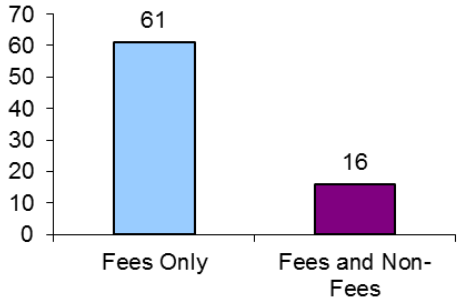


Stormwater Program

3-10. Is your stormwater operating budget funded only from stormwater fee revenue, or are other non-fee funds utilized?

A. Stormwater fees only (79%)

B. Stormwater fees and other non-fee funds (21%)



3-11. If non-fee funds are used for operations, what is the source of the revenue?

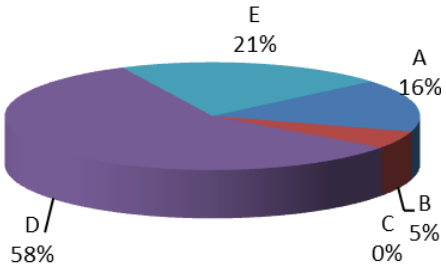
A. Ad Valorem (3)

B. Sales Tax (1)

C. Gas Tax (0)

D. General Fund (11)

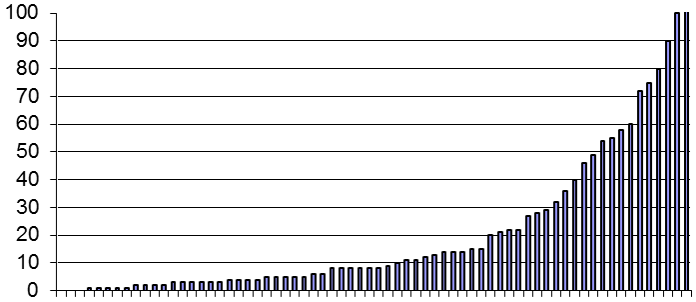
E. Other (4)



3-12. What is the current number of full-time equivalent employees funded with Stormwater fee revenue?

(Not shown in graph: DeKalb County - 110 employees; City of Charlotte - 101 employees

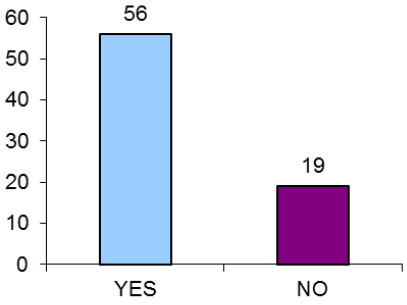
Average reported was 20.4 FTEs.
2013 was 20.7
2011 was 20.5
2009 was 17.8
2007 was 22



3-13. Does your jurisdiction monitor improvements in water quality?

A. Yes = 56 (75%)

B. No = 19 (25%)

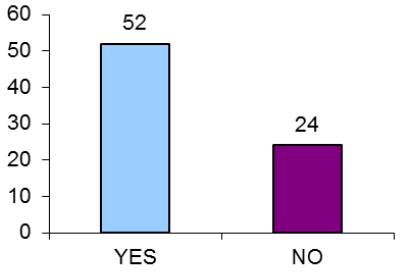


Stormwater Program

3-14. Does your jurisdiction monitor improvements in flood protection?

A. Yes = 52 (68%)

B. No = 24 (32%)



3-15. What percentage of your jurisdiction's stormwater facilities are mapped and inventoried?

