# St. Tammany Parish Stormwater Management Plan



December 2017

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## Acronyms

BMPs Best Management Practices

CWA Clean Water Act

EPA U.S. Environmental Protection Agency

LDEQ Louisiana Department of Environmental Quality

LPDES Louisiana Pollutant Discharge Elimination System

MCM Minimum Control Measures

MEP Maximum Extent Practicable

MS4 Municipal Separate Storm Sewer System

NOI Notice of Intent

NPDES National Pollutant Discharge Elimination System

SPCC Spill Prevention, Control, and Countermeasures

STP St. Tammany Parish

SWMP Stormwater Management Plan

TMDL Total Maximum Daily Load

UA Urbanized Areas

WLA Waste Load Allocation

# 1.0 Stormwater Management Plan Introduction

Polluted stormwater runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and bayous without treatment. In order to improve the Nation's waterways, the Unite States Environmental Protection Agency (EPA) has set up the Stormwater Phase II Rule that establishes an MS4 stormwater management program that is intended to reduce the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. Pollutants that are deposited into nearby waterways through MS4 discharges can impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

St. Tammany Parish (Parish) operates a number of open gravity flow ditches that collect and route stormwater into main conveyance systems that discharge the stormwater to eleven nearby waterways. The Parish is a Regulated Small Municipal Storm Sewer System (MS4) operating under General Permit # LAR041024, Agency Interest # 108405 with the Louisiana Department of Environmental Quality (LDEQ). Copies of the Notice of Intent (NOI) and the MS4 Permit are located in Appendix A. This section presents the background of the LPDES General Permit and a brief account of the Parish history.

## 1.1 Stormwater Permit Background

The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain small MS4s. A small MS4 is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II Rule automatically covers on a nationwide basis all small MS4s located in "urbanized areas" (UAs) as defined by the Bureau of the Census, and on a case-by-case basis those small MS4s located outside of UAs that the NPDES permitting authority designates. Appendix B contains the major UAs located within St. Tammany Parish.

Stormwater discharges from the St. Tammany Parish are regulated by EPA through the state of Louisiana under the Louisiana Pollutant Discharge Elimination System (LPDES) Stormwater Program. The permit requires that the Parish prepare and implement a Stormwater Management Plan for the purpose of implementing public education/involvement and best management practices (BMPs). The intent of this Plan is to establish and implement a Stormwater Management Program and to select and employ the appropriate measures to prevent or control the discharge of pollutants in stormwater runoff.

Within five years following initial authorization under the permit, the Program must be developed, implemented, and enforced as documented in the Plan. The Program is designed to reduce the discharge of pollutants from the St. Tammany small municipal separate storm sewer system to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Louisiana Environmental Quality Act.

Operators of regulated small MS4s are required to design their programs to:

- Reduce the discharge of pollutants to the maximum extent practicable (MEP);
- · Protect water quality; and
- Satisfy the appropriate water quality requirements of the Clean Water Act (CWA).

Implementation of the MEP standard will typically require the development and implementation of BMPs and the achievement of measurable goals to satisfy each of the six minimum control measures. A summary of the established and projected measurable goals for the Parish are in included in Appendix A.

# 1.2 St. Tammany Parish History

St. Tammany Parish started as a French settlement, but became a part of the United States in the 1700's and in 1810 by proclamation as a parish. The completion of the Lake Pontchartrain Causeway in 1956, spanning 24 miles, made driving to and from New Orleans South Shore a forty-minute commute, as shown in the Site Location Map located in Appendix B. Because of this and Hurricane Katrina related relocations, thousands of South Shore residents have relocated to the North Shore. St. Tammany Parish is today the fastest-growing parish in Louisiana.

There are eight (8) incorporated communities in St. Tammany Parish: Abita Springs, Covington, Folsom, Madisonville, Mandeville, Pearl River, Slidell, and Sun. The unincorporated areas in the Parish include: Alton, Bonfouca, Blond, Bush, Chinchuba, Colt, Dave, Florenville, Goodbee, Haaswood, Hickory, Houltonville, McClane City, North City, North Shore, Onville, Ramsay, St. Benedict, St. Joe, St. Tammany, Talisheek and Waldheim.

The Parish's Stormwater Management Plan is maintained at the Parish Administrative Complex by the Watershed Management staff of the Department of Development-Engineering and is maintained and updated annually. The Plan is available onsite for review by Louisiana Department of Environmental Quality (LDEQ), U.S. Environmental Protection Agency (EPA), other appropriate environmental officials and the public. The preparation of this document will satisfy the LPDES general permit requirements.

 The St. Tammany Parish SWMP can be found on the Parish Stormwater webpage: http://www.stpgov.org/stormwater-information.

#### 1.3 Six Minimum Control Measures

Development of the Stormwater Management Program must involve the six (6) Minimum Control Measures (MCM) summarized below and in Figure 1:

#### 1. Public Education and Outreach on Stormwater Impacts

Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff.

#### 2. Public Involvement/Participation

Comply with State and local public notice requirements when implementing a public involvement/participation program.

#### 3. Illicit Discharge Detection and Elimination

Implement a program plan to detect and eliminate illicit discharges to the storm sewer system (including development of a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).

#### 4. Construction Site Stormwater Runoff Control

Enforce program to reduce pollutants in stormwater runoff to MS4 from construction activities disturbing greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the Parish small MS4. The Parish must also enforce an ordinance that controls construction site erosion, sediment and waste control requirements, site plan water quality impact review requirements, and public review and site inspection procedures.

#### 5. Post-Construction Stormwater Management in New Development and Redevelopment

Execute a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the Parish small MS4. The program must ensure that controls are in place that would prevent or minimize water quality impacts, including enforcement of ordinances.

#### 6. Pollution Prevention/Good Housekeeping for Municipal Operations

Implement an operation and maintenance program that includes training and pollution prevention of municipal operations.

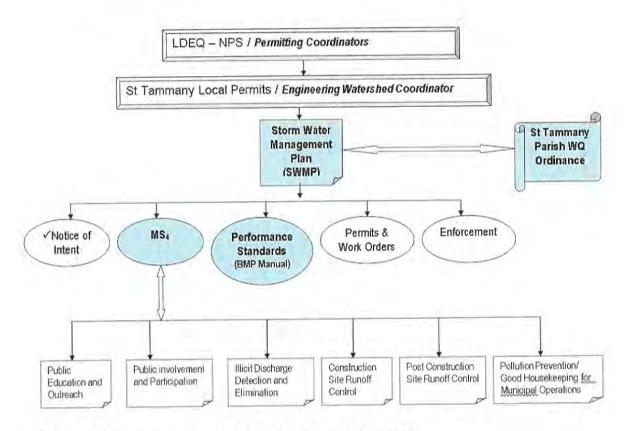


Figure 1-1. St. Tammany Parish MS4 Process Flowchart

#### 1.4 Stormwater Management

The St. Tammany Stormwater Management staff are responsible for developing the technical standards outlined in the SWMP as well as implementation, maintenance and updates to the plan. The staff consists of Parish personnel who are collectively knowledgeable about water resources, stormwater, spill control, and waste management. Stormwater Management staff may consist of the Watershed personnel and additional staff from multiple Parish departments. Collectively, the stormwater management staff is responsible for developing the SWMP and for assisting management in its implementation, coordination, management, maintenance, and updates.

The St. Tammany Parish Government Administration is committed to water quality improvements. The Water Quality/Regulatory Group, an internal working group hosted by the CAO, was initiated in 2014. It is attended by the Directors of Development, Environmental Services and Public Information; Parish Engineer; Regulatory Manager; Watershed Coordinator/MS4 Administrator, Environmental Specialist and a consultant. The Group meets monthly to discuss projects, initiatives, outreach opportunities and funding issues.

Specifically, the Stormwater management responsibilities are as follows:

 To develop, implement and update the SWMP, including setting appropriate measurable goals and water quality monitoring plans;

- To identify individual responsibilities for monitoring, implementation and compliance with the Parish MS4 Permit; and
- Stormwater site plan review, stormwater inspections, stormwater complaint investigations and stormwater awareness.

Other responsibilities of the Parish Stormwater Management staff include the following:

- Provide guidance and assistance in developing, implementing, maintaining, and updating the SWMP;
- Evaluate the effectiveness of the SWMP to maintain compliance with the MS4 Permit and meet measurable goals as set forth in the SWMP; and
- Assess the impact of new development and redevelopment on Parish watersheds (see Figure 1-2). New commercial developments and residential subdivisions located on ONRWs, Scenic Rivers, and/or impaired waterways will be modeled to ensure the development will meet discharge standards set forth by state/federal antidegradation and TMDL regulations.

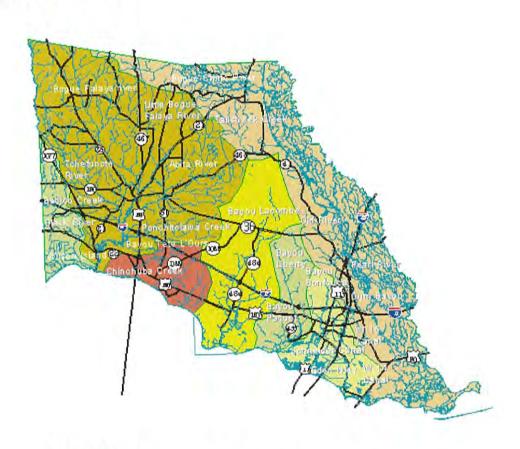


FIGURE 1-2 St. Tammany Watershed Basin Map

Table 1-1 describes the responsibilities of the key persons involved in implementing and maintaining this Plan.

TABLE 1-1
Key Personnel and Responsibilities for Implementing and Maintaining SWMP

Stormwater Management Name	Position - Responsibility	Phone Number 985-809-7448	
Sabrina Schenk	Watershed Coordinator (Department of Development-Engineering) – Watershed/ MS4 Coordinator		
Lottie Brock	Watershed Technician (Department of Development- Engineering) – Plan Review	985-809-7448	
E. deEtte Smythe, Ph.D.  Regulatory Manager (Department of Development-Engineering) – Water Resources, Water Quality Modeling, Grants		985-809-7448	
Angela Gagliano	Environmental Specialist (Department of Environmental Services) – Illicit Discharge MCM, Decentralized Management Program		
Glenn Delatte	Engineering Inspector (Department of Development- Engineering) – Commercial Drainage/Stormwater	985-809-7448	

(See Appendix C for the stormwater management liaisons from each applicable Parish Department.)

# 1.4.1 Funding the Stormwater Management Program

The St. Tammany Stormwater program will be funded through a variety of sources such as grants, local funding sources, permit & inspection fees, donations, and private funding.

#### 1.4.2 SWMP Review and/or Revision

The St. Tammany Stormwater Management staff will evaluate and update the SWMP at least annually, in order to assess the effectiveness of the Plan and confirm the selected control measures are still applicable. The review and/or revision of the SWMP will include addressing the escalating regulatory requirements of the TMDL's on Parish waterways.

 For details, see Section 4.0 Water Quality and the St. Tammany Parish TMDL Action Plan that is available on the Parish Stormwater webpage: http://www.stpgov.org/stormwater-information.

#### **Stormwater Impact Modeling** 1.4.3

In addition to plan review, studies and/or modeling will be performed and revisions made to the SWMP to incorporate the recommendations from studies and/or modeling such as the St. Tammany Parish Watershed Management Study (CPRA 2014) and the WAAT model (CH2M-Hill 2007) (see Appendix D, Exhibit 4).

St. Tammany Parish implemented a pilot program to model the water quality impacts from new and redevelopments (≥5 acres) utilizing the CPRA's post-TMDL models of 17 watersheds in the Parish.1

Post-TMDL modeling results, recommendations, and SWMP revisions will be reported in each MS4 Annual Report.

# 2.0 Minimum Control Measures

Within five years following initial authorization under the permit, a Stormwater Management Program must be developed, implemented, and enforced. This Program documented in a Stormwater Management Plan (SWMP) is designed to reduce the discharge of pollutants from the St. Tammany small MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Louisiana Environmental Quality Act. The Stormwater Management Program includes the minimum control measures described in detail in the following sections (Figure 1-1).

Best Management Practices (BMPs) and measurable goals must be selected for each minimum control measure. The BMPs and measurable goals that are chosen for St. Tammany Parish are chosen due to their appropriateness for the Parish and ability to meet permit requirements. Each measurable goal will include, when appropriate, the following three components:

- The activity, or BMP, to be completed;
- A schedule or date of completion; and
- A quantifiable target to measure progress toward achieving the activity or BMP

# **Public Education and Outreach on Stormwater Impacts**

An informed community is vital for the success of a stormwater management program within the St. Tammany Parish. Knowledgeable citizens ensure greater support of stormwater management program when they are made aware of how their individual actions (proper waste

<sup>1</sup> The CPRA obtained the LDEQ TMDL MODELS for impaired watersheds in St. Tammany Parish and updated them to include a newer inventory of LPDES dischargers. Throughout the SWMP, these models are termed "post-TMDL" watershed models. LDEQ's LA-QUAL model was used to develop many of the TMDLs on St. Tammany Parish waterbodies (Appendix D, Exhibit 4).

disposal, sewage management, industrial and construction controls) impact the entire Parish stormwater quality and economics. The materials and outreach programs are directed toward targeted groups of commercial, residential, and institutional entities likely to have significant stormwater impacts.

To meet the permit requirements of the stormwater management program, a public education program is mandatory. The public education program will distribute educational materials to the community and/or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff. The public education program will also inform individuals and households about the steps they can take to reduce stormwater pollution, such as ensuring proper septic tank system maintenance, ensuring the proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil and household hazardous waste.

 St. Tammany Parish Stormwater Education & Outreach material is available online at the Parish Stormwater webpage: <a href="http://www.stpgov.org/stormwater-information">http://www.stpgov.org/stormwater-information</a>.

## 2.1.1 Measurable Goals

TABLE 2-1
Public Education and Outreach on Stormwater Impacts Measurable Goals

Measurable Goals	Frequency	Start/End Date
Media – Continue to deliver various stormwater educational messages through various media types.	Continuous	Continuous
<ul> <li>Deliver educational, promotional, or motivational messages through the governmental access channel, newspaper articles, local and regional conferences, and scientific journals.</li> </ul>	Continuous	Continuous
<b>Homeowner Education</b> – Continue to educate homeowners in the proper way to maintain on-site residential sewage systems and proper household hazardous waste disposal.	Continuous	Continuous
Presentations and Workshops – Conduct workshops and provide presentations for Homebuilders Associations, Developers, and Engineers and at local and regional conferences on how to reduce stormwater impacts related to construction and development projects.	Continuous	Continuous
Marina Education Outreach Project - Conduct presentation for local marina operators on the water quality and business benefits of the Clean Marina Program.	Continuous	Continuous
Demonstration Projects – Conduct demonstration projects on proper BMP installation and maintenance on construction sites and demonstrations related to using the Critical Drainage Map to identify Critical/Sensitive Areas prior to development.	Continuous	Continuous
Educational Displays, Pamphlets, Booklets, etc Outreach materials that inform the public about stormwater pollution.	Continuous	Continuous
<ul> <li>Stormwater Information will be located on the STPG Stormwater webpage: <a href="http://www.stpgov.org/stormwater-information">http://www.stpgov.org/stormwater-information</a></li> </ul>		

#### 2.2 Public Involvement and Participation

Public participation is the key to success of a Stormwater Management Program due to citizens' ability to supply valuable and free intellectual and labor resources. Also involving the public will decrease potential legal challenges by the community since they will actively be involved in the program implementation. Citizens involved in the stormwater program development process provide important cross-connections and relationships with other community and government programs.

 Public events will be effectively publicized and comply with state, and local public notice requirements. Events may also be found on the Stormwater webpage at: <a href="http://www.stpgov.org/stormwater-information">http://www.stpgov.org/stormwater-information</a>.

FIGURE 2-1 Water Quality Volunteers on the West Pearl River



# 2.2.1 Measurable Goals

**TABLE 2-2** 

<b>Public Involvement</b>	and Partici	pation Measur	able Goals
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Measurable Goals	Frequency	Start/End Date
Adopt-A-Road Program:	Continuous	Continuous
The St. Tammany Adopt-A-Road Program is a volunteer litter reduction and prevention campaign to remove litter from parish roadways and rights of way and improve the appearance of the Parish and water quality.		
Litter Abatement and Household Hazardous Waste Programs:	Continuous	Continuous
The Parish conducts litter abatement programs through community service and with Keep St. Tammany Beautiful volunteers. The Parish also assists the public in proper disposal of household hazardous and non-hazardous waste by hosting an annual litter abatement program where residents can bring various items (paint cans, batteries, tires, etc.) to be properly disposed.		
Household Hazardous Waste Days events will be announced on Parish PSAs and on the Department of Environmental Services website:		
http://www.stpgov.org/departments/envionmental- services		
Individual Sewer Inspection/Permit Program:	As needed	Continuous
The St. Tammany Parish Department of Environmental Services will assist the public with individual sewer systems by providing information and public awareness events.		
Sewer system events will be announced on the		
Department of Environmental Services website:		
http://www.stpgov.org/departments/envionmental-		
services	Actorial Co	\$60.423
Planting Projects:	As needed	As needed
St. Tammany Parish solicits volunteers to assist with planting projects for marsh restoration and retrofitting existing ponds with vegetation to improve water quality.	7-7-1-12	
Demonstration Projects:	As needed	As needed
St. Tammany has implemented demonstration projects such as stormwater retrofits of existing ponds to characterize influent and effluent water quality and demonstrate the removal efficiencies (%RE) of selected BMPs. The Parish completed this three-year project in June 2016. The results will be disseminated to assist developers and homeowner associations with alternatives to improve water quality in Parish and private ponds.		
<ul> <li>Stormwater Information will be located on the STPG</li> <li>Stormwater webpage: <a href="http://www.stpgov.org/stormwater-information">http://www.stpgov.org/stormwater-information</a></li> </ul>		



FIGURE 2-2 Examples of Illicit Discharges

## 2.3 Illicit Discharge Detection and Elimination

Federal regulations define an illicit discharge as "...any discharge to an MS4 that is not composed entirely of stormwater..." with some exceptions. These exceptions include discharges from LPDES-permitted industrial sources and fire-fighting activities. Illicit discharges may include, but are not limited to, discharges from unauthorized cross-connections, failing septic tanks or individual sewer systems, and illegal dumping activities. See Table 2-3, for additional discharges that are considered "illicit" because they are unauthorized discharges and MS4s are not designed to accept process, or non-stormwater discharges.

St. Tammany Parish utilizes ordinances, policies, and programs to detect and eliminate illicit discharges to the storm sewer system (including development of a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste). Ordinances pertaining to illicit discharge detection and elimination are found in the St. Tammany Parish Code of Ordinances as summarized in Table 2-4.

#### TABLE 2-3

#### Sources of Illicit Discharges

#### Potential Sources of Illicit Discharges

Sanitary Wastewater

Effluent from Septic Tanks

Illegal Dumping

Improper Oil Disposal

Radiator Flushing Disposal

Laundry Wastewaters

Spills from Roadway Accidents

Improper Disposal of Auto and Household Toxics

Improper Disposal of Household Hazardous Waste

TABLE 2-4
St. Tammany Parish Ordinances Pertaining to IDDE<sup>2</sup>

Chapter	Section Name
115	Drainage/Stormwater
38	Garbage/Trash (Solid Waste/transfer)
18	Health/Sanitation
26	Nuisances
28	Miscellaneous Offenses/Litter (Offenses & Miscellaneous Provisions: Obstruction of ditches or waterways; litter)
40	Sewer/Sewage Disposal (Utilities (Sewerage Disposal)
23	Environmental Services regarding "the protection of public health and the environment through the control, monitoring, and inspection of public and private sewerage and water systems"

<sup>&</sup>lt;sup>2</sup> STP has converted its Code of Ordinances into MUNIS to make it more readily searchable and useful to residents and other users. The Code may be accessed at the following li9nk: <a href="https://library.municode.com/la/st">https://library.municode.com/la/st</a>. <a href="tammany-parish-/codes/code">tammany-parish-/codes/code</a> of ordinances

Recognizing the adverse effects that illicit discharges can have on receiving waters, the final rule requires an operator of a regulated small MS4 to develop, implement and enforce an illicit discharge detection and elimination program. This program must include the following:

- A storm sewer system map, showing the location of all outfalls and the names and location
  of all waters of the United States that receive discharges from those outfalls (see Appendix
  B for the Storm Sewer System Discharge Map);
- Through an ordinance, or other regulatory mechanism, a prohibition (to the extent allowable under State, Tribal, or local law) on non-stormwater discharges into the MS4, and appropriate enforcement procedures and actions;
- A plan to detect and address non-stormwater discharges, including illegal dumping, into the MS4;
- The education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste; and
- The determination of appropriate best management practices (BMPs) and measurable goals
  for this minimum control measure. Some program implementation approaches, BMPs (i.e.,
  the program actions/activities), and measurable goals are suggested below.
  - See Appendix E for the St. Tammany Parish Watershed Management Study (CPRA 2014) for additional strategies to address illicit discharge detection and elimination.
  - The Study is also available on the Parish Stormwater webpage: http://www.stpgov.org/stormwater-information

FIGURE 2-2 Individual Sewer System Open for Inspection



## 2.3.1 Measurable Goals

TABLE 2-4 Illicit Discharge Detection and Elimination Measurable Goals

Measurable Goals	Frequency	Start/End Date
Detecting Sanitary Sewer Overflows: Sanitary sewer inspections of all nonexclusive franchise utility companies.	Quarterly	Annual
Identifying Illicit Connections: Ordinance requires septic tank inspections on transfer of electrical power. Septic tanks and sewer systems that fail inspections are required to repair, upgrade, or replace at the owner's expense.	Continuous	Continuous
Identifying Illicit Connections: Grants provide funding for Decentralized Management Program (DMP) inspections of individual on-site homeowner waste treatment systems. Septic tanks and sewer systems that fail inspections are required to repair, upgrade, or replace at the owner's expense.	Continuosis	C2011712020
Identifying Illicit Connections: Ordinance that institutes building and plumbing codes to prevent connections of potentially hazardous pollutants to storm drains.	Continuous	Continuous
<b>Educational Booklets:</b> Continue producing outreach materials that inform the public about on-site sewage maintenance and inspections.	Continuous	Continuous
<ul> <li>Booklet, example inspection form and website information available on Parish Department of Environmental Services webpage: <a href="http://www.stpgov.org/departments/evs">http://www.stpgov.org/departments/evs</a></li> </ul>		

FIGURE 2-3 Construction Site Control



### 2.4 Construction Site Stormwater Runoff Control

Construction is a major contributor to suspended solids concentration in stormwater and can cause major erosion issues. Polluted stormwater runoff from construction sites often flows to MS4s and ultimately is discharged into local rivers and bayous. Of the pollutants listed in Table 2-5, sediment is usually the main pollutant of concern. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. The resulting siltation and the contribution of other pollutants from construction sites can cause physical, chemical, and biological harm to receiving waterways in the Parish.

Sediment excursions from construction sites result in volume decreases in the capacity of waterways that may contribute to destruction of aquatic habitats and flooding in critical, sensitive areas. This may ultimately require dredging to restore capacity to the waterway. For development and redevelopment projects, St Tammany Parish refers to a BMP Manual, *Best Management Practices (BMPs) for Coastal Louisiana Nonpoint Source Pollution* (2008). The manual was created through several state agencies, LDEQ, LDNR, LDoTD and vetted through public meetings.

- The BMP Manual may be obtained at the following links:
   http://dnr.louisiana.gov/crm/ and
   http://www.stpgov.org/files/Departments/Engineering/Stormwater/BMP Manual for U
   rban\_SW1.pdf
- For additional information and methods to control sediment during the construction phase of a project, see: Watershed Alternatives Analysis Tool (WAAT, CH₂M-Hill, 2007, Appendix E) and St. Tammany Parish Watershed Management Study (CPRA

2014) on the Parish Stormwater webpage: <a href="http://www.stpgov.org/stormwater-information">http://www.stpgov.org/stormwater-information</a>)

# TABLE 2-5 Potential Pollutants Commonly Discharged from Construction Sites

#### **Potential Pollutants**

Sediment

Solid and sanitary wastes

Phosphorous (fertilizer)

Nitrogen (fertilizer)

Pesticides

Oil and grease

Concrete truck washout

Construction chemicals

Construction debris

The EPA Phase II Final Rule for small MS4 Permit-holders requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in stormwater runoff to their MS4 from construction activities that result in a land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, and discharge into the Parish MS4. The Parish is required to:

- Have an <u>ordinance</u> or other regulatory mechanism requiring the implementation of proper erosion and sediment controls, and controls for other wastes, on applicable construction sites;
- Have procedures for <u>site plan review</u> of construction plans that consider potential water quality impacts;
- Have procedures for stormwater <u>site inspections</u> to monitor BMP compliance on construction sites and enforcement of control measures;
- Require <u>Stormwater Pollution Prevention Plans (SWPPPs)</u> be made available for stormwater inspections on construction sites;
- Have <u>sanctions to ensure compliance</u> (established in the ordinance or other regulatory mechanism);
- Establish procedures for the receipt and consideration of information submitted by the public; and
- Determine the <u>appropriate best management practices (BMPs)</u> and measurable goals for this minimum control measure.
  - A policy for the procedures set forth in Section 2.4 will be available, upon administrative approval, in the MS4 Annual Report and subsequent revisions of the SWMP.

# 2.4.1 Measurable Goals

TABLE 2-6 Construction Site Stormwater Runoff Control Measurable Goals

Measurable Goals	Frequency	Start/End Date
Stormwater Inspection Training for Employees & Contractors: Educate and train employees, contractors, and developers in the Parish. Address stormwater requirements for construction sites such as installing and maintaining BMPs (silt fencing, construction sequencing, storm drain inlet protection, oil/water separators, sediment traps, etc.)	Continuous	Continuous
Construction Site BMP Inspection Program: Perform site inspections to verify erosion/sediment control measures are properly installed and adequately maintained during construction	Continuous	Continuous
SWPPP Requirement for new subdivisions and commercial developments: Require SWPPP and/or Erosion Control Plans for all new subdivisions and commercial developments	Continuous	Continuous
SW Ordinance Revision: Ordinance was improved (October 2016) to address escalated enforcement, SW plan review, and on-site SWPPPs. Continue current requirements for BMPs to address silt and sedimentation runoff from construction sites.	Revise as needed	Adopted by Council in 2016
<ul> <li>The St. Tammany Parish Stormwater Quality Ordinance is available in Appendix D, Exhibit 6 and on the Parish Stormwater webpage: <a href="http://stpgov.org/stormwater-information">http://stpgov.org/stormwater-information</a></li> </ul>		
Stormwater Modeling: Water quality impact modeling (WQIM) for all new subdivisions and commercial developments to assure developments do no negatively impact the MS4	As needed	As needed
<ul> <li>The WQIM program is detailed in a white paper in Appendix D, Exhibit 5 and on the Parish Stormwater webpage: <a href="http://stpgov.org/stormwater-information">http://stpgov.org/stormwater-information</a></li> </ul>		

# 2.5 Post-Construction Stormwater Management in New Development & Redevelopment

The Parish will develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the Parish small MS4. The program must ensure that controls are in place that would prevent or minimize water quality impacts.

- For additional information and methods to control post-construction stormwater runoff, see Appendix E): 1) St. Tammany Parish Watershed Management Study (CPRA 2014), 2) Watershed Alternatives Analysis Tool (WAAT, CH<sub>2</sub>M-Hill, 2007), and 3) St. Tammany Parish Water Quality Impact Modeling Program (STP 2015).
- The St. Tammany Parish Watershed Management Study (CPRA 2014) and WQIM white paper are available on the Parish Stormwater webpage: http://stpgov.org/stormwater-information.

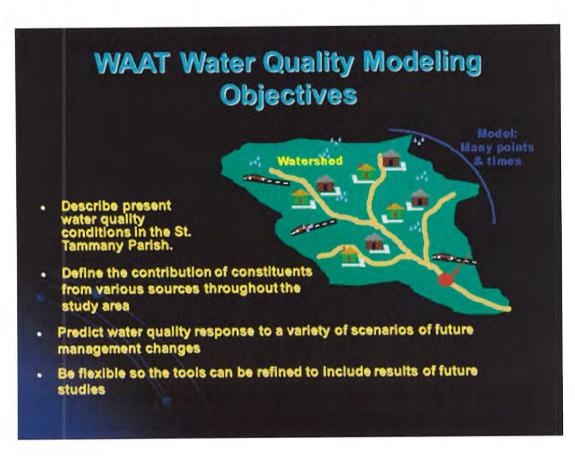


FIGURE 2-4
WAAT Water Quality Modeling Tool for Post-Construction BMP Selection

# 2.5.1 Measurable Goals

TABLE 2-7
Post-Construction Stormwater Management in New Development & Redevelopment
Measurable Goals

Measurable Goals	Frequency	Start/End Date
SW Program Review and/or Revision: Review Stormwater program annually to determine if changes are required to continue to maintain effective strategies for long-term BMPs and their enforcement within STP communities.	Annually	2013-2018
Stormwater Modeling: Perform water quality modeling on large developments and redevelopments to prevent impacts and/or degradation to receiving waterways.	As needed	20 inte@04d
<ul> <li>STP WQ Impact Modeling (WQIM) Program is available on the Parish Stormwater website: http://stpgov.org/stormwater-information.</li> </ul>		
Ordinances: An ordinance revision was passed by St. Tammany Parish Council improving an existing program that addresses post-construction runoff from new development and redevelopment projects to the extent allowable under State or local law.	Revise as needed	Adopted by Council in 2016
St. Tammany Parish Stormwater Ordinance is available in Appendix D, Exhibit 5 and on the Parish Stormwater webpage: <a href="http://stpgov.org/stormwater-information">http://stpgov.org/stormwater-information</a> .		

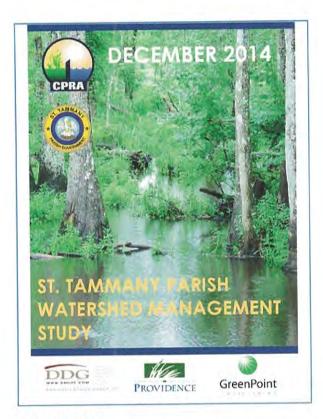


FIGURE 2-5

Post-Construction Stormwater BMPs Included in St. Tammany Parish Watershed Management Study (CPRA 2014)

# 2.6 Pollution Prevention & Good Housekeeping for Parish Operations

Municipal pollution prevention and good housekeeping standards are required of St. Tammany Parish to improve and protect the receiving water quality in the MS4. Municipal good housekeeping and pollution prevention will support a reduction in the amount and type of pollution that collects on streets, parking lots, open spaces, storage and vehicle maintenance areas.

The program must include Parish staff training on pollution prevention measures and techniques regarding materials storage, road and storm sewer maintenance, catch basin clean out, etc. Stormwater training for Parish personnel will increase awareness regarding stormwater quality related to proper municipal good housekeeping and pollution prevention.

- The Parish implemented a new protocol requiring quarterly reports from departmental liaisons. Reports will include any activity by the departments that supports the MS4 measurable goals and MCM requirements.
- See Appendix E from the St. Tammany Parish Watershed Management Study (CPRA 2014) for additional information regarding this requirement.

#### 2.6.1 Measurable Goals

TABLE 2-8
Pollution Prevention & Good Housekeeping for Parish Operations Measurable Goals

Measurable Goals	Frequency	Start/End Date
Capital Improvement Program: Maintain roadside vegetation; litter control; regular road and bridge maintenance.	Continuous	Continuous
Maintenance Barn Improvements: Wash racks with grease traps and/or sand filters are to be installed at Parish maintenance barns.	Continuous	Continuous
Preventative Maintenance: The preventive maintenance program involves the periodic lubrication, adjustment, and replacement of worn parts in all equipment where failure could result in a spill of oils or hazardous materials.	Continuous	Continuous
Develop Spill Prevention Plans: Develop plans describing spill response training sessions for all pertinent Parish personnel.	As needed	As needed
Employee Stormwater Training: Conduct pollution prevention and spill prevention and response training sessions for all Parish employees.	Annual	Annual
Roadway & Bridge Maintenance: Continue regular maintenance of roadways, bridges, structural BMPs and stormwater conveyances.	Continuous	Continuous

#### 2.6.2 Preventative Maintenance

Preventive maintenance addresses items that have the potential to directly affect stormwater quality. The preventative maintenance program established in the St. Tammany Public Works Department involves the periodic lubrication, adjustment, and replacement of worn parts in all equipment (for example, pump bearings and engine parts such as hydraulic lines) where equipment failure could result in a spill of oils or hazardous materials. The program includes the following:

- Periodic testing of equipment for integrity;
- Periodic adjustment, cleaning, lubrication, and repair or replacement of parts and equipment as recommended by the manufacturer or required by good maintenance practices;
- Tagging equipment that should not be operated because of ongoing maintenance activities or because it is inoperable; and
- Coating storage tanks, pipes, and associated equipment to avoid failure because of corrosion

### 2.6.3 Good Housekeeping

The policy of the Parish Department of Public Works to maintain a clean, orderly work environment. Good housekeeping practices include the proper labeling of significant materials, maintaining clean work areas, keeping work areas neat and well organized, disposing of waste promptly and responsibly, and making the above activities a priority. These practices are executed by Public Works personnel during each shift.

Good housekeeping practices contribute to the Parish's spill control and prevention effort. Those practices employed in the facility include:

- Neat and orderly storage of chemicals:
- · Prompt removal of spillage;
- Maintain proper pathways and walkways (no containers and drums should protrude onto walkways); and
- Training and motivating employee to maintain good housekeeping practices.

### 2.6.3.1 Operation and Maintenance

Good housekeeping practices for operations and maintenance include:

- Floors and ground surfaces are kept clean and dry by using brooms, shovels, vacuum cleaners, or cleaning machines;
- Garbage and waste material is regularly picked up and properly disposed (currently garbage is picked up weekly); and
- All spills are promptly and properly cleaned up (spill cleanup kits and supplies are maintained onsite and are readily available).

#### 2.6.3.2 Material Storage Practice

Good housekeeping practices for material storage include:

- Containers of material are stored away from direct traffic routes to prevent accidental spills;
- Containers are stored in a neat and orderly fashion;
- Labels are present on all liquid storage vessels;
- Containers are stacked according to manufacturers' instructions; and
- Containers and tanks are routinely inspected for leaks and current condition.

The importance of these practices will be emphasized through staff stormwater training.

## 2.6.3.3 Employee Training

The Parish expanded in-house employee training in 2016 to contain water quality topics such as: stormwater, pollution prevention, spill prevention/response, etc. The Parish facilities also include an Emergency Operations Center that trains personnel specifically as first responders for handling and responding to emergency situations.

 Training is documented by each respective department and, if applicable, training documentation is submitted annually to the Watershed Coordinator/ MS4 Administrator for inclusion in the MS4 Annual Report.

# 2.7 Additional Requirements for Permit

Some capital improvement projects and municipal facilities such as maintenance barns and wastewater treatment plants require separate discharge permits with LDEQ (see Appendix A). These additional permits protect stormwater runoff, water quality, and endangered species with discharge limits and stormwater controls, in addition to MS4 Permit requirements.

## 3.0 Stormwater Enforcement

#### 3.1 Inspection Failure & Reinspections

New Construction building permits in the Parish require a minimum of two scheduled drainage inspections to be performed during the drainage grade inspection and the drainage final inspection. A third inspection at an undisclosed time is provided for in the St. Tammany Parish Stormwater Ordinance.

Escalated enforcement of stormwater violations noted at stormwater inspections are as follows:

- The inspection fails and a red sticker is placed on the placard. The inadequacies are
  noted in a report to the contractor. The contractor must address the inadequacies prior to
  scheduling a reinspection. The first reinspection is \$50, with each subsequent
  reinspection increasing in cost by an additional \$50.
- Failure to address the stormwater issues on a construction site will result in a Notice of Violation or a Cease and Desist Order. If the violation is not brought into compliance within 10 days, the contractor is issued a summons to appear in an Administrative Hearing.
- When the decision of the judge is against the contractor, the contractor is required to pay court costs and fines, as determined by the judge.
- Double or triple fines may be applied to repetitive violators as determined by the judge.
  - Details of enforcement actions will be presented in the MS4 Annual Report.

#### 3.2 Stormwater Complaints & Violations

St. Tammany Parish responds to stormwater complaints in the following manner:

- Citizen complaints regarding stormwater are received by phone, in person, or by email
  to stormwater@stpgov.org. The St. Tammany Parish Stormwater webpage includes a
  link to the email address to facilitate citizen complaints of stormwater issues.
- A field investigation is performed to confirm a violation. If a violation is confirmed and the site is under a building permit, the steps for enforcement in Section 3.1 are followed.
- If the site does not have a permit, the site is posted with a Notice of Violation or a Cease and Desist order.
- If compliance is voluntarily achieved, no further action is taken. If the site continues to be in violation, the property owner and/or contractor receive a summons to appear in an Administrative Hearing and the case proceeds as in Section 3.1.

# 4.0 Water Quality

The Louisiana Department of Environmental Quality (LDEQ), by the authority of EPA, sets all water quality standards for the State and assesses the quality of the State's waters based upon those standards. The assessments are based upon monthly sampling for numerous constituents at ambient stream sites within each subsegment on a rotating, four-year cycle (Figure 4-1). Water quality assessments conducted for the 305(b) Integrated Report (IR)<sup>3</sup> are based on the most recent four years of data.



FIGURE 4-1 LDEQ Subsegments in St. Tammany Parish (2016)

<sup>&</sup>lt;sup>3</sup> "The Clean Water Act (CWA) of 1972 requires states to set water quality standards that are protective of the designated uses for each waterbody. Under Section 305(b) of the CWA, states must list all waterbodies being assessed. Under Section 303(d) of the CWA, all states must assess waterbodies against current standards every 2 years and develop a list of impaired waterbodies that require TMDL development. This list is referred to as the 303(d) list. Louisiana combines both the 305(b) and 303(d) listing into one document, commonly called the Integrated Report (IR).

Through this assessment, LDEQ identifies impaired waterbodies, as required by Section 303(d) of the Clean Water Act (CWA). The CWA also requires that all states establish priority rankings for waters on the 303(d) list and develop TMDLs for these waters based on their individual priority ranking (LDEQ TMDL Brochure 2013). The LDEQ Ambient Water Quality Monitoring Sites (WQMS) for St. Tammany Parish subsegments are listed in Appendix B.

St. Tammany Parish waterbodies failing to meet designated uses due to water quality impairments are placed on EPA's Section 303(d) list per the Clean Water Act. There are currently 37 TMDLs for impaired waterbody subsegments in St. Tammany Parish (Figure 4-2), including:

- Mercury in fish tissue (Hg),
- Low dissolved oxygen (DO),
- Fecal coliform bacteria (FC),
- Total dissolved solids (TDS),
- Low/high pH, chlorides,
- Copper (Cu),
- High temperature, and
- Lead (Pb).

Per the 303(d) list, the number of subsegments impaired by low DO doubled in the period 2006-2010, yet was significantly reduced in 2012-2014 due to implementation of water quality improvement efforts by the Parish. The 2016 listings show an increase in low DO due to drought conditions (Figure 4-3), but the number of DO impairments remained lower than the period 2006-2010. TMDLs are used as a basis for establishing wastewater discharge limits and water quality improvement goals for nonpoint source controls (usually through the MS4 Permit and Education and Outreach programs).

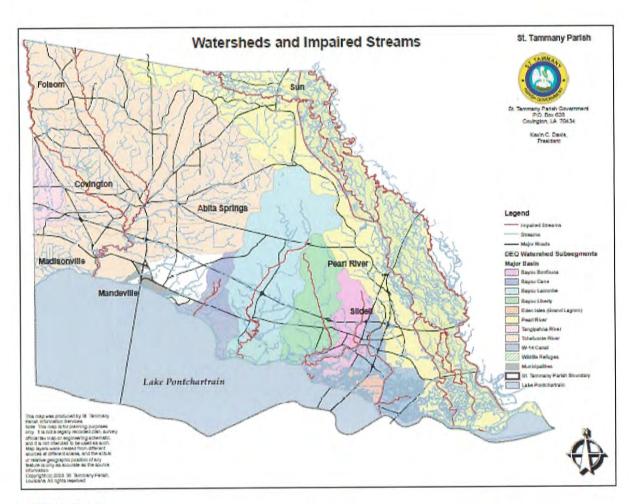


FIGURE 4-2 EPA 303(d)-Listed Impaired Waterbodies in St. Tammany Parish (LDEQ 2016)

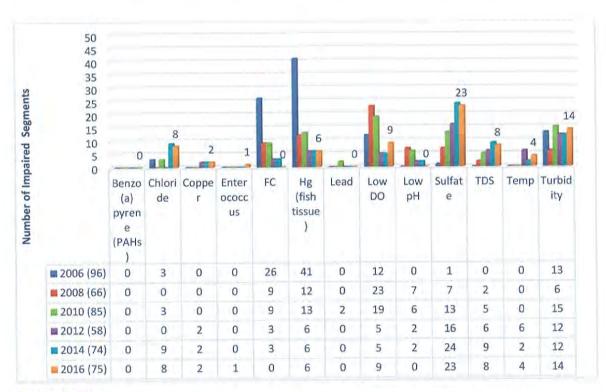


FIGURE 4-3 Impaired Waterbody Subsegments in St. Tammany Parish (LDEQ 2016)

### 4.1 TMDL Drivers: Requirements

From the 303(d) Lists that are generated every two years based upon data collected from the LDEQ Ambient Water Quality Monitoring Sites (WQMS), EPA prioritizes the impairments and creates a Total Maximum Daily Load for each specific constituent per segment. The TMDL is a regulatory document that allocates loads to permitted discharges (including St. Tammany Parish MS4) and nonpoint sources. The TMDLs that have been promulgated for St. Tammany Parish stream segments are presented in Table 4-2.

Several new subsegments were added in 2016 by LDEQ in the Lower Mississippi River Alluvial Plains (LMRAP) ecoregion of the Parish. Several of these subsegment have a completed Use Attainability Analysis (UAA) and the parameters were adjusted to lower the numerical criteria in accordance with the analyses.

The physical locations of the sample sites are critical to appropriate water quality results in the LMRAP. The Parish coordinated with LDEQ in early 2017 regarding locations of ambient water quality monitoring stations in order to continue the trend for improved water quality and ultimately, the delisting of additional Parish waterbodies. LDEQ has recently established new WQM sites to monitor water quality in the new subsegments that were determined from the Use Attainability Analysis for the Lower Mississippi River Alluvial Plain (LMRAP) Ecoregion. The list of subsegments, including the new ones from the LMRAP, is presented in Appendix B.

TABLE 4-2 TMDLs in St. Tammany Parish

Subsegment	Watershed	Impairment	
40802	Tchefuncte River		
40803	reneruncte River		
40901	Bayou Lacombe		
40902	Bayou Lacombe		
40903	Bayou Cane		
40904	Bayou Calle		
40905	Bayou Liberty	BOD	
40906	Bayou Paquet		
40907	Bayou Vincent		
40908	Bayou Bonfouca		
90105	Pearl River Navigation Canal		
90204	Tear River Havigation Canal		
90207	Middle & West Middle River		
40909	W-14 Diversion Canal		
40910	Salt Bayou	Fecal Coliform	
90101	Pearl River	10011100111	
90207	Middle & West Middle River		
40801	Tchefuncte River		
40905	Bayou Liberty		
40906	Bayou Paquet		
90101	Pearl River		
90107	T Cut Ti voi		
90102	East Pearl River		
90103	Last I call I d ver	Mercury	
90105	Pearl River Navigation Canal		
90204	1 car 1 (1 ver 1 vavigation canal		
90106	Holmes Bayou	-	
90201	West Pearl River		
90205	Wilson Slough		
90207	Middle & West Middle River		
90105	Pearl River Navigation Canal		
90204	Tear Niver Navigation Cana	Nitrate	
90207	Middle & West Middle River		
40903	Bayou Cane	TSS	
90106	Holmes Bayou	_	
90201	West Pearl River	Turbidity	
90202	Morgan River		
Total		37	

## 4.2 Additional Regulatory Drivers: Outstanding Natural Resource Waterways (ONRWs) and Scenic Rivers

More stringent water quality standards are applied to waterbodies in the Parish that have been designated Outstanding Natural Resource Waterbodies (ONRW) or Scenic Rivers<sup>4</sup> (Table 4-3). These more stringent standards are promulgated to protect sensitive, threatened or endangered species, but may slow or restrict economic development in the Parish. Recently, a new subdivision development proposed in St. Tammany Parish was denied a wastewater discharge permit into the Tchefuncte River, an ONRW and Scenic River<sup>5</sup>.

TABLE 4-3 Scenic Rivers in St. Tammany Parish

Waterbody Segment	Subsegment Description	
Abita River		
Bayou Cane	From its head waters to Lake Pontchartrain.	
Bayou Chinchuba	From the West Causeway approach south to Lake Pontchartrain.	
Bayou LaCombe	From its head waters to Lake Pontchartrain.	
Bayou Liberty	Portion in St Tammany Parish	
Bogue Chitto River	From the Louisiana-Mississippi state line to its entrance into the Pearl River Navigation Canal.	
Bogue Falaya River	From its headwaters to Louisiana Highway 437 in the parish of St. Tammany.	
Bradley Slough (Bayou)	All of that portion of the slough lying within the boundaries of St. Tammany Parish.	
Holmes Bayou	All of that portion of the bayou lying within the boundaries of St. Tammany Parish.	
Morgan River	From its juncture with the Porters River to its reentry into the West Pearl River.	
Tchefuncte River-	From the Bogue Falaya River to Louisiana Highway No. 22, excluding any tributaries thereto	
subsegment	from the Bogue Falaya south to Louisiana Highway No. 22.	
Tchefuncte River	From the Highway 22 bridge to Lake Pontchartrain	
Tchefuncte River and its tributaries	Washington, Tangipahoa, St. Tammany - From its origin in Tangipahoa Parish to its juncture with the Bogue Falaya River_ o Tributaries in St. Tammany Parish include, but are not limited to: - Clark Branch - Cowpen Branch - Mary Branch - Flowers Bayou - Hornsby Branch - Horse Branch - Mile Branch - Pruden Creek - Savannah Branch - Soap and Tallow Branch - Timber Branch	
West Pearl River	From the state line to its entrance into Lake Borgne.	
Wilson Slough (Bayou)	All of that portion of the slough lying within the boundaries of St. Tammany Parish.	

<sup>&</sup>lt;sup>4</sup> ONRW criteria are established by EPA/LDEQ and are published annually in the LA Register. <u>Scenic Rivers</u> are designated by the LA Legislature and the respective Management Plans are under the authority of the LA Department of Wildlife and Fisheries.

<sup>&</sup>lt;sup>5</sup> The permit was eventually granted with restrictions required from the discharger.

# 4.3 Jurisdictional Challenges: Pollutant Sources Originating Outside of St. Tammany Parish

Many of the impairment constituents originate in headwaters, wetlands and during coastal-use recreation, areas in which the Parish has no jurisdiction, including:

- Tchefuncte-Bogue Falaya Watershed headwaters are in Tangipahoa and Washington Parishes;
- Bogue Chitto-W. Pearl River Watershed headwaters are in Washington Parish;
- E. Pearl River is shared with the state of Mississippi;
- · Coastal zone WQ issues due to vessel traffic to/from marinas;
- Lake Pontchartrain impacts from houseboats near Parish facilities are State-regulated, yet the Parish is required to improve coastal WQ through its MS4 permit;
- Mercury methylation occurs in wetlands, which comprise a significant percentage of St Tammany Parish land use<sup>6</sup>.
  - Inter-Jurisdictional challenges will be addressed in the Water Quality Task Force meetings, Agency briefings and TMDLs.

# 4.4 St. Tammany Parish Nonpoint Source (NPS) Program

Nonpoint Source (NPS) pollution was identified as a major contributor to water quality impairments in most of the 37 TMDL subsegments for St Tammany Parish. NPS impairments will be controlled through programmatic vehicles (SWMP, MS4, BMPs and ordinances), and will address urban stormwater runoff; silviculture; construction; individual home sewage systems; and channelization of streams, rivers and bayous.

St. Tammany Parish aggressively identifies, quantifies and develops programs to reduce Nonpoint Sources of Pollutants in Parish waterbodies. To address the significant NPS loads, the Parish has implemented several wastewater and stormwater programs:

<sup>&</sup>lt;sup>6</sup> St Tammany Parish has been listed for mercury impairments on the State's 303(d) list, yet, it is an aerial deposition issue for which EPA has developed a regional TMDL. Some mercury minimization measures are required of wastewater dischargers and certain permitted facilities within the Parish, such as battery recyclers.

### Wastewater

- · Formation of Tammany Utilities
- Wastewater Consolidation Program
- Residential On-Site Wastewater System Inspection Program consists of inspections of homeowner on-site wastewater treatment systems upon change in utilities.
- Residential Decentralized Management Program and Database consists of door-to-door inspections of homeowner on-site wastewater treatment systems, development of a database of all on-site treatment systems inspected.
- Commercial Wastewater Plant inspections
- Wastewater to Wetland Permits

### Stormwater

- Review of Stormwater Site Plans for residential, subdivisions and commercial developments as part of the permit process.
- Stormwater Agreements are required from all permittees who construct in the FEMA SFHAs<sup>7</sup>, Critical Drainage Areas<sup>8</sup> and Areas of Special Concern<sup>9</sup>. These areas require no-net-fill calculations, SWPPs and a signed declaration that the permittee understands the stormwater BMPs and maintenance responsibilities during construction and postconstruction for their project.
- · DO Hot Spot Monitoring
- Demonstration Pond BMP Treatment (respective effluent quality and removal efficiency of the pollutants of concern)
- Water Quality Impact Modeling Program

### 4.4.1 St. Tammany Parish Wastewater Consolidation Program

St Tammany Parish has completed a Parish-wide study and prioritized areas for implementation of wastewater consolidation. Many poorly-operated, small treatment plants are targeted for wastewater regionalization to reduce discharges of pollutants into Parish waterbodies. The five St. Tammany Parish Water Quality Improvement Areas (WQIAs) are:

- West Tchefuncte WQIA
- East Tchefuncte WQIA

<sup>7</sup> FEMA SFHAs are defined by FMA as flood zones V, VE, A and AE

<sup>&</sup>lt;sup>8</sup> Critical Drainage Areas are St. Tammany Parish designated. They represent areas of know drainage problems and require an engineering review for no-net-fill, structural elevations, etc.

<sup>&</sup>lt;sup>9</sup> Areas of Special Concern are also St. Tammany Parish designated. Construction requirements in these areas are stricter than CDA, requiring net-fill calculations. Thus, structures constructed in these areas must be raised structures.

- Lacombe WQIA
- West Slidell WQIA, and
- East Slidell WQIA.

The locations of the WQIAs are shown in Figure 4-4 along with the LPDES dischargers, unsewered subdivisions and proximity to DO Hot Spots.

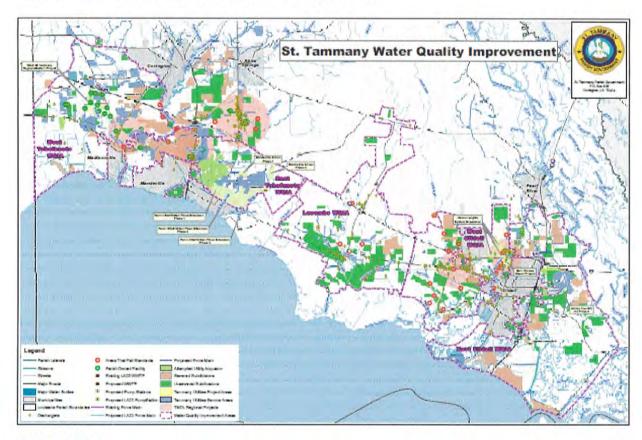


FIGURE 4-4 St. Tammany Parish Water Quality Improvement Areas (WQIAs)

New construction of wastewater treatment plants is not a feasible option for the Parish at this time, but small subdivisions and residential areas were targeted for tie-ins to existing wastewater treatment facilities based on proximity and sufficient capacity available to service additional customers.

The St. Tammany Parish Watershed Management Study (CPRA 2014) provides modeling results of proposed regionalization projects and water quality impacts for specific subdivisions and collectively in watersheds. The Study results and estimated engineering costs allow Parish Administration to prioritize target areas for implementation of water quality improvement projects.

### 4.4.2 Residential On-Site Wastewater System Inspection Program

St. Tammany Parish implemented a Residential Wastewater Inspection Program in which individual residential on-site treatment systems are inspected for every electricity turnover. Approximately 1000 inspections are completed per year. Systems that fail inspections are required to pump-out, repair, or replace the system in order to reconnect to electrical service. For every Aerobic Treatment Unit (ATU) that is inspected, the impact realized will be 1.42 lbs/day BOD<sub>5</sub> (Table 4-4).

 The numbers of individual homeowner on-site inspections, repairs and replacements (septic tanks), along with estimated BOD₅ load reductions, will be reported for each watershed in the MS4 Annual Reports.

TABLE 4-4
Estimated BOD<sub>5</sub> Load for an Individual On-Site ATU

	ATUs	ATU Capacity (Estimated)	Total Discharge from Failed ATUs	The state of the s	Estimated BODs Concentration [2, 3, 4]  Estimated BOI		Estimated BOD Load [2, 3,	
ATUs	failed	500		370	30			
	[1]	gpd	gpd	mg	/L	lbs/day		
				Before Maintenance	After Maintenance	Before Maintenance	After Maintenance	Removed
	1.0	500	500	370	30	1.54	0.125	1.42

<sup>[1]</sup> EPA's national failure rate for ATUs is estimated to be 50%. For this study we are asuming a more conservative 32.2% to corroborate the St Tammany Watershed Management Study (CPRA 2014)

<sup>[2]</sup> Raw wastewater strength 270-400 mg/L BOD5 (Metcalf and Eddy, 1991). On 12/09/2016, LDEQs ChUck Berger presented LDEQ's alternative Vision to TMDL program for targeting WQ Improvements in specific watersheds. Chuck used 370 mg/L for raw sewage.

<sup>[3]</sup> CONVERSIONS: 3.7854 liters per gallon; 453.59 grams/lb

<sup>[4]</sup> DHH and LDEQ BOD5 permit discharge estimates for ATUs

### 4.4.3 Decentralized Wastewater Management Program

St. Tammany Parish developed an inventory of homes services by individual on-site wastewater treatment systems. For the approximately 750 subdivisions and phases, the Parish estimates there are more than 35,000 homes hat have individual on-site wastewater treatment systems.

### The full inventory of "unsewered" homes is available in Appendix D, Exhibit 4.

As discussed previously in Section 4.4.1 (St. Tammany Parish Wastewater Consolidation), St. Tammany Parish Department of Environmental Services embarked upon an aggressive course of action to consolidate wastewater treatment throughout the Parish into regional treatment facilities, wherever practical (Figure 4-2). Where regionalization is not feasible, a decentralized wastewater management approach will provide an interim solution to improve water quality while wastewater regionalization progresses in the Parish. In some more rural areas of the Parish, decentralized management will become the permanent water quality improvement <sup>10</sup>.

The decentralized wastewater management pilot program has a successful precedent as evidenced in a similar program in adjacent Tangipahoa Parish. Lake Pontchartrain Basin Foundation (LPBF) and the Louisiana Department of Health (LDH) reported excellent success with this method of ATU inspections along with homeowner education. The Program estimates 93% success rates in improved ATU performance. This lead to such significant water quality improvements on the Yellow Water River and Ponchatoula Creek that both have been removed from the Impaired Waterbodies List for Secondary Contact Recreation. The Success Story for water quality improvement on the Yellow Water River will be published by LPBF, LDEQ and EPA in the near future.

Since 2015, St. Tammany Parish has received funding for four EPA grants to conduct door-to-door inspection programs in impaired waterways of the Parish. The four grants that have funded the DMP inspection program are detailed in Table 4-5.

TABLE 4-5
Pollution Source Tracking Grant-Funded Projects Awarded Since 2015

Project Name	TMDL Impairment	Agency	Date Completed	Agency Funding
Pollution Source Tracking in Ponchitolawa Creek Watershed	BOD/low DO	EPA LPBR PRN FY2016	in process	\$65,000
Pollution Source Tracking in Abita River Watershed	not assessed	EPA Gulf of Mexico Cooperative Agreement FY2015	in process	\$300,000
Pollution Source Tracking in Bayou Liberty Watershed	BOD/low DO	EPA LPB PRN FY2015	in process	\$85,500
Pollution Source Tracking in Bayou Liberty Watershed	BOD/low DO	EPA Gulf of Mexico Cooperative Agreement FY2017	in process	\$300,000
St. Tammany Total				\$750,500

<sup>10</sup> For example, to achieve the BOD reduction for regulatory compliance by sewering Tammany Hills Subdivision in the Abita River Subbasin (Tchefuncte River TMDL) the cost is estimated to be \$27,952,800 (CPRA 2014, Table 56, Page 293). The decentralized management program (DMP) provides an interim solution while funding is obtained for sewer regionalization.

The Parish is completing one of the grant projects in a subdivision in the Bayou Liberty Watershed. The Bayou Liberty Watershed has a TMDL for BOD<sub>5</sub> (resulting in low DO). Ozone Woods subdivision contains 856 homes and has a 52% failure rate, slightly higher than EPA's expected failure rate. Ditches are filled with sewerage solids whose high organic content has been found to be a preferred habitat for the West Nile Virus (WNV) mosquito larvae<sup>11</sup>.

Sampling data demonstrate that BOD<sub>5</sub>, fecal coliform bacteria and nutrients are being loaded into Bayou Liberty by homeowner treatment units in Ozone Woods subdivision. Interim-project BOD<sub>5</sub> reductions have been significant, relative to the baseline samples (Figure 4-5). Fecal coliform bacteria in the same laterals were measured as high as 7000 col/100 mL pre-project, where the criteria is 400 cols/100 mL. Upon its completion significant water quality improvement (BOD<sub>5</sub>, nutrients and fecal coliform), with consequent DO improvement, is expected from this project. A public health enhancement is a byproduct of the improved ATU performance, with reduction of WNV larvae in residential ditches.

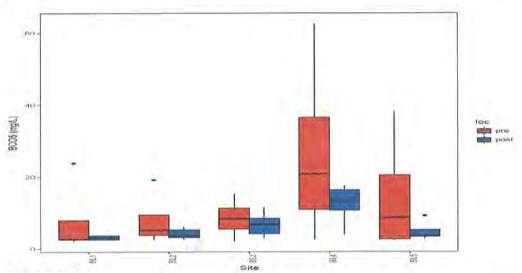


FIGURE 4-5
Boxplot of Pre- and Post-Inspection BOD5 in Sampling Sites in Bayou Liberty Watershed

<sup>11</sup> Dr. Kevin Caillouet, Asst. Director, St. Tammany Parish Mosquito Abatement District (MAD) indicated 36 positive mosquito pools of the primary vector for *West Nile virus* (WNV), *Culex quintquefasciatus* (southern house mosquito), continue to come from a cluster of sites within the <u>Ozone Woods neighborhood</u> in West Slidell. Consistently high infection rates are also found in this neighborhood. MAD Surveillance Report, July 2015.

Results from the grants to fund the inspection programs in Bayou Liberty and Abita River Watersheds facilitated the development of the Parish's Decentralized Management Plan (DMP) that is being implemented by the Department of Environmental Services (DES). The inspection process and program administration of the DMP are summarized in Table 4-6. The DMP will be used for areas in the Parish where centralized sewerage is unavailable, infeasible, or impractical.

TABLE 4-6
St. Tammany Parish Decentralized Management Plan Program Administration

Program Element	Responsible Party	Activity
	DES	Prior and/or in conjunction with the initiation of the Decentralized Management Program, conduct meetings with
Oublic Outrouch	Community Groups	Council members, HOA and community groups, real estate firms, and homeowners from unsewered areas to discuss the
Public Outreach	Other Agencies	needs and benefits of the Decentralized Management Program, watershed impairments, nature of the inspections, schedule of events.
	Homeowner	
	DES	Offer to Council members, HOA and community groups, real estate firms, and any other interested parties presentations
Public Education	Community Groups	and information regarding the proper operation and maintenance of on-site wastewater systems.  Distribute multimedia materials on basic system operation and maintenance needs.
Public Education	Other Agencies	User route multimedia materials on pasic system operation and maintenance needs.     Use current and updated website information.
	Homeowner	Potential Grants
Compliance Inspections/Monitoring	DES	<ul> <li>Maintain existing on-site inspection program.</li> <li>Conduct inspections on ATU's throughout subdivisions within the Hot Spot areas within specific watersheds in unincorporatedSt. Tammany Parish</li> <li>Document GPS coordinates at outfall, system type, performance of the ATU.</li> <li>Re-inspect entire Hot Spot areas after one year to evaluate the operation of new systems installed as well as locating existing on-site systems not operating properly.</li> </ul>
	DES	<ul> <li>Educate homeowner about proper operation, maintenance and monthly electrical costs vs. expensive repairs.</li> <li>Handout operation and maintenance brochure at completion of inspection for homeowner reference.</li> </ul>
Operations & Maintenance	Homeowner	<ul> <li>Provide homeowners with lists of state approved State/DHH approved service providers/installers.</li> <li>Provide homeowners with contact numbers and website resources for any further questions.</li> </ul>
Corrective Actions	DES	If sewer system fails, a letter will be submitted to the resident informing them of corrective actions needed to pass reinspection. A re-inspection will be conducted in 30 days or less if requested by homeowner for electrical transfer. If system falls re-inspection, a second letter will be submitted to resident giving them an additional 30 days—stating that fines may be imposed if the system is not attained compliance.
Recordkeeping, Inventory, & Reporting	DES	Identify and track by GPS coordinates the locations of all inspected ATUs/on-site treatment units.  Administer a database inventory (locations, permits, performed maintenance, inspection reports) of all inspected systems.  Maintain system inventory, permits, and inspection files  Distribute, post, send, maintenance reminders generated in database.
	DES	Provide information for grants available through the Department of Health and Human Services to repair or replace
Financial Assistance & Funding	Department of Health and Human Services	ATUS

The Parish has compiled a list of unsewered subdivisions with numbers of homes. There are approximately 35,000 of these unsewered homes in the Parish (see Appendix D, Exhibit 4 for detailed list of unsewered subdivisions by watershed). The unsewered subdivision list was prioritized based upon TMDLs or LDEQ request. Effective August 2017, the Parish has begun implementing the DMP, inspecting approximately 200 homes per month in subdivisions that are specified in the Inspection Priority List (Figure 4-6). For the inspection period 2018-2020, a list of subdivisions and numbers of homes in each are presented in Appendix D, Exhibit 4.

The goals of the DMP program are to:

- Instruct homeowners on proper operation and maintenance of their individual on-site Aerated Treatment Units (ATUs), including educating them on the health benefits <sup>12</sup>, quality of life improvements <sup>13</sup>, and the small cost of operation versus the cost of sludge removal (from not maintaining the systems) <sup>14</sup>.
- Quantify water quality benefits resulting from improved on-site system performance and discharges from unsewered subdivisions<sup>15</sup>.
  - o The numbers of individual homeowner on-site inspections, repairs and replacements (septic tanks), along with estimated BOD₅ load reductions, will be reported for each watershed in the MS4 Annual Reports.
- Coordinate with the St. Tammany Parish Mosquito Abatement District (STP MAD) to
  obtain counts of West Nile Virus mosquito larvae populations in unsewered subdivisions
  in the Parish. This information will be utilized to inform the Parish whether DMP
  progress is reducing the West Nile Virus larvae in MAD sampling sites where on-site
  systems have been inspected and repaired.

The DMP has resulted in development of an on-site inspection database. Results of all residential on-site systems that are inspected will be entered into the database, along with details of the units. A table of the inspection field sheet, homeowner results and reinspection schedule, database metadata, the Ordinances allowing the Parish to conduct inspections and require homeowners to complete maintenance on their systems is presented in Appendix D, Exhibit 4.

 Numbers of on-site inspections and DMP progress will be presented in the MS4 Annual Report.

<sup>12</sup> Health benefits include the removal of fecal coliform bacteria and some other deleterious analytes, including pharmaceuticals and endocrine disruptors, and reduction in West Nile Virus mosquito larvae present in the ditches receiving discharges from the onsite systems.

<sup>13</sup> Quality of life benefits to improved on-site performance include increased property values, yards that are not "soppy" with decayed vegetation.

<sup>14</sup> LPBF has determined the operational cost of an aerator on a single on-site system is \$3.50 per month, or \$420 every 10 years. The cost of a sludge pump-out is approximately \$400 and may be required as frequently as every 5 years (or more frequently), costing \$800 every 10 years. The cost of aeration is approximately twice as efficient as non-aeration.

<sup>15</sup> Quantification is based upon an estimate of 1.42 lbs/day per on-site unit that is no longer failing (Table 4-4).

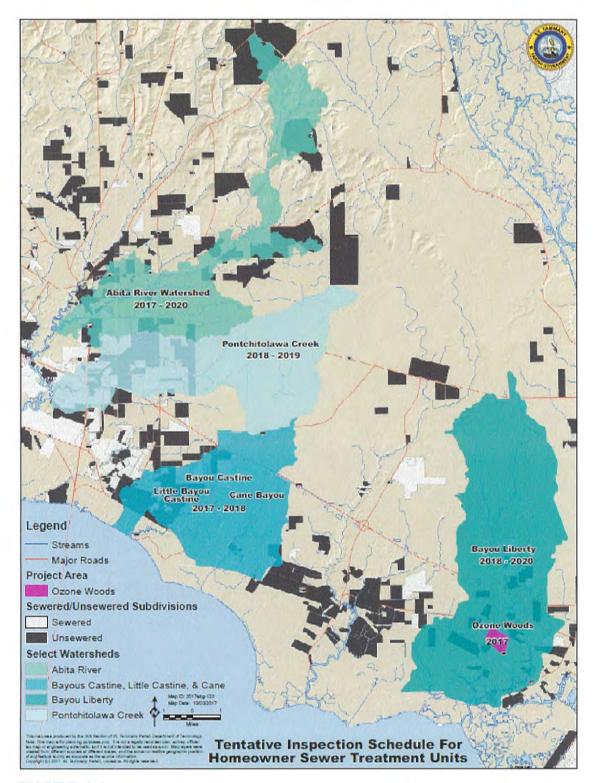


FIGURE 4-6
Decentralized Management Plan Inspection Schedule for Impaired Watersheds in St.
Tammany Parish with Unsewered Subdivisions

With the additional EPA funding that was awarded in October 2017, St. Tammany Parish and Southeastern Louisiana University will expand this single subdivision inspection program (Table 4-5 and Figure 4-5) to encompass another 3,000 unsewered homes in the Bayou Liberty Watershed. Applying the EPA national failure rate of 50% for ATUs to the Bayou Liberty area, the estimated 1,500 failed ATUs discharge 750,000 gpd of untreated sewerage, or 2,316 lbs-BOD/day. After maintenance, the BOD load is expected to be 188 lbs/day (Table 4-7). The BOD removal accomplished from this proposal is > 250% more than the 598 lbs/day required for DO compliance (CPRA 2014).

The projects will improve water quality, and health and safety conditions in the residential ditches and Parish laterals. Subsequent to the BOD<sub>5</sub> reductions, DO is expected to improve to concentrations that are above minimum compliance levels in the main stem of Bayou Liberty (a LA Scenic River), Lake Pontchartrain and the Gulf of Mexico.

Study results will be presented in the MS4 Annual Report.

TABLE 4-7
Estimated BOD Load Reduction from ATU Performance Improvement

ATUs	ATUs failed	ATU Capacity (Estimated),	Total Discharge from Failed				Estimated BOD Load, lbs/day [2, 3]	
	[1]	gpd	ATUs, gpd	Before Maintenance	After Maintenance	Before Maintenance	After Maintenance	Removed
3000	1500	500	750,000	370	30	2,316	188	2,128

<sup>[1]</sup> EPA's national failure rate for ATUs is estimated to be 50%.

<sup>[2]</sup> Raw wastewater= 270-400 mg/L BOD5 (Metcalf and Eddy, 1991). LDEQ uses 370 mg/L in TMDL models.

<sup>[4]</sup> DHH and LDEQ BOD5 permit discharge estimates for ATUs

### 4.4.4 Wastewater-to-Wetlands: Wetland Assimilation

St Tammany Parish, in cooperation with LDEQ and the City of Mandeville, implemented a project to discharge wastewater treatment plant effluent into a 1,300 acre wetland in the Bayou Chinchuba area. The wetlands settle solids, polish the effluent to remove nutrients and bacteria and reduce water quality impacts to Lake Pontchartrain. In the process, the wetlands are nourished and subsidence is reduced in the receiving wetlands. The assimilation project also results in reduced loading from failing and/or poorly maintained wastewater treatment systems. The homes and businesses being serviced by the Mandeville Wastewater Treatment Plant, due to the assimilation project, are no longer utilizing individual on-site sewer systems.

The wastewater assimilation project was permitted by LDEQ in 2006 to polish 1.9 MGD of effluent from the Mandeville area. The Parish has a Cooperative Endeavor Agreement (CEA) with Mandeville to accept an additional 2 MGD of Parish effluent, bringing the total loading to almost 4 MGD into the Chinchuba Swamp (Figure 4-7). An added benefit to the wastewater-to-wetlands project is a healthy, flourishing wetland and the reduction of coastal subsidence.

 Monitoring data or reports will be presented in the MS4 Annual Reports as they become available.

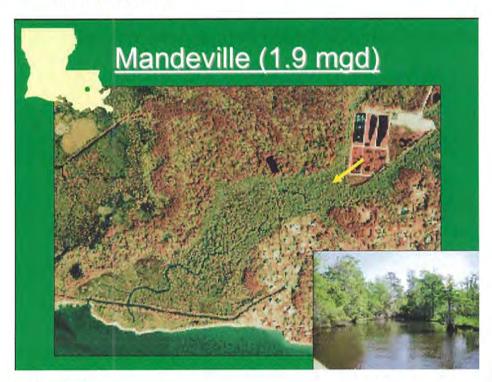


FIGURE 4-7 LDEQ Permitted Wastewater Assimilation Location in St. Tammany Parish

### 4.5 Identify and Resolve Programmatic Gaps

The pro-active stance taken by the Parish to improve water quality utilizes several programmatic vehicles that are available on the Parish's website:

- Manuals such as BMPs for Coastal Louisiana<sup>16</sup>;
- St. Tammany Parish SWMP;
- St. Tammany Parish Critical Drainage Areas and Areas of Special Concern;
- St. Tammany Parish Stormwater Ordinance;
- St. Tammany Parish Watershed Management Study (CPRA 2014); and
- St. Tammany Parish Water Quality Impact Modeling Program.

The Parish is addressing water quality improvements through ordinances, permitting, BMP implementation, retrofitting, and enforcement. Coordination and collaboration with municipalities, agencies and developers will address jurisdictional issues and stakeholder responsibilities to comprehensively address water quality issues in the Parish.

The St. Tammany MS4 Permit is enforced through LDEQ and requires the use of an ordinance or other regulatory mechanism to address post-construction runoff from new development and re-development projects to the extent practicable. The Parish continues to develop and implement strategies that include a combination of structural and non-structural BMPs appropriate for construction and post-construction stormwater for new development and re-development.

St Tammany Parish will identify and resolve programmatic gaps through established programs, such as: Clean Marinas Program (LDNR OCP); monitoring and tracking water quality impairments; plan reviews and inspections; *St. Tammany Parish Watershed Management Study* (CPRA 2014); Watershed Management Tool (WAAT, CH<sub>2</sub>M-Hill 2007); a pilot WQ Impact Modeling Program<sup>17</sup>; and a Decentralized Management Program. Further, St. Tammany Parish revised its Development Code in 12/2017 to strengthen regulations and coordinate reviews of drainage plans for water quantity and quality.

<sup>16</sup> BMP manuals have been created through several state agencies, LDEQ, LDNR, LDoTD. These have been vetted through public meetings, so STP refers to these pre-existing BMP Manuals.

<sup>17</sup> This program utilizes LAQUAL watershed models developed by LDEQ during the TMDL process. These models were obtained by CPRA and updated, resulting in 17 "post-TMDL" watershed models. The models are described in detail in the St. Tammany Parish Watershed Management Study (CPRA 2014).

Using the calibrated post-TMDL models, the impacts of planning choices can be easily measured using GIS or land use mapping; easily understood by policy-makers and politicians; are inexpensive to measure and report; can provide a uniform method for measurement and assessment; and provide a comprehensive measure of the cumulative impact of land development on watersheds..

The post-TMDL models can be used by Parish officials to evaluate the effectiveness of BMPs implemented prior to and during construction, and as a planning tool in making zoning and master planning decisions. The watersheds were calibrated to existing conditions; thus, can provide valuable assessments of potential impacts to aquatic systems from increased runoff and pollutant loading from developments.

- The impacts of land use on annual pollutant loading, stormwater runoff, storm event peak flows, runoff, and hydrographs will be assessed periodically to determine the effectiveness of ordinances and the stormwater program to address these issues.
- The Parish will continue to assess BMP influence on pollutant loads and hydrology studies (annual and storm event) to compare site performance with targets and standards.
  - These assessments will be provided in the MS4 Annual Report.

### 4.5.1 Use Attainability Analysis (UAA) to Establish Appropriate Dissolved Oxygen (DO) Standard

LDEQ protects the waters of the state by water quality monitoring and pollutant load modeling resulting in scientifically appropriate water quality standards. The current dissolved oxygen standard of 5.0 mg/L was considered by EPA and LDEQ to be too high for the slow-moving, low-energy, tidally-influenced and wetland-impacted naturally dystrophic coastal plains streams in Louisiana. In St Tammany Parish, these are found south of I-12 and Hwy 190. The LDEQ conducted a Use Attainability Analysis (UAA) for these naturally dystrophic streams and more appropriate DO standards were approved by EPA and the LA Legislature.

The new standards published in the LA Register (May 2016) are 2.3 mg/L in the summer and 5.0 mg/L in the winter for upland, and 4.0 mg/L in summer and 5.0 mg/L in winter for tidally-dominated streams, respectively 18 for waterbodies in the Pontchartrain Basin within the Lower Mississippi River Alluvial Plain (LMRAP) Ecoregion (Figure 4-8).

 Watershed staff will monitor the water quality in the new subsegments along with the existing ones that are reported in the 305(b) report.

### 4.5.2 St. Tammany Parish Water Quality Task Force

The Parish is required to improve water quality on 303(d) listed waterways to comply with the water quality standards of the Clean Waters Act. However, as discussed in Section 4.3, many of the sources of these impairments are from outside the Parish (impaired headwaters, air-deposition of mercury, and boater/vessel traffic into Lake Pontchartrain).

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<sup>18</sup> TMDLs are developed under two scenarios of hydrologic and temperature-driven conditions. Summer critical conditions occur during historical low-flow and high-temperature conditions, presumably to capture "worst case" stream conditions. A Use Attainability Analysis (UAA) was conducted by LDEQ on waterbodies in the eastern Lower Mississippi River Alluvial Plain (LMRAP) Ecoregion, in which new water quality criteria were proposed by LDEQ based upon extensive data collection throughout the Pontchartrain Basin.

