D Water and Wastewater Systems

Introduction

The purpose of the Water and Wastewater Systems Element of the Community Agenda is to establish the framework to guide future capital investments in water and wastewater systems allowing them to maintain compliance with increasingly stringent environmental standards and allow for the future growth of Plaquemines Parish. The recommendations outlined in this element are the result of input from the Water and Wastewater subcommittee in which smaller-scale projects that are implementable in the near term were given preference over infrastructure upgrades that may require a very large capital commitment and perhaps decades to implement.

The Water and Wastewater Systems element of the Community Agenda section is organized as follows:

D.1 Summary of the Water and Wastewater Systems Element of the Community Assessment

D.2 Short Term Plans and Recommendations for Investment in Water and Wastewater Systems

D.3 Medium Term Plans and Recommendations for Investment in Water and Wastewater Systems

D.4 Long Term Plans and Recommendations for Investment in Water and Wastewater Systems

D.5 Action Plan and Top Recommendations for Investment in Water and Wastewater Systems

D.6 Potential Funding Strategies for Future Investment in Water and Wastewater Systems

D.1. Summary of the Water and Wastewater Systems Element of the Community Assessment

Plaquemines Parish owns, maintains, and operates five (5) domestic water treatment facilities (WTPs). These WTPs are listed below along with their daily treatment capacities:

Plaquemines Parish owns, maintains, and operates five (5) domestic water treatment facilities (WTPs). These WTPs are listed below along with their daily treatment capacities:

- Belle Chasse WTP (7.5 Million Gallons per Day)
- Port Sulphur WTP (4.0 Million Gallons per Day)
- Boothville WTP (2.0 Million Gallons per Day)
- Dalcour WTP (1.0 Million Gallons per Day)
- Ponte a la Hache WTP (0.5 Million Gallons per Day)

All of the above WTPs are operated and maintained by a private contractor, Severn Trent Services (STS) and all utilize the Mississippi River as their raw water supply. Major concerns regarding the maintenance of the water system are as follows:

- Salt water intrusion along the lower end of the Mississippi River affecting the raw water sources at the Boothville WTP, Point a la Hache WTP, and Davant WTP.
- Compliance with regulatory requirements
- Reducing water loss throughout the distribution system
- Establishing redundancy throughout the water distribution system
- Providing for treatment facility expansion to provide water supply for future population

Plaquemines Parish owns, maintains, and operates eight (8) mechanical wastewater treatment plants or facilities (WWTP's). These WWTP's are listed below along with their daily treatment capabilities:

- Belle Chasse WWTP (3.0 Million Gallons per Day)
- Port Sulphur WWTP (1.0 Million Gallons per Day)
- Buras WWTP (2.5 Million Gallons per Day)
- Boothville WWTP (0.5 Million Gallons per Day)
- Davant WWTP (0.2 Million Gallons per Day)
- Braithwaite WWTP (0.030 Million Gallons per Day)
- Woodlawn WWPT (0.005 Million Gallons per Day)
- Ironton Oxidation Pond (0.040 Million Gallons per Day)
- Myrtle Grove Oxidation Pond (0.040 Million Gallons per Day)

Major concerns regarding the maintenance of the wastewater system are as follows:

- Need for major rehabilitation / replacement of existing WWTP facilities (end of design life)

- Need for expansion of existing WWTP facilities to accommodate future growth in Infiltration and Inflow (I&I) into the aging sewerage system
- Compliance of smaller treatment facilities with increasingly stringent discharge limits

Based upon the results of the Community Assessment, the Master Plan Steering Committee developed a Community Agenda to guide investment in the drainage and stormwater facilities and strategies for the future. This agenda will guide investment by presenting a series of goals and recommendations based upon public input, needs as identified by the Parish Government and pump station operators, and observations of the current system in general.

The Master Plan Steering Committee developed the following recommendations which are presented below. These recommendations were divided into groups based upon their projected completion timeframe. Accordingly, these recommendations are presented in the following groups: Short Term Goals and Recommendations, Medium Term Goals and Recommendations, and Long Term Goals and Recommendations. From these, the top needs were identified and are presented at the end of this Community Agenda as the Top Needs and Recommendations for Drainage and Stormwater Management Facilities and Strategies.