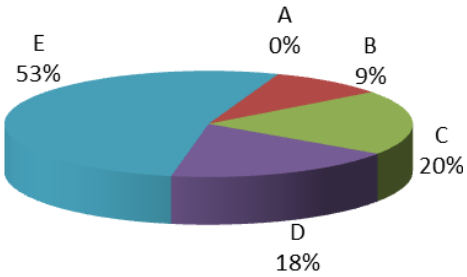
A. 0 % = 0

B. 25% = 7

C. 50% = 15

D. 75% = 14

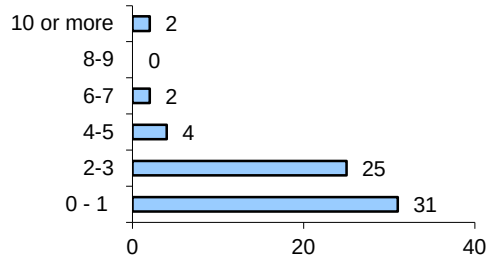
E. 100% = 40



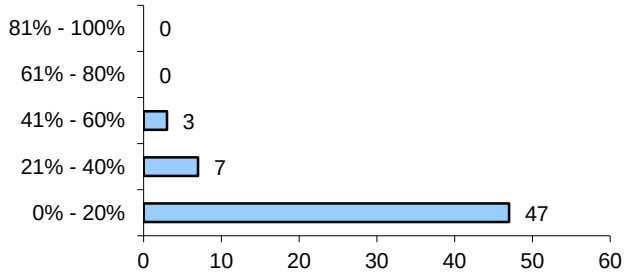
3-16. Estimate the number of employees (FTE's) and the percentage of your total stormwater program's annual budget allocated to the following program categories:

Administration(Management, Billing, Records, Etc.):

Number of Employees

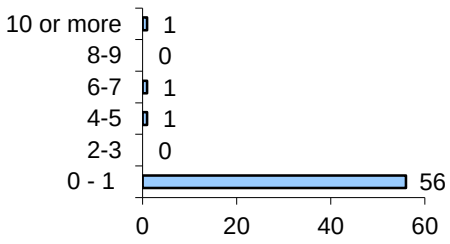


Percent of Budget

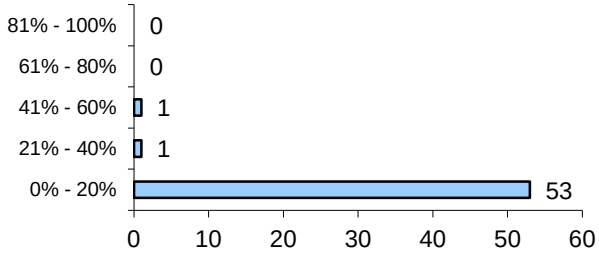


Overhead Charges(Indirect Cost Allocation) Paid to Parent Governmental Jurisdiction:

Number of Employees



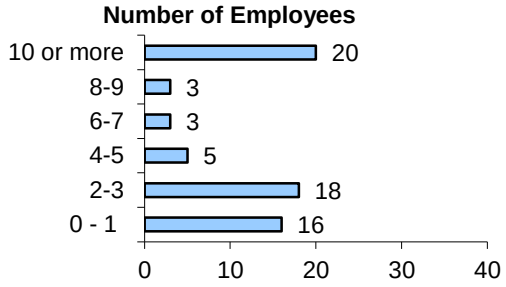
Percent of Budget

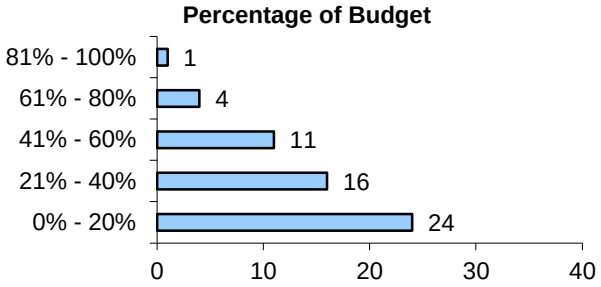


Stormwater Program

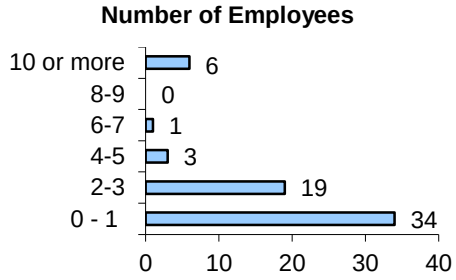
3-16. Estimate the number of employees (FTE's) and the percentage of your total stormwater program's annual budget allocated to the following program categories: (continued)