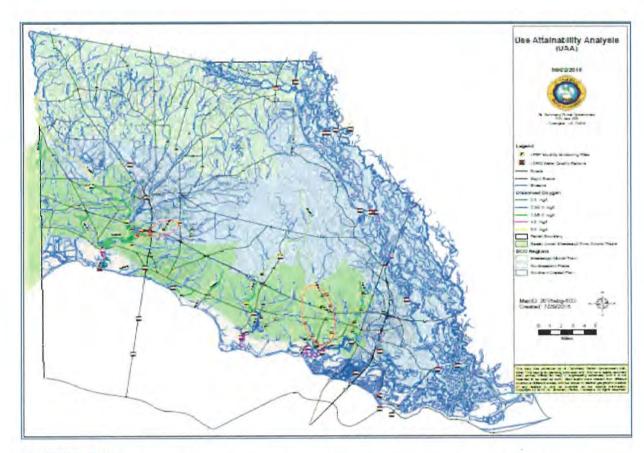


FIGURE 4-8 LMRAP Ecoregion Area in St. Tammany Parish (May 2016) with new DO Criteria

In December 2007, the LDEQ announced a water quality program that was "designed to protect, improve and restore water bodies throughout the state". One goal was to improve impaired water bodies to allow fishing and swimming by the year 2012." (LDEQ press release; December 6, 2007). To address the new water quality requirements, St. Tammany Parish implemented a Water Quality Task Force under this new initiative. The Task Force, hosted jointly by LDEQ and Lake Pontchartrain Basin Foundation (LPBF) (under contract with LDEQ), consists of representatives from federal, state and local government, universities, NPOs, municipalities and other stakeholders. The Task Force conducts regular bi-monthly meetings to achieve regional water quality improvement.

Businesses, industry and the general public are frequently invited to present projects, programs or discuss permit applications to encourage stakeholder review and to facilitate forward movement of these respective issues. Stakeholder participation in this interagency watershed task force comprehensively addresses interjurisdictional pollutant loading and implementation plans for water quality improvement; as well as to optimize funding opportunities and technical resources.

 Sign-in sheets and presentations will be provided to the Watershed Coordinator for inclusion in the MS4 Annual Report.

### 4.6 Watershed Modeling and Characterizations

LDEQ concluded in the final 2006, 2008, 2010, 2012, 2014 and 2016 305(b) Integrated Water Quality Reports that the Tchefuncte River and Bayou Liberty watersheds are 303(d) listed for low DO. Existing literature suggests that including more rigorous BMPs in new and redevelopments will improve water quality in the respective receiving streams.

### 4.6.1 Watershed Characterizations

Watershed characterizations must first be conducted in watersheds targeted for water quality improvement. Watershed characterization/assessments will be utilized to meet the following objectives:

- Identify the 303(d)-listed waterbodies and determine the specific constituents of impairment<sup>19</sup> for each respective waterbody.
  - The 303(d) lists are monitored by STP Engineering/Watershed staff. Changes to the 303(d) listings of Parish waterbodies are noted and water quality improvement projects are recommended in the respective watersheds.
- Identify primary causes of stream impairments with respect to water quality standards and designated uses;
- Identify the extent to which the Parish's decentralized wastewater system is impacting water quality;
  - TMDLs and Parish DO monitoring has targeted areas in which unsewered areas impact water quality. Funding for and development of a Parish Decentralized Management Plan (DMP) will improve water quality in the target areas.
- Assess current and future conditions applying computer models to project hydrology, hydraulics, and water quality;
  - Many Engineering watershed models were developed for the Parish with funding from LDEQ 319 program and LDNR's CIAP program. Figure \_\_\_\_ shows the watersheds that were modeled from 2002 to 2007.
- Utilization of modeling tools for screening and prioritizing areas for water quality improvement.

<sup>19</sup> The 2014 EPA 303(d) list for St Tammany Parish waterbodies indicates a significant reduction in total impairments for listed stream segments. Constituents of impairment include mercury in fish tissue (6 segments), low DO (5 segments), fecal coliform bacteria (3 segments), chlorides (9 segments), sulfates (24 segments), TDS (9 segments), low pH (0 segments), Benzo(1)pyrene (PAHs) (0 segments), copper (2 segments), temperature (2 segments), turbidity (12 segments) and lead (0 segments).

### 4.6.2 Watershed Modeling

The use of modeling tools has evolved in the Parish as they become available and staff becomes more proficient with utilizing them. The major tools utilized by the Parish Engineering/Watershed staff are listed below.

<u>T-QUAL</u>. The assumptions that were initially being used to test BMPs are based on data from the EPA Stormwater Institute were modeled using LDEQ's T-QUAL<sup>20</sup>. T-QUAL is a steady-state, unbranched, Excel-spreadsheet, step-model. Because it is user-friendly and requires minimal data, the model is useful for BMP screening purposes. Data from the study was used to verify that stormwater with similar land use in the Parish may be accurately modeled utilizing literature values.

<u>WAAT.</u> A GPS/GIS Watershed Management Tool in the Tchefuncte River Watershed (WAAT, CH<sub>2</sub>M-Hill 2007<sup>21</sup>) was developed in 2007 for use in aiding the Parish in managing the Tchefuncte/Bogue Falaya watersheds. The WAAT assists with predicting loads and downstream water quality via BMP removal efficiencies in the Tchefuncte and Bogue Falaya watersheds. This area has seen an extraordinary amount of development since the WAAT was developed, making the WAAT a great planning tool to predict water quality impacts from developments. Furthermore, the St. Tammany Watershed staff may utilize the WAAT in areas of the Upper Tchefuncte River/Bogue Falaya River watersheds for which no TMDL model exists.

LA-QUAL/Post-TMDL Models. In 2014 the LA Coastal Protection and Restoration Authority (CPRA) updated the LA-QUAL models for the BOD/Low DO TMDLs in St. Tammany Parish. Since the TMDLs were completed from 2007-2011 in the Parish, the models were updated to account for development in the interim. The CPRA study utilizes the water quality models developed by LDEQ through extensive calibration efforts during the TMDL program<sup>22</sup> and several watersheds that had no TMDL that were minimally calibrated<sup>23</sup> by CPRA's contractor. The calibration modeling results for the 17 post-TMDL watershed models are presented in the *St. Tammany Parish Watershed Management Study* (CPRA 2014). Table 4-8 lists the CPRA post-TMDL models and their respective TMDL status. Figure 4-9 presents an example of a watershed model calibration "DO-sag" output. A similar DO-sag calibration model output is available for each of the 17 watersheds for which a model exists. These are presented in Appendix D, Exhibit 5.

<sup>&</sup>lt;sup>20</sup> T-QUAL was developed in the LDEQ Engineering Department by Jeff Baker in the late 1990s.

<sup>&</sup>lt;sup>21</sup> The WAAT model is an EXCEL spreadsheet that was calibrated for hydrology, hydraulics and water quality utilizing the USGS gauge and LDEQ WQMS at Folsom. Calibration is relatively poor below Folsom and ends at Hwy 22.

<sup>&</sup>lt;sup>22</sup> LDEQ's LA-QUAL is a LA-specific version of EPA's QUAL-2E and QUAL-TX

<sup>23</sup> Watershed models that have no Intensive Survey are termed "minimally calibrated". These models use the Louisiana Technical Procedures (LTP) Manual for loads, rates and kinetics.

### TABLE 4-8

### **Post-TMDL Watershed Models**

(Source: St. Tammany Parish Watershed Management Study, CPRA 2014)

Watershed	LDEQ DO TMDL
Abita River	
Bayou Bonfouca	✓
Bayou Cane	<b>√</b>
Bayou Castine	
Bayou Chinchuba	
Bayou DeZaire	V
Bayou Lacombe	<b>√</b>
Bayou Liberty	<b>√</b>
Bayou Tete L'Ours	<b>√</b>
Bayou Vincent	<b>√</b>
Big Branch	<b>√</b>
Bogue Falaya River	V
Cypress Bayou	V
Lower Tchefuncte River	V
Ponchitolawa Creek	V
Upper Tchefuncte River	
W-14 Canal	
Indicates that this watershed is an updated version of the extensivelty calibrated LDEQ TMDL model.	<b>√</b>

A summary of the post-TMDL DO <u>calibration</u> model results indicating Pass/Fail of DO criteria was prepared for use by Permit staff. Table 4-9 shows areas that are failing DO standards in each respective watershed at the time of calibration, prior to additional loading.

 The Summary Table will be updated as new developments are permitted in the respective watersheds and included in the MS4 Annual Report.

Utilizing the post-TMDL models, the CPRA Study identified a number of necessary drainage and water quality improvements that were recommended for funding as Capital Projects. Many of these improvements have been completed and budgets for continued implementation are allocated every year.

 A list of the Capital Drainage /Water Quality Improvements will be included in the MS4 Annual Report by watershed with estimated reductions in pollutants and projected water quality improvement in the respective watershed.

The Study also specified the need for ordinances with stricter drainage and water quality performance standards requirements for new developments and redevelopments. Many of the recommended actions have been implemented to date (the regulatory recommendations are described in detail in Appendix E).

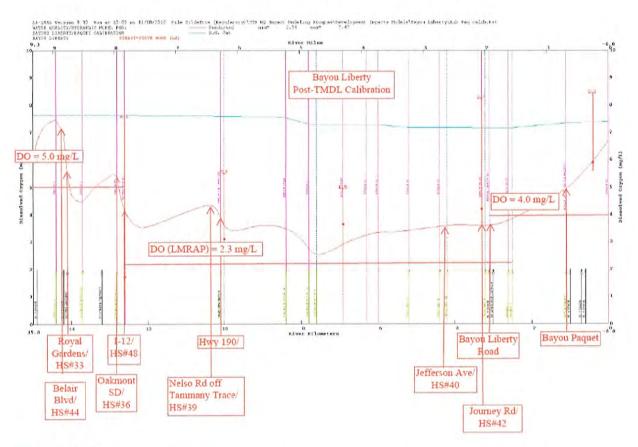


FIGURE 4-9
Example of a Post-TMDL Calibration Model Output with DO Hot Spots used in STP
Water Quality Impact Modeling Program

TABLE 4-9 Post-TMDL Watershed Models DO Calibrations

	DO Criteria							
Watershed	Subsegment	DO Standard, mg/L[1]	Subsegment Description	LDEQ WQMS Number	Watershed Condition at Model Calibration Pass [2] /Fail			
Abita River		5.0/ 5.0			Failed (south of Hwy 190)			
	040907	2,3/5,0	Headwaters to Hwy 433 (ILMRAP boundary)	301	Failed			
Bayou Bonfouca	040917	2.3/5.0	Hwy 433 to LMRAP boundary	TBD	Failed			
	040908	2.3/4.0	Hwy 433 (LMRAP boundary) to Lake	TBD	Passed			
	040903	5.0/ 5.0	Headwaters to Hwy 190	TBD	Failed			
Bayou Cane	040914	2.3/5.0	US 190 to LMRAP boundary	TBD	Failed			
	040904	2.3/4.0	LMRAP boundary to Lake	TBD	Failed			
Bayou Castine		2.3/5.0		[3]	Near-failure			
Bayou Chinchuba	040806	2.3/5.0			Failed (above Hwy 59): Passed downstream			
Bayou DeZaire	040802	2.3/5.0			Failed (above Hwy 21/1077): Passed downstream			
Bayou Lacombe	040901	5.0/ 5.0	Headwaters to I-12 (nr Krentel Rd bridge)	TBD	Passed			
	040912	2.3/5.0	I-12 to Hwy 190	300	Passed			
	040913	2.3/5.0	Hwy 190 to LMRAP boundary	TBD	Passed			
	040902	2.3/4.0	LMRAP to Lake	TBD	Passed			
Big Branch	040913	2.3/5.0		[5]	Passed			
Bayou Liberty	040905	5.0/ 5.0	Headwaters to LMRAP boundary	TBD	Failed			
	040915	2.3/5.0	LMRAP boundary to Hwy 433	1077	Near-failure			
	040906	2.3/4.0	Hwy 433 to Bayou Bonfouca	TBD	Passed			
Bayou Paquet	040916	2.3/5.0	Headwaters to Bayou Liberty	TBD	Failed			
Bayou Tete L'Ours	040808	2.3/ 5.0		[6]	Failed (at Hwy 190, RM 2.5): Passed downstream of RM 1.5			
Bayou Vincent	040907	2.3/5.0			Failed			
Bogue Falaya River	040804	5.0/ 5.0	Headwaters to Tchefuncte River	TBD	Passed upstream of Hwy 190 Failed downstream			
Cypress Bayou	040913	2.3/ 5.0		/	Passed			
The second	040802	5.0/ 5.0	(east of Hwy 190) Headwaters to US 190	TBD	Failed			
Ponchitolawa Creek	040808	2.3/5.0	(west of Hwy 190) US 190 to Tehefuncte River	TBD	Failed			
chefuncte River (Upper)	040801	5.0/ 5.0	Headwaters to US 190	107	Passed			
enerunete Kiver (Opper)	040807	2.3/5,0	US 190 to Bogue Falaya River	TBD	Failed			
chefuncte River (Lower)	040808	2.3/5.0	Bogue Falaya River to Hwy 22	106	Passed			
cheruncte River (Lower)	040803	2.3/4.0	Hwy 22 to Lake	638	Passed			
Black River	040809	2.3/5.0	Headwaters to Hwy 22	TBD	[7]			
W-14 Canal	040909	5.0/ 5.0			Failed			

<sup>[2]</sup> Utilizing post-TMDL Models (CPRA 2014), indicates whether the watershed Passed or failed DO standard at Current Conditions.

<sup>[3]</sup> Bayou Castine is considered within the Bayou Cane subsegments, but is Modeled as its own subwatershed

<sup>[4]</sup> New subsegment - not yet assessed

<sup>[5]</sup> Big Branch is part of the Cypress Bayou subsement, but is Modeled as its own subwatershed

<sup>[6]</sup> Bayou Tete L'Ours is monitored in the Tchefuncte River Subsegment, but is Modeled as its own subwatershed

<sup>[7]</sup> Black River is included in the Lower Tchefuncte River post-TMDL Model

### 4.6.2.1 St. Tammany Parish Water Quality Impact Modeling (WQIM) Program

St. Tammany Parish is conducting a pilot program (since September 2015) to quantify water quality impacts from proposed new developments and redevelopments. As developments are tested for impacts, the resulting DO-sags are compared against the calibration runs to determine whether the development causes an impact on water quality. Negative water quality impacts would trigger additional BMPs by the developer in order to receive a permit from St. Tammany Parish.

Upon Administration approval, the pilot WQIM will be integrated into the permitting system to test water quality impacts from developments. The WQIM process flow chart is presented in Figure 4-10. PowerPoint presentations and a technical memo with a detailed example of the WQIM to Parish Administration are available in Appendix D, Exhibit 5.

 A matrix of all developments that are tested by the WQIM, along with Pass/Fail recommendations, will be provided to the Watershed Coordinator for inclusion into the MS4 Annual Reports.

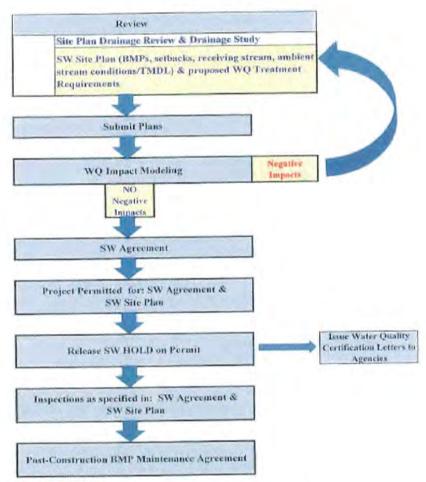


FIGURE 4-10
Water Quality Impact Modeling (WQIM) Process

The goals of the St. Tammany Parish Water Quality Impact Modeling (WQIM) Program are to:

- Characterize land use, natural resources, water quality and physical conditions using the TMDLs, stream assessments and field activities;
- Assess future conditions with Post-TMDL models (computer models calibrated to STP watersheds for hydrology, hydraulics, and water quality);
- Identify pollutants of concern within the watershed that may potentially discharge from the proposed development (stormwater and wastewater); and
- Recommend potential improvement and restoration projects within watersheds that will
  mitigate water quality problems or impacts, in order to facilitate development.

The program has wide utility for the Parish, including:

- Enables permitting staff to evaluate water quality impacts prior to permitting;
- Facilitates State permitting (LDEQ LPDES and LDWF Scenic Rivers);
- Provides documentation for Engineering/Watershed staff to recommend additional BMPs to developers who propose discharging into sensitive areas;
- Quantifies proposed water quality improvements that may result from water quality projects;
- Provides documentation that the Watershed Coordinator/MS4 Administrator needs in order to provide Water Quality Certification Letters that are requested by developers and agencies (LDEQ and LDWF) prior to permitting;
- · Tests water quality improvements from projects proposed for funding; and
- Allows comparisons of water quality conditions in stream reaches over time.

### 4.7 Water Quality Monitoring

St. Tammany Parish committed a significant amount of resources (budget and staff) to determine current conditions, perform impact modeling, evaluate new development, and enact ordinances to enforce programs that will maintain compliance with TMDL limits.

Through Public Records Requests, the Parish obtained information on all dischargers in the TMDL areas. Most of the dischargers were found to be Class 1, 3 & 4 Sanitary Discharge permits. Areas of densely clustered dischargers were identified for potential regionalization of wastewater. The database of dischargers is stored in ARCGIS shapefiles. These are illustrated as large orange circles, with dischargers shown as green triangles in Figure 4.11.

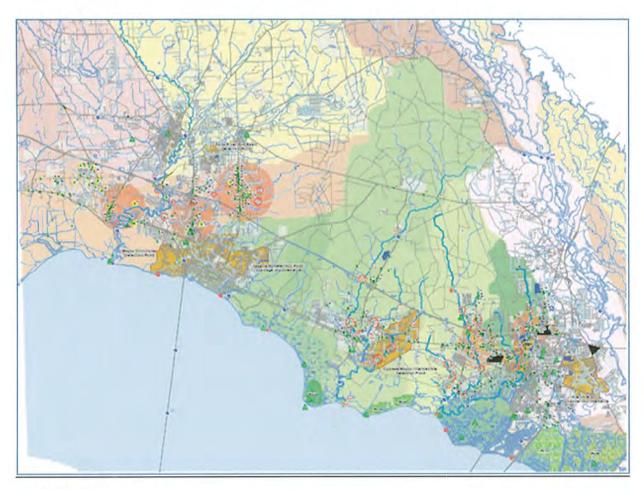


FIGURE 4.11 Parishwide DO "Hot Spots" and Clusters of Dischargers

Parish reviews of the TMDL models and reports allowed Watershed staff to locate areas that failed to meet current standards for dissolved oxygen (DO). These were termed "Hot Spots" (HS). The HS are depicted as large orange circles, with dischargers shown as green triangles in Figure 4-11. The dense cluster of dischargers are areas of water quality failure or hot spots. Areas of densely clustered dischargers were identified for potential regionalization of wastewater. Additional details of hot spot monitoring sites are provided in Appendix D (Exhibit 2).

Watershed staff conducted a field evaluation of the hot spots to determine whether they failed standards due to hydrology, shallow depths, geomorphology (sinuosity and bottom type), sewer discharges, or wetland dominance (Appendix D, Exhibit 2). The characterizations of each HS monitoring site are available in Appendix D (Exhibit 2). Most of the hot spots at the field assessment were found to have adequate flow and/or depth for accurate monitoring<sup>24</sup>.

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<sup>&</sup>lt;sup>24</sup> Ponchitolawa Creek, a tributary of the Tchefuncte River, is wetland dominated, very shallow, runs east-to-west with minimal slope/velocity and is constrained by culverts. The four HS along this small stream were found to be questionable for TMDL development and have DO<1.5 mg/L throughout the summers.

### 4.7.1 Hot Spot Monitoring Program

Per the TMDLs for St. Tammany Parish waterbodies, NPS pollutants have been identified as major contributors to water quality impairments. The Parish responded with a three-year parishwide program to monitor the hot spots in the Parish (discussed above). Lake Pontchartrain Basin Foundation (LPBF) was contracted to produce a Quality Assurance Project Plan (QAPP)<sup>25</sup>, conduct monthly monitoring collections at 34 respective hot spot locations, maintain quality control, conduct statistical analyses, and maintain a database of water quality results for the Parish.

The purpose of the monitoring is to obtain additional water quality information on the waterways in the Parish to present to LDEQ for use in evaluation of future TMDLs to be implemented in the Parish. Utilizing a water quality meter (YSI), the Parish conducted monthly hot spot monitoring to determine baseline water quality and seasonal trends. These baseline datasets will be invaluable to target locations for improvement projects and to confirm water quality improvements in the impaired receiving streams.

The *in situ* constituents that were monitored monthly include: dissolved oxygen, pH, water temperature, specific conductivity, and salinity. LPBF also calculated saturation DO (DO<sub>sat</sub>) for each event.

 Per the project Quality Assurance Project Plan (QAPP, January 2013), hot spot datasets are presented annually to the Parish, the St. Tammany Water Quality Task Force and to LDEQ as experimental water quality monitoring results (Appendix D, Exhibit 2).

<sup>25</sup> The QAPP addresses the quality assurance and quality control requirements for the project. Data collection and analysis will consist of three elements: nutrient analyses; *in situ* monitoring; and data analysis (GIS and statistical analyses). The QAPP is presented in its entirety in Appendix D (Exhibit 2).

### 4.7.2 Hot Spot Analysis and Education/Outreach

St. Tammany Parish has completed the three-year parishwide HS monitoring program at the 34 HS sites (June 2013-June 2016). Figure 4-12 shows the results of DO pass/fail for each of the sites (with UAA DO standards applied). The Year-3 summary report, PowerPoint Presentation, project QAPP, data, GPS coordinates and shapefiles were sent to LDEQ (October 2017) for use in the 2018 IR report.

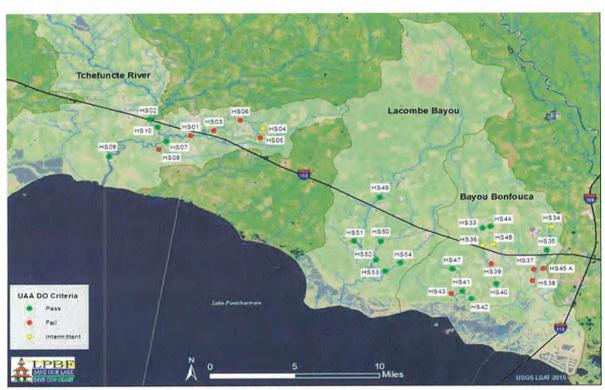


Figure 4-12 Map of sites showing pass/fail of HS DO levels (after UAA) with Intermittent Streams

The following documentation is available for this program:

- A detailed Final report of the program (LPBF, December 2017), is available on the Parish Stormwater webpage (<a href="http://www.stpgov.org/initiatives/water-quality/stormwater">http://www.stpgov.org/initiatives/water-quality/stormwater</a>).
- The Year-3 PowerPoint Presentation and Report are available in Appendix D, Exhibit
   The Final Report (LPBF, December 2017), PowerPoint Presentation (Year 3),
   datasets, GIS maps, and presentations will be included in the 2017 MS4 Annual
   Report.

### 4.8.5 Water Quality Sampling in Demonstration Ponds

Another program to address NPS in Parish waterbodies was to implement a series of demonstration projects to test BMP pollutant removal efficiencies by retrofitting existing retention ponds with water quality BMPs. Retrofitted retention ponds become useful tools for effective treatment of NPS pollutants. Existing literature on BMPs suggests that retrofitting the ponds will improve water quality in the respective receiving streams by removing oxygendemanding substances by 40% to 100%.

Beginning in June 2013, St. Tammany Parish implemented a three year program to test the various BMPs by retrofitting of existing detention ponds (dry and wet) into water quality ponds within several impaired waterbodies identified in 303(d) listed subsegments, for which TMDLs have been developed. The ponds were all constructed either after flooding events or from the new more restrictive stormwater and floodplain management ordinance and receive discharges primarily from three land uses: highly urbanized residential, timber land (silviculture) and undeveloped wetlands. The demonstration ponds and their respective BMP retrofits are listed below and summarized in Table 4-10.

TABLE 4-10 St. Tammany Parish Water Quality BMP Demonstration Ponds

Del Sol S/D Pond	8.1	WEI POND	Soap & Tallow Branch	Tchefuncte	Floating Wetland
Casa Bella S/D Pond #1	0.47	WET POND	Little Bayou Castine	L. Pontchartrain	Aeration
Labarre Street	5	DRYPOND	Bayou Castine	L. Pontchartrain	Tree & Vegetative Planting
Little Creek Commercial	5	WET POND	Little Creek	Tchefuncte	Induced Flow

While the selected dry detention pond (Labarre Street Regional Pond) currently serves its purpose for storing stormwater from those land uses, it is also an effective treatment tool for nonpoint source pollutants. Two of the wet ponds (Del Sol and Casa Bella #1 Subdivision Ponds) were retrofitted with differing BMP treatments, one each with floating wetland and aeration. The demonstration BMP for the Little Creek Commercial Pond was not conducted because of the failure to reach a CEA with the owners, but the monthly HS monitoring in the area were conducted. A Map of the demonstration ponds and their proximity to discharger clusters and DO HotSpots is shown in Figure 4-13.

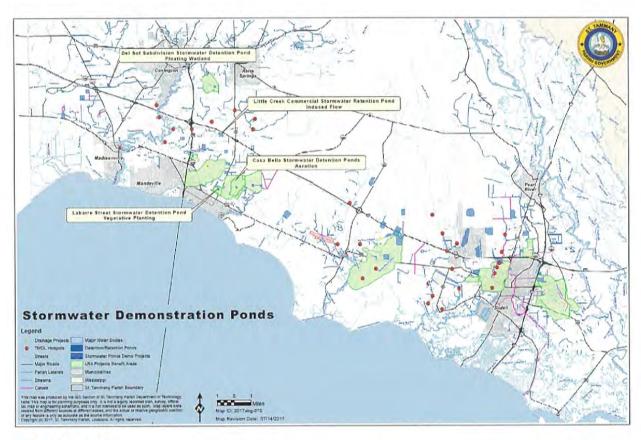


FIGURE 4-13
Water Quality Demonstration Ponds in St. Tammany Parish

Lake Pontchartrain Basin Foundation (LPBF) is working in collaboration with Southeastern Louisiana University (SLU) to collect samples using an ISCO sampler during rainfall events ("wet weather sampling") in summer and winter and collecting grab samples during dry times ("dry weather sampling"). Stormwater retention (wet)/detention (dry) ponds are selected for demonstration projects based upon certain criteria. Selection criteria for the demonstration ponds are the ponds must:

- · Be maintained by the Parish,
- · Be located in a Parish determined hot spot, and
- Discharge to a 303(d) listed waterway for low dissolved oxygen (DO) with an approved TMDL.

The pond sampling program characterizes the influent and effluent qualities, and removal efficiencies from each of the BMPs before and after installation of the BMP and includes seasonality.

 The pond BMP projects were completed in 2017. Detailed reports by LPBF and Comite Resources (design-builder of the floating wetland) will be presented in the 2017 MS4 Annual Report.

### 4.7.3 CPRA Grab Sampling Program

One of the tasks in the St. Tammany Parish Stormwater Management Study (CPRA 2014) was to validate the Hot Spot sites for various water quality constituents and for use in re-calibration of post-TMDL models. The CPRA sites were sampled on October 14, 2014. Constituents included *in situ* parameters (pH, temperature, specific conductivity, salinity and dissolved oxygen) and BODs. The latter samples were sent to a LELAP certified laboratory for analysis. A detailed list of sampling locations (site map), parameters and data are provided in Appendix D, Exhibit 3. The sampling sites correspond to the Parish HS locations.

### 4.7.4 LDEQ and Other Agency Ambient Water Quality Monitoring

The LDEQ collects samples at various ambient water quality monitoring sites throughout the Parish. Samples are taken monthly for 29 parameters and current results are available on LDEQ's website (see Table 4-11 and Figure 4-14). Many of the sites include historical datasets that date back to the 1980s. Additional monitoring sites in the Parish are maintained by other agencies. These include: US Geological Survey, the Army Corps of Engineers, Lake Pontchartrain Basin Foundation, and the Louisiana Department of Health and Hospitals (see Table 4-8 and Figure 4-13). The water quality datasets are an invaluable tool for the Parish in determining long-term trends for pollutants of concern during the modeling process, for planning purposes, and to determine causes of water quality impacts or improvements.

TABLE 4-11 Additional Water Quality Monitoring Sites in St. Tammany Parish

STATION NUMBER	y Parish WQ Sampling Sites STATION NAME	Watershed Location [1]	DATA OWNER	x	γ
7375222	ABITA R N OF ABITA SPRINGS, LA	A1	usgs	-90.0389	30.4819
7375220	ABITA R @ ABITA SPRINGS, LA	A2	usgs	-90.0272	30.4786
		BBF0	PONTCHARTRAIN BASIN FOUNDATION AND LDHH	-89,5	30.13
10	NORTH SHORE BEACH IN SLIDELL	The second second	CORPS OF ENG	-89,9	30.22167
35738	LK PONTCH 4 MI SE OF BY LACOMBE	BBF0		-89.79362	30.2711
58010301	Bayou Bonfouca at Slidell, La.	BBF1	LOUISIANA DEPT ENV QUAL	*09.79302	30.2711
7374577	Bayou BonFourca	BBF2			-
7374575	Bayou BonFourca	BBF3		00.00504	20.0500
35575	LAKE PONTCHARTRAIN AT MANDEVILLE	BC0	CORPS OF ENG	-90.09584	30.3586
58010303	Bayou Chinchuba near Mandeville, La.	BC1	LOUISIANA DEPT ENV QUAL PONTCHARTRAIN BASIN	-90.09362	30.3788
3	BAYOU CASTINE AT MOUTH IN MANDEVILLE	BCa0a	FOUNDATION AND LDHH PONTCHARTRAIN BASIN	-90.03	30.
9	FONTAINEBLEAU BEACH AT STATE PARK	BCa0b	FOUNDATION AND LDHH	-90.02	30,
58010064	Bogue Chitto River near Bush, Louisiana	BCht	LOUISIANA DEPT ENV QUAL	-89,89723	30.6291
02492000	BOGUE CHITTO RIVER NR. BUSH, LA	BCh1	USGS	-89.8972	30.629
02491900	TALLEYS CK NR SUN, LA	BCh2	USGS	-89.9639	30.657
07375224	TCHEFUNCTER BELOW COVINGTON, LA	BF0a BF0a	USGS	-90.1167 -90.075	30.438
07375214	LITTLE BOGUE FALAYA AT COVINGTON, LA.  E. FK LITTLE BOGUE FALAYA NR COVINGTON, LA. (near Hwy 1082)	BFOb	USGS	-90.0453	30.526
07375210	LITTLE BOGUE FALAYA NR COVINGTON, LA. (near Hwy 1081)	BF0e	USGS	-90.0569	30.533
7375185	little Bogue Falaya Headwaters at Hwy 40	BF0d			
		BF1	usgs	-90.0844	30.499
07375170	BOGUE FALAYA @ COVINGTON, LA  BOGUE FALAYA NR COVINGTON, LA	BF2	USGS	-90.1131	30.524
07375150		BF3	USGS	-90,1453	30.557
07375115	BOGUE FALAYA NR ST. BENEDICT, LA.			-90.1422	30.577
07375110	SIMALUSA CK NR RAMSAY, LA.	BF4	USGS	-90.1153	30.615
07375100	BILLS CREEK TRIBUTARY NEAR FOLSOM, LA.	BF4a	USGS		30,628
07375093	BEASON CK NR FOLSOM, LA.	BF4b	USGS	-90.1542	
07375085	BOGUE FALAYA @ FOLSOM, LA	BF5	USGS	-90.1708	30,628
07375075	BOGUE FALAYA NR FOLSOM, LA.	BF6	USGS	-90.1831	30.685
05007	LK PONTCHARTRAIN AT BY LACOMBE	BLO	CORPS OF ENG	-89.95556	30.2
85738	LK PONTCH 4 MI SE OF BY LACOMBE	BLO	CORPS OF ENG	-89.9	30.2216
58010300	Lacombe Bayou west of Slidell, La,.	BL1	LOUISIANA DEPT ENV QUAL	-89,93528	30.3136
07374587	BYU LACOMBE NR LACOMBE, LA	BL2	USGS	-89,935	30.342
07374584	BAYOU LACOMBE AT ST. TAMMANY, LA.	BL3	USGS	-89.8961	30,393
7374581	Bayou Liberty below I12	BLi1			
58010302	Cane Bayou east of Mandeville, La.	CB1	LOUISIANA DEPT ENV QUAL	-90,0025	30.3372
58010032	Pearl River (East) at Pearlington, Mississippi	PRE1	LOUISIANA DEPT ENV QUAL	-89.61528	30.2388
58010105	Pearl River (West) Southeast Of Slidell, La.	PRW1	VICKSBURG DISTRICT	-89.66889	30.2308
PEARL7W	W. PEARL RIVER AT HWY 12 BR.	PRW2	CORPS OF ENG	-89.70001	30
02492600	PEARL RIVER AT PEARL RIVER, LA	PRW3	usgs	-89.7367	30.38
58010106	Tchefuncte River at Madisonville, Louisiana	T1	LOUISIANA DEPT ENV QUAL	-90.15445	30.4044
7375230	Tchefuncte River	T1			
TOTOEGO	Tanelande Files	100	PONTCHARTRAIN BASIN	2010	2.68
6	BOGUE FALAYA PARK IN COVINGTON	T1a	FOUNDATION AND LDHH	-90.05	30.2
07375224	TCHEFUNCTE R BELOW COVINGTON, LA	T2	USGS	-90.1167	30.438
58010107	Tchefuncte River near Covington, Louisiana	T3	LOUISIANA DEPT ENV QUAL	-90.16945	30.4944
07375050	TCHEFUNCTE RIVER NEAR COVINGTON, LA	ТЗ	USGS	-90.1694	30,494
07375035	TCHEFUNCTA R NR ST. BENEDICT, LA.	T4	USGS	-90.2064	30.5
07375000	TCHEFUNCTA RIVER NR FOLSOM, LA	T5	usgs	-90.2486	30.615
85733	LK PONTCHARTRAIN AT HOWZE BEACH	W40a	CORPS OF ENG	-89,77001	30,1933
58010035	Pass Rigolets Southeast of Slidell, Louisiana	W40b	LOUISIANA DEPT ENV QUAL	-89,73695	30.1672
7374572	The second of th		CORPS OF ENG	-90.17223	30.3638
85614 58010139	LK PONTCH AT TCHEFUNCTA RIVER	-	LOUISIANA DEPT ENV QUAL	-90.10361	30.307
	IN COUNTY AND DESCRIPTION OF THE PROPERTY OF T		PONTCHARTRAIN BASIN	12000	7.7
7 07374720	TCHEFUNCTE BOAT LAUNCH CATCA CK S. OF STONEY POINT, LA.		FOUNDATION AND LDHH USGS	-90.09 -90.2372	30.73
07374720	TCHEFUNCTE R @ MADISONVILLE, LA  L, PONTCHARTRAIN @ CAUSEWAY NEAR NEW		USGS	-90.1547	30.40
07380233	ORLEANS, LA. Talisheek Creek (Isolated-Used to drain into Pearl River		usgs	-90.1258	30.18
2492200	Nav. Canal)				
[1]	Relative from Lake Pontchartrain or other Confluence	Bla	Bayou LaCombe Bayou Liberty	-	
BBF	Abita River Bayou BonFourca	CB	Cane Bayou		
Bca	Bayou Castine	PRE	Pearl River East		
BCh BCh	Bogue Chitto River Bayou Chinchuba	PRW	Pearl River West Tchefuncte River	-	
	D-SAMOU Chinchilla	T	W4 Canal		

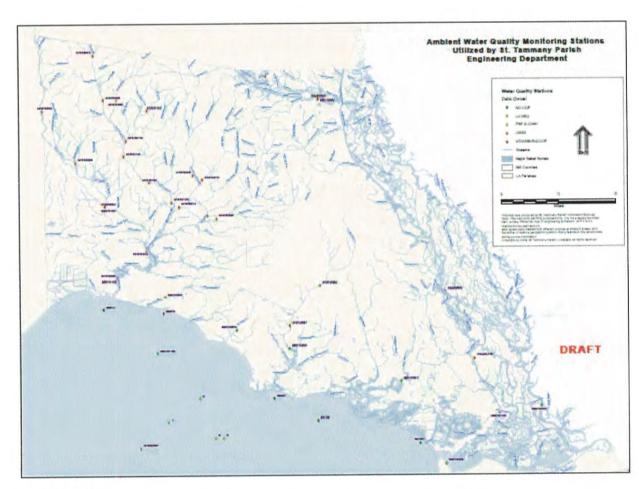


FIGURE 4-14 LDEQ Ambient Water Quality Monitoring Sites in St. Tammany Parish

### 4.6 Annual Water Quality Program Action Items for St. Tammany Parish MS4

The Watershed Management staff will conduct an annual comprehensive review to evaluate the overall effectiveness of this Plan regarding whether minimum control measures to reduce pollutant loadings identified in this Plan are adequate and properly implemented or whether additional control measures are needed.

The process for conducting the annual evaluation will be as follows:

- Maintain database of monthly water quality sampling and monitoring data in St. Tammany Parish;
- Evaluate trends at each site of Pollutants of Concern (PoC)<sup>26</sup>;
- Review LDEQ 305(b) and 303(d) lists for water quality benchmarks (improvements, delistings, or new listings);
  - A summary of changes in 303(d) listings will be presented to the Watershed Coordinator/MS4 Administrator for inclusion in the MS4 Annual Report.
- Review the cumulative results of developments in each watershed based upon Water Quality Impact Modeling (WQIM);
- Determine if additional watersheds should be included in the WQIMP based on water quality sampling results of the previous year. (Watersheds for which post-TMDL models are not available will need to be developed when funding becomes available);
- Maintain the 17 watershed models to include completion of new developments and postdevelopment, structural BMPs;
  - A worksheet for the annual WQIM review will be presented to the Watershed Coordinator/MS4 Administrator for MS4 Annual Report (example is included in Appendix D, Exhibit 5).

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<sup>26</sup> PoCs would include those listed in TMDLs that are modelable and preventable in BMP implementation: TSS, BOD, Ammonia, Nitrite/Nitrate

### 5.0 Annual Evaluation

### 5.1 Annual Evaluation

The Watershed Management staff will conduct an annual comprehensive program evaluation to gauge the overall effectiveness of the SWMP and to determine if the minimum control measures to reduce pollutant loadings identified in the SWMP are adequate and properly implemented.

The process for conducting the annual evaluation will be as follows:

- Review the current Plan and MS4 program to determine if additional BMPs are required to adequately address stormwater management in the Parish. Determine if the SWMP needs to be revised to include any additional programs.
- Conduct a comprehensive evaluation to determine if all spill prevention and minimum control measures are accurately identified in the SWMP and performing adequately (see
- Document findings in a brief report summarizing the scope of the evaluation, the
  personnel performing the evaluation, date(s) of the evaluation, and any comments and/or
  observations related to the implementation of the SWMP.

### 5.2 MS4 Annual Report

St. Tammany Parish will submit annual reports to LDEQ by March 10 for the preceding calendar year. The report must include:

- The status of compliance with permit conditions, an assessment of the appropriateness
  of identified best management practices and progress towards achieving identified
  measurable goals for each of the minimum control measures;
- Results of information collected and analyzed, including monitoring data, if any, during the reporting period;
- A summary of the stormwater activities the Parish plans to undertake during the next reporting cycle; and
- A change in any identified measurable goals that apply to the program elements.
- St. Tammany Parish will submit annual reports to LDEQ by March 10 for the preceding calendar year. The report will include:
  - Results of information collected and analyzed, including monitoring and sampling data collected during the reporting period;
  - Reports and Presentations of data collection results, trends and analyses will be submitted in the MS4 Annual Report for each respective year.

### **Annual Stormwater Evaluation Checklist**

### St. Tammany Parish

Evaluation Issue (Answer Yes or No to the following questions)	Yes	No
Have inspections been completed as required?	X	
If required, has storm water sampling been completed as required?		N/A*
3. Were the BMPs implemented for the year effective?	X	
Do new storm water sources or pollutant exposures indicate a need for additional BMPs?	Х	
5. Has this Plan been updated to include recommended changes resulting from previous inspections or annual evaluation?	Х	
6. If sampling required, were pollutants in storm water sampling data present above LPDES permit limitations?		N/A
7. Are additional BMPs warranted? If yes, describe below:	X**	
BMPS OR BMP Improveme	nts Needed	
*3 Year "Hot Spot" & demonstration pond monitoring/sampl	ing completed during	<u> 2</u> 017.
** Continue Pollution Source Tracking & Decentralized Manwatershed.	agement for individu	al sewer systems by
** Continue Water Quality Impact Modeling for new subdivis	sion & commercial de	evelopments.
** Plans to plant and/or aerate parish ponds for water qualit	y improvement.	
Notes: Budget & staffing constraints may limit the extent to	which these program	ns are implemented.

### Appendix A

### LPDES General Permit 2013-2018 For Small MS4s

Permit No.: LAR041024

**Agency Interest No.: 108405** 

- NOI
- Permit
- Projected & Measureable Goals

TMDL Allocation Summaries for St. Tammany Parish Waterbodies

### ST. TAMMANY PARISH COUNCIL

ORDINANCE CALENDAR NO. 5620	ORDINANCE COUNCIL SERIES NO. 16-3396
COUNCIL SPONSOR. DEAN BRISTER	PROVIDED BY: Planning and Development
INTRODUCED BY MR STEFANCIK	SECONDED BY: MR TANNER
ON THE 4th DAY OF AUGUST 2016.	

ORDINANCE AMENDING THE ST. TAMMANY PARISH CODE OF ORDINANCES CHAPTER 7 DRAINAGE AND FLOOD CONTROL. ARTICLE II, DIVISION 5, SECTION 7-042.00, TO ESTABLISH A PROGRAM THAT ADDRESSES STORMWATER AND NON-STORMWATER DISCHARGES BASED ON BEST PRACTICES AND LIDEQ REGULATIONS. WHEREAS, the Clean Water Act of 1972 established the basic structure for regulating discharges of politizants into the waters of the United States as well as the quality standards for surface waters, and

WHEREAS, the United States Environmental Protection Agency is the federal agency charged with establishing pollutari centrol programs, which are often implemented and enforced through state agencies, such as Louisiana Department of Environmental Quality, and

WHEREAS, in an effort to comply with the water quality standards and requirements established by United States Environmental Protection Agency and Louisiana Department of Environmental Quality. St. Tammany Parish Government is taking steps to address water quality as a whole by evaluating current water. quality conditions, programming infrastructure improvements, and reviewing existing policies and WHEREAS, St. Tanmany Parish Government is permitted by Louisiana Department of Environmental Quality as the owner of the Parish's Small Municipal Separate Storm Sewer System, which is a conveyance of system of conveyances that is owned by a public entity that discharges to waters of the US and is used to collect or convey stormwater (including storm drainages, pipes, direlies, etc.); and WHEREAS, in order to maintain Municipal Separate Storm Sewer System permit compliance, St. Tammony Parish Government must develop a Stormwater Management Program that addresses sts minimum control measures. Public Education Outreach: Public Participation - Involvement. Illest Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Runoff Control, Municipal Poliution Prevention Good Housekeeping; and

WHEREAS, of the six minimum control measures addressed in the Stormwater Management Program, the Loutisiana Department of Environmental Quality requires local legislation be enacted specifically for three of the measures: Illicit Discharge Defection and Elimination. Construction Site Runoff Control, Post-Construction Runoff Control, and WHEREAS, the St. Tammany Parah Stormwater Ordinance shall address these three minimum control measures and establish methods to centrel the introduction of pollutaris into the Small Municipal Separate Storm Sewer System. THE PARISH OF ST. TAMMANY HEREBY ORDAINS that in accordance with LAC 33.1X and 40 CFR § 122, it adopts new regulations to control the introduction of pollutants into the Small Municipal Separate Storm Sever System.

BE IT FURTHER ORDAINED that the St. Tammany Pansh Code of Ordinances, Chapter 7 Drainage and Flood Control. Article II St. Tammany Parish Flood Hazard Actu Ordinance. Division 5 Provisions for Flood Hazard Reduction, Section 7-042 OS perceits Standards is amended to dedice all carried novisions within Sub-section (5) "Construction Sites. Storm Water Runoff" as specifically set forth mineriately hetematics, and replace it with new provisions as specifically set forth within the Exhibit attached to this ordinance, all as follows, to-wit:

## ORDINANCE CALANDAR NO. <u>5620</u> ORDINANCE COUNCIL SERIES NO.16.3396 PAGE 2 OF 3

## (5) Construction Sites - Storm Water Runoff

 a. A. permit shall be required. for the obsentige, guidbing, guiding, displacement or removal-of-dirt thresafter referred to us-dist work? For any properties not specifically evenpoted as per Paragraph (c) of this Section. This permit shall be in the form of an approval of the "Culvert Data Sheef", the "Formit Data-Review-Shoet , a general work order or land-clearing permit provenity required, for construction assisting to account. The ordinance shall be administered by Department of Engineering or any other parsh personnel-that-should be-necessary.

retention measurer must accompany the building permit or development proposal and be reviewed by the Department of Englishering before approval of the Culvert Data Sheet, or the Pennit Data Tracking Sheet or the issuance of a general work order. 6. A detailed description of distavork, boundaries of the acess to be disturbed and the proposed sediment

- ... Agricultural-land management peacitees and construction of agricultural-structures as defined
  - 2. Mining, quarrying, processing of rock, sand, gravel, aggregate or olay where established and in the St. Tenuminy Parish Land Use Ordinance No. 825.
- . Activities uniestaken on forest land in the production and harvesting of timber when approved provided for by law.
- via an agricultural obsaring, timber harvesting or citral obsaring permit in accordance with St. Tammary Parish Land Use Ordinance No. 52.1.

  LSingle family residences, and related accessory structures or cites, when the disturbed are compressed family residences, and related accessory structures or cites, when the disturbed are compressed classified at least 10 feet from all property compressed class than 50% of the feet of pared and is besided at least 10 feet from all property
- 6. The owner, builder or developer of a construction project shall cause the placement of a required sediment control measure for all trile slope and down slope boundaries of a construction area, anless a sedimentation basin designed to accommodate. MM cubic feet of water and
- sediment for each acre of disturbed groperty is provided.

  The owner, builder or developer will further cause the placement of said sediment confrol mensure around all-drainage structure intets which flow-into-a-public-drainage system, or a drainage system which is intended to be dedicated to the public.
  - X. Sedinum Retention Measures
- 9. The following mensures are soliment-steadism measures, subject to review and approval of each application based upon the characterisms of the work and site being permitted. A detailed is samplication, despite enterin and imitations of each is outlined in Appendix A-
- 2. Eroston-Centrol Mals
- Vegetation.
- 4.-Silt-Fencing 5.-Straw-Bale-Dikes
- 6. Diversion Dikes
- T-Interceptor Swales
- 10. Inlet Protection
- H. Any other functionally equivalent technology or method deemed appropriate by the Director of the Department of Engineering

 6.1 Alenker permit may be isoped for large scale developments when the developer provides the required nen-ventro) mensures for the development as a whole. The appropriatences of these measures be determined by the Director of the Department of Engineering.

3: Provision of solinent-retentant measures on site close not retease the builder developer from responsibilities as outlined in Section 40 07 LOI of Appendix B (Subdivision Regulations) of the St. Fannamy Parish Code of Ordinances should the retention measures fait to prevent sediment tunoff. The Director of the Department of Engineering may release the builder developer from the provisions

FERTILIZER - shall mean any substance that cortains essential plant nutrients in a form available to plants and is used primarily for promoting we stimmlating growth of a plant or improving the quality of a crop. FILL OR FILLING - shall mean the deposition of soil and other inert materials on the land to raize its grade. HAZARIXMS SUBSTANCE - shall mean any of the following: Any substance determined to be hazardous according to 49 CFR § 171.8 or insteal in Table 502.4 of 40 CFR § 302 or Section 311(b) (2) (A) of the Clean Water Act [33 USC § 1317 (a) and 1321 (b) (A)].

HAZARDOUS WASTE - shall mean any substance identified or listed as a hazardous waste by the EPA

pursuant to 40 CFR § 261.

ILLICIT DISCHARGE - shall mean a probibited non-stormwater discharge containing pullutaris.

LOCISIANA DISCHARGE PERMIT ELIMINATION SYSTEM (LPDES) PERMIT OR NATIONAL.

DISCHARGE PERMIT ELIMINATION SYSTEM (NPDES) PERMIT - shall arean the permit issued by the LDEQ or the EPA, under authority delegated pursuant to 33 USC § 1342(6) that authorizes the discharge of HERBICHDE - shall mean a substance used to defolizite, desiceate, destroy, minibit or regulate vegetation

polletants to waters of the United States MOST PROBABLE. NUMBER (MIN) - the number of organisms that are most likely so have produced laboratory results in a particular test. The MPN method is used to estimate the concentration of the vinible

bostis, curbs, ganters, disches, man-made channels, or storm drains used for collecting and or conveying shonwaster in the Parish.

NOTICE OF INTENT (NOI) - shall mean the Notice of Intent that is required by the LPDES General Permit microseganisms in a sample based on dilution factors.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) - shall mean roadside draininge systems, catch

for Discharges of Stormwaler from Coronuction Activities 5 Acres or Grener, the Multi-Sector General Permit for Stormwater, or other General Permits for the discharge of stormwater.

NON-POINT SOURCE POLLUTION - shall mean pollution discharged over a wide land area that cannot be

traced to one specific point or iccation. These are forms of diffuse pollution caused by sediment, nutrients, organic, and toxic substances contained in stormwater runoff from urbanized areas, construction sites agricultural sites, and silvicultural operations, etc.

OPERATOR, shall mean the person or persons who, either malvidually or taken together, has operational control over the facility or has day-to-day operational control over those activities at the facility necessary to ensure compliance with pelhation prevention requirements and any permit conditions.

PARISH - shall mean St. Tammany Parish in the State of Louviana.

PERSON - shall mean any individual, partnership, firm, company, corporation, association, trust, estate, enals, or any legal representative, agent, or assignee.

FPSTICIDE - shall mean a substance used to prevent, destroy, repel, or mingute any pest. POINT SOURCE - shall mean the discharge of pollutants at a specific location from paper, outfalls, channels, or enter discormble or discrete conveyances. Point source does not include irrigation flow returns from

agricultural stormwater mentil

POLLUTANT - shall mean dredgod spoil, solid waste, sewage, garbage, ahulge, chemical waste, biological materials, radioactive materials, heat, rock, soil, sediment, or industrial waste discharged into waters of the

stare and/or the MSA, drainage infrastructure, conveyances, or waterways of the Parish
POLLUTION - shall mean the contamination of the physical, thermal, chemical, or biological quality of
waters that causes impairment of the designated uses of a water body a stipulated in the current EPA
Integrated Report or readers the water harmful detrumental, injuraous to humans, animal life, vegetation, or
impairs the usefulness for the public enjoyment of the water for any law ful or reasonable purpose.
RELEASE - shall mean any spilling, leaking, pumping, pouning discharging, nijecting, leaching, dumping,
or disposing, directly or indirectly, into the MSA, drainage infrastructure, conveyances, or waterways of the

SANITARY SEWER (OR SEWER) - shall mean the system of pages, combuits, and other conveyances which zary industrial waste and samitary sewage from residential twellings, commercial buildings, industrial and manufacturing facilities, and institutions, whether treated or untreated, to any sewage treatment plant. SAMITARY SEWAGE • shall mean the domestic sewage and/or industrial waste that is discharged into the similary sewer system and passes through the sunitary sewer system to any public or privately owned sewage.

infrastructure, and waterways, usually during or after a ram. Sediment may cause a reduction in storage capacity, impede drainage, deutoy fish-nesting areas, clog animal habitats, and cloud waters to such an extent stockpiling/storage of fill sand, clay, and murerals washed from land into roadways, drainage SITE WORK . shall mean excavation, grading, filling, cutting, draining, paving, earthwork,

SOLID WASTE - any garbage, rubinsh, refuse, sludge from a waste treatment plant, water supply treatme plant, or air pollution centrol facility, and other descarded material, including, solid, liquid, semi-solid, contained gascous national resulting from construction or industrial, municipal, corn agnoultural operations, and from community and institutional activities as to prevent sunlight from reaching aquatic biotic.

STORAWATER - shall mean stormwater runoff, surface runoff and drainage runoff. (Agricultural stormwater rany be excluded, subject to the provisions of LAC 33:1X 2313.) STATE - shall mean the State of Louistana

STORMWAYER AGREEMENT - shall mean the agreement suttined by the Parch and signed by the contractor, developer, land owner, or agent to ensure all required permits are in place and the implementation of BMPs will be used to control evosion and sedimentation and reduce the pollutaris in stormwater this charges associated with excavation, grading, filling, and other construction projects as well as heavy equipment STORAWATER POLLUTION PREVENTION PLAN (SWPPP) - shall mean a plan required by the LPDES General Permits for Discharge of Stormwater from Construction Activities (LAR160000) and LAR2000001, LPDES Multi-Sector General Permit, or any LPDES Individual Permit which describes and crossics the implementation of practices that are to be used to reduce the pollutants in stormwater discharges associated with construction or other industrial activity at the facility.

TOTAL MAXIMUM DAILY LOAD (TAIDL) - shall meen the water quality assessment that determines the source(s) of pollutants of concern for a particular water body, considers the maximum amount of pollutants the waterbody is able to assimilate and still meet WLA standards, and then allocates to each source a set level

of politumis that is allowed to discharge. WASTEWATER - shall mean any water or other liquid, other than uncontamnated stormwater, discharged

WATER QUALITY STANDARD - shall mean the numerical criterion established by LDEQ and deemed necessary by the state to protect the designated tases of a water body.
WATERS OF THE UNITED STATES (WOTUS) - Waters of the United States- any waters within the federal

definition of "waters of the United States" at 40 CFR § 122.2; but not including any waste treatment systems. Ireatment points, or agoous designed to meet the requirements of the federal Clean Water Act. WETLAND - shall mean an area that is frequently intundated or strurated by water and is sufficient to support a prevalence of vegetation typically adapted for life in situated soil conditions. Wetlantly generally include

swamps, marshes, bogs, and similar areas.
WASTE LOAD ALLOCATION (WLA) - shall mean that portion of the assumisative capacity of the receiving water apportoned to a specific discharger in such a way that water quality standards are maintained under design conditions.

### PURPOSE

The purposes and objectives of this section are to establish policies and procedures for the permitting-institution, and/or enforcement regarding Hitcit Discharge Detection and Elimination. Construction Site Runoff Control, and Post-Construction Runoff Control. In doing so, the provisorus will allow the Parish to. 3) Comply with the MS4 Permit, all federal, state, and local regulations applicable to stormwater and non-

b) Manage stormwater impacts at their source and prevent contaminated stormwater and mon-stormwater descharges into the MS4, draitinge infracture, conveyances, and waterways within the Parish stormwater discharges.

g) Provide for proper operations and maintenance of all permanent and non-parametrit stormwater management BMPs that are implemented within the Parish.

Excitate compliance with federal and state water quality standards, limitations, and permits by owners and operators of commercial and industrial activities and construction sites within the Parish. Provide review procedures and performance standards for stormwater planning and management. 4

### ADMINISTRATION

The Parish MS4 Administrator shall administer, implement, and enforce the provisious of this section. Any powers granted to or dutes imposed upon the MS4 Administrator shall be entired out by the Administrator or may be delegated to other authorized personnel.

The Parish may adop, by council action, recognible stormwater fees for reinforcement of costs related to administration of the atomscate ordinance. MSE compliance. TMD, implementations and costs refused to destinate the atomscate ordinate for the PA or LDEO Fees are provided in Chapter 2 of the Parish Code of Ordinances, Article 1, Section 2.009.00, Parish Fees and Service Charges.

### NON-STORYWATER AND ILLICIT DISCHARGES œ,

### PROHIBITED NON-STORMWATER ILLICIT DISCHARGE a) GENERAL PROHIBITION

No person skall interduce or cause to be introduced into the MSJ, draininge infrastructure, conveyances, or waterways of the Paricka by allket disclosule, including non-sommwater disclusiges that are not composed entirely of sommwater, except as expressly provided for in this Article. I. No person shall introduce or cause to be introduced into the MSJ, diamage infrastructure, conveyances, or waterways of the Parish any disclusing that causes or contributes to violation of

a water quality standard.

No person shall connect an interior deain or any other source of wastewater to lite NIS4, drainings
infrastructure, conveyances, or wasteways of the Partie, or allows waste a connection to confinite.
 Any person that causes a spill, release, or other discharge of a probabilistic substance or other
pollument in the Partie, is solely responsible for the cleauup and removal of the substance.

- Capital projects or infrastructure improvement projects by Parish personnel (such projects shall comply with all other state, federal, and local stormwater permit requirements). This exemption
  - immediately necessary for the protection does not apply to private contractors working on Parish projectes. An activity that is determined by an STPG official to be immediate of life, property, or natural resources
    - Excavation of graves in conselence,
- Agricultural practices such as plowing, cultivation, tree cuning, legging operations that leave the stump and root mat intact, and cultivated sod operations. Agricultural projects shall comply with all other state, federal, and local stormwater and water quality requirements

### b) Stormwater Agreement

- requires a building permit, and work permit or subdivisions work order. This agreement, which is a decument provided by SUFG, will seem as a signed contrat with the Parish sating that the property owner or its designee agrees to obtain an LDEQ permit for construction, if applicable, and comply with all applicable LDEQ regulations during the term of the project. It shall be the responsibility of the property owner or his designee to acquire and comply with any applicable LDEQ permits prior to the commencement of censination. The Parish shall require an approved Stormwater Agreement for any developation or improvement project that
  - For subdivisions developed in phases, a Stomwater Agreement shall be in submitted at their preliminary approval phase for each phase of the development.

### c) Stormwater Site Plan

- A Stormwater Site Plan is a component of the SWPPP as required by LDEQ In an effort to ensure
  the owner, developer or contractor has a sufficient plan to address necessary stormwater controls
  before the commensement of consuraction, the Parish shall require a copy of the Stormwater Site
  Plan at the time of badding permit application. This information may be included on a plot plan. depending on the complexity of the project.
  - An approved Stormwater Site Plan is required with submittal of any applicable building permit site work permit or desirage plan for a subdivision within unincorporated St. Turmany Parish The site plan shall contain the following:

    - The property owner's name, address, date, legal description of percel, lot number, and a houndary survey indicating the location, and dimensions of the lot; The stape, size, and location of all existing and proposed buildings or other structures.
- The location and approximate dimension of drivervays, entrances, and all points of access to a public street or road;
  - Locations of areas subject to flooding or limits of Hootplam, if applicable,
  - Total land area:
- The locations of all existing and proposed streets, allegs, utilities. Stormwater conveyances, draininge features, samitary sewers and drainage, utility, or access easements servitudes, specifically noting connections to Parish conveyance systems;
  - All existing and proposed impervious areas.
    - Natural or man-made watercourses;
- All existing and proposed slopes, terraces, bulkheads, or retaining walls. Erosion and sedimentation control plans or SWPPP.
  - Drainage and/or fill calculations as required by permit and/or ordinance;
    - Direction of flow indicators, and
- m. Receiving waterhody for the ultimate discharge of stormwater from the site.
- When a Stormwater Size Plan is required to obtain a Parish permit, it shall be submitted to the Department of Planning and Development for review. The Stormwater Site Plan, including any approved revisions, is valid for the duration of the project. r.
- The submittal process for the residential and commercial development Stormwater Site Plan shall be in accordance with Chapter 7 of the Parish Code of Ordinances.
  - For a subdivision development, a Stormwater Site Plan shall be submitted as the Pretimenary Approval phase and will focus on stormwater management, water quality, and receiving waters.

# 3. CONSTRUCTION ACTIVITY REQUIREMENTS

- The following requirements shall be implemented and maintained during the course of construction activities.

  Sexing vegetation shall be preserved, where featible, and disturbed portions of the site shall be stabilitied within II days of the temperary or parameter tessation of construction activities stabilitied within II days of the temperary or parameter tessation of construction activities stormwater, or otherwise reduce tuned and the discharge of pollutants from the construction site. Installation, inspection, and maintenance of ensure and solutions they shall be consistent with the elfective operating conditions on the site. Operators are responsible for lite installation and maintenance of stormwater BMPs until warranty obligations are met and/or occupancy certificates.

- required by LDEQ permits, operators shall be responsible for overseeing self-inspections of
  - all BMPs at construction sites as noted in the LDEQ permit.

    2. Based on the results of the inspections, BMPs shall be maintained, revised, repaired, or replaced. as necessary but prior to a future storm event.
- The SWPPP or Stormwater Site Plan shall be updated with any BMP revisions.
   Any BMP mosifications shall be recorded in the SWPPP and/or Stormwater Site Plan within (7)
  - calendar days and implemented on site as soon as is practical.
- 6 The Parish may hold occupancy certificates related to a site until approval of the final stormwater 5. The owner, contracter, and/or operator of a construction site is responsible for a unplinate with the requirements of this section.
- inspection with a determination that any required stormwater controls are in place.
  c) The SWPPP, which shall include the Stormwater Site Plan, and stormwater self-inspection and BMP maintenance reports shall be available on site for inspections.
- In necessaries with LDEQ requirements, a SWPPP is required (that not an NOI) for all construction projects I acre or greater, but less than 5 acres, if not part of a larger common plan In accordance with LDEQ requirements, an NOI and SWPPP is required for large construction projects on 5 or more acres. This requirement includes any lot or pureel that is part of a larget common plan of development.
- of development.
- d) A stabilized construction entrance/exit paid shall be addited to minimize the tracking of mud, elay, sedament, and other construction materials ento roodways and streets
   e) The discharge of construction or building materials, including cement, construct, time, mortat, sturries, and paints is probabited. On-site containment or off-site disposal is required.
- (i) Greed housekeeping measures, such as covered storage, atom drain protection, secondary containment, etc., shall be employed to prevent, contain, and clean up spills of paints, solvents, litel. sewage, and any lazzadous substances and pollutants associated with construction
  - g) Proper waste disposal, such in covered waste containers and concrete disposal hins, shall be employed to manage construction materials, construction debts, paints, solvents, chemicals and
- construction waste, etc. shall be utilized to prevent stormwater contamination.

  () On phasesi subdivision developments, are disturbance shall be plaased, when applicable, to limit soil crosson and sediment excursion. Final stabilization shall be accomplished prior to commencement of the next phase of development

### STORMWATER INSPECTIONS

Roatine stormwater inspections will be performed by Parish stormwater inspectors in accordance with the applicable permuting processes or as needed. Fees associated with inspections re-inspections will be in accordance with Section 2-069/00 of the St. Tammany Parish Code of Ordinances.

- The final stormwater inspection shall be The first stormwater inspection for each project shall be scheduled at the commencement construction with the preliminary drainage inspection. The final stormwater inspection shall scheduled as the completion of construction with the dramage final inspection.
  - c). Unscheduled stommater inspections and drainage inspections may be performed by the Parish at any Re-asspections will be scheduled and performed as required
    - point during the construction privess.
- d) Failure to correct inadequacies following a failed dramage and or stormwater inspection may result in enforcement action.
  - e) All stormwater inspections shall be performed in accordance with the STPG approved SWMP

# D. POST-CONSTRUCTION STORMWATER REQUIREMENTS

# POST CONSTRUCTION PERMANENT STORMWATER FACILITIES

Pernament Stormwater BMPs shall melaabe boils structural and non-sunctural BMPs.

3) Seructural BMPs shall include, but are not liteated to, retention detention pounds, stormwater diversion

- structures, and filtration devices

  1. Installation of permanent structural measures intended to control storm; after the completion of a subdivision developments shall be in accordance with Appendix B, Chapter 40 of the Parish Code of Ordinances. Subdivision Regulatory Ordinance 499, Section 40.
  - Eroston, sedimentation, and pollutaris shall be convolled affer completion of the development process in accordance with the  $BMP_k$  for Control Lorinstant Zore manules and or current LDEQ and EPA guidelines for structural BMPs.
    - Structural stoemwater controls for residential and commercial development shall continue to meet the performance standards as stipulated in the original design and approved by the Parish in accordance with this section.
- It is the stared goal of STPG to develop a program to address and protect water quality in St. Tananasy Parish. This program involves capital improvements, water quality monitoring, and development of regulations based on recommendations outlined in the CPRA Watershed

### Table 9. Subsegment 040803 Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for a 4.0 mg/L dissolved oxygen standard

	SUMMER		WINTER		
ALLOCATIONS	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV-APR) (lbs/day)	
Point Source Wasteload Allocation (WLA)	0% below Hwy 22	57	0% below Hwy 22	57	
Point Source Reserve MOS (20%)		14		14	
St. Tammany Parish MS4 WLA (Nonpoint Loads)	0% below Hwy 22	15	0% below Hwy 22	12	
St. Tammany Parish MS4 MOS (Nonpoint Source Reserve MOS) (20%)		4		3	
City of Mandeville MS4 WLA (Nonpoint Loads)	10% below Hum 77	o	0% below Hwy 22	0	
City of Mandeville MS4 MOS (Nonpoint Source Reserve MOS) (20%)		0		0	
Nonpoint Loads	0% below Hwy 22	10,709	0% below Hwy 22	8,661	
Nonpoint Source Reserve MOS (20%)		2,677		2,165	
TMDL		13,476		10,913	

Table 10. Summary of MS4 loading for Tchefuncte River Subsegment 040803

Urban Area	Permit Number	MS4 area (acres)	Summer MS4 (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	15.21	19	16
City of Mandeville	LAR041008/AI#108432	0.00	0	0

DRAFT Bayou Lacombe Watershed TMDL Subsegments 040901 and 040902 Originated: October 12, 2011

Table 7. Subsegment 040901 Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for a 5.0 mg/L dissolved oxygen standard

	SUMMER		WINTER	
ALLOCATIONS	% Reduction Required	(MAY-OCT) (lbs/day)	% Reduction Required	(NOV- APR) (lbs/day)
Point Source Wasteload Allocation (WLA)	Bayou Lacombe: 0% Hwy 36 to I- 12. 70% I-12 to Hwy 190.	36	Bayou Lacombe: 0% Hwy 36 to I- 12. 70% I-12 to Hwy 190.	36
Point Source Reserve MOS (20%)		9		9
St. Tammany Parish MS4 WLA (Nonpoint Loads)	Bayou Lacombe: 0% Hwy 36 to I- 12. 70% I-12 to Hwy 190.	4	Bayou Lacombe: 0% Hwy 36 to I- 12. 70% I-12 to Hwy 190.	3
St. Tammany Parish MS4 MOS (Nonpoint Source Reserve MOS) (20%)		1		1
Nonpoint Loads	Bayou Lacombe: 0% Hwy 36 to 1- 12. 70% I-12 to Hwy 190.	1169	Bayou Lacombe: 0% Hwy 36 to I- 12. 70% I-12 to Hwy 190.	924
Nonpoint Source Reserve MOS (20%)		292		231
TMDL		1,512		1,204

<sup>\*\*\*</sup>Note1: UCBOD as stated in this allocation is Ultimate CBOD.
UCBOD to CBODs ratio = 2.3 for all treatment levels
Permit allocations are generally based on CBODs\*\*\*

Table 8. Summary of MS4 loading for Bayou Lacombe Subsegment 040901

Urban Area	Permit Number	MS4 area (acres)	Summer MS4 (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	148.2	5	4

Table 9. Subsegment 040902 Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for a 4.0 mg/L dissolved oxygen standard

	SUMMER		WINTER	
ALLOCATIONS	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV-APR) (lbs/day)
Point Source Wasteload Allocation (WLA)	Bayou Lacombe: 40% Hwy 190 to Big Branch Bayou. 0% Big Branch Bayou to Cypress Bayou. 0% Cypress Bayou to RKM 6.1. 10% RKM 6.1 to RKM 0.3. 0% RKM 0.3 to Lake Pontchartrain. Big Branch Bayou: 80%. Cypress Bayou: 80%	96	Bayou Lacombe: 40% Hwy 190 to Big Branch Bayou. 0% Big Branch Bayou to Cypress Bayou. 0% Cypress Bayou to RKM 6.1. 10% RKM 6.1 to RKM 0.3. 0% RKM 0.3 to Lake Pontchartrain. Big Branch Bayou: 80%. Cypress Bayou: 80%	96
Point Source Reserve MOS (20%)		24		24
St. Tammany Parish MS4 WLA (Nonpoint Loads)	Bayou Lacombe: 40% Hwy 190 to Big Branch Bayou. 0% Big Branch Bayou to Cypress Bayou. 0% Cypress Bayou to RKM 6.1. 10% RKM 6.1 to RKM 0.3. 0% RKM 0.3 to Lake Pontchartrain. Big Branch Bayou: 80%. Cypress Bayou: 80%	1743	Bayou Lacombe: 40% Hwy 190 to Big Branch Bayou. 0% Big Branch Bayou to Cypress Bayou. 0% Cypress Bayou to RKM 6.1. 10% RKM 6.1 to RKM 0.3. 0% RKM 0.3 to Lake Pontchartrain. Big Branch Bayou: 80%. Cypress Bayou: 80%	1434
St. Tammany Parish MS4 MOS Nonpoint Source Reserve MOS) (20%)		436		358
Nonpoint Loads	Bayou Lacombe: 40% Hwy 190 to Big Branch Bayou. 0% Big Branch Bayou to Cypress Bayou. 0% Cypress Bayou to RKM 6.1. 10% RKM 6.1 to RKM 0.3. 0% RKM 0.3 to Lake Pontchartrain. Big Branch Bayou: 80%. Cypress Bayou: 80%	8896	Bayou Lacombe: 40% Hwy 190 to Big Branch Bayou. 0% Big Branch Bayou to Cypress Bayou. 0% Cypress Bayou to RKM 6.1 10% RKM 6.1 to RKM 0.3. 0% RKM 0.3 to Lake Pontchartrain. Big Branch Bayou: 80%. Cypress Bayou: 80%	7318
Nonpoint Source Reserve MOS (20%)		2224		1830
rmdl .		13,419		11,059

Table 10. Summary of MS4 loading for Bayou Lacombe Subsegment 040902

Urban Area	Permit Number	MS4 area (acres)	Summer MS4 (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	3440.4	2179	1792

Bayou Cane Watershed TMDL Subsegments 040903 and 040904 Originated: February 4, 2011

addition, the projected load reductions indicate that the dissolved oxygen criteria for Bayou Cane may be inappropriate based on the experience of LDEQ's water quality modelers. The load reductions implemented in reach 1, in particular, the new permit limits established for the Southeast Louisiana State Hospital, may contribute to some load reductions in reaches 2-6. Phase II may require different load reductions based on the DO criteria and in-stream conditions.

Existing ecoregion data suggests that the summer and winter DO criteria should be 2.3 mg/L and 4.0 mg/L, respectively. Based on a potential summer criterion of 2.3 mg/L, a 50% overall reduction of nonpoint loading would be required. Southeast Louisiana State Hospital would have permit limits of 5/2/5 (CBOD<sub>5</sub>/NH<sub>3</sub>-N/DO). Water quality monitoring site 0302 is located in the reaches of Bayou Cane for which these proposed criteria would apply.