D.2. Short Term Plans and Recommendations for Investment in Water and Wastewater Systems

The Short Term Plans and Recommendations for Investment in Water and Wastewater Systems are presented below:

Action	Action Type	Projected Cost	Responsible Party
Create a Water and Sewer Master Plan	Study	$500,000 - $1,000,000	Plaquemines Parish
Create Operation and Maintenance Guidelines for Water & Wastewater	Policy	$250,000 - $500,000	Plaquemines Parish
Conduct a Comprehensive Revenue Sufficiency Study	Study	$250,000 - $500,000	Plaquemines Parish
Conduct an Audit of the Performance of the Billing System	Study	$250,000 - $500,000	Plaquemines Parish
Audit Billing and Account Collection Procedures	Study	$250,000 - $500,000	Plaquemines Parish
Conduct a Cost of Service Study	Study	$250,000 - $500,000	Plaquemines Parish
Develop a System to Monitor and Evaluate Utility Rates to Maintain Operating Funds	Policy	$250,000 - $500,000	Plaquemines Parish
Monitor Population Distributions and Projects as Part of Water Planning Process	Policy	$250,000 - $500,000	Plaquemines Parish
Develop Financial Model and Update Annually	Policy	$250,000 - $500,000	Plaquemines Parish
Implement System for Water Audits and Loss Control	Policy	$250,000 - $500,000	Plaquemines Parish
Complete a Sanitary Sewer Evaluation Survey	Study	$5 - $10 Million	Plaquemines Parish

Short Term Plan and Recommendation 1 –*Create a Water and Sewer Master Plan:* The Parish should prepare a water and sewer master plan based on the future land use and development recommendations of the Comprehensive Master Plan. The water and sewer master plan would include facility assessments and hydraulic modeling, as well as a thorough analysis of existing and future water and sewer system demands. Near- and long-term infrastructure needs would be identified, and classified as to whether they are required to serve existing or anticipated future population and businesses. The water and sewer master plan will analyze the potential impacts of growth, and allow for an efficient programming of capital dollars. The answers from a master plan will help to enhance the functionality of the financial planning model described above, and guide the Parish in future updates of the financial planning model to ensure that revenue sufficiency is attained by the deadlines specified by the Parish.

Estimated Timeline: 1-5 Years

Estimated Cost: $500,000 - $1,000,000

Short Term Plan and Recommendation 2 – *Create Operation and Maintenance Guidelines for Water & Wastewater:* The creation of a uniform operation and maintenance guidelines as a policy would benefit the Parish by ensuring that all plants are operated to a uniform standard. Because at current time the water and wastewater plants are operated by a contract operator it is likely that a fairly uniform operation occurs. However, should the plants be taken back under Parish operation in the future, the policy would be in place and would ensure a seamless transition.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 3 –*Conduct a Comprehensive Revenue Sufficiency Study:* It is recommended that Plaquemines Parish conduct a comprehensive revenue sufficiency study. Such a study would involve the creation of a financial planning model to allow the evaluation of the sufficiency of revenues, as well as setting the stage for a meaningful capital planning process, an analysis of debt obligations and potential opportunities, and the development of a gradual series of steps to implement an adequate set of rates and charges. Creation of a financial planning model is fundamental to creating a well-functioning enterprise fund. In the absence of the guidance of a sound financial model, managers and public officials are forced to implement decisions without sufficient data and without an integrated view of the enterprise for which they are responsible.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 4 –*Conduct an Audit of the Performance of the Billing System:* It is recommended that Plaquemines Parish conduct an audit of the performance of its billing system. In some cases, utility billing systems and practices can suffer from distortions, sometimes resulting in significant revenue loss. Customers who might stop receiving a bill, or who might receive bills lower than they had traditionally received often do not call to complain or inquire. New customers are sometimes not captured in the billing system, the theft of services can become a problem, and changes in customer status are sometimes not caught. A billing system and procedures audit could potentially be completed as a relatively minor project, and could potentially identify major errors in current billing system practices and procedures.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 5 –*Audit Billing and Account Collection Procedures:*The Parish should also audit its billing and account collection procedures to detect uncollected revenues to improve cash flow and reduce the amounts being written off. The audit will review current practices regarding billing, late payment fees, disconnect policies, and related items. Such projects can be conducted by consulting firms, but they are often cost-effectively conducted using existing utility staff members.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 6 –*Conduct a Cost of Service Study:* The Parish should also audit its billing and account collection procedures to detect uncollected revenues to improve cash flow and reduce the amounts being written off. The audit will review current practices regarding billing, late payment fees, disconnect policies, and related items. Such projects can be conducted by consulting firms, but they are often cost-effectively conducted using existing utility staff members.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 7 –*Develop a System to Monitor and Evaluate Utility Rates to Maintain Operation Funds:* Most areas across the country and throughout Southeastern Louisiana are increasing consumption rates for water and sewer usage. Traditionally, rates have been kept artificially low to minimize the burden on low income residents for these most basic of utilities. Capital improvements were often funded through federal grant programs. With federal budgets no longer funding grant at the level of the 1970s and 1980s, local governments have been left to fund capital improvements with sales tax funds.