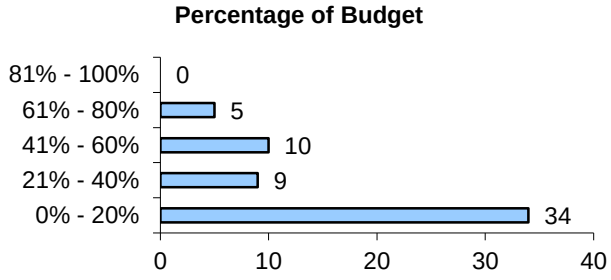
O & M (Field Activities):



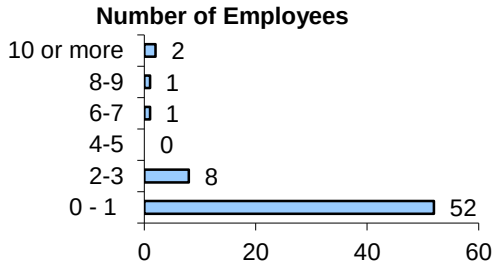


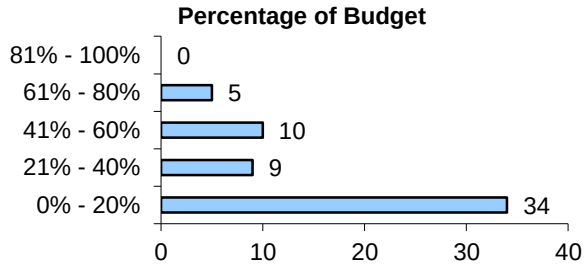
Technical (Planning Engineering):



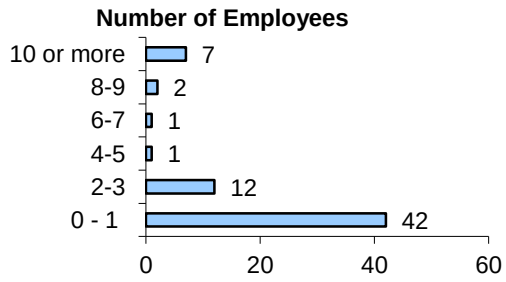


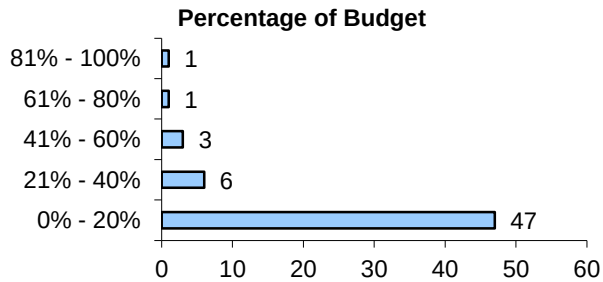
CIP:





NPDES MS4 Permit Compliance:

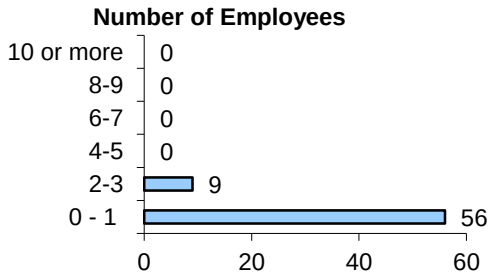


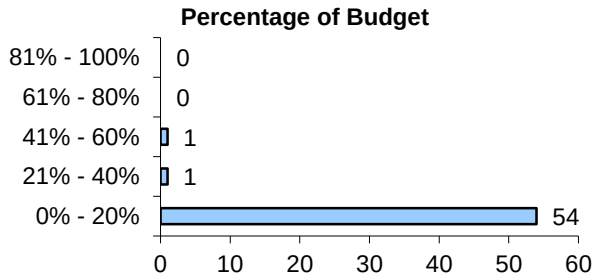


Stormwater Program

3-16. Estimate the number of employees (FTE's) and the percentage of your total stormwater program's annual budget allocated to the following program categories: (continued)