Table 2. Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for the current

dissolved oxygen criteria of 5.0 (Subsegment 040903) and	id 4.0 (Subsegment 040904)
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ALLOCATION	SUMM	ER	WIN'	ΓER
Subsegment 040903	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV-APR) (lbs/day)
Point Source WLA		53		53
Point Source Reserve MOS (20%)		13		13
Nonpoint Source LA	90	7	90	13
Nonpoint Source Reserve MOS Summer (20%) Winter (20%)		2		4
TMDL		75		83
ALLOCATION	SUMM	(ER	WIN'	TER
Subsegment 040904	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV-APR) (lbs/day)
Point Source WLA		1,010		1,010
Point Source Reserve MOS (20%)		254		254
Nonpoint Source LA	60	423	60	348
Nonpoint Source Reserve MOS				
Summer (20%)		106		86
Winter (20%)		1 703		1,698
TMDL		1,793	<u> </u>	1,070

Bayou Cane Watershed TMDL
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		BAYC	BAYOU CANE (SUBSECMENT 040903)	IBSEGM	NTT04090X	1													
				100								Cale	for notifely	TWD!	Coloulation of the TMDL - Pounds ner day	r day			
		Calcula	Calculation of the TMDL - Kilograms per day	MDL-Kik	ngrams per i	day			1			Carc	nearron or	THE THIRD	ord sommon in	(in)		-	1000
Load description	WLA (kg O <sub>2</sub> /day)	CBOD1 LA	WLA CBODI LA CBOD2 LA Organic-N (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day)	Organic-N LA (kg/day)	Ammonia-N LA (kg/day)	Ammoria-N NBOD LA LA (kgday) (kg O <sub>2</sub> /day) (	SODLA (kg O <sub>2</sub> /day)	LA (kg O <sub>2</sub> /day)	Ammoria-N NBOD LA SOD LA LA MOS Load LA (kgday) (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day)	S	Load description	WLA (Ps Og-(day))	CBOD1 CBOD2 LA LA (fbs (fbs 02:(day) 02:(day)		Organic- Arrmonia-N N LA LA (bs/day) (bs/day)	ia-N LA (bs	SOD LA (fbs s) O <sub>2</sub> (day)	(Bs 0-/day)	Load (fbs O <sub>2</sub> .(day)
Point Source loads	22								9	Poi	Point Source loads	83	-	+	H	H	-		13
Headwater / Tributary loads		0	0	0	0	0		0	0	Headwa	Headwater / Tributary leads		0	0	0 0	0		0	0
Benthic loads			0	0	0	0	2	m	1		Benthic loads		2	0	0 0	0	4	7	2
Incremental Loads		0	0	0	0	0		0	0	pul	Incremental Loads		0	0	0 0	0		0	0
SUB-TOTAL.	24	-	0	0	0	0	2	3	7		SUB-TOTAL	23	2	0	0 0	0	7	7	15
MDL = WLA + LA + MOS								34	kg/day	TADL = H	= WLA+LA+310S					Ш			75 lbs/day
Nets: 1) - Lond Enidoy - Lond Gridoy) x 2.205	10									(I) - Load/lis	Notes: (1) - Lead/Beidzy = Lead/gpidy) x 2.205								
		Calcula	Calculation of the TMDL - Kilograms per day	MDL-Kil	ograns per	day						Calc	ulation of	the TMD1	Calculation of the TMDL - Pounds per day	er day			
Load description	WLA (kg O <sub>2</sub> /day)	CBOD1 LA (kg O <sub>2</sub> /day)	WLA         CBOD1 LA CBOD2 LA Organic-N         Ammonia-N         NBOD LA LA LA           (kg O <sub>2</sub> /day)         (kg O <sub>2</sub> /day)         (kg O <sub>2</sub> /day)         (kg O <sub>2</sub> /day)         (kg O <sub>2</sub> /day)	Organic-N LA (kg/day)	Armonia-h LA (kg/day)	(kg O <sub>2</sub> /day)	SOD LA	LA (kg O <sub>2</sub> /day)	Armoria-N NBOD LA SOD LA LA MOS Load LA (kgday) (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day)	3	Load description	WLA CI	CBOD1 CB LA 1 (fbs (	CBOD2 Organical Children (Ibs (Ibs) (Ibs) (Ibs)	Organic- Ammonia-N N LA LA (Bis/day) (Ibs/day)	ini-N LA (lbs ay) O <sub>2</sub> (day)	SOD LA (bs s) O <sub>2</sub> (day)	A LA (Bs	MOS Load (bs O <sub>2</sub> /day)
Point Source bads	24								9	Po	Point Source loads	53		-		L	H		13
Natural Nonpolist Loads		0	0	0	0	0	0	0		Natur	Natural Nonpoint Loads		0					0	-
Manmade Nonpoint Loads		1	0	0	0	0	2	m		Mann	Manmade Nonpoint Loads		2	0	0	0	4	7	2
SUB-TOTAL	24	-	0		0	0	2	3	7		SUB-TOTAL	53	2	0	0 0	0	7	7	15
										1	Soft of the training							-	75 theirby
TADI = WLA + LA + MOS											1								

Bayou Cane Watershed TMDL. Subsegments 040903 and 040904 Originated: February 4, 2011

MLA decreasion	BAN	BAYOU CANE (SUBSEGMENT 040904	UBSEGNIE	VAT 040904													
	Calcul	Calculation of the TMDL - Kilograms per d	MDL - Kile	grams per d	lay			Γ		3	culation of	Calculation of the TMDL - Pounds per day	L - Pounds	per day			
	CBODI LA	WLA CBODI LA CBODZ LA Organic-N Attrooria-N (kg O <sub>2</sub> /day)	Organic-N LA (kg/day)	Armonia-N LA (kg/day)	NBODLA SODLA LA MOS Load (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day) (kg O <sub>2</sub> /day)	SOD LA (kg O <sub>2</sub> /day)	LA (kg O <sub>2</sub> /day)	MOS Load (kg O <sub>2</sub> /day)	Load description	WLA (lbs O <sub>2</sub> /day)	CBOD1 CBOD2 LA LA (bs (bs O <sub>2</sub> /day) O <sub>2</sub> /day)	CBOD2 LA Orga (hs (bs)	Organic- Armin N LA I (Ibs/day) (Ibs	Ammonia-N LA (fibs/day)	NBOD SO LA (Bs O2/day)	SOD LA (bs (bs 02/day)	(hs (bs (bs (bs (bs (bs (bs (bs (bs (bs (b
Point Source loads 458								115	Point Source loads	1,010	1	+	+	T	t	+	255
Headwater / Tributary loads	0	0	0	0	0		0	0	Headwater/ Tributary loads.		0	0	0	0	0	0	+
Benthic loads	72	0	0	0	98	3	192	48	Benthic loads		95	0	0	0	57	207 423	3 106
Incremental Loads	0	0	0	0	0		0	0	Incremental Loads		0	0	0	0	0	0	+
SUB-TOTAL 458	72	0	0	0	92	ð	192	163	SUB-TOTAL	1,010	8	0	0	0	57 2	207 423	3 360
SON + FI + FIB = IGEL						-	040	Partition								-	
Netros (1) - Lond Bulty) = Lond by hyj s 2 285									Nates: (1) - Lenal Tackey) = Lenal Agiley (1206								1
	Calcul	Calculation of the TMDL - Kilograms per d	MDL-Kilo	grams per d	lay			F		5	inlation of	Calculation of the TMDL - Pounds ner day	- Pounds	Derday			
WLA Load description (kg O <sub>2</sub> /da)	CBC	CBODI LA CBODZ LA Organic-N Arranonia-N (kg O <sub>2</sub> (day)) (kg O <sub>2</sub> (day)) (kg days) (kg days)	Organic-N LA (kg/day)	Ammonia-N LA (kg/day)	NBOD LA SOD LA LA MOS Load (kg O₂⟨day) (kg O₂⟨day) (kg O₂⟨day)	SOD LA	LA (kg O <sub>2</sub> /day)	MOS Load (kg O <sub>2</sub> /day)	Load description	WLA (lbs O <sub>2</sub> /day)	CBOD1   CBOD2   LA   LA   (bs   (bs   02,/day)   02,/day)	CBOD2 LA Orga (Ibs O <sub>2</sub> /day) (Ibs/	Organic- Arren N LA L (Be/day) (bs	Armonia-N LA (bs/day) O <sub>2</sub>	NBOD SOI LA (bs O <sub>2</sub> /day)	SOD LA LA (bs O2/day)	MOS Load s (bs
Point Source loads 458						T	I	115	Daile Bornes Leafe	0,0,0	1	-	+	1	+	+	+
Natural Nonpoint Loads	0	0	0	0	0	0	0		Manual Manual Parks	200	6	-	+		+	+	4
Maarrade Nonpoint Loads	72	0	0	0	92	8	192	89	Manmade Nonpoint Loads	I	35	+	00	00	57 2	207 423	301
SUB-TOTAL 458	72	0	0	0	36	3.	192	163	SUB-TOTAL	1,010	\$	0	0	0	57 2	207 423	3 360
SOW + VT + VTH = TGWL							813	813 kg/day	TMDL = WLA + LA + MOS							-	1,793 lbs/da

Table 12. Subsegment 040905 Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for a 5.0 mg/L dissolved oxygen standard

	SUMMER		WINTER	
ALLOCATIONS	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV- APR) (lbs/day)
Point Source Wasteload Allocation (WLA)	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	161	0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	161
Point Source Reserve MOS (20%)		40		40
St. Tammany Parish MS4 WLA (Nonpoint Loads)	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	216	0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	313
St. Tammany Parish MS4 MOS (Nonpoint Source Reserve MOS) (20%)		54		78
	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	102	0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	148
City of Slidell MS4 MOS Nonpoint Source Reserve MOS) 20%)		26		37
Nonpoint Loads	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	1351	0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	1960
Nonpoint Source Reserve MOS 20%)		337		491
MDL		2287		3228

<sup>\*\*\*</sup>Note1: UCBOD as stated in this allocation is Ultimate CBOD.

UCBOD to CBOD<sub>5</sub> ratio = 2.3 for all treatment levels

Permit allocations are generally based on CBOD<sub>5</sub>\*\*\*

Table 13. Summary of MS4 loading for Bayou Liberty Subsegment 040905

Urban Area	Permit Number	MS4 area (acres)	Summer MS (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	2,471.91	270	391
City of Slidell	LAR04105/AI#108410	1,171.44	128	185

DRAFT Bayou Liberty and Bayou Bonfouca Watershed TMDL Subsegments 040905, 040906, 040907, and 040908 Originated: June 6, 2011

Table 14. Subsegment 040906 Total Maximum Daily Load (Sum of UCBOD¹, UNBOD, and SOD) for a 4.0 mg/L dissolved oxygen standard

	SUMMER		WINTER	
ALLOCATIONS	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV-APR) (lbs/day)
Point Source Wasteload Allocation (WLA)	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	26	0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	26
Point Source Reserve MOS (20%)		7		7
	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet		0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	441
St. Tammany Parish MS4 MOS (Nonpoint Source Reserve MOS) (20%)		78		110
	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet		0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	0
City of Slidell MS4 MOS (Nonpoint Source Reserve MOS) (20%)		0		0
Nonpoint Loads	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	100, 440, 240, 1	0% above Hwy 190 and 19% below Hwy 190 and 0% for Bayou Paquet	1948
Nonpoint Source Reserve MOS (20%)		345		487
TMDL		2154		3019

Table 15. Summary of MS4 loading for Bayou Liberty Subsegment 040906

Urban Area	Permit Number	MS4 area (acres)	Summer MS4 (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	1,354.26	392	551
City of Slidell	LAR04105/AI#108410	0.00	0	0

DRAFT Bayou Liberty and Bayou Bonfouca Watershed TMDL Subsegments 040905, 040906, 040907, and 040908 Originated: June 6, 2011

Table 16. Subsegment 040907 Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for a 5.0 mg/L dissolved oxygen standard

	SUMMER		WINTER	
ALLOCATIONS	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV-APR (Ibs/day)
Point Source Wasteload Allocation (WLA)	77% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.		38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	66
Point Source Reserve MOS (20%)		15		15
St. Tammany Parish MS4 WLA (Nonpoint Loads)	77% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.		38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	193
St. Tammany Parish MS4 MOS (Nonpoint Source Reserve MOS) (20%)		27		48
City of Slidell MS4 WLA (Nonpoint Loads)	77% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.		38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	138
City of Slidell MS4 MOS (Nonpoint Source Reserve MOS) (20%)	1	19		34
Nonpoint Loads	77% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.		38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	606
Nonpoint Source Reserve MOS (20%)		84		151
TMDL		734		1252

Table 17. Summary of MS4 loading for Bayou Bonfouca Subsegment 040907

Urban Area	Permit Number	MS4 area (acres)	Summer MS4 (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	2,473.69	134	241
City of Slidell	LAR04105/AI#108410	1,771.84	96	172

DRAFT Bayou Liberty and Bayou Bonfouca Watershed TMDL Subsegments 040905, 040906, 040907, and 040908 Originated: June 6, 2011

Table 18. Subsegment 040908 Total Maximum Daily Load (Sum of UCBOD<sup>1</sup>, UNBOD, and SOD) for a 4.0 mg/L dissolved oxygen standard

	SUMMER		WINTER	
ALLOCATIONS	% Reduction Required	(MAY- OCT) (lbs/day)	% Reduction Required	(NOV- APR) (lbs/day)
Point Source Wasteload Allocation (WLA)		44	38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	44
Point Source Reserve MOS (20%)		11		11
St. Tammany Parish MS4 WLA (Nonpoint Loads)	[[ [ [ 가게 되었다.] 하는 사람이 되었다.] 하는 사람들이 되었다. 그는 이번 주었다.	1,100	38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	1,004
St. Tammany Parish MS4 MOS (Nonpoint Source Reserve MOS) (20%)		275		251
City of Slidell MS4 WLA (Nonpoint Loads)	[[ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	638	38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	582
City of Slidell MS4 MOS (Nonpoint Source Reserve MOS) (20%)		159		145
Nonpoint Loads	80% above Hwy 190 and 38% below Hwy 190 and 35% for Bayou Paquet	3,448	38% above Hwy433 for Bayou Vincent and Bayou Bonfouca and 0% below Hwy 433.	3,148
Nonpoint Source Reserve MOS (20%)		862		788
TMDL		6,538		5,973

Table 19. Summary of MS4 loading for Bayou Bonfouca Subsegment 040908

Urban Area	Permit Number	MS4 area (acres)	Summer MS4 (lbs/day)	Winter MS4 (lbs/day)
St.Tammany Parish	LAR041024/AI#108405	1,607.93	1,375	1,255
City of Slidell	LAR04105/AI#108410	7,578.64	797	727

Additional data would not change the fact that inorganic particles represented in the TSS measurements are the major contributor to the turbidity reading, and are the major constituent reduced when sediment best management practices (BMPs) are applied to nonpoint sources.

The nonpoint source BMPs for sediment also reduce the load of many of the unexplained contributors in the regression. The effort to attain a perfect explanation of turbidity might not result in a better selection of BMPs. The regression presented above between TSS and turbidity is adequate for preparation of this TMDL. A stakeholder group of knowledgeable persons from the watershed might need additional information to set a plan of action for the TMDL.

The regression between turbidity and TSS was developed for subsegments 040301, 040401, and 040903 using turbidity and TSS data from those subsegments, resulting in surrogate TSS targets (Table 4-1).

Table 4-1. Numeric water quality targets for the listed subsegments

Subsegment	Subsegment name	TSS (mg/L)
040301	Amite River	428.49
040401	Blind River	99.83 a
040903	Bayou Cane	868.07

The sediment value is expressed as a TSS concentration for calculation of this TMDL.

### 4.2 TMDL, WLA, and LA

The TSS TMDLs for subsegments 040301, 040401, and 040903 within the Lake Pontchartrain Basin were calculated based on each subsegment's water quality target and average local water yield. For each subsegment, the water quality target was multiplied by the average water yield and the calculated drainage area to estimate the total allowable load. Table 4-2 summarizes the TMDLs for the selected subsegments in this report. Water quality targets are discussed in Section 2.6 and in Section 4.1. WLAs are discussed in Section 4.2.1, and LAs are discussed in Section 4.2.2. The MOS and FG of the TMDLs are discussed in Sections 4.4 and 4.5, respectively.

Table 4-2. Summary of TSS TMDLs, WLAs, LAs, MOS, and FG for selected subsegments of the Lake Pontchartrain Basin

Subsegment	Pollutant	TMDL (lb/d)	WLA (lb/d)	LA (lb/d)	Explicit MOS (lb/d)	FG (lb/d)
040301	TSS (turbidity)	1,257,198.00	14.25	1,005,747.00	125,718.38	125,718.38
040401	TSS (turbidity)	45,206.54	7,285.06	30,337.19	3,792.15	3,792.15
040903	TSS (turbidity)	95,183.61	38.31	76,116.25	9,514.53	9,514.53

#### 4.2.1 Wasteload Allocation

The WLA portion of the TMDL equation is the total loading of a pollutant that is assigned to point sources. Examples of point sources include sanitary and industrial wastewater facilities, and industrial stormwater. This TMDL provides allocations as a starting point for permit writing, and carries assumptions as to which permits received allocations and the targets and flow used in the allocation. Due to the limited numbers of permit holders and the lack of information regarding existing permitted facilities, WLAs were available only for subsegment 040401. These WLAs and TMDLs can be revised in the future when more information is available. The individual WLAs for each point source included in these TMDLs are presented in Table 4-3.EPA's stormwater permitting regulations require municipalities to obtain permit coverage for all stormwater discharges from MS4s. Currently, no permitted MS4s are within subsegment 040301, 040401, or 040903.



Table E-37. Summer fecal coliform bacteria concentrations before and after reductions for subsegment 040910 station 1044

Station	Date	Concentration before reduction (cfu/100 mL)	Concentration after reduction (cfu/100 mL)	Loading before reduction (cfu/d)	Loading after reduction (cfu/d)
1044	05/15/01	30	24	2.45E+10	1.96E+10
1044	06/12/01	1,300	1,040	1.06E+12	8.48E+11
1044	07/17/01	50	40	4.08E+10	3.26E+10
1044	08/14/01	1,300	1,040	1.06E+12	8.48E+11
1044	09/11/01	60	48	4.89E+10	3.91E+10
1044	10/09/01	50	40	4.08E+10	3.26E+10
1044	05/09/07	189	151	1.54E+11	1.23E+11
1044	05/30/07	1,300	1,040	1.06E+12	8.48E+11
1044	06/20/07	230	184	1.87E+11	1.50E+11
1044	07/18/07	300	240	2.45E+11	1.96E+11
1044	08/06/07	8	6	6.52E+09	5.22E+09
1044	08/29/07	500	400	4.08E+11	3.26E+11
1044	09/26/07	230	184	1.87E+11	1.50E+11

Table E-38. Fecal coliform bacteria summer TMDL summary table for subsegment 040910

Average water budget (mm/day)		2.04
Subsegment area (acres)		9,869.0
Total calculated flow (cfs)		33.31
Criterion (#/100mL)		400
Criterion as loading (cfu/d)		3.26E+11
Wasteload allocation (cfu/d)		1.27E+08
Point source flow (MGD)		0.02
	Before reduction	After reduction
Average concentration (cfu/100 mL)	427	341
Average loading (cfu/d)	3.48E+11	2.78E+11
TMDL (cfu/d)	3.26E+11	3.26E+11



Table E-33. Summer fecal coliform bacteria concentrations before and after reductions for subsegment 040909 station 1045

Station	Date	Concentration before reduction (cfu/100 mL)	Concentration after reduction (cfu/100 mL)	Loading before reduction (cfu/d)	Loading after reduction (cfu/d)
1045	05/15/01	110	5	6.74E+10	3.00E+09
1045	06/12/01	16,000	711	9.80E+12	4.36E+11
1045	07/17/01	130	6	7.97E+10	3.54E+09
1045	08/14/01	16,000	711	9.80E+12	4.36E+11
1045	10/09/01	80	4	4.90E+10	2.18E+09
1045	05/09/07	240	11	1.47E+11	6.54E+09
1045	05/30/07	16,000	711	9.80E+12	4.36E+11
1045	06/20/07	2,200	98	1.35E+12	5.99E+10
1045	07/18/07	2,400	107	1.47E+12	6.54E+10
1045	08/06/07	900	40	5.51E+11	2.45E+10
1045	08/29/07	9,000	400	5.51E+12	2.45E+11
1045	09/26/07	300	13	1.84E+11	8.17E+09
1045	10/19/10	5	0	3.06E+09	1.36E+08

Table E-34. Fecal coliform bacteria summer TMDL summary table for subsegment 040909

Average water budget (mm/day)		2.04
Subsegment area (acres)		7,419.0
Total calculated flow (cfs)		25.04
Criterion (#/100mL)		400
Criterion as loading (cfu/d)		2.45E+11
Wasteload allocation (cfu/d)		5.19E+10
Point source flow (MGD)		6.88
	Before reduction	After reduction
Average concentration (cfu/100 mL)	4,874	217
Average loading (cfu/d)	2.99E+12	1.33E+11
TMDL (cfu/d)	2.97E+11	2.97E+11

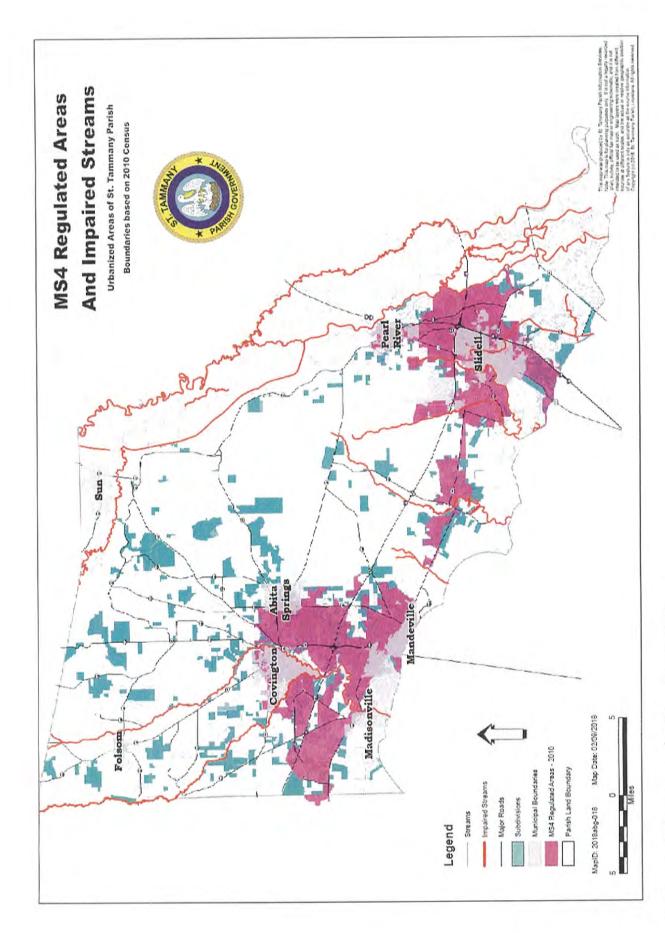


# Appendix B

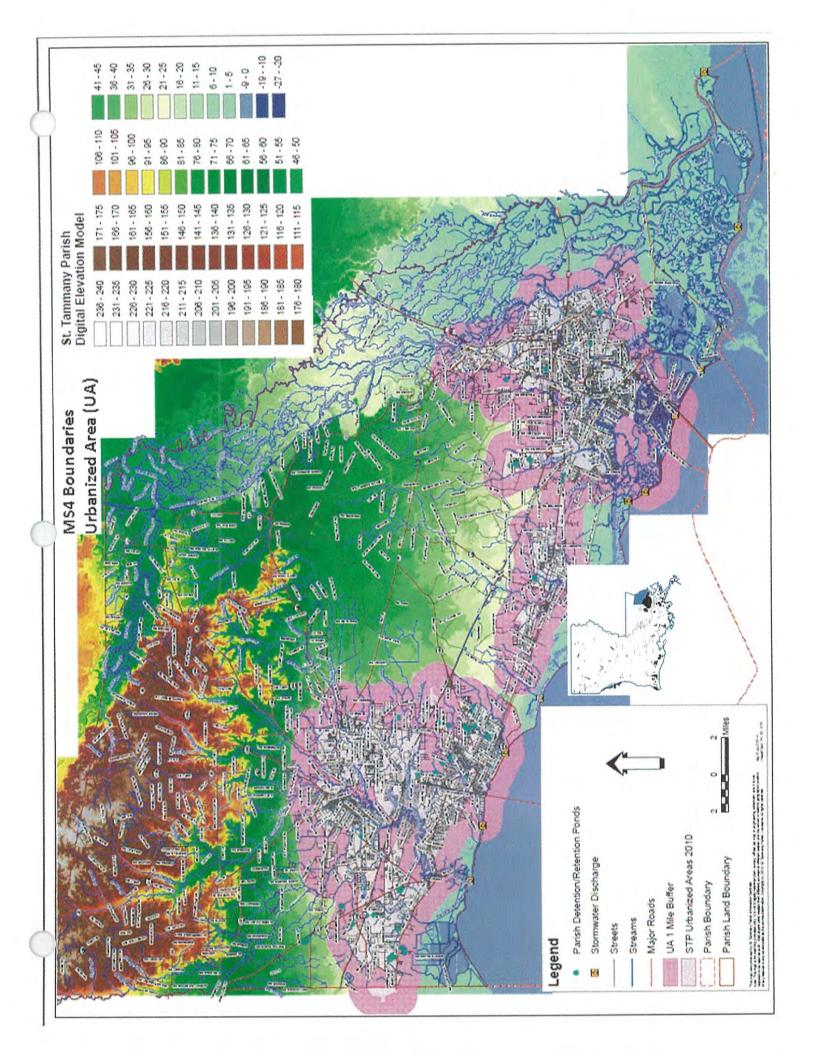
# **Stormwater Maps:**

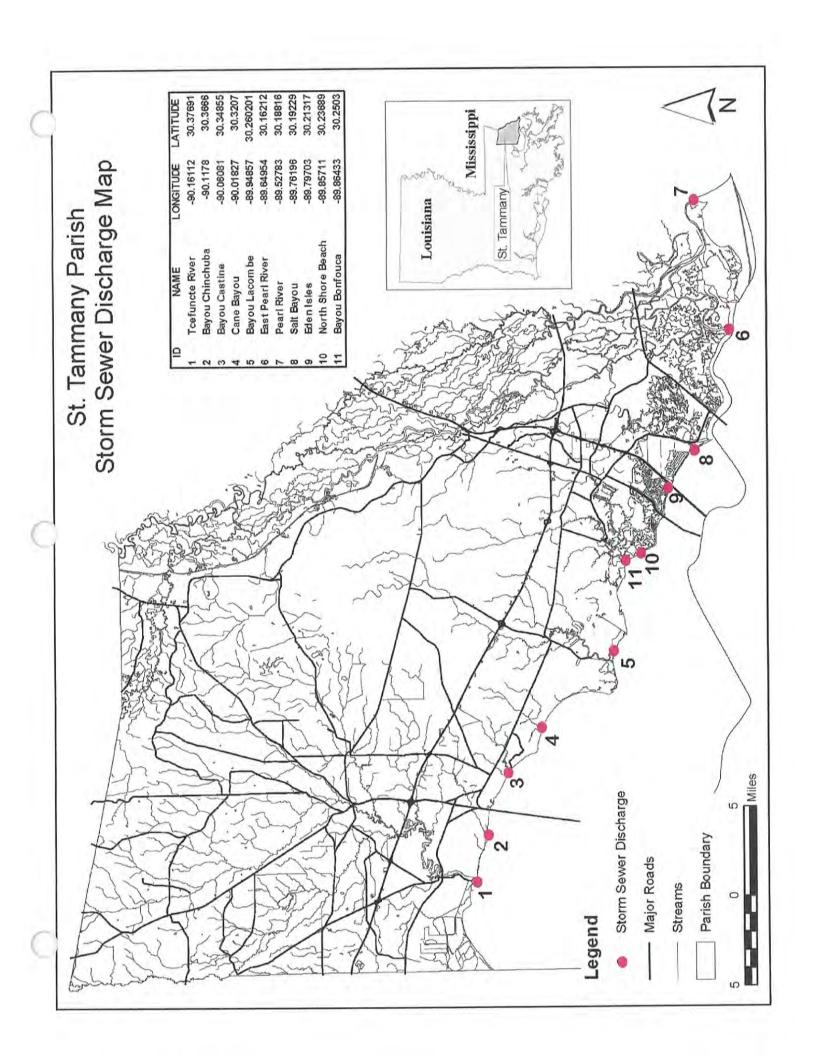
- o Urbanized Area
- o Site Location
- o Storm Sewer System
- o LDEQ Subsegments in St. Tammany Parish Waterbodies
- List of LDEQ Subsegments in St. Tammany Parish Waterbodies

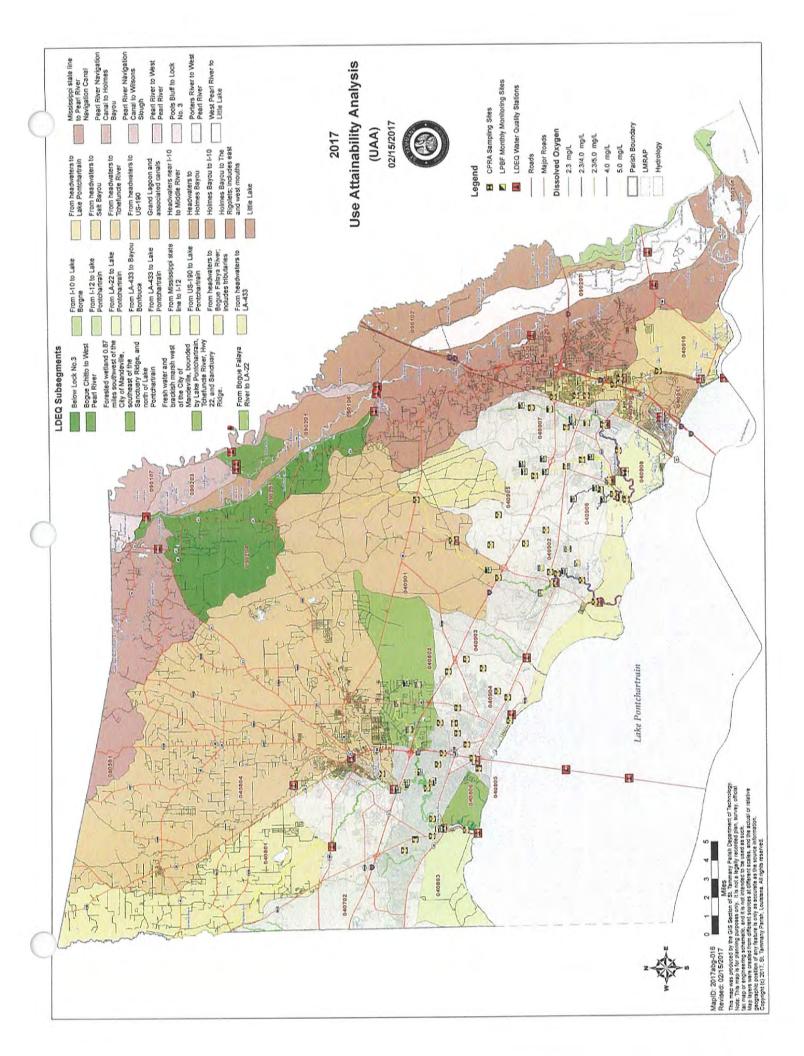
(Maps produced by St. Tammany Parish Government)



B.3.c Impaired Streams Map







# Appendix C

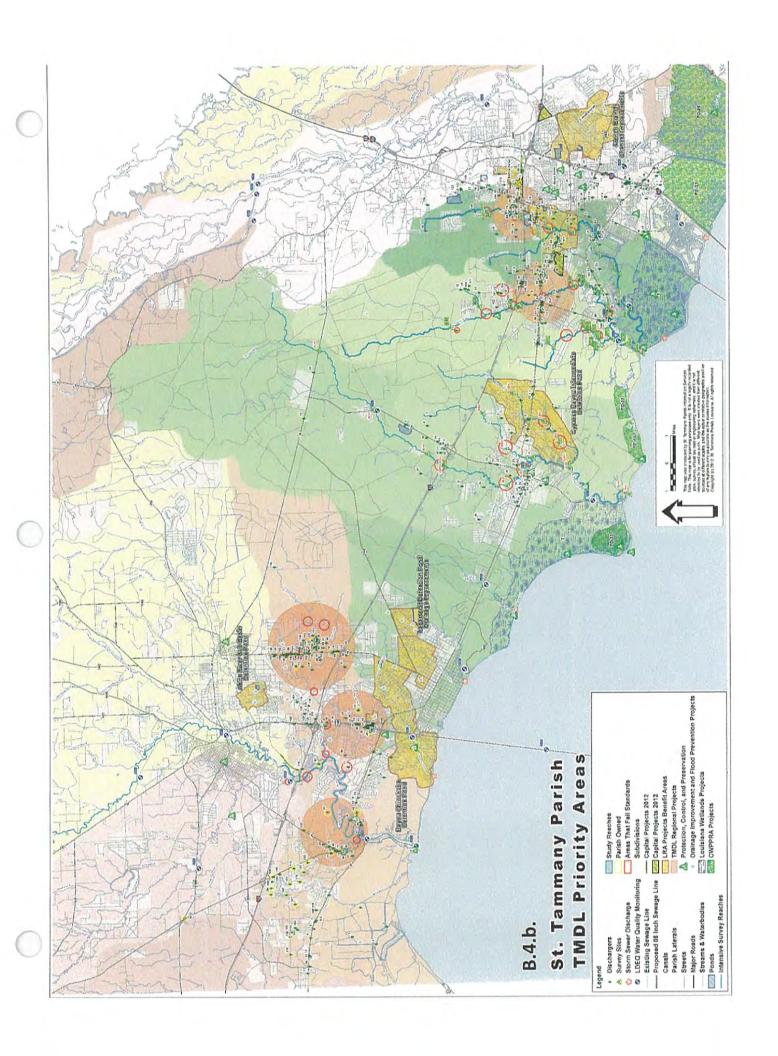
# **Departmental Stormwater Liaisons**

DEPARTMENT	CONTACT PERSON	SUBJECT MATTER TOTALS	E-MAIL	PHONE
Animal Services	MelisaSullivan	Good Housekeeping/Staff Training	msullivan@stpgov.org	985-\$09-0183
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	Kenny Wortmann	Enforcement/Inspections	kwortman@stogov.org	985-898-2521
Culture, Recreation, & Tourism	Lisa Maddox	Tammany Trace	Imaddox AstpRov.org	985-867-9490
	John S. Goodnow	Camp Salmen & WQ/Env Programs	sepodno w@stogovorg	985-288-5901
Development-Permits	Kathy Ostarly	Permits	kostarly@stneov.org	985-898-2574
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	deEtte Smythe	WQ& Modeling Report	edsmythe@stogov.org	985-809-7448
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	Vera Clay	WQ Related Programs	vdav@stpsov.org	985-898-3074
Homeland Security	Vanessa Wall	Emergency Notices & Storm Preparedness	vanessa@stneov.ore	985-898-2359
Public Information	Christina Pinner	Stormwater Website	Sipinner@stngov.org	985-898-5243
Technology	Ann Ballard	MS4 & WQ Maps	aballard@stogov.org	985-898-2448
5.00	Debbie Henton	Public Records Requests	dshenton@stoapv.org	985-898-3427

## Appendix D

## **TMDL Action Plan**

- Exhibit 1: Parish-Maintained Ponds Inventory and Pond WQ Prioritization/BMP Enhancement Program
- Exhibit 2: QAPP for HS Monitoring & SW Pond sampling Programs
- Exhibit 3: Decentralized Management Program for On-Site Sewer Treatment Systems
- Exhibit 4: WQ Impact Modeling Program STP Stormwater Quality Ordinance (10/2016)
- Exhibit 5: STP Stormwater Quality Ordinance (10/2016)



# Exhibit 1

 Parish-Maintained Ponds Inventory and Pond WQ Prioritization/BMP Enhancement Program

St. Tammany Parish Pond Inventory WQ BMIP Recommendations & Estimated Costs of Conversion 825/2017

		POND	POND TYPE	TYPE		Receiving Stream Segment, Impaired?				_	Surveying		Visual	Visual Water Quality	1111	Sile Access	PON	POND INTEGRITY	ż	HYDROLOGY (INFLUENT)	COCY ENT)	HYDROLOGY (EFFLUENT)	COCY ENT)	NOTES	Recommended
QIA .	PROP NAME	ACRES	DRY	WET	WATERBOOT	Yes (Constituent) N	No.	Recommended BMP	Ε	EMP [2]	王	Sublem	GOOD	POOR D	RY GOO	GOOD POOR DRY GOOD POOR Stepe		Excess	Erosion Isrues?	S/D Only	Outside Sources W	Large Waterbody	Local	2	Action
NOR	PRIORITY 12: Ponds discharging into Imparired waterbodies with TMDL	ing into In	oparired	1 waterbo	odies with TMDL																				
63	BELAIR POND#1	9970		×	BAYOU LIBERTY (N of F12)	BODY lew DO	Acration	Acretion on one or more	13 \$	6,600	066 S	\$ 7,590	x o		×		×			×			x	Outfall has no Atrium Gate like ponds 2 & 3	
10	SELAIR POND #2	0.23		×	BAYOU LIBERTY (N of F12)	BOD/Lew DO	Aeration	Актайов ов ове от тоте.	13 \$	2,300 9	\$ 345	\$ 2,645	x s		×		x			×			×	Arium Gale on outfall pipe	
50	BELAIR FOND 45	0.80		х	BAYOU LIBERTY (N of L12)	BODY low DO	Acradon	Астабоп оп све от потт.	12 5	8,000	\$ 1,200	\$ 9,200	X 0		×		×			×			×	Arrium Gate on outfall pipe	
40	BRADFORD FLACE I	0.34	×		BAYOULIBERTY (N of 1-12, below Royal Gardens)	BOD/les DO	Vegeta	Vegetarive Planting	4	1,020	\$ 510	s 1,590			×		×	×		×			и	Some construction debris on southern end. Clean woody vegetation around inlet on southern end.	DPW maintiain
8	BRADFORD PLACE 2	1.78		×	BAYOU LIBERTY (N of 1-12. below Royal Gardens)	BOD/los DO	*	Acrabon	12	17,800	\$ 2,670	\$ 20,470	X 0		X		×		x	х	x		х	Some crosion around outfall.	DPW maintiain
11	CROSS GATES/Minuses	\$00		×	W. PEARL RINER	BODVive DO	Respector a	Reguestes are planted: Add Aeration	In S	50,000	\$ 7,500	\$ 57.500	X 0		×		×			×	×		×	Influent from commercial parcels comed directly into the pond.	Engineering review
23	GRAND MAISON	1.35		×	BAYOU CHINCHUSA	BODYLOW DO	4	Acrason	ti s	13,500	\$ 2,025	\$ 15,525	x s		-	×	×			×				Can't access pend. Only access is through private property.	DPW Row
	LAPIN ST POND	898	×		BAYOUCASTNE	BOD/low DO	Vegeta	Vegetative Planting	Is S	26.053	\$ 13,027	\$ 39,080	0		x		×			x	×		x	Sod is dying	DPW maintiain
4	NORTHSHORE COMMERCIAL PARK	06:0	×		PONCHITOLAWA	BODY1ew DO	Vegeta	Vegetative Plansing	13 \$	2,700	\$ 1350	\$ 4,050	9		x x		×		×	×			×	West side of pond has some erosion problems	DPW maintiain
49	OZONE PARK POND	0.23	×		PONCHITOLAWA	Bob/Lew Do	Vegeta	Vegetative Planting	22	069	\$ 345	\$ 1,035	V:		×		×			×			×	Spall is working on a planting plan for pond	
8	TUSCANY WEST	3.30		×	SOAP & TALLOW	BOD/Lew DO	4	Acration	12 S	33,000	\$ 4,950	\$ 37,950	0	х	×		×		×	х			×	Water was very high during assessment. Influent water was not cause of turbidity.	
88	WESTON WAY	1:00		×	TIMBER BRANCH	B0D/Iles D0	· ·	Acration	12 \$	10,000	\$ 1,500	\$ 11.500	×		×		×		×	×			×	Some subsience on N and SW side. Pond drains into an adjacent pond not on our list.	Engineering review
	WILLOW BEND FOND	2.50		×	SOAP & TALLOW	B00/low D0	Y	Acrabon	12 S	25,000	\$ 3,750	s 28,759	8		×		×		×	×			×	Soil sluffing near house south of the pond. Inlet is completely underwater.	DPW maintain
	13	26.77	7	9 1	ToTALS - PRIORITY 1a: Ponds discharging into Imparired waterhodies with TMDL.	n: Ponds discharging	ginto Imparire.	waterbodies us		\$ 196,663	\$ 40,162	\$ 236,825	10												

n	GRAND DAKS #1	1,00		×	BLACK KIVER	X	Aesabon for one or both	116	\$ 10,000	\$ 1500	44	X 005.11	ú		x	×		×	×			
36	GRAND OAKS #2	06:0		×	BLACK RIVER	х	Acration for one or both	119	\$ 9,000	*	350 \$ 1	X 065.01	×		×	×		×	×			
22	GRAND ONES #3	1,00		×	BLACK RIVER	×	Acrabon	q.	\$ 10,000	89	500 \$ 1	11.500	×		×	×	x	×	х	-	Lots of environ on the south side. Inlet pipe is completely underwater	DPW maintining
z	INGRAM ESTATES 1	0.30	×		ABITA RIVER	assessed	Vegetative Planting	- P	\$ 90t	S	452 \$	1.355		×	×	×		×	×			
32	INGRAM ESTATES 2	0.15	×		ABITA RIVER	assessed	Vegetaine Planting	19	\$ 457	8	228 S	589		х	x	×	×	х	х		Some erosion on western side.	DPW maintiain
38	MEADOW LAKE	9009		×	PRENCH BRANCH -> W-15-> DOUBLAOON BATOUL	not	DRY/ Riparian Planting: WET: Arration	42	\$ 18,000	000'6 \$	49	Z7,000 X	x	- 1	×	×		×		North portic South portic	North portion of pond very shallow and turbid. South pertion deeper and better quality	
9	MONTOOMERY TERRACE FOND #1	8		×	BLACK RNER	×	Aeration	2	\$ 15,000	\$ 2,250	41	17.250	x		×		×	×	X		Pend needs to be dredged back to design speed. Belly is aware of the problems and said that the developer has taken the pond back to enlarge it.	Engineering review
	MONTOOMERY TERRACE POND#2	138		×	SEACK RIVER	×	Acrabien	19	\$ 13,000	\$ 1,950	8	14,950	×		×	×	x	х	x		Outfall is partially sedimented in.	DPW maintain
4	PALM COURTS #1	8		×	BLACK RIVER	×	Plant Trees at shallow end of pond (with bollands)	15	\$ 4,200	\$ 2,100	vi.	6,306 X	×		×	×	×	×	х		West end of pond has shallow area that 4wheelers are using and is very turbod.	DPW Post sign: "No vehicles"
23	PALM COURTS #2:	3,23		×	BLACK RPER	×	Acrabin	15	\$ 32,300	\$ 4,845	N	37,145 X	×		×	×	×	x	×	0.2	Some areas of bare soil on south side of pond. Influent pipes need to be cleaned.	DPW meintain
56	WESTWOOD	2.08	×		BAYOU TETELOUSS	×	Vegetaiive Planing	119	\$ 6,240	\$ 3,120	5	9369								Need key to	Need key to gate to assess.	
	п	15.63	117	*	ToTALS - PRORITY Ib: Ponds discharge into unimpaired waterbodies, or with known water quality iscues (such as proximity to noncompliant HotSpoke (RS) or unsewered subdivisions)	scharge into u proximity to t	unimpaired waterbodies, noncompliant HotSpots ()		\$ 119,100 \$	\$ 28.295		\$ 147,395										

Action
ge Local body Ditch
Only Sources Water
Acceptable Excess Erosion SrD Only Sources Waterbody
00
GOOD POOR DRY GOOD P
Ŧ
BMP [2]
Ξ
2
Yes (Continue)
TALEBOOM IN
ACRES DRY WET
AC ACCUSED AC

																	-				1 [
PRIOR	UTY 2a: Ponds discharg	ge into im	paired v	waterbod	PRIORITY 2st. Ponds discharge into impaired waterbodies with known water quality issues (proximity to noncompliant HS or unsewered subdivisions), but lower priority than 1a	lity issues (proximi	ity to noncor	mpliant HS or unsewn	sted subo	livisions),	but lower p	riority than	Ia								
10	ASHTON DAKS I	6.88	х		W-14 CANAL	BODYLOW DO	N.	Vegetative Planting	S S	2,640	\$ 1,320	\$ 2,640 \$ 1,320 \$ 3,960		×	×	×	*	×	×		
05	ASHTON OAKS 2	0970	×		W-14 CANAL	BODY Ise DO	W.	Vegetative Planting	8	1,800	\$ 900	\$ 1,800 \$ 900 \$ 2,700		х	x	x	×	u	×		
ß	PAY ST POND#1	0.29	×		BAYOUCASTNE	B0D/low D0	5.	Vegetative Planting	8	870	\$ 435	870 8 435 \$ 1,305		×	×	×	×		×		
23	EAT ST TOND #2	0.13	×		BAYOUCASTNE	B0D/low D0	*	Vegetañve Planting	S.		\$ 561 \$ 066	\$ 585		×	×	×	×		×		
	*	1.90	4	۰	ToTALS - PRORITY 2a: Peads discharge into impaired waterbodies with known     water quality issues (provalinity to noncompliant IX or unsewered subdivisions),     but lower priority than 1a	: Ponds discharge i	into impaire liant HS or u	ed waterbodies with k insewered subdivision	6	5,700	\$ 2,850	\$ 5,700 \$ 2,850 \$ 8,550									

PRIORITY 20: Regional wet storage pumped ponds that discharge into unassessed waterbodies (Abita River, Bedico Creek, W-15), near dense clusters of unswered SDs, with the potential to improve downstream WQ	The state of the s																	
31	HAAS RD POND	40.23		×	W-IS CROAL	not assessed	not induced Flow.Need I cfs assessed pump, min gauge & turne [3]	2b S	100,000	60,345	\$ 100,000 \$ 60,345 \$ 160,345	×	×	×	×	×	Gate Locked	
38	LOWE POND	18.98		×	W-15 CANAL	not 2000/590	not Induced Flow:Need I cfs assessed pump, rain gauge & inner [3]	2b S	100,000	130,263	\$ 100,000 \$ 130,263 \$ 230,263	×	×	×	×	х	Need to review as built to get additional information	
	2	86.84	0	- 23	7.0TALS. PRIORITY 2h: Regional wet storage pumped ponds that discharge into 86.84 0 2 unaccessed waterbodies (Abhia River, Bedioo Creek, W-15), near dense dusters of \$ 200,000 \$ 190,608 \$ 390,608 unsewered SDs, with the potential to improve downstream WQ.	ional wet storage River, Bedico Cr ial to improve do	e pumped ponds that dischary reek, W-15), near dense cluste wastream WQ	e into	200,000	190,608	\$ 390,608	99						

PRIORI	PRIORITY 3: Ponds that require Maintenance or Engineering Review	ire Maint	enance	or Engin	eering Review															
. 11	COUNTRYSIDE#1	1.00		×	SEDICO CREEK	not assessed	-	Maintenance required	3		×		×		×				No apparent outflow, Pond is almost full. Very little freeboard.	DPW maintiain
12	COUNTRYSIDE#2	08'0	x		BEDICO CREEK	not 255e55ed		Engineering review required	**1			×	×		×	×	×		Very little freeboard. Small berms	Engineering review
13	COUNTRYSDE#5	0.95	х		BEDROCKESK	not		Engineering review required	9			Х	×		×		х		Only I pipe for inflowfortflow.	Engineering review
47	COUNTRYSDE**	0.65	×		BEDICO CREEK	not		Engineering review required	6			×	×		×		×		Walking trail appears to be impeding flow into the pend.	Engineering review
15	COUNTRYSDERS	0.97	×		NEDICO CREEK	not assessed	- 1	Maintenance required	3		×		×		x		×		Difficult to determine of pipes on southern end are influent or effluent.	
16	COUNTRYSIDE #6	1.15		×	BEDICO CRIEK	not		Maintenance required	dr.		×		×		×		×	×	Cufverts on SW are full of sediment.	DPW maintain
38	CLISTE ISLAND POREST POND #1	0.71		х	BLACK RIVER -> L. PONTCHARTRAIN	х		Meintenance required	ē		×			×	×	×	х	×	Erosion along outfall dirch. Culverts under Woodshrush 1/2 filled with sediment.	DPW maintain
53	GUSTE ISLAND ROREST POND #2.	230		×	BLACK RIVER -> L PONTCHARTRAIN	x		Engineering seview required	r,		3	×	×		×	×	×	×	Pond currently being enlarged	Engineering review
36	MONTEREY POND	3.25	×		BAYOUCASTINE	BOD/Lew DO	Nature Mainte	Naturally Vegetated - Maintenance required	3			×	×		×				Hard to determine influent and effluent in the field. Need to review plans.	DPW to check Inflow/outflow culverts
14	PINECRIBER ACRES	4:00	X		BLACK RVER	Х		Maisenance required	n			X	х			×		×	Lots of erosion and stuffing on slopes of pond. Influent not apparent in the field.	DPW inspect & mainfain
89	STONEBRINGS #1	1.00		×	W-15 CANAL	not assessed		Maintenance required	m		×		×			×			Sluffing on slopes of pond.	DPW maintiain
	п	16.78	9	w	To TALS - PRIORITY 3: Ponds that require Maintenance or Engineering Review	that require Ma	aintenance	or Engineering R	s	\$										

Recommended	Action				
NOTES					
N'DROLOGY (RFFLUENT)	rge Local rbedy Ditch				
HYDROLOGY H	Only Sources Wate				
POND INTEGRITY	Acceptable Excess Erosion Silope Vegetation Issues?				
Water Quality Site Access	GOOD POOR DRY GOOD POOR				
Estimated Surveying Substants	<u>=</u>				
la la	Ξ				
Recommended EMP					
Receiving Stream Segment, Impaired?	Yes (Constituent) No				
Adolegation					
POND POND TYPE SIZE	ACRES DRY WET				
are to a const	TROP MARK				
	2				

	X CTB	CYPRESS BAYOU BOI	BOD/Jow DO	N	Naturally Vegetated	.0							Trans.	8	Cypress	Cypress Bayou Pond	DPW maintiain
	063	275	Ollow DO	٧	eration completed	0	Х	81	х	X		×			n.	in pond.	
			Wlow DO	No	oction recommended	0	×			×					×		
1		777	D/low DO	Dry	Vegetative Planting letted West Aeration new completion	0	×		×	х		x	×	×	Water	quality is good in the wet swale. ader of pond is dry	4
The control of the		PRESS BATOU		5 /	egetative Planting: completed	0	х	×	×	×	х		×	×	Culver or reini	across Cypness Bayou need to be replaced forced. Enosion around pipe.	DPW maintiain
No.			D/low DO	Float	ng Wetland completed	0	×		×	×		×	ke yi		7 17 19	g welland project in the pond	20'x4' rafts of floating welland nay be utilized for other pends
1	li		D/Jew DO	A .	egetative Planting: completed	0		х	×	X		797	×		W	lantings are doing very well	
1			D/Jow DO	To	so small! No action recommended	0	×		×	×		×			×		
X   S   S   S   S   S   S   S   S   S			Driew DO	To	o small/ No Action recommended	0	×		Х	х		×			x		
X   X   AMINO, MATERIAL AND   AMINO, Vegeneral Complexies   X   AMINO, V	_	CK RVER -> L. NTCHAKTRAIN			Action recommended	0	x	_	×	×		x			×		
X   Structure of the control of th		JEITA RIVER	0 955E	16.	egetative Planting: completed	0		x	×	×		×	×		HOY	lantings are doing great	
X   X   W.144CAVLL   BOOT-IN DEPT.   BOOT-IN			O/low DO	×	hamily Vegetated	0		je Hi							Chinch	ruba Pond off Hwy 59	
X   X   SANOUTHELOURS			DVIce DO	Parm	ped pendi No Action recommended	0		х	×	×			×			coked	DPW inspect & maintinin
X   AMYONICIDANITION   Southward absorbed by the series   A   A   A   A   A   A   A   A   A		OUTETELOURS			Action recommended	0		х	×	х		х	×		x		
X   MAYON LIMENTA   MODALE-STO   Model And Antonimended   0   Model And Antonimended   0   Model And Antonimended   0   Model Antonimended			D/Joe DO	Steel Steel	nwater abrady atrated flows over weir into includy/No Action recommended	0									Do we	own the pend? Or just the weir? No to pend itself. Weir is behind a fence.	DPW inspect & mointinin
X   TAMBER BELANCES   SOCIETION OF A COMMUNICATION OF A COMMUNICATIO			O/les DO	No	Action recommended	0	×		×	×		x			×		
X         TANIBER BEANCH         BODY Les TO         Too small No Action         0         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X			Ottes DO	No	Action recommended	0				×					No acc	ess to pond.	DPW inspect & mainfiain
X   ANYOLCHINCHILIA   BODY Lev 10   Too small Ye decide   0   X   X   X   X   X   X   X   X   X			D/ less DO	ř.	small/ No Action recommended	0	×		×	×	×	×		×	Some	enosion on east side of pond.	DPW maintiain
X         We ASSOLATED.         Total STATE (MANUMENT CONTINUED AND CONTI			DV low DO	4	so small/ No Action recommended	0	×					×	×		No acc	ess to pond itself. Can see through side	DPW inspect & maintiain
X         BAYOU CIRWATIUBA         Too small No Action         0         X         X         X         X		W-15 CANAL	3886		Action recommended	0	×		×	×		×				ould be cleared of some woody vegetation.	DPW maintiain
			DV low DO	ř	so small/No Action recommended	0	×		×	×		×			×		

Recommended	Action						
NOTES							
HYDROLOGY (EFFLUENT)	Large Local Waterbody Ditch						
HYDROLOGY (INFLUENT)	S/D Only Sources						
POND INTEGRITY	Acceptable Excess Erosion Slope Vegetation Issues?						
ster Quality Sile Access	GOOD POOR						
Visual Water Quality	GOOD POOR DRY						
	New College						
Estimated Servering	BMP [2]						
Priority	Ξ						
	Segment, Recommended BMP						
Receiving Stream Segment, Impaired?	Yes (Considered) No						
	WATERBODY						
POND POND TYPE SIZE	ACRES DRY WET						
	PROP_NAME						
	OL OL						

					8	ded S	or No Action recommen	completed	/a: Pond BMPs	7 ToTALS - PRIORITY n/s: Pond BMPs completed or No Action recommended	_	25	101.82	10
	No pond, just pine wellands.		×			n/a	Not a pond		BOD/Low DO	SAYOU LIBERTY (Soff-12)		x	1.00	51 THETRACEPOND #2
	Low spot in landscape. Not really a pond.					n/a	Not a pond	not		W-15 CANAL	х		0.39	49 STONEBRHXE#2
with Letting						olo.	Design not complete	assessed		W-15 CANAL	×	7	41.14	SERVICE ROAD PONDY Puture Tenet Pool
Engineering to	No access to pond. Hatare site of Tenet pond											+		POND
	Not a parish pond, per Joey Lobrano					sta	Not in PMS		BODYles DO	HORSEBRANCH	×		6.50	PENN MILL LAKES BLVD
only partially dug.	Little Bayer Castine just upstream from pond is ently partially dug. freshly cleaned and is bare dirt.	х	x	×		n/a	Design not complete		800V3vv D0	LITTLE BAYOU CASTINE	×	0	11.30	NELSON CT (Woodlands pend/5Q 328)
	Not a parish pond.					g	Not in PMS		BOD/New DO	BAYOU LACOMBE (hw)	×	_	37.84	HWY 434
	Not a parish joint, jor rocy Loccano					a a	Not in PMS		BODY loss DO	TRIB OF w. Pead River	×		1.00	CREEKSIDE CT #2
	Not a parism porta, per recy Londano					2/0	Not in PMS		BODY low DO	TRIB OF w. Poud River	×		3.20	CREEKSIDECT#1
	No Pond					ske	Not a pond	assessed		BEDICO CREEK		×	0.20	COLONIAL CT#2
	No Pond					şa.	Not a pond	assessed		BEDICOCREEK		x .	0.26	COLOSIAL CT+1.

TOTAL   TOTAL   CRAND	815.85 \$ 219.164 \$ 664.152 \$									
roTAL stimated lost for tMP [2]	521,463									
	•									
	•		0000	3600		1500				
		completed, No action recommended, or too small]]	60008		sviving stream in times when NO Rain occurs (to avoid e. I. eds during summer (high temperature), daylight boxes (1 eds) - 855,000; insaliasion (2 x equipment) - 570,000					
		d. O-project completed, No action recommended, or too small]			(Itash libe receiving stream in times when NO Rain occurs (to avoid will disclauge 1 ets during summer (high temperature), daylight boxus reflow-Pump (1 ets) - 835 si0), incallasion (2 x equipment) - 570,000				operty)	
		nance needed, 0-project completed, No action recommended, or too small]			by pump will flush the receiving seream in times when NO Rain occurs (to avoid the pump will discharge I ofs during summer (fulgh temperature), daylight hours reation). Low-thow-Pump (1 ofs) - 335 500; installation (2 x equipment) - 570,000			n roquired	or private property)	
GRAND TOTAL - ALL PRIORITYS		[1-high; 2-low; 3-maintenance needed; 0-project completed, No action recommended, or too small]	Acrasion : \$10,000/bare (turnkey) - per Heather	Planting Material + Planting Manpower: 53000 bare - per Spall	Similar to Mienaro Pend, the pump will flush the receiving stream in times when NO Rain occurs (to avoid downestream issues). Assume the pump will discharge I cfs during summer (high temperature), daylight boars (high tempe & emporature), daylight boars (high tempe & emporature), and the pump (I cfs) - 535,500, installation (X regimperer) - 570,000	Surveying: \$1500-acre for baltymetric and inflowbuiltow inverts	DPW Maintenance required	DPW-Engineering inspection required	Not a purish pend (No pend or private property)	Completed project

## Exhibit 2

- QAPP for HS Monitoring and SW Pond Sampling Program
- Executive Summary for Final Reports for HS Monitoring and SW Pond Sampling (LPBF, 12/2017)
- Executive Summary for Final Report for Del Sol Floating Wetland (Comite Resources, Inc., 12/2017)
- PowerPoint Presentation to Del Sol HOA (Hunter, 11/2017)
- PowerPoint Presentation of St. Tammany Parish's Water Quality Survey Program (Smythe, 7/2017)

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# Receiving Water Quality Sampling Plan

St. Tammany Parish Water Quality Action Plan



Prepared by:
St. Tammany Parish Government Department of Engineering
And
Lake Pontchartrain Basin Foundation

November 22, 2013

Project Approval	
Signature LAHR DAM	Date 11/16/2013
St Tammany Parish Regulatory Manager:	E.D. Smythe, PhD
Signature Salohura Salohura Salohura St Tammany Parish Watershed Coordinator/ MS4 Administrator:	Date 11/16/13 Sabrina Schenk
Signature Ondrea Bourgeois Call LPBF WQ Program Director/ QA Manager:	Date

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#### Distribution List (A3)

#### St. Tammany Parish

P.O. Box 628

Covington, LA 70434

- E. deEtte Smythe PhD, STP Regulatory Manager

- Sabrina Schenk, STP Watershed Coordinator & MS4 Administrator

#### Lake Pontchartrain Basin Foundation

Pontchartrain Beach Office

2045 Lakeshore Drive, Suite 339

New Orleans, LA 70122

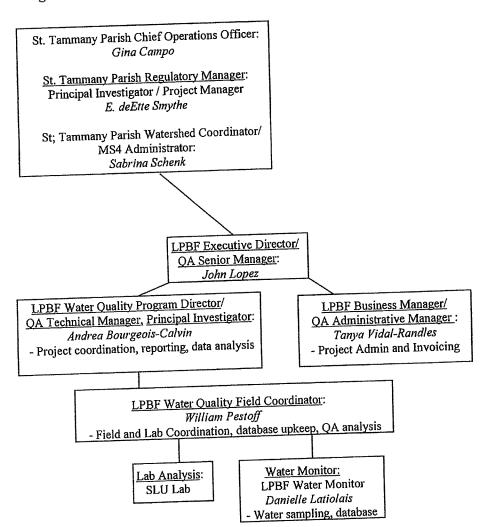
- John Lopez Ph.D., LPBF Executive Director/QA Senior Manager
- Andrea Bourgeois-Calvin Ph.D., LPBF Water Quality Program Director/ QA Technical Manager, Principal Investigator
- Tanya Vidal-Randles, LPBF Business/Program & Grants Manager/QA Administrative Manager
- Danielle Latiolais, LPBF Water Quality Monitoring Assistant

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## Project/Task Organization (A4)

St. Tammany Parish is contracting with the Lake Pontchartrain Basin Foundation (LPBF) on 1) water quality monitoring of "hotspots" in parish rivers and 2) wet and dry weather water monitoring of stormwater retention and detention lagoons to assess the effectiveness of treatment technologies. The LPBF will be responsible for sampling physiochemical parameters, collection of water samples for organic and nutrient analysis, data storage and analysis, and overall sampling and logistics components of the project. An EPA/LELAP approved laboratory will provide organic and nutrient analysis. St. Tammany is the funding agent and will be responsible for oversight of the investigative water quality project that includes the stormwater demonstration ponds and "hot spot" monitoring. Results obtained from the above activities will be analyzed by LPBF to accomplish the study objectives. An organization chart is presented below (Figure 1).

Figure 1. Project Organization Chart

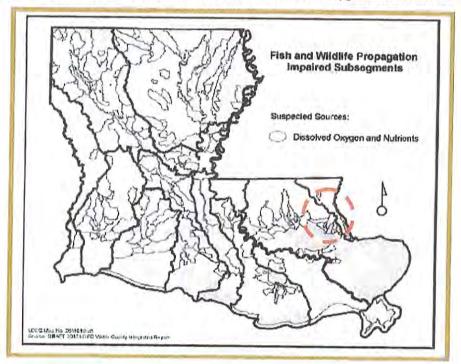


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#### Problem Definition/Background (A5)

Lake Pontchartrain is the centerpiece of a large estuarine watershed in southeast Louisiana. St. Tammany Parish, on the north shore of Lake Pontchartrain, is a rapidly developing region of the Lake Pontchartrain Basin. Several major rivers of the Pontchartrain Basin run through this region and have felt the effects of accelerated urban development. The building of subdivisions, shopping centers, and other private and commercial developments has introduced many types of pollutants into the rivers. As a consequence, many of the stream segments in St. Tammany Parish have been listed on EPA's 303(d) List of Impaired Waterbodies and have had Total Maximum Daily Loads (TMDLs) completed for their respective constituents (Figure 2, orange dotted circle around St. Tammany).

Figure 2. Louisiana Stream Segments Impaired for Dissolved Oxygen and/or Nutrients



Nonpoint Sources (NPS) have been identified as major contributors to water quality impairments in the 12 recently implemented TMDLs for St. Tammany Parish waterbodies. Part of the Parish response, or "Action Plan", to address impairments by NPS is to implement a series of demonstration projects to test Best Management Practices (BMP) removal efficiencies (REs) by retrofitting existing retention ponds into water quality ponds. While the retention ponds currently serve their purpose for storing stormwater, they could be used as an effective treatment tool for non-point source pollutants. Existing literature on BMPs suggests that retrofitting the ponds into water quality ponds should improve water quality in the respective receiving streams by removing oxygen-demanding substances by 40% to 100%. A second part of the "Action Plan" involves the Parish gaining more water quality data on streams and rivers listed on the Impaired Waterbodies list (so-called "hot spots").

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The Lake Pontchartrain Basin Foundation (LPBF), in association with St. Tammany Parish, will perform: 1) water quality sampling on selected "hotspots" on parish rivers and 2) water quality sampling of up to four stormwater ponds that will be retrofitted to water quality ponds using a variety of best management practices (BMPs). In order to document the removal efficiencies of each respective BMP, understand potential water quality improvements to the respective impaired stream subsegments and address seasonality issues, monitoring and sampling are proposed to be conducted on each demonstration pond through four storm events and also through dry-weather conditions. Additionally, monthly in-situ monitoring will be conducted at each of the wet ponds and in the up to 34 known "hot spots" in Parish waterbodies.

The Parish will also incorporate a public education, participation, and involvement element detailing the water quality improvements attained by the BMP retrofits of the existing retention ponds. The most effective BMPs will be applied to the remaining 49 Parish-maintained ponds and recommended to Homeowner Associations and commercial entities to retrofit their own ponds for water quality improvements.

The goals of this program are:

1) To further document water quality conditions on St. Tammany waterways listed as impaired on the 2012 LDEQ Integrated Report;

2) To document the nutrient removal efficiency and other water quality benefits to stormwater ponds retrofitted with different technologies.

Water monitoring of the actual system, statistical analysis, and GIS analysis will accomplish the goals of this program.

## Project/Task Description (A6)

Task 1: In situ water quality monitoring of rivers: To address the first goal of this program, the LPBF will perform monthly in situ monitoring of up to thirty four (34) hotspots along rivers in St. Tammany Parish (Figure 3). Water quality parameters of water temperature, dissolved oxygen, specific conductance, salinity, turbidity, and pH will be analyzed in situ using EPAapproved field meters and methodologies. The purpose of the monitoring is to obtain additional water quality information on the rivers in St. Tammany Parish to present to the Louisiana Department of Environmental Quality for its use in evaluation of future total maximum daily load ("TMDL") requirements for impaired water bodies. While no specific weather conditions will be targeted for this monitoring, the monitoring will not take place during adverse weather conditions.

All samples will be taken approximately one (1') to two (2') feet below the water surface. Three (3) samples will be taken from each site, with the parameters averaged to determine the daily value. For turbidity, the field turbidimeter will be set on "average" and ten readings will be averaged for a daily value.

Task 2: Dry weather monitoring of retention ponds: To address the second goal of this program, the LPBF will perform dry weather monitoring of three (3) storm water retention ponds and the receiving streams (collectively, the "Systems" or individually, a "System") identified as (a) Casa Bella subdivision pond; (b) Labarre detention pond; and (c) Del Sol subdivision pond.

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LPBF will sample two (2) points in each System, namely (a) influent points of each pond; (b) effluent points of each pond. The sampling will be conducted twelve (12) times at each pond throughout the course of the project. It is the goal that six (6) samplings shall occur during summer conditions, and six (6) samplings shall occur during winter conditions.

Sampling will occur on dry weather days, when no rainfall has occurred for at least seventy two (72) hours prior. The water quality parameters of water temperature, dissolved oxygen, specific conductance, turbidity, and pH will be analyzed *in situ* using EPA-approved field meters and methodologies. The LPBF will concurrently collect one (1) grab sample at each of the collection points for laboratory analysis of nitrate-nitrite-nitrogen, ammonia-ammonium-nitrogen, total kjeldahl nitrogen, total nitrogen, total phosphorus, total organic carbon, total suspended solids, and 5-day carbonaceous biochemical oxygen demand. The samples will be transported, on ice, to the laboratory within six hours of collection. Samples that require acid preservation will be preserved at the lab. Information regarding the time of analysis, and name of the person taking the measurements, and state of the site (i.e. trash/debris, wildlife, weather) will be recorded.

For selection criteria, the ponds must be Parish-maintained, located within the watersheds of impaired waterbodies that have been identified in USEPA's 303(d) list for low dissolved oxygen (DO) and have an EPA-approved TMDL. The BMPs that are proposed are: 1) Vegetative Planting of a dry pond, 2) Floating Wetland in a wet pond, and 3) Aeration of a wet pond.

Task 3: Wet weather monitoring of retention ponds: The LPBF will perform wet weather monitoring on up to four (4) storm water retention ponds identified as (a) Casa Bella subdivision pond; (b) Labarre Street pond; and (c) Del Sol subdivision pond. The LPBF will install, deploy and operate two (2) ISCO multi-samplers to collect ten (10) to twelve (12) grab samples at one (1) to two (2) hour intervals during rain events at the influent and effluent points of the selected System. When deploying and collecting the ISCO multi-samplers, LPBF will also test the water quality parameters of water temperature, dissolved oxygen, specific conductance, salinity, turbidity, and pH, analyzed in situ using EPA-approved field meters and methodologies. The samples collected by the ISCO multi-samplers shall be laboratory analyzed for nitrate-nitritenitrogen, ammonia-ammonium-nitrogen, total kjeldahl nitrogen, total nitrogen, total phosphorus, total organic carbon, total suspended solids, and carbonaceous biochemical oxygen demand (5). The ISCO multi-sampler testing will occur up to twelve (12) times at each of the three (3) referenced retention/detention ponds. Two samples will be collected each hour (one containing acid and one not). The samples will be transported, on ice, to the laboratory within 24 hours of collection completion. Samples that require acid preservation will be preserved at the lab. Information regarding the time of analysis, and name of the person taking the measurements, and state of the site (i.e. trash/debris, wildlife, weather) will be recorded.

All samples collected for laboratory analysis by the LPBF will be analyzed using a laboratory certified by the Louisiana Department of Environmental Quality's Louisiana Environmental Laboratory Accreditation Program ("LELAP"). Foundation shall utilize EPA-approved methodologies to transport the samples to the LELAP lab. The LPBF will also operate, maintain and preserve the databases associated with this monitoring. Statistical analyses will document baseline conditions and changes in water quality as a result of the program.

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The sampling will be conducted up to twelve (12) times at each pond throughout the course of the project. It is the goal that six (6) samplings shall occur during summer conditions, and six (6) samplings shall occur during winter conditions.

This QAPP addresses the QA/QC requirements for the project. This data collection and analysis component of this study consists of three elements: a laboratory effort (nutrient analyses); in situ measurement of the physiochemical parameters; and gathering and analysis of data for statistical analyses.

### Quality Objectives and Criteria (A7)

The purpose of this project is to better document water quality conditions in St. Tammany rivers and document removal efficiencies of different stormwater BMPs on demonstration stormwater detention and retention ponds. Data to be collected will include water quality testing and data will be used to perform statistical analyses. Observing and recording the behavior of the actual system through the field data collected as described in this QA/QC plan, will accomplish this purpose.

Sampling activities have been described above (Section A6) and data collection methodology for this study, sample size, and quality criteria are discussed in Section B. Water quality data will be stored in a Microsoft Excel spreadsheet. It will be subjected to quality control and descriptive statistics as described in *Guidance for Data Quality Assessment* (EPA QA/G-9). The mean (and/or median if using non-parametric stats) and relative percent difference will be computed for each meter parameter at each site as part of the quality assurance regime. Statistical analyses on the data will be performed using Microsoft Excel or JMP, a SAS program.

- To address the first objective: Dissolved oxygen (D.O.) values from each monitored "hot spot" will be compared to the LDEQ's standard (5 mg/l for rivers, 4 mg/l for wetlands) and to new LDEQ Use Attainability Analysis DO levels (when those become applicable). For sites with low D.O. values (prioritized by magnitude- see below), land use will be analyzed and potential sources contributing to the low D.O. will be investigated.
- To address the second objective: Nutrient samples will be taken at three stormwater ponds during dry-weather conditions and throughout the duration of wet-weather conditions. Influent/effluent and wet/dry will be compared for each pond to ascertain the pollutant removal efficiency of the different stormwater BMPs utilized.

The investigation of pollution sources within the watersheds will be prioritized based on the results of the water quality monitoring and physical observation of land use. Water quality "hot spot" monitoring sites with at least three D.O. counts under 2 mg/l (anoxic, during dry-weather conditions) will have priority for source investigation. Sites with D.O. counts of 2-5 mg/l will have second priority and sites with counts >5 mg/l (meeting standards) will not investigated. For priority sites, physical observation and GIS, if needed, will be used to locate sources and assistance will be offered.

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Summaries of the analyzed data will be presented in annual status reports and in a final project report to St. Tammany Parish.

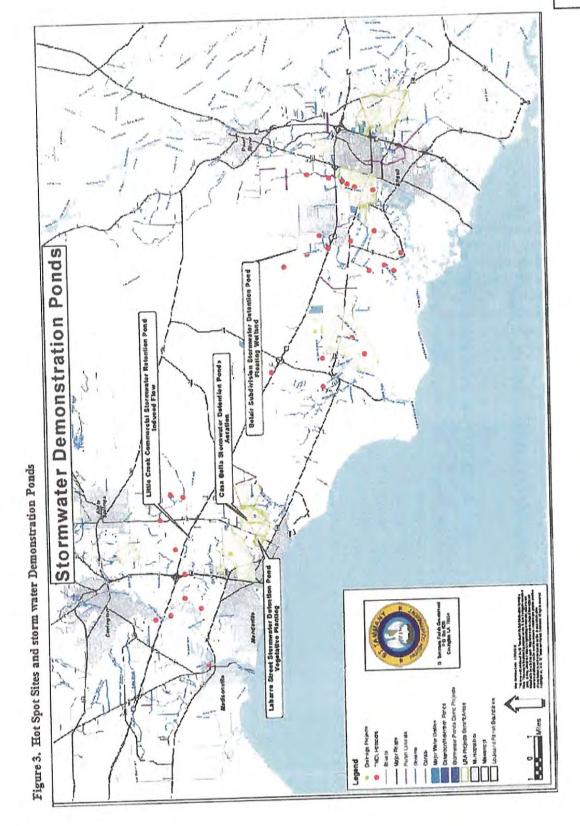
#### Special Training Requirements (A8)

LPBF water monitors have been trained by the Southeastern Louisiana University Microbiology Laboratory on sampling procedures and on the operation of the multi-sampler unit.

#### Documentation and Records (A9)

All project personnel will receive copies of this QAPP and subsequent updates/revisions. Water monitoring personnel will receive copies of the sampling standard operating procedure with all standard methods employed explained in full detail and copies of operator's manuals for all equipment. Records maintained will include the following: all data relating to sampling, analysis and quality control, documentation on equipment upkeep and calibrations for preventative maintenance, documentation of errors and corrective actions, and all performance evaluations. Project reports will be generated annually to assess progress of the project.

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### Sampling Process Design (B1)

LPBF will perform intensive water quality monitoring in St. Tammany Parish rivers and tributaries listed on the Impaired Waterbodies (303d) list (aka the "hot spots") and will monitor BMPs on stormwater retention and detention ponds during wet and dry conditions.

To achieve the study objective, monitoring of "hot spots" in St. Tammany streams, LPBF will monitor dissolved oxygen and other physiochemical parameters monthly at the pre-chosen hot spot site. Sites will be accessed by car and will be established with GPS coordinates. Sites will be sampled at least monthly or 12 times minimum in a one-year period. Sites will be monitored throughout the course of the project to document seasonal variations and potential improvement in quality as a result of intervention. Based on the findings, exploratory sites may also be monitored to help locate inputs.

To achieve the second study objective, documentation of BMP efficiency during wet and dry weather, LPBF will monitor three stormwater retention/detention ponds. Each pond will be monitored twelve (12) times for dry-weather conditions and up to twelve (12) timed for wetweather conditions throughout the course of the project. All three pond sites will be accessible by vehicle and established with GPS coordinates.

The specifics of each monitoring regime are described in Section A6. All test results and information will be stored at LPBF in a spreadsheet where it will be quality assured.

### Sampling Methods Requirements (B2)

### Physiochemical Parameters

Temperature, specific conductance, dissolved oxygen, pH, and turbidity will be measured *in situ* (by meters outlined in B4) at all hot spot and pond sites. For each site, three measurements will be averaged for each parameter as the daily value. All values will be recorded on the water quality data sheet (Figure 4).

### **Nutrient Analysis**

Nutrient analysis will be performed at sites on the four stormwater ponds during wet and dry conditions. For dry-weather analysis: grab samples of 1 liter volume will be taken at each pond site described in Section A6, Task 2. Samples will be collected in a 1 liter cleaned and autoclaved plastic sample bottle using a fishing pole with bottle holder. For wet-weather analysis: a multi-sampler will be deployed to collect 1 hour grab samples during a 10-12 hour period of a rainfall event as per Section A6, Task 3. Hourly samples will be collected in two 500 ml clean multi-sampler containers (one fixed with H<sub>2</sub>SO<sub>4</sub>).

Samples will be stored and preserved in accordance with Standard Methods for the Examination of Water and Wastewater Methods 1060B and 9060A. The samples will be stored on ice (< 10°C, SM 9060B) and transported to the laboratory within six hours of collection (dry-weather samples) or within 24 hours (wet-weather samples), in accordance with Standard Methods for the Examination of Water and Wastewater Methods 1060C and 9060B. Upon receipt of samples in the lab, nutrient samples will be held in accordance with their individual procedures.

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### Sample Handling (B3)

All physiochemical measurements are to be performed in situ. Data will be recorded on field data forms (Figures 3). Sample handling procedures for nutrient analysis are presented in B2. Samples will be collected by the water monitoring personnel, delivered by him/her to the laboratory, and personally handed to the lab personnel performing the analysis. Sample labeling, handling, and disposal within the laboratory will proceed in accordance with their standard operating procedures.

# Analytical Methods Requirements (B4)

Physiochemical, Microbiological, and Nutrient Analysis

The analytical methods to be employed for this study are summarized in this section (Table 1).