This method of funding is highly variable and not sustainable in most communities. Ideally, water and sewer rates would be set at a rate which would fully fund operations and routine maintenance programs such as fire hydrant and sewer pump station rehabilitation along with long term capital needs such as treatment plant expansions and major rehabilitation efforts.

One of the basic economic principles applicable to the operation of public utilities, whether publicly owned or investor owned, is that utilities should be operated as independent enterprises. The corollary is that public water and sewer systems should minimize reliance on general funds from the general fund sources and instead should charge customers the full cost of providing utility services.

A second fundamental principle indicates that utilities should strive to recover their costs in an equitable manner by analyzing consumption patterns and then setting rate schedules that avoid "cross-subsidies" between customer groups. Such subsidies provide a benefit to some by shifting costs to others with no underlying economic justification. Costs should be recovered from individual customers or classes in proportion to the services provided. The provision of any service or capacity to a customer or group of customers at charges less than the actual costs incurred results in the remaining costs being recovered from other customers through the imposition of higher charges than actual costs of service. This shift in cost recovery creates a reduction in equity. The result of this inequity is ultimately an inefficient allocation of resources as the subsidized customer or group over-consumes, and all remaining customers inappropriately constrain their consumption because they are being "overcharged".

Accordingly, to meet and comply with the above principles, it is recommended that the Parish develop a system to monitor and evaluate utility rates in adjacent Parishes as detailed in the Community Assessment to ensure that the Parish is keeping pace with adjacent jurisdictions to charge customers the full cost of services and to recover costs in an equitable, justifiable manner.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 8 –*Monitor Population Distributions and Projections as Part of Water Planning Process:* Water demands on the distribution network are completely dependent upon population. Areas with larger populations will naturally place more demands on the water distribution network than areas with smaller populations. Because the water network's operation depends on many variables including demands and physical configuration of the network, it is highly recommended that future population distributions and projections be monitored as a part of future planning and water system investment.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 9 –*Develop Financial Model and Update Annually:* Creation of a financial planning model is fundamental to creating a well-functioning enterprise fund. In the absence of the guidance of a sound financial model, managers and public officials are forced to implement decisions without sufficient data and without an integrated view of the enterprise for which they are responsible. Thus, it is highly recommended that the Parish develop and maintain a financial model to ensure the financial well-being of the enterprise funds for water and sewer.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 10 –*Implement System for Water Audits and Loss Control:* As a complement to tightening the water and sewer fund financial performance, it is essential to look at water losses in the system. Water auditing and loss control can be a significant conservation measure, because as utilities minimize water loss, they increase their efficiency and reduce their expenses, while maintaining the lame level of water sales. There are recommended practices to monitor and control water and revenue losses, some of them provided through the American Water Works Association's Water Loss Control Committee. These include active leakage control, as well as the careful analysis of production flows and customer consumption. Additionally, customer billing systems, which are commonly used to archive customer account and consumption data, should be configured so that consumption volumes are not distorted by billing adjustments or inconsistent procedures. By correcting deficiencies in archiving customer consumption in billing systems, utilities can often recover significant revenue. Internal examination of the accounting and billing aspects of this problem are often the most cost effective place to start, with "outdoor" efforts to locate system leaks often being more profitably pursued as a second step.The Parish should conduct a regular water audit in a fashion similar to how a financial audit is performed every year: by tracking volumes of water supplied by the water utility from source to customer. The water audit quantifies production flows, customer consumption, and a number of different loss volumes and assigns costs to these volumes. Throughout the audit process, the Parish can determine

specific areas of water loss, examine deficiencies in the overall performance, review current practices and procedures for developing data, and calculate the costs of water loss.