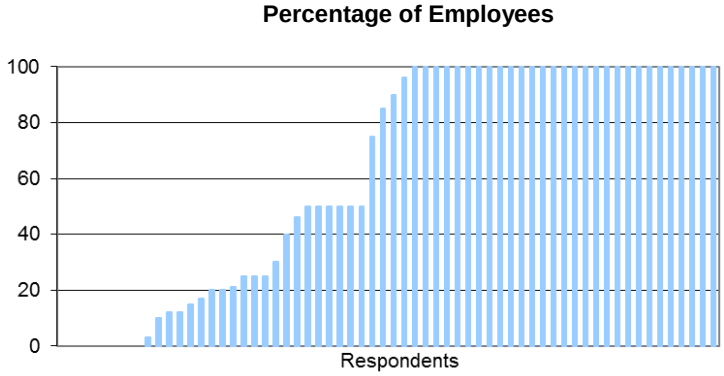
Public Education and Information:





3-17. For Operations and Maintenance (field) personnel, how many have received formal training or certification?

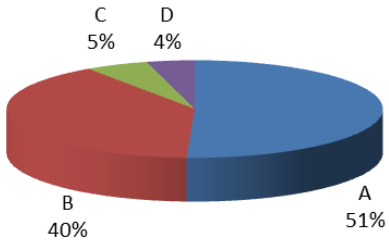
Average Number: 14.5
Average Percentage: 62.4%



3-18. Is the stormwater fee revenue sufficient to address the following program areas?

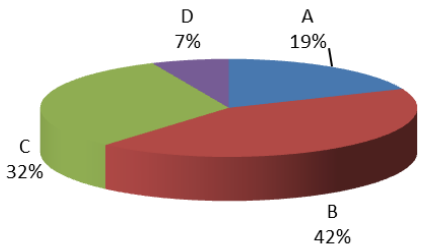
Administration

A. Adequate to meet all needs (37)
B. Adequate to meet most needs (29)
C. Adequate to meet most urgent needs (4)
D. Not adequate to meet urgent needs (3)



O & M

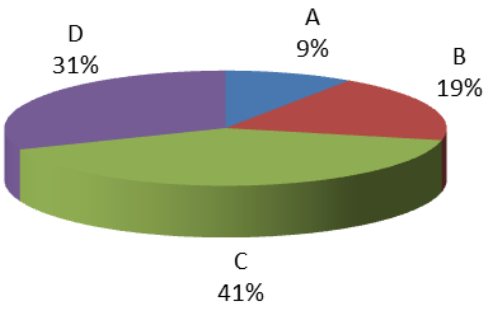
A. Adequate to meet all needs (14)
B. Adequate to meet most needs (32)
C. Adequate to meet most urgent needs (24)
D. Not adequate to meet urgent needs (5)



3-18. Is the stormwater fee revenue sufficient to address the following program areas? (continued)

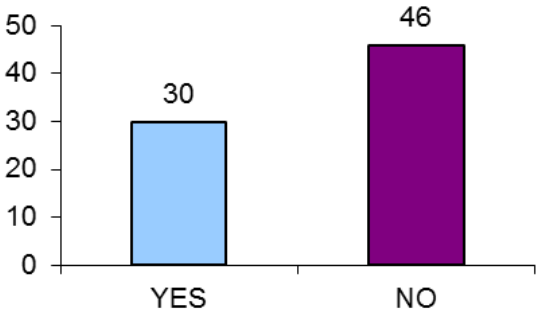
CIP

A. Adequate to meet all needs (7)
B. Adequate to meet most needs (14)
C. Adequate to meet most urgent needs (30)
D. Not adequate to meet urgent needs (23)



3-19. Does your utility manage the FEMA community rating system flood management program for your jurisdiction?