Table 1. Analytical Parameter	Method	Equipment
Dissolved Oxygen	Standard Methods for Examination of Water and Wastewater, 22 <sup>nd</sup> Ed. SM 4500-OG	YSI2030 Pro S-C-DO-T Meter 0-20mg/L range, ± 0.3mg/L accuracy 0 to 200% air saturation range, ± 2% of the reading or ± 2% air saturation, whichever is greater, accuracy
Temperature	Standard Methods for Examination of Water and Wastewater, 22 <sup>nd</sup> Ed. SM 2550B	YSI2030 Pro S-C-DO-T Meter -5 to +65°C range, 0.1°C accuracy
Specific Conductance	Standard Methods for Examination of Water and Wastewater, 22 <sup>nd</sup> Ed. SM 2510B	YSI2030 Pro S-C-DO-T Meter 0 to 4999 μS/cm range, ± 0.5% accuracy
Turbidity	Standard Methods for Examination of Water and Wastewater, 22 <sup>nd</sup> Ed. SM 2130 B	Hach Portable Turbidimeter 0 to 1000 NTU range, 0.01 NTU accuracy
pН	Standard Methods for Examination of Water and Wastewater, 22 <sup>nd</sup> Ed. SM 4500-H <sup>+</sup> B	YSI 60 pH Meter 0 to 14.00 range, 0.1pH accuracy
Nitrate/Nitrite	Standard Methods for Examination of Water and Wastewater, 21st ed. SM 4500-NO3 F	Hach DR5000 Spectrophotometer BioTek PowerWave HT Microplate Spectrophotometer 0.1-unlimted range (dilution scheme used for high range samples)
Orthophosphate as P	Standard Methods for Examination of Water and Wastewater, 21st ed. SM 4500-P E	Hach DR5000 Spectrophotometer BioTek PowerWave HT Microplate Spectrophotometer 0.01-unlimted range (dilution scheme used for high range samples) precision: for 0.228 ug/L sample Relative SD =3.03

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TOC/IC Standard Methods for Examination of Shimadzu TOC-Vcpn Water and Wastewater, 21st ed. SM Range: 0.1-unlimited range (dilution 5310 B scheme for high range samples) precision: 5-10% depending on sample characteristics TN High Temperature Shimadzu TOC-Vcpn, TNM-1 module Combustion/Chemilumenscence 0.1-200mg/L precision: CV 3% max Ammonia as N Standard Methods for Examination of Hach DR5000 Spectrophotometer Water and Wastewater, 20th ed. SM BioTek PowerWave HT Microplate 4500-NH3 G B Spectrophotometer 0.05-unlimited range (dilution scheme used for high range samples) Residue-nonfilterable Standard Methods for Examination of Satorius model CP224S Water and Wastewater, 21st ed. SM (TSS) 2540 D Carbonaceous BOD, Standard Methods for Examination of Hach HQ40d multi-meter and Hach LBOD (CBOD) Water and Wastewater, 21st ed. SM probe 5210 B Standard Methods for Examination of Total Kjeldahl Nitrogen Hach DR5000 Spectrophotometer Water and Wastewater, 21st ed. SM BioTek PowerWave HT Microplate (TKN) 4500-N J Spectrophotometer 0.05-unlimited range (dilution scheme used for high range samples) Total Phosphorus (TP) Standard Methods for Examination of Hach DR5000 Spectrophotometer Water and Wastewater, 21st ed. SM BioTek PowerWave HT Microplate 4500-P J Spectrophotometer 0.05-unlimited range (dilution scheme used for high range samples) Alkalinity Standard Methods for Examination of Oakton pH 510 series meter Water and Wastewater, 21st ed. Brinkman digital buret Method 2320B, Titration method both 0-20mg/L range and >20 mg/L method used, depending on sample As per Standard method, no general precision statement can be made.

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### Quality Control Requirements (B5)

The quality control performed on a sample or set of samples is dictated by the protocols of the individual methods. All quality control methodology and statistics will be performed in accordance with: Methods 1020B&C, 1030A, the parameters' test methods in Standard Methods for the Examination for Water and Wastewater, the manufacturers' guides, and the Guidance for Data Quality Assessment (EPA QA/G-9). The laboratories will perform all of their quality control requirements in accordance with standard operating procedures/QA plans.

<u>Field Replicates</u>

Field replicates are not needed for the Hotspot samples as triplicate sampling is continually employed. For the stormwater sampling, it is not possible with the multisampler.

Field and Laboratory Blanks

Field blanks are not needed for the Hotspot samples as triplicate sampling is continually employed. For the stormwater sampling, it is not possible with the multisampler. Laboratory blanks will be run under the lab's QA plan. The QC goal is to have no recorded values for the parameters.

Matrix Spikes/Spike Duplicates

Matrix Spikes/ Spike Duplicates are not necessary for the analysis of physiochemical parameters as all tests are conducted in situ. Matrix Spikes and Spike Duplicates associated with the collection and analysis of nutrients are detailed in the labs' QA plans.

Analysis of Quality Control Data

Quality control data is summarized in QA/QC reports and forwarded to St. Tammany Parish. Data from the reports are utilized to assess the overall precision, accuracy, and completeness of each particular method. For these methods, the precision and accuracy is assumed to approximate published precision and accuracy.

# Assessing Data Precision, Accuracy, and Completeness

### 1. Precision

Precision is defined as the reproducibility of multiple data points that have been generated for a particular method under identical condition. On each sampling date, three readings for each physiochemical parameter are taken at each site. The triplicate data is subjected to precision analysis. Precision is expressed as the relative percent difference (RPD). The JMP Statistical Program, or Microsoft Excel will be used for these calculations.

 $RPD = (X^1 - X^2) / X(100)$ 

Where X1 and X2 are maximum and minimum sample values from daily triplicate samples

2. Accuracy

Accuracy is a measure of the closeness an experimentally observed value and the actual value, the latter of which is determined by the analyst through the use of sample spikes, surrogates, or reference standards. Field meters will be considered to be giving accurate readings through calibration with NIST standards and equipment maintenance. See Calibration and Maintenance schedule (Table 2) below for upkeep activities.

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### 3. Completeness

Completeness is the amount of valid data generated in relation to the total amount of data produced for a given analytical method. Valid data is defined as data with associate QA/QC measurements that fall within required values for the purpose of this study (Table 2). Data completeness goal for each parameter are also noted in Table 2.

### Evaluation of Statistically Derived QA/QC Data

Data that has been generated for QA/QC purposes must be assessed to determine the ability of the equipment and personnel to generate reliable data. Microsoft Excel or JMP statistical program will be used for these calculations.

Table 2. Criteria for QA/QC Analyzed Parameters

Parameter	Relative % Difference	Standard Method	Completeness Goal
Specific Conductance	5	Ref1/2510B	> 90% data/ year
Turbidity	10	Ref1/2130B	> 90% data/ year
Temperature	5	Ref1/2550B	> 90% data/ year
Dissolved Oxygen	10	Ref1/4500-OG	> 90% data/ year
РН	5	Ref1/4500-H+	> 90% data/ year

# Instrument/Equipment Testing, Inspection, and Maintenance Requirements (B6)

### Physiochemical Parameters

All equipment and associated components will be inspected, calibrated, and tested by the Principal Investigator upon receipt according to the operator's manual. Equipment will be maintained according to the operator's manuals with all calibrations and maintenance documented. If a piece of equipment gets damaged or otherwise does not perform correctly, the piece of equipment will be mailed to appropriate repairers. Equipment will be re-inspected, calibrated, and tested by the Principal Investigator or water monitoring personnel upon receipt. Back-ups for all equipment and spare parts will be maintained by the LPBF at all times.

### Instrument Calibration and Frequency (B7)

### Physiochemical Parameters

Calibration protocols are performed under the following conditions:

- 1) First use of an analytical instrument, component of the analytical instrument, or analytical method;
- 2) During the sample analysis procedure, as dictated by the methodology;
- 3) After instrument repair and/or maintenance;
- 4) After quality control check failure.

Additional calibration requirement and procedures recommended by the instrument manufacturers' are also followed. All calibrations are performed according to the operator's

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manual using standard solutions purchased from the instrument manufacturers (standardized against NIST-certified references). All calibrations are performed in accordance with the procedures specified in the analytical methodology commanding their use (Table 3).

Table 3. Physiochemical Instruments Calibration/Maintenance Procedures

Equipment	Schedule	Procedure
Dissolved Oxygen Probe	Each Use/Weekly→	<ul> <li>Calibrate to 100% saturation</li> <li>Check against standard chart</li> </ul>
	Tri-weekly→ Bi-annually→	- Change tip of probe - Clean anode/cathode, change tip of probe
Conductivity Probe	Bi-Annual/ Repair→ Tri-weekly→	<ul> <li>Check one standard KCl solution</li> <li>Check salinity against distilled water</li> </ul>
Turbidimeter	Three Months→ Tri-weekly→	<ul><li>Calibrate to formazin standard</li><li>Check against secondary standards</li></ul>
pH meter	Each Use/Weekly→ Tri-weekly→	- Perform two point calibration - Change all buffers and solutions

### Nutrient Analysis

The lab standardizes and calibrates all of its equipment in accordance with its QA plan.

# Inspections/Acceptance Requirements for Supplies and Consumables (B8)

The Principal Investigator and the monitoring personnel will log the receipt of all new equipment and will inspect, calibrate, and test the equipment (as necessary) before accepting them. If equipment/supplies are damaged or do not pass calibration and testing, they will not be accepted. All supplies will be handled and stored according to operator's instructions.

### Nutrient Analysis

During sample collection, the monitoring personnel are responsible for inspection and acceptance of the sample containers. The lab will inspect its own consumables and supplies in accordance with its QA plan.

### Non-Direct Measures (B9)

There are no secondary data needed for this project.

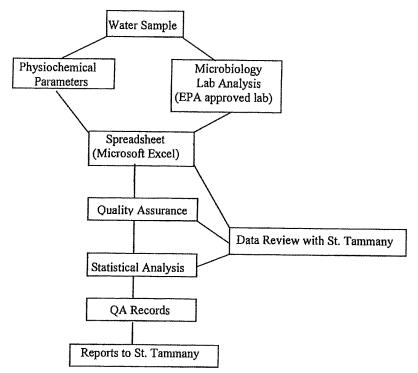
### Data Management (B10)

Data management will follow the chart presented below (Figure 4). The results of both the physiochemical and nutrient analysis will be put into a spreadsheet format by the LPBF monitoring personnel for preliminary descriptive statistical analysis (Microsoft Excel). JMP, a SAS program, will be utilized for statistical analysis.

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Figure 4. Data Management Flow Chart

\* All steps in data flow performed by LPBF unless indicated otherwise.



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# Assessment and Response Actions (C1)

Assessment activities needed for this project include performance evaluations, performance audits, and peer review. The Principle Investigator is in constant contact with the monitoring staff to resolve issues as they arise. In addition, all data is subject to bi-annual QA review, which is summarized in an annual program QA/QC document. The laboratory will conduct its own assessment of its methodology in accordance with its QMP.

Performance Evaluation

Monitoring personnel will be evaluated for their knowledge and ability to carry out the required measurements. Performance evaluations will be implemented before project personnel are allowed to participate and repeated randomly throughout the project, at least once per reporting period. The Principle Investigator/QA Technical Manager will view the data monthly, upon receipt. If questions arise, the PI will work with the monitor to resolve the issue.

Performance audits will be conducted randomly to document the taking of measurements and the treatment of data from time of collection to final reporting of results at least once per reporting period. The primary goal of the audit will be to detect deviations from the standard operating procedures and to make corrective adjustments. The Principal Investigator will be responsible for implementing corrective procedures and monitoring the progress of the monitoring personnel.

Data quality will be evaluated by peer review through technical information exchange and consultation with other research parties involved with similar projects. Publication of project results in peer reviewed scientific journal is desired.

# Reports to Management (C2)

The following project reports will be prepared and submitted to St. Tammany Parish for review.

Annual Progress Reports

Annual progress reports will be prepared by Andrea Bourgeois-Calvin and will consist of summary statistics of the data and an evaluation of the status of the project. Will present all data up to current, report QA/QC findings, and address any problems that may affect the quality of the data with the corrective actions performed.

Upon completion of the project, LPBF will submit a final project report detailing the methodology, results, and a discussion of the results of the project. It is anticipated that results and lessons learned from the project will be used to move forward in these watersheds and will transfer to work in other watersheds in the state and region.

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### Data Review, Verification, and Validation (D1)

A comprehensive review and verification of quality assurance items will be conducted after data collection is complete including: assessment of data entry, transcription, and calculation errors; use of acceptable sampling methods; verification that holding times for those parameters analyzed by a lab were met; meters were properly calibrated for each use; use of correct containers and preservatives; verification that field blanks and replicates were collected as planned and that they meet aforementioned QC acceptance criteria; verification that the number of samples planned for collection were collected as planned; verification that sites listed for sampling were actually sampled, as well as verification that completeness goals were met for each parameter. Any departures from these types of project planning criteria listed in the QAPP will be noted in project reports.

### Verification and Validation Methods (D2)

Section A7 discusses the responsibilities of each organization in this study and Section B10 discusses the chain of custody for all accumulated data. The water monitoring personnel are responsible for verifying the completeness and correctness of the data through the custody and transferal process. The Principal Investigator performs the quality assurance and validation analysis to assure that the data complies with QA/QC criteria and that all instruments comply with operational standards.

The following data verification methods will be employed:

- 10% (or more) of field data sheets will be randomly compared with the database to verify correct data transcription.
- Sample delivery sheets will be checked to verify holding times and preservation requirements for microbiological samples.
- Calibration logs will be consulted to verify that meters were properly calibrated.
- Replicates will be verified against precision targets listed in Table 2.
- Blanks will be verified against assessment criteria for field blanks described in Section B5.
- Number of samples collected will be compared to the total number originally planned for each parameter.
- Completeness (defined in Section A7) will be assessed using the following equation: Completeness = (Total valid samples / Total samples collected) (100)
- Field data sheets will be reviewed to verify sampling locations were sampled as planned. Experimental controls that are not within limits and/or when duplicate samples vary significantly the data will be rejected. Data acceptance will be the responsibility of the Principal Investigator.

#### Reconciliation with Data Quality Objectives (D3)

LPBF will reconcile the data with the quality assurance process outlined in the LPBF QMP. LPBF will verify that pertinent data results are acceptable by intercomparison checks, performance evaluations, and evaluations as described previously in Section C1. Data that does not meet the data quality requirements will be rejected after review by the Principal Investigator/QA Technical Manager.

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### Literature Cited

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# CHAIN OF CUSTODY RECORD

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# Water Quality Monitoring- Data Form

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# **Water Quality Survey Program**

# **FINAL REPORT**

July 2013 - June 2017

Andrea Bourgeois-Calvin, PhD
John O'Donnell, MSPH





# **Executive Summary**

### Introduction

To begin implementation of St. Tammany Parish's Water Quality Action Plan, the Lake Pontchartrain Basin Foundation (LPBF) partnered with St. Tammany Parish in a Cooperative Endeavor Agreement to perform the <u>Water Quality Survey Program</u> (WQSP).

The WQSP included two major goals:

- 1) "Hotspot" Monitoring To further document water quality conditions on St.

  Tammany waterways listed as impaired on the 2012 LDEQ Integrated Report and utilize the results to prioritize wastewater intervention activities;
- Pond BMP's (Best Management Practices) To document the organic and nutrient removal efficiencies and other water quality benefits to stormwater ponds retrofitted with different Best management Practices (BMP) technologies.

These goals were the two main activities of the program; which were performed July 2013 – June 2017. This report serves as the final report for the WQSP.

Hotspot Monitoring- Monthly water quality monitoring was conducted at up to thirty-four (34) known "hotspots" (streams determined by LDEQ to have low dissolved oxygen<sup>1</sup>) in Parish waterbodies. Dissolved oxygen, water temperature and a suite of physiochemical parameters were monitored *in-situ* for a three-year period. The purpose of the hotspot monitoring was to obtain additional water quality information on the rivers in St. Tammany Parish to present to the Louisiana Department of Environmental Quality (LDEQ) for its use in evaluation of future total maximum daily load (TMDL) requirements for impaired water bodies. The data may also be used by LDEQ to support ongoing Use Attainability Analyses (UAA) for two Ecoregions in the Parish.

**Pond BMPs**- To document the nutrient removal efficiency and other water quality benefits to stormwater ponds retrofitted with different stormwater BMPs, LPBF sampled three retention/detention ponds during both dry-weather and wet-weather conditions before and after the installation of the water quality retrofits to quantify potential positive water quality impacts of the BMPs. The ponds were sampled for a suite of physiochemical parameters and nutrients. The water quality data were utilized to assess removal capacity and efficiency of stormwater ponds before and after installation of the BMPs. Each pond had different BMPs installed and the data collected will be used to inform future projects in the parish.

<sup>&</sup>lt;sup>1</sup> The Hotspots were identified from LDEQ Intensive Survey samples and/or from TMDL model output, where the DO was predicted to fail EPA water quality standard.

The most effective BMPs will be considered in the remaining 65+ Parish-maintained ponds and recommended to Homeowner Associations and commercial entities to retrofit their own ponds for water quality improvements.

### **Results & Recommendations**

Hotspot Monitoring- Three years of monthly sampling at up to 34 "hotspots" (HS) on St. Tammany Parish rivers yielded data to characterize the selected stream reaches, particularly in terms of dissolved oxygen (DO) levels, in light of new standards. The data served to reveal streams with chronically low oxygen as potential candidates for intensive wastewater source tracking activities<sup>2</sup>. As a result of this data, St. Tammany Parish and LPBF have already begun wastewater source tracking programs on two of the impaired streams, the Bayou Liberty and Abita River Watersheds. Data collected in this project will serve as a baseline from which to calculate future water quality improvements. The study vielded four major recommendations for hotspot sites.

### "Hotspot" Recommendations:

- Institute Wastewater Source Tracking programs on the waterways that did not pass the revised UAA criteria. Nine sites in three watersheds failed to reach a pass rate of 75% for DO under the UAA criteria- Ponchitolawa Creek (HS01, HS03, HS05, HS06), Bayou Tete L'ours (HS08), and Bayous Liberty/Bonfouca (HS37, HS38, HS39, and HS45a).
  - a. Fully implement wastewater source tracking program in the <a href="Bayou Liberty/Bonfouca">Bayou Liberty/Bonfouca</a> watershed, including inspection of individual home systems and education/assistance to homeowners in targeted neighborhoods whose wastewater treatment is decentralized. In addition, coordinate with LDEQ to perform a watershed-wide sweep of commercial wastewater plants to ensure that they are correctly permitted, the owners/operators are regularly sampling their effluents and submitting discharge monitoring reports, and the plants are in good working order.
  - b. Conduct wastewater source tracking in <u>Ponchitolawa Creek and Bayou Tete</u> L'ours watersheds as described above.
- 2) Review the discharge monitoring reports (DMRs) from Eagle Lake Mobile Home Park (HS38) for compliance with permit limits and suggest that pollution source tracking be conducted for the area discharging upstream of HS38.
- 3) Present intermittent sites to LDEQ. Based on three years of DO results, LPBF recommends meeting with LDEQ to determine whether the four sites that have been identified as intermittent through monitoring (having water less than 60% of the time-HS04, HS34, HS36, HS47, and HS48) can be officially considered intermittent at the state level.
- 4) Encourage LDEQ to utilize the collected data in the future re-evaluation of TMDLs (or alternative assessment) for the impaired streams and for support in the ongoing UAA

<sup>&</sup>lt;sup>2</sup> EPA funded studies of pollution source tracking in Bayou Liberty, Ponchitolawa Creek, and Abita River Watersheds

process for determining appropriateness of current water quality standards in the Southern Plains Terrace and Flatwoods Ecoregion.

Overall, both pond BMP's (aeration and floating wetland) increased 5-day biochemical oxygen demand (BOD<sub>5</sub>) and total organic carbon (TOC) levels during dry weather. The aeration produced a greater decrease of nitrate-nitrite-nitrogen (NO<sub>3</sub>-NO<sub>2</sub>-N). Floating wetland better assimilated TSS during dry weather. The floating wetland decreased ammonia-ammonium-nitrogen (NH<sub>3</sub>-NH<sub>4</sub>-N) while the aeration increased it. Both ponds showed improvement in total nitrogen (TN), the floating wetlands more so than the aeration. Both BMPs have their strong points and weaker points with respect to different water quality parameters. Depending on the water quality issue (nutrients or total suspended solids-TSS), different BMPs could be recommended.

### Pond BMP- Dry Weather Recommendations:

- Nutrient Assimilation- Both aeration and floating wetland showed a reduction in the concentrations of nitrogen species, floating wetlands showed a greater reduction for more constituents. Both BMPs appear to be effective for dry-weather nutrient concentrations.
- 2) TSS- Both BMP's decreased median TSS levels. However, aeration in a small pond like Casa Bella increased the TSS values (as seen in the post-BMP data range). Some additional modifications of the aeration system may be required to address TSS. Much like a wastewater treatment pond, aeration needs in a stormwater pond will be pond-specific.
- 3) Buffer Strips- Plant a buffer of native grass species along the edge of the stormwater retention pond to act as another mechanism by which to remove nutrients from and provide other water quality benefits to the system. For example, the treatment train consisting of aeration, which functioned rather well, with native grass plantings could benefit the TOC and BOD values (both of which increased post-BMP during the study).
- 4) Aesthetic- Around the Del Sol pond, residents complained about the white pipes that constructed the wetland. Recommend utilizing green or black pipes to blend with the plant material.
- 5) Tree Plantings- Plant trees in the riparian area around the pond. In time, this will produce a canopy that will shade and decrease water temperatures during summer critical conditions, slowing down the kinetic rates of degradation during dry-weather periods and maintaining higher DOs and a better aquatic habitat.
- 6) Bioremediating Vegetation- Research shows that lining the littoral shelf with native bioremediating vegetation can also be advantageous, even though it wasn't explicitly studied in this project. Institute a "no mow" zone around the pond.
- 7) Treatment Trains- Combine different BMPs into a stormwater treatment train to most effectively remove all of the constituents of concern. This "polishes" the effluent by physically slowing velocity, reducing the volume being released to receiving streams and allowing vegetation to capture nutrients and fine sediments. An example of this would be to drain the effluent from a pond retrofitted with

- aeration or a floating wetland into a stormwater detention area before release into the local waterway.
- 8) Homeowner Education about Wastewater's Influence on Stormwater- Education of local homeowners on the proper operation and maintenance of individual sewer treatment units. Malfunctioning units can release partially treated or untreated sewer (containing excessive nutrients, bacteria, and organics) into the stormwater.
- 9) Public Awareness- Include educational signage by ponds explaining to residents how and why pond works and how it is part of a larger hydrologic system.
- 10) Concentration in MS4s- Concentrate pond conversion efforts in EPA-designated Urban Areas, the areas under Municipal Separate Storm Sewer (MS4) program jurisdiction. The water quality benefits will be especially relevant, important, and quantifiable in these areas.
- 11) Continued and Regular Maintenance- Maintenance of the retrofitted BMP's will be of utmost importance to ensure their continued efficacy. A long-term maintenance program should be established for each pond, either retroactively or during the development process and permitting.
- 12) Designing for Quantity and Quality- If future ponds can be designed at the outset for water quality and quantity it would be advantageous. The pond design could optimize water quantity and quality treatment for maximum benefit. Designing ponds for both stormwater runoff storage and water quality treatment (such as capturing and treating the first 1" of runoff from a development) will increase the size of ponds over St. Tammany's already aggressive requirement for up to 25% detention of 100-yr storm for post-development over pre-development conditions.

**Pond BMP's, Wet Weather-** Of the three BMPs, aeration provided the most consistent and best overall pollutant removal efficiencies (of the parameters tested). A wetland detention area provided the best NO<sub>3</sub>-NO<sub>2</sub>-N removal efficiency at 55.6%. Ponds- aerated and floating wetland- provded the best TSS removal efficiency at around 40%.

Overall, during wet weather conditions:

- Del Sol pond (floating wetland) indicated statistically significant decreases in TSS, NO<sub>3</sub>-NO<sub>2</sub>-N, TN, NH<sub>3</sub>-NH<sub>4</sub>-N, and DIN post installation of the floating wetland. BOD showed a statistically significant increase. NO<sub>3</sub>-NO<sub>2</sub>-N showed a slight increase post BMP installation and TOC remained constant throughout. Performance may improve as the wetland further matures.
- Casa Bella pond (aeration) indicated statistically significant decreases in TSS, TN, NH<sub>3</sub>-NH<sub>4</sub>-N, and DIN post installation of the aeration. BOD showed a statistically significant increase. NO<sub>3</sub>-NO<sub>2</sub>-N showed a slight decrease post BMP installation and TOC remained constant throughout.
- Labarre detention area indicated statistically significant decreases of NO<sub>3</sub>-NO<sub>2</sub>-N, TOC, TN, and DIN in the effluent as compared to the influent. Non-significant decreases in BOD and DIN were also observed. Finally, TSS increased statistically significantly influent to effluent.

### Pond BMP- Wet Weather Recommendations:

Based on the results of this study, the following recommendations can be offered as to the best wet-weather treatment of stromwater in a retrofitted pond or detention area. These recommendations are in addition to and compliment the dry-weather recommendation already presented.

- Wet-Weather Removal of Nutrients- A wetland detention area for nitrogen and phosphorus constituents, a floating wetland for nitrogen constituents, aeration for nitrate and TN. Overall, the wetland detention area performed best for nutrients.
- 2) Wet-Weather Removal of TSS- An aerated pond or a floating wetland
- 3) Wet-Weather Removal of BOD- Wetland detention area and aeration had the best RE's. However, none of the BMPs addressed this constituent satisfactorily.
- 4) Wet-Weather Removal of TOC- None of the BMPs addressed this constituent satisfactorily.
- 5) Consistency of treatment in wet-weather and dry weather- A floating wetland
- 6) Fine-tuning of BMPs for each application- All BMPs were installed in the course of the study. It is anticipated that the ponds would show improved RE's as the plants mature and the systems come to their new equilibrium. Also, no matter which BMP or group of BMP's is utilized, it will have to be engineered specifically to that site.
- 7) Treatment Trains- Combine different BMPs into a stormwater treatment train to most effectively remove all of the parameters studied. An example of this would be to drain the effluent from a pond retrofitted with aeration or a floating wetland into a stormwater detention area before release into the local waterway.
- 8) Buffer Strips- Plant a buffer of native grass species along the edge of the stormwater retention pond to act as another mechanism by which to remove nutrients from and provide other water quality benefits to the system. For example, when combined with aeration, the native grass plantings could benefit the TOC and BOD values (that increased during the study).

Overall, based on removal efficiencies calculated, aeration was shown to be an excellent treatment for materials that need extensive oxygen to oxidize, (constituents such as BOD5 and NH3-NH4-N). It was more effective than floating wetlands in attenuating NO3-NO2-N and TOC. It was as effective as floating wetlands in attenuating TSS. This BMP is appropriate for ponds where the solids are not so colloidal. Native plantings in a detention area handled wastewater related pollutants (NO3-NO2-N and resultant DIN and TN) and BOD5 well. Finally, Floating Wetlands equaled aeration for TSS attenuation but otherwise did not perform well with the other parameters tested (Table ES1).

Table ES1. Summary- BMP RE's and Statistically Significant Difference in Effluent Pre- vs. Post-BMP

	Floating Wet	land (Retention)	Aeration	(Retention)	Native Vegeta	tion (Detention)
	Post-BMP RE	Signif Pre/Post	Post-BMP RE	Signif Pre/Post	Post-BMP RE	Signif Pre/Post
BOD5	-14%	increase	12.60%	increase	11.50%	N/A
TSS	38.30%	decrease	39.30%	increase	-144%	N/A
NO3-NO2-N	-21%		33.30%		55.6% **	N/A
TOC	6.70%		12.90%		7.80%	N/A
TN	7.00%	decrease	20.40%	decrease	27.50%	N/A
NH3-NH4-N	-11.40%	decrease	5.90%	increase	-5.40%	N/A
DIN	-14.40%	decrease	11.00%	increase	15.90%	N/A
Phos-P*	20%		No Analysis *		No Analysis *	N/A

(Based on median Removal Efficiency during Wet-Weather Conditions)

(Green= best RE for constituent, Red= negative RE)

### Conclusions

Three years of monthly sampling at up to 34 "hotspots" on St. Tammany Parish rivers yielded data to characterize the selected stream reaches, particularly in terms of dissolved oxygen levels, in light of new standards. The data served to reveal streams with chronically low dissolved oxygen as potential candidates for intensive wastewater source tracking activities. As a result of this data, St. Tammany Parish and LPBF have already begun wastewater source tracking programs on two of the impaired streams.

Of the three stormwater BMPs analyzed in this study, the most effective for both wetweather and dry-weather conditions seems to be aeration, according to the removal efficiencies. However, all BMP's had their stronger and weaker points and are best utilized under specific applications, based on the water quality parameter(s) to be improved. As each of the BMPs mature, the results may evolve over time so future water quality analysis will be necessary to assess these features over time.

With this project, St. Tammany Parish has taken a significant step forward in both identifying and addressing wastewater inputs into impaired streams and providing water quality treatment for stormwater. If implemented parish-wide, both of these activities could lead to profound water quality improvements in St. Tammany Parish Rivers.

<sup>\*</sup> Most of data below detection limit

# DEL SOL RETENTION POND FLOATING WETLAND FINAL REPORT

Submitted To
St. Tammany Parish
Department of Procurement
21454 Koop Dr., Suite 2F
Mandeville, LA 70471

Submitted By
Comite Resources, Inc.
P.O. Box 66596
Baton Rouge, LA 70791



December 18, 2017

### **EXECUTIVE SUMMARY**

This project was initiated to determine the effectiveness of a bioremediation best management practice (BMP), the installation of a floating wetland to reduce nutrient and sediment concentrations in water flowing through a stormwater retention pond. Specifically, the objective of this project was to determine removal efficiency of nutrients, sediments, total organic carbon (TOC), and 5-day biological oxygen demand (BOD $_5$ ) of surface water flowing through the Del Sol stormwater retention pond that was retrofitted with a floating wetland.

Available data (e.g., watershed area and drainage, results of bathymetric survey, water quality data) and input from the Del Sol subdivision residents were used to design the floating wetland to reduce nutrient and suspended solids concentrations of surface water and to determine optimum size and placement of the floating wetland within the retention pond. A "wagon wheel" design was chosen for the layout of the floating wetland because it provided a high water to marsh edge ratio. Each "spoke" of the wagon wheel was 16 ft wide and about 200 ft long. In addition, 20' x 20' rafts of floating marsh were constructed at each of the three inflow areas to intercept TSS and reduce nutrients in surface runoff water as it entered the pond. Floating mats were constructed using PVC pipe glued shut to stay permanently buoyant. The base of each mat was built with vinyl-coated crab wire, an extremely durable material. The base mesh served as the planting surface for maidencane (Panicum hemitomon) and other vegetation. Floating wetland mats were anchored to the pond bottom to keep them in place when surface water entered and exited the wetland during and after a storm. Maidencane was the dominant vegetation species planted on the floating structure, and Southern swamp lily (Crinum americanum) and Southern blue flag iris (Iris hemifolia) were included for aesthetic appeal. Monitoring showed that some of the spokes of the floating wetland had vigorous growth while some did not, but the percent cover of maidencane on the floating wetland increased. All arms of the platform showed a positive change in cover. Southern swamp lily and Southern blue flag iris had high survivorship, but did show many signs of herbivory.

In November 2014, 80 baldcypress (*Taxodium distichum*) and 49 water tupelo (*Nyssa aquatica*) seedlings were planted in the shallow areas of the southern portion of the stormwater pond. Between November 2014 and August 2016, the mean change in diameter for baldcypress seedlings was 1.67 cm, while the mean change in diameter for water tupelo seedlings was 1.44 cm, for an annual growth rate of 0.95 and 0.82 cm/yr, respectively (Leggett 2016). In coastal Louisiana, the mean change in diameter of baldcypress seedlings planted at three assimilation wetlands was 1.63±0.14 cm/yr and ranged between 0.5 and 1.3 cm/yr for fertilized and unfertilized seedlings (reviewed by Lundberg et al. 2011), similar to growth of seedlings planted at the Del Sol stormwater pond.

Turbidity in the pond was measured using a Secchi disk that was lowered into the water column and the depth at which it could no longer be seen was recorded. Secchi depth was measured at the beginning of the project (March through August 2015) and one year after installation of the floating wetland (June through August 2016). Secchi depth changed significantly between the two time periods. Mean Secchi depth measured in 2015 was 23 cm and the mean Secchi depth measured in 2016 was 67 cm.

Water samples at the influent and effluent locations were collected 23 times by the Lake Pontchartrain Basin Foundation (LPBF) during the course of this study. Water samples were collected once per hour for 12 hours during a heavy rainfall event and analyzed for biological oxygen demand (BOD<sub>5</sub>), total organic carbon (TOC), total suspended solids (TSS), total nitrogen (TN), ammonium (NH<sub>4</sub>-N), nitrate (NO<sub>3</sub>-N), ortho-phosphate (PO<sub>4</sub>-P), and total phosphorus (TP) concentrations. During dry weather, grab samples were collected at the influent and effluent locations. Mean BOD<sub>5</sub>, TOC, TSS, TN, NO<sub>3</sub>-N, NH<sub>4</sub>-N, TP, and PO<sub>4</sub>-P concentrations were calculated for dry and wet sampling periods at the influent and effluent sampling sites for the time period before installation of the floating wetland (prior to July 2015) and after installation of the floating wetland (after July 2015). Statistics for nutrient concentrations were conducted on flow-adjusted data due to backflow from Timber Creek, a water body with un-sewered homes nearby, into the Del Sol stormwater pond from.

No significant differences were found between mean influent and effluent BOD<sub>5</sub> and TOC concentrations for wet and dry weather or installation period (Table ES1). Analysis of variance comparing influent BOD₅ concentration before and after the installation of the floating wetland showed that mean concentration after installation was significantly higher than concentration prior to installation. Mean BOD<sub>5</sub> removal efficiency (RE) was negative and very similar before and after installation of the floating wetland. Based on these results, it does not appear that the floating wetland had any impact on BOD<sub>5</sub> concentrations in the stormwater pond. The amount of rainfall that occurred during each wet-weather sampling event was one factor that affected BOD<sub>5</sub> RE, with precipitation less than 2.5 cm showing a decrease in concentration between the influent and effluent sampling locations and events greater than 2.5 cm having an increase in concentration between the sampling locations. BOD<sub>5</sub> is essentially a measure of organic matter and the main mechanism for rapid removal (i.e., during the 12 hour sampling period) of organic matter would be settling (while decomposition would be the main mechanism for removal in a longer time period). The most likely explanation is that a heavy rainfall would cause water to flow faster through the stormwater pond than with no rainfall. This faster flow would lower the hydraulic retention time (HRT) of water in the pond and, with a lower retention time, there is less time for organic matter to settle than with a higher retention time.

Mean TOC concentration varied over the sampling period, with most concentrations between 10 and 15 mg/L and, for most samples, with little change between influent and

effluent concentrations. Mean TOC RE varied between 60 and -60%, with about the same number of events where concentration decreased between the influent and effluent sampling locations as those where concentration increased. The amount of rainfall that occurred during each wet-weather sampling event was one factor that affected TOC RE, with precipitation explaining about 30% of the variation in RE. Rainfall events greater than about 4 cm caused an increase in TOC concentration between the influent and effluent sampling locations while rainfall less than 4 cm caused a decrease in TOC between the two locations. As with BOD<sub>5</sub>, the most likely explanation is that a heavier rainfall would cause water to flow faster through the stormwater pond, lowering the HRT of water in the pond. With a lower retention time, there is less time for TOC to settle than with a higher retention time. Similar to BOD<sub>5</sub>, the floating wetland does not appear to enhance TOC removal and may even be a source of TOC in the surface water, possibly due to sloughing of root organic matter and root exudates.

No significant differences were found for TSS between mean influent and effluent concentrations for wet/dry weather or installation period (Table ES1). However, it should be noted that during wet weather sampling events, TSS was much higher in the pond prior to floating wetland installation than after floating wetland installation and, while mean TSS concentration varied over the sampling period, both influent and effluent concentration varied more prior to installation of the floating wetland than after installation. This is most likely because trees were planted around the perimeter of the pond and more grass was present as the project progressed and these would slow sediment runoff into the pond. Statistical analysis found that mean effluent TSS concentration was higher before installation of the floating wetland than after installation. TSS RE varied widely among the sampling events and there did not appear to be any difference in TSS RE prior to and following installation of the floating wetland. As with BOD<sub>5</sub> and TOC, the main removal mechanism for TSS removal is settling and during periods of heavy rainfall the HRT may not have been sufficient to allow for TSS settling. The amount of rainfall that occurred during each wet-weather sampling event did not have as much of an influent on TSS RE as with BOD<sub>5</sub> and TSS. Dr. Gary Shaffer, with Southeastern Louisiana University, stated that it took about 10 days for TSS to settle out of the water column after a heavy rainfall and the 12-hour sampling period would not capture these changes. This observation, along with the improvement in Secchi depth, suggests that the floating wetland enhanced sediment removal from the water column over a longer time period than the 12-hour sampling event.

No significant differences were found between mean influent and effluent TN concentrations for dry weather sampling periods, but significant differences were found between influent and effluent concentrations for the wet weather sampling periods (Table ES1). Mean TN concentration declined over the sampling period perhaps due to uptake by vegetation growing on the floating wetland. Mean TN RE was not as high as was expected and did not meet target removal rates. However, during wet weather sampling events, the floating wetland was effective at removing TN from water flowing through the stormwater pond. No significant differences were found between mean

influent and effluent NO<sub>3</sub>-N concentrations for dry weather sampling, but following installation of the floating wetland there was a significant difference between influent and effluent concentrations for wet weather sampling. Nitrate is a readily available nitrogen source for vegetation and plant uptake and denitrification are two of the major removal pathways in wetlands. Mean NO<sub>3</sub>-N concentration varied over the sampling period, but was generally lower than 0.2 mg/L. Mean NO<sub>3</sub>-N RE fluctuated over the sampling period, but with a few extremes was generally positive after installation of the floating wetland. No significant differences were found between mean influent and effluent NH<sub>4</sub>-N concentrations for wet and dry weather or installation period. Mean NH<sub>4</sub>-N concentration varied over the sampling period but was primarily less than 1.0 mg/L. NH<sub>4</sub>-N was a much greater percentage of total nitrogen than NO<sub>3</sub>-N and this is important because the nitrogen species will impact removal rates in wetlands. While plants can uptake both species, only NO<sub>3</sub> has a permanent removal pathway through denitrification. Mean NH<sub>4</sub>-N RE did not change much over the sampling period, with the exception of two post-installation sampling periods.

No significant differences were found between mean influent and effluent concentration for dry weather sampling, but mean TP effluent concentration was significantly lower in the effluent compared to the influent during the wet weather sampling periods (Table ES1). Analysis of variance comparing mean influent TP concentration before and after the installation of the floating wetland found that TP concentration was lower following the wetland installation. Analysis of variance comparing mean effluent TP concentration before and after the installation of the floating wetland found that TP concentration was lower following the wetland installation. During wet weather sampling events, mean TP concentration of water flowing through the wetland was reduced between the influent and effluent sampling points (although not significantly), regardless of the presence of the floating wetland. This is most likely because phosphorus sorbs to sediment and settles out of the water column as water moves through the pond. The presence of plant roots in the water column helped settle suspended solids and also take up phosphorus for plant growth. For dry weather conditions, no significant differences were found between mean influent and effluent PO<sub>4</sub>-P concentrations for wet/dry weather or installation period. However, pre-installation influent and effluent concentrations were significantly different for wet weather sampling. Like TP, mean PO<sub>4</sub>-P concentration was very low and primarily below 0.20 mg/L. Mean PO<sub>4</sub>-P percent RE varied over time with no patterns detected, but mean RE was higher during wet weather events than with dry weather events.

Table ES1. Summary of concentrations and percent removal efficiencies (%RE) measured in surface water at the Del Sol stormwater pond during dry periods (DRY) and rainfall events (WET).

	Pre-	Installation		Post	:-Installation	
DRY	In (mg/L)	Out (mg/L)	%RE	in (mg/L)	Out (mg/L)	%RE
BOD	2.51±0.61 (7)	2.83±0.55 (4)	-12.8	2.51±0.19 (6)	2.70±0.29 (6)	-7.7
TOC	9.84±1.90 (7)	9.62±1.66 (7)	2.2	9.79±0.78 (6)	9.69±0.65 (6)	1.0
TSS	17.38±5.92 (7)	22.11±6.47 (7)	-27.2	7.11±0.78 (6)	23.56±11.45 (6)	-231.3
TN	0.94±0.07 (7)	0.70±0.10 (7)	25.4	0.50±0.03 (6)	0.58±0.08 (6)	-14.6
NO <sub>3</sub> -N	0.095±0.028 (7)	0.100±0.047 (7)	-5.3	0.090±0.037 (6)	0.167±0.078 (6)	-85.2
NH <sub>4</sub> -N	0.620±0.176 (7)	0.610±0.177 (7)	1.6	0.298±0.055 (6)	0.265±0.053 (6)	11.2
TP	0.113±0.061 (7)	0.050±0.045 (7)	55.6	0.022±0.010 (6)	0.025±0.011 (6)	-15.4
PO <sub>4</sub> -P	0.063±0.032 (7)	0.155±00127 (7)	-148.0	0.040±0.000 (6)	0.040±0.000 (6)	0.0
WET						
BOD	3.47±0.21 (54)	3.47±0.25 (60)	-4.8	5.15±0.27 (82)	5.87±0.30 (82)	-10.2
TOC	13.64±0.88 (50)	12.14±0.51 (56)	11.0	13.78±0.44 (66)	13.23±0.91 (66)	4.0
TSS	75.31±12.69 (50)	64.30±12.99 (56)	14.6	23.83±3.08 (66)	27.26±4.84 (66)	-14.4
TN	0.91±0.04 (50)	0.78±0.02 (56)	13.7	0.74±0.05 (66)	0.56±0.03 (66)	23.3
NO <sub>3</sub> -N	0.113±0.010 (50)	0.098±0.008 (56)	12.8	0.182±0.016 (66)	0.123±0.008 (66)	32.4
NH <sub>4</sub> -N	0.625±0.045 (50)	0.567±0.021 (56)	9.3	0.472±0.030 (66)	0.495±0.042 (66)	-5.1
TP	0.216±0.055 (50)	0.08±0.008 (56)	62.7	0.056±0.004 (66)	0.043±0.005 (66)	23.2
PO <sub>4</sub> -P	0.077±0.008 (50)	0.056±0.005 (56)	27.5	0.061±0.009 (66)	0.040±0.007 (66)	34.2

The floating wetland significantly reduced total nitrogen concentration of stormwater and improved water clarity, as measured by a Secchi disc, over the course of the study. The floating wetland also contributed to the reduction of  $NO_3$ -N, and  $PO_4$ -P concentrations in stormwater . These reductions are proof-of-concept that constructed floating wetlands can be retrofitted into stormwater retention ponds for the improvement of water quality. The problems and issues encountered during this project, and documented in this report, can be overcome and provide guidelines for what to expect. We are certain that with research and development that the removal efficiency of the wetlands can be increased and that this method can become viable in the future.

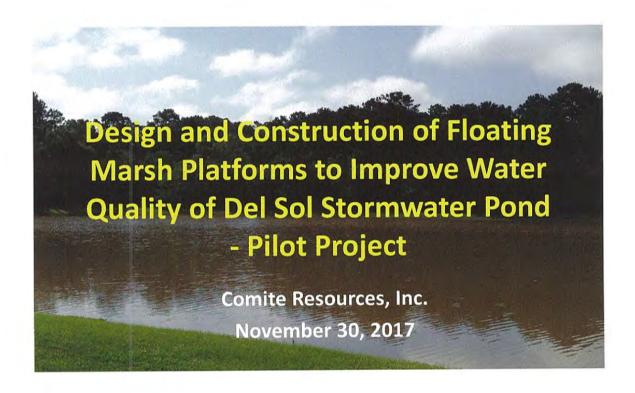
If floating wetlands were to be installed at other stormwater ponds throughout St. Tammany Parish, we recommend the following:

- <u>Use a different material to build the floating platforms</u> The white PVC pipe was not aesthetically pleasing to homeowners living around the pond. There are several materials for purchase that may be less noticeable than white PVC pipe.
- Reduce the size of the floating wetland The "spokes" of the floating wetland
  were too large and, when connected together, the entire wetland was too large to
  maneuver. In addition, the size made it hard to anchor, and the wetland
  subsequently moved during storms.
- Change the shape of any wetlands installed at the influent points The v-shaped floating wetlands did not work well when installed at the influent points because

- the force of storm water moving into the wetland cause them to bend and detach from anchoring. A linear or round shape would probably work much better.
- <u>Install hanging biofilters on the wetland</u> The use of bunches of natural fibers hanging off of the floating wetland will enhance water filtration and provide instant fish fry and invertebrate habitat.
- <u>Construction materials</u> Most of the zip ties used in construction broke during the project, however, the 100-lb test boating line did not. The boating line is a much stronger material and zip ties should not be used in this type of construction.
- <u>Emergent vegetation</u> If homeowners do not object, plant emergent vegetation (or allow natural colonization without mowing) around the edge of the stormwater pond to reduce nutrients and sediments coming into the pond, and provide habitat for fish and invertebrates.

### Exhibit 2

- QAPP for HS Monitoring and SW Pond Sampling Program
- Executive Summary for Final Reports for HS Monitoring and SW Pond Sampling (LPBF, 12/2017)
- Executive Summary for Final Report for Del Sol Floating Wetland (Comite Resources, Inc., 12/2017)
- PowerPoint Presentation to Del Sol HOA (Hunter, 11/2017)
- PowerPoint Presentation of St. Tammany Parish's Water Quality Survey Program (Smythe, 11/2017)



# **Objectives**

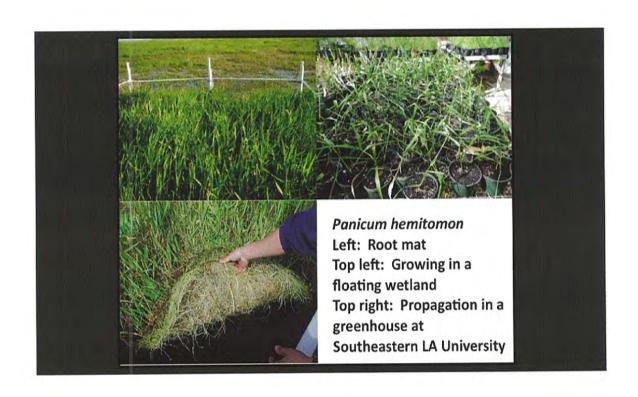
- Improve pond water clarity
- Reduce nutrient & sediment concentrations in water flowing out of the pond
  - Target RE (%) = NOx-N (59%), TP (65%), TSS (66%)

# **Project Tasks**

- Stormwater pond bathymetric survey
- · Floating wetland design
- Floating wetland construction, deployment, and anchoring
- Tree Plantings
- Water Quality Monitoring LBPF
- Wetland monitoring and maintenance





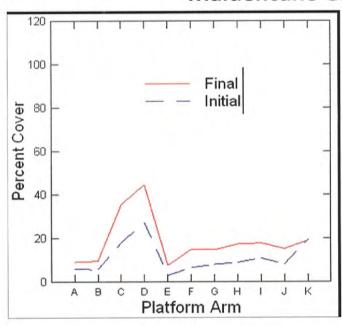






Vegetation Growth

## **Maidencane Growth**



- Cover increased,
   but not as much as expected
- •Maidencane is a perennial
- Southern swamp lily
   blue flag iris had
   high survivorship but
   also some herbivory

# **Baldcypress – Water Tupelo Planting**





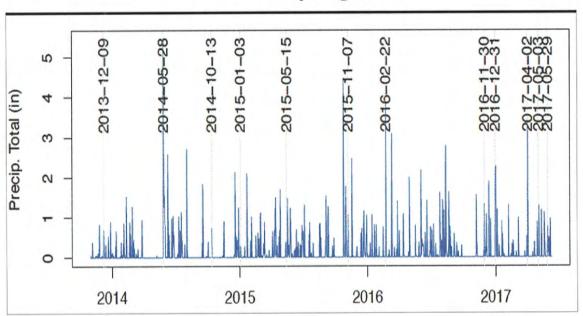
### Baldcypress - Water Tupelo Growth

- •Survival rate >90%
- •Baldcypress change in diameter was 16.7 mm
- •Water Tupelo change in diameter was 14.4 mm

# **Water Quality Sampling**

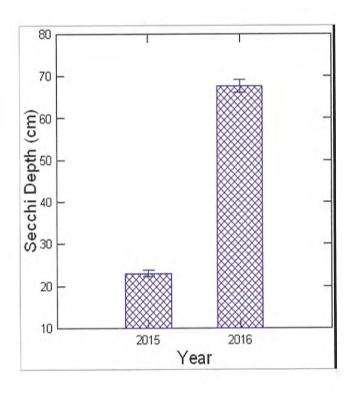
- Collected by LPBF
- · 23 sample dates
- Collected once per hour for 12 hours during rainfall events using ISCO multi-samplers
- Dry weather samples also collected for comparison

# **Water Sampling Dates**



# Backflow from Timber Creek – Cleared by Sample 6 or 7

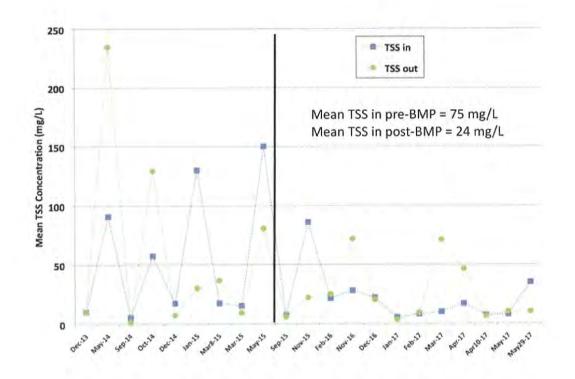




# **Water Clarity**

Secchi disc depth in
2015 was 23 cm
Secchi disc depth in
2016 was 67 cm





## **Wet Weather Concentrations and Removal Efficiencies**

	BOD	TSS	тос	PO <sub>4</sub>	TP	NO <sub>3</sub>	NH <sub>4</sub>	TN
Mean Influent Concentration (mg/L	5.06	23.83	13.78	0.061	0.066	0.18	0.47	0.73
Mean Effluent Concentration (mg/L)	5.57	27.26	13.23	0.040	0.043	0.12	0.50	0.56
% Removal Efficiency	0	0	3.97	34.24	34.80	32.39	0	23.27

# **Project Success**

#### **PROS**

- Fish habitat
- Improvement in water clarity
- · Tree growth
- Roots 18-20 inches deep
- Wetland cleans TSS in about 10 days after a rainstorm

#### **CONS**

- Aesthetic appeal
- Vegetation did not grow as well as expected
- Structure moved & broke apart
- Did not meet target REs (or sampling protocol was not adequate to capture actual removal)

## **Future Action**

- Remove 3 platforms where vegetation has not grown well
- Move remaining platforms to the far end of the pond
- Maidencane is a perennial and will continue to increase in biomass

# Questions?



# St. Tammany Parish Water Quality Survey Program

St. Tammany Parish Government
Department

St. Tammany Parish Government

## **Our Mission**

The mission of the St. Tammany
Parish Watershed Management
Program is to protect and enhance
water quality in St. Tammany Parish
through a targeted watershed
approach.





# Water Quality Survey Program

- STP and LPBF collaborated on a 3 year monitoring & sampling study from late-2013 to mid-2017
- · Study consisted of two parts:
  - o "Hot Spot " Monitoring and
  - Water Quality Demonstration Pond BMP Sampling
- Interim presentations were submitted to STP on the two parts.
- This presentation will review the final report, recommendations and fit all within the context of the STP Water Quality Action Plan

# Analysis of Three Years of Hotspot Data in St. Tammany Rivers

Andrea Bourgeois-Calvin, PhD and John O'Donnell, MSPH Lake Pontchartrain Basin Foundation



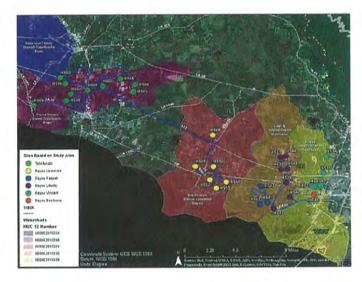


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# Hot Spot Monitoring Program: Purpose

- The purpose of the Hot Spot monitoring program was to obtain additional water quality information on the rivers in St. Tammany Parish to present to the LDEQ for its use in evaluation of TMDL requirements for STP's impaired water bodies or to support future management plans.
- 34 HS were Identified by the TMDLs at locations that failed DO Standards in 3 TMDL watersheds:
  - o Tchefuncte
  - o Lacombe
  - Liberty/Bonfouca





# "Hot Spot" Program: Characterizations

Characterization of each HS was conducted by STP Watershed Coordinator to determine standards failure:

#### Cause

- Was there a fix by engineering or DPW?
- field error (water depth too shallow for credible measurement)
- Culverts (undersized or misaligned)

#### o Source

- Waterbody suspected of being intermittent, wetland or naturally dystrophic
- land use (unsewered SD)

25.50 To COMMON CO MANA	sh WQ Action Plan Assessment				
Number: HS					
Assessment By:					
Date:					
Assessment Parameter	Findings				
Hydrolog	y & Color				
Water depth [1]	Influences K2 & SOD zone of influence				
Width of stream [2]	Aerial				
Velocity [3]	Flowing/Not flowing				
Culvert of Bridge [4]	Restricting flow or causing pooling				
Color	Clear/cloudy, brown/black				
Geomo	phology				
Type of water bottom [5]	Mud/sand/gravel				
Sinuosity [6]	Natural or channelized				
Pool or Riffle	Affects K2				
Land Use - Effl	uent Dominated				
Note Land Use in Vicinity	Residential/commercial/wetlands				
Note unsewered communities nearby [7]	No central system				
Wetland	Impacted?				
Other Releva	nt Information				
Pic	tures				



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# "Hot Spot" Program: Monitored per Quality Assessment Project Plan (QAPP)

- The HS Monitoring program was conducted according to Standard Methods and the STP QAPP so that data would be reproducible and defensible
- Monthly In situ measurements collected at 34 HS
- Meter measurements for physio-chemical parameters:
  - o DO
  - o Temperature
  - Specific Conductance
  - o Turbidity
  - o pH
  - o Salinity
- Data was collected, QA/QC conducted & database maintained by LPBF

Receiving Water Quality	Sampling Plan
St. Tammany Parish   Action Pia	
	CAMMADA.
Prepared by: St Taumany Pacish Government Department Engeneering	
January 2013	
Project Approx	nl .
lignature	Date
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LDEQ Nonpoint Source Supervisor	
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# "Hot Spot" Program: Results Post-UAA

- Many HS were located in streams determined to be intermittent, flow-limited (stagnant), shallow or wetland-dominated
  - These areas will require an LDEQ regulatory remedy (UAA or vacate)
- Most HS were in areas dominated by individual homeowner sewer treatment units
  - These areas require a parishwide program to remedy (expand current inspection program, implement a decentralized management plan, ordinances)
  - Utilize existing treatment options (retrofit stormwater → water quality ponds, implement BMP ordinance)





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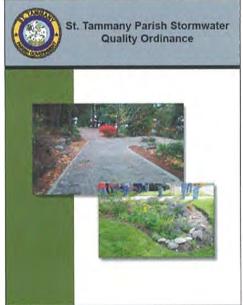
# "Hot Spots" Program: Recommendations

- Utilize the failed HS to locating and prioritizing areas for decentralized management program and as targeting for Wastewater Management Areas.
- Implement additional wastewater source tracking programs on HS areas.
- Present datasets to LDEQ on suspected intermittent sites (having water <60% of time). Intermittent waterbodies are not subject to the same WQ standards.
- Encourage LDEQ to utilize the collected data in future evaluation of TMDLs and in support of the ongoing UAA process for determining appropriate WQ standards to use in the Southern Plains Terrace and Flatwoods Ecoregion.



Water Quality Demonstration Ponds Program: Driver - MS4 Compliance

- Post 2012, STP MS4 permit requires more attention to TMDL requirements.
- 2015 STP Stormwater Ordinance passed to meet State MS4 regulatory requirements.
  - Provides incentives for greater than minimum BMP standards & innovations.
  - All new and redevelopments (EDD & SD) are now reviewed for WQ improvement potential and modeled for DO impacts.
- Post-UAA, STP has unresolved WQ problem areas (HS) that need to be remediated (regulatory or project).
- Stormwater ponds are frequently the last "line of defense" for water quality treatment prior to discharging into impaired waterbodies. STP retrofitted existing stormwater ponds and tested BMPs to determine effectiveness.



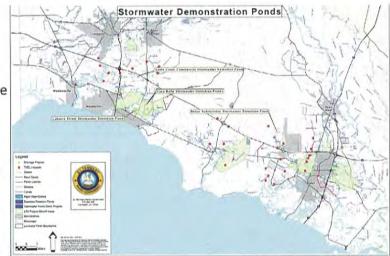


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# Water Quality Demonstration Ponds Program: Assumption

- Local ditches are effluentdominated in areas of unsewered communities.
- Stormwater retention/ detention ponds receive these nonpoint source (NPS) pollutants via local ditches during rainfall events.
- This provides STP with a "last line of defense" opportunity to treat these NPS pollutants prior to discharge into a receiving waterbody.





# Water Quality Demonstration Ponds: Program Costs

- STP collaborated with LPBF on testing influent & effluent water quality for 3 stormwater retention/detention ponds that were retrofitted with various BMPs.
- •LPBF tested the 3 demonstration ponds during dry and storm events pre- and post-BMP for 3 years.
- •The total cost of \$468,000 for BMP implementation and 3 years of monitoring/sampling was a significant investment for a local government. It demonstrates STP's commitment to understanding the local pollutant loads that are necessary for improving the waterbodies of the parish (as opposed to literature).

			Pond	Proposed	BMP	Co	sts
Project	Pond name	Watershed	Size, Acres	Treatment	Capital	Se	oft Costs
1	Labarre Street	Bayou Castine	5	Vegetative Planting	3	\$	59,892
2	Del Sol S/D Pond	Bayou Castine	8.1	Floating Wetland	\$ 250,000	\$	65,857
3	Casa Bella S/D Pond #1	Little Bayou Castine	0.87	Aeration	\$ 7,500	s	65,857
4	Little Creek Commercial	Little Creek	18	Induced Flow		\$	19,311
Hot Spo	ot Ananlysis & Monitoring (	34 hot spots P	arishwi	de)			[2]
	3-Year Tot	als (\$468,417	)		\$ 257,500	s	210,917
	niction/Retrofit, Installation Insp O&M, "Hot Spot" Monitoring	ections, Sampling	Survey/	WQ Characterization,	Modeling, Public	Edu	ication &
[2] Hotspo	ot analysis is included with pond	surveys					

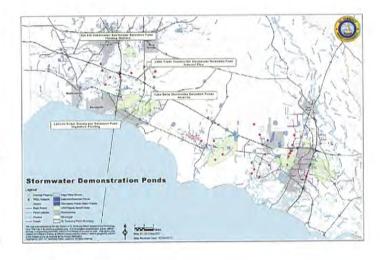


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# Water Quality Demonstration Pond Program

- The 2<sup>nd</sup> part of the LPBF collaboration was to document the nutrient removal efficiency and other WQ benefits to stormwater ponds retrofitted with different SW BMPs.
- LPBF sampled 3 retention/detention ponds during both dry- and wetweather conditions before and after installation of WQ retrofits.
- The WQ data were used to characterize influents/effluents and to assess removal efficiency (%RE) of SW ponds before and after installation of BMPs.
- Each pond had a different BMP for which the data collected will be used to inform future projects in the parish.





# Del Sol SD Pond: Floating Wetland BMP Timber Branch/Tchefuncte River Watershed

- >>250 homes in micro watershed
- 150 Sewered
- 100 Unsewered







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# Casa Bella SD Pond: Aeration BMP Little Bayou Castine Watershed

- 25 homes
- •2 schools (1250 students & staff)
- Sewered SD







# Labarre Street Pond: Extended Detention with Vegetative Planting Little Bayou Castine Watershed

- 205 homes benefitting
- · Sewer connections under construction







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# Methods: Wet Weather Sampling (QAPP)

- Two ISCO Samplers are deployed at inflow and outflow of ponds to capture samples during rainfall events.
- One sample is collected every hour in the ISCO containers – 12 samples from each ISCO taken over a 12-hour period.
- The 24 ISCO samples (12 from each sampler at I/O) are analyzed at the lab for the following water quality parameters: BOD<sub>5</sub>, TOC, NH<sub>4</sub>+NH<sub>3</sub>-N, NO<sub>2</sub>+NO<sub>3</sub>-N, TN, DIN, PO<sub>4</sub>-, TP and TSS.
- In-situ WQ parameters monitored were: water temperature, dissolved oxygen, specific conductance, turbidity, and pH.





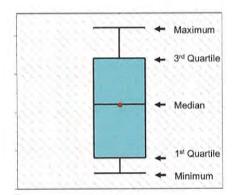
# Methods: Data Analysis

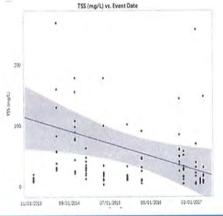
#### Means/Medians

- Box & whisker plots generate 25<sup>th</sup> and 75<sup>th</sup> percentiles and means/medians for each parameter for each event for both inflow and outflow.
- o 95% confidence intervals about the medians

#### Removal Efficiency

- Average of means (Grand means) and medians were generated for each pond for each parameter.
- Removal efficiencies were for each parameter for each pond using medians for inflow and outflow (simulating the process of the International SW Database).
- $\circ$  %RE = (influent concentration effluent concentration) \* 100
  Influent concentration







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# Casa Bella Pond: Post-BMP (Aeration)

- The 1.1 acre pond is located in Casa Bella SD east of Mandeville. Pond was dominated by colloidal particulates.
- The SW pond was retrofitted with a bubbler that circulates and oxygenates eh water and breaks stratification
- Inflow and effluent ISCO sampler locations are represented by the points A & B, respectively

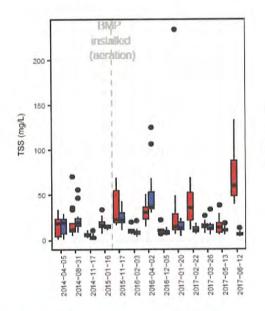




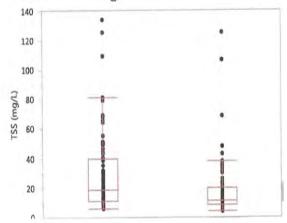




# Casa Bella Pond: Pre- vs Post-BMP Influent TSS



- Post BMP less variability in observed data
- Post BMP significant lowering of TSS concentration
- · Indicates this is a good treatment for TSS



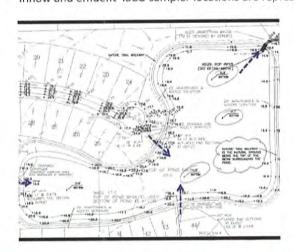


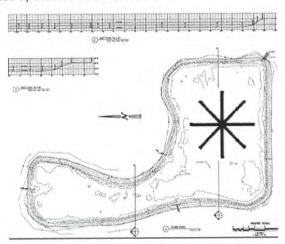
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# Del Sol Pond: Post-BMP (Floating Wetland)

- The 8.1 acre pond was located in Del SD north of Covington. Pond was completely sterile, evidenced by a veil
  of mosquitos and dominated by colloidal particulates.
- The SW pond was retrofitted with a floating wetland constructed by Comite Resources and Dr. Gary Shaffer with SLU. Shape of the wetland was a 0.62 acre asterisk of PVC "rafts".
- · Inflow and effluent ISCO sampler locations are represented by the arrows as shown below.







# Del Sol Pond Floating Wetland: Vegetation Varieties



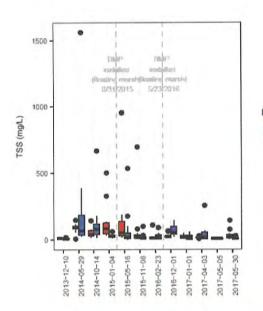




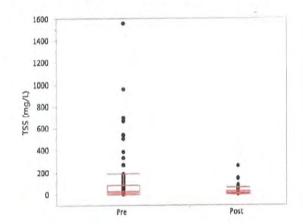
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## Del Sol Pond: Pre- vs Post-BMP Influent TSS



- Post BMP less variability in observed data
- Post BMP significant lowering of TSS concentration
- · Indicates good treatment option for TSS





## Labarre Street Pond: Vegetative Planting BMP

- The 5 acre pond was located east of the City of Mandeville. The dry SW detention pond has a low-water channel to preserve plantings from being drowned during dry weather. This pond only had post-BMP sampling conducted.
- The SW pond was replanted with various indigenous fruit and nut trees, shrubs and wildflowers to provide a balanced ecosystem when mature.
- Inflow and Effluent (ISCO sampler locations) were placed as shown below.



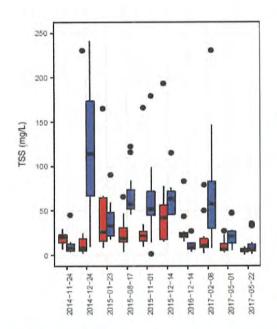




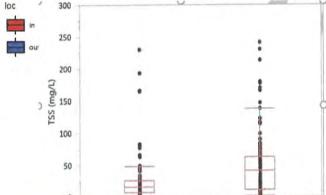
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# Labarre Pond: Pre- vs Post-BMP Influent, TSS

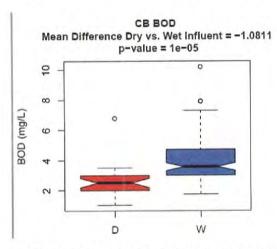


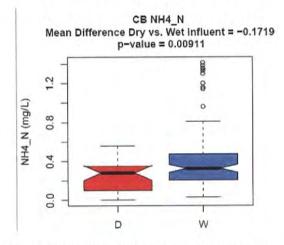
- Post-BMP effluent: Unacceptable variability
   & outliers in observed data
- Post-BMP effluent: Significant increase in TSS concentration
- TSS showed poor performance





# Casa Bella Pond: Post-BMP, Dry vs Wet Influent





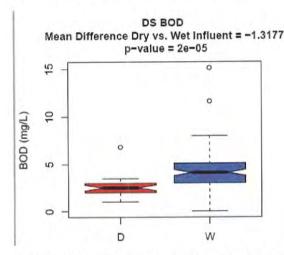
- Casa Bella Pond Influent: BOD and NH4 have higher concentrations during wet-weather than in dry- with greater variability & many outliers during wet-weather
- Inflows from dry- and wet-weather are significantly different (p>0.05) from each other (meaning the data cannot be pooled)

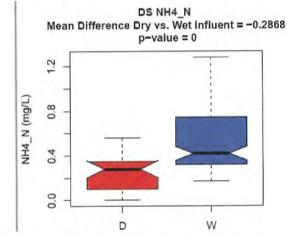


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# Del Sol Pond: Post-BMP, Dry vs Wet Influent

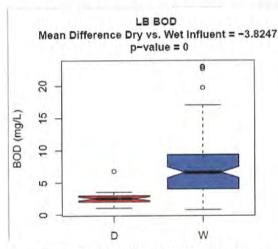


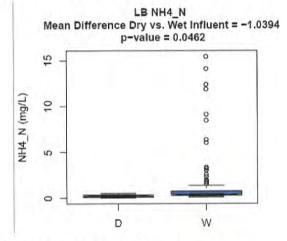


- Del Sol Pond Influent: BOD and NH4 have higher concentrations during wet-weather than in dry- with greater variability during wet-weather
- Inflows from dry- and wet-weather are significantly different (p>0.05) from each other (meaning the data cannot be pooled)



# Labarre Pond: Post-BMP, Dry vs Wet Influent





- Labarre Pond Influent: BOD and NH4 have higher concentrations during wet-weather than in dry- with greater variability & more outliers during wet-weather
- Inflows from dry- and wet-weather are significantly different (p>0.05) from each other (meaning the data cannot be pooled)



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Comparison of STP Study vs International SW

Database

- STP wet ponds (Casa Bella & Del Sol) were in sewered area of STP so that influent concentrations were lower in nutrients & organics than ISWD.
- Effluent concentrations were similar or lower; thus, %RE were lower than the ISWD.
- Labarre pond (dry, planted) had significantly higher TSS in the outflow relative to the inflow.
   Apparently detritus is entrained in traversing the pond.
- All additional parameters in the planted dry pond out-performed those of the ISWD.

			Wet-Weather, Post-BMP (flow-adjusted)								
		3.14	Retenti (Wet	on Pond Pond)	Wetland Bas Po	in/ Retention nd	Detention (Dry	on Basin Pond)			
Constituents	Units	Sample Location	(n=54) [2]	(n=12)	(n=71) [3]	(n=12)	(n=21) [4]	(n=9)			
		Location	ISWD 2014	Casa Bella (Aeration)	ISWD 2014	Del Sol (Floating Wetland)	ISWD 2014	Labarre (Vegetated Planting)			
		Influent	47.70	15.33	37.90	15.33	68.20	16.34			
Suspended	(mg/L)	Effhent	11.50	10.00	10.90	10.34	23.30	34.67			
Solids	777	RE, %	75.89	34.77	71.24	32.58	65.84	-112.2			
		Influent	1.63	0.49	1.57	0.57	1.93	1.02			
Total Nitrogen	(mg/L)	Effloent	1.20	0.42	1.21	0.51	1.37	0.78			
		RE, %	26.38	14.29	22.93	10.53	29.02	23.53			
NO2+NO3- Nitrogen		Influent	0.39	0.07	0.34	0.14	0.44	0.34			
	(mg/L)	Effloent	0.13	0.05	0.11	0.12	0.27	0.09			
	1	RE, %	66.67	28.57	67.65	14.29	38.64	73.13			
Total	(mg/L)	Influent	0.21	0.02	0.17	0.06	0.25	0.32			
		Effluent	0.09	0.01	0.09	0.04	0.20	0.18			
Phosphorus	17.00	RE, %	55.83	50.00	45.83	33.33	22.13	43.75			
Per note.		Influent	0.13	0.01	0.11	0.03	0.08	0.29			
Dissolved Phosphorus	(mg/L)	Effluent	0.07	0,01	0.06	0.01	0.08	0.09			
Phosphorus		RE, %	47.73	-	43.86	66.67	2.41	68.97			
250000		Influent	11/	0.31		0.48		0.35			
(NH3-N)	(mg/L)	Effluent		0.32		0.39		0.29			
(1413-11)	170-16	RE, %		-3.23		18.75		16.45			
		Influent		3.84		4.70		6.30			
BOD5	(mg/L)	Effluent		3.60		4.85		5.70			
		RE, %		6.25		-3.19		9.52			
		Influent		9.58		13.04		15.72			
TOC	(mg/L)	Efflient		9.36		9.73		14.60			
		RE, %		2.35		25.38		7.12			



# **Constituent Treatment Recommendations**

- Labarre (Dry) pond appears to effectively treat most of the constituents of concern in STP waters that cause DO collapse (nutrients & BOD). The planted pond outperforms the ISWD.
- Casa Bella (Aeration) appears to treat solids, several nitrogen species, TP & BOD.
- Del Sol (Floating Wetland) is very effective in removing solids, ammonia, phosphorous and uniquely, TOC. TOC causes long-term DO demand, as opposed to BOD<sub>5</sub> that results in hot spots closer to outfalls.
- Utilize STP study results for effluent quality & %REs in ordinance or TM.

Constituents	Casa Bella (Aeration)	Del Sol (Floating Wetland)	Labarre (Dry Pond, Vegetative Planting)
Suspended Solids	<b>✓</b>	<b>✓</b>	
Total Nitrogen	V	<b>✓</b>	<b>√</b> *
Nitrate-Nitrogen	/		<b>√</b> *
Total Phosphorus	V	1	<b>/</b> *
Dissolved Phosphorus		<b>/</b> *	<b>√</b> *
Ammonia (NH3-N)		/	/
BOD5	V		V
TOC		1	

√\* Indicates BMP outperformed ISWD



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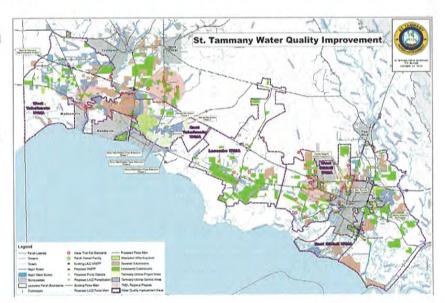
## Dr. Andrea Bourgeois-Calvin, June 2017

"With this project STP has taken a significant step forward in both identifying and addressing wastewater inputs into impaired streams and providing water quality treatment for stormwater. If implemented parish-wide, both of these activities could lead to profound water quality improvements in St. Tammany Parish rivers."



# Study Recommendations: Wastewater (WW) Regionalization

- Per the TMDLs, NPS pollutants from unsewered areas are the main source of impairments (disregarding Hg) in STP waterbodies.
- Regionalization of sewerage is recommended by LDEQ to mitigate these impairments.
- Utilize the Hot Spots as a method of prioritizing & justifying Regionalization.
- STP should continue to procure funding and advance Regionalization.



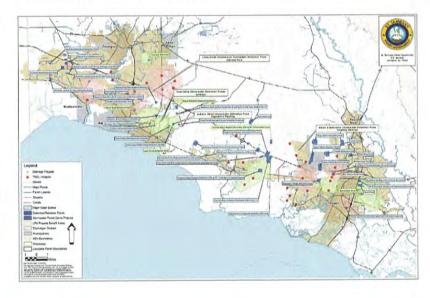


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# Study Recommendations: Optimize WQ Treatment in all SW Ponds

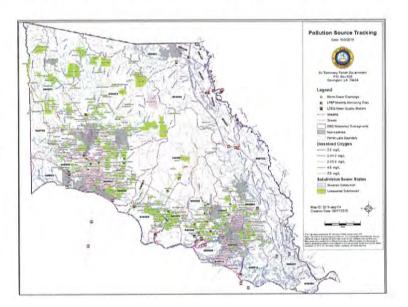
- Require by ordinance aeration as a minimum BMP in all wet ponds.
- Retrofit STP ponds with appropriate WQ BMPs – seek funding sources.
- Regional drainage ponds should have pre- and post-construction water quality parameters tested for WQ performance.
- Hot spots should continue to be periodically tested during critical summer months in areas that have failed DO standards.





## Study Recommendations: WW Source Tracking

- Continue to conduct pollution source tracking inspections in unsewered areas with homeowner outreach & education.
- Priority should be given to areas of TMDLs or unresolved HS.
  - Areas with < 50 homes may potentially be conducted in-house (DES),
  - Larger areas should seek grantfunding for inspections.
- Implement a parish-wide Decentralized Management Program until wastewater regionalization can be completed.



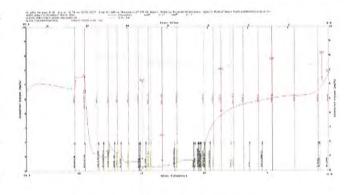


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# SWMP, MS4, TM & Modeling Recommendations

- Share Hot Spot Monitoring and Pond influent/effluent qualities with LDEQ for us in management plans.
- Work with LDEQ to delist areas that the study found to be intermittent, or meeting EPA standards.
- Add study report, results & recommendations to the 2018 STP SWMP and report progress in MS4 annual reports.
- Incorporate Study BMP effluent quality & REs to the STP <u>Technical Manual</u> for use by developers & engineers.

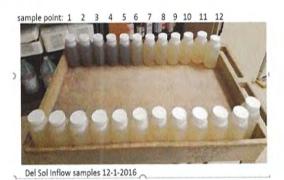


- The WQ Impact Modeling Program should become an integral part of the development review process.
  - Testing development s for DO impacts on receiving streams, as early as possible in the process, may prevent WQ permitting problems (LDH, LDEQ, LDWF).
  - o Drainage and Road projects that disturb > 1 acre of soil should be modeled for DO impacts
  - o Permitting caution should be exercised in areas of impairment .