Estimated Timeline: 1-5 Years

Estimated Cost: $250,000 - $500,000

Short Term Plan and Recommendation 11 –*Complete a Sanitary Sewer Evaluation Survey:* The only way to truly identify what is really happening in the Parish's sewerage system is to physically inspect the system via a system wide Sanitary Sewer Evaluation Survey (SSES). The purpose of the SSES is to inspect all sanitary sewer pipes (8" and larger in diameter) and identify all defects found along the pipelines.

An SSES program uses various equipment and techniques to detect sewer pipe defects, blockages and capacity problems. These techniques include smoke tests, dye tests, closed circuit TV (CCTV), flow monitoring, rain monitoring, building service connection location/inspection, and flow isolation. As problems are identified, engineers determine if the sewer lines or manholes should be repaired or replaced immediately, or scheduled for improvements in the future.

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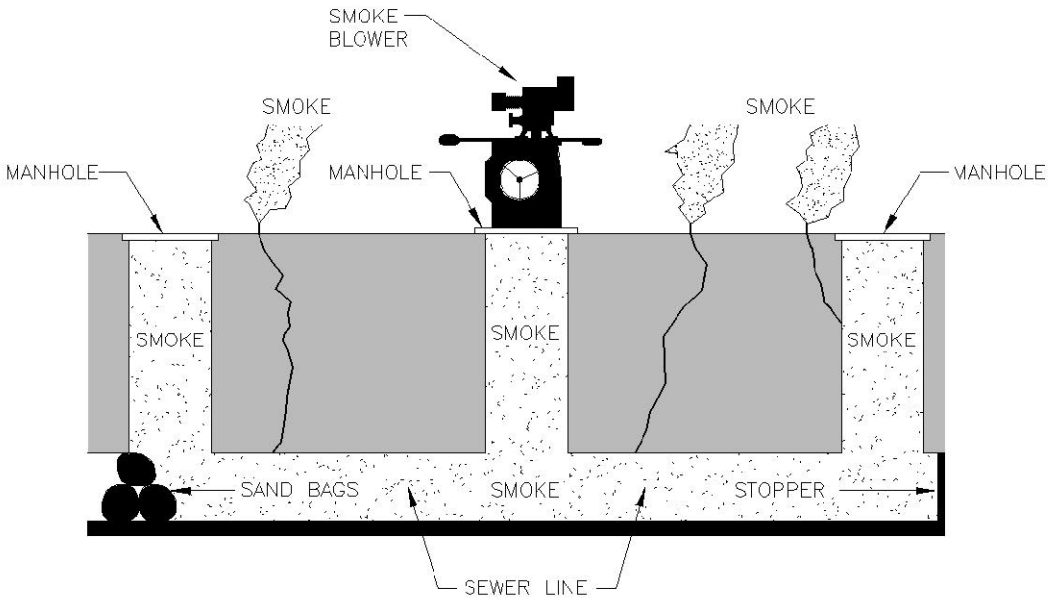
Smoke testing is one of the most efficient and cost effective methods of locating sources of inflow and infiltration problems with sewers. The non-toxic "smoke" will help locate places where storm and other surface waters enter the sanitary sewers. It is conducted by placing a blower over a centrally located manhole and forcing non-toxic smoke-filled air through a sewer line. The smoke under pressure will fill the main line plus any connections, then follow the path of any leaks to the ground's surface, quickly revealing the source of inflow and infiltration (I&I) . I&I occurs when groundwater or rainwater enters the sewer lines through cracks, breaks, and/or areas not intended to drain to the sewer system, which robs the pipes of needed capacity and causes overflows and flooding. The smoke is noticeable wherever there is a leak in a sanitary sewer pipe, such as a crack in a sewer pipe, a cross-connection between a storm sewer and a sanitary sewer, where a roof drain is connected to the sanitary sewer, from a broken cleanout cap, or from a defective or damaged manhole.