A. Yes = 30 (39%)
B. No = 46 (61%)



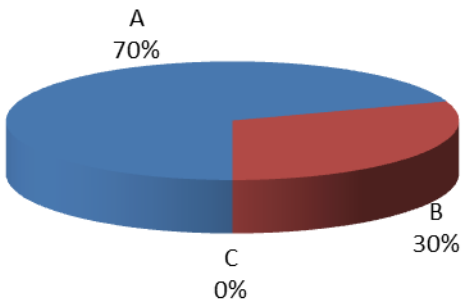
Public Information Effort

4-1. How important is an organized public information/education effort to the continuing success of a user fee funded stormwater utility?

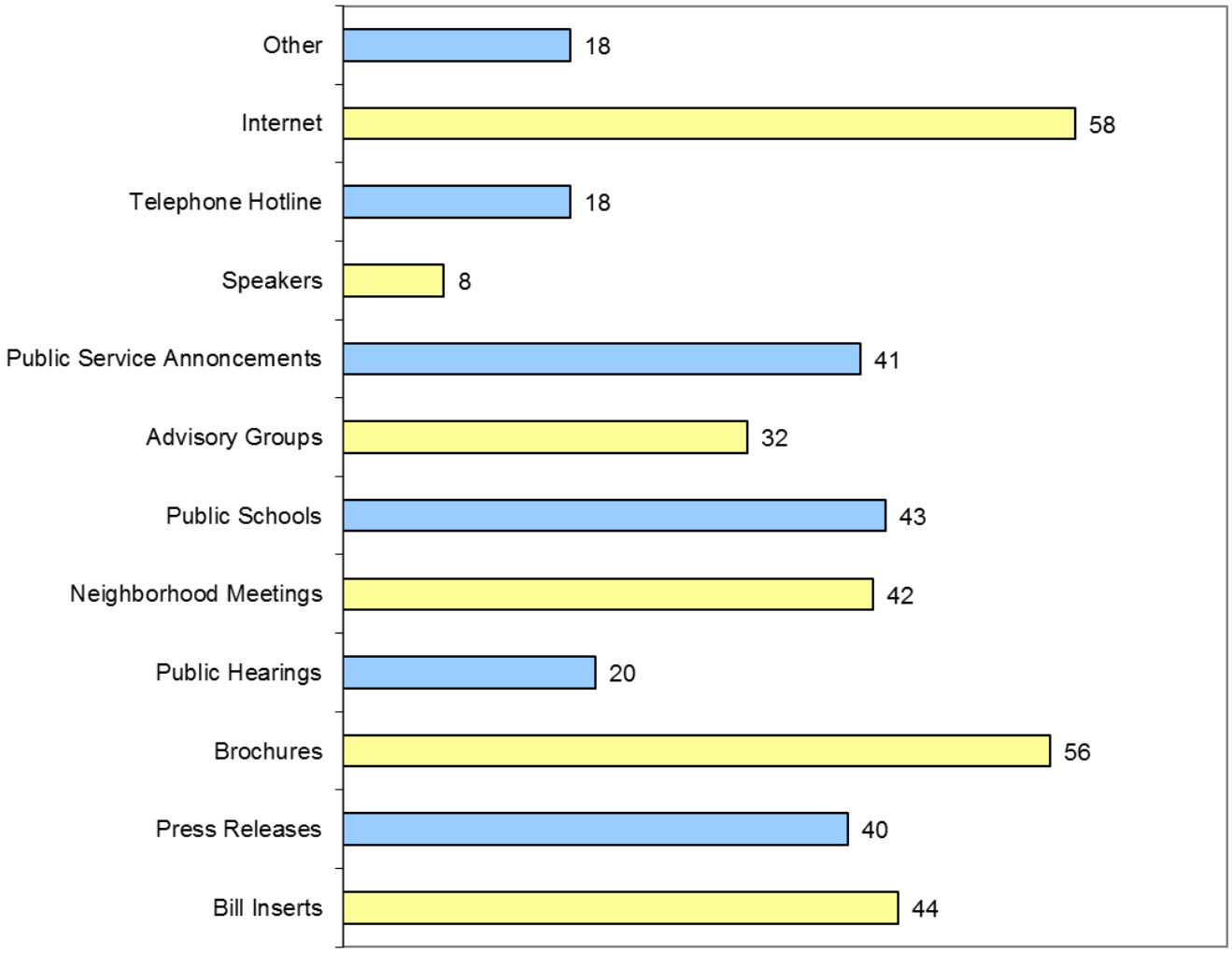
A. Essential (53)