# **Maintenance** Recommendations

- Partial floating wetland should remain in Del Sol Pond to protect outfall from Timber Branch back-ups.
- Remaining rafts should be relocated to STP ponds needing solids or nutrient removal.
- Area around Del Sol outfall is building land and is nutrient-rich from Timber Branch back-ups. Periodic removal of this material by DPW will improve appearance & clear outfalls.







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## Contact Us

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# **Questions or Comments?**

Thank you for your attention and interest in our GREAT Parish! If you think of other questions, please feel free to contact us.

We will be happy to assist you.

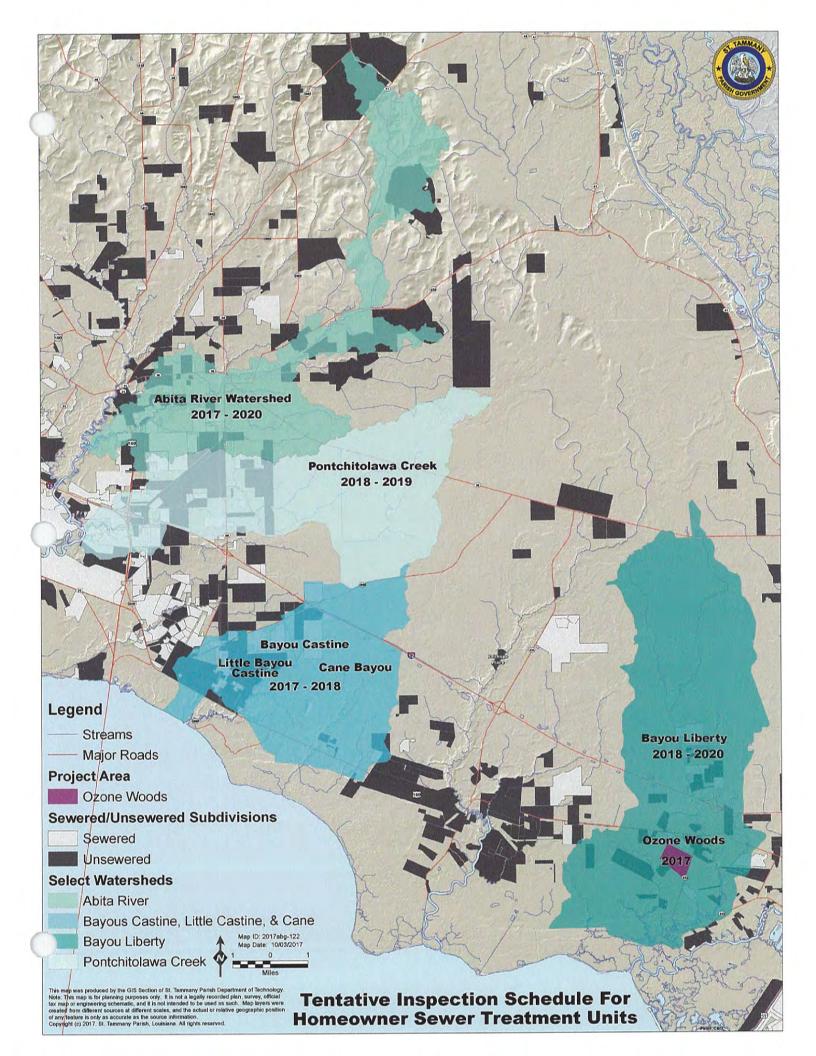
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## Exhibit 3

- STP Decentralized Management Program for On-site Sewer Treatment Systems Program documents
- Inventory of Unsewered homes in STP by Watershed
- MAP and List of SDs to be inspected 2018-2020

# St. Tam y Parish Decentralized Management Plan

Program Element	Responsible Party	Activity
	DES	• Prior and/or in conjunction with the initiation of the Decentralized Management Program, conduct meetings with Council
	Community Groups	members, HOA and community groups, real estate firms, and homeowners from unsewered areas to discuss the needs and
Public Outreach	Other Agencies	benefits of the Decentralized Management Program, watershed impairments, nature of the Inspections, schedule of events.
	Homeowner	
	DES	• Offer to Council members, HOA and community groups, real estate firms, and any other interested parties presentations
Public Education	Community Groups	and information regarding the proper operation and maintenance of on-site wastewater systems.  Distribute multimedia materials on basic system operation and maintenance needs.
	Other Agencies	• Use current and updated website information.
	Homeowner	Potential Grants
		<ul> <li>Maintain existing on-site inspection program.</li> <li>Conduct inspections on ATU's throughout subdivisions within the Hot Spot areas within specific watersheds in</li> </ul>
Compliance	,	unincorporated St. Tammany Parish
Inspections/Monitoring	DES	<ul> <li>Document GPS coordinates at outfall, system type, performance of the ATU.</li> <li>Document GPS coordinates at outfall, system type, performance of the ATU.</li> </ul>
		Aristing on-site systems not operating properly.
	DES	<ul> <li>Educate homeowner about proper operation, maintenance and monthly electrical costs vs. expensive repairs.</li> <li>Handout operation and maintenance brochure at completion of inspection for homeowner reference.</li> </ul>
Operations & Maintenance		• Provide homeowners with lists of state approved State/DHH approved service providers/installers.
	Homeowner	<ul> <li>Provide homeowners with contact numbers and website resources for any further questions.</li> </ul>
		• If sewer system fails, a letter will be submitted to the resident informing them of corrective actions needed to pass re-
	Wan.	
Corrective Actions	DES	<ul> <li>If system fails re-inspection, a second letter Will be submitted to resident giving them an additional 30 days—stading that fines may be imposed if the system is not attained compliance.</li> </ul>
		<ul> <li>Identify and track by GPS coordinates the locations of all inspected ATUs/on-site treatment units.</li> </ul>
		<ul> <li>Administer a database inventory (locations, permits, performed maintenance, inspection reports) of all inspected</li> </ul>
Kecordkeeping, Inventory, & Renorting	DES	systems.
0 1 1 1	- On a position	<ul> <li>Maintain system inventory, permits, and inspection files</li> <li>Distribute post send, maintenance reminders generated in database.</li> </ul>
		11LV
	DES	<ul> <li>Provide information for grants available through the Department of Health and Human Services to repair or replace ATUS.</li> </ul>
Financial Assistance &	Department of	
Funding	Health and Human	
	SELVICES	



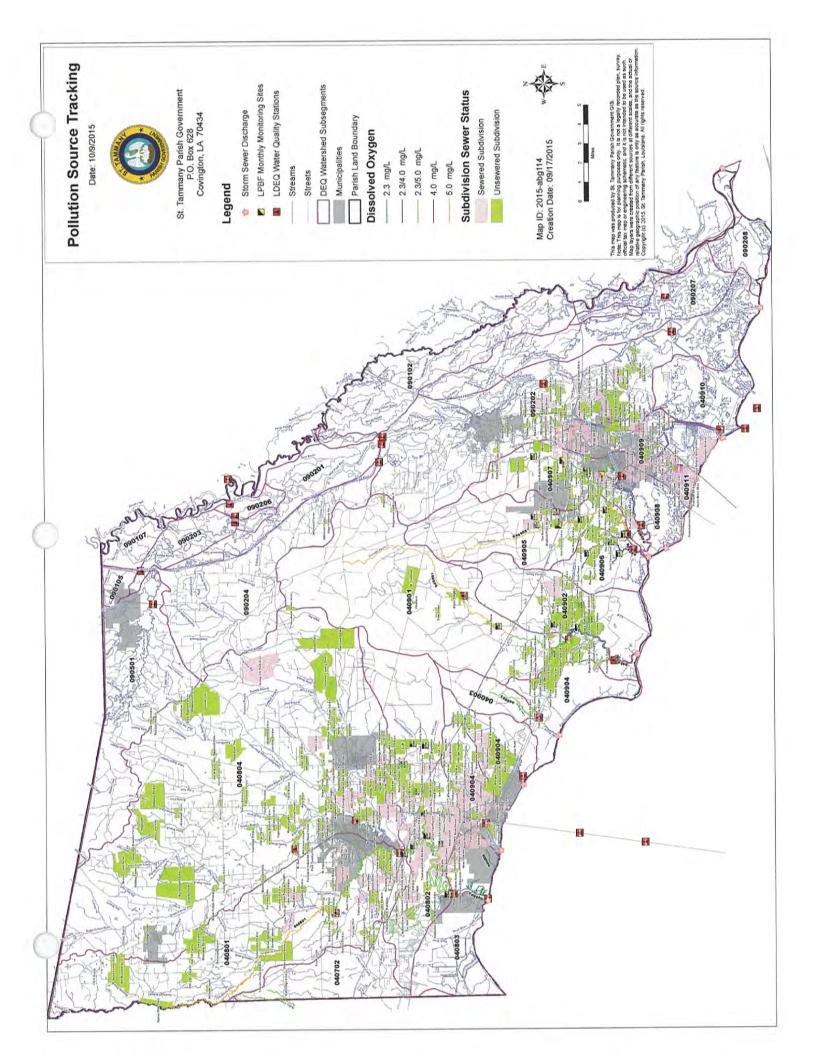
Tentative Inspection Schedule for Homeowner Sewer Treatment Units: 2017-2020

SUBDIVISION	DATE Recorded Plat	Number Lots [1]	Watershed	Impairment (If assessed) [2]	Inspection Responsible Party [3]	Inspection YR
Abita Nursery	1956	277	Abita River	not assessed	DES	2018-2020
Abita River Estates, Ph1	1979	5	Abita River	not assessed	DES	2018-2020
Abita River Estates, Ph2	1980	16	Abita River	not assessed	DES	2018-2020
Abita Springs Annex	1914	TNTC	Abita River	not assessed	DES	2018-2020
Abita Springs Estates, Addition1	1973	50	Abita River	not assessed	DES	2018-2020
Abita Springs Estates	1959	39	Abita River	not assessed	DES	2018-2020
Abita Tract	1985	6	Abita River	not assessed	DES	2018-2020
Abita View Apartments			Abita River	not assessed	DES	2018-2020
Abita View Condominum Park		14	Abita River	not assessed	DES	2018-2020
Mexiusville	1935	TNTC	Abita River	not assessed	DES	2018-2020
Alexiusville (East Addition)	?	TNTC	Abita River	not assessed	DES	2018-2020
Alpine Village Estates, Ph1	1975	19	Abita River	not assessed	DES	2018-2020
Alpine Village Estates, Ph2	1978	36	Abita River	not assessed	DES	2018-2020
Atlas Addition	1906	TNTC	Abita River	not assessed	DES	2018-2020
Azalea Park	1955	32	Abita River?	not assessed	DES	2018-2020
Bootlegger Run	1998	10	Abîta River	not assessed	DES	2018-2020
Dirmann	1908	20	Abita River	not assessed	DES	2018-2020
Garland's (Covington & Claiborne Add'n)	1900?	TNTC	Abita River	not assessed	DES	2018-2020
Glisson Division	1906	12	Abita River	not assessed	DES	2018-2020
Grande Hills Estates	1984	215	Abita River	not assessed	DES	2018-2020
Green Woods, Ph1	1969	10	Abita River	not assessed	DES	2018-2020
Green Woods, Ph2	1979	33	Abita River	not assessed	DES	2018-2020
Greensburg	1961	15	Abita River	not assessed	DES	2018-202
lickory Knoll	1990	16	Abita River	not assessed	DES	2018-202
	1961	101	Abita River	not assessed	DES	2018-202
Hillcrest Country Club Estates Hillcrest Country Club Estates, Addition1	1961	TNTC	Abita River	not assessed	DES	2018-202
		606	Abita River	not assessed	DES	2018-202
Hillcrest Country Club Estates, Addition3	1961 1961	TNTC	Abita River	not assessed	DES	2018-202
Hillcrest Country Club, Addition1			Abita River	not assessed	DES	2018-202
Hillcrest Country Club, Addition2	1961	455			DES	2018-202
ronwoods	2015	14	Abita River	not assessed		
Laura Paige Tract		9	Abita River	not assessed	DES	2018-202
Long Branch Acres	1973	9	Abita River	not assessed	DES	2018-202
Long Leaf Estates, Addition No1	1976	13	Abita River	not assessed	DES	2018-202
Oak Alley Estates	1979	13	Abita River	not assessed	DES	2018-202
Oak Knoll Estates, RS	1979	TNTC	Abita River	not assessed	DES	2018-202
Pailet First Subdivision	1910	48	Abita River	not assessed	DES	2018-202
Pelican Estates	1972	14	Abita River	not assessed	DES	2018-202
Pelican Estates, Addition1	1975	11	Abita River	not assessed	DES	2018-202
Pelican Estates, Addition2	1918/ 1978	24	Abita River	not assessed	DES	2018-202
Pelican Estates, Ph3	1979	28	Abita River	not assessed	DES	2018-202
Plantation Manor			Abita River	not assessed	DES	2018-202
Project 59	1979	8	Abita River	not assessed	DES	2018-202
Rainbow	1956	22	Abita River	not assessed	DES	2018-202
Sherwood Forest	1966	10	Abita River	not assessed	DES	2018-202
Sunny Meadows Acres	1980	8	Abita River	not assessed	DES	2018-202
Sunrise Park	1981	72	Abita River	not assessed	DES	2018-202
Tammany Hills		1626	Abita River	not assessed	Grant	2017-201
Town of Mailleville	1901	60	Abita River	not assessed	DES	2018-202
Town of New Claiborne			Abita River	not assessed	DES	2018-202
Waldheim Estates	1982	43	Abita River	not assessed	DES	2018-202
West Abita Springs	1919	308	Abita River	not assessed	DES	2018-202
Whippoorwill Grove (on Money Hill), Ph1	1988	102	Abita River	not assessed	DES	2018-202
Whippoorwill Grove (on Money Hill), Ph1 Whippoorwill Grove (on Money Hill), Ph2	1992	102	Abita River	not assessed	DES	2018-202
	1992	55	Abita River	not assessed	DES	2018-202
Whippoorwill Grove (on Money Hill), Ph3	1993	41	Abita River	not assessed		2018-202
Whippoorwill Grove (on Money Hill), Ph4	1994	12	Abita River	not assessed		2018-202
Whippoorwill Grove (on Money Hill), Ph5			Abita River	not assessed		2018-202
Whippoorwill Grove (on Money Hill), Ph6	1995	8 40	Abita River	not assessed		2018-202
Whippoorwill Grove (on Money Hill), Ph7	1996		<del></del>			2018-202
Wilsonville	1977	TNTC	Abita River	not assessed	DE9	2017-202
Watershed Total	1007	4595	Abita River	BOD	DES	2017-20
Cane Bayou Estates	1984	26	Bayou Cane	BOD		2017-20
Fountainebleau Heights	1955	35	Bayou Cane	BOD	DES	
Laurel Oaks	2002	10	Cane Bayou	BOD	DES	2017-20
Bayou Acres	1989	8	Bayou Castine	BOD	DES	2017-20
Castine Point	1993	15	Bayou Castine	BOD	DES	2017-20
Hidden Pines (part of Town of Mandeville)		308	Bayou Castine	BOD .	DES	2017
Mandeville Annex	1913	379	Bayou Castine	BOD	DES	2017
Town of Mandeville	1928	180	Little Bayou Castine	BOD	DES	2017-20
Sunset Park (part of Town of Mandeville)			Little Bayou Castine	BOD	DES	2017-20
Cantoncrest (part of Town of Mandeville)			Little Bayou Castine	BOD	DES	2017-20
V & L Acres Estates	1971	41	Bayou Castine	BOD	DES	2017-20
Cours Carson	2002	54	Bayou Castine	BOD	DES	2017-20
Watershed Total		1056	Bayou Cane/ Bayou Castine/ Little Bayou Castine	BOD	DES	2017-20

SUBDIVISION	DATE Recorded Plat	Number Lots [1]	Watershed	Impairment (If assessed) [2]	Inspection Responsible Party [3]	Inspection YR
Bayou Bend Estates	1983	24	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Bayou Court	1954	21	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Bayou Liberty Estates	1927	188	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Bayou Liberty Gardens	1930	215	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Bayou Pines	1954	17	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Bayou Vista	1955	132	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Brenwood	1954	104	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Cadillac Park	1954	42	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Christie Ann Lee *Christy Lea m+canals	?	68	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Coin du Lestin, Addition1	1961	48	Bayou Liberty	BOD	Proposed Grant	2018 - 2020 2018 - 2020
Elysian Acres	1973	23	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Elysian Acres, Unit2	1974	21	Bayou Liberty	BOD	Proposed Grant Proposed Grant	2018 - 2020
Garden Drive	1953	138 185	Bayou Liberty Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Home Estates Acreage	1967 1983	32	Bayou Liberty  Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Huntington Estates	1983	98	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Liberty Acres	1955	29	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Liberty Pines	1978	6	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Nottingham Place, Ph1	1978	22	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Oak Manor Estates, Ph1		22	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Oak Manor Estates, Ph2	1975 1974	25	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Oak Ranch Estates, Ph2	1974	7	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Oak Ranch Estates, Ph3	1974	54	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Oak Ranch Estates. Ph1	1973	139	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Ozone Acres Ozone Woods (cost side)	1932	200	Bayou Liberty	BOD	Grant	2017
Ozone Woods (east side) Ozone Woods (westside)	1956	656	Bayou Paquet	BOD	Grant	2017
Pichon Heights	1944	12	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Pine Ridge	1972	69	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Pine Kinge Regal Park Estates	1972?	49	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Regal Park Estates, Extension	1972	13	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Romano No.2	1949	19	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Royal 18th Estates	979	4	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Royal Estates, Ph2	1974	19	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Royal Estates, Ph1	~1997	13	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Slidell Manor	1946	457	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
St Tammany Gardens	1961	252	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Thompson Road area	45	33	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Treasure Cove			Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Victoria Park	1986	30	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Wildwood Park	1951	29	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Bayou Terrace	1956	66	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Home Acres	1989	52	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Kimberly Manor	1977	10	Bayou Liberty	BOD	Proposed Grant	2018 - 2020
Watershed Total	· Lagine, in	3643	Bayou Liberty	BOD		2017 - 2020
Covington Acres	1979	11	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Beatty Acres Estates	1968	23	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Birg Boulevard, The, Northern & Southern Division	1911	TNTC	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Crown Country Estates	1978	42	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Dove Park	1957	300	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Harold Park Acres	1968	26	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Heatherstone, Ph1	1980	7	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Heatherstone, Ph2	1981	35	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
	1914	TNTC	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
Helenbirg Lots & Farms					Grant or DES	2018-2019
Helenbirg Lots & Farms King's Row	1961	110	Ponchitolawa Creek	BOD		
	1961 1962	255	Ponchitolawa Creek	BOD	Grant or DES	2018-2019
King's Row	1961 1962 1977	255 31	Ponchitolawa Creek Ponchitolawa Creek	BOD BOD	Grant or DES Grant or DES	2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres	1961 1962 1977 1971	255 31 46	Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek	BOD BOD	Grant or DES Grant or DES Grant or DES	2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda	1961 1962 1977 1971 1954	255 31 46 50	Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek	BOD BOD BOD	Grant or DES Grant or DES Grant or DES Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property	1961 1962 1977 1971 1954 1957	255 31 46 50 TNTC	Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek	BOD BOD BOD BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park	1961 1962 1977 1971 1954 1957 1908	255 31 46 50 TNTC 212	Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek Ponchitolawa Creek	BOD BOD BOD BOD BOD BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract	1961 1962 1977 1971 1954 1957 1908 1915	255 31 46 50 TNTC 212 16	Ponchitolawa Creek	BOD BOD BOD BOD BOD BOD BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa	1961 1962 1977 1971 1954 1957 1908 1915 1978	255 31 46 50 TNTC 212 16 5	Ponchitolawa Creek	BOD BOD BOD BOD BOD BOD BOD BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa Ponchitolawa Estates	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959	255 31 46 50 TNTC 212 16 5	Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row Litolff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa Ponchitolawa Estates Red Gap Acres	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959	255 31 46 50 TNTC 212 16 5 40	Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa Ponchitolawa Estates	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959	255 31 46 50 TNTC 212 16 5	Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row Litolff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Fann Tract Ponchitolawa Ponchitolawa Estates Red Gap Acres	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959 1961 1961	255 31 46 50 TNTC 212 16 5 40 148 ?	Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa Ponchitolawa Estates Red Gap Acres Red Gap Annex	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959 1961 1961 1927	255 31 46 50 TNTC 212 16 5 40 148 7 TNTC 45	Ponchitolawa Creek & Tchefuncte River Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa Ponchitolawa Estates Red Gap Acres Red Gap Annex Suburban Estates	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959 1961 1961	255 31 46 50 TNTC 212 16 5 40 148 ?	Ponchitolawa Creek & Tchefuncte River Ponchitolawa Creek Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019
King's Row LitoIff Maplewood Estates Marci Acres Nidda Northern Homes Property Ozone Park Ponchatolawa Farm Tract Ponchitolawa Ponchitolawa Red Gap Acres Red Gap Annex Suburban Estates Thelma Estates	1961 1962 1977 1971 1954 1957 1908 1915 1978 1959 1961 1961 1927	255 31 46 50 TNTC 212 16 5 40 148 7 TNTC 45	Ponchitolawa Creek & Tchefuncte River Ponchitolawa Creek	BOD	Grant or DES	2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019 2018-2019

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 Impairments are from the EPA 303(d) list from which TMDLs are developed
 DES St. Tammany Parish Department of Environmental Services
 Indicates the information could not be found

Values highlighted in green are the result of current inspection programs (DES & EPA Grants)



SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERE
ee Road Heights	1944	20	Bogue Falaya River	LaTice Branch-> Bogue Falaya River	1774			Unsewered Subdivision
Venchy Branch Estates	1979	4	Bogue Falaya River	Nenchy Branch> Bogue Falaya River				Unsewered Subdivision
lighland Park Center	1985	16	LTR	Flowers Bayou> LTR	BOD	24.28/ >2 acrs min	Individual	Unsewered Subdivision
Brin Farms	1980	24	UTR	Talisheek Branch> UTR (south of Hwy 21)		_		Unsewered Subdivision
Lake Vista Estates, Ph3	1988	26	UTR	Pruden Canal & Horse Branch-> UTR (bounded to south by Simpson Sod Farm)		25.00	Individual	Unsewered Subdivision
Pruden Acres	1989	11	UTR	Pruden Creek-> UTR		30.98/>1 acre lots	Individual	Unsewered Subdivision
Wildwood Farms	2006	61	W Pearl River	Evans Creek-> PRNC-> W Pearl River (bounded on E by W Pearl River waterway)				Unsewered Subdivision
Slico	1958	18	W Pearl River	Doubloon BaYOU-> W Pearl River (straddles US190 E of Slidell)				Unsewered Subdivision
Suburba Gardens (Resub of Slico)	1954	10	W Pearl River	Doubloom Bayou-> W Pearl River (bordered on N by US 190; lillian St bisects SD; on E by Belair SD)				Unsewered Subdivision
Dirmana	1908	20	Abita Reiver				Individual	Unsewered Subdivision
Abita Nursery	1956	277	Abita River	Abita River		4.3 acre lots	Individual	Unsewered Subdivision
Abita River Estates, Ph1	1979	5	Abita River	Abita River		67.00	Individual	Unsewered Subdivision
Abita River Estates, Ph2	1980	16	Abita River	Abita River		59,00	Individual	Unsewered Subdivision
Abita Springs Annex	1914	1724	Abita River	Abita River				Unsewered Subdivision
Abita Springs Estates, Addition1	1973	50	Abita River	E Fork Long Branch-> Abita River				Unsewered Subdivision
Abita Tract	1985	6	Abita River	Abita River				Unsewered Subdivision
Abita View Apartments			Abita River	Abita River				Unsewered Subdivision
Abita View Condominum Park		14	Abita River	Abita River				Unsewered Subdivision
Alexiusville	1935	TNTC	Abita River	Abita River				Unsewered Subdivision
Alexiusville (East Addition)	7	TNTC	Abita River	Abita River				Unsewered Subdivision
Ipine Village Estates, Ph1	1975	19	Abita River	Abita River		-	Unknown	Unsewered Subdivision
.lpine Village Estates, Ph2	1978	36	Abita River	Abita River			Unknown	Unsewered Subdivision Unsewered Subdivision
Atlas Addition	1906	32 blocks	Abita River	Long Branch> Abita Eiver Abita River			Individual	Unsewered Subdivision
Bootlegger Run	1998	10 TNTC	Abita River	(Covington)		-	marvidua	Unsewered Subdivision
Garland's (Covington & Claiborne Add'n) Glisson Division	1906	12	Abita River	Long Branch> Abita River (north of Abita Springs)				Unsewered Subdivision
Grande Hills Estates	1.984	215	Abita River	Abita Creek> Abita River		1420.751/ 5 acre lot avg	Individual	Unsewered Subdivision
Green Woods, Ph1	1969	10	Abita River	Long Branch> Abita River (north of Abita Springs)		20.4/ > 1 acre	Individual	Unsewered Subdivision
Green Woods, Ph2	1979	33	Abita River	Long Branch-> Abita River (north of Abita Springs)		69,43/1 acre min lot	Individual	Unsewered Subdivision
Greensburg	1961	15	Abita River	Long Branch-> Abita River (north of Abita Springs)		lots > lacre	Individual	Unsewered Subdivision
Hickory Knoll	1990	16	Abita River	Abita Creek> Abita River (southern boundary is Lowe Davis Rd @ Fanny Cook)		372.16/23 acre avg lot	Individual	Unsewered Subdivision
Hillcrest Country Club Estates	1961	101	Abita River	Abita Creek> Abita River				Unsewered Subdivision
Hillcrest Country Club Estates, Addition1	1961	TNTC	Abita River	Abita Creek> Abita River		1		Unsewered Subdivision
Hillcrest Country Club Estates, Addition3	1961	606	Abita River	Abita Creek> Abita River		511.07		Unsewered Subdivision
Hillcrest Country Club, Addition1	1961	TNTC	Abita River	Abita Creek-> Abita River		250 222	-	Unsewered Subdivision Unsewered Subdivision
Hillerest Country Club, Addition2	1961	455	Abita River	Abita Creek-> Abita River	-	250.237		Cusewered Subdivision
Ironwoods	2015	14	Abita River	Abita Xcreek-> Abita River (bounded on west by Money Hill Rd; south by Hwy 435)	4	103.45/4.21 acres lot avg	Individual	Unsewered Subdivision
Laura Paige Tract		9	Abita River					Unsewered Subdivision
Long Branch Acres	1973	9	Abita River	Long Branch-> Abita River		30.74		Unsewered Subdivision
Long Leaf Estates, Addition No1	1976	13	Abita River	Long Branch-> ditches along Lowe David Rd-> Abita River		73.70		Unsewered Subdivision
Oak Alley Estates	1979	13	Abita River	Long Branch-> Abita River (Waldheim area)		41.54	11	Unsewered Subdivision
Oak Knoll Estates, RS	1979	TNTC	Abita River	(off Peg Keller Rd)		910.02		Unsewered Subdivision
Pailet First Subdivision	1910	48	Abita River				Unknown	Unknown

	SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERI
lican E	istates	1972	14	Abita River	(Abita Springs area: bounded on south by Hwy 433)		56.20		Unsewered Subdivision
Pelican E	Estates, Addition1	1975	11	Abita River	(bordered on north by Hwy 435, east by Abita Springs corp limit)		21.3/> ncre lots		Unsewered Subdivision
Pelican E	estates, Addition2	1918/1978	24	Abita River	(bordered on north by Hwy 435, east by Abita Springs corp limit)				Unsewered Subdivision
Pelican E	States, Ph3	1979	28	Abita River	(bordered on north by Hwy 435, east by Abita Springs corp limit)		19.51	"existing oxidation ponds" per plat	Unsewered Subdivision
Plantation	и Маног			Abita River	Long Branch> Abita River			Unknown	Unknown
Project 59	10	1979	8	Abita River	Abita Creek> Abita River	-	4.30	"mechanical" per	Unsewered Subdivision
Rainbow		1956	22	Abita River	(bounded to nN by "Covington-Abita Springs			plat	Unsewered Subdivision
	180.4	1966	10	Abita River	Hwy) (Straddles Lowe-Davis Rd N		29,81/2 acre		Unsewered Subdivision
Sherwood		7277		- C - C - C - C - C - C - C - C - C - C	of Abita Springs)		min lots 158.916/5	"Individual septic	
Sunny M	leadows Acres	1980	8	Abita River	Abita Creek-> Abita River			tanks" per plat	Unsewered Subdivision
Sunrise P	Park	1981	72	Abita River	(Bounded to N by Lowe- David Rd, to E by Robindale SD)		103.26	Individual	Unknown
	Mailleville	1901	60	Abita River	(Covington)				Unsewered Subdivision Unsewered Subdivision
	New Claibome	1005	43	Abita River	Long Branch-> Abita River				Unsewered Subdivision
Waldheir	m Estates	1982	43	Abita River	Abita River (bounded on E				
West Abi	oita Springs	1919	308	Abita River	by Camation St)				Unsewered Subdivision
Whippoc	orwill Grove (on Money Hill), Ph1	1988	102	Abita River	Abita Creek-> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		299,19	Individual	Unsewered Subdivision
Whippoo	orwill Grove (on Money Hill), Ph2	1992	10	Ablia River	Abita Creek-> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		70.25	Individual	Unsewered Subdivision
hippoc	orwill Grove (on Money Hill), Ph3	1993	55	Abita River	Abita Creek-> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		120.00	Individual	Unsewered Subdivision
Whippoo	orwill Grove (on Money Hill), Ph4	1994	41.	Abita River	Abita Creek—> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		74.50	Individual	Unsewered Subdivision
Whippoo	orwill Grove (on Money Hill), Ph5	1995	12	Abita River	Abita Creek> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		20.91	Individual	Unsewered Subdivision
Whippoo	orwill Grove (on Money Hill), Ph6	1995	8	Abita River	Abita Creek> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		20,19	Individual	Unsewered Subdivision
Whippoo	orwill Grove (on Money Hill), Ph7	1996	40	Abita River	Abita Creek> Abita River (Bounded on E by LA21 & W by Fairgrounds Dr)		108.47	Individual	Unsewered Subdivision
Wilsony		1977	522 32	Abita River Abita River?	Abita River Abita River?				Unsewered Subdivision Unsewered Subdivision
Azalea P	Park e Heights, Addition4	1981	30	Bayou Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)		39/ Lacre lots	Individual	Unsewered Subdivision
Heritage	e Heights, Addition5	1982	16	Bayou Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)		22.50	Individual	Unsewered Subdivision
Heritage	e Heights, Addition6	1986	17	Bayou Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)		23.621/>   acre lots	Individual	Unsewered Subdivision
Heritage	e Heights, Phi	1979	26	Bayou Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)			Individual	Unsewered Subdivision
Heritage	e Heights, Ph2	1979	15	Bayon Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)		16,67	Individual	Unsewered Subdivision
Heritage	e Heights, Ph3	1979	56	Bayou Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)		83.57	Individual	Unsewered Subdivision
Heritage	e Heights, Ph7	1994	7	Bayou Chinchuba?	Bayou Chinchuba? (western boundary Hwy 59)		22.29	Individual	Unsewered Subdivision
Avondal	le	1928	397	Bayou Bonfouca	Bayou Bonfouca				Unsewered Subdivision
ayou C		1954	197	Bayou Bonfouca	Bayou Bonfouca	BOD	-		Unenpersal Subdisidation
Chamale		1977	15	Bayou Bonfouca	Bayou Bonfouca	BOD		-	Unsewered Subdivision Unsewered Subdivision
	e' Addition No 1	1977	39	Bayou Bonfouca	Bayou Bonfouca	BOD	-		Unsewered Subdivision
	Lestin Estates	1965	62	Bayou Bonfouca	Bayou Bonfouca Bayou Bonfouca	BOD	6,46		Unsewered Subdivision
(Coin du	Lestin Estates, Addition5	1966 1962	105	Bayou Bonfouca Bayou Bonfouca	Bayou Bonfouca	BOD	46.00		Unsewered Subdivision
	Lestin, Addition2								

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWEREI
Little Addition to the Town of Slidell leans S/D of Oaklawn	1927	92	Bayou Bonfouca Bayou Bonfouca	(slidell area)				Unsewered Subdivision
Serenity Oaks Estates	2001	12	Bayou Bonfouca	Bayou Bonfouca	BOD	15.785/ 1 acre lots min	Individual	Unsewered Subdivision
Shipyard Quarters	7000		Bayou Bonfouca	Davis De Come	BOD			Unsewered Subdivision Unsewered Subdivision
Slidell Oak Ridge	1927	TNTC	Bayou Bonfouca	Bayou Bonfouca	276 27		"Septic Tanks" on	Unsewered Subdivision
Cane Bayou Estates	1984	26	Bayou Cane	Bayou Cane	BOD		recorded plat	and the state of t
Fountainebleau Heights	1955	35	Bayon Cane	Bayou Cane Bayou Castine	BOD	10,00	-	Unsewered Subdivision Unsewered Subdivision
Bayou Acres Castine Point	1989	15	Bayou Castine Bayou Castine	Bayou Castine	BOD		Individual	Unsewered Subdivision
Mandeville Annex	1913	TNTC	Bayou Castine	Bayou Castine? (bounded to north by Lotus, to south by Eola, to west by Ceres)				Unsewered Subdivision
Ozone Place Annex	1956	89	Bayou Castine	(part of Town of Mandeville)				Unsewered Subdivision
Sunset Park (part of Town of Mandeville)	1959	84	Bayou Castine	(bounded on W by Molitor)			Individual	Unsewered Subdivision
Fown of Mandeville	1928	400	Bayou Castine				Individual	Unsewered Subdivision
/ & L Acres Estates	1971	41	Bayou Castine	Bayou Castine (upstr of Hwy 190)		90.20		Unsewered Subdivision
Cantonerest (part of Town of Mandeville)			Bayou Castine	120)			Individual	Unknown
Cours Carson	2002	54	Bayou Castne				No. No. No.	Unsewered Subdivision
Forest Park Estates	1955	133	Bayou Chinebuba	Bayer Chinstole			Unknown Unknown	Unknown Unknown
Chinchuba East Chincuba Gardens	1956 1956	49	Bayou Chinchuba Bayou Chinchuba	Bayou Chinchuba Bayou Chinchuba		-	CIRRIOWII	Unsewered Subdivision
De Val Estates Sites	1958	62	Bayou Chinchuba	Bayou Chinchuba				Unsewered Subdivision
De Val Estates Sites, SectionB	1960	127	Bayou Chinchuba	Bayou Chinchuba				Unsewered Subdivision
Lanchster	7	TNTC	Bayou Chinchuba	(bounded on north by Dupard; south by Menamara, Mandeville)		193.19	Individual	Unsewered Subdivision
Mandeville Heights Farms No 2	1914	36	Bayou Chinchuba					Unsewered Subdivision
Random Oaks	1979	12	Bayou Chinchuba	Chinchuba Creek-> Bayou Chinchuba		16.50		Unsewered Subdivision
Glendale Heights Farms	1914	77	Bayou Chnichuba	Bayou Chnichuba	BOD			Unsewered Subdivision
Acadian Country	1995	9	Bayon deZaire	Bayou deZaire	BOD		Individual	Unsewered Subdivision Unsewered Subdivision
Bayou Heights	1956 1968	126 46	Bayou Lacombe Bayou Lacombe	Bayou Lacombe Bayou Lacombe	BOD			Unsewered Subdivision
ayou Lacombe Estates ayou Lacombe Manor	1973	39	Bayou Lacombe	Bayou Lacombe	BOD			Bayou Liberty
Bayou Mellun Estates	1972	41	Bayou Lacombe	Bayou Melun-> Bayou Lacombe	BOD		102	Unsewered Subdivision
Bayou Rouville Heights	1974	29	Bayou Lacombe	Bayou Rouville-> Bayou Lacombe	BOD			Unsewered Subdivision
Big Pine	1955	8	Bayou Lacombe	Big Branch Bayou-> Bayou Lacombe	BOD			Unsewered Subdivision
Clearview	1971	9	Bayou Lacombe	Bayou Lacombe	BOD	100,00	"Individual septic tanks" per plat	Unsewered Subdivision
Cloverland Acres	1962	84	Bayou Lacombe	Tag-Along Creek-> Bayou lacombe	BOD	133.99		Unsewered Subdivision
Deer Haven	1966	34	Bayou Lacombe			80,38/		Unsewered Subdivision
Fairhope Place	2005	11	Bayou Lacombe	Bayou Lacombe	BOD	62.679/ 5 acre min	Individual	Unsewered Subdivision
isherman's Haven	1960	66	Bayou Lacombe	Bayou Lacombe	BOD		Individual	Unsewered Subdivision
Forest Estates	26	620	Bayou Lacombe	Bayou Lacombe	BOD	347+ sacres	"Central" per plat	Unknown Unsewered Subdivision
Forest Glen	7	314	Bayou Lacombe	Tag-Along Creek> Bayou	BOD			Unsewered Subdivision
Forest Glen Farm Lots		3	Bayou Lacombe	Lacombe				A STATE OF THE PARTY OF THE PAR
Glenwood Acres	-	12	Bayou Lacombe	Bayou Lacombe (Adj Bayou	BOD			Unsewered Subdivision
Glenwood Annex	1956	39	Bayou Lacombe	Gardens) (northernmost street, Park	BOD	7	-	Unsewered Subdivision
Irvington Farm Lots	1902	12	Bayou Lacombe	Ave: Adj to Town of St Tammany)		137.10		Unsewered Subdivision
Lacombe Acres	1953	32	Bayou Lacombe	Bayou Lacombe (bounded on east by LA Hwy 072)	BOD			Unsewered Subdivision
Lacombe Acres Annex	1956	103	Bayou Lacombe	Bayou Lacombe (bounded on east by LA Hwy 072) Bayou Lacombe	BOD	30.77 80.71		Unsewered Subdivision Unsewered Subdivision
Lacombe Forest Lacombe Park	1970	27	Bayou Lacombe	Bayou Lacombe	BOD	60.71		Unsewered Subdivision
Lazy K Acres	1974	25	Bayou lacombe	(bounded on east by Transmitter Rd,)				Unsewered Subdivision
Lincolnville	1973	97	Bayou Lacombe	(bounded to west by Pierce Ave, to east by Cousin St)	45.5	167.91		Unsewered Subdivision
Martha F Todd	1925	1.5	Bayou Lacombe	Bayou Lacombe	D.C.I.	17.00		Unsewered Subdivision
Mimosa Park	1956	52	Bayou lacombe	Bayoù lacombe	BOD	16.02		Unsewered Subdivision Unsewered Subdivision
Oaklawn	1908	6	Bayou lacombe Bayou Lacombe	Bayou Lacombe	BOD			Unsewered Subdivision
Oaklawn Acreage Sites	1969	16	Bayou Lacombe	Bayou Lacombe	BOD	16.58/1 acre lots		Unsewered Subdivision
Oaklawn East	1960	TNTC	Bayou Lacombe	Bayou Lacombe	BOD	93,30		Unsewered Subdivision
Oaklawn Estate Sites	1969	17	Bayou Lacombe	Bayou Lacombe	BOD			Unsewered Subdivision Unsewered Subdivision

	SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERED
	nehurst Farm Lots	1902/1909	10	Bayou Lacombe	(in Town of St Tanmany; bounded on south by Hotel Ave, on west by Mitchell Dr, on north by Park Ave)		180.58/ 15 acre lots		Unsewered Subdivision
	Pinewood Addition To Lacombe	1912	82	Bayou Lacombe	(bounded on south by Seventh, on east by Toulouse, on north by Cousin)				Unsewered Subdivision
	Powell Heights	1961	34	Bayou Lacombe	Bayou Powell> Bayou Lacombe	BOD			Unsewered Subdivision
	Powell Heights, Ph2	1969	91	Bayou Lacombe	Bayou Powell> Bayou Lacombe	BOD	67.73		Unsewered Subdivision
	Powell Heights, Ph3	1973	27	Bayou Lacombe	Bayou Powell> Bayou Lacombe	BOD			Unsewered Subdivision
	Ridgewood Addition No 1	1965	18	Bayou Lacombe	(bounded on S by Singletary Rd)		48.41		Unsewered Subdivision
	Ridgewood Addition No 2	1968	51	Bayou Lacombe	(bounded on N by Singletary Rd)		108.46		Unsewered Subdivision
	Rouville	1911	19	Bayou Lacombe	Bayou Lacombe	BOD			Unsewered Subdivision
	Rustling Oaks	1980	15	Bayou Lacombe	Cypress Bayou> Bayou Lacombe	вор	36.5/ 1.88 acre min lot	Individual	Unsewered Subdivision
	South Oakdale	1946	12	Bayou Lacombe	(bounded on E by Bayou Rouville, to N by US190)				Unsewered Subdivision
	Sportsman Park	1957	27	Bayou Lacombe	Bayou Lacombe			410.00	Unsewered Subdivision
	Tag A Long Annex (Cloverland Acres SD)	1965	96	Bayou Lacombe	Bayou Lacombe	BOD			Unsewered Subdivision
	Tag-A-Long	1956	97	Bayou Lacombe	Bayou Lacombe	BOD			Unsewered Subdivision Unsewered Subdivision
	Tag-A-Long Addn.1	1963	12	Bayou Lacombe	Bayou Lacombe	BOD			Unsewered Subdivision Unsewered Subdivision
	Tammany Forest	1986	104	Bayou Lacombe			385.62		Unsewered Subdivision
	Town of St Tammany  West Oaklawn	1900	TNTC 131	Bayou Lacombe  Bayou Lacombe	Bayou Lacombe (bounded on W by Bayou Lacombe; bisected by Great Northern	BOD	363.02		Unsewered Subdivision
	Wooded Acres	1973	10	Bayou Lacombe	RR) Talesheek Creek-> Bayou Lacombe	BOD	21.13		Unsewered Subdivision
	Woodhaven Estates, Ph1	1994?	2	Bayou Lacombe	Bayou Lacombe	BOD	11.842/ 1 acre avg lots	Individual	Unsewered Subdivision
	Woodhaven Estates, Ph2	1995	11	Bayou Lacombe	Bayou Lacombe	BOD		Individual	Unsewered Subdivision
6	oodlands Grove Acres	1981	7	Bayou Lacombe	Talasheek> Bayou Lacombe		160.91/5 acre avg lots	"septic tanks" per plat	Unsewered Subdivision
Minneson	Woodlawn	1973	423	Bayou Lacombe	Bayou Lacombe (bounded on S by Lincolnville SD, on E by 12th St in Lacombe)				Unsewered Subdivision
	Bayou Gardens	1954	145	Bayou Lacombe?	Bayou Lacombe?	BOD			Unsewered Subdivision
	Bayou Bend Estates	1983	24	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
	Bayou Court	1954	21	Bayou Liberty	Bayou Liberty (adj Bayou Liberty Estates)	BOD			Unsewered Subdivision
	Bayou Liberty Estates	1927	188	Bayou Liberty	Bayou Liberty	BOD	<u> </u>		Bayou Liberty Unsewered Subdivision
	Bayou Liberty Gardens	1930	215	Bayou Liberty	Bayou Liberty	BOD	ļ		Unsewered Subdivision
	Bayou Pines	1954	17	Bayou Liberty	Bayou Liberty	BOD			10 1 11 11
	Bayou Vista	1955	132	Bayou Liberty  Bayou Liberty	Bayou Liberty Bayou Liberty (Adj Liberty	BOD			Unsewered Subdivision Unsewered Subdivision
	Brenwood		1		Gardens SD)  Bayou Liberty	BOD	<del> </del>		Unsewered Subdivision
	Cadillac Park	1954	42	Bayou Liberty Bayou Liberty	Bayou Liberty	BOD	?	<del> </del>	Unsewered Subdivision
	Christie Ann Lee *Christy Lea m+canals	? 1961	68 48	Bayou Liberty  Bayou Liberty	Bayou Liberty  Bayou Liberty	BOD	19.00		Unsewered Subdivision
	Coin du Lestin, Addition1	1973	23	Bayou Liberty	Bayou Liberty	BOD	33.84		Unsewered Subdivision
	Elysian Acres Elysian Acres, Unit2	1974	21	Bayou Liberty	Bayou Liberty	BOD	27.12		Unsewered Subdivision
	Garden Drive	1953	138	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
	Home Estates Acreage	1967	185	Bayou Liberty		BOD			Unsewered Subdivision
	Huntington Estates	1983	32	Bayou Liberty	Bayou Liberty	BOD	1		Unsewered Subdivision
	Liberty Acres	1953	98	Bayou Liberty	Bayou Liberty	BOD		F 1 1	Unsewered Subdivision Unknown
	Liberty Pines Nottingham Place, Ph1	1960	6	Bayou Liberty Bayou Liberty	Bayou Liberty  Bayou Liberty	BOD	21.43/1 acre	Unknown Individual	Unsewered Subdivision
					Bayou Liberty	BOD	lots		Unsewered Subdivision
	Oak Manor Estates, Ph1	1974	22	Bayou Liberty	Bayou Liberty	BOD	<del> </del>	<b> </b>	Unsewered Subdivision
	Oak Manor Estates, Ph2	1975 1974	22	Bayou Liberty Bayou Liberty	Bayou Liberty  Bayou Liberty	BOD			Unsewered Subdivision
	Oak Ranch Estates, Ph2 Oak Ranch Estates, Ph3	1974	7	Bayou Liberty	Bayou Liberty	BOD	1		Unsewered Subdivision
	Oak Ranch Estates, Ph3 Oak Ranch Estates. Ph1	1973	54	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
	Ozone Acres	1952	139	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
	Ozone Woods (eastside)	1956	200	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
	Pichon Heights	1944	12	Bayou Liberty	(no roads or location markers)				Unsewered Subdivision
f. and	Pine Ridge	1972	69	Bayou Liberty	Bayou Liberty	BOD	L	<b> </b>	Unsewered Subdivision
Consultation of the second	Regal Park Estates	1972?	49	Bayou Liberty	Bayou Liberty	BOD	55.56/ 1 acre lots		Unsewered Subdivision
	Regal Park Estates, Extension	1972	13	Bayou Liberty	Bayou Liberty	BOD	15.96/ ~ 1 acre lots		Unsewered Subdivision
	Romano No.2	1949	19	Bayou Liberty	(bounded to N by Camp Village Rd, slidell area)			<u> </u>	Unsewered Subdivision
	Royal 18th Estates	979	4	Bayou Liberty	Bayou Liberty	BOD	6.83	Individual	Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERE
Royal Estates, Ph2	1974	19	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
oyal Estates. Ph1	~1997	13	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
blidell Manor	1946	457	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
St Tammany Gardens	1961	252	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
Thompson Road area	45	33	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
Treasure Cove			Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
Victoria Park	1986	30	Bayou Liberty	Bayou Liberty	BOD			Unsewered Subdivision
Wildwood Park	1951	29	Bayou Liberty	Bayou Liberty (bounded on N by Bayou Liberty Rd, on S by Laurent Ave)			"central" per plat	Unsewered Subdivision
Bayou Terrace	1956	66	Bayou Liberty	Bayou Liberty (Adj Bayou Libety Estates)	BOD			Unsewered Subdivision
Home Acres	1989	52	Bayou Liberty	Bayou Liberty (Northern boundary is Royal Golf Course)	BOD		Individual	Unsewered Subdivision
Kimberly Manor	1977	10	Bayou Liberty	Bayou Liberty (access on west by Bayou Liberty Rd and on east by Laurent Ave)	BOD	12.28		Unsewered Subdivision
Acadian Estates, Ph2	1978	22	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Acadian Estates. Ph1	1978	22	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Bayou Paquet Estates	1971	118	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Belle Tene Acres	1975	24	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Chateau Estates, Ph1	1973	24	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Chateau Estates, Ph2	1977	58	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Dixie Pines	1954	39	Bayou Paquet	2.000000			Individual	Unsewered Subdivision
Fox Lair			Bayou Paquet				Unknown	Unknown
Ozone Woods (westside)	1956	656	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
Paquet Estate Sites	1970	35	Bayou Paquet	Bayou Paquet	BOD			Unsewered Subdivision
	1970	12	Bayou Paquet	22,001,0000		12.65		Unsewered Subdivision
Tchoupitoulas Estates				Bayou Paquet	BOD	1200		Unsewered Subdivision
Tranquility Park	1956	78	Bayou Paquet		BOD	19.22	Individual	Unsewered Subdivision
Woods, The Ph1	1982	20	Bayou Paquet	Bayou Paquet		ļ		
Woods, The Ph2	1984	22	Bayou Paquet	Bayou Paquet	BOD	22.00	Individual	Unsewered Subdivision
Woods, The Ph3B	1986	5	Bayou Paquet	Bayou Paquet	BOD	5,47	Individual	Unsewered Subdivision
Woods, Thr Ph3A	1993	24	Bayou Paquet	Bayou Paquet	BOD	23.00	Individual	Unsewered Subdivision
Bayou Vincent	?	539	Bayou Vincent	Bayou Vincent	BOD		Unknown	Unsewered Subdivision
Blue Haven (west)	1928	TNTC	Bayou Vincent	Bayou Vincent				Unsewered Subdivision
Browns Village	1951	111	Bayou Vincent					Unsewered Subdivision
rowns Village Annex No 1	1952	69	Bayou Vincent					Unsewered Subdivision
Morgan, West Addition	1965	TNTC	Bayou Vincent	Bayou Vincent				
Nottingham Place, Ph2	1980	17	Bayou Vincent	Bayou Vincent	BOD	25.34/>1 acre lots	Individual	Unsewered Subdivision
Piney Ridge Park	1956	301	Bayou Vincent	Bayou Vincent	BOD	ļ	Unknown	Unsewered Subdivision
West Addition to Morgan	?	TNTC	Bayou Vincent	Bayou Vincent				Unsewered Subdivision
Woodland Park	1954	339	Bayou Vincent	((bordered on S by US 190)				Unsewered Subdivision
Secluded Estates	1971	20	Bayu Chinchuba	(bounded on S by Sharp Rd, E of Hwy190)		39.97		Unsewered Subdivision
Bonita Estates	1988	23	Bedico Creek	Fox Branch> Bedico Creek		35.48/9 acre		Unsewered Subdivision
Deer Cross Park, Ph1	1989	2	Bedico Creek	Fox Banch> Bedico Creek	ļ	min. 8.757/ 2 acres	Morviduai	Unsewered Subdivision
Deer Cross Park, Ph2	1997	4	Bedico Creek	Fox Banch> Bedico Creek		min. 20.716/ 2 acre	individuai	Unsewered Subdivision
Deer Cross Park, Ph3	1998	8	Bedico Creck  Bedico Creek	Fox Banch> Bedico Creek (nr Goodbee)		min.	Individual	Unsewered Subdivision Unsewered Subdivision
Live Oak Hills	1962	201		Fox Branch> Bedico	<b>-</b>	<del>                                     </del>		
Mayhaw Plantation	2009	5	Bedico Creek	Creek		57.34	7.15.23	Unsewered Subdivision
White Oak Estates	1994	11	Black River> LTR	Black River> LTR  Pigeon Roost Creek>		acre avg lots	Individual	Unsewered Subdivision
Handsome Meadow Farms	1994	34	Bogue Falaa River	Simalusa Creek> Bogue Falay River (eastern bounfaty is Hwy 437)		691.75 / >10 acres lots	Individual	Unsewered Subdivision
Beechwood Gardens	2001	13	Bogue Falaya River	Bogue Falaya River			Individual	Unsewered Subdivision
Blackburn Place	1986	10	Bogue Falaya River	Bogue Falaya River		<b></b>	ļ	Unsewered Subdivision
Bleu Lake Hills Estates, Ph1	1972	40	Bogue Falaya River	Bills Creek> Bogue Falaya River				Unsewered Subdivision
Bleu Lake Hills Estates, Ph2	1979	27	Bogue Falaya River	Bills Creek> Bogue Falaya River Bills Creek> Bogue Falaya				Unsewered Subdivision
Bleu Lake Hills Estates, Ph3	1979	28	Bogue Falaya River	River  Bills Creek> Bogue Falaya  River				Unsewered Subdivision
Bleu Lake Hills Estates, Ph4	1989	10	Bogue Falaya River Bogue Falaya River	River Bogue Falaya River				Unsewered Subdivision Unsewered Subdivision
Bogue Falaya Plantation	2006	11	·	(north & adj Madisonville)	.1		.1	1
Chandler Covington - St Benedict	1965 1929	40	Bogue Falaya River  Bogue Falaya River	(bunded to E by Monestery Rd, on S by St Josephs				Unsewered Subdivision
		-		Abbey) Bully Branch> Reed Brake		87.09/ 5acre	<del> </del>	

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWER
*lendale Estates	1984	18	Bogue Falaya River	Latice Branch> Bogue Falaya River> UTR		97.5/ 5 acre min		Unsewered Subdivision
Hilltop Farms	1982	8	Bogue Falaya River	Vinchy Branch-> Bogue Falaya River		105.9/ 5 acre min	"septic tanks" per plat	Unsewered Subdivision
Hilltop Farms, Addition1	1984	8.	Bogue Falaya River	Vinchy Branch> Bogue Falaya River		38.8/5 acre min	"septic tanks" per plat	Unsewered Subdivision
Holliday Farms	1980	4	Bogue Falaya River	Pigeon Roost Creek-> Simalusaa Crekk-> Bogue Falaya River (bounded on west by Holiay Rd, folsum)		37.35/ 9 acre avg lots	"septic tanks" per plat	Unsewered Subdivision
Lake Ramsey Heights	1970	63	Bogue Falaya River	Bogue Falaya River		199.29		Unsewered Subdivision
Latice Branch	1996	16	Bogue Falaya River	Lative Branch> Bogue Falaya		36.80	Individual	
Lauraland Estates	1996	10	Bogue Falaya River	Venchy Branch-> Bogue Falaya River(bounded to north by Coin Rd. to south nr Bennet Dr. west by S&N Fitzmorris Rds)		53.67	Individual	Unscwered Subdivision
Lee Heights	1981	2	Bogue Falaya River	Bogue Falaya? (bounded on		74.57/5 ncre	"Septic tanks" per	Unsewered Subdivision
The section	1961	23	Bogue Falaya River	west by Hwy 437/ Lee Rd)		min lots	plat	Unsewered Subdivision
Lions Gate	1961	4,7		Beason Creek> Bogue				Unsewered Subdivision
Little Farms			Bogue Falaya River	Falaya River				Clisewered Subdivision
Merrywood Estates, Additions No1,2&3	1966	159	Bogue Falaya River	Pigeon Roost Creek-> Simalusa Creek-> Bogue Falaya River (bounded on north by LA Hwy 40)		532.35		Unsewered Subdivision
Mill Haven Heights	1936	32	Bogue Falaya River	Bogue Falaya River				Unsewered Subdivision
Palm Plaza, Extension1	1926	208	Bogue Falaya River				Unknown	Unknown
Park Twenty Five, Ph1	1997		Bogue Falaya River	(bounded on west by Hwy 25, accessed on Norwel Dr)		4.00	Individual	Unsewered Subdivision
Park Twenty Five, Ph2	1997	4	Bogue Falaya River	(bounded on west by Hwy 25, accessed on Norwel Dr)		3.78	Individual	Unsewered Subdivision
Park Twenty Five, Ph3	1999	14	Bogue Falaya River	(bounded on west by Hwy 25, accessed on Norwel Dr)		1.20	Individual	Unsewered Subdivision
ark Twenty Five, Ph4	2004	2	Bogue Falaya River	(bounded on west by Hwy 25, accessed on Norwel Dr)		5,23	Individual	Unsewered Subdivision
Riverside Drive Estates	1963	10	Bogue Falaya River	Bogue Falaya River		6,41		Unsewered Subdivision
Royal Pine Acres	1981	4	Bogue Falaya River	(Bounded on E by Stafford Rd, accessed by Hwy 437)		21.77/5 acre lots	Individual	Unsewered Subdivision
Sansouci Forest (trust)	1978		Bogue Falaya River	Bogue Falaya River				Unsewered Subdivision
Shadows East, The	1960	23	Bogue Falaya River	(_River to E, Pine Lane to		> 1 acre lots		Unsewered Subdivision
WILLIAM DE SE	2005	6	Bogue Palaya River	W) Bogue Falaya River		4.98	Individual	Unsewered Subdivision
South Ridge Tammany Terrace	1963	862	Bogue Falaya River	Latice Branch-> Bogue Falaya River (bounded on W by Lee Hwy, - 3.5 miles N of Covington)				Unsewered Subdivision
Town of Bogue Falaya	1901	31	Bogue Falaya River	Bogue Falaya River				Unsewered Subdivision
Town of Claiborne	1 -1-1	-	Bogue Falaya River			fi.43 acre min		Unsewered Subdivision
Wunderlich Estate	1936	5	Bogue Falaya River			h.43 acre min		Unsewered Subdivision
Beason Creek Acres	1980	17	Bogue falaya River	Pigeon Roost Creek> HW of Bogue Falaya (north of Hwy 40)->				Unsewered Subdivision
Green leaf Acres	1981	2	Bogue Falaya River	Simalusa Creek-> Bogue Falaya River		73.75/ 5 acre min	"Septic tanks" per plat	Unsewered Subdivision
River Glen Estates, Ph1	1980	4	Bogue Falaya River	Bogue Falaya River (bounded on W by River Rd. covington)		13.55/ 3 acre lots	"Individual septic tanks" per plat	Unsewered Subdivision
River Glen Estates, Ph2	1984	65	Bogue Falaya River	Bogue Falaya River (bounded on W by River Rd, covington)		95.82/ 1.3 acre lots	"Individual septic tanks" per plat	Unsewered Subdivision
Simalusa Estates	1996	117	Bogue Falaya River	Simalusa Creek> Bogue Falaya River		962.60	Individual	Unsewered Subdivision
Highlands	1986	126	Boguye Falaya River	Bills Creek> Pigeon Roost Creek> Simalusa Creek> Bogue Falaya River	1000	370.80	Individual	Unsewered Subdivision
Laurel Oaks	2002	10	Cane Bayou	Cane Bayou	BOD	12.86	Individual	Unsewered Subdivision Unsewered Subdivision
Lewisburg	1050	57	Chinchuba Cypress Bayou	Cypress Bayou	BOD	-		Unsewered Subdivision
Bayou Cyprian Estates, Section 1 'ayou Cyprian Estates, Section 2	1958 1958	12 46	Cypress Bayou Cypress Bayou	Cypress Bayou Cypress Bayou	BOD			Unsewered Subdivision
3ayou Cyprian Estates, Section 2	1959	10	Cypress Bayou	Cypress Bayou	BOD			Unsewered Subdivision
Choctaw Springs, Addition1	1966	15	Cypress Bayou		BOD	24-25		Unsewered Subdivision
Choctaw Springs, Addition2	1966	66	Cypress Bayou		BOD	76.48	Individual	Unsewered Subdivision Unsewered Subdivision
Chris Kennedy	1987	45	Cypress Bayou		BOD	89,81	Individual	Unsewered Subdivision
Cypress Bayou	1955	26 182	Cypress Bayou Cypress Bayou	Cypress Bayou	BOD	1		Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERE
rindale Heights		184	Cypress Bayou	Big Branch Bayou-> Cypress Bayou		1		Unsewered Subdivision
acombe Harbor, Addition1	971	25	Cypress Bayou	Cypress Bayou		45.00		Unsewered Subdivision
acombe Harbor, Addition2	1972	24	Cypress Bayou	Cypress Bayou		45,00		Unsewered Subdivision
acombe Harbor, Addition3	1972	7	Cypress Bayou	Cypress Bayou		15.50		Unsewered Subdivision
acombe Harbor, Addition4	1971	8	Cypress Bayou	Cypress Bayou		13.00		Unsewered Subdivision
scombe Harbor, Addition5	1973	9	Cypress Bayou	Cypress Bayou		15.00		Unsewered Subdivision
	1972	7	Cypress Bayou	Cypress Bayou		14.50		Unsewered Subdivision
acombe Harbor, Addition6		12		Cypress Bayou  Cypress Bayou		15.70		Unsewered Subdivision
acombe Harbor, Addition7	1974		Cypress Bayou			7.20		Unsewered Subdivision
acombe Harbor, Addition8	1972	6	Cypress Bayou	Cypress Bayou		1,40		
acombe Harbor, Addition9	1972	5	Cypress Bayou	Cypress Bayou		0.01611		Unsewered Subdivision
utece at Lacombe, Ph1	1994	10	Cypress Bayou	Cypress Bayou	BOD	8.015/1 acre min lots	Individual	Unsewered Subdivision
ak Mill, Addition1	1991	21	Cypress Bayou	Cypress Bayou	BOD	23.86/ 1 acre lots	Individual	Unsewered Subdivision
oak Mill, Addition2	1983	33	Cypress Bayou	Cypress Bayou	BOD	11,6/1 acre lots	Individual	Unsewered Subdivision
aklawn Park	1966	25	Cypress Bayou	Cypress Bayou				Unsewered Subdivision
aklawn Park Bayou Sites	1968	39	Cypress Bayou	Cypress Bayou			May be "Central" per plat	Unsewered Subdivision
aklawn Park Bayou Sites, Addition1	1971	16	Cypress Bayou	Cypress Bayou			Individual	Unsewered Subdivision
ine Grove	1974	16	Cypress Bayou	adjust any an		20,80		Unsewered Subdivision
ine Grove, Addition1	1974	60	Cypress Bayou	on US190, (nr Transmitter Rd on west & Tranquility Rd on north)		77,50		Unsewered Subdivision
ranium Park	1955	49	Cypress Bayou	(Cypress St & Tranquility Ln quarter the SD				Unsewered Subdivision
Vhispering Pines Estates	1972	19	Cypress Bayou	Cypress Bayou	BOD	24.70		Unsewered Subdivision
/hispering Pines Estates, Addition1	1985	35	Cypress Bayon	Cypress Bayou	BOD	49.40		Unsewered Subdivision
iney Woods Sites	1960	16	E Bedico Creek	(bounded on south by US190)	13.00	4.78 acre lots		Unsewered Subdivision
bita Springs Estates	1959	39	E Fork Long Branch->	E Fork Long Branch>				Unsewered Subdivision
avannah Trace, Addition l	2001	6	Abita River E. Bedico Creek	Abita River E. Bedico Creek		13.65	Individual	Unsewered Subdivision
avannah Trace, Ph1	1999	40	E. Bedico Creek	E. Bedico Creek		52/1 acre lots	Individual	Unsewered Subdivision
avannah Trace, Ph2	2001	44	E. Bedico Creek	E. Bedico Creek		50.00	Individual	Unsewered Subdivision
lower Estates	1964	417	Flowers Bayou> LTR	Flowers Bayou> LTR	BOD			Unsewered Subdivision
ady Lake Estates (17 blocks)	1961	170	Flowers Bayou> LTR	LTR->Flowers Bayou		-		Unsewered Subdivision
bney Country Air	1954	306	Gum Bayiu?	Gum Bayiu?				Unsewered Subdivision
Allison Park, Ph1	1980	12	Gum Bayou	Gum Bayou			Individual	Unsewered Subdivision
	2004	13	Gum Bayou	Gum Bayou			Individual	Unsewered Subdivision
Ilison Park, Ph2	2004	10	Cum Dayon	Count Dayon	-		20743 ( 00000)	THE STATE OF THE S
ake Gardens (MAY NOW BE Hyundai of Slidell at and Bremen Resources.BMO Harris)	1956	TNTC	Horse Branch-> UTR	Horse Branch> UTR				Unsewered Subdivision
leach View, Slidell	1927	527	Lake Pontchartrain	? (Adj Highland Park, Slidell)				Unsewered Subdivision
Central Park, SectionA	7	16	Lake Pontchartrain	(bounded on west by Old Spanish Train)			Unknown	Unknown
Central Park, SectionB	1929	TNTC	Lake Pontchartrain	(bounded on west by Old Spanish Train)			Unknown	Unknown
restmont Vista	1964	44	Lake Pontchartrain					Unsewered Subdivision
Forth Shore Sites	1927	25	Lake Pontchartrain	Canal> Lake Pontchartrain				Unsewered Subdivision
Ontchartrain Bridge Sites	1933	49	Lake Pontchartrain	Lake Pontchartrain (Rats Nest Rd, Lakeshore Dr)				Unsewered Subdivision
ontlake Estates	1927	24	Lake Pontchartrain	Lake Pontchartrain (Rats Nest Rd, Lakeshore Dr)		160+ acres		Unsewered Subdivision
Port Louis	1983	3	Lake Pontchartrain	Lake Pontchartrain		386.37		Unsewered Subdivision
Tanglewood II	1982	1111	Lake Pontchartrain	small trib> Lake (N of Hwy 190, E of Hwy 190, W of Bayou Casstine, nr Town of Mandeville)		30.44		Unsewered Subdivision
Whispering Timbers	1994	22	Lake Pontchartrain	(Lake Theodora-> Lake Pontchartrain S of I-12, bounded on W by Hwy 1066 and N by ?)		28.61	Individual	Unsewered Subdivision
Barker's Corner Estates	1987	33	Little Bogue Falaya	Little Bogue Falaya				Unsewered Subdivision
logue Glen (Magnolia Gardens)	1977	39	Little Bogue Falaya	Little Bogue Falaya	FC (LDEQ)			Unsewered Subdivision
logue Glen (Magnolia Gardens) Addition 1	1978	20	Little Bogue Falaya	Little Bogue Falaya	FC (LDEQ)			Unsewered Subdivision
logue Glen (Magnolia Gardens) Addition 2	1979	15	Little Bogue Falaya	Little Bogue Falaya	FC (LDEQ)			Unsewered Subdivision
logue Glen (Magnolia Gardens) Addition 3	1979	38	Little Bogue Falaya	Little Bogue Falaya	FC (LDEQ)			Unsewered Subdivision
	1960	22	Little Bogue Falaya	Little Bogue Falaya	FC (LDEQ)			Unsewered Subdivision
Military Heights Liverbank Farms, Ph.1	1980	6	Little Bogue Falaya	Little Bogue Falaya (S of	to (mining)	72.75		Unsewered Subdivision
Niverbank Farms, Ph2	1982	6	Little Bogue Falaya	Hwy 40, access by Le eRd) Little Bogue Falaya (S of		37.27		Unsewered Subdivision
Schiro Estates	1984	29	Little Bogue Falaya	Hwy 40, access by Le eRd)		73.86/ Lacre	"septic tanks" per	Unsewered Subdivision
remo remos	2704	- SC.	chur na Bac sanda	Brushy Branch> Little		min	plat	and the strong or the state of the state of