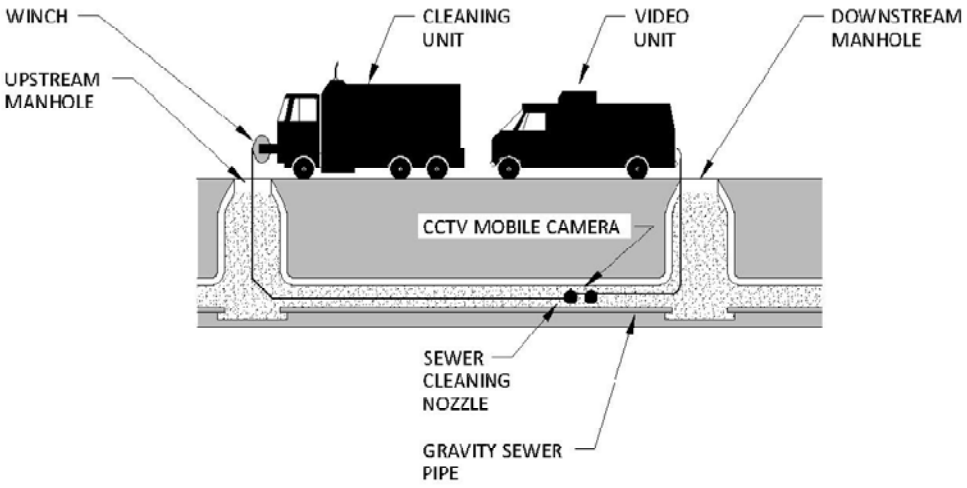


Typical Smoke Testing Arrangement

Dye testing is a method used to locate rain or ground water entry points into the sanitary sewer system. During this process, non-toxic dyed water is introduced into roof drain leaders, driveway drains, or area drains. In some instances, dyed water is injected into the ground around foundations to check for the illegal connection of foundation drains. After introducing the dyed water, the downstream sanitary sewer manhole is checked, or if an inspection port is present, it is checked for dyed water. Dye testing with a non-toxic dye is one way of determining where a pipe or structure drains to if it is not obvious by observation or on existing plans or records. By conducting dye testing, inappropriate connections can be identified. For instance, if a dye is introduced to a catch basin and the dye is then observed in the sanitary sewer downstream from that point, this would indicate that the catch basin is directly connected to the sanitary sewer system.

One of the methods recommended to survey sewer lines is the use of CCTV (closed circuit television) systems. This cutting edge technology uses a television camera mounted on a robotic device that is connected to a video monitor, a videocassette recorder and other recording devices connected by a long electric cable. The robotic system is placed directly into the sewer through a manhole. Once inside the sewer line, the robotic device can be operated by remote control located inside a truck. The operator can examine the entire length of sewer line between two manholes. The camera's "pan and tilt" capabilities allow the operator to move the camera in all directions. Sonar or ultra sound systems can also be used to examine the sewer below the waterline if sewage flow is too high.

The CCTV system relays live footage from within the sewer to a high-resolution monitor in a mobile survey unit. The footage is also recorded on videotape. Since the operator has full control of the robotic system, if a defect is detected, the operator can stop the camera and investigate the defect in more detail. With the camera's pan and tilt capabilities, service connections can also be located and documented. An electronic footage counter is connected to the camera, enabling the operator to note the exact location of problem spots. The operator creates a structural and service condition report as the live footage is viewed, documenting all defects and noting the general condition of the sewer section.



Typical CCTV Arrangement

Once the footage is returned to the office, it is reviewed again to verify the operator's initial field report according to quality assurance standards. The sewer sections are then given a grade from 1 to 5, with 5 representing the most severe conditions (e.g., a sewer on the verge of total collapse). The video footage is then transferred to CD-Rom for easy storage and retrieval.