B. Helpful (23)

C. Not necessary (0)



4-2. What means have you found to be most effective in educating the public about utility services, program needs and financing, and citizen responsibilities?



Survey Respondents

Survey Respondents

Alabama

City of Birmingham
Thomas Miller
Stormwater Administrator
710 N 20th Street, Rm 220
Birmingham, AL 35203

Jefferson County
Mandy Elledge
Environmental Biologist
716 Richard Arrington Jr. Blvd, Rm B210
Birmingham, AL 35203

Florida

City of Stuart
Tim Voelker
City Engineer
121 SW Flagler Avenue
Stuart, FL 34994

Georgia

Barrow County
Matt Treeter
Stormwater Coordinator
30 North Broad Street
Winder, GA 30680

City of Athens/Clarke County
Kathryn Shepard
Stormwater Coordinator
PO Box 1868
Athens, GA 30603-1868

City of Austell
Duane Demeritt
Floodplain Administrator
5000 Austell-Powder Springs Road, Ste 105
Austell, GA 30106

City of Covington
Tres Thomas
City Engineer/Assistant Public Works Director
PO Box 1527
Covington, GA 30015-1527

City of Decatur
Jennings Bell
Project Civil Engineer
PO Box 220
Decatur, GA 30031

City of Dunwoody
David Elliott
Storm Water Deputy Director
41 Perimeter Center East, Ste 250
Dunwoody, GA 30346

City of Garden City
Ron Feldner
Deputy City Manager
100 Central Avenue
Garden City, GA 31405

City of Griffin
Brant Keller
Director of Public Works & Utilities
PO Box T
Griffin, GA 30224

City of Holly Springs
Nancy Moon
Community Development Director
PO Box 990
Holly Springs, GA 30142-0990

City of Lawrenceville
Paul Austin
City Engineer
PO Box 2200
Lawrenceville, GA 30046-2200

Survey Respondents

Georgia (continued)

City of Norcross
Craig Mims
Director - Public Works, Utilities & Parks
65 Lawrenceville Street
Norcross, GA 30071

City of Peachtree City
Michael Madison
Stormwater Manager
209 McIntosh Trail
Peachtree City, GA 30269

City of Powder Springs
Pam Conner
Community Development Director
PO Box 46
Powder Springs, GA 30127

City of Snellville
Gaye Johnson
Dir. Public Works
1000 E. Park Drive
Snellville, GA 30078

City of Valdosta
Emily Davenport
Assistant Director
PO Box 1125
Valdosta, GA 31603-1125

City of Warner Robins
William Gray
City Engineer
202 N. Davis Drive, PMB 718
Warner Robins, GA 31093

Clayton County Water Authority
Kevin Osbey
Manager, Stormwater Utility
1600 Battle Creek Road
Morrow, GA 30260