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERED
ring Clover Acres	1982	13	Little Bogue Falaya	Little Bogue Falaya (bounded on E by LA Hwy 1082)		78.6/ 5 acre min	"septic tanks" per plat	Unsewered Subdivision
Great Southern Acres	1982	42	Little Bogue Falaya River	Red Oak Fork> Reed Brake> East Fork> Little Bogue Falaya River (Adj on northwest to Money Hill Plantation)		330/ 5 acre min lot		Unsewered Subdivision
HY Alexander	1905	11	Little Bogue Falaya River	Little Bogue Falaya River		> 4 acre l;ots		Unsewered Subdivision
Little Bogue Falaya			Little Bogue Falaya River	Brushy Fork> Little Bogue Falaya River			Individual	Unsewered Subdivision
	1005	-	Yimi D Palana Dinas	(bounded on sw by Smith		19.476/ 1.5	"Individual Septic	Unsewered Subdivision
Magnolia Trace (Covington)	1995	7	Little Bogue Falaya River	Rd)		acre avg lots	tanks" per plat	Oliseweted Subdivision
Old Military Hills, Ph1	1978	9	Little Bogue Falaya River	(hounded on north by Pat O'Brien Rd and east by LA Wy 1082/Old Military Rd)		45.00		Unsewered Subdivision
Old Military Hills, Ph2	1978	20	Little Bogue Falaya River	(bounded on north by Pat O'Brien Rd)		105.06/ 5 acre min lots		Unsewered Subdivision
Plantation, The (See Resub plat) 12	2005		Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)		464.11	Individual	Unsewered Subdivision
Plantation, The, Resub of Parcell	2007	2	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)			Individual	Unsewered Subdivision
Plantation, The, Resub of Parcels 10A, 11A & 12B vinto 10A-1 & 11A-1, 12B-1 & 12B-2	2014	4	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)			Individual	Unsewered Subdivision
Plantation, The, Resub of Parcels 10B-1, 10A-1 vinto 10B-2	2014	1	Little Bogue Falaya River	East Fork-> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)		25.65	Individual	Unsewered Subdivision
Plantation, The, Resub of Parcels 2A&2B	2007	3	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)		14.6+ acres each	Individual	Unsewered Subdivision
antation, The, Resub of Parcels 2A-1, 2A-2, 2A-3 into parcels 2B-1, 2B-2, 2B-3	2014	3	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)		9.6-1.65 acres each	Individual	Unsewered Subdivision
Plantation, The, Resub of Parcels 3A & 3B into 3A1, 3B1 & 3B2	2008	3	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)		12+ acres each	Individual	Unsewered Subdivision
Plantation, The, Resub of Parcels 6, 7A & 8A into 7A1 & 8A1	2014	2	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)			Individual	Unsewered Subdivision
Plantation, The, Resub of Parcels 9A & 10B into 9A-1 & 10B-1 & 10C	2014	3	Little Bogue Falaya River	East Fork> Little Bogue Falaya River (N of Hwy21, between Hwys 1082&10 due N of Abita Springs)			Individual	Unsewered Subdivision
Red Oak Estates	1999	10	Little Bogue Falaya River	Waterhole Fork> Reed Br5ake> East Fork> Little Bogue Falaya River (bounded on N by Hwy 40, east by MHP)		17.15/ 1.5 acre lots	Individual	Unsewered Subdivision
Sundown Farms	1983	11	Little Bogue Falaya River	Red Oak Fork> Reed Brake> East Fork> Little Bogue Falaya River (S of Hemphill RD)		59.9/ 5 acre min	Individual	Unsewered Subdivision
Magnolia Gardens	1942	34	Little Bogue Falaya to east & Bogue Falaya River to west	Little Bogue Falaya toeast & Bogue Falaya River to west				Unsewered Subdivision
Nathanville	1908	140	Little Bogue Falaya?	(bounded on east by Abita Ave, and on north by Edgar Ave)				Unsewered Subdivision
Brady Island	1989	19	LTR	Lower Tchefuncte River				Unsewered Subdivision
Country Club Estates	1955	82	LTR LTR	Bayou Tete L'ours> LTR Bayou Tete L'ours> LTR	<u> </u>	-	-	Unsewered Subdivision Unsewered Subdivision
Country Club Estates Extension Fairway Gardenhomes (Condominium)	2004	70	LTR	Bayou Tete L'Ours> LTR  Bayou Tete L'Ours>  LTR(S of I-12, N of Hwy 22  access off of Hwy 190/ N  Causeway Blvd)	,	5.95		Unsewered Subdivision
alatas	1905?:	20	LTR	Bayu DeZaire> LTR		169.00		Unsewered Subdivision
Henderson Acres	1979	12	LTR	Black River> LTR(bounded on west by 3- Rivers Heights Sd & ou south by Brewwster RD)	-	20.00		Unsewered Subdivision
Hidden Acres	1979	27	LTR	Tchefuncte River (Access off of Penn Chapel Rd)		30.40	Individual	Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERE
dden Acres Extension	2002	6	LTR	Tchefuncte River (Access off of Penn Chapel Rd)		7.966/~1 acrs lots	Individual	Unsewered Subdivision
oultonville Estates	7	64	LTR		BOD		Unknown	Unknown
Lands End	2007	6	LTR	Bayou Monga> Tchefuncte River (bounded to north by Monga Dr, to south by Francis watrway, nr Lazy Rivers Estates SD)		9.27	Individual	Unsewered Subdivision
azy River Estates, SectionA	1957	246	LTR	Tchefuncte River (Bounded on East by Bayou Monga, on south by Monga Dr.)	BOD			Unsewered Subdivision
Lazy River Estates, SectionB	1957	44	LTR	Bayou Monga & Tchefuncte River (Bounded on north by Monga Dr; Frances waterway bisects the SD->Bayou Monga, East side of SD drainsw into Tchefuncte River, west side drains into Frances WW, )	вор		contains oxuidation pond	Unsewered Subdivision
Matthew Dicks (Latimer, Heidelberg Tract & nortion of Penick Tract)			LTR	Towns Towns		20.4591 + 104.4776		Unsewered Subdivision
Oak Park Estates	1959	80	LTR	LTR (NW of Madisonville, bounded on North by Brewster Rd)	BOD			Unsewered Subdivision
Ozone Heights	1946	31	LTR	Bayon Tete L'Ours-> LTR				Unsewered Subdivision
Pine Oaks Estates, PhI	1985	14	LTR	Black River> LTR (bounded on north by Brewster Rd, cast by Perilloux Rd)		15,56/ ~1 acre lots	Individual	Unsewered Subdivision
Pine Oaks Estates, Ph2	1985	17	LTR	Black River-> LTR (bounded on north by Brewster Rd, east by Perilloux Rd)		18.86/ –1 acre lots		Unsewered Subdivision
Pineland Acres	1961	30	LTR	(bounded on south by US190)		14.92		Unsewered Subdivision
Summer Haven	1981	4	LTR	Black River-> LTR (boundary on S is Brewster Rd, E of Henderson Acres SD)		20.2/ > 4 acre lots		Unsewered Subdivision
Three Rivers Heights	1955	266	LTR	Black River-> LTR(bounded on S by Brewster Rd)				Unsewered Subdivision
Tumpike	1962	4,5	LTR	LTR (N of Madisonville, intersection of Tumpike Rd & Brewster Rd)		38.38		Unsewered Subdivision
Wildewood Estates	1973	.8	LTR	(bounded on N by Brewster Rd)		2,39 aere min lot size		Unsewered Subdivision
Penn's Chapel Acres	1979	8	LTR	(bounded on south by Hidden Acres SD)		8.20		Unsewered Subdivision
Athene St			Payou Paquet	Payou Paquet	BOD	1	1	Unsewered Subdivision
Centennial Park	1966	163	Payou Paquet	Payou Paquet	BOD	7		Unsewered Subdivision Unsewered Subdivision
Circle O Acres	1973	32	Payou Paquet Payou Paquet	Payou Paquet Payou Paquet	BOD	-		Unsewered Subdivision
Evangeline St Olympia St.	_		Payou Paquet	Payou Paquet	BOD			Unsewered Subdivision
Pinewood Park/Christa Drive	1972	10	Payou Paquet	Payou Paquet	BOD	13.37		Unsewered Subdivision
Bushwood Estates	2016	18	Pearl River Nav. Canal	Pearl River Nav. Canal			Individual	Unsewered Subdivision
LitoIff	1962	255	Ponchitolawa	that B. L. Washinton		364,09	Individual	Unsewered Subdivision
Beatty Acres Estates	1968	23	Ponchitolawa Creek	Little Creek-> Ponchitolawa Creek			Individual	Unsewered Subdivision
Birg Boulevard, The, Northern & Southern Division	1911	740	Pouchitolawa Creek	Ponchitolawa Creek  Little Creek> Ponchitolawa			23D701X	Unsewered Subdivision
Campbell Business Park	2001	6	Ponchitolawa Creek	Creek			Individual	Unsewered Subdivision
Crown Country Estates	1978	42	Ponchitolawa Creek	Ponchitolawa Creek	BOD	49.53	Individual	Unsewered Subdivision
Dove Park	1957	300	Ponchitolawa Creek	Ponchitolawa Creek	BOD	-	Individual	Unsewered Subdivision
Harold Park Acres	1968	26	Ponchitolawa Creek	Ponchitolawa Creek (esatern boundary is Heleubirg)		80,02	Individual	Unsewered Subdivision
Heatherstone, Ph1	1980	7	Ponchitolawa Creek	Little Creek-> Ponchitolawa Creek		12/>1 acre lot avg	"Septic tanks" per plat	Unsewered Subdivision
Heatherstone, Ph2	1981	35	Ponchitolawa Creek	Little Creek> Ponchitolawa Creek		60,64/>1 acre lots	Unknown	Unsewered Subdivision
Helenbirg Lots & Farms	1914	TNTC	Ponchitolawa Creek				Individual	Unsewered Subdivision
King's Row	1961	110	Ponchitolawa Creek	Little Creek> Ponchitolawa Creek> LTR (east of GMSO?, covington)		162.56	Unknown	Unsewered Subdivision
Mandabita	1955	24	Ponchitolawa Creek	Little Creek-> Ponchitolawa Creek	1			Unsewered Subdivision
Maplewood Estates	1977	31	Ponchitolawa Creek	(bounded to south by Littoff		39.07	Individual	Unsewered Subdivision
With a second	1971	46	Ponchitolawa Creek	SD. ) (south of Abita Springs)	-	1		Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERED
<sup>1</sup> dda	1954	50	Ponchitolawa Creek	Ponchitolawa Creek (SD is bisected by Slemmer Rd)	BOD	18.91	Individual	Unsewered Subdivision
orthern Homes Property	1957	TNTC	Ponchitolawa Creek				Individual	Unsewered Subdivision
Ozone Park	1908	212	Ponchitolawa Creek	Ponchitolawa Creek	BOD	5 & 10 acre		Unsewered Subdivision
Ponchatolawa Farm Tract	1915	16	Ponchitolawa Creek	Ponchitolawa Creek	BOD	lots		Unsewered Subdivision
Ponchitolawa	1978	5	Ponchitolawa Creek	Ponchitolawa Creek	BOD		Individual	Unsewered Subdivision
Onchitolawa Estates	1959	40	Ponchitolawa Creek	Ponchitolawa Creek	BOD		Individual	Unsewered Subdivision
Red Gap Acres	1961	148	Ponchitolawa Creek	Ponchitolawa Creek	BOD	228.00	Individual	Unsewered Subdivision
Red Gap Annex	1961		Ponchitolawa Creek	Ponchitolawa Creek	BOD	150.00		Unsewered Subdivision
Thelma Estates	1968	45	Ponchitolawa Creek	Ponchitolawa Creek	BOD	153.93	Individual	Unsewered Subdivision Unsewered Subdivision
Folawa Place	1968	7	Ponchitolawa Creek Ponchitolawa Creek &	Ponchitolawa Creek Ponchitolawa Creek &		29.18		
Suburban Estates	1927	TNTC	Tchefuncte River	Tchefuncte River		1 2 2 2 1		Unsewered Subdivision
Covington Acres	1979	11	Ponchitolawa Creek?	(adj to Red Gap Acres)		10.37		Unsewered Subdivision
Weems Island Area	1986	29	Rigolets	(bounded on S by Geoghegan Canal, on N by US Hwy 90)				Unsewered Subdivision
Avery Estates, Addition1	1962	13	Salt Bayou	Salt Bayou				Unsewered Subdivision
Avery Estates, Addition2	1968	23	Salt Bayou	Salt Bayou				Unsewered Subdivision
Avery Estates, Addition3	1970	43	Salt Bayou	Salt Bayou				Unsewered Subdivision
Avery Estates, Addition4	1972	132	Salt Bayou	Salt Bayou				Unsewered Subdivision
Avery Estates, Addition5	1973	6	Salt Bayou	Salt Bayou			to district	Unsewered Subdivision
Bermuda Hills	1927	478	Salt Bayou	(bounded on S by Brookter		-	Individual	Unsewered Subdivision Unsewered Subdivision
Beverly Heights	1927	483	Salt Bayou Salt Bayou	Salt Bayou Salt Bayou		-	Unknown	Unsewered Subdivision Unsewered Subdivision
Beverly Heights Manor	1930?	414	Salt Bayou	Salt Bayou			Olikilowii	Unsewered Subdivision
Beverly Hills Blue Haven (east)	1926 1928	TNTC	Salt Bayou	Salt Bayou		_	_	Unsewered Subdivision
Homeland Heights	1979	318	Salt Bayou	Salt Bayou-> Lake Pontchartrain (Access: south from Howze Beach Rd, east is Old Spanish Train, north is LA 433)	BOD, FC			Unsewered Subdivision
Howze Beach	1927	TNTC	Salt Bayou	Salt Bayou-> Lake Pontchartrain (bounded on S by Bnorthshore Dr then Borrow Pit Canal-> Salt Bayou-> Lake Pontchartrain)	BOD, FC			Unsewered Subdivision
Howze Beach Estates	1929	TNTC	Salt Bayou	Salt Bayou-> Lake Pontchartrain (bounded on S by Bnorthshore Dr then Borrow Pit Canal-> Salt Bayou-> Lake Pontchartrain)				Unsewered Subdivision
Lindbergh Glen	7	TNTC	Salt Bayou	Salt Bayou				Unsewered Subdivision
Lindbergh Glenh Annex No.1	1926?	72	Salt Bayou	Salt Bayou				Unsewered Subdivision
Lindbergh Glenh Annex No.2	1929	173	Saît Bayou	Salt Bayou			1	Unsewered Subdivision
Oak Ridge	1928	42	Salt Bayou					Unsewered Subdivision
Piazza Farms	1925	31	Salt Bayon	Salt Bayou-> Lake Pontchartrain (3 miles west of salt bayou)		Most lots >5 acres		Unsewered Subdivision
Pine Villa	1926	36	Salt Bayou	Salt Bayou> Lake Pontchartrain (bounded on south by Old Spanish Trail)				Unsewered Subdivision
Snug Harbor	1951	40	Salt Bayou	Geoghegan Canal> Salt	FC			Unsewered Subdivision
				Bayou Salt Bayou	BOD, FC	-		Unsewered Subdivision
Treasure Isle  West Salt Bayou	1951	37	Salt Bayou Salt Bayou	Salt Bayon-> Lake Pontchartrain (bounded on S by Bnorthshore Dr then Borrow Pit Canal-> Salt Bayou-> Lake Pontchartrain)	BOD, FC			Unsewered Subdivision
Mayfair	1928	361	Salt Bayou	Salt Bayou-> Lake Pontchartain (bounded on west by Old Spanish Trainl, on south by 2nd St)				Unsewered Subdivision
Witteborg Farms	1979	32	Salt Bayou	Salt Bayou	BOD, FC			Unsewered Subdivision
Harmony Heights	1958	20	Salt Bayou?	Salt Bayou?		10.0513	-0	Unsewered Subdivision
Honeysuckie Estates	1981	32	Simalusa Creek>Bogue Falaya River	Simalusa Creek>Bogue Falaya River		40.65/1 acre lots	JAN PARA	Unsewered Subdivision
Starwood		1	Tangipahoa River	Clark Branch> Tangipahoa River			Individual	Unsewered Subdivision
Creekwood Estates, Ph1	1986	16	Tchefuncte River	Tehefuncte River		85.92	Individual	Unsewered Subdivision
	1978	23	Tchefuncte River	Tchefuncte River @ US190,				Unsewered Subdivision
Acadian Oaks, Pb2	1978	5	UTR	cov Timber Branch->UTR (nr Del Sol)			Individual	Unsewered Subdivision
Very resolution of the second	- Address	χ- 1		Cowpen Branch> Upper		1	t halon senso	Discontinued Cubalitateless
Bennett Woods, Ph1	1979	29	UTR	Tchefuncte River			Unknown	Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/UNSEWEREI
Sennett Woods, Ph2	1980	12	UTR	Cowpen Branch-> Upper Tchefuncte River			Unknown	Unsewered Subdivision
Camino Ranch Estates	1985	12	UTR	Clark Branch->Horse Branch-> UTR				Unsewered Subdivision
Cherry Hill Estates, Ph1	1993	60	UTR	Cowpin Branch (west fo Horse Branch)->UTR (Folsum)		336/ 5 acres min.	Individual	Unsewered Subdivision
Cherry Hill Estates, Ph2	1995	55	UTR	Cowpin Branch (west fo Horse Branch)—>UTR (Folsum)		336/ 5 acres min.	Individual	Unsewered Subdivision
Delaune Acres	1980		UTR			42.2/ 2.7 acre min.		Unsewered Subdivision
Du Bois Plantation	1989	12	UTR	Sooap & Tallow Branch-> UTR		19.679/ 1 acre min	Individual	Unsewered Subdivision
Evergreen Acres	1959	70	UTR	Timber Branch-> UTR			Unknown	Unknown
Gordon Estates	1962	31	UTR	Soap& Tallow Branch> UTR (Goodbee)				Unsewered Subdivision
Green Valley Acres	1981	7	UTR	Horse Branch-> UTR		76.73/5 acre min	"Septic tanks" per plat	Unsewered Subdivision
Lake Vista Estates	1976	167	UTR	Horse Br5anch→ UTR(Bounded on South by Lake Ramsey Rd, on east by Carrol Dr)		195.42	Individual	Unsewered Subdivision
Normand Oaks, Ph I	1993	21	UTR	Horse Branch-> UTR (NE of Lake Ramsey, North of Hewitt Dr)		79.72	"Individual Septic tanks" per plat	Unsewered Subdivision
Normand Oaks, Ph2	1994	25	UTR	Horse Branch-> UTR (NE of Lake Ramsey, North of Hewitt Dr)			Individual	Unsewered Subdivision
North Folsom Estates	1998	10	UTR	Savannah Branch-> UTR		242.84	Individual	Unsewered Subdivision
Oak Hill Estates, Ph1	1998	9	UTR	Savannah Branch-> UTR (south of Hwy 40, adj on east by Willie Rd)		50.06	Individual	Unsewered Subdivision
Oak Hill Estates, Ph2	1998	19	UTR	Savannah Branch-> UTR (south of Hwy 40, adj on east by Willie Rd)		164.35	Individual	Unsewered Subdivision
Oak Hill Farms	1996	6	UTR	Savannah Branch-> UTR		43.82	Individual	Unsewered Subdivision
Old Stonehill Acres	1983	3	UTR	Savannah Branch-> UTR (bounded on NE by Hwy25)				Unsewered Subdivision
Pine Air	1960	15	UTR	(NW of Covington, bunded on south by US190)		Long Cir		Unsewered Subdivision
Ramsey Estates, Ph1	1980	45	UTR	"Pruden Canal" -> UTR		52,00	Individual	Unsewered Subdivision
Ramsey Estates, Ph2	1981	40	UTR	"Pruden Canal"> UTR	-	48.86	Individual	Unsewered Subdivision Unsewered Subdivision
River Bend Estates River Forest	1945	32	UTR	Upper Tchefuncte River (S of Pruden Creek, N of City of Covington)		326.54		Onsewered Subdivision
River Forest Country Club	1961	TNTC	UTR	Upper Tchefuncte River (bisects SD; bounded on N by US190		200.25		Unsewered Subdivision
River Heights, Ph1	1978	14	UTR	Latice Branch-> UTR		18.76	Individual	Unsewered Subdivision
River Heights, Ph2	1979	57	UTR	Latice Branch-> UTR  Latice Branch-> UTR		55,20 112,09	Individual Individual	Unsewered Subdivision Unsewered Subdivision
River Heights, Ph3 River Heights, Ph4	1979 1998	15	UTR	Latice Branch-> UTR		35.75	Individual	Unsewered Subdivision
River Heights, Ph5	1998	7	UTR	Latice Branch> UTR		18.10	Individual	Unsewered Subdivision
Spring River Park, Ph1	1979	42	UTR	UTR (N of LA Hwy 40)		160,00	Individual	Unsewered Subdivision
Spring River Park, Ph2	1980	45	UTR	UTR (N of LA Hwy 40)		120.00 210.78/ 5 acre	Individual "Septic tanks" per	Unsewered Subdivision
Stonehill Acres	1983		UTR	Horse Branch-> UTR		min	plat	Unsewered Subdivision
Stonelake Estates, Ph1	1984	31	UTR	Cowpen Branch-> UTR		79.56	Individual	Unsewered Subdivision Unsewered Subdivision
Stonelake Estates, Ph2 Stonelake Estates, Ph3	1984 1993	49	UTR	Cowpen Branch-> UTR Cowpen Branch-> UTR		29.85 123.00	Individual Individual	Unsewered Subdivision Unsewered Subdivision
Tantella Ranch Estates, Ph1 A&B	1995	20	UTR	Cowpen Branch-> CTK		60.79	Individual	Unsewered Subdivision
Tantella Ranch Estates, Ph2A&B	1995	10	UTR			44.39	Individual	Unsewered Subdivision
Tchefuncte Acres	1930	31	UTR	Confluences weith UTR S of Horse Branch( bounded on W by Tchefuncte Ruiver, on S by 'bammond- Covington Hwy, ar Illinois Central RR; LA Ave bisects the SD)		4.5 acre min lots		Unsewered Subdivision
Tiffany Farms	1972	В	UTR	Soap & Tallow Branch-> UTR		45,2/5 acre min lots	"Septic tanks" pe	Unsewered Subdivision
Timber Branch	1975	21	UTR	Timber Branch (Headwaters)> UTR	-	23.30		Unsewered Subdivision
cadian Oaks, PhI	1993	15	UTR	Timber Branch->UTR (nr Del Sol)	-		Individual	Unsewered Subdivision
Doux Maison			W Peal River	Det Sally	-		Individual	Unsewered Subdivision
Belle Acres	1967	55	W Pearl River	Doubloge Program - W Pro-			Dr. A. Charles	Unsewered Subdivision
Blue Crane Point	1999	3	W Pearl River	Doubloon Bayou> W Pear River			Individual	Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERE
ranker's	1979	16	W Pearl River	Little Brushy Branch> PRNC> W Peaarl River				Unsewered Subdivision
Bush Forest Estates, Ph1	1980	21	W Pearl River	Waterhole Branch> Talisheek Creek> PRNC > W Pearl River				Unsewered Subdivision
Bush Forest Estates, Ph2	1980	14	W Pearl River	Waterhole Branch> Talisheek Creek> PRNC > W Pearl River				Unsewered Subdivision
Calongneville	1906	26	W Pearl River					Unsewered Subdivision
Cross Gates East	1978	38	W Pearl River	W Pearl River		17.43	"central" per plat	Unsewered Subdivision
Debonair Heights	1963	48	W Pearl River	Doubloon Bayou> W Pearl		56.31/1 acre		Unsewered Subdivision
Doubloon Bayou Estates	1973	42	W Pearl River	River		lots		Unsewered Subdivision
Hickory Heights	1961?	20	W Pearl River	G. D. WD1		100.00	Individual	Unsewered Subdivision
Hickory Hills	1972	18	W Pearl River	Gum Bayou> W Pearl River (west boundary is Rivr Gardens SD)		40.10	Individual	Unsewered Subdivision
Hickory Village, Ph1	1974	41	W Pearl River	Gum Creek> W Pearl River		~1 acre lots	Individual	Unsewered Subdivision
Hickory Village, Ph2	1986	22	W Pearl River	Gum Creek> W Pearl River		26.05	Individual	Unsewered Subdivision
Holly Ridge	1977	8	W Pearl River	W Pearl River (bounded on south by Indian Village Rd)	BOD	18.35	Individual	Unsewered Subdivision
Holly Ridge, Addition1	1984	20	W Pearl River	W Pearl River (bounded on south by Indian Village Rd)	BOD	30.42	Individual	Unsewered Subdivision
Huchison	1926	42	W Pearl River			>2 acre lots		Unsewered Subdivision
Indian Village Camp Site, Section1	1962	29	W Pearl River	W Pearl River				Unsewered Subdivision
Indian Village Camp Site, Section2	1971	21	W Pearl River	W Pearl River				Unsewered Subdivision Unsewered Subdivision
Live Oak Ranches	1973	18	W Pearl River	W Pearl River (bounded on south by		43.63		Unsewered Subdivision
Lynn Park	1973	19	W Pearl River	Hickory Dr)  Bogue Chitto River> W		41.63		
Mill Creek	1969	22	W Pearl River	Pearl River		54.00		Unsewered Subdivision
Morgan Bluff Estates	1979	6	W Pearl River	Gum Bayou> W Pearl River (bounded on west by Magnolia Forest, Ph7 and on south by Morgan Bluff Rd)		6.819/1 acre avg lots	Individual	Unsewered Subdivision
latures Way	997	42	W Pearl River	Gum Bayou> E Pearl River (access off of Robert Rd, Slifell; east of Haaswood SD)			Individual	Unsewered Subdivision
Oak Downs	1998	14	W Pearl River	W Pearl River (NW of Hwy 11 and west of Hwy 41, north of alton)		18.4198/ ~ 1 acre lots	Individual	Unsewered Subdivision
Ozonair	1963	60	W Pearl River	Doubloon Bayou> W Pearl River				Unsewered Subdivision
Ozone Pines	1955	202	W Pearl River	(bounded on south by Brownswitch Rd, on east by Military Rd)	BOD, FC		Unknown	Unknown
Pearl Acres	1928	142	W Pearl River	Chinchas Creek> W Pearl River				Unsewered Subdivision
Pennydale	1977	15	W Pearl River	( west of Pearl Acres SD, bounded on east by Cross- Gates SD)		18.25 acres		Unsewered Subdivision
Pouderosa Ranches, Ph1	1977	42	W Pearl River			57,15	Individual	Unsewered Subdivision
Ponderosa Ranches, Ph2	1977	39	W Pearl River			44.96	Individual	Unsewered Subdivision
Ponderosa Ranches, Ph3	1977	31	W Pearl River			40,06 32.187/ 1	Individual	Unsewered Subdivision
Ponderosa Ranches, Ph4	1977	24	W Pearl River			Acre lots 69.10/1 acre	Individual	Unsewered Subdivision
Ponderosa Ranches, Ph5	1980	61	W Pearl River			lots 58.06/ 1 acre	Individual	Unsewered Subdivision
Ponderosa Ranches, Ph6	1981	44	W Pearl River			lots   55.385/ 1 acre	Individual	Unsewered Subdivision
Ponderosa Ranches, Ph7	1981	41	W Pearl River	Doubloon Bayou> W Pearl		lots 17.313/>1	individual	Unsewered Subdivision
Quail Valley, Ph1	1980/2003	11	W Pearl River	River	ROD	acre lots	Individual	Unsewered Subdivision
Quail Valley, Ph2	1978	21	W Pearl River	Doubloon Bayou> W Pearl River	BOD	22.695/~1 acre lot	Individual	Unsewered Subdivision
Ravenwood, Ph1	1978	17	W Pearl River	Morgan River> W Pearl River		20.69/ 1 acre lots	Individual	Unknown
Ravenwood, Ph2	1979	16	W Pearl River	Morgan River> W Pearl River		19.37/ 1 acre lots	Individual	Unknown
Ravenwood, Ph3	1979	15	W Pearl River	Morgan River> W Pearl River		18,24/1 acre lots	Individual	Unknown
idgewood	1964	23	W Pearl River	Pearl River Navigational Canal> W Pearl River	BOD	55/ > 1 acre lots		Unsewered Subdivision
River View	1977	30	W Pearl River	Gum Bayou> W Pearl River (bounded on W by Magnolia Forest, Ph7 and or S by Morgan Bluff Rd)	вор	36.171/ 1 acre lots	e	Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERED
vercrest	1956	150	W Pearl River	W Pearl River (bounded to N by Steele Rd, to S by Gauze, E of Military Rd)	BOD			Unsewered Subdivision
Rollin Hills Estates, BlockA	1963	17	W Pearl River	Bogue Chitto River> W Pearl River (located along Hwy 40)	BOD	109.80		Unsewered Subdivision
Rollin Hills Estates, Ph2	1970	35	W Pearl River	Bogue Chitto River> W Pearl River (located along Hwy 40)	BOD	314.30		Unsewered Subdivision
Secluded Pines Estates, Ph1A	1983	21	W Pearl River	Old Gum Creek> W Pearl River	BOD	28.65/>1 acre lots	"Individual septic tanks" per plat	Unsewered Subdivision
Secluded Pines Estates, Ph1B	1998	5	W Pearl River	Old Gum Creek> W Pearl River	BOD	42.09	Individual	Unsewered Subdivision
Settlement, The, Ph1A	1980	10	W Pearl River	Doubloon Bayou-> W Pearl River	BOD	57.552/ > 2 acre lots	Individua)	Unsewered Subdivision
Settlement, The, Ph1B	1983	7	W Pearl River	Doubloon Bayou> W Pearl	BOD	37.96/>2	Individual	Unsewered Subdivision
Can Table 201	1985	9	W Pearl River	River Doubloon Bayou> W Pearl	BOD	55.1952/ 5	Individual	Unsewered Subdivision
Settlement, The, Ph2	7,55	-		River Doubloon Bayou-> W Pearl	BOD	65.27/5.5	Individual	Unsewered Subdivision
Settlement, The, Ph3A	1993	11	W Pearl River	River Doubloon Bayou-> W Pearl		acre avg lots 40.764/5.5	And the Value	TO THE OWNER OF THE PARTY OF TH
Settlement, The, Ph3B	2000	7	W Pearl River	River Doubloon Bayou-> W pearl	BOD	acre avg lots	Individual	Unsewered Subdivision
Shady Acres	1956	57	W Pearl River	River (Bounded on S by US190, slidell area)				Unsewered Subdivision
Slidell Suburban Acres	1929	15	W Pearl River	W Pearl River	BOD			Unsewered Subdivision
Starling Point Estates	1999	4	W Pearl River	Doubloon Bayou-> W Pearl River	BOD	27.7747/5 acres avg lots	Individual	Unsewered Subdivision
Sylvan Glen	1978	13	W Pearl River	W Pearl River		17.43		Unsewered Subdivision
Tary Estates	1974	12	W Pearl River	Gum Bayou> W Pearl		14.57		Unsewered Subdivision
Timber Lake Estates	1975	40	W Pearl River	River		61.73		Unsewered Subdivision
Turtle Creek			W Pearl River	I was a second way			Unknown	Unknown
Twin Hickory Farm Sites	1931	40	W Pearl River	Little Gum Creek-> W Pearl River (bounded on E by Military Rd)				Unsewered Subdivision
Village Guthrie	1980	184	W Pearl River	W Pearl River (E access from Military Rd/Hwy 190)		55.70	Individual	Unsewered Subdivision
West Pearl River Village	2002	38	W Pearl River	W Pearl River	BOD	128.533/ 3.38 acre avglots	Individual	Unsewered Subdivision
Spanish Trail Highlaads	1930	TNTC	W Pearl River	Salt Bayou> W Pearl River (bounded to NE by Old Spanish Train, to E by Howzw Beach Rd)				Unsewered Subdivision
Alton		900	W-14	(North of Brownswitch Rd,	BOD, FC			Unsewered Subdivision
Camelia Trace	1998	14	W-14	Slidell)			Individual	Unsewered Subdivision
Dunaway	1979	13	W-14			16.24/ 1 acre lots	Individual	Unsewered Subdivision
Grand (Not Grand Oaks)			W-14		6			Unsewered Subdivision
Hidden Oaks, Ph1	1980	6	W-14	W-14? (east of I-10, north of Gause, adj to west of Pearl Acres SD, Slidell)		14.308/ > 2 acre lots	Individual	Unsewered Subdivision
Hidden Oaks, Ph2	1980	4	W-14	W-14? (east of I-10, north of Gause, adj to west of Pearl Acres SD, Slidell)		6,86/ ~ 2 acre lots	Individual	Unsewered Subdivision
Holiday Acres	1974	48	W-14	W-147 (between 1-10 and French Branch, south of Gauze)	BOD, FC	>2 acre lots		Unsewered Subdivision
Hunters Creek Village	1978	33	W-14	(nr Haaswood SD)		40.44/1 acre lots		Unsewered Subdivision
Hyde Park	1952	22	W-14		-	> 2 acre hots		Unsewered Subdivision
Johnston	7	13	W-14	(bounded to NE by Hwy 41)				Unsewered Subdivision
Karvel	1969	14	W-14	(bounded on south by GMRR, Covington, north of				Unsewered Subdivision
Leonell Park	1981	5	W-14	(north of Camelot SD)		57.07/ 5 acre min lots	Individual	Unsewered Subdivision
Morgan	1956	TNTC	W-14	(bounded on south by 1str St, west by RR Ave, east by St Tammany Ave)		ann iois		Unknown
North Forest, Ph1	1974	337	W-14	W-14	BOD	76.30		Unsewered Subdivision
North Forest, Ph2	1974	334	W-14	W-14	BOD	76,30		Unsewered Subdivision
orth Forest, Ph3	1975	122	W-14	W-14	BOD	PER DECEMBER		Unsewered Subdivision
Oak Mere	1971	4	W-14	(bounded on south by Hwy 1067		parcels 10.18 acres each		Unsewered Subdivision
Oakview Estates	1993	8	W-14			0.9/ ~ 1 acrer	Individual	Unsewered Subdivision

C

can Grove Pecan Grove, Addition1	Plat 1995	L. WALLEY						
Pecan Grove, Addition I		TNTC	W-14	W-14 (bounded on east by Military Rd, south by Robert				Unsewered Subdivision
read chove, Addition.	1961	44	W-14	Rd) W-14		13.20		Unsewered Subdivision
Pine Shadows	1954	11	W-14	(bounded on south by US190, adj to Pine Fprest SD, on north by Catherine				Unsewered Subdivision
Roadside Camp Sites	1955	41	W-14	Ave) W-14 (bounded to E by Hwy11)	BOD			Unsewered Subdivision
Robbert Park, Annex1	1958	25	W-14	(SE of Robert Rd, bounded on N by Gauze)		15.26		Unsewered Subdivision
Robbert Park, Annex2	1960	26	W-14	(SE of Robert Rd, bounded on N by Gauze)		9.94		Unsewered Subdivision
Robbert Park, Annex3	1960	33	W-14	(SE of Robert Rd, bounded on N by Gauze)		24.50		Unsewered Subdivision
Sullivan's Legacy	2008	5	W-14	(bounded on W by S Fitzmorris Rd)		> 1 acre lots		Unsewered Subdivision
West Alton	1905	236	W-14	(bounded on N by Pearl Rover ST)		1		Unsewered Subdivision
Whisper-Wood Estates, Unit1	1975	72	W-14	W-14	BOD			Unsewered Subdivision
Whisper-Wood Estates, Unit2	1976	41	W-14	W-14	BOD	9.90		Unsewered Subdivision
Pine Forest	1954	145	W-14	W-14 (bounded on south by Daney St, on north by US 190, on east by Nellie Dr)	BOD			Unsewered Subdivision
Mossy Oaks	2000	8	W-14?	W-14? (on Robert Rd, slifell north of Brownswitch)		12.1298/> 1 acre avg lots	Individual	Unsewered Subdivision
Bel-Air	1954	43	W-15	S of French Branch Estates		m. d		Unsewered Subdivision
French Branch Estates, Ph1	1974	20	W-15	French Branch-> W-15		7	Individual	Unsewered Subdivision
French Branch Estates, Ph10	1978	36	W-15	French Branch> W-15		42.076/ 1 acre lot avg 17.5797/ 1	Individual	Unsewered Subdivision
French Branch Estates, Ph11A	1993	15	W-15	French Branch-> W-15		acre lot avg 49.9331/1	Individual	Unsewered Subdivision
French Branch Estates, Phi 1B	1993	44	W-15	French Branch> W-15		acre lot avg 38.7637/1	Individual	Unsewered Subdivision
French Branch Estates, Ph11C	1994	32	W-15	French Branch-> W-15		acre lot avg	Individual	Unsewered Subdivision
ench Branch Estates, Ph2	1975	9	W-15	French Branch-> W-15		15,09	Individual	Unsewered Subdivision
French Branch Estates, Ph3	1975	30	W-15	French Branch> W-15		35.90	Individual	Unsewered Subdivision
French Branch Estates, Ph4 French Branch Estates, Ph5	1976 1976	25 4	W-15 W-15	French Branch> W-15 French Branch> W-15		29.72 5.227/ 1 acrelot avg	Individual Individual	Unsewered Subdivision Unsewered Subdivision
French Branch Estates, Ph6	1977	8	W-15	French Branch> W-15		15.116/ 1 acre lot avg	Individual	Unsewered Subdivision
French Branch Estates, Ph7	1978	18	W-15	French Branch> W-15		23.142/1 acre lot avg	Individual	Unsewered Subdivision
French Branch Estates, Ph8	1978	19	W-15	French Branch> W-15		23.667/ 1 acre lot avg	individuai	Unsewered Subdivision
French Branch Estates, Ph9	1978	35	W-15	French Branch> W-15		42,218/1 acre lot avg	Individual	Unsewered Subdivision
Frenchmens Estates, Ph1	1974	14	W-15	French Branch> W-15		25.89		Unsewered Subdivision
Frenchmens Estates, Ph2	1975	8	W-15	French Branch> W-15		11.62		Unsewered Subdivision Unsewered Subdivision
Frenchmens Estates, Ph3	1975 1975	11	W-15 W-15	French Branch> W-15 French Branch> W-15		16.48 25.32		Unsewered Subdivision
Frenchmens Estates, Ph4 Shamrock Villa Estates	1974	14	W-15	W-15		20.75		Unsewered Subdivision
Oak Grove Estates, Ph1	1984	11	W-15	French Branch> W-15		18.38	"Individual mechanical"	Unsewered Subdivision
Oak Grove Estates, Ph2	1984	26	W-15	French Branch-> W-15		33.6567/ 1 acre lots		Unsewered Subdivision
Alan Park	2007	16		(May be in City of Slidell)				Unsewered Subdivision
Azalea Lane MHP							-	Unsewered Subdivision Unsewered Subdivision
Beau Chateau							Individual	Unsewered Subdivision
Bigner Place Cahier Tract	1956	32					- Audul	Unsewered Subdivision
Country Club MHP	1,200	1000			W. C. C.			Unsewered Subdivision
Cousin Partition, The	5 7 2 2 2 2	-			(3-27-27)		2013 1 1 11	Unsewered Subdivision
Creekstone Oaks							Unknown	Unknown
DECS Hwy 59 Building	\$ 200 m	20		(north of Madisonallis)	-		Individual	Unsewered Subdivision Unsewered Subdivision
Dendinger Inc.	1929	39		(north of Madisonville)			Individual	Unsewered Subdivision
Dennis Glass Esquestrain							Unknown	Unknown
Forest Hill Estates	2008	17				129.46/ 5 acre lot min	Individual	Unsewered Subdivision
ruhurst Farm Lots	7	10				5 acre min lots		Unsewered Subdivision
Golden Oaks	1979	46		Double Branch-> (northeast of Abita Springs)		500/10 acres ave lot		Unsewered Subdivision
Harry Singletary	1974	9		1/1-1-1				Unsewered Subdivision

SUBDIVISION	DATE Recorded Plat	Number Lots	Watershed	Location	Impairment (If any)	Avg. Lot size/ Sd acreage	TYPE OF SYSTEM	SEWERED/ UNSEWERED
ighland Acres, Addition1	1975	11		(eastern boundary is South Fitzmorris,/Lee Rd)		33.8/ 2 acre min	Individual	Unsewered Subdivision
ighland Park	1927	TNTC					Individual	Unsewered Subdivision
ohn Prats Road	2002	20		(bounded on west by Hwy 59; south by Long Leaf Dr)		6 acre min lots		Unsewered Subdivision
ones and Pickett Addition to the Town of Ramsey	1907	100		(bounded on west by GMRR, Covington)				Unsewered Subdivision
ake Villa Mobile Home Park								Unsewered Subdivision
Lawrence Luke	1954	28		(bounded on north by Blackwell Dr, siuth by Raymond Rd, located east of US Hwy 190)				Unsewered Subdivision
Mandeville 5 Acre Farms	1956	24		(Southof Abita Springs)		5 acre lots		Unsewered Subdivision
Ioney Hill, Estates of	2015	10				54.03	Individual	
furray Road	7	21				1 acre min lots		Unsewered Subdivision
forth End Addition to Slidell	1928	TNTC		(slidell area)				Unsewered Subdivision
Onesime Faciane	1952/1996	6						Unsewered Subdivision
ark in Cross Gates, The								Unsewered Subdivision
iney Wood-Marina	984	19				5.90	"central" per plat	Unsewered Subdivision
ded Oak Forest		8		(SE boundary is Red Oak Fork Branch; SD accessed off Bob Baxter Rd)			Individual	Unsewered Subdivision
River Gardens	1954	14				K		Unsewered Subdivision
tollin Pastures	2011	8		(located along Lee Rd on western perimeter)		79.81	Individual	Unsewered Subdivision
Rucker Road								Unsewered Subdivision
Savannah Oaks	1994	5		(access off Hwy 1082 above merge with Hwy21)		44/ 4.06 acre min	Individual	Unsewered Subdivision
Slidell Ozone Heights	1957	TNTC						Unsewered Subdivision
V.E. Gause		100						Unsewered Subdivision
Valter Ferrier	1985	10						Unsewered Subdivision
Vayne Cliff Farm & Home Sites	1975	32		(bounded on W by "Covington-Mandeville Rd")				Unsewered Subdivision

### Exhibit 4

### **Water Quality Impact Modeling Program**

- Technical Memo
- PowerPoint Overview of Program Proposal (Smythe)
- Process Flowchart
- Input Data Flowchart
- Summary of WQIM DO Calibration Results by Watershed
- Detailed list of SDs & commercial developments that have been modeled for WQ impacts – by Watershed

#### ST. TAMMANY PARISH



DEPARTMENT OF ENGINEERING 21490 KOOP DRIVE P.O. BOX 628 COVINGTON, LA 70434

FAX: (985) 898-5205

Pat Brister Parish President

STP Water Quality Impact Model Pruden Creek SD October 20, 2015

The Department of Engineering has run the water quality impact model for the Upper Tchefuncte River for the proposed development, Pruden Creek Subdivision. The wastewater and stormwater discharges are proposed to discharge into Horse Branch near its confluence with the Tchefuncte River (Exhibits 1 and 2). In the Parish model, the discharges are included with the "Horse Branch Cluster" that are introduced into Reach 1 at river kilometer (RKm) 16.3, into element #104 (Exhibit 3).

Both the Upper Tchefuncte River and the Horse Branch must meet the EPA dissolved oxygen (DO) of 5.0 mg/L. Assessments by Louisiana Department of Environmental Quality (LDEQ) indicate that the Upper Tchefuncte River is in compliance (not impaired); Horse Branch has not been assessed. No impairments means that no Total Maximum Daily Load allocations (TMDLs) have been promulgated by U.S. Environmental Protection Agency (USEPA); however, both waterbodies are designated Scenic Rivers by the LA Legislature and Outstanding Natural Waters (ONRW) by the LDEQ. Scenic Rivers are regulated by the Louisiana Department of Wildlife and Fisheries (LDWF) and are held to a higher standard of water quality via an anti-degradation limit by the USEPA and LDEQ. As such, dissolved oxygen (DO) concentration in the streams may not degrade from current conditions by more than 0.2 mg/L due to the development.

Model results for current conditions without development. The current conditions model contains one headwater, six reaches, 266 elements and 24 wasteloads. Sampling and modeling by the Coastal Protection and Restoration Authority (CPRA 2014) indicate a pre-existing failure of the DO standard downstream of the development. DO falls below the current standard of 5.0 mg/L at river kilometer (RKm) 3.8 (model element #228 in Reach 5) with recovery (achieving the standard) occurring in in element #265 possibly due to the influence of Timber Branch (Exhibit 4 and 7).

Model results with the proposed development. A WW discharge of 24,000 gpd is proposed for Pruden Creek SD with secondary limits of 30 mg/L BOD<sub>5</sub>, 15 mg/L NH<sub>3</sub>, and 2 mg/L DO. This corresponds to ultimate carbonaceous and nitrogenous BODs of 69 mg/L CBOD<sub>u</sub> and 64.5 mg/L NBOD<sub>u</sub>, respectively<sup>1</sup>. SW is detained and treated in the wet pond. The National SW Database (NSWD) provides average inlet and outlet (I/O) concentrations for Total Suspended Solids (TSS) and Total Nitrogen (TN) for various Best Management Practices

<sup>&</sup>lt;sup>1</sup> Per the Louisiana Technical Procedures (LTP) Manual (LDEQ 2012), CBODu is estimated to be BOD<sub>5</sub>\*2.3 and NBOD<sub>u</sub> is determined to be NH3\*4.3.

 $(BMPs)^2$ . I/O data are provided in Exhibit 5. TSS is utilized as a surrogate for  $BOD_5$  in the Parish modeling analysis.

- Scenario 1: SW discharge from the subdivision detention pond of 1.0 cfs, with WW discharge DO = 2.0 mg/L. Upper Tchefuncte River DO fails the antidegradation limit of 0.2 mg/L at RKm 15.2 (element #114 in Reach 2), almost immediately upon receiving discharges from Pruden Creek. Further, the discharges fail the DO standard of 5.0 mg/L at RKm 6.6 (element #200 in Reach 3) much further upstream than the pre-development scenario. The stream DO recovery occurs at RKm 4.2 (element #224 in Reach 4) (Exhibits 6 and 8).
- Scenario 2: SW discharge from the subdivision detention pond of 1.0 cfs, with WW discharge DO = 5.0 mg/L. This modification provides very little improvement in water quality downstream of the discharge. Upper Tchefuncte River DO fails the antidegradation limit of 0.2 mg/L at RKm 15.5 (element #114 in Reach 2) rather than 15.2 with DO of 2.0 mg/L. Further, the discharges fail the DO standard of 5.0 mg/L at RKm 6.6 (element #200 in Reach 3). The stream DO recovery occurs at RKm 4.2 (element #224 in Reach 4) (Exhibits 6.a and 8.a).
- <u>Scenario 3: SW discharge reduced to 0.1 cfs</u>, the development successfully meets the antidegradation limits of <0.2 mg/L DO even with utilizing less expensive WW discharge DO of 2.0 mg/L (Exhibits 6.b).

 $<sup>^2</sup>$  Wet Pond I/O concentrations from the NSWD for wet ponds are: TSS, 37.73/9.86 mg/L and TN, 60.75/21.58 mg/L

EXHIBIT 1
Pruden Creek SD Location

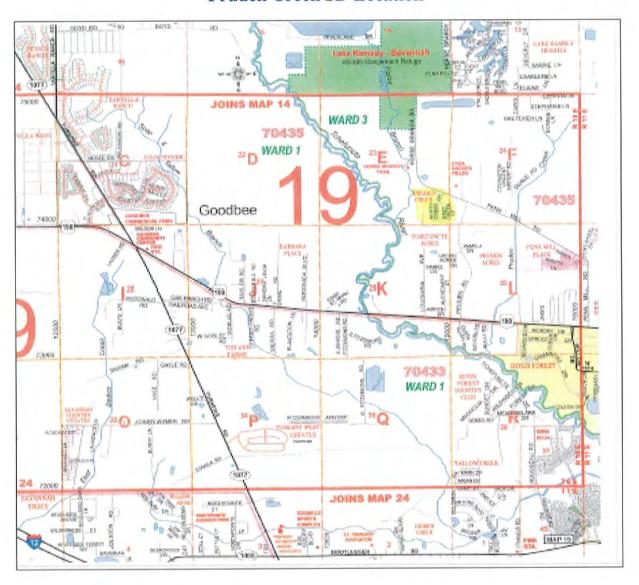


EXHIBIT 2
Pruden Creek SD Stormwater & Wastewater Outfall Locations



EXHIBIT 3
Upper Tchefuncte River Model Reaches and Confluence Distances
STP Watershed Management Study (CPRA, 2014)

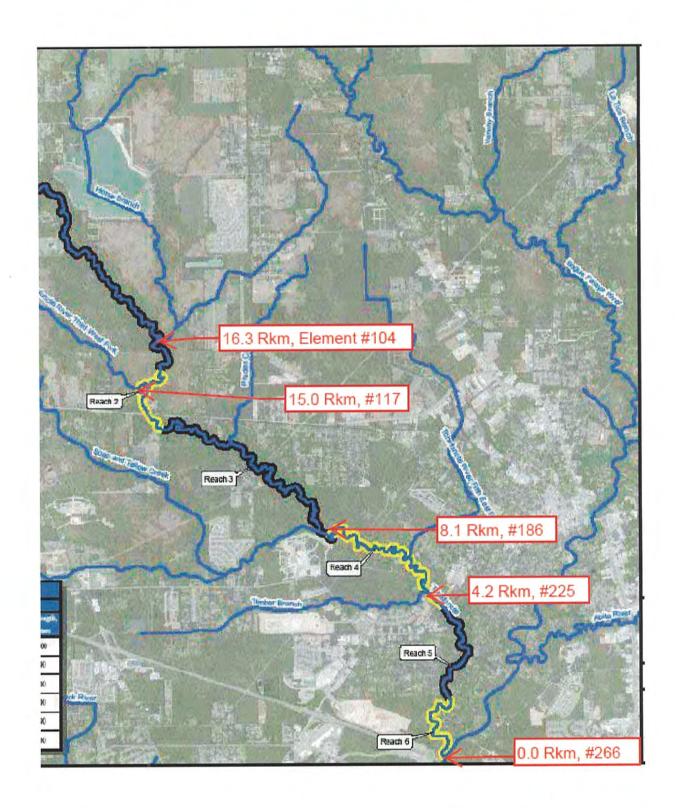
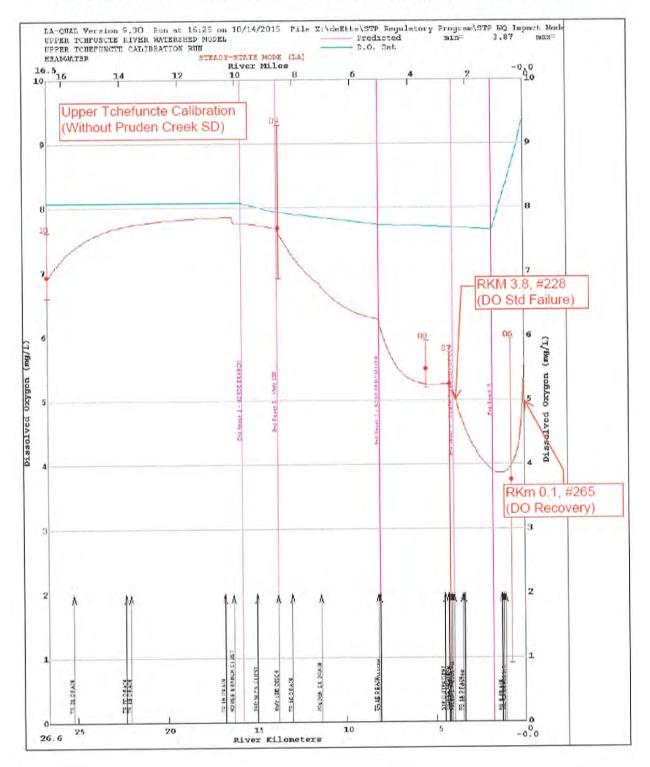


EXHIBIT 4

DO Calibration: Upper Tchefuncte River without Pruden Creek SD



# EXHIBIT 5 Average Influent and Effluent Concentrations of BMPs National Stormwater Database (2010)

		Sample	Detention Pond	Wet Pond	Wetland Basin	Biofilter	Media Filter	Hydrodynamic Devices	Porous Pavement
Constituents	Units	Location	(n=25) [1]	(n=46) [2]	(n=19 [3]	(n=57) [4]	(n=38) [5]	(n=32) [6]	(n=6) [7]
Constituents	Cinto	Influent	72.65	37.73	37.76	52.15	43.27	39.61	
		Effluent	25.31	9.86		17.64	10.99	24.94	13.26
Suspended Solids	(me/L)	RE, %	65.16	73.87	66,13	66.17	74.60	37.04	
завренаса понав	(mg/L)	Influent	0.71	0.41	0.34	0.54	0.25	0.74	
		Effluent	0.47	0.27	0.24	0.3			
Total Cadmium	(µg/L)	RE, %	33.80	34.15	29.41	44.44	24.00	22.97	
Total Cadimon	(HB/L)	Influent	0.24	0.19		0.16			
Dissolved		Effluent	0.25	0.11	0.21	0.13	0.31		
Cadmium	(µg/L)	RE, %	-4.17	42.11	16.00	18.75	6.06		
Cuamium	(PB II)	Influent	20.13	9.84	5.65	31.93	14.57		
		Effluent	15.91	5.82			7.63		2.78
Total Copper	(µg/L)	RE, %	20.96	40.85	40.71	69.84	47.63	22.75	
rotal coppe.	(PB/L)	Influent	5.88	7.33		7,75	13.59		
Dissolved		Effluent	8.31	4.35			12.36		
Copper	(µg/L)	RE, %	-41.33	40.65		9.68			
Соруж	(HB/L)	Influent	7.36						
		Effluent	3.18						
Total Chromium	(µg/L)	RE, %	56.79	76.00			13.51		
Total Cittoman	(ABC)	Influent	25.01	13.88		19,53		17.9	
	7.5	Effluent	14.57					5.05	7.88
Total Lead	(µg/L)	RE, %	41.74	75.50			76.79		100000
Total Betta	(hB)	Influent	1.25				1.44	1.89	(-
		Effluent	1.33					1.7	
Dissolved Lead	(µg/L)	RE, %	-6.40	37.42			40.28	10.05	
2-100001144	(10-0)	Influent	111.56				92.34	119.08	
		Effluent	58.66		29.21	27.93	32.23	75.12	16.6
Total Nitrogen	(mg/L)	RE, %	47,42	64.48					
TO THE OBSTITUTE OF THE	V. B	Influent	24.03	38.83	58.1	69.27	35.88		
		Effluent	27.84	29.17			34.38		
Nitrate-Nitrogen	(mg/L)	RE. %	-15.86		58.54	53.49	4.18		
	, , ,	Influent	0.19			0.25	0.2	0.24	
	147	Effluent	0.19	0.1	0.11	0.27	0.11	0,2	0.09
TKN	(mg/L)	RE, %	0.00	52.38	59.26	-8.00	45.00	16.67	
		Influent	0.09	0.09	0.08	0.09	0.09	0.06	
4 44 6		Effluent	0.09	0.05	0.08	0.33	0.08		
Total Zinc	(µg/L)	RE, %	0.00	44.44	0.00	-266.67	11.11		
		Influent	1.25	1.64	1.45	1.32	1.31	1.25	
		Effluent	2.22	1.31	1.15	0.57			
Dissolved Zinc	(µg/L)	RE, %	-77.60		20.69				
		Influent	0.7	0.38	0.37	0.59	0.41		
		Effluent	0.48				0.66		
Total Phosphorus	(mg/L)	RE, %	31.43			38.98			
		Influent	1,45				1.52	1.07	
Dissolved		Effluent	1.51	1.01	1.05				
Phosphorus	(mg/L)	RE, %	-4.14		5.41	27.78	23.68	-11.21	

Actual number of BMPs reporting a particular constituent may be greater or less than the number reported in this table, which was based on number of studies reported in database based on BMP category.

Notes: xx- Lack of sufficient data to report median and confidence interval. Values in parenthesis are the 95% confidence intervals about the median.

Differences in median influent and effluent concentrations does not necessarily indicate that there was a statistically significant difference between influent and effluent. See "Analysis of Treatment System Performance, International Stormwater BMP Datab

EXHIBIT 6
DO Impact: Upper Tchefuncte River with Pruden Creek SD

 $Q_{WW} = 24,000 \text{ GPD DO} = 2.0 \text{ mg/L}$  $Q_{SW} = 1.0 \text{ cfs}$ 

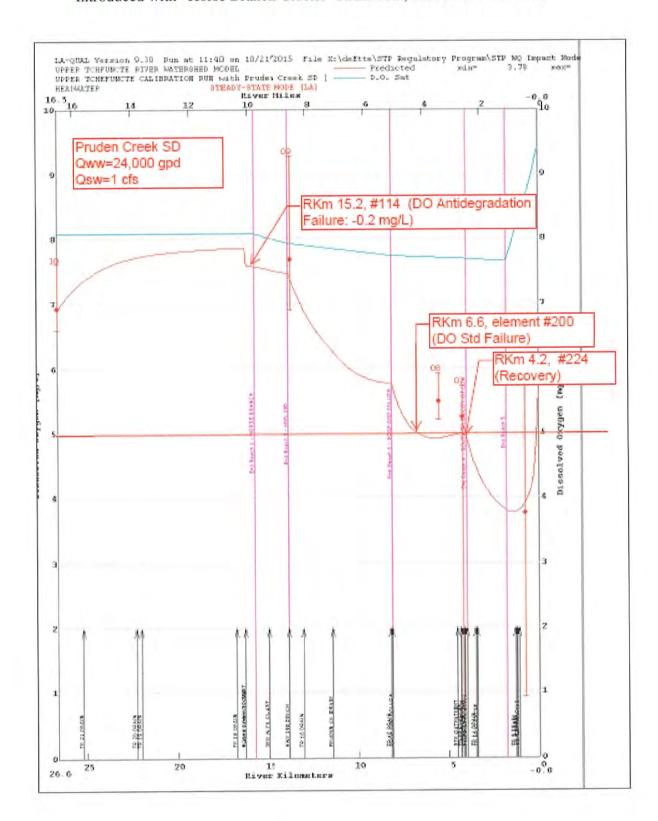


EXHIBIT 6.a

DO Impact: Upper Tchefuncte River with Pruden Creek SD

 $Q_{WW} = 24,000 \text{ GPD DO} = 5.0 \text{ mg/L}$  $Q_{SW} = 1.0 \text{ cfs}$ 

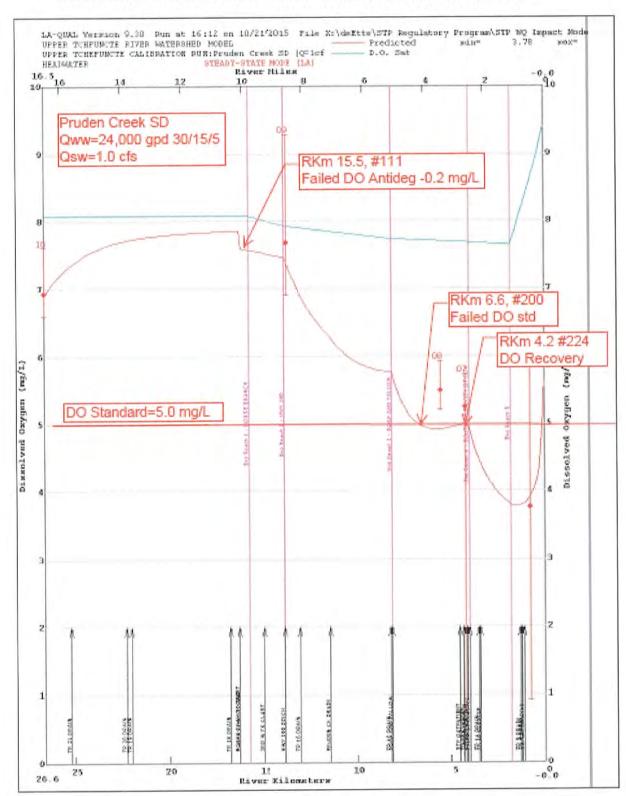


EXHIBIT 6.b

DO Impact: Upper Tchefuncte River with Pruden Creek SD

 $Q_{WW} = 24,000 \text{ GPD DO} = 2.0 \text{ mg/L}$  $Q_{SW} = 0.1 \text{ cfs (minimum)}$ 

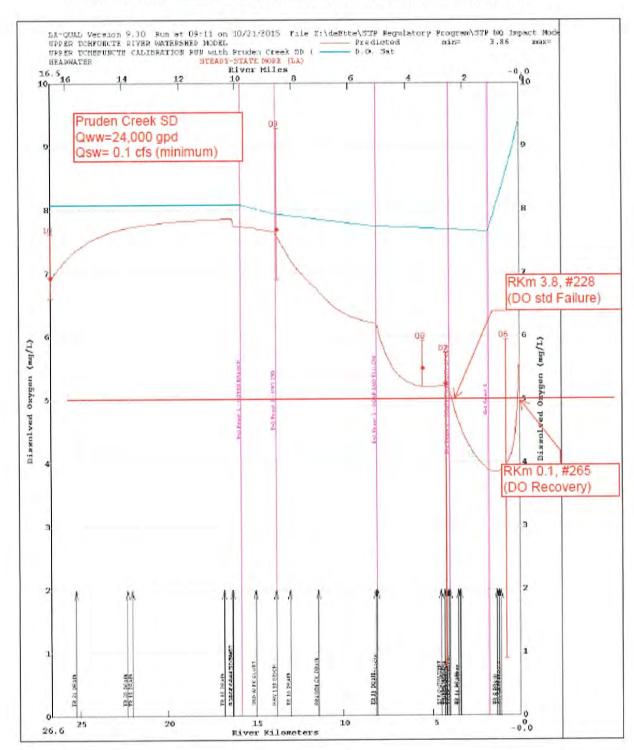


EXHIBIT 7

DO Calibration: Upper Tchefuncte River without Pruden Creek SD

IOR	REAG	Н	DIST km		FLOW mº/s	FLOW cfs	TEMP deg C	SALN ppt	DO mg/L	BOD1 mg/L	BOD2 mg/L	NBOD mg/L
		WAS	STELOAD	#	104 (H	ORSE BRA	NCH CL	UST)	ENTERS	HERE		
104		1	16.200	3,0	0.988	34.880	26.24	0.0	7.76	5.89	0.00	1.72
105	UT	1	16.100		0.988	34.880	26.24	0.0	7.76	5.86	0.00	1.71
106	UT	1	16.000		0.988	34.880	26.24	0.0	7.76	5.82	0.00	1.69
107	UT	1	15.900		0.988	34.880	26.24	0.0	7.76	5.79	0.00	1.68
108	UT	1	15.800		0.988	34.880	26.24	0.0	7.76	5.75	0.00	1.66
109	UT	2	15.700		0.988	34.880	26.29	0.0	7.76	5.72	0.00	1.65
	UT	2	15.600		0.988	34.880	26.34	0.0	7.75	5.69	0.00	1.64
111	UT	2	15.500		0.988	34.880	26.39	0.0	7.75	5.65	0.00	1.62
112	UT	2	15.400		0.988	34.880	26.44	0.0	7.75	5.62	0.00	1.61
113	UT	2	15.300		0.988	34.880	26.49	0.0	7.75	5.59	0.00	1.59
114	UT	2	15.200		0.988	34.880	26.54	0.0	7.74	5.56	0.00	1.58
115	UT	2	15.100		0.988	34.880	26.59	0.0	7.74	5.52	0.00	1.57
116	UT	2	15.000		0.988	34.880		0.0	7.74	5.49	0.00	1.55
		WA:	STELOAD	#	117 (3	RD W FK	CLUST	ENT!	ERS HERI	E		
117	UT	2	14.900		0.989	34.937	26.69	0.0	7.73	6.09	0.00	1.66
118	UT	2	14.800		0.989	34.937	26.74	0.0	7.72	6.05	0.00	1.65
119	UT	2	14.700		0.989	34.937	26.78	0.0	7.72	6.02	0.00	1.64
120	UT	2	14.600		0.989	34.937	26.83	0.0	7.71	5.98	0.00	1.62
121	UT	2222	14.500		0.989	34.937	26.88	0.0	7.71	5.95	0.00	1.61
122	UT	2	14.400		0.989	34.937	26.93	0.0	7.71	5.91	0.00	1.59
123	UT	2	14.300		0.989	34.937	26.98	0.0	7.70	5.88	0.00	1.58
124	UT	2	14.200		0.989	34.937	27.03	0.0	7.70	5.84	0.00	1.56
125		2	14.100		0.989	34.937	27.08	0.0		5.81	0.00	1.55
126		2	14.000		0.989	34.937	27.13	0.0		5.77	0.00	1.54
127	UT	2	13.900		0.989	34.937	27.18	0.0	7.68	5.74	0.00	1.52
128	UT	2	13.800		0.989	34.937	27.23	0.0		5.71	0.00	1.51
		WA.	STELOAD	#		WY 190			RS HERE			41.44
129	UT	3	13.700		0.990	34.975	27,25	0.0		5.57	0,00	1.50
130	UT	3	13,600		0.990	34.975	27.28	0.0		5.42	0.00	1.46
131	UT	3	13.500		0.990	34.975	27.30	0.0		5.27	0.00	1.42
132	UT	3	13.400		0.990	34.975	27.33	0.0		5.13	0.00	1.38
133	UT	3	13.300		0.990	34.975	27.35	0.0		4,99	0.00	1.34
134	UT	3	13.200		0.990	34.975	27.38	0.0		4.85	0.00	1.30
135	UT	3	13.100		0.990	34.975	27.40	0.0		4.72	0.00	1.26
136	UT	3	13.000		0.990	34.975	27.43	0.0		4.59	0.00	1.23
30.0			STELOAD	#	137		AIN) E			00000	0.000	
137	UT	3	12.900		0.991	34.985		0.0		4.59	0.00	1.22
138	UT	3	12.800		0.991	34.985	27.48	0.0	7.21	4.47	0.00	1.19

IOR REACH	d DIST	FLOW	FLOW	TEMP	SALN	DO	BOD1	BOD2	NBOD
	km	m*/s	cfs	deg C	ppt 	mg/L	mg/L	mg/L	mg/L
139 UT 3 140 UT 3		0.991 0.991	34.985	27.50 27.53	0.0 0.0	7.17 7.14	4.35 4.23	0.00 0.00	1.15 1.12
141 UT 3 142 UT 3		0.991 0.991	34.985 34.985	27.55	$0.0 \\ 0.0$	7.10 7.07	4.11 4.00	0.00 0.00	1.09 1.06
142 UT 3		0.991	34.985	27.60	0.0	7.04	3.89	0.00	1.03
144 UT 3 145 UT 3		0.991 0.991	34.985 34.985	27.63	0.0	7.01 6.98	3.78 3.67	0.00 0.00	1.00 0.97
145 UT 3	12.000	0.991	34.985	27.68	0.0	6.95	3.5 <i>7</i>	0.00	0.95
147 UT 3 148 UT 3	3 11.900 3 11.800	0.991 0.991	34.985 34.985	27.70 27.73	0.0 0.0	6.93 6.90	3.47 3.38	0.00 0.00	0.92 0.89
140 UT 3		0.991	34.985	27.75	0.0	6.88	3.28	0.00	0.87
150 UT 3 151 UT 3	3 11.600 3 11.500	0.991 0.991	34.985 34.985	27.78 27.80	0.0 0.0	6.85 6.83	3.19 3.10	0.00 0.00	0.84 0.82
152 UT 3	3 11.400	0.991	34.985	27.83	0.0	6.81	3.02	0.00	0.80
153 UT 3	VASTELOAD # 3 11.300	153 (P 0.995	RUDEN CI 35.121	< DRAIN 27.85	N) ENT	ERS HE	RE 4.76	0.00	1.18
154 UT 3	11.200	0.995	35.121	27.88	0.0	6.73	4.63	0.00	1.14
	3 11.100 3 11.000	0.995 0.995	35.121 35.121		0.0	6.70 6.67	4.50 4.37	0.00 0.00	1.11 1.08
157 UT 3	3 10.900	0.995	35.121	27.95	0.0	6.64	4.25	0.00	1.05
	3 10.800 3 10.700	0.995 0.995	35.121 35.121		0.0	6.61 6.59	4.13 4.02	0.00 0.00	1.02 0.99
160 UT :	10.600	0.995	35.121	28.03	0.0	6.57	3.91	0.00	0.96
	3 10.500 3 10.400	0.995 0.995	35.121 35.121		0.0 0.0	6.54 6.52	3.80 3.69	0.00 0.00	0.93 0.91
163 UT :	3 10.300	0.995	35.121	28.10	0.0	6.50	3.59	0.00	0.88
	3 10.200 3 10.100	0.995 0.995	35.121 35.121		0.0	6.48 6.47	3.49 3.39	0.00 0.00	0.86 0.83
166 UT :	3 10.000	0.995	35.121	28.18	0.0	6.45	3.30	0.00	0.81
	9.900 3 9.800	0.995 0.995	35.121 35.121		0.0	6.43 6.42	3.21 3.12	0.00 0.00	0.79 0.76
169 UT	9.700	0.995	35.121	28.25	0.0	6.40	3.03	0.00	0.74
	9.600 3 9.500	0.995 0.995	35.121 35.121		0.0	6.39 6.38	2.94 2.86	0.00 0.00	0.72 0.70
172 UT	9.400	0.995	35.121	28.33	0.0	6.36	2.78	0.00	0.68 0.66
	3 9.300 3 9.200	0.995 0.995	35.121 35.121		0.0	6.35 6.34	2.70 2.63	0.00 0.00	0.64
175 UT	3 9.100	0.995	35.121	28.40	0.0	6.33	2.55	0.00 0.00	0.62 0.60
	3 9.000 3 8.900	0.995 0.995	35.121 35.121		0.0	6.32 6.31	2.48 2.41	0.00	0.59
178 UT	3 8.800	0.995	35.121		0.0	6.31	2.34 2.28	0.00 0.00	0.5 <i>7</i> 0.55
	3 8.700 3 8.600	0.995 0.995	35.121 35.121		0.0	6.30 6.29	2.21	0.00	0.54
181 UT	3 8.500	0.995	35.121	28.55	0.0	6.28 6.28	2.15 2.09	0.00 0.00	0.52 0.51
	3 8.400 3 8.300	0.995 0.995	35.121 35.121		0.0	6.27	2.03	0.00	0.49
184 UT		0.995 # 105 (7			0.0		1.98	0.00	0.48
185 UT	3 8.100	0.996	35.179	28.65	0.0	6.25	2.14	0.00	0.63
	WASTELOAD : 4 8.000	186 (9 1.005	OAP AND 35.483	TALLO 28.66	W) ENT 0.0	FERS HE 6.11	RE 3.87	0.00	1.37
187 UT	4 7.900	1.005	35.483	28.67	0.0	6.02	3.54	0.00	1.29
	4 7.800 4 7.700	1.005 1.005	35.483 35.483		0.0	5.93 5.85	3.23 2.96	0.00	1.21 1.13
190 UT	4 7.600	1.005	35.483	28.69	0.0	5.78	2.70	0.00	1.06
	4 7.500 4 7.400	1.005 1.005	35.483 35.483	28.70	0.0	5.72 5.66	2.47 2.26	0.00 0.00	1.00 0.94
193 UT	4 7.300	1.005	35.483	28.72	0.0	5.61	2.07	0.00 0.00	0.88 0.83
	4 7.200 4 7.100	1.005 1.005	35.483 35.483	28.73	0.0	5.56 5.52	1.89 1.73	0.00	0.78
196 UT	4 7.000	1.005	35.483	28.74	0.0	5.48	1.58 1.44	0.00 0.00	0.73 0.68
	4 6.900 4 6.800	1.005 1.005	35.483 35.483		0.0 0.0	5.45 5.42	1.32	0.00	0.64
199 UT	4 6.700	1.005	35.483 35.483			5.39 5.37	1.20 1.10	0.00	0.60 0.57
200 UT 201 UT	4 6.600 4 6.500	1.005 1.005	35.483	28.79	0.0	5.35	1.01	0.00	0.53
202 UT	4 6.400	1.005 1.005		28.80 28.80		5.33 5.31	0.92 0.84	0.00 0.00	0.50 0.47
203 UT 204 UT	4 6.300 4 6.200	1.005	35.483	28.81	0.0	5.30	0.77	0.00	0.44
205 UT 206 UT	4 6.100 4 6.000	1.005 1.005		28.82 28.83	0.0 0.0	5.29 5.28	0.70 0.64	0.00	0.41 0.39
207 UT	4 5.900	1.005	35.483	28.84	0.0	5.27	0.59	0.00	0.36
208 UT 209 UT	4 5.800 4 5.700	1.005 1.005		28.85 28.85		5.26 5.26	0.54 0.49	0.00 0.00	0.34 0.32
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IOR	REAG	ΞH	DIST		FLOW	FLOW	TEMP		DO	BOD1	BOD2	NBOD
			km		m*/5	cf5	deg C	ppt	mg/L	mg/L	mg/L	mg/L
210	UΤ	4	5.600		1.005	35.483	28.86	0.0	5.25	0.45	0.00	0.30
211		4	5.500		1.005	35.483		0.0	5.25	0.41	0.00	0.28
212		4	5.400		1.005	35.483		0.0	5.24	0.37	0.00	0.26
213		4	5.300		1.005	35.483 35.483		0.0 0.0	5.24 5.24	0.34 0.31	0.00 0.00	0.25 0.23
214 215		4 4	5.200		1.005	35.483		0.0	5.24	0.28	0.00	0.23
216		4	5.000		1.005	35.483		0.0	5.24	0.26	0.00	0.21
217		4	4.900		1.005		28.92	0.0	5.24	0.24	0.00	0.19
218		4	4.800		1.005	35.483		0.0	5.24	0.22	0.00	0.18
219		4	4.700		1.005	35.483		0.0	5.24	0.20	0.00	0.17
220		4	4.600		1.005	35.483		0.0	5.25	0.18	0.00 0.00	0.16 0.15
221	UΙ	4 waci	4.500	J.	1.005	35.483 TP OUTP		0.0 ) ENTE	5.25 RS HERI	0.17	0.00	0.15
222	IJТ	4	4.400	TT.	1.005	35.485	28.97	0.0	5.25	0.15	0.00	0.14
223		4	4.300		1.005	35.485	28.97	0.0	5.25	0.14	0.00	0.13
		WAST	FELOAD	#	224 (T	R 12 CL						
224	UT	4	4.200		1.005	35.495	28.98	0.0	5.25	0.26	0.00	0.16
				#		IMBER BI 35.651	RANCHI	O.O	5.22	1.06	0.00	0.50
225	UI	-4 -₩∧⊆1	4.100	#	1.010	35.651 • ITY OF					0.00	0.50
226	ПΤ	₩ <i>Α</i> ⊃ (	4.000	TIT.	1.030	36.375			5.19	1.37	0.00	0.78
220	٠.	WAS1	ΓELOAD	#	227 (T	YLER ST	CLUST	ER) EN				
227	UΤ	5	3.900		1.031	36.394	29.01	0.0	5.07	1.22	0.00	0.73
228		5	3.800		1.031	36.394		0.0	4.97	1.07	0.00	0.66
229		5	3.700		1.031	36.394		0.0	4.87	0.93	0.00	0.59
230		5	3.600		1.031	36.394 36.394		0.0 0.0	4.78 4.70	0.81 0.71	0.00	0.53 0.47
231	וט	5 Wast	3.500 TELOAD	#	1.031	30.334 R 11 DR.	ZJ.O/ ATN) FI			0.71	0.00	0.47
232	UΤ	5	3.400	11	1.031	36.395	29.08	0.0	4.63	0.63	0.00	0.43
	Ψ,			#		R 10 CL		ENTER	S HERE			
233	UT	5	3.300		1.032	36.441	29.09	0.0	4.55	0.76	0.00	0.51
234		5	3.200		1.032	36.441		0.0	4.48	0.66	0.00	0.45
235	UT	5	3.100		1.032	36.441 36.441		0.0 0.0	4.41 4.36	0.5 <i>7</i> 0.50	0.00 0.00	0.41 0.37
236 237		5 5	3.000 2.900		1.032 1.032	36.441		0.0	4.30	0.44	0.00	0.33
238		5	2.800		1.032	36.441		0.0	4.25	0.38	0.00	0.30
239		5	2.700		1.032	36.441		0.0	4.21	0.33	0.00	0.27
240		5	2.600		1.032	36.441	29.18	0.0	4.16	0.29	0.00	0.24
241		5	2.500		1.032	36.441		0.0	4.12	0.25	0.00	0.21
242		5	2.400		1.032	36.441		0.0	4.09 4.05	0.22 0.19	0.00 0.00	0.19 0.17
243		5	2.300		1.032 1.032	36.441 36.441		0.0	4.03	0.17	0.00	0.16
244	UT UT	5 5	2.100		1.032	36.441		0.0	3.99	0.15	0.00	0.14
	ŬΤ	5	2.000		1.032	36.441			3.96	0.13	0.00	0.13
	ŪΤ	5	1.900		1.032	36.441			3.93	0.11	0.00	0.11
	UT	5	1.800		1.032	36.441			3.90	0.10	0.00	0.10
	UΤ	6				36.441				0.10 0.11	0.00 0.00	0.09 0.09
	UT	6	1.600 1.500		1.032 1.032	36.441 36.441				0.11	0.00	0.09
	UT UT	6	1.400		1.032	36.441				0.24	0.00	0.11
	ŰΤ	6	1.300		1.032	36.441				0.44	0.00	0.15
	- '	WAS"	TELOAD	#	254 (	TR 8 DRA	IN) EN	TERS H	ERE			
254	UT	6	1.200		1.034	36.523	25.65	0.0	3.87	0.85	0.00	0.25
					255 (1	TR 9 DRA	IN) EN	TERS H	IEKE	0.79	0.00	0.25
255	UT	6 WAC	1.100			36.529 JIL GREE			3.88 RS H <b>E</b> R		0.00	0.23
256	UΤ	6 6	1.000		1.038		24.43	-	3.89	0.73	0.00	0.26
	ŬΤ	6	0.900		1.038	36.662			3.92	0.65	0.00	0.23
	ŪΤ	6	0.800		1.038	36.662	23.22	0.0	3.96	0.57	0.00	0.21
	UΤ	6	0.700		1.038		22.61		4.01	0.51	0.00	0.20
	UT	6	0.600		1.038		22.00		4.07	0.46 0.42	0.00	0.19 0.18
	UT	6 6	0.500		1.038 1.038		21.40 20.79		4.15 4.25	0.42	0.00	0.18
262 263	UT UT	6 6	0.400		1.038		20.18		4.40	0.40	0.00	0.20
	ÜT	6	0.200		1.038		19.57		4.63	0.45	0.00	0.25
	ŪΤ	6	0.100		1.038	36.662	18.97	0.0	5.00	0.60	0.00	0.35
266	UT	6	-0.000		1.038	36.662	18.36	0.0	5.65	0.93	0.00	0.57

## EXHIBIT 8 DO Impact: Upper Tchefuncte River with Pruden Creek SD

#### WW Q=24,000 GPD DO= 2.0 mg/L SW Q=1 cfs

IOR	REAC	Н	DIST km		FLOW m*/s	FLOW cfs	TEMP deg C	SALN ppt	mg/L	BOD1 mg/L	BOD2 mg/L	NBOD mg/L
		WAS	TELOAD	#	104 (	Pruden Cr	reek st	(WW)	ENTERS	HERE		
			TELOAD	#	104 (	ruden Cr	reek St	SW)	ENTERS	HERE		
			TELOAD	#		HORSE BRA			ENTERS	HERE		
104	UT	1	16.200		1.017	35.906		0.0	7.59	6.42	0.00	4.26
105	UT	1	16.100		1.017	35.906	26.24	0.0	7.59	6.39	0.00	4.23
106	UT	1	16.000		1.017	35.906	26.24	0.0	7.58	6.35	0.00	4.19
107	UT	1	15.900		1.017	35.906	26.24	0.0	7.58	6.32	0.00	4.16
108	UT	1	15.800		1.017	35.906	26.24	0.0	7.57	6.28	0.00	4.13
109	UT	2	15.700		1.017		26.29	0.0	7.57	6.24	0.00	4.09
110	UT	2	15.600		1.017	35.906	26.34	0.0	7.56	6.21	0.00	4.06
111	UT	2	15.500		1.017	35.906	26.39	0.0	7.56	6.17	0.00	4.02
112	UT	2	15.400		1.017	35.906	26.44	0.0	7.55	6.14	0.00	3.99
113	UT	2	15.300		1.017	35.906	26.49	0.0	7.55	6.10	0.00	3.96
114		2	15.200		1.017	35.906	26.54	0.0	7.54	6.07	0.00	3.92
115	UT	2	15.100		1.017	35.906	26.59	0.0	7.54	6.03	0.00	3.89
116		2	15.000		1.017	35.906		0.0	7.53	6.00	0.00	3.86
777	17.		STELOAD	#	117 (	BRD W FK	CLUST)	ENTE	ERS HER			
117	UT	2	14.900		1.018	35.963	26.69	0.0	7.52	6.58	0.00	3.94
118		2	14.800		1.018	35.963	26.74	0.0	7.52	6.54	0.00	3.91
119		2	14.700		1.018	35.963	26.78	0.0	7.51	6.50	0.00	3.88
120	UT	2	14.600		1.018	35.963	26.83	0.0	7.51	6.47	0.00	3.84
121	UT	2	14.500		1.018	35.963	26.88	0.0	7.50	6.43	0.00	3.81
122	UT	2	14.400		1.018	35.963	26.93	0.0		6.39	0.00	3.78
123	UT	2	14.300		1.018	35.963	26.98	0.0	7.49	6.36	0.00	3.75
124	UT	2	14.200		1.018	35.963	27.03	0.0		6.32	0.00	3.72
125	UT	2	14.100		1.018	35.963	27.08	0.0		6.28	0.00	3.68
126	UT	2	14.000		1.018	35.963	27.13	0.0		6.25	0.00	3.65
127	UT	2	13.900		1.018	35.963	27.18	0.0		6.21	0.00	3.62
128	UT	2	13.800		1.018	35.963	27.23	0.0		6.17	0.00	3.59
		WA:	STELOAD	#	129 (	HWY 190 I		ENTER				
129	UT	3	13.700		1.019			0.0	7.38	6.03	0.00	3.52
130	UT	3	13.600		1.019	36.001	27.28	0.0	7.31	5.87	0.00	3.42
131	UT	3	13.500		1.019	36.001	27.30	0.0	7.24	5.72	0.00	3.33
132	UT	3	13.400		1.019	36.001	27.33	0.0	7.17	5.56	0.00	3.24
133		3	13.300		1.019	36.001	27.35	0.0	7.11	5.42	0.00	3.15
134	UT	3	13.200		1.019	36.001	27.38	0.0	7.04	5.27	0.00	3.07
135		3	13.100		1.019			0.0		5.13	0,00	2.98
136		3 .	13.000		1.019	36.001		0.0	6.93	4.99	0.00	2.90
70.0		WA	STELOAD	#	137 (	TR 16 DR		NTERS	HERE			
137	UT	3	12.900		1.020			0.0		4,99	0.00	2.85