CCTV inspections are cost effective since they require only a small work crew, therefore making efficient use of man-hours. CCTV also allows efficient examination of the sewer footage and specific information on the exact condition and location of defects, enabling crews to strategically target and implement repairs or maintenance. CCTV inspections also save time. Knowing the exact location of defects and blockages enables crews to quickly repair and rehabilitate problem areas. Through the CCTV system, operators are able to review milesmiles of sewer footage on a specialized computer program, which allows them to revisit problem areas as often as needed without actually having to be in the field.

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The results of a successful CCTV program would be:

- Documentation of sewer network topography and connections
- Generation of high-quality data for development of long-term wastewater management plans.
- A tool that would allow for effective focusing of capital resources on sewer repair, replacement, and rehabilitation.

Estimated Timeline: 1-5 Years

Estimated Cost: $5 Million - $10 Million

D.3. Medium Term Plans and Recommendations for Investment in Water and Wastewater Systems

The Medium Term Plans and Recommendations for Investment in Water and Wastewater Systems are presented below:

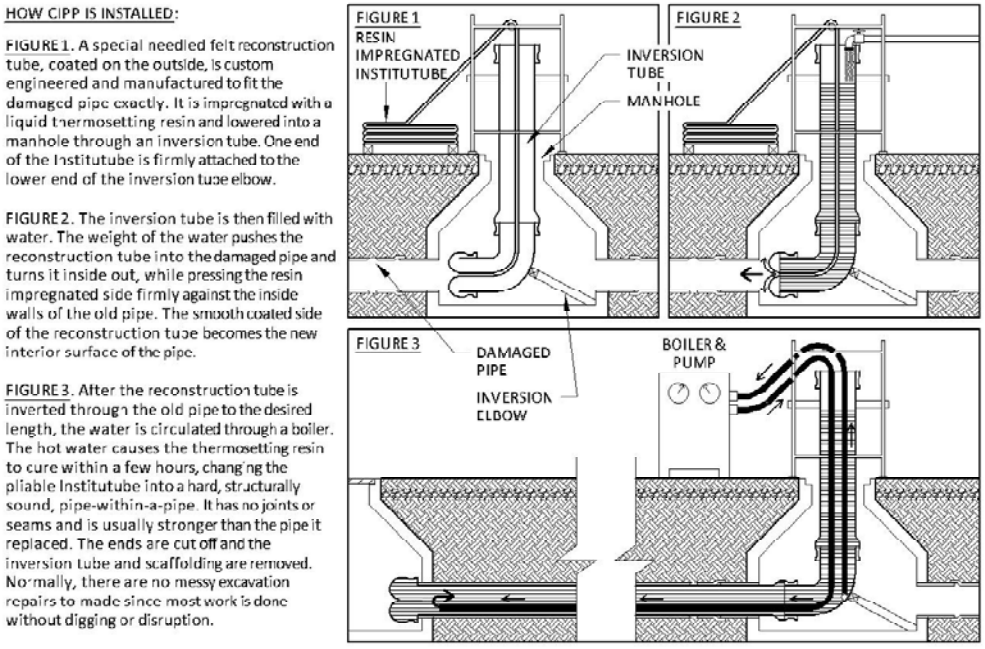
Action	Action Type	Projected Cost	Responsible Party
Conduct a Regular Inflow and Infiltration Analysis and Remedy Accordingly	Program	$5 Million – $30 Million	Plaquemines Parish
Ensure Water/Wastewater Enterprise Fund is Self – Sustaining	Policy	$250,000 - $500,000	Plaquemines Parish
Replace Raw Water Intakes at Belle Chasse, Boothville, Dalcour, and Pointe 'a la Hache WTPs	Project	$10 Million – $25 Million	Plaquemines Parish
Maintain Current WTP Scheme that places multiple WTPs along the Mississippi River	Policy	$<250,000	Plaquemines Parish
Develop a Wastewater Treatment Facilities Consolidation Plan	Project	$250,000 - $500,000	Plaquemines Parish
Study WTP Abilities to Meet Latest LDEQ WTP Requirements	Study	$250,000 - $500,000	Plaquemines Parish
Upgrade East Bank WTP's for Additional