Columbia County
Jacques Palmer
Project Manager
P.O. Box 498
Evans, GA 30809

DeKalb County
Angel Jones
Roads and Drainage
727 Camp Road
Decatur, GA 30032

Gwinnett County
Steve Leo
Director, Stormwater Management Division
684 Winder Highway
Lawrenceville, GA 30045

Rockdale County
Todd Cosby
Stormwater Engineer II
PO Box 1495
Conyers, GA 30012

Survey Respondents

Kentucky

City of Florence
Tom Gagnon
Project Administrator
8100 Ewing Blvd
Florence, KY 41042

Lexington Fayette Urban County Government
Jennifer Carey
MS4 Water Quality Manager
125 Lisles Industrial Avenue, Ste. 180
Lexington, KY 40511

Sanitation District #1
Sean Blake
Senior Manager
1045 Eaton Drive
Ft. Wright, KY 41017

Warren County
Jack Wright
Storm Water Management Director
1141 State Street, 2nd Floor
Bowling Green, KY 42101

North Carolina

City of Archdale
D. J. Seneres
Stormwater Program Manager
PO Box 14068
Archdale, NC 27263

City of Asheville
Keisha Lipe
Stormwater Quality Specialist
PO Box 7148
Asheville, NC 28802

City of Belmont
Chad Waldrup
Stormwater Coordinator
PO Box 431
Belmont, NC 28012-0431

City of Charlotte
Daryl Hammock
Assistant Stormwater Manager
600 East 4th Street
Charlotte, NC 28202

City of Concord
Jeff Corley
Deputy Director of Water Resources
850 Warren C. Coleman Blvd.
Concord, NC 28025

City of Fayetteville
Shauna Haslem
Stormwater Educator
433 Hay Street
Fayetteville, NC 28301

City of Greensboro
S. Shree Collins
Regulatory Compliance Specialist
PO Box 3136
Greensboro, NC 27406

City of High Point
Derrick Boone
Public Services Manager/ Public Services Dept.
PO Box 230
High Point, NC 27261-0230

City of Monroe
Chris Costner
Stormwater Supervisor
PO Box 69
Monroe, NC 28111-0069

City of Raleigh
Danny Bowden
Stormwater Utility Manager
PO Box 590
Raleigh, NC 27602

City of Wilmington
David Mayes
Stormwater Services Manager
PO Box 1810
Wilmington, NC 28402-1810

City of Winston-Salem
Keith Huff
Stormwater Manager
101 North main Street, Ste 53
Winston-Salem, NC 27101

Survey Respondents

North Carolina (continued)

Mecklenburg County
W. Dave Canaan
Director, Water and Land Resources
700 N Tryon Street
Charlotte, NC 28202

Town of Chapel Hill
Sue Burke
Senior Engineer
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514

Town of Indian Trail
Scott Kaufhold
Director of Engineering and Public Works
PO Box 2430
Indian Trail, NC 28079

Town of Matthews
Ralph Messera
Public Works Director
1600 Tank Town Road
Matthews, NC 28105

Town of Morrisville
Robert Patterson
Senior Stormwater Engineer
260-B Town Hall Drive
Morrisville, NC 27560

Town of Wrightsville Beach
Jonathan Babin
Stormwater Manager
200 Parmele Blvd.
Wrightsville Beach, NC 28480

South Carolina

Charleston County
Taylor Anthony
Administrative Assistant II
4045 Bridge View Drive
North Charleston, SC 29405

City of Anderson
Adam Cromer
Stormwater Manager
1100 Southwood Street
Anderson, SC 29624

City of Aiken
George Grinton
Director of Engineering and Utilities
PO Box 1177
Aiken, SC 29802

City of Conway
Susan Hucks
Director of Public Works
PO Drawer 1075
Conway, SC 29528