	/L mg/L mg	BOD g/L
139 UT 3 12.700 1.020 36.011 27.50 0.0 6.77 4 140 UT 3 12.600 1.020 36.011 27.53 0.0 6.72 4 141 UT 3 12.500 1.020 36.011 27.55 0.0 6.67 4 142 UT 3 12.400 1.020 36.011 27.58 0.0 6.63 4 143 UT 3 12.300 1.020 36.011 27.60 0.0 6.59 4 144 UT 3 12.200 1.020 36.011 27.63 0.0 6.55 4 145 UT 3 12.100 1.020 36.011 27.65 0.0 6.51 4 146 UT 3 12.000 1.020 36.011 27.68 0.0 6.48 3 147 UT 3 11.900 1.020 36.011 27.70 0.0 6.44 3 148 UT 3 11.800 1.020 36.011 27.73 0.0 6.41 3 149 UT 3 11.700 1.020 36.011 27.75 0.0 6.38 3 150 UT 3 11.600 1.020 36.011 27.78 0.0 6.38 3	.73 0.00 2 .60 0.00 2 .48 0.00 2 .36 0.00 2 .13 0.00 2 .91 0.00 2 .70 0.00 2 .50 0.00 2	2.77 2.70 2.63 2.55 2.48 2.42 2.35 2.29 2.29 2.16 2.10 2.05 1.99
152 UT 3 11.400 1.020 36.011 27.83 0.0 6.29 3 WASTELOAD # 153 (PRUDEN CK DRAIN) ENTERS HERE 153 UT 3 11.300 1.024 36.147 27.85 0.0 6.24 5 154 UT 3 11.200 1.024 36.147 27.88 0.0 6.21 4 155 UT 3 11.100 1.024 36.147 27.90 0.0 6.17 4 156 UT 3 11.000 1.024 36.147 27.93 0.0 6.14 4 157 UT 3 10.900 1.024 36.147 27.95 0.0 6.11 4 158 UT 3 10.800 1.024 36.147 27.98 0.0 6.09 4 159 UT 3 10.700 1.024 36.147 28.00 0.0 6.06 4 160 UT 3 10.600 1.024 36.147 28.03 0.0 6.04 4 161 UT 3 10.500 1.024 36.147 28.03 0.0 6.04 4 161 UT 3 10.500 1.024 36.147 28.05 0.0 6.01 4 162 UT 3 10.400 1.024 36.147 28.08 0.0 5.99 3 163 UT 3 10.300 1.024 36.147 28.10 0.0 5.97 3 164 UT 3 10.200 1.024 36.147 28.13 0.0 5.95 3 165 UT 3 10.100 1.024 36.147 28.15 0.0 5.95 3	.00 0.00 2 .86 0.00 2 .73 0.00 2 .61 0.00 2 .48 0.00 2 .36 0.00 2 .24 0.00 2 .13 0.00 2 .02 0.00 2 .91 0.00 2 .80 0.00 2	1.88 2.22 2.16 2.10 2.04 1.99 1.93 1.88 1.83 1.78 1.78 1.68 1.64 1.59
167 UT 3 9.900 1.024 36.147 28.20 0.0 5.90 3 168 UT 3 9.800 1.024 36.147 28.23 0.0 5.89 3 169 UT 3 9.700 1.024 36.147 28.25 0.0 5.87 3 170 UT 3 9.600 1.024 36.147 28.28 0.0 5.86 3 171 UT 3 9.500 1.024 36.147 28.30 0.0 5.85 3 172 UT 3 9.400 1.024 36.147 28.33 0.0 5.84 2 173 UT 3 9.300 1.024 36.147 28.33 0.0 5.84 2 174 UT 3 9.200 1.024 36.147 28.35 0.0 5.83 2 175 UT 3 9.100 1.024 36.147 28.38 0.0 5.82 2 176 UT 3 9.000 1.024 36.147 28.40 0.0 5.81 2 177 UT 3 8.900 1.024 36.147 28.45 0.0 5.81 2 177 UT 3 8.900 1.024 36.147 28.45 0.0 5.80 2 178 UT 3 8.800 1.024 36.147 28.45 0.0 5.80 2 178 UT 3 8.800 1.024 36.147 28.48 0.0 5.79 2	.41	1.55 1.50 1.46 1.42 1.38 1.31 1.27 1.27 1.24 1.20 1.17 1.14 1.10
180 UT 3 8.600 1.024 36.147 28.53 0.0 5.79 2 181 UT 3 8.500 1.024 36.147 28.55 0.0 5.78 2 182 UT 3 8.400 1.024 36.147 28.58 0.0 5.78 2 183 UT 3 8.300 1.024 36.147 28.60 0.0 5.78 2 184 UT 3 8.200 1.024 36.147 28.63 0.0 5.77 2 WASTELOAD # 185 (TR 15 DRAIN) ENTERS HERE 185 UT 3 8.100 1.025 36.205 28.65 0.0 5.76 2 WASTELOAD # 186 (SOAP AND TALLOW) ENTERS HERE 186 UT 4 8.000 1.034 36.509 28.66 0.0 5.63 3 187 UT 4 7.900 1.034 36.509 28.67 0.0 5.55 3 188 UT 4 7.800 1.034 36.509 28.68 0.0 5.47 3	.31	1.04 1.01 0.99 0.96 0.93 1.07 1.76 1.65 1.55 1.46 1.38
191 UT 4 7.500 1.034 36.509 28.70 0.0 5.27 2 192 UT 4 7.400 1.034 36.509 28.71 0.0 5.22 2 193 UT 4 7.300 1.034 36.509 28.72 0.0 5.18 2 194 UT 4 7.200 1.034 36.509 28.73 0.0 5.14 1 195 UT 4 7.100 1.034 36.509 28.74 0.0 5.10 1 196 UT 4 7.000 1.034 36.509 28.74 0.0 5.07 1 197 UT 4 6.900 1.034 36.509 28.75 0.0 5.04 1 198 UT 4 6.800 1.034 36.509 28.75 0.0 5.04 1 198 UT 4 6.800 1.034 36.509 28.75 0.0 5.02 1 199 UT 4 6.700 1.034 36.509 28.77 0.0 5.00 1 200 UT 4 6.600 1.034 36.509 28.77 0.0 5.00 1 200 UT 4 6.600 1.034 36.509 28.78 0.0 4.98 1 201 UT 4 6.500 1.034 36.509 28.79 0.0 4.96 1 202 UT 4 6.400 1.034 36.509 28.80 0.0 4.95 203 UT 4 6.300 1.034 36.509 28.80 0.0 4.95 203 UT 4 6.200 1.034 36.509 28.81 0.0 4.94 204 UT 4 6.200 1.034 36.509 28.81 0.0 4.93 205 UT 4 6.100 1.034 36.509 28.81 0.0 4.93	.34 0.00 .15 0.00 .97 0.00 .80 0.00 .51 0.00 .39 0.00 .27 0.00 .16 0.00 .07 0.00 .98 0.00 .89 0.00	1.29 1.22 1.14 1.08 1.01 0.95 0.90 0.84 0.79 0.75 0.66 0.62 0.58

IOR	REA	СН	DIST km		FLOW m²/s	FLOW cfs	TEMP deg C	SALN ppt	DO mg/L	BOD1 mg/L	BOD2 mg/L	NBOD mg/L
209	ПΤ	4	5.700		1.034	36.509	28.85	0.0	4.92	0.53	0.00	0.43
210		4	5.600		1.034	36.509		0.0	4.92	0.48	0.00	0.40
211		4	5.500		1.034	36.509		0.0	4.92	0.44	0.00	0.38
212	UT	4	5.400		1.034	36.509		0.0	4.92	0.41	0.00	0.36
213		4	5.300		1.034	36.509	28.89	0.0	4.93	0.37	0.00	0.34
214		4	5.200		1.034	36.509	28.90	0.0	4.93	0.34	0.00	0.32
215		4	5.100		1.034	36.509	28.91	0.0	4.94	0.31	0.00	0.30
216		4	5.000		1.034	36.509		0.0	4.94 4.95	0.29 0.26	0.00	0.28 0.26
217		4	4.900		1.034	36.509 36.509		0.0	4.95	0.28	0.00	0.25
218 219		4 4	4.800 4.700		1.034	36.509			4.96	0.22	0.00	0.23
220		4	4.600		1.034	36.509		0.0	4.97	0.20	0.00	0.22
221		4	4.500		1.034	36.509			4.98	0.18	0.00	0.21
221	٠,		TELOAD	#		TP OUTP	ATIENT	) ENTE	RS HERE			
222	UT	4	4.400		1.034	36.511	28.97	0.0	4.98	0.17	0.00	0.20
223		4	4.300		1.034	36.511	28.97	0.0	4.99	0.16	0.00	0.18
		WAS		#		R 12 CL	USTER)	ENTER	RS HERE			
224	UT	4	4.200		1.034	36.521			5.00	0.27	0.00	0.20
	_			#		IMBER B			RS HERE	4 05	0 00	0 57
225	UT	4	4.100		1.039	36.677	28.99 COVENC	0.0 \ ENT	4.97	1.05	0.00	0.53
226				#		ITY OF 4 37.401	OO OO OOTNG	) ENIC	4.95	1.35	0.00	0.81
226	UI	-4 -₩Α <i>σ</i> 1	4.000	J.	1.059	37.401 YLER ST	29.00	ER) EM			0.00	0.01
227	нт	5 S	3.900	₩.	1.060	37.420			4.84	1.21	0.00	0.76
228		5	3.800		1.060	37.420			4.75	1.06	0.00	0.68
229		5	3.700		1.060	37.420			4.66	0.93	0.00	0.61
230		5	3.600		1.060	37.420			4.58	0.81	0.00	0.55
231		5	3.500		1.060	37.420			4.51	0.71	0.00	0.50
		WAS	TELOAD	#	232 (T	R 11 DR.			HERE			
232	UT	5	3.400		1.060	37.421			4.44	0.63	0.00	0.45
				#		R 10 CL			RS HERE	~ ~ ~		0.50
233		5	3.300		1.061	37.467			4.37	0.76	0.00	0.52 0.47
234		5	3.200		1.061	37.467			4.31 4.25	0.66 0.58	0.00	0.47
235 236	UT	5 5	3.100 3.000		1.061	37.467 37.467	29.14		4.20	0.50	0.00	0.38
237		5	2.900		1.061	37.467			4.15	0.44	0.00	0.34
238		5	2.800		1.061	37.467			4.10	0.39	0.00	0.31
239		5	2.700		1.061	37.467			4.06	0.34	0.00	0.28
240		5	2.600		1.061	37.467		0.0	4.03	0.30	0.00	0.25
241		5	2.500		1.061	37.467			3.99	0.26	0.00	0.23
242	UT	5	2.400		1.061	37.467			3.96	0.23	0.00	0.20
243	UT	5	2.300		1.061	37.467			3.93	0.20	0.00	0.18
244		5	2.200		1.061	37.467	29.24		3.90	0.17	0.00	0.17
245	UT	5	2.100		1.061	37.467			3.87 3.85	0.15 0.13	0.00	0.15 0.13
246		5 5	2.000 1.900		1.061 1.061	37.467 37.467			3.83	0.13	0.00	0.13
247 248		5	1.800		1.061	37.467			3.80	0.10	0.00	0.10
249		6	1.700		1.061	37.467			3.78	0.10	0.00	0.09
250		6	1.600		1.061	37.467			3.78	0.11	0.00	0.09
251		ē	1.500		1.061	37.467	27.47	0.0	3.78	0.15	0.00	0.10
252		6	1.400		1.061	37.467	26.86	0.0	3.78	0.24	0.00	0.11
253	UT	6	1.300		1.061	37.467			3.78	0.43	0.00	0.16
		WAS	TELOAD	#		TR 8 DRA	IN) EN	ITERS I	HERE			
254	IJΤ	6	1.200		1.063	37.549	25.65	0.0	3.79	0.83	0.00	0.25
255				#		TR 9 DRA	TNI EN	11EK5	9 80	0.79	0.00	0.25
255	υI	6 WAC	1.100	J.	1.063 256 ()	3 <i>7</i> .555 JIL GREE			3.80 ERS HER	0.78 F	0,00	0.23
256	ПΤ	- WAS - 6	1.000	#*	256 (U 1.067	37.688	74.47	., EMI	3.82	0.72	0.00	0.26
257		6 6	0.900		1.067	37.688			3.85	0.64	0.00	0.23
	ÜΤ	6	0.800		1.067	37.688				0.57	0.00	0.22
	ŬΤ	Š	0.700		1.067	37.688				0.51	0.00	0.20
260		6	0.600		1.067	37.688	22.00	0.0		0.46	0.00	0.19
	UT	6	0.500		1.067	37.688				0.42	0.00	0.18
262		6	0.400		1.067	37.688				0.40	0.00	0.18
263		ē	0.300		1.067	37.688		_		0.40	0.00	0.20 0.25
	UT	6	0.200		1.067	37.688				0.46 0.60	0.00	0.36
265 266	UT	6	0.100		1.067 1.067	37.688 37.688				0.80	0.00	0.57
200	υļ	9	0.000		T.001	J,.800	TO:26	, 0.0	2:07	J.J.	٥.00	

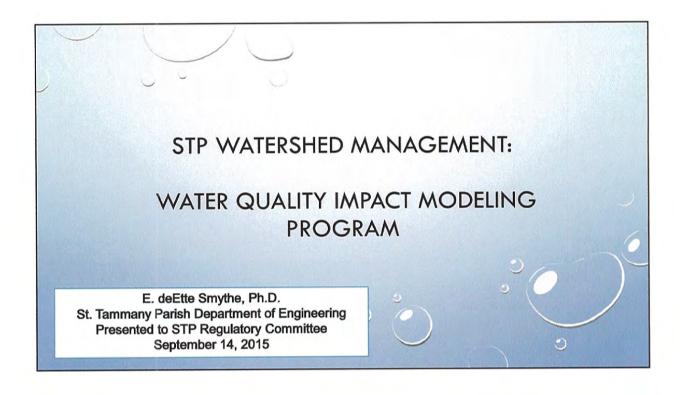
## EXHIBIT 8.a DO Impact: Upper Tchefuncte River with Pruden Creek SD

### WW Q=24,000 GPD DO = 2.0 mg/L SW Q=0.1 cfs (minimum)

IOR	REAC	H DIST		FLOW m²/s	FLOW cfs	TEMP deg C	SALN ppt	DO mg/L	BOD1 mg/L	BOD2 mg/L	NBOD mg/L
		WASTELOAD WASTELOAD WASTELOAD	#	104 (	Pruden Ci Pruden Ci HORSE BR	reek st	SW)	ENTERS ENTERS ENTERS	HERE HERE HERE		
404	UT	and the second second second	**	0.992	35.016		0.0	7.74	6.00	0.00	2.04
109		1 16.200 1 16.100		0.992			0.0	7.74	5.97	0.00	2.02
106		1 16.000		0.992	35.016		0.0	7.74	5.94	0.00	2.01
107		1 15.900		0.992	35.016		0.0	7.73	5.90	0.00	1.99
108		1 15.800		0.992	35.016		0.0	7.73	5.87	0.00	1.97
108		2 15.700		0.992	35.016		0.0	7.73	5.83	0.00	1.96
110				0.992			0.0	7.73	5.80	0.00	1.94
				0.992			0.0	7.73	5.76	0.00	1.92
111				0.992	35.016		0.0	7.72	5.73	0.00	1.91
112					35.016		0.0	7.72	5.70	0.00	1.89
113		2 15.300		0.992				7.72	5.66	0.00	1.87
	UT	2 15.200		0.992			0.0	7.71	5.63	0.00	1.86
115		2 15.100		0.992			0.0	7.71	5.60	0.00	1.84
116	UT	2 15.000		0.992	35.016		0.0			0.00	1.04
		WASTELOAD						RS HERE		0.00	1 05
	UT	2 14.900		0.993			0.0	7.70	6.20		1.95
	UT	2 14.800		0.993			0.0	7.69	6.16	0.00	1.93
119		2 14.700		0.993		26.78	0.0	7.69	6.12	0.00	
	UT	2 14.600		0.993		26.83	0.0	7.69	6.09	0.00	1.90
	. UT	2 14.500		0,993			0.0	7.68	6.05	0.00	1.88
122		2 14.400		0.993		26.93	0.0	7.68	6.02	0.00	1.87
123		2 14.300		0.993		26.98	0.0	7.67	5.98	0.00	1.85
124		2 14.200		0.993			0.0	7.67	5.94	0.00	1.83
125		2 14.100		0.993			0.0	7.67	5.91	0.00	1.82
126		2 14.000		0.993			0.0	7.66	5.87	0.00	1.80
127		2 13.900		0.993		27.18	0.0	7.66	5.84	0.00	1.79
128	UT	2 13.800		0.993			0.0	7.65	5.81	0.00	1.77
		WASTELOAD			HWY 190			S HERE	1.12	2 20	1000
129		3 13.700		0.994			0.0	7.59	5.67	0.00	1.75
130		3 13.600		0.994			0.0	7.53	5.52	0.00	1.70
131		3 13.500		0.994			0.0	7.48	5.37	0.00	1.65
132		3 13.400		0.994			0.0	7.43	5.22	0.00	1.61
133		3 13.300		0.994			0.0	7.38	5.08	0.00	1.56
134	I UT	3 13.200		0.994			0.0	7.33	4.94	0.00	1.52
135	UT	3 13.100		0.994			0.0	7.29	4.80	0.00	1.48
136	UT	3 13.000		0.994			0.0	7.24	4.67	0.00	1.44
		WASTELOAD	#	137 (	TR 16 DR						1,0100
137	UT	3 12.900	(V)	0.995	35.121	27.45	0.0	7.20	4.68	0.00	1.42

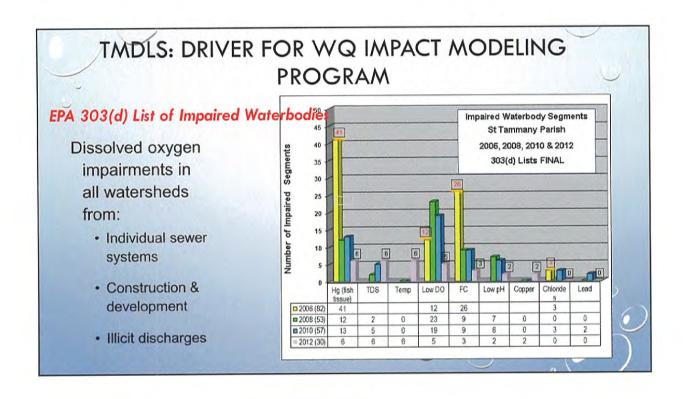
TOP	DE 04	- ш	DIST		FLOW	FLOW	ТЕМР	S AL N	DO	BOD1	BOD2	NBOD
TOK	REAG	_П	km		m*/s	cfs	deg C	ppt	mg/L	mg/L	mg/L	mg/L
138 139			12.800 12.700		0.995 0.995	35.121 35.121		0.0	7.16 7.12	4.55 4.42	0.00 0.00	1.38 1.35
140	UT	3	12.600		0.995	35.121 35.121	27.53	0.0	7.08 7.05	4.30 4.18	0.00 0.00	1.31 1.27
141 142	UT	3	12.500 12.400		0.995	35.121	27.58	0.0	7.01	4.07	0.00	1.24
143 144			12.300 12.200		0.995 0.995	35.121 35.121	27.60 27.63	0.0 0.0	6.98 6.95	3.96 3.85	0.00 0.00	1.20 1.17
145 146			12.100 12.000		0.995 0.995	35.121 35.121		0.0	6.92 6.89	3.74 3.64	0.00	1.14 1.10
147 148	UT	3	11.900 11.800		0.995 0.995	35.121 35.121	27.70	0.0 0.0	6.86 6.83	3.54 3.44	0.00 0.00	1.07 1.04
149	UT	3	11.700		0.995	35.121 35.121	27.75	0.0	6.81 6.79	3.35 3.25	0.00	1.01
150 151	UT	3	11.600 11.500		0.995	35.121	27.80	0.0	6.76	3.16	0.00	0.96
152	IJΤ	WAS	11.400 TELOAD	#		35.121 RUDEN CI	< DRAI			3.08 RE	0.00	0.93
153 154	UT UT		11.300 11.200		0.998 0.998	35.25 <i>7</i> 35.25 <i>7</i>	27.88	0.0 0.0	6.69 6.66	4.81 4.68	0.00 0.00	1.30 1.27
155 156		3	11.100 11.000		0.998 0.998	35.25 <i>7</i> 35.25 <i>7</i>		$0.0 \\ 0.0$	6.63 6.60	4.55 4.42	0.00 0.00	1.23 1.20
157 158	UT	3	10.900		0.998	35.257 35.257	27.95	0.0	6.57 6.54	4.30 4.18	0.00 0.00	1.16 1.13
159	UT	3	10.700		0.998	35.25 <i>7</i>	28.00	0.0	6.52 6.50	4.06 3.95	0.00	1.10
160 161	UT	3	10.600 10.500		0.998 0.998	35.257 35.257	28.05	0.0	6.47	3.84	0.00	1.04
162 163			10.400 10.300		0.998 $0.998$	35.25 <i>7</i> 35.25 <i>7</i>	28.10	0.0	6.45 6.43	3.74 3.63	0.00 0.00	1.01 0.98
164 165			10.200		0.998 0.998	35.25 <i>7</i> 35.25 <i>7</i>	28.13 28.15	0.0	6.41 6.39	3.53 3.43	0.00 0.00	0.95 0.92
166 167	UT		10.000		0.998 0.998	35.257 35.257	28.18 28.20	0.0	6.38 6.36	3.34 3.24	0.00 0.00	0.90 0.87
168	UΤ	3	9.800		0.998	35.257 35.257	28.23	0.0	6.35	3.15 3.07	0.00	0.85 0.82
169 170	UT	3	9.700 9.600		0.998	35.25 <i>7</i>	28.28	0.0	6.32	2.98	0.00	0.80
171 172	UT	3	9.500 9.400		0.998 0.998	35.25 <i>7</i> 35.25 <i>7</i>	28.33	0.0	6.31 6.29	2.90 2.82	0.00	0.78
173 174		3	9.300 9.200		0,998 0.998	35.25 <i>7</i> 35.25 <i>7</i>	28.35 28.38	0.0	6.28 6.27	2.74 2.66	0.00 0.00	0.73 0.71
175 176	UT UT	3 3	9.100 9.000		0.998 0.998	35.257 35.257	28.40 28.43	0.0 0.0	6.26 6.25	2.59 2.51	0.00 0.00	0.69 0.67
177 178	UT	3	8.900 8.800		0.998	35.257 35.257	28.45	0.0	6.25 6.24	2.44 2.38	0.00 0.00	0.65 0.63
179	UT	3	8.700		0.998	35.257	28.50	0.0	6.23 6.22	2.31	0.00	0.62
180 181	UT	3 3	8.600 8.500		0.998 0.998	35.25 <i>7</i> 35.25 <i>7</i>	28.55	0.0	6.22	2.18	0.00	0.58
182 183		3	8.400 8.300		0.998 0.998	35.257 35.25 <i>7</i>	28.60		6.21 6.21	2.12 2.06	0.00 0.00	0.56 0.55
184	UT	3 WAS	8.200 TELOAD	#	0.998 185 (	35.25 <i>7</i> TR 15 DR	28.63 AIN) E	0.0 NTERS	6.20 HERE	2.00	0.00	0.53
185	UT	3	8.100		1.000		28.65	0.0	6.19	2.17 RE	0.00	0.69
186 187		4	8.000 7.900		1.009	35.619	28.66	0.0	6.05 5.95	3.89 3.56	0.00 0.00	1.42 1.33
188	UT	4	7.800		1.009	35.619	28.68	0.0	5.87 5.79	3.25 2.97	0.00	1.25
189 190	UT	4 4	7.700 7.600		1.009	35.619	28.69	0.0	5.72	2.72	0.00	1.10
191 192		4 4	7.500 7.400		1.009 1.009	35.619	28.71	0.0	5.66 5.60	2.49 2.27	0.00	1.03 0.97
193 194		4 4	7.300 7.200		1.009			0.0	5.55 5.51	2.08 1.90	0.00 0.00	0.91 0.86
195		4	7.100 7.000		1.009 1.009	35.619	28.74		5.46 5.43	1.74 1.59	0.00	0.80 0.75
197	UT	4	6.900 6.800		1.009	35.619	28.75	0.0	5.40 5.37	1.45 1.33	0.00	0.71 0.67
199	UT UT	4	6.700		1.009	35.619	28.77	0.0	5.34	1.22	0.00	0.62
	UT UT	4 4	6.600 6.500		1.009 1.009	35.619	28.79	0.0	5.32 5.30	1.11	0.00	0.55
202 203	UT UT	4 4	6.400 6.300		1.009 1.009	35.619	28.80	0.0	5.28 5.26	0.93 0.85	0.00	0.52
	UT UT	4 4	6.200 6.100		1.009 1.009		28.81 28.82	0.0 0.0	5.25 5.24	0.78 0.71	0.00 0.00	0.46 0.43
206	UT UT	4	6.000 5.900		1.009	35.619	28.83	0.0	5.23 5.22	0.65 0.59	0.00 0.00	0.40 0.38
	ÜΤ	4	5.800		1.009					0.54	0.00	0.35

IOR I	REAC	H DIST km	-	FLOW m*/s	FLOW cfs	TEMP deq C	SALN ppt	DO mg/L	BOD1 mg/L	BOD2 mg/L	NBOD mg/L
				•		-					
209		4 5.700		1.009	35.619		0.0	5.21 5.21	0.50 0.45	0.00 0.00	0.33 0.31
210 211		4 5.600 4 5.500		1.009 1.009	35.619 35.619		0.0	5.20	0.45	0.00	0.31
212		4 5.400		1.009	35.619		0.0	5.20	0.38	0.00	0.28
213		4 5.300		1.009	35.619		0.0	5.20	0.35	0.00	0.26
214		4 5.200	3	1.009	35.619		0.0	5.20	0.32	0.00	0.24
215		4 5.100		1.009	35.619		0.0	5.20	0.29	0.00	0.23
216		4 5.000		1.009	35.619 35.619		0.0	5.20 5.20	0.26 0.24	0.00	0.21 0.20
217 218		4 4.901 4 4.801		1.009 1.009	35.619		0.0	5.20	0.22	0.00	0.19
219		4 4.70		1.009	35.619		0.0	5.21	0.20	0.00	0.18
220	UT	4 4.60		1.009	35.619	28.95	0.0	5.21	0.18	0.00	0.17
221	UT	4 4.50	)	1.009	35.619		0.0	5.21	0.17	0.00	0.16
		WASTELOAI								0.00	0.15
222		4 4.40		1.009 1.009	35.621 35.621			5.22 5.22	0.16 0.14	0.00	0.15 0.14
223	υı	4 4.301 WASTELOAI		224 (T					0.14	0.00	. 0.14
224	UT	4 4.20		1.009	35.631		0.0	5.22	0.26	0.00	0.16
		WASTELOAL			IMBER B	RANCH)		S HERE			
225	UT	4 4.10	)	1.013	35.787	28.99	0.0	5.19	1.05	0.00	0.50
		WASTELOAL							1 7/	0.00	0.78
226	דט	4 4.00 WASTELOA	J ~ ~	1.034	36.511 VLER ST	29.00 CLUST	. 0.0 FR) FN	5.16 UTERS HE	1.36	0.00	0.78
227		5 3.90		1.034	36.530			5.04	1.22	0.00	0.73
228		5 3.80		1.034	36.530			4.94	1.07	0.00	0.66
229		5 3.70	)	1.034	36.530			4.84	0.93	0.00	0.59
230		5 3.60		1.034	36.530		0.0	4.76	0.81	0.00	0.53
231	UT	5 3.50 WASTELOA	) - 4	1.034	36.530	29,U/ AIND E	0.0 NTEDE	4.68	0.71	0.00	0.48
232	шт	WASTELUA 5 3.40		1.034	36.531		0.0	4.61	0.63	0.00	0.43
232	01	WASTELOA	) ) #								
233	UT	5 3.30		1.036	36.577			4.53	0.76	0.00	0.51
234		5 3.20		1.036	36.577			4.46	0.66	0.00	0.46
235		5 3.10		1.036	36.577		0.0	4.39 4.34	0.58 0.50	0.00	0.41 0.37
236 237		5 3.00 5 2.90		1.036 1.036	36.577 36.577		0.0	4.28	0.50	0.00	0.37
238		5 2.80		1.036	36.577			4.23	0.38	0.00	0.30
239		5 2.70		1.036	36.577			4.19	0.33	0.00	0.27
240	UT	5 2.60		1.036	36.577			4.15	0.29	0.00	0.24
241		5 2.50		1.036	36.577			4.11	0.25	0.00	0.22 0.19
242		5 2.40 5 2.30		1.036 1.036	36.577 36.577	29.21	0.0	4.07 4.04	0.22 0.19	0.00 0.00	0.19
243 244		5 2.30 5 2.20		1.036	36.577			4.00	0.17	0.00	0.16
245		5 2.10		1.036	36.577	29.25	0.0	3.97	0.15	0.00	0.14
	UT	5 2.00		1.036	36.577	29.26	0.0	3.95	0.13	0.00	0.13
247		5 1.90		1.036	36.577	29.28	0.0	3.92	0.11	0.00	0.11
248		5 1.80		1.036	36.577 36.577			3.88 3.87	0.10	0.00	0.10
249 250		6 1.70 6 1.60			36.577				0.10	0.00	0.09
251		6 1.50		1.036	36.577				0.15	0.00	0.09
252		6 1.40		1.036	36.577	26.86	0.0		0.24	0.00	0.11
253	UT	6 1.30	0	1.036	36.577	26.25	0.0		0.44	0.00	0.15
		WASTELOA		254 (1	R 8 DRA	IN) EN	TERS		0.85	0.00	0.25
254	UI	6 1.20 WASTELOA	U N: -#	755 (J	36.659 Agn e e	TN) FN	O.O TERS I		0.05	0.00	0.25
255	ΗТ	6 1.10		1.038	36.665	25.04	0.0	3.87	0.79	0.00	0.25
	٠.	WASTELOA	- D #						Ξ		
256		6 1.00	0	1.042	36.798	24.43	0.0	3.89	0.73	0.00	0.26
257		6 0.90			36.798				0.65	0.00	0.23 0.21
258 259		6 0.80 6 0.70			36.798 36.798				0.57 0.51	0.00	0.21
259 260		6 0.60			36.798				0.46	0.00	0.19
261		6 0.50			36.798		0.0	4.14	0.42	0.00	0.18
262	UT	6 0.40	0		36.798		_		0.40	0.00	0.18
		6 0.30			36.798				0.40	0.00	0.20 0.25
264 265		6 0.20 6 0.10			36.798 36.798			4.62 5.00	0.46 0.60	0.00	0.25
265		6 -0.00			36.798				0.93	0.00	
		<b></b>		_							



### TMDL = TOTAL MAXIMUM DAILY LOADS

- A number that quantifies the amount of a pollutant that can be assimilated by a waterbody and still comply with the state standard for the pollutant
  - Established by Section 303(d) of the EPA Clean Water Act
- Streams that do not meet ambient water quality standards are placed on the 303(d) list



/	3/ 1/	NDLS for IA	APAIRED	WA	I EKRODIE2	In STP	6
0	Subsegment	Waterbody	Impairment	40801	Tchefuncte River		
	40802	20.40.102.00		40905	Bayou Liberty		
	40803	Tchefuncte River		40906	Bayou Paquet		
	40901		1	90101	Pearl River		
	40902	Bayou Lacombe		90107	Pearl Kill	00	
	40903		1	90102	East Pearl River		
	40503	Bayou Cane		90103		Mercury (13)	
	40904	Dayon Came		90105	Pearl River Navigation Canal		
	40905	Bayou Liberty	BOD (13)	90204			
	40906	Bayou Paquet	-	90106	Holmes Bayou		
	40907	Bayou Vincent	- 1	90201	West Pearl River		
	7000		- 1/	90205	Wilson Slough		
	40908	Bayou Bonfouca	- 0	90207	Middle & West Middle River		
	90105	Pearl River Navigation Canal		90105	Pearl River Navigation Canal	1000000	
	90204			90204	Teat Farty Tangation Commi	Nitrate (3)	
	90207	Middle & West Middle River		90207	Middle & West Middle River		
	40909	W-14 Diversion Canal		40903	Bayou Cane	TSS	
	40910	Salt Bayou		90106	Holmes Bayou		
	90101	Pearl River	Fecal Coliform (4)	90201	West Pearl River	Turbidity (3)	
	90207	Middle & West Middle River		90202	Morgan River	/	

### POLLUTANTS of CONCERN in STP TMDLS

- <u>Suspended solids</u> aesthetic impacts, reservoir siltation, harmful to aquatic life at high levels
- Metals can be toxic to humans and wildlife at various levels (depending upon metal species)
- <u>Nutrients</u> stimulate algal growth, high levels can be toxic to humans and wildlife
- Oxygen demands reduce dissolved oxygen levels, possibly to levels harmful for aquatic life

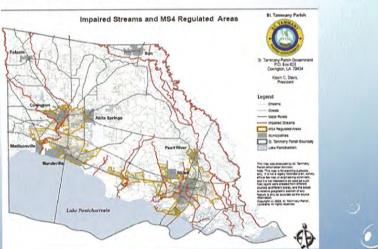
## WQ IMPACT MODELING PROGRAM: OBJECTIVES

- PLAN: watershed management strategies at the planning level
- ASSESS: & control potential water quality impacts related to new developments
- IMPLEMENT: strategies to maintain or improve watershed health as land uses change
- PREDICT: Best Management Practices (BMPs) that will be needed in order to meet or exceed water quality goals for a specific watershed and land use

# STP MS4 PERMIT: VEHICLE FOR WQ IMPROVEMENT

2015 STP Stormwater Management Plan (SWMP) will provide TMDL details

2015 Multiple Separate Storm Sewer Permit (MS4) Annual Report will detail STP WQ programs & results



All drainage projects proposed to be reviewed for WQ improvement potential

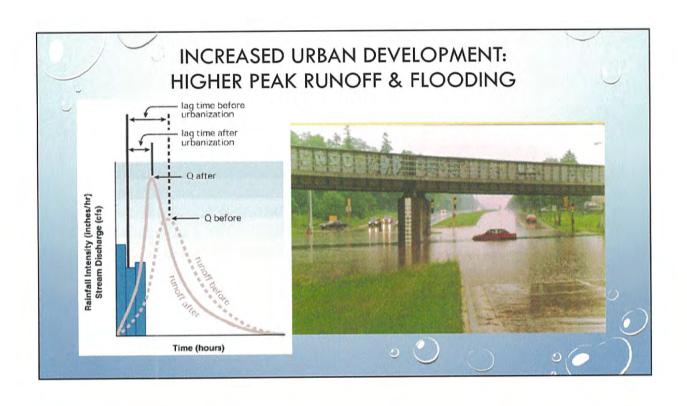
### STORMWATER MANAGEMENT PLAN (SWMP)

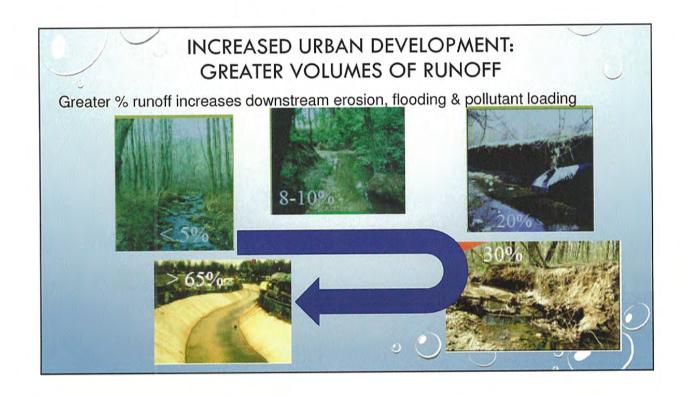
Originates from the need to protect STP from WQ
St Tammany Parish
& quantity problems caused by past practices and tormwater Management Plan
future development; MS4 Permit requirement

- Enhance public safety due to land development
- · Reduce flooding
- · Decrease volume and intensity of runoff
- · Improve water quality in streams
- · Minimize loss of wetlands
- Improve stream habitat
- · Enhance economic growth
- · Enhance aesthetics of watersheds



December 2015





### BEST MANAGEMENT PRACTICES (BMPS) & TREATMENT TRAINS

BMPs are <u>structural or non-structural</u> stormwater technique that is recognized by the scientific community to be the most effective practical means of controlling stormwater runoff and nonpoint source pollution

IF BMPs are inadequate to reduce pollutant loading from a development to a receiving stream, additional BMPs must be considered. This is a <u>TREATMENT TRAIN</u>.

### STRUCTURAL BMPS TO MITIGATE SW IMPACTS

#### STRUCTURAL

- Facilities designed to capture and treat stormwater runoff (stormwater ponds, infiltration trenches)
- Wet ponds (detention and retention of stormwater)
- <u>Dry Ponds/Bioretention</u> (detention, filtration, and retention of stormwater)
- Vegetated Swale (ditches)
- Aeration (oxidizes organics & nutrients not TSS)
- NOTE: Permit Holder MUST have a Maintenance Agreement to specify O&M activities & schedule for maintenance & inspections; must contain provision for access to Parish or inspectors

### NON-STRUCTURAL BMPS TO MITIGATE SW IMPACTS

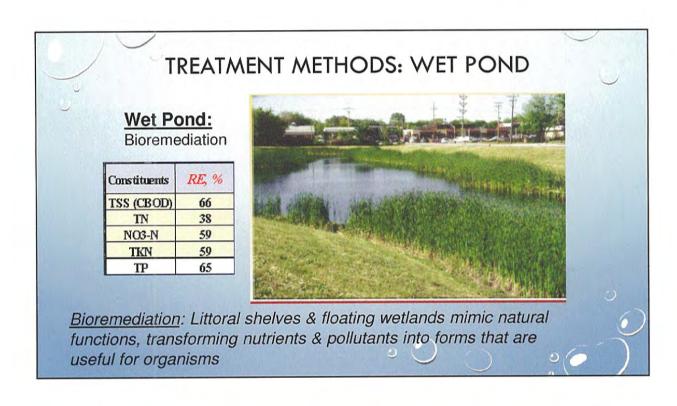
### NON-STRUCTURAL (Impervious Cover)

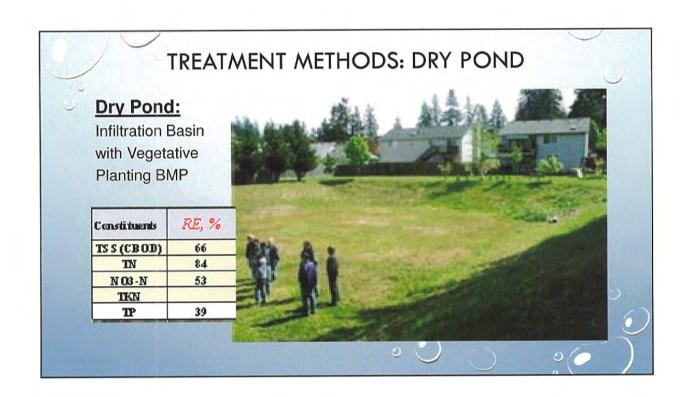
Facilities designed to slow stormwater runoff and facilitate percolation (porous pavement, setbacks, buffers)

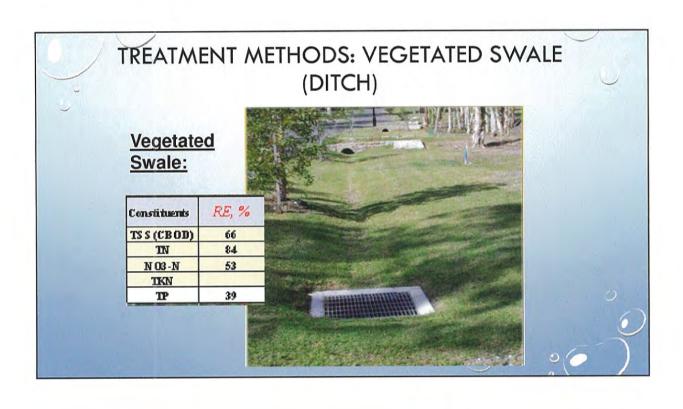
- Reduce stormwater velocity and volume.
- Can be used to reduce size of structural BMPs
- Developers will be encouraged to minimize their impervious cover through judicious site planning.

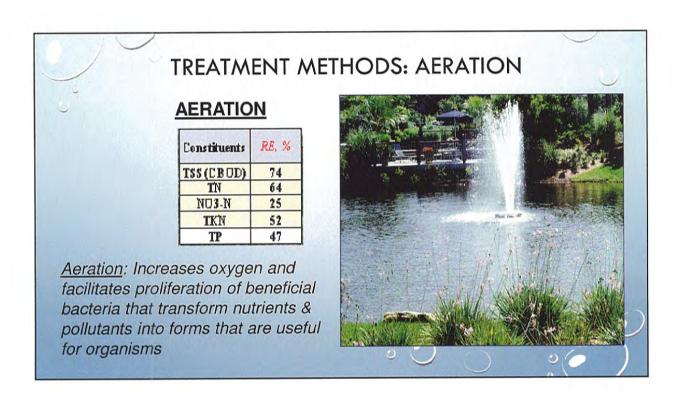
### TO IMPROVE WQ MOST URBAN WATERSHEDS NEED:

- 80%+ CAPTURE OF SOLIDS (TSS) AND
- POLLUTANTS OF CONCERN
  - STP TMDL models are developed for dissolved oxygen (DO).
     Pollutants of concern (POCs) include:
    - · TSS
    - · BOD
    - · Ammonia
    - · nitrate/nitrite



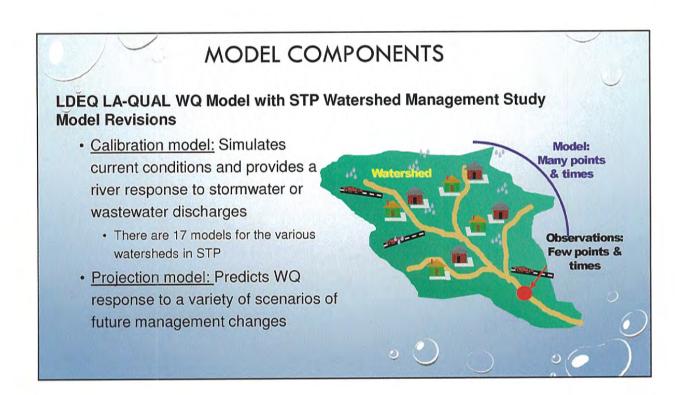






#### WHAT DEVELOPMENTS WILL BE ASSESSED

- Subdivision
- Commercial
- Industrial
- Institutional
- Outstanding Natural Resource Water (ONRW)/Scenic River
- Establish Minimum thresholds for large residential developments ≥ 5 acres



#### PHASES OF WQ MODELING PROCESS

- PHASE 0 Required documentation
  - Permit application(s)
  - Letters from other Agencies
  - BMP site plan
  - · Types & locations of discharge outfalls
- PHASE 1 Characterization
- PHASE 2 Assessment & Modeling
- PHASE 3 Report & WQC Response

#### PHASE 1: CHARACTERIZATION

- Identify discharge locations and discharges (SW & WW, outfall locations)
- Specify receiving stream/watershed model to be utilized (17 available)
- · Identify POCs in discharges
- Quantify pollutant loading from discharges that may contribute to TMDL exceedences

0

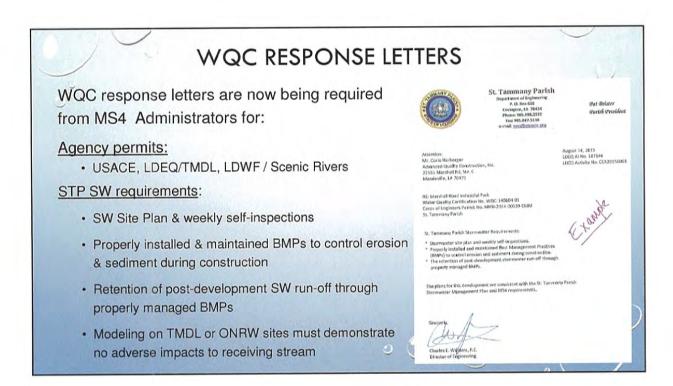
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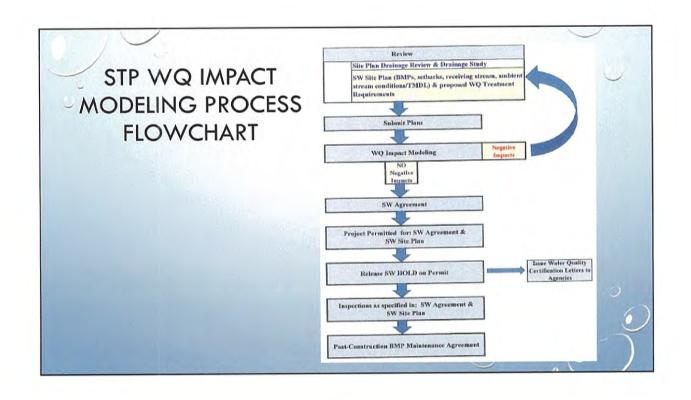
#### PHASE 2: ASSESSMENT & MODELING

- Input BOD and nutrient loads
- Develop insertions into applicable watershed model
- Evaluate WQ impacts in receiving stream (CBOD, NBOD, DO)
- If DO is reduced >0.2 mg/L (per LDEQ) Modeler may test discharge impacts in another location
- IF DO impact (reduction) remains >0.2 mg/L developer will expand BMP Treatment Train

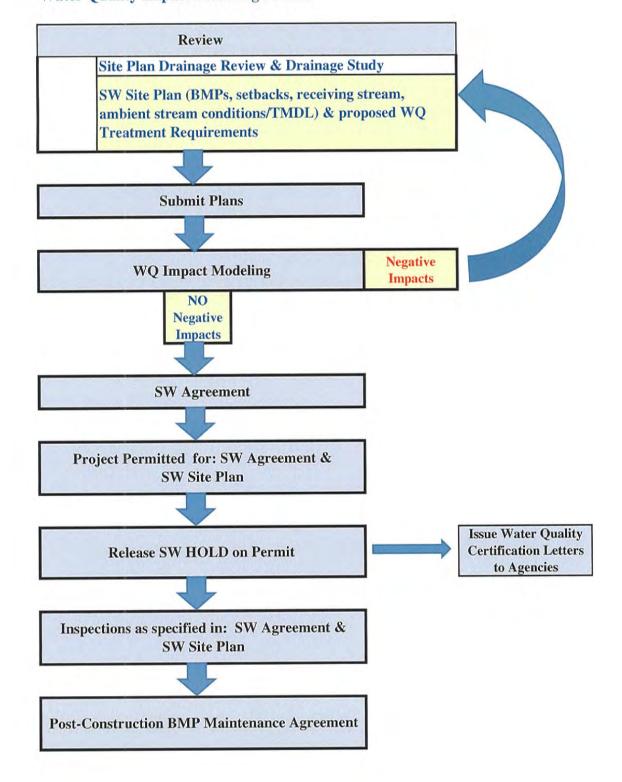
### PHASE 3 - REPORT and WATER QUALITY CERTIFICATION (WQC) RESPONSE

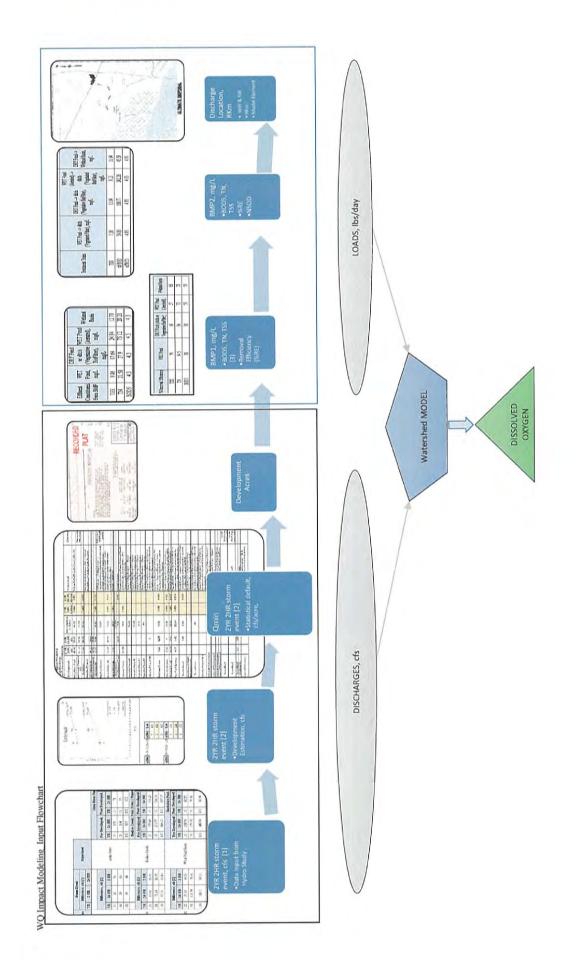
- If Modeling demonstrates <u>acceptable</u> watershed impacts (DO<0.2 mg/L reduction)</li>
- WQ Hold is released on permit
- WQC response letter is issued to LDEQ for agency distribution
- Should a WQ Modeling results report be generated (or just release WQ HOLD on permit)?





#### STP Watershed Management: Water Quality Impact Modeling Process





#### STP WQ Impact Modeling Minimum Discharge Default Estimate 07/12/2016

Development	2 YR, 2HR, cfs	2YR, 24 HR, cfs	Development, Acres	2YR, 2HR, cfs/acre	2YR, 24 HR, cfs/acre	Watershed	Comments
Abita River Park	45.92	53.63	46.32	0.991	1.158	Trib to Abita River before mailleville	
Bedico Creek, Phases 4 & 5	52,39	57.46	20.54				Not used for Minimum O stats
Berkshire	28.68	56.78	58.38	0.491	0.973		Transmitted & value
Coquille, Phase 3						Hwy 22 ditch @ Koepp Rd> Trib of Black River> Tchefuncte River nr Lake	
Del Sol (pond)	15.21	24.53				TOTAL PRODUING CONTROL IN CAME	
Del Sol (undetained)	4,74	10.96					
Gardenwalk	2,24	4.94	15.43	0.145	0.320	torra to to min of the min of the	Only monided
Goodbee Square			21.29			1077 ditch-> Tallow Creek-> Tchefuncte River (Northwest corner of US 190B and LA 1077, Covington)	Only provided 100YR 24HR profile
Grand Oaks, 2B	33.29	40.93	33,22	1.002	1.232	Hwy 22 ditch west to marsh> Lake (North of LA 22 across from Guste Island, Madisonville)	
Grand Maison	7.18		44.7	0.161		Bayou Chinchuba	
Guste Island		44.10	27,266		1 101	Panny Vincent	
JF Smith Business Park	_	44.18	37.11		1,191	Bayou Vincent Bayou Liberty ar Camp Salmen (South of US	
Logans Trace	23.54		60.1	0.392		190, on east side of Hwy. 433 (Thompson Rd.), Slidell)	
Magnolia Mound1			50.22			Soap & Tallow Branch> Upper Tchefuncte River (above Lake Ramsey)	
Magnolia Mound2			38.05			Soap & Tallow Branch> Upper Tchefuncte River (above Lake Ramsey)	
Magnolia Mound3			72.2			Soap & Tallow Branch> Upper Tchefuncte River (above Lake Ramsey)	
Magnolia Mound4			59			Soap & Tallow Branch> Upper Tchefuncte River (above Lake Ramsey)	
Northpark, Phase3 4B		í				Trib of Tehefucte above confluence with Tete L'Ours (West of US 190 north of Holiday Blvd,, Covington)	
Jaklawn Trace	1,22	12.55	81.73	0.015	0.154	Discharge flows West along Hwy 190 ditch> Cypress Bayou> Lake Ponchartrain (South of 190, east of Transmitter Rd., Slidell)	
Planche Estates	7.22	1	38.15	0.189	0.026	Falaya (West side of Hwy 25 N; South of Lake	
Pruden Creek	10.24	17.1	24.88	0.412	0.687	Horse Branch (Upper Tchefuncte)	
River Park Estates	4.07	8.62	22.69	0.179	0.380	Hwy 25 ditch> St. Gertrude ditch> Bogue Falaya River (Located on the west side of Hwy 25 off of MP Planche Road.)	
Ruelle Court		1,25	5.68		0.220	Black River> Lower Tehefuncte River (On southside of Brewster Rd., west of Perriloux Rd, east of LA 1085, Madisonville)	
Spring Haven2 (WAS Autumn Creek)						Black River> Tchefuncte River (North of Hwy, 22, West of LA 21, Madisonville)	
Terra Marie			48			Unnamed trib of Bogue Falaya @ Palm Blvd above City of Covington (West of LA 1081 north of Thibodeau Rs., Covington)	
Terra Bella, Phase I-A-8						Soap & Tallow Branch> Tchefuncte River (On LA 1085 east of Rousseau Rd., Covington)	
The Estates of Watercross1		3	35.87			ditch> sheetflow>Flowers Bayou>Lower Tchefuncte River	
The Estates of Watercross2			10,7			sheetflow>Flowers Bayou>Lower Tchefuncte River	
The Estates of Watercross3		-	17.02		1	sheetflow>Lower Tchefuncte River	
The Estates of Watercross4			16.78			sheetflow>Lower Tehefuncte River	
Versailles I			61.65			Bayou Monga	r2 for discharges i unacceptably larg
Versailles2			14.65			Ponchitolawa Creek	r2 for discharges i unacceptably larg
Versailles3	0.6	1.89	0.95	0.632	1.989	Bayou Monga HW of Bayou Castine	
Wadsworth gfield (4 basins)			219.35			Bedico Creek (Northeast of 1-12 @ Intersection of Hwy 1077 & Baham Rd, Goodbee)	
			1		2YR,		

	2 YR, 2HR, cfs/acre	24 HR, efs/acre
Average	0.419	0.757
STDev	0.336756	0.6053225
Number	1.1	- 11

Summary of DO Results for Developments and Watersheds

	-		100	Criteria		
Watershed	Summer DO Standard, mg/L	Subsegment	Anti- degradation Pass [1]/Fail	EPA Standard in Reaches where Developments Confluence Pass [1]/Fail	Watershed Condition at Calibration Pass [1] /Fail	Comments
Abita River	5		Passed	Passed	Failed	Failure at RM 2.3 (south of Hwy 190), with recovery at RM 1.5. Caution should be exercized when permitting developments south of Hwy 190 until DO improves.
Bayou Castine	2.3		Passed	Passed	Passed	until DO Improves.
Bayou Chinchuba	2.3	040806	Passed	Passed	Failed	In danger of failure nr headwaters. Caution should be exercized when permitting developments near headwaters of Bayou Chinchuba to West tributary drains at the end of Reach 1 (from RM 8 - 6.7 until recovery at west tributary confluence).
	5.0 (north of I-12)	040901	None [2]	None [2]	Passed	
1 2 - Asserted 1	2.3 (J-12 to Hwy 190)	040912	Passed	Passed	Passed	
Bayou Lacombe	2.3 (Hwy 190 to LMRAP boundary)	040913	Passed	Passed	Passed	
Big Branch	2.3	040913	Passed	Passed	Passed	
N. Is. /	5.0	040905	None [2]	None [2]	Failed	Failure at RM 8.8 near Royal Gardens confluence, with recovery at RM 8.3. At that point the LMRAP becomes effective. Caution should be exercized when permitting developments in the vicinity of Royal Garden until DO improves.
Bayou Liberty	2.3 (northern LMRAP to Hwy 433)	040915	Passed	Passed	Passed	
	2.3	040905	Passed	Passed	Passed	
Bayou Tete L'Ours	2.3	040808	Passed	Passed	Passed	In danger of Failure at RM 2.3 due to Causeway & Hwy 190 dischargers with recovery at RM 1.8.
Bayou Vincent	2.3	040907	Passed	Passed	Failed	Failure at RM 2.5 due to Eagle Lake MHP, with recovery at RM 12.2, Failure at RM10.3 with no recovery. Caution should be exercized when permitting developments in Reaches 7-12 (below I-12 to confluence with Bayou Bonfouca) until DO improvement.
Bogue Falaya River	5.0		Passed	Passed	Failed	Failure at RM 15.3 beginning just upstream of Hwy 190, with no recovery. Caution should be exercized when permitting developments below Hwy 190 until DO improvement.
/press Bayou	2.3	040913	Passed	Passed	Passed	and the second s
	5.0 (east of Hwy 190)	040802	None [2]	None [2]	Failed	Entire headwater (Reaches 1-2) failed DO standard. Caution should be exercized when permitting developments in headwater Reach I to Hwy 190 until DO improvement.
Ponchitolawa Creek	2.3 (west of Hwy 190)	040808	Passed	Passed	Failed	Dischargers at Hwy 190 crash DO at calibration. Although Hwy 190 is a beginning of LMRAP area, Lower Ponchitolawa Creek Failes DO Standard until recovery only due to the confluence with the Tchefuncte River. Most new dischargers are downstream of Hwy 190 in LMRAP. Caution should be exercized when permitting developments in Lower Ponchitolawa Creek (Hwy190 to confluence with the Tchefuncte River) until DO improvement.
Lower Tehefuncte River	2.3 (Hwy 190 to Bogue Falaya River)	040807	Passed	Passed	Failed	Failure RM 10-9: downstream of I-12, with recovery at confluence with Ponchitolawa Creek and Tete L'Ours. Caution should be exercised when permitting dischargers near I-12 and upstream Flowers Bayou. (These include Nor du Lac, Avanti Nursing Home, Cultural Arts, Rooms to Go. River Chase, Estates of Watercross. All of these developments have excellent BMPs. Unfortunately, upstream Flowers Bayou contains a significant load from unsewered homes along this scenic stream.)
	2.3 (Bogue Falaya River to Hwy 22)	040808	Passed	Passed	Marginal	Caution should be exercized when permitting developments from 1-12 to the Ponchitolawa Creek.
Black River (Lower Tchefuncte River Watershed)	2,3 (Headwaters to Hwy 22)	040809	Passed	Passed	Passed	
Upper Tchefuncte River	5.0	040801	Most Passed	Most Passed	Failed	AT calibration (no projects) Failure RM 5.2 -0 (south Tyler/City of Covington to the Lake). Recovery only occurs due to confluence with Lake Pontchartrain.  NEW developments within the watershed failed the anti-degradation criteria and caused additional collective failure of the EPA DO standard the watershed. The developments causing problems were Magnolia Mound (formerly Tantella Ranch) and Simpson Farms. Caution should exercized when permitting developments in Upper Tehefuncte River (Tyler Street to I-12) until DO improvement. Caution also includes developments on the Soap & Tallow, Hidden Creek and Timber Branch
W-14 Canal	5.0		Passed	Passed	Failed	The entire W-14 Canal's below the EPA DO Standard, Caution should exercized when permitting developments in the W-14 Canal until DO is

DEVELOPMENT 12/12/2017	SCOPE	LOCATION	UTILITIES PROVIDER	WATERSHED MODEL	Dev. Size	BMP Treatment Train to Receiving Stream [4]	Anti Deg	EPA Standard	Waters
bita Lakes, Ph. 3-B-2	Residential, 17 Units	On the south side of Grand Lake Drive, east of Lowe Davis Rd, east of LA Hwy 59 and West of LA Hwy 1083 (a.k.a. Allen Rd), northeast of Abita Springs, LA	Tammany Utilities	Abita River	33,01	d-> Wp-> branch-> Abita River(LA59)	Pass	Pass	Pass
bita Ridge (förmerly Abita River ork)	Residential; 138 total lots	Entrances are located on the n side of Harrison Ave, approximately 1/2 mile east of LA HWY 190	UIL.	Abita River	46.32 (Moxleled 11/14/2016)	Wp-d	Pass	Pass	Fai
lexander Ridge (Pending approval /14/2017 ) Formerly Terra Mariae hase 3	Residential; 103 Lots	West of LA 1081 north of Thibodeaux Rs., Covingion	Tammany Utilities	Bogue Falaya	48,0 (Modeled 11/14/2016)	d-Wp-d	Pass	Pass	Fa
angelic Estates Phase 1-B-2 (Sherry court and April Court)	Residential; 12 Lots; AKA "The Birg"	Helenburg Rd., Covington, Sherry Court and April Court	Tammany Utilities	Ponchitolawa	1.51+0.762= 2.272) (Modeled 11/14/2016)	Dp-d	Pass	Pass	Fi
artesia Apartments @ Watercross	Residential; Multi-Family; Apartment Complex; 264 Units; 19 Total Buildings	Northside of I-12; Pinnicle Parkway to Westshore Drive behind Hobby Lobby	UIL; Approved	LTR	14.33 (w/ offsite roadway)	d-> Wp> wetland	Pass	Pass	Fi
srundel	Residential; 26 Lots	Located on the south side of Brewster Rd, and west of LA Hwy 21, north of Madisonville	Tammany Utilities	LTR	16.77	d> Wp-> d -> NE fork of Blk River -> LTR	Pass	Pass	Pa
shton Parc, 2nd & 3rd Filings	Residential; 122 Lots	Off of Hwy 11 & Haas Rd	Resolve	W-15	196.4		/	/	-
SSOCIATED WHOLE GROCERS		Old Military Rd., Pearl River	Town of Pearl River	W. Pearl River			/	/	
Complete)  AUDUBON TRAIL (Fermetly known a Audubon Oaks) (Recorded on 15/2016 File No. 5479)	facility in Pearl River Residential; 76 Lots	North of 1-12, east of US 190, south of Hollycrest Blvd, Covington	UIL.	Ponchitolawa	17,896	d-Wp-ddd -> Ponchatolawa Creek(nr Confluence w/TR)	Pass	Pass	Fa
VANTI NURSING HOME 2016- 7098 (Completed)	New Nursing Home Facility: Construction completion anticipated for Spring 2017	2234 Watercross Blvd-Covington (Ochsner Blvd to rounds about about 1/4 mile to Watercross Blvd)		LTR	1.79 (Modeled 11/14/2016)	d	Pass	Pass	Pa
BEDICO CREEK Phase 11 Recorded)	Residential; 84 Lots	Hwy. 1085 off of 1-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek	77		/	/	/
BEDICO CREEK Phase 1-D2	Residential; Lots 56-65	COMME WEI	Bedico Creek	Bedico Creek			/	/	
Recorded per file) SEDICO CREEK Phase 1-D3	Residential; 25 Lots 74-98	Hwy. 1085 off of 1-12. 1077 / Madisonville /	Bedico Creek	Bedico Creek			/	/	
Recorded per file) BEDICO CREEK Phase 1-E2 Formerly 1-D2A) (RECORDED	Residential; 13 Lots 66-73, 233-237	Goodbee area  Hwy, 1085 off of J-12, 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/	/	
EDICO CREEK Phase 4	Production	Hwy. 1085 off of I-12, 1077 / Madisonville /	Bedico Creek	Bedico Creek					
6/10/2014 - Recorded Sept 14)	Residential	Goodbee area Hwy, 1085 off of 1-12, 1077 / Madisonville /	C. Committee and C. Com	ESTABLISHED TO SERVE			-	-	_
Sedico Creek Bubble 2-1	Residential; 54 Lots	Goodbee area	Bedico Creek	Bedico Creek			/	/	
edico Creek Bubble 2-2	Residential; 47 Lots	Hwy, 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek		-	/	/	/
SEDICO CREEK Parcel "F" Recorded 12/13/2016: File No.5594)	Residential; 27 Lots	East side of Audubon Pkwy, south of I-12 and north of LA Hwy 1085, west of Covington, LA	Bedico Creek	Bedico Creek			/,	1	/
SEDICO CREEK Parcel "F" LECORDED 12/12/2016 File No. 559-	Residential; 27 Lots	11 100 C (112 1037 M d) - (11		Bedico Creek			/_	/,	/
Bedico Creek Parcel 13	Residential; 61 Lots; 21.50 Acres	Hwy, 1085 off of 1-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/	/	/
BEDICO CREEK PARCEL 16 RECORDED 4/15/2015)	Residential; 34 Lots (618-623, 651- 678)	Hwy, 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek				/	/
Bedico Creek Parcel 3	Residential; 10 Lots (181 - 190)	Hwy. 1085 off of I-12, 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek		1			/
Recorded 9/22/2016 File#5571)	Residential; 11 Lots; 4.87 Acres	Hwy. 1085 off of 1-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/	/	/
BEDICO CREEK PARCEL B  'Heron Point" (Formerly 1-A)  Recorded 9/4/2015 File No 5425)	Residential; 16 Lots	Hwy, 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek				/	/
BEDICO CREEK Parcel B "Heron Point" (Formerly 1-A) (Recorded 0/1/2015 File No 5425)	Residential; 16 Lots	Hwy. 1085 off of 1-12. 1077 / Madisonville / Goodbee area		Bedico Creek			/	/	/
Bedico Creek Parcel C BEDICO CREEK Phase 11 (Recorde	Residential; 50 Lots; 39.069 Acres	In the southwest quadrant of Bedico Creek Hwy, 1085 off of I-12, 1077 / Madisonville /	Bedico Creek	Bedico Creek					
722/2016 File No. 55691	Residential; 84 Lots	Goodbee area	Bedico Creek	Bedico Creek				/	/
Bedico Creek Phase 12	Residential; 56 Lots	Hwy. 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/,	/	/
BEDICO CREEK Phase 12B (8/17/1 File No. 5665)	Residential; 56 Lots	Hwy, 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/		/
Bedico Creek Phase 15	Residential: 26 Lots.(249 - 574)	Hwy. 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/	/	/
BEDICO CREEK Phase 5 (8/12/14 - RECORDED)	Residential; 28 Lots (252 - 279)	Hwy. 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/	/	
BEDICO CREEK Phase 9 (Deer Park) (RECORDED 1/6/15)	Residential	Hwy, 1085 off of I-12. 1077 / Madisonville / Goodbee area	Bedico Creek	Bedico Creek			/	/	/
BERKSHIRE (Recorded on 1/5/2016- ile No. 5479)	Residential; 91 Lots	West of I-59, on Robert Rd. North of Haas Rd., Pearl River	Resolve	W. Pearl River			/	/	
BLIND TIGER (2016-294) 2	Commercial; Restaurant	West End Blvd; Slidell; Off of Oak Harbor		Lake			/	/	
implete)  Brentwood Estates	PUD; 102 Lots	Exit to Marina/Boat Yard located on the North side of Sharp Road, &	H2O	Pontchartrain Tete L'Ours	107.635	d->Wp->d->pool	Pass	Pass	F
AND THE PARTY OF T		East of Westwood Drive Hwy 190 Service Road next to Toyota		200 17 17018	Jacobski	The sections	- 100		
Car Max (12/12/2017)  CHRISTIAN BROTHERS	Commercial; Retail	Dealership			No. No.	(SS)-Dp-d >			Pı
CHRISTIAN BROTHERS AUTOMOTIVE (2016-20115 Building Permit) (Completed); 2016- 30353 (Landelearing Completed)	Commercial; Mechanic Shop	Dalwill Dr. (NEAR FIRST AMERICAN BANK AND TRUST)Mandeville, LA	Approved	Chinchuba	0.791	(SS)-Dp-d> Chinchuba (@ W. Causeway Extension)	Pass	Pass	

DEVELOPMENT 12/12/2017	SCOPE	LOCATION	UTILITIES	WATERSHED	Dev. Size	BMP Treatment Train to Receiving		tandard (P EPA	The state of the
DEVELOPMENT INTERNIT	SCOTE	20101101	PROVIDER	MODEL	acres	Stream [4]	Anti Deg	Standard	Watershe
COAST Council on Aging Not ough information to model	Commercial: Parking Lot addition in rear of building for outdoor storage and bus yard	Ramos Street Covington near Claiborne Hill	application made, DES will have no issue for water & sewer for parking lot(for flat work permit only)	Bogue Falaya					
Cobblestone Court	Commercial: 40 Lots		un.						
Copperstill	Retail on La 1077; 60,000 sq. foot development; developer considering expansion of grocery square footage from 35,000 to 43,000	Southeast Corner of 1085/1077 intersection	Tammany Utilities - USA completed, lift station ordered; awaiting response for revised COS issued for proposed expansion of grocery	UTR	1,3774 (Modeled 11/14/2016)	d	Pass	Pass	Pass
COQUILLE Phase 2 (RECORDED)	Residential; 23 Lots (33-55)	Madisonville LA, south of LA 22 east of Trapagnier Rd.	Guste Island	LTR	11.57	d-d(Hwy22)> BlkRiver> LTR	Pass	Pass	Pass
Coquille Phase 3A	Residential; 48 Lots (48-95)	Madisonville LA, south of LA 22.	Guste Island	LTR	Modeled 11/14/2016	Black River -> LTR	Pass	Pass	Pass
COUNTRYSIDE Phase 1A (Recorded to/20/2015 Map File No. 5444)	Residential; 8 Lots	Northwest corner of Hwy 190 and Hwy 1077 Covington		E Bedico Creek			/	/	/
Cultural Arts District	3 Lots, 48 Acres, Cultural Arts District, Children's Museum, Amphitheater, Hotel, Convention Center	Northside of intersection of Pinnacle Pkwy and 1-12. East of Nor du Lac, West of Tchefuncte River	uu.	LTR	82.31(Modele d 11/14/2016)	d-Wp-Wp-d-BF-LTR	Pass	Pass	Fail
Deer Crossing	Residential; 107 Lots; 23.37 Acres	SW intersection of 1-12 & Hwy 1085 across from Perriloux Ref, Madisonville	Tummany Utilities	Bedico Creek	23.379	Wp->Bootlegger d- >Fox Branch->Bedico Creek	/	/	/
Diaz Gas Station Not enough	Retail; Convenience Store and Gas Station	Corner of Hwy 21 & Greenbrier Blvd							
DISC Of Louisiana (Inwood Dr hydrostudy, Phase) > Bayon Jacques Pelloat)	Doctor's Office	Innwoods Drive; hwy 21;Covington		UTR	2 (estimate)	(Dp holds water, so functions as Wp) d>Wp> d	Pass	Pass	Fail
Doux Maison	Residential; 8 Lots (10.921 Acres)	West side of LA Hwy 41, Bush, LA		W. Pearl River			/	/	/
Dove Park Estates	Residential; 84 Lots; 57.72 Acres	Dove Park Road		Ponchitolawa Creek		Little Creek>LTR	1	1	
First Baptist Church of Covington	Commercial/Suburban District; New	16333 Hwy 1085; Northeastern corner of Hwy 21 @ Hwy 1085	Approved	LTR	1,491	Wp->d-> LTR	Pass	Pass	Fail
ORIDA MARINE TRANSPORTERS BUILDING (Complete)	Worship Center  Commercial/Office building: expansion and redesign	US 190 East service rd Mandeville		Tete L'Ours	1 est. (Modeled 11/14/2016)	d	Pass	Pass	Pass
GARDENWALK Phase IA (Filed B- 13-2015 File No 5413)	Residential; 25 Lots	East of Hwy. 190, northeast of Walmart, south of Crestwood Blvd., Covington	UIL	Ponchitolawa	6,44	d-Dp-d →> Ponchitolawa Creek	Pass	Pass	Fail
Gardenwalk; Phase 1B	Residential; 40 Lots	East of Hwy. 190, northeast of Walmart, south of Crestwood Blvd., Covington	UIL	Ponchitolawa	15.43 (Modeled 11/14/2016)	d-Dp-d	Pass	Pass	Pail
Goodbee Square, Phase 1	Residential; 82 Lots	Northwest corner of US 190B and LA 1077. Covingion	Tammany Utilities	UTR	21,29 (Modeled 11/14/2016)	Dp-d	Pass	Pass	Pail
Grand Champions of Oak Harbor, Filing	Residential: 130 Lots	West of 1-10, north of Oak Harbor, Slidell	Coast	Lake Pontchartrain	39.21		/	/	/
GRAND MAISON, Ph 3B (6/23/2017) File No. 5650)	Residential; 97 Lots	Just South of I-12 off of Hwy 59 next to Heritage Heights	Tammany Utilities	Chinchuba	44.70 (Modeled 11/14/2016)	d-Dp-d	Pass	Pass	Fait
GRAND OAKS Ph 2-B (Filed 2-23- 16 - File #5497)	Residential; 44 Lots; 17.16 Acres	North of LA 22 across from Guste Island, Madisonville	SELA	Lake Pontchartrain	33.22		/	/	/
Grand Oaks, Phase 2C	Residential: 48 Lots; 26.18 Acres	North of LA 22 and east of LA 1085 and West of Town of Madisonville	Guste Island	Lake Pontchartrain			/	/	/
GREYSTONE, The (Annexed into the City of Mandeville) (2016-28720 Land clearing Complete: 2016-26940 Building Permit)	Banquet Hall	935 Clausel Street, Mandeville; at the intersection of Clausel & America Street	City of Mandeville	Little Bayou Castine			/	/	/
Guste Island Parcel B	Residential; 72 Lots	South of LA 22 on Gustle Island Rd., west of Trapagnier Rd., Madisonville	Guste Island	LTR	27,27	d-Wp-wetland (nr Black River) -> LTR	Pass	Pass	Pass
GUSTE ISLAND Parcel D-2 (8/(2/14 RECORDED)	Residential; 43 Lots	South of LA 22 on Gustle Island Rd., west of Trapagnier Rd., Madisonville	Guste Island	LTR	13.78	d-Wp-d> Black River> LTR	Pass	Pass	Pass
GUSTE ISLAND ESTATES Parcel D-3 "The Oaks" (4/10/2017 File No. 5628)	Residential; 35 Lots; 13 Acres	West of Perriloux Rd and west of Town of Madisonville	Guste Island	LTR	13.089 (Modeled 11/14/2016)	d->Wp->d-> Blk River -> LTR	Pass	Pass	Pass
Guste Island Estates Parcel D-3B "The Oaks"	Residential; 12 Lots	east of LA Hwy 1085 and south of hwy 22 at Guste Island Road; west of the Town of Madisonville	Gus(e Island	LTR	13,089 (Modeled 11/14/2016)	d->Wp->d-> Blk River -> LTR	Pass	Pass	Pass
HARBOR FREIGHT TOOLS- laiborne Shopping Center (Completed	Retail Center (Discount Tool and Equipment Retail Store). 16,933 sq. ft. of Interior Renovations, New Offices, Restrooms, Breakroom, Auto Entry/Exit Doors	Claiborne Hill Shopping Center, near Covington by-pass	Model assuming Regional WW						
Helm Paint Retail Center Not enough information to model' no permit	12,000 - Commercial Retail Center	6th Street @ N Causeway Approach, Mandeville							

DEVELOPMENT 12/12/2017	SCOPE	LOCATION	UTILITIES	WATERSHED	Dev. Size	BMP Treatment Train to Receiving	DO S	tandard (P EPA	ASS/ Full)
DEVELOPMENT 12/12/2017	SCOPE	LOCATION	PROVIDER	MODEL	acres	Stream [4]	Anti Deg	Standard	Watershee
HIDDEN CREEK Phase 2 (Recorded 10/2017; File No.5601)	Residential; 55 Lots	North side of LA Hwy 1085 (Bootlegger Road) at the intersection with Arbre Ct, west of Covington, LA	Tammany Utilities	UTR	30.9	d-Wp-d(Hwy1085)> Hidden Creek> Soap&Tallow Creek (N of Del Sol)> UTR	Pass	Pass	Pass.
Highland Park Center	Retail Center; [1.631 sq ft	70515 Hwy 21; Lot 1A; Between Greenbrier & Hwy 1085	Approved	UTR	1.563	ditches along Hwy 21- > N side Flowers Bayou@ S. Tyler St.— > UTR	Pass	Pass	Fall
Holy Trinity / St. Anthony's Garden	112 Acres: Church, retirement center, cemetery, funeral horne	South of Dove Park Rd., east of Westwood Dr., Covington	Tammany Utilities; Approved by DES	Ponchitolawa	112 (Modeled 11/14/2016)	d-Dp-d	Pass	Pass	Fall
Houltonville	Residential; 47 Lots; 90.619 Acres	South side of Hwy 22 Near Fairview Oaks Drive							
Hunter's Haven, Phase 1 (formerly Houltonville Estates) Name change up for approval @12/14/17 PCM	Residential; 32 Lots	The property is located south of LA Hwy 22 at Penn's Chapel Road and east of Madisonville							
HWY 21 MARKET PLACE (Starbucks & Aspen Clinic)	5.507 Sq Fi Shell for future tenants; Stanbucks & Aspen Chaic	Hwy 21 Market Place near Winn Dixie		UTR	2.49	SSdetention> d (Hwy21)> FlowersBayou@ S. Tyler St>UTR	Pass	Pass	Pail
Hwy 21 Marketplace (Oyster House)	Resturant and Retail	Hwy 21; near north Azelea	DES Approved Shell	LTR	1.81	SSdetention- d(Hwy21)- FlowersBayou-> UTR	Pass	Pass	Fail
Hwy 21 Marketplace (Oyster House)	Resturant and Retail	Hwy 21; near north Azelea	DES Approved Shell	LTR	0.4	sheetflow-d(Hwy21)- FlowersBayou> UTR	Pass	Pass	Fail
Hwy 21 Planned Corridor Not enough information to model	Retail Center; 14,090 sq fi	Parcel located at South West intersection of LA Hwy 21 & Highland Park Entrance, North of Greenbrier Blvd		LTR					
IRONWOODS (RECORDED 1/20/2015)	Residential: 14 Lots	Hwy. 435 near Money Hill, Abita Springs		Abita River	103,45	d-Dp-d (Hwy 435) -> Jacks Branch -> Abita River(Hwy 35)	Fail	Pass	Fail
J.F. Smith Memorial Business Park, Phase 2	Commercial; 7 Lots	Near the northwest corner of I-12 and US 11, Slidell	Resolve	Bayou Vincent	37.11 (Modeled 11/14/2016)	Dp-d	Pass	Pass	Fail
ckson Court	Residential; 46 Lots; 17.81 Acres	The property is located on the north side of Hwy 22 approx .5mile east of the intersection of Hwy 22 and 1085	H2O	LTR	21.5	subsurface> d -> Blk River(above Hwy 22)> LTR	Pass	Pass	Pass
Jefferson Muslim Association	Mosque	2235 9th Street( 9th St between Iberville & Marquette)	Approved	Chinchuba	1,068	d(internal) -> d(roadside Hwy 22) - > Chinchuba	Pass	Pass	Pass
Lake Ramsey Ph 5	Residential; 68 lots	Phase 5 abuts Lake Ramsey Rod and runs along the northern side of Lake Ramsey, east to west, north of Covington	Artesian	UTR	53,6194	d->Wp-> d(long traverse) -> Horse Branch (hw) -> UTR	Pass	Pass	Fail
LAKESHORE DODGE, CHRYSLER, JEEP, RAM (2016- 29412)	Dealership (Old Kia Dealership Location), 8,513 sq ft	Howze Beach Road- Slidell		Lake Pontchartrain			/	/	/
Lakeshore Motor Coach Resort	Commercial; 99 Lots, 5 Parcels	Southeast corner of Lakeshore Blvd. and Oak Harbor Blvd. Intersection, Slidell	Oak Harbor East	Lake Pontchartrain	28.8483		/	/	
Liberty Park	Baseball/Recreation Center	Bayou Liberty, between Logan's Trace & Ozone Acres (paper). LDEQ AI#198742 (Curtis Environmental.Subsegment # 040905. 8,000 gpd, 5BOD5/2NH4/5DO		Bayou Liberty	17.75	park-ballfields-Dp- wetlands/greenspace = > B.Narcisse -> BL (@HW of Reach 26)	Pass	Pass	Pass
Logan's Trace	Residential; 97 Lots	South of US 190, on east side of Hwy, 433 (Thompson Rd.), Slidell	Water: Bayou Liberty; Sewer: NEES	Bayou Liberty	60.129 (Modeled 11/14/2016)	Dp-d	Pass	Pass	Fail
Lone Oak Park, Phase 2	Residential; 80 Lots	Property is bisected by Lone Oak Drive, west of U.S. Hwy 11 & North of Slidell, LA							
Longleaf Estates	Residential; 165 Lots; 82,759 Acres	Southwest of LA 1077 & US Hwy 190 intersection	Tammany Utilities	Bedico Creek				/	/
LOPA (Louisiana Organ Procurement Agency)	Organ Procurement Agency	68190 Hwy 190 Service Rd-Covington	Approved	Ponchitolawa	2 acres (assume)	internal grassy swales > wooded buffer-> Wp (Little Creek Commercial) -> d	Pass	Pass	Fail
MADISONVILLE MARKETPLACE (Marucci) (2017-32363C ompleted (Marucci Hinters House Northshore)listing Cage Facility with nerchandising area at front.2017-34960 (Job Trailer); 2017-32469 (LC- Completed);	Retail	70327 HWY 1077; Near intersection of Hwy 1077 and Belington Drive, just north of Brewster Road	Approved (Holding Occupancy)	LTR	3 acres (assume)	discharge into HW of NE fork of Blk River -> LTR	Pass	Pass	Pass
Magnolia Mound (formerly Tantella Ranch)	Residential; 220 Lots (Indivulual Sewer 110.000 gpd)	East side of LA 1077 and Tantella Ranch Rad, north of Magee Rd.	None + Individual	UTR	219.4 (Modeled 11/14/2016)	d-Dp-d	Full	Fill	Pail
MAISON du LAC Phase 1	Residential	Located on the South Side of Hwy 1085	Tammany Utilities (Timber Branch II)	UTR	150.31	d-Wp-d> Timber Branch> UTR			
Maison du Lac Phase 2	Residential; 36 Lots	Located on the South Side of Hwy 1085	Tammany Utilities (Timber Branch II)	UTR	11,148	d-Wp-d> Timber Branch> UTR			
Maison du Lac Phase 3	Residential; 50 Lots	Main entrance is off of LA 1085, west of LA	Tammany Utilities	UTR	11,148	d-Wp-d> UTR Branch> UTR			
MARRIOTT TOWN PLACE	AN ACCOUNT OF	22 and South of Covington	(Timber Branch II)	-	1.9	Branch -> UTK	1		

DEVELOPMENT 12/12/2017	SCOPE	LOCATION	UTILITIES	WATERSHED	Dev. Size	BMP Treatment Train to Receiving	Townson and	andard (P EPA	Tenes
DETEROIMENT INTENT	00010		PROVIDER	MODEL	acres	Stream [4]	Anti Deg	Standard	Watersl
MeCALMAN OFFICE BUILDING Complete)	Commercial; Multi-tenant facility, 47,333 sq. ft.	1155 US 190 East service rd Mandeville		Ponchitolawa	1 est (Modeled 11/19/2016)	Wp-d	Pass	Pass	Entl
ercedes Benz (in Pinnacle Nor d du .ac)	Commercial;Car Dealership	8080 Westshore Dr;At the intersection of Westshore Drive and Pinnacle Pkwy	Approved	LTR	5.117	landscape buffer -> Wp-> d-> LTR @112	Pass	Pass	Poil
MONEY HILL Phase 6, Part 4 (Recorded 8/19/2016; File No.5562)	Residential; 23 Lots, 7,27 Acres		H2O	Abita River	9.081	d-Wp-ddd-d(Hwy) -> Jacks Branch -> Abita River	Pass	Pass	Pall
MONEY HILL PLANTATION Phase 7A (9/9/2014; RECORDED)	Residential; 25 Lots	North of Hwy. 435, east of Hwy. 21, Covington	1120	Abita River	23.097	d-Wp-d> Jacks Branch> Abita River	Pass	Pass	Fail
Money Hill Plantation, Ph 7B "Hidden Lake"	Residential:24 Lots	Located at the intersection of Campbill Drive and Fox Trot, west of Money Hill Parkway, near Talisheek, Louisiana	1120	Abita River	24.907	d-> park-> greenspace > d-> w to Abita Creek> Abita River(Hwy 435/ (Talisheek Hwy)	Pass	Pass	Fai
NATCHEZ TRACE Phase 4 (Recorded 9/2/2015 File No 5423)	Residential; 23 Lots			LTR	6.78	d-Wp-d (Pine Crest Dr) -> LTR (@Riverside Dr just s of 1-12)	Pass	Pass	Pass
New Orleans Mission-Women's Pavilion	Commercial - 5 Acre Parcel (Old K Bar B Ranch in Lacombe) 31294 Hwy 190, Lacombe, LA	31294 Hwy 190, Lacombe; S, Side of I-12, East of Hwy 434, South of Hwy 190 on K Bar B Road.	Approved	Bayou Liberty	5.0 (Modeled 11/14/2016)	Wp-d	Pass	Pass	Fal
Nor du lac Shopping Center (bldgs A.H.J)	Commercial - Recently purchased and redeveloped by Cypress Equities	Northeast of intersection of 1-12 and LA 21. Covington	UIL - Submitted number of units to TU for COS calculation, USA amendment signed but still needs revision to include master meter	LTR	Assume 3 among bldgs A, J & H	internal d-Wp-d → LTR	Pass	Pass	Pai
Northpark; Lot 12 (Northpark Apartments)	Residential; 5.10 Acre;218 Unit 4- Story w/4 Level Ramp Parking Apartment Complex	2021 Sullivan Lane., Covingtors	SELA: Approved	LTR	5,1 (Modeled 11/14/2016)	Wp-d	Pass	Pass	Po
Northpark - Chevron - Project on hold indefinitely	Commercial; 8 Lots. 30.1348 acres; Additional 316,070 sq. feet for 860 additional employees; new parking for 1110	West of US 190 north of Holiday Blvd., Covington	SELA; Approved for work order	LTR	7.256 (Modeled 11/14/2016)	Wp-d	Pass	Pass	Fa
Northpark Phase 4B (Resubmitted)	1 Lot; Multi Family; 5.1 Acres	Located on w side of US Hwy 190, just north of Village Lane, south of Covington, LA	SELA	LTR	6.148 (Modeled 11/14/2016)	d-Wp·d	Pass	Pass	Pi
NORTHPOINTE Phase 4* (Fedex Distribution Center) (CO Issued 20/2015)	Commercial: 2 Lots (Fedex comprises one)	Northwest of LA 1077 and LA 1085. Covington			too small to model/ no impact		n/a	n/a	n/
Oak Alley Meadows	Residential, 204 Residential Lots-2 Commercial Lots	Located on the north side of Hwy 190 approximately half a mile east of Hwy 25 US Hwy 190 (aka Ronald Regan Hwy) East of Covington High School	тво	UTR	87.06	d->Wp-> d> Rattlesnake Branch > UTR	Pass	Pass	Fa
Oak Ridge / Southern Oaks [11/05/2016]	Residential; 133 Lots (individual- Sewer-Guste Island WW)	Southwest corner of Hwy. 22 & Trapagnier Rd, Madisonville (just upstream of Coquille)	Bayou Liberty Water, Guste Island WW	LTR	69.78	d-Dp-d-HW of finger of Black River> LTR	Pass	Pass	Pa
Oaklawn Trace	Residential; 160 Lots	South of 190, east of Transmitter Rd., Slidell	NEES	Cypress Bayou	81.73 (Modeled 11/14/2016)	d-Wp-d	Pass	Pass	Pa
Oehsner Clinic Expansion	Commercial, 58,100 Sq Ft addition- new clinic, business suites&33,100 sf gym & atrium	Ochsner Bivd off of Hwy 21	Approved	LTR	66,13	d⇒ Wp∻d	Pass	Pass	Po
O'Reilly Auto Parts	Commercial Auto Parts Store; 10,000 sq ft (Individual LPDES)	Gause Blvd, Slidell, near Amber St/Pearl Acres	Approved	W. Pearl River			/	/	/
PENN MILL PLACE (7/6/17 File No.	Residential;58 Lots; 32 acres	North Side of hwy 190, Covington, near Pruden Road	H2o-Water & Tammany Utilities Sewer						
Perriloux Trace	Residential, 25 Lots	East side of Perillorx Rd and south of Brewster Rd, west of Madisonville, LA	Tammany Utilities (Water) & Possibly for WW drawings say "Community". Need LPDES permit	LTR	10	(disch into NW HW finger of Black River nr NW corner of Pine Creek SD)> LTRP>d> LTR	Pass	Pass	Pa
Pet Cemetary NEED better site plan & hydro study	Public Facilities	Located on the north side of Harrison Avenue, west of Flowers Drive	Approved for site work only 12/12/2017			1			
PetSuites	Pet Resort & Spa		Approved (Tammany Utilities)	Ponchitolawa Creek	West Area:1,62 acres	(West area: low-flow chaquuell (pond)> offsite welland area/ditch -> PC	Pass	Pass	Fi
PetSuites	Pet Resort & Spa	975 Hwy 190 East Service Road; northwest quadrant of I-12 across from lowes	Approved (Tammany Utilities)	Ponchitolawa Creek	East Area: 0.38 acres	sheet flow from pasd- > ditch-> PCPonchitolawa Creek-> LTR	Pass	Pass	T)
PINE CREEK Ph 2B & 2C (2B RECORDED 1/14/15: 2C RECORDED 7/30/2015)	Residential; 2B 27 Lots, 2C 34 Lots	North of LA 22, east of Perrilloux Rd., Mandeville		LTR	2B: 11.881 2C: 16.439	d - conservancy -> finger Blk River -> LTR	Pass	Pass	Pi
Planet Fitness	Interior Remodel	409 N Hwy 190; in old Rooms to Go Building next to 2nd and Charles Bookstore		n/a	/	/	/	/	/
Pontchartrain Medical Park	Resdential; 165 Lots	The property is bounded on the south by Lakeview Drive on the north by Hickory Drive, north of Mandeville, Louisiana	Tammany Utilities	Tete L'Ours	16,2	N: d-> Dp->d along Hickory St -> d(Hwy 190)> BTL	Pass	Pass	h
	AL THE STREET	Located on Hwy 190, west of Hwy 1077 and	A THE LOCALINA		444	S: Wp-> wetland->	/	1/	1
Preston Vineyard (Formerly Long Leaf)	Residential; 165 Lots; 82,759 Acres	north of the Town of Madisonville	Tammany Utilities	E. Bedico Creek	82.76	Hw EBC	/	1	/

DEVELOPMENT 12/12/2017	SCOPE	LOCATION	UTILITIES PROVIDER	WATERSHED MODEL	Dev. Size	BMP Treatment Train to Receiving Stream [4]	Anti Deg	tandard (P EPA Standard	Watersh
Preston Vineyard (Formerly Long Leaf)	Residential; 165 Lots; 82.759 Acres	Located on Hwy 190, west of Hwy 1077 and north of the Town of Madisonville	Tammony Utilities	E. Bedico Creek		E: P-> wetland -> EBC		/	/
eston Vineyard (Formerly Long Leaf)	Residential; 165 Lots; 82.759 Acres	Located on Hwy 190, west of Hwy 1077 and north of the Town of Madisonville	Tammany Utilities	E. Bedico Creek		W: Wp-> piped betw houses -> HW EBC	/		/
PRUDEN CREEK SD (Recorded 1/05/2016; File NO.5571)	Residential; 60 Lots	South of Penn Mill Rd., east of Tehefuncte River, North of US 190N, Covington	H20	UTR	24.88 (Modeled 11/19/2016)	d-Wp-d> Horse Branch -> UTR	Pass	Pass	Fail
Redemption Church	Commercial; 17,344 sq ft Church	62060 HWY 434; 1 mile south of 1-12 on hwy 434 on the east side of Hwy 434	Approved	Bayou Lacombe			1. 1		
Retail Center	Commercial Retail Center(Vanilla Box Building-5 potential tenants)	71170 HWY 21 and 71174 HWY 21; Between Bootlegger Road and Bridge	Approved						
Rigolets Estates Phase 3-A1	Residential: 35 Lots (16.89 Acres)	Located on the south side of LA Hwy 433 and approximately 1 Mile West of U.S. Hwy 90 intersection, southeast of Slidell, LA		Lake Pontchartrain				/	/
River Chase	Commercial, Residential, Multi Family	1776 Continental Dr. ;South side of Brewster Rd., east of River Chase Drive	UIL	LTR	177 (Modeled 11/19/2016)	Wp-Wp-dry canal> LTR	Pass	Pass	Fail
RIVER CHASE Parcel 9 (2016-28306 (2 Story - (Shell Only Completed); 2017-32466 (Tenant Build out for DDG- Completed); 2017-32650(Monument Sign-Completed); 2017-32826 (Tenant Build out for Vanilla Bos-Completed)	Office Space: 44,500 Sq. Ft.	16564 E Brewster Road;South side of Brewster Rd., east of River Chase Drive	UIL; Approved	LTR	1.022 (Modeled 11/19/2016)	Wp-Wp-dry canal -> LTR	Pass	Pass	Fall
RIVER CLUB Phase 1 (Formerly called River Place) (11/18/2018 File#5462)	Residential; 57 Lots	Located on southside of Tchefuncte Interchange, Covington	Utilities, Inc.	LTR	48.75	d-Wp-d -> LTR(just below J-12)	Pass	Pass	Fail
River Club, Ph4A	PUD; 37 Lots	This property is located south of East Brewster Road and east of LA Hwy 21, north of Madisonville, LA	Utilities, Inc.	LTR	8.064	d-> canal/oxbow/Wp - > Wp -> LTR	Pass	Pass	Fai
RIVER PARK CROSSING Phase 1 (approved @9/13/16 PCM (Formerly Planche Estates) (Recorded2/06/2017; File No.5606)	Residential; 49 Lots	South side of MP Plance Rd, west of LA Hwy 25, and northwest of Covington, LA	1120	Bogue Falaya	38.15 (Modeled 11/19/2016)	d-Dp-d	Pass	Pass	Fail
RIVER PARK ESTATES Ph. 1 (RECORDED 3/1/2017 File No. 5613)	Residential Lots; 81	Located on the west side of Hwy 25 off of MP Planche Road & North of the City of Covington	Individual Water and Sewer	Bogue Falaya	22,69 (Modeled 11/19/2016)	d-Dp-d> BFR	Pass	Pass	Fai
ROOMS TO GO @ River Chase (2016-27661 Building Permit; Occupancy Granted on 4/11/2017)	Commercial, Retail	69631 Stirling Blvd; South side of Brewster Rd., east of River Chase Drive	UIL	LTR	3.252 (Modeled 11/19/2016)	Wp-Wp-dry canal -> LTR	Pass	Pass	Fai
UELLE COURT (Recorded /28/2016; Fife No.5554)	Residential: 12 Lots	On southside of Brewster Rd., west of Perriloux Rd, east of LA 1085, Madisonville	SELA	LTR	4.67	d-Dp-d(Hwy22)> Blk River> LTR	Pass	Pass	Pas
Simpson Farms	Residential; 106 Lots	North of US 190B, east of Pruden Rd., Covington	H20	UTR	51.28 (Modeled 11/19/2016)	d-Dp-d> Horse Branch> UTR	Fail	Pass	Fall
Southern Oaks (formerly Ook Ridge)	Residential; 137 Lots	South Side of Hwy 22, west of Trepagnier Rd and east of Helen Dr.	Guste Island	LTR	69.78	S: (27.81): d> Wp - > d -> Black River > LTR N: (44.90): d> Wp- d -> Black River -> LTR	Pass	Pass	Pas
SPRING HAVEN Phases 1 &2 (Once called Autumn Creek) (Entire SD was approved & modeled for impacts as a whole. Ph1 RECORDED12/19/2014)	Residential; 141 Lots	North of Hwy. 22, West of LA 21, Madisonville	Water: Tammany Utilities; Sewer: Guste Island	LTR	23.31 (Modeled 11/14/2016)	d-Wp-d> Black River> LTR	Pass	Pass	Pass
SPRING LAKE (formerly Bedicts Ranch) (Recorded 7/10/2015)	Residential; 260 Lots	North of I-12 off of LA 1077 along Tantella Ranch Rd., Folsom		E Bedico Creek				/	/
SPRINGS @ River Chase 2015- 24565 thru 24579; Buildings 1-14 (Completed); 2015-24580 Clubhouse (Completed)	Commercial, Residential, Multi Family			LTR					
Tamanend Business Park*	Commercial, Residential, Industrial, RetailSTAC	West of LA 434, north of I-12, Lacombe	Tammany Utilities	Bayon Lacombe	40 (Modeled 11/14/2016)	d-d	Pass	Pass	Pas
Tamanend Phase 1* (Including STAC)	Commercial, Residential, Industrial, Retail, STAC	65296 Hwy 434;East of LA 434, north of 1-12, Lacombe	Sewer/Water lines being installed presently/Water Tower Installed/Well to be drilled soon. Treatment plant options being looked into in Phases.	Bayou Lacombe		Wp-Wp-dry canal -> B.Lacombe	Pass	Pass	Pas
TERRA BELLA Phase 1-A-3 (RECORDED)	Retail: State Bank	On LA 1085 east of Rousseau Rd., Covington	Tammany Utilities	UTR	0,74	d-ddd-d → Soap&Tallow → UTR	Pass	Pass	Fa
TERRA BELLA Phase 1-A-5 (Recorded 10/23/2015 File number 5449)	Residential; 18 Lots	On LA 1085 east of Rousseau Rd., Covington	Tammany Utilities	UTR	6.644	d-Wp-Soap&Tallow- UTR	Pass	Pass	Fa
TERRA BELLA Phase 1-A-6 RECORDED 19915)	Residential: Multi-family for 172 units: Studio - 12; 1 bedroom - 73; 2 bedroom - 87; 3 bedroom - 6	On LA 1085 east of Rousseau Rd., Covington	Tammany Utilities	UTR	12.65	SS-Wp> Soap&Tallow> UTR	Pass	Pass	Fa
TERRA BELLA Phase I-A-7 (9/) 1/2015 File No. 5428)	Residential; 18 Lots	On LA 1085 east of Rousseau Rd., Covington	Tammany Utilities	UTR	6.717	d-Wp> Soap&Tallow> UTR	Pass	Pass	Fa
Terra Bella Phase 1-A-8	Residential; 2 Lots	On LA 1085 east of Rousseau Rd., Covington	Tammany Utilities	Bogue Falaya	5.77 (Modeled	d-Wp-d	Pass	Pass	Fe

AMILIO AND ALLOWAY	MANAGE TO	Transport Control	UTILITIES	WATERSHED	Dev. Size	BMP Treatment	DO S	andard (P	ass/ Fail)
DEVELOPMENT 12/12/2017	SCOPE	LOCATION	PROVIDER	MODEL	acres	Train to Receiving Stream [4]	Anti Deg	EPA Standard	Watersh
Ferra Mariae Phase 3 (Now Alexander Sidge 2/14/2017)	Residential; 103 Lots	West of LA 1081 north of Thibodeaux Rs., Covington	Tammany Utilities	Bogue Falaya	48.0 (Modeled 11/14/2016)	d-Wp-d	Pass	Pass	Fail
TE ESTATES of WATERCROSS, Phase 1A (Recorded 11/21/2016; File No.5589)	Residential; 26 Lors	Northeast corner of I-12 and LA 21, east of Nor du Lac shopping center, west of Tehefuncte River, Covington	UIL.	LTR	10.01	d-wetland-trib> LTR	Pass	Pass	Fail
THE ESTATES of WATERCROSS, Phase 1B	Residential; 30 lots; 9.38 Acres	The property is located on the northern end of Westshore Drive and esst of LA Hwy 21, south of Covington, LA	UIL	LTR	9.38 (Modeled 11/14/2016)	d-Dp-> wetland -> LTR	Pass	Pass	Fail
The Landings of Cross Gates Phase 5	Residential; 50 Lots	Northeast corner of I-10 and LA 1090, Slidell	Cross Gates	W. Pearl River					
The Preserve at River Chase	Residential; 76 Lots	south side of East Brewster Rd., west of the Tehefunete River and south of Covington, LA	tm.	LTR	19	S:Wp-> south to d(Christwood)> LTR	Pass	Pass	Fall
The Preserve at River Chase	Residential; 76 Lots	south side of East Brewster Rd., west of the Tchefuncte River and south of Covington, LA	un.	LTR	11.28	N: Wp-> d - d(north to I-12 service Rd)> LTR	Pass	Pass	Fall
The Village at Pelican Trace	Residential; 49 Lots;6.11 Acres	South of LA Hwy 1088, West of I-12, and east of the City of Mandeville	Tummany Utilities	Bayou Castine	4.97	N: Wp-> d(roadside) - d(Hwy 1088)> BC	Pass	Pass	Pass
The Willows	Residential; 25 Lots	Northeast of I-12 and 1085 overpass	Tammany Utilities	Bedico Creek	17.055		/	/	/
Tolowa Place Subdivision NEED site plan, Hydro study & size of development	Commercial; Additional Parking for Zennoh Grain Corporation	On Hwy 190 Service Rd, SE of I-12. Runs North off of Bodet Lane	n/u	Ponchitolowa		d			
TURTLE CREEK Phase 5-2 (RECORDED 10/(6/14)	Residential: 30 Lots	Easat of LA 1090, north of US 190B, South of 1-10, Slidell	Cross Gates	W. Pearl River				/	/
Valero Gas Station (On-Hold prer Chris Tissue)	Commercial; Gas Station	Southwest corner of Hwy 59 & Lonesome Road.	Not yet submitted	Tete L'Ours					/
VERSAILLES BUSINESS PARK* LC 2015-24763 (Pertion of Lot 16) Complete; LC 2015-23348 (clearing of roads) Complete. RECORDED 8/3/2016 File No. 5556	Commercial	Northwest corner of 1-12 and US 190, Covington	un.	LTR	61.65 (Modeled 11/14/2016)	Wp-d	Pass	Pass	Pail
Versailles Business Park-Lot 7	Apartment Complex; 272 Units	Nortwest corner of I-12 & Us Hwy 190	UIL	LTR					
Versailles Business Park-Lot 10A (Globalstar)	Commercial; 3 Story Office Building; first two levels-build-outs, 3rd level-completed shell for future use	1313 Holiday Blvd; Nortwest corner of 1-12 & Us Hwy 190	un.	LTR					
Versailles Business Park, Phase 2 (Globalstar)	Commercial; 1 Lot	Located in the northwest quadrant of I-12, and Hwy 190 just east of Ave De Bellevue and south of Covington	UIL,	LTR					
Versailles-Multi Family(Proposed sailles Business Park)	Residential-Multi Family; 302 Units; 21; 8 Lots	Nortwest corner of I-12 & Us Hwy 190. Covington	UIL; Approved	LTR	12,61 (Modeled 11/14/2016)	Wp-d	Pass	Pass	Fail
VILLAGE of NORMANDY OAKS (Warranty was released 2/08/2017)	the Parish. Plat is being checked to	d by Wainver (developer) can remian in the pond see if maintenance servitude can replace the own tude will preclude the need for insurance, etc. to	ership by Parish	LTR	No modeled		n/a	n/a	n/a
VILLAGE of NORMANDY OAKS Phase 2C (Approved 10/14/14 - RECORDED)	Residential; 17 Lots	Near the northwest corner of LA21 and Ochsner Blvd, Covington	Utilities, Inc.	LTR	5.5	d-Wp> Flowers Bayou> LTR	Pass	Pass	Fail
VILLAGES of BOCAGE Phase III (RECORDED 4/16/2015)	Residential; 65 Lots			E Bedico Creek			/	/	/
WADSWORTH* (Recorded 6/30/2016; File No.5550)	Industrial	North side of the I-12 / LA 1088 interchange, Lacombe		Bayou Castine	160.0587	d-Wp-Wp-dddd-d(I- 12)> BC			Pass
WALK-ONS@RIVER CHASE (2016) 36458; Occupancy Certificate = 09/25/2017)	Commercial, Restaurant	69796 Stirling Blvd;In River Chase Shopping Center, at the intersection of Stirling and Brewster Road across from Sam's	OII.	LTR	2 (assume)	Wp-Wp-dry canal → LTR	Pass	Pass	Fail
WESTON GLEN, Phase 2A (Recorded 2/21/2017 file no. 5610)	Residential; 24 Lots; 10 Acres	Off of Hwy 1085	Tammany Utilities	UTR	32.535 (Modeled 11/14/2016)	d-Wp-d>Timber Branch> UTR	Pass	Pass	Fail
Whispering Forest (Resubmitted)	Residential; 13 Lots; .45 Acres	South side of Joiner Wymer Rd., West of 1077	Tammany Utilities	Bedico Creek	7.98		/	/	/
Wingfield (Revised PUD)	Residential; 47 Lots	Located on n side of Joiner Wymer Rd and bisected by Bedico Creek, w of Covington, LA	Tammany Utilities	Bedico Creek	163.45		/	1/	/

## Exhibit 5 STP Stormwater Quality Ordinance (10/2016)

# ST. TAMMANY PARISH COUNCIL

### ORDINANCE

RDINANCE CALENDAR NO. 5620	ORDINANCE COUNCIL SERIES NO. 16-3596
OUNCIL SPONSOR: DEAN-BRISTER	PROVIDED BY: Planning and Development
N'TRODUCED BY AIR STEFANCIK	SECONDED BY: MR_TANNER
NATHE 4" DAY OF AUGUST 2016.	

ORDINANCE AMENDING THE ST. TAMMANY PARISH CODE OF ORDINANCES CHAPTER 7 DRAINAGE AND FLOOD CONTROL. ARTICLE 11, DIVISION 5, SECTION 7-042-00. TO ESTABLISH A PROGRAM THAT ADDRESSES STORMWATER AND NON-STORMWATER DISCHARGES BASED ON BEST PRACTICES AND LIDEO REGULATIONS. WHEREAS, the Clean Water Act of 1972 established the basic structure for regulating discharges of pollutants into the waters of the United States as well as the quality standards for surface waters, and

WHEREAS, the United States Environmental Protection Agency is the federal agency charged with establishing pollutant control programs, which are often implemented and enforced through state agencies, such as Louisiana Department of Environmental Quality; and

WHEREAS, in an effort to comply with the water quality standards and requirements established by United States Environmental Protection Agency and Louisians Department of Environmental Quality, St. Tannanay Parish Government is taking steps to address water quality as a whole by evaluating current water quality or conditions, programming infrastructure improvements, and reviewing existing policies and procedures; and WHEREAS, St. Tammuny Parish Government is permitted by Louissana Department of Environmental Quality as the owner of the Parish's Small Municipal Separate Storm Sewer System, which is a conveyance or system of conveyance that is owned by a public entity that discharges to waters of the US and is used to collect or convey stormwater (including storm drainages, pipes, ditches, etc.); and WHEREAS, in order to maintain Municipal Separate Storm Sewer System permit, compliance, St. Tammany Parsh Covernment must develop a Stormwater Management Program that addresses atx minimum control measures. Public Education Outreach: Public Participation - Involvement, Illicat Discharge Detection and Elimination. Construction Site Runoff Centrol, Post-Construction Runoff Control, Municipal Pollution Prevention Good Housekeeping, and

WHEREAS, of the six minimum control measures addressed in the Stormwater Management Program, the Louisiana Department of Environmental Quality requires local legislation be enacted specifically for three of the measures. Illient Discharge Detection and Elimination, Construction Site Russif Control, and

WHEREAS, the St. Tammany Pansh Normwater Onlinance shall address these three intrimum control measures and establish methods to centrol the introduction of pollutants into the Small Municipal Separate Storm Sewer System THE PARISH OF ST. TAXMANY HEREBY ORDAINS that in accordance with LAC 33:EX and 40 CFR § 122, it adopts new regulations to control the infreduction of pollutants into the Small Municipal Separate Storm Sewer System.

BE IT FURTHER ORDANNED that the St. Tammany Parish Code of Ordinances, Chapter 7 Drainings and Flood Control. Article II St. Tammany Parish Flood Hazard Acta Ordinance, Division 5 Provisions for Flood Hazard Acta Chapterin, Section 7-042/00 Specific Standards is amended to defect all current provisions within 8ths-section (5) "Construction Sites - Storm Vater Runoff" as specifically so current, and replace a with new provisions as specifically set forth within the Exhibit attached to this ordinance, all as follows, no-wit:

# ORDINANCE CALANDAR NO. 5620 ORDINANCE COUNCIL SERIES NO.16-3596 PAGE. 2. OF 3.

# (5) Construction Sites - Storm Water Runoff

a. A. pernik shall be required for the elevring, guideing, guideing, displacement or removal of dirt thereafter referred to us-dirt work?) for any properties not specifically even pred as per Paragraph (e) of this Section. This permit shall be in the form of an approval of the "Culvert Data Sheet", the "Permit Data Review Sheet - a general work order or land chouring permit proximity required for construction astivity to occur. The ordinance shall be administered by Department of Engineering or any other purch personnel-that-should be necessary.-

retention measures must accompany the building permit or development proposal and be reviewed by the Department of Englineering before approval of the Culver Department of Englineering before approval of the Culver Data Sheet or the Permit Data Twoleing n. A detailed description of dist work, boundaries of the areas to be disturbed and the proposed sediment Sheet or the issuance of a general work order

### c-Exemptions-

- tr-Agricultural-land management practices and constroution of agricultural structures as defined in the St. Tommany Parish Land Use Ordinance Nrs-SDs:
- 2. Minny, quarying, precessing of reck, sand, gravel, aggregate or clay where established and
- 3. Activities undernaken on forest land un the production and harvesting of timber when approved via an agrecultural eleming, it indee harvesting, or rural eleming permit in accordance with St. provided for by law.
- 4. Single-family residences, and retailed accessory structures or uses, when the disturbed area comprises of less than 50% of the let or paved and is located at least 10 feet from all property Fammany Pansh Land Use Ordinance No-523-
- S. Requirements.
- required sediment control mensure for all side slope and down slope boundaines of a constitution away, tabless a sedimentation basin designed to accommodate 3630-eubia-feet-of-water-and 6. The owner, builder or developer of a construction-project shall custo the placement of a
- seeinnent for each auce of disturbed property is provided.

  7. The owner, builder or developer will further cause the placement of said sediment control measure an and all drainage structure intees which flow into a public drainage structure intees which flow into a public drainage structure intees which flow into a public drainage structure of a dramage system which is intended to be dedicated to the public.
  - nent Retention Measures
- 9. The following mensures are rediment retention mensures, subject to review and approval of each application-based upon the characteristics of the work and site being permitted. A dentied description of the application, design orders and limitations of each is ordined in Appendix A-

Erosion Control Mats

- 4. Salt-Fenering 5. Straw Bale Dikes
  - 6. Diversion Diversion
- 1-Interceptor Swales
- 10 Injet Protection
- onally equivalent technology or method deemed appropriate by the Breets of the Department of Engineering 11. Any-other functi

i. - A blank of permit may be usured for large seale developments when the developer provides the required soliment control measures for the development as a whole. The appropriateness of these measures will he determined by the Director of the Department of Engineering.

responsibilities are enthand in Section 40.47.1.01 Appendix B. (Subdivison Regulations) et tire St. Farmmay, Parish Code of Ordinances should the retention measures fall to prevent rediment tunoff. The g. Prooppor of seiment retenion measures on site does not release the builderdeveloper-from Director of the Department of Engineering may release the hunder-developer from the provisions

and is used primarily for promoting or stimulating growth of a plant or improving the quality of a crop. FILL OR FILLING - shall mean the deposition of soil and other men materials on the land to raise its grade. FERTILIZER - shall mean any substance that contains essential plant natrients in a form available to plants and or smooth its features.

HAZARDAUS SUBSTANCE - shall mean any of the following. Any substance determined to be bazardous according to 49 CFR § 171.8 or folded in Table 502.4 of 40 CFR § 302 or Section 311(b) (2) (A) of the Clean Water Act [33 USC § 1317 (a) and 1321 (b) (A)].
HAZARDOUS WASTE - shall mean any substance identified or listed as a bazardous waste by the EPA

pursuant to 40 CFR § 261.

JILICIT DISCHARGE - shall mean a prohibited non-stormwater discharge containing polluturis.
LOUISIANA DISCHARGE PERMIT ELIMINATION SYSTEM (LPDES) PERMIT OR NATIONAL DISCHARGE PERMIT ELIMINATION SYSTEM (NPDES) PERMIT - shall mean the permit issued by the LDEQ or the EPA, under authority delegated pursuant to 33 USC § 1342(b) that authorizes the discharge of HERBICIDE - shall mean a substance used to defoliate, destecate, destroy, inhibit or regulate vegetation pollutants to waters of the United States

MIGST PROBABLE NUMBER (MPN) - the number of organisms that are most likely to have produced laboratory results in a particular test. The MPN method is used to estimate the concentration of the viable mineroeganisms in a sample based on obtainen factors.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) - shall mean roadsole dramage systems, each

basins, curbs, guiters, ditches, man-made channels, or storm drains used for collecting and 'or conveying stormwater in the Parish

NOTICE OF INTENT (NOI)—shall mean the Notice of Intent that is required by the LPDES General Permit for Discharges of Senewater from Constitution that Activities 5. Actives or General Constitution for Constitution of Activities 5. Actives or General Constitution of Permit for Stormwater.

NON-POINT SOURCE POLLUTION—shall mean pollution discharged over a wide land area that cannot be traced to one specific point or location. These are forms of diffuse pollution caused by sediment, nutrients, organic, and looks substances evolution in stormwater tracel from urbanized areas, constitution sites, agricultural sites, and substances evolution in stormwater tracell.

OPERATOR, shall mean the person or persons who, either individually or taken together, has operational centrol over the Jackity, or has day-to-day operational control over those activities at the facility necessary to compliance with pollution prevention requirements and any permit conditions.

PARISH - shall mean St. Tammany Papsh in the State of Louisiana.

PERSON - shall mean any individual, partnership, firm, company, corporation, association, trust, estate, entity, or any legal representative, agent, or assignee.
PESTICIDE - shall mean a substance used to prevent, destroy, repel, or mitigate any post-

POINT SOURCE - shall mean the discharge of pollubarts at a specific location from pipes, outfalls, channels, or other disconnible or discrete conveyances. Point source does not include irrigation flow returns from

POLLUTION - shall mean the contamination of the physical, thermal, chemical, or hisological quality of waters that causes impairment of the designated uses of a water bedy as supulated in the current EPA integrated Report or renders the water harmful detrimental, injuntous to humans, animal life, vegetation, or POLLUTANT - shall mean dredged spoil, solid waste, sewaga, garbage, shulge, chemical waste, biological materials, radioactive materials, heat, reck, soil, sediment, or industrial waste discharged into waters of the state and or the MS4, drainage infrastructure, conveyances, or waterways of the Parish.

impairs the usefulness for the public cajoyment of the water for any lawful or reasonable purpose.

RELEASE - shall mean any spilling, leaking, pumping, pouring, discharging, injecting, leaching, dumping, or disposing, directly or indirectly, into the MS4, drainage infrastructure, conveyances, or waterways of the

SANITARY SEWAGE - shall mean the domestic sewage and/or industrial waste that is discharged into the similary sewer system and passes through the sunitary sewer system to any public or privately owned sewage

stockpring starage of fill SEDIMENT - shall mean soil, sand, clay, and minerals washed from land into roadways, drainage SANITARY SEWER (OR SEWER) - shall mean the system of pipes, conduits, and other curveyances which carry industral waste and sanitary sewage from residential dwellings, commercial buildings, industrial and facturing facilities, and institutions, whether treated or untreated, to any sewage treatment plant WORK - shall meen excavation, grading, filling, cuting, draining, paving, earthwork,

as to prevent surdight from reaching aquatic bista.

SOLID WASTE - any gacbage, rubbish, refuse, shadge from a waste treatment plant, water supply treatment spant, or a pollution centrol facility, and other discussed material, including, solid, liquid, senti-solid, or plant, or an pollution centrol facility, and other discussived material, resching from construction or individual, municipal, commercial, mining, and agreements and from community and institutional activities. capacity, impede drainage, destroy fish-nesting areas, clog animal habitats, and cloud waters to such an extent

infristructure, and waterways, usually during or aller a ram. Sediment may cause a reduction in storage

STORMWATER - shall mean stormwater runoff, surface runoff and drainage runoff. (Agricultural stormwater may be excluded, subject to the provisious of LAC 334IX 2313.) STATE - shall mean the State of Louistona.

STORMWATER AGREEMENT - shall mean the agreement utilized by the Parish and signed by the contractor, developer, land owner, or agent to ensure all required permits are in place and the unplementation of BMPs will be used to control erosion and sedimentation and reduce the pollutaris in stomwater discharges associated with excevation, grading, filling, and other construction projects as well as beavy equipment

General Permits for Discharge of Stormwater from Construction Activities (LAR100000) and LAR200000). LPDES Multi-Sector General Permit, or any LPDES Individual Fermit which describes and ensures the implementation of practices that are to be used to reduce the pollutants in stormwater discharges associated STORMWATER POLLUTION PREVENTION PLAN (SWPPF) - shall mean a plan required by the LPDES with construction or other industrial activity at the facility.

TOTAL MAXIMIM DAILY LOAD (TMDL) - shall meen the water quality assessment that determines the source(s) of pollutants of concern for a particular water body, considers the maximum amount of pollutants the waterbody is able to assumilate and still meet WLA standards, and then allocates to each source a set level

of pollutants that is allowed to discharge.
WASTEWATER - shall mean any water or other liquid, other than uncontaminated stormwater, discharged

WATER QUALITY STANDARD - shall mean the numerical criterion established by LDEQ and deemed necessary by the state to protect the designated uses of a water body.

WATERS OF THE UNITED STATES (WOTUS) - Waters of the United States - any waters within the Rederal definition of "waters of the United States" at 40 GFR § 122.2; but not including any waste treatment systems. treatment ponds, or lagoons designed to meet the requirements of the federal Clean Water Act. WETLAND - shall mean an area that is frequently inundated or raturated by water and is sufficient to support

a prevalence of vegetation typically subspect for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WASTE LOAD ALLOCATION (WLA) - shall mean that portion of the assimilative capacity of the treestring, water apportioned to a specific discharger in such a way that water quality standards are maintained under design conditions.

### PURPOSE

The purposes and objectives of this section are to establish policies and procedures for the permitting, mentioning, and/or enforcement regarding Blittel Deschage Descreton and Edimination, Construction Site Bussiff Control, and Post-Construction Runard Control, in doing so, the provisions will allow the Parish on a). Comply with the MSA Permit, all federal, state, and local regulations applicable to stormwater and mon-

b) Manage stormwater impacts at their seurce and prevent contaminated stormwater and non-stormwaler declarages into the MS4, defunge inferencement, conveyance, and waterways within the Parish. Or Provide for proper operations and maintenance of all permanent and non-permanent stormwater management BMPs that are implemented within the Parish. stermwater discharges.

d) Provide review procedures and performance standards for stormwater planning and management.
e) Facilitate compliance with federal and state water quality standards, limitations, and permits by and operators of commercial and industrial activities and construction sites within the Parish.

# ADMINISTRATION

The Parish MS4 Administrator shall administer, implement, and enforce the provisions of this section. Any powers granted to or dates imposed upon the MS4 Administrator or powers granted to or dates imposed upon the MS4 Administrator or may be delegated to other authorized personnel.

The Parish may adopp, by council action, reasonable stormwater fees for remittancement of costs related to administration of the stormwater redinance, MS4 compliance, TMDL implementation, and cross related to the SMMP as required by the EPA of LDEQ Fees are provided in Chapter 2 of the Parish Code of Ordinances. Aracle J. Section 2-009,00, Parish Fees and Service Charges.

# B. NON-STORMWATER AND ILLICIT DISCHARGES

# PROHIBITED NON-STORMWATER ILLICIT DISCHARGE

a) GENERAL PROHIBITION:

No person, shall introduce or cause to be introduced into the MS4, draininge infrastructure, conveyances, or waterways of the Parish any lifer discharge, including non-stormware discharges, thank no or composed entirely of fourmariner, accept as expressly provided for in this Article.

I. No person shall introduce or cause to be introduced (not the MS4, drainings infrastructure, conveyances, or waterways of the Parish any discharge that causes or countibutes to violation of

a water quality standard

No person shall connect an untwiner drain or any other source of wastewater to life NIS4, drainage infrastructure, conveyances, or waterways of life Parklo, or allow swith a contolling to confiling Any person that causes a spill, release, or other discharge of a problemel substance or other pollutant in the Parklot is solely responsible for the cleamp and removal of the substance or other pollutant in the Parklot is solely responsible for the cleamp and removal of the substance.

- Capital projects or infrastructure improvement projects by Parish personnel (such projects shall comply with all other state, federal, and local stormwater permit requirements). This exemption does not apply to private contractors working on Parish projects:
  - An activity that is determined by an STPCI official to be immediately necessary for the protection of life, property, or natural resources.
    - Excavation of graves in completies;
- Agricultural practices such as plenting, cultivation, tree curting, logging operations that leave the stump and root mat intact, and cultivated sed operations. Agricultural projects shall comply with all other state, federal, and local stormwater and water quality requirements

## b) Slomwater Agreement

- 1. It shall be the responsibility of the property owner or his designee to acquire and comply with any applicable LDEO permits prior to the commencement of construction. The Parish shall require an approved Stormwater Agreement for any development or improvement project that requires a building permit, site work permit or subdivision work order. This agreement, which is a decriminent previded by STEC, will be seen as a supperd contrar, with the Praisa stating that the property owner or his designes agrees to obtain an LDEQ permit for construction, if applicable, and comply with all applicable LDEQ regulations during the term of the project.
  - For subdivisions developed in phases, a Stormwater Agreement shall be in submitted at then prehuming approval phase for each phase of the development.

## c) Stormwater Site Plan

- the owner, developer or contractor has a sufficient plan to address necessary stormwater controls before the commencement of construction, the Parish shall require a copy of the Stormwater Site. Plan at the time of badding permit application. Hais information may be included on a plot plant. 1. A Stormwater Site Plan is a component of the SWPPP as required by LDEQ. In an effort to ensure depending on the complexity of the project.
  - An approved Stormwater Site Plan is required with submittal of any applicable building permut, site work permit or drainage plan for a subdivission within unincorporated St. Tummany Parish The site plan shall contain the following:
    - The property owner's name, address, date, legal description of parcel, lot manber, and a boundary survey indicating the location, and dimensions of the lot;
      - The shape, size, and location of all existing and proposed buildings or other structures,
- The location and approximate dimension of draveways, entrances, and all points of access to a public street or road
  - Locations of areas subject to flooding or limits of floodplain, if applicable,
    - Total land area;
- The locations of all existing and proposed streets, alleys, indiffues, stormwater conveyances, draining features, samtury sewers and drainage, utility, or access easements servitudes, specifically noting connections to Panish conveyance systems:
- All existing and proposed impervious areas. Natural or man-made watercourses.
- All existing and proposed slopes, terraces, bulkheads, or retaining walls, Erosion and sedimentation control plans or SWPPP.
- Drainage and/or fill calculations as required by permit and/or ordinance.
  - Direction of flow indicators, and
- m. Receiving waterbody for the ultimate declaring of stormwater from the site.

  When a Stormwater Site Plan is required to obtain a Parish permit, it shall be submitted to the

  Department of Planning and Development for review. The Stormwater Site Plan, including any approved revisions, is valid for the duration of the project.
- The submittal process for the residential and commercial development Stormwater Site Plan shall be in accordance with Chapter 7 of the Parish Code of Ordinances.
  - For a subdivision development, a Stermwater Site Plan shall be submitted at the Preliminary Approval phase and will focus on stormwater management, water quality, and receiving waters

# 3. CONSTRUCTION ACTIVITY REQUIREMENTS

- The following requirements shall be implemented and nanntained during the course of construction activities:

  a) Existing vegetation shall be preserved, where feasible, and disturbed portions of the site shall be subhilted within 14 days of the temporary or permanent exestion of construction advisers.

  3 Structural BMPs shall be utilized, where feasible, to diver flow away from exposed soil, store stormwater, or otherwise reduce runoff and the discharge of pollutants from the construction site.

  b) Installation, inspection, and maintenance of crusion and sediment BMPs shall be construction site.
  - effective operating conditions on the site. Operators are responsible for the installation and maintenance of stormwater BMPs until warranty obligations are nict and or occupancy certificates are issued

- As required by LDEQ permits, operators shall be responsible for overseeing self-imprections of all BMPs at construction sites as noted in the LDEQ permit.
   Based on the results of the inspections, BMPs shall be maintained, revised, repaired, or replaced.
- as necessary but prior to a finure storm event.

  3. The SWPPP or Stormwater Sue Plan shall be updated with say BMP revisions.

  4. Any BMP modifications shall be recorded in the SWPPP and/or Stormwater Site Plan within (7)
- calendar days and implemented on site as soon as is practical.

  The owner, contractor, and/or operator of a construction site is responsible for compliance with
  - the requirements of this section.

    (i) The Parish may hold occupancy ceftificates related to a site until approval of the final stoomwater. c) The SWFPP, which shall include the Stormwater Stre Plan, and stormwater self-inspection and BMP inspection with a determination that any required stormwater controls are in place.
- maintenance reports shall be available on site for inspections.

  I. In accordance with LDEQ requirements, an NOI and SWPPP is required for large construction. common plan of development. In accordance with LDEQ toquirements, a SWPPP is required that not an NOD for all projects on 5 or more acres. This requirement includes any lot or parcel that is part of a larger
  - construction projects I acre or greater, but less than 5 acres, if not part of a larger continion plan of development
- d) A stabilized construction entrance/exit pad shall be utilized to manarize the tracking of mud, clay, sediment, and other construction materials onto roadways and streets
- The discharge of construction or building materials, including cement, construct, linte, mortan, sturries, and paints is prohibited. On-site containment or off-site disposal is required.
- D Good housekeeping measures, such as covered storage, storm drain protection, secondary containment, etc., shall be employed to prevent, contain, and clean up spills of paints, solvents, fuel, sewage, and any hazardous substances and pollutants associated with construction.
  - g) Proper waste disposal, such in covered waste containers and concrete disposal funs, shall be employed to manage construction majorials, construction debris, paints, solvents, chemicalis and construction waste, etc. shall be utilized to prevent stormwater contamination.
- (b) phased subdivision developments, are dissurbance shall be phased, when applicable, to limit soil
  enosion and actiment excursion. Final subdization shall be accomplished prior to commencement of the next phase of development

# STORMWATER INSPECTIONS

Routine stormwater inspections will be performed by Pansh stormwater inspectors in accordance with the applicable permitting processes or as needed. Pers associated with inspections re-inspections will be in accordance with Section 2,009,00 of the St. Tammany Parist Code of Ordinances.

- 2) The first stormwater inspection for each project shall be scheduled at the communication of construction with the preliminary dramage inspection. The final stormwater inspection shall be scheduled as the completion of construction with the dramage final inspection.
  b) Re-inspections will be scheduled and performed as required.
  - Unscheduled stomwater inspections and drainage inspections may be performed by the Parish at any
- d) Failure to correct inadequacies following a failed drainage and or stormwater inspection may result point during the construction process.
  - e) All stormwater inspections shall be performed in accordance with the STPG approved SWMP in enforcement action.

# B. POST-CONSTRUCTION STORMWATER REQUIREMENTS

# I POST CONSTRUCTION PERMANENT STORMWATER FACILITIES

Pernament Stormwater BMPs, shall melaute both structural and non-stouctural BMPs.

3) Structural BMPS shall include, but are not limited to, retention detention ponds, stormwater diversion

- hasallation of permanent structural measures intended to control stormwater politizants after the tures, and filtration devices
- completion of a subdivision developments shall be in accordance with Appendix B, Chapter 40 of the Parish Code of Ordinances, Sussivision Regulatory Ordinance 4998, Section 40.

  Erosson, sedimentation, and pollutarits shall be controlled after completion of the development
  - the performance standards as stipulated in the original design and approved by the Parish in process in accordance with the BMFs for Coustal Lonvisons Zone manuals and/or current LDEQ Structural stormwater controls for residential and commercial development shall continue to meet and EPA guidelines for structural BMPs.
- accordance with this section.

  It is the started goal of STPG to develop a program to address and protect water quality in St. It is the started goal of STPG to develop a program involves edited improvements, water quality monitoring, and Tammang Parish. This program involves edited improvements, water quality monitoring, and elevelopment to Tregulations based on recommendations outlined in the CPRA Watershed



## **Elements of an Effective Stormwater Ordinance**

(STP SW Ordinance Adopted by Council on October 6<sup>th</sup>, 2016)

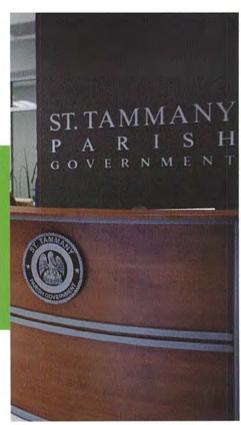
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Department of Planning & Development/Engineering

St. Tammany Parish Government

#### Administrative Comment:

As a designated Small Municipal Separate Storm Sewer System (MS4), St. Tammany Parish Government is required by LDEQ to have an ordinance in place that addresses three specific minimum control measures aimed at improving water quality: Illicit Discharge Detection & Elimination, Construction Site Runoff Control, and Post-Construction Runoff Control. The Stormwater Ordinance addresses each of these measures by establishing requirements and permitting procedures related to stormwater and nonstormwater discharges.





#### Components of the New STP Stormwater Ordinance (Section 7-042.00 of STP Code)

- · Whereas section
- · Strike through current stormwater ordinance
- · General Provisions
- Nonstormwater & Illicit Discharges
- Stormwater Discharges from Construction Activities
- Post-Construction Stormwater Requirements
- Public Participation & Involvement
- · Parish Enforcement & Remedies







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### The Whereas Section: Why We Need a SW Ordinance

- · Clean Water Act
  - Water Quality Protection
- USEPA/NPDES Program
  - Establishes Pollutant Control Programs
- LDEQ/LPDES Program
  - State Regulatory Authority
- STPG/Small MS4
  - Local Regulatory Authority
  - MS4 Permit Requirements





#### Strikethrough & Replace Previous STP Stormwater Ordinance

In order to meet our MS4 permit requirements and minimum control measures, the previous ordinance was replace to provide the following elements:

- General Provisions
- Nonstormwater & Illicit Discharge Controls
- More Effective Construction Controls
- Post Construction Discharge Controls
- · Increased Public Participation
- Improved Enforcement Provisions



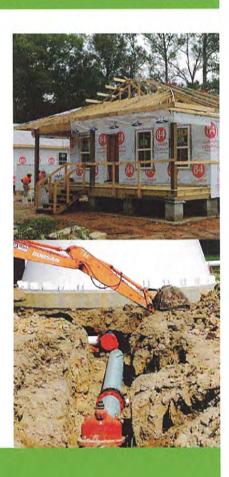


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#### **General Provisions**

- · Abbreviation of Terms
  - Clarify Acronyms
- · Definitions
  - Provide Specific Meaning of Words & terms as Used in this Ordinance
- Purpose
  - What is the Driver
  - Why We Need Stormwater Regulations
- Administration
  - Who Administrates, Implements, & Enforces the Ordinance
  - How the Ordinance is Adopted,
     Administrated, Implemented, & Enforced
  - STP SWMP





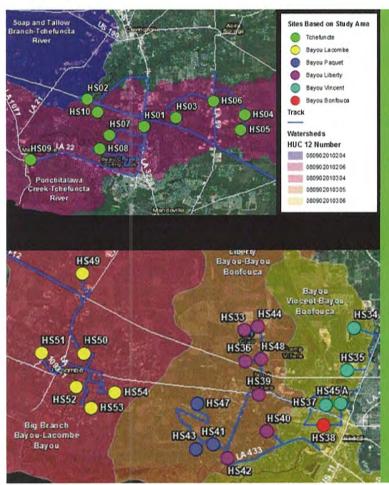
#### Nonstormwater & Illicit Discharges

- · General Prohibitions
  - Broad Brush Strokes
    - · The Big Idea
- Specific Prohibitions
  - Nitty Gritty
    - The Fine Points
- Allowable Nonstormwater Discharges
  - Insignificant Contributor
    - Compliant LPDES Permit Holders
    - Uncontaminated Nonstormwater Discharges
    - Nonprofit Car Washes
  - Okay to Discharge Until..
    - · Deemed a Significant Contributor





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#### **STP Water Quality Action Plan**

Pollution Source Tracking
Hot Spot Monitoring
(SWM9/SW Ordinappe)

- Hot Snots selected by TMDIs
  - Meet WLAs
    - TMDL/UAA
- Targeted for DO failure due to wastewater
  - Unsewered subdivisions
    - Ozone Woods
    - Tammany Hills
    - Ponchitolawa Estates
    - Thelma Estates
    - Tammany Terrace
- Decentralized Management
  - Inspection
- Maintain/Pump-out/Repair/Replace
- Regionalization
  - Guste Island/Mandeville
  - Tammany Utilities
    - Cross Gates/Reno Hills/Alton



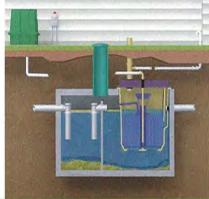
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## Illicit Discharge Detection & Elimination: Pollution Source Tracking

- · Individual Home Sewer System Inspections
  - At transfer of electricity
  - By TMDL priority watersheds
- Require Repairs, Pump-outs, Upgrades, and/or Replacement
- CDBG Funding for LMI Households
- Tiered Compliance Structure
- Fines and/or Loss of Electrical Service for Noncompliance
- Ordinance Supported
  - Sewer System Inspections Regulated in Chapter 21 of STP Code
  - STP SWMP/SW Ordinance







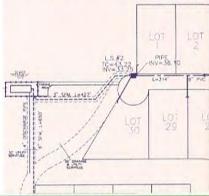
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## Illicit Discharge Detection & Elimination: Pollution Source Tracking

- Community Sewer Required:
  - Within 300' of Community Sewer Connection for New Construction Permits
  - New Subdivisions (Lots < 2 acres)</li>
  - Within 1000' of Community Sewer Connection for Enter the Parish Right of Way
- Individual Sewer Systems Allowed, if the Above Sewer Connection Criteria do not Apply:
  - Subdivisions with Lots ≥ 2 Acres and ≤ 15 Total Lots
  - Minor Subdivisions (≤ 5 lots)
- Regulated in Appendix B, Chapter 40 & 21 of the STP Code





#### Stormwater Discharges from Construction Activities

- General Requirements
  - Prohibits degradation of water quality
  - Adverse affects to MS4 and/or waterways
- · Permitting Requirements
  - Fees per Section 2-009.00 of STP Code
  - Applicable project types
  - Stormwater Agreement
  - Stormwater Site Plan
- · Construction Activity Requirements
  - BMPs designed to control erosion/sedimentation/ WQ impacts
- · Stormwater Inspections
  - In Accordance with Section 2-009.00 of STP Code
  - Scheduled and/or Unscheduled Inspections







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ST. TAMMANY PARISH PATRICIA P. BRISTER PARISH PRESIDENT

#### St. Tammany Parish Stormwater Agreement

Contractor: \_\_\_\_\_Business Name: \_\_\_\_\_

- I will maintain compliance with the St. Tammany Parish Stormwater Ordinance, Chapter 7, Section 7-042.00 on all new construction projects in St. Tammany Parish.<sup>1</sup>
- I will allow reasonable access on my project site for both scheduled and unscheduled St. Tammany Parish stormwater and/or drainage inspections.
   I will employ adequate stormwater Best Management Practices (BMPs) on my new construction.
- I will employ adequate stormwater 8est Management Practices (BMPs) on my new construction projects to control erosion, contain sediment on site, and prevent construction pollutants from entering stormwater conveyances and waterways.
- I will perform regular inspections and maintenance on stormwater BMPs to prevent adverse stormwater impacts related to my project.
- When applicable to my project, I will maintain compliance with either the LPDES General Permit for Discharges of Stormwater from Construction Activities Five Acres or More, for large construction activities, as defined by LDEQ in Master General Permit LARI00000 or the LPDES Stormwater General Permit for Small Construction Activities, one to less than five acres, as defined by LDEQ in Master General Permit AP2000012
- I will make the Stormwater Pollution Prevention Plan (SWPPP) available on site for scheduled Parish stormwater and/or drainage inspections, if the project is a small or large construction site, as defined by LDEQ in the permits identified above.
- I have read the Guide to Stormwater Requirements for New Construction provided on the reverse side of the St. Tammany Parish Stormwater Agreement and initialed the Guide in the area indicated.

Signature Date

Please refer to St. Tammany Parish Ordinance Chapter 7, Section 7-042.00 for an explanation regarding the relationship between state and parish stormwater requirements.
\*IPDES Master General Pemils for Stormwater Discharges from Construction Activities (Large and Small) are available on the LDEQ website; the LDEQ website address is provided on the reverse side of this document.

#### **STP Stormwater Agreement**

- Signed Agreement
- Required for New Developments
   & New Construction Permits.
- Contractor Agrees to:
- Comply with SW Ordinance.
- · Allow Access for Inspections
- Provide SW Site Plan for Plan Review
- Comply with LDPES SW Requirements
  - Large & Small Sites
  - SWPPP Maintained on Site for Inspections
- Contractor Acknowledges Receipt of SW Guide



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#### GUIDE TO STORMWATER REQUIREMENTS FOR NEW CONSTRUCTION<sup>1</sup>

Small Construction Sites that are less than 1 acre and are not of part of a common plan of development

- No LPDES General Stormwater Permit required
   St. Tammany Parish Stormwater Agreement and Stormwater Site Plan required

Small Construction Sites that are at least 1 acre to less than 5 acres and are not a part of a larger common plan of development):

- LPDES Stormwater General Permit LAR200000 required
- Make SWPPP available on site for scheduled Parish drainage/stormwater inspections
- Post notice at construction site noting location of SWPPP, contact name, telephone, LDEQ Permit number, and a brief description of the project
- St. Tammany Parish Stormwater Agreement and Stormwater Site Plan required

#### Small Construction Sites that are part of a common plan of development:

- LPDES Stormwater General Permit LAR100000 or LAR200000 required<sup>2</sup>
- Make SWPPP available on site for scheduled Parish drainage/stormwater inspections
- Post notice at construction site noting location of SWPPP, contact name, telephone, LDEQ Permit number, and a brief description of the project
- St. Tammany Parish Stormwater Agreement and Stormwater Site Plan required

- Large Construction Sites (5 Acres or More):

  LPDES Stormwater General Permit LAR100000 Required
  - Make SWPPP available on site for scheduled Paris drainage/stormwater inspections
  - Post notice at construction site noting location of SWPPP, contact name, telephone
  - number, LDEQ permit, Agency Interest Number, and a brief description of project St. Tammany Parish Stormwater Agreement and Stormwater Site Plan required

#### For more information:

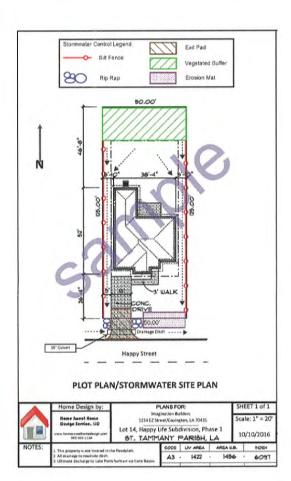
- St. Tammany Parish Stormwater Website: www.stpgov.org/stormwater-information
- St. Tammany Parish Department of Development/Engineering
  O Phone: 985-809-7448
- E-mail: stormwater@stpgov.org
- LDEQ Website: www.deg.louisiana.gov

<sup>1</sup>This is for guidance purposes only. It is the responsibility of the owner/contractor to comply with all state, federal, &

local stormwater requirements.

LIPDES permit type is based on the total amount of disturbed area within the common plan of development. See LPDES General Permits and/or LDEG website for additional guidance regarding definitions of large construction sites, small construction sites, and common plan of development.

P.O. BOX 628 | COVINGTON, LOUISIANA | 70434 | storrewater@stpggv.org | 985-809-7443 WWW.STPGOV.ORG



#### STP Stormwater Guide

#### Purpose:

- · To quantify the number contractors receiving SW Guide
- To remove contractor deniability
- STP Requirements for All New Developments & New Construction
  - Regardless of Property Size
- Basic LDEQ SW Requirements
  - Large & Small Sites
- For More Information:
  - STP Phone Number
  - STP SW E-mail
  - STP SW Web Address
  - LDEQ Web Address



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#### STP Stormwater Site Plan

- STP Requirement for All New Construction & Development
- · Submit SW Site Plan for Review
  - Plot Plan
  - SWPPP Site Plan
- Include the Following:
  - BMPs
  - Vegetated Buffers
  - Stabilized Exit Pad

  - · Property Dimensions

  - Drainage Flow Arrows
  - Drainage Infrastructure
  - Stockpiles
  - Impervious Area

(A Site Plan Checklist will be Included with Sample Site Plan)



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#### Stormwater Inspections

- · Scheduled Inspections
  - Drainage/Stormwater (Preliminary/Grade)
  - Final Drainage/Stormwater
- · Unscheduled Inspections
  - Complaint Response
  - Field Observation
  - Prioritized Categories
- Re-inspections
  - After Failed Inspections
  - A Fee is Applied to Re-inspections
- Continued Noncompliance
  - Code Enforcement Action
    - Posting
      - Cease & Desist/NOV/Summons to Appear
      - Court Hearing/Fines





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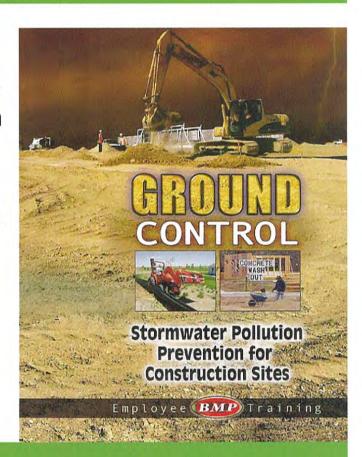
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#### Stormwater Inspection Training & Certification

#### SWMP/SW Ordinance

In-House Qualification in Three Parts:

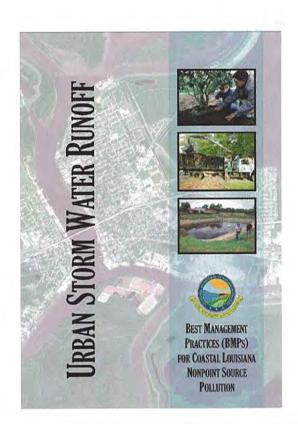
- ExCal Visual
  - Ground Control-Pollution Prevention for Construction Sites
- STP Program Specific Presentation
  - Stormwater Inspections on Construction Sites
- Field Training
  - One-on-One Training
  - On Construction Site
- Qualification
  - Test & Certificate of Completion





## Stormwater BMP Manuals for Construction & Post Construction Controls

- · Manual mentioned the in SW Ordinance
- Best Management Practices (BMPs) for Coastal Louisiana Nonpoint Source Pollution
  - Prepared by Providence Engineering and Environmental Group, LLC
  - Grant Funded USEPA/LDEQ/LDNR
- · Urban Stormwater Runoff
- Highways, Roads, Bridges
- · Hydromodification





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#### Post-Construction Stormwater Requirements: Permanent BMPs

- · Post-Construction Permanent Stormwater Facilities
  - Structural BMPs
  - Nonstructural BMPs
- · Stormwater BMP Maintenance
  - Inspection & Maintenance is the Responsibility of the Land Owner/HOA
  - Subject to STP SW Inspections
- Permanent BMP Enforcement
  - Required to repair inadequacies
  - Enforcement action for continued noncompliance

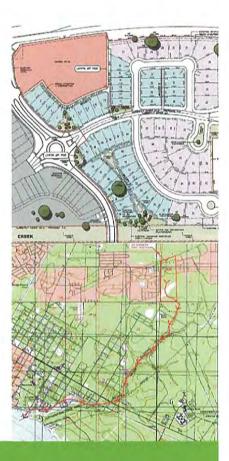






#### Post-Construction Stormwater Requirements: Subdivision Development

- · Stormwater Detention Ponds
  - Wet
  - Dry
- Green Space
  - Community Recreation
  - Vegetated Buffers
- · Hydrology Study
  - 25% SW reduction in a 100 yr./24 hr. event
  - Not net fill in the floodplain
- · Water Quality Certification Letter
  - Environmental Assessment
  - Water Quality Impact Modeling/Study
- Regulated in Appendix B, Chapter 40 of the STP Code





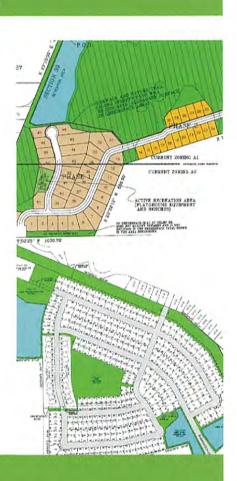
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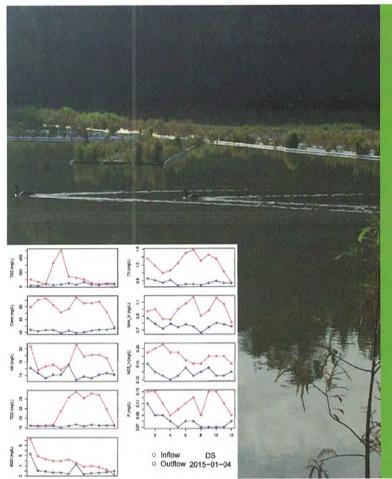
St. Tammany Parish Government

#### Post-Construction Stormwater Requirements: Planned Unit of Development

- · Environmentally Sensitive Design
  - Preservation of Natural Features
  - Diversification/Variation in Residential Use & Green Space
  - Functional/Beneficial Uses of Open Space
- Mixed Use PUD
  - Mixed Residential & Business
  - Subject to STP SW Inspections
- Hydrology Study
  - 25% SW reduction in a 100 yr./24 hr. event
  - Not net fill in the floodplain
- · Water Quality Certification Letter
  - Environmental Assessment
  - Water Quality Impact Modeling/Study
- PUDs are Regulated in Appendix B, Chapter 40 and Chapter 6 of the STP Code







#### **STP Water Quality Action Plan**

- Demonstration Ponds
  - - · Literature values are not
- **Regional Ponds** 

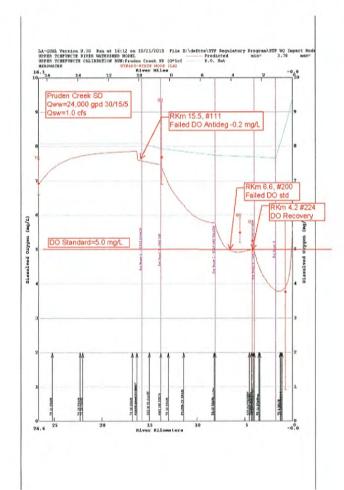
  - Haas Pond
  - Tammany Hills Dry Pond
- Stormwater BMP Retrofits

  - Wet Pond

    - Floating Wetland



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#### **STP Water Quality Action Plan**

Water Quality Impact Modeling for Large

- - In-House Demonstration Project
  - Water Quality Impact Modeling

  - Stormwater and Wastewater
  - and/or antidegradation (≤ 0.2
- - Modeling failure will require:
  - Adding BMPs to the treatment
  - criteria for both DO and



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### Public Participation & Involvement

- Commercial Owner and/or Operator Reporting Requirements
  - Report hazardous/toxic release to STP and LDEQ per LPDES Permit
  - Report pollutants discharged to MS4 to STP and LDEQ
  - Report incidents to appropriate local, state, federal agencies
- Citizen Complaint Reports
  - Nonstormwater discharges
  - Illicit discharges
  - Illegal dumping
  - Stormwater and/or water quality impacts





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### Stormwater Enforcement & Remedies

- · Enforcement of Stormwater Violations
  - Chapter 1 of STPG Code of Ordinances
- · Escalated Enforcement
  - Failed Inspection
  - Notice of Violation
  - Cease & Desist order
  - Summons to Appear
  - Administrative Hearing
  - Fines & fees
  - Criminal Prosecution
- STP May Take More than One Enforcement Action Against a Violator
- · Remedies Nonexclusive of:
  - other remedies under state, federal, & local laws





#### Contact Us

ST. TAMMANY PARISH GOVERNMENT 21490 KOOP DRIVE MANDEVILLE. LA 70471

#### SABRINA SCHENK

WATERSHED COORDINATOR DEVELOPMENT PLANNING

985.809.7448 stormwater@stpgov.org www.stpgov.org/stormwater-information

For STP Code Of Ordinances: www.stpgov.org/files/Council/Code\_of\_Ordinances





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#### **Questions or Comments?**

Thank you for your attention and interest in the St. Tammany Parish Stormwater Ordinance. If you think of other questions, please feel free to contact us. We will be happy to assist you.

#### Appendix E

- STP Watershed Management Study (CPRA 2014)
  - O Final Report is available on STP Stormwater webpage: (<a href="http://www.stpgov.org/initiatives/water-quality/stormwater">http://www.stpgov.org/initiatives/water-quality/stormwater</a>).
  - Models are available in STP Department of Development-Engineering
- WAAT Tool PowerPoint Presentation (CH2M-Hill 2017)
  - The WAAT Tool is available on STP Stormwater webpage: (<a href="http://www.stpgov.org/initiatives/water-quality/stormwater">http://www.stpgov.org/initiatives/water-quality/stormwater</a>).

#### Appendix F

#### **Annual Evaluation Checklist**

&

**MS4 Goals** 

#### 2017 Annual Comprehensive Site Evaluation Checklist

#### St. Tammany Parish

Evaluation Issue	Yes	No
Have inspections been completed as required?	X	
If required, has stormwater sampling been completed as required?		N/A*
3. Were the BMPs implemented for the year effective?	X	
4. Do new stormwater sources or pollutant exposures indicate a need for additional BMPs?	Х	
5. Has this Plan been updated to include recommended changes resulting from previous inspections or annual evaluation?	Х	
6. If sampling required, were pollutants in stormwater sampling data present above LPDES permit limitations?		N/A*
7. Are additional BMPs warranted? If yes, describe below:	X**	

#### BMPS OR BMP Improvements Needed

- \*3 Year "Hot Spot" & demonstration pond
- \*\* TMDLs are completed for St Tammany and there are likely to be several recommendations for STP SW program changes because of the TMDLs. The TMDL allocation summaries are provided in Appendix D of the SWMP.
- '\* A major revision of the SWMP was delivered to LDEQ in 2015 (during the permit cycle 2013-2018) to accommodate TMDLs. The 2017 SWMP includes an update to address additional water quality programs.
- \*\* Continue Pollution Source Tracking & Decentralized Management for individual sewer systems by watershed.
- \*\* Continue Water Quality Impact Modeling for new subdivision & commercial developments.
- \*\* Plans to plant and/or aerate parish ponds for water quality improvement.
- \*\*\* Revisions to the STP Stormwater Ordinance were adopted by STP Parish Council (in October 2016) to accommodate the TMDLs.

Notes: Completed evaluation form will be retained in the STP Department of Development-Engineering. Budget & staffing constraints may limit the extent to which these programs are implemented.