City of Charleston
Kinsey Holton
Stormwater Program Manager
75 Calhoun St, 3rd Floor
Charleston, SC 29401

City of Isle of Palms
Taylor Anthony
Administrative Assistant II
4045 Bridge View Drive
North Charleston, SC 29405

City of Folly Beach
Taylor Anthony
Administrative Assistant II
4045 Bridge View Drive
North Charleston, SC 29405

City of North Charleston
Mike Hardy
Staff Engineer
Post Office Box 190016
North Charleston, SC 29419-9016

City of North Augusta
Tanya Strickland
Environmental Coordinator, SWMD
PO Box 6400
North Augusta, SC 29861-6400

Survey Respondents

South Carolina (continued)

City of North Myrtle Beach
Jay Beeson
Stormwater Compliance Manager
1018 2nd Avenue South
North Myrtle Beach, SC 29582-3100

City of Sumter
Tiege Elliott
Title Not Provided
PO Box1449
Sumter, SC 29151

Dorchester County
Kelly Billbrough
Stormwater Division- Civil Engineer Technician
2120 E Main Street
Dorchester, SC 29437

Georgetown County
Ray Funnye
Director, Public Services
PO Box 421270
Georgetown, SC 29440

Town of James Island
Taylor Anthony
Administrative Assistant II
4045 Bridge View Drive
North Charleston, SC 29405

Town of Lincolnville
Taylor Anthony
Administrative Assistant II
4045 Bridge View Drive
North Charleston, SC 29405

Greenville County
Judy Wortkoetter
County Engineer
301 University Ridge, Ste 3900
Greenville, SC 29601

Horry County
Tom Garigen
Stormwater Manager
4401 Privetts Road
Conway, SC 29526

Town of Bluffton
Jeremy Ritchie
Stormwater Management Division Director
P.O. Box 386
Bluffton, SC 29910

Town of Hilton Head Island
Bryan McIlwee
Assistant Town Engineer / Stormwater Manager
1 Town Center Court
Hilton Head Island, SC 29928

Tennessee

City of Bristol
Jonathan Scherer
Civil Engineer
104 8th Street
Bristol, TN 37620

City of Chattanooga
Don Green
Water Quality Supervisor
1250 Market Street, Ste 2100
Chattanooga, TN 37402

City of Goodlettsville
Amy Murray
Public Works Superintendent
215 Cartwright Street
Goodlettsville, TN 37072

City of Maryville
Dale Jayne
Stormwater Program Manager
416 W. Broadway Avenue
Maryville, TN 37801

City of Murfreesboro
Robert Haley
NPDES Stormwater Coordinator
220 NW Broad Street
Murfreesboro, TN 37130

Davidson County/City of Nashville
Maxine Stevenson
Metro Water Services / Storm Water Division
800 2nd Ave South
Nashville, TN 37219

Survey Respondents

Tennessee (continued)

Hamilton County
Crystal Piper
Program Manager
1250 Market Street, Ste 3050
Chattanooga, TN 37402

*** Additional Cities and Counties included in the reporting Jurisdictions**

Sanitation District #1, KY includes: Boone County, Campbell County, City of Alexandria, City of Bellevue, City of Bromley, City of Covington, City of Crescent Springs, City of Crestview, City of Crestview Hills, City of Dayton, City of Edgewood, City of Elsmere, City of Erlanger, City of Fort Mitchell, City of Fort Thomas, City of Fort Wright, City of Highland Heights, City of Independence, City of Kenton Vale,City of Lakeside Park, City of Ludlow, City of Melbourne, City of Newport, City of Park Hills, City of Silver Grove, City of Southgate, City of Taylor Mill, City of Union, City of Villa Hills, City of Wilder, City of Woodlawn, and Kenton County.

Hamilton County, TN includes: City of Collegedale, City of East Ridge, City of Lakesite, Town of Lookout Mountain, City of Ridgeside, City of Red Bank, and City of Soddy-Daisy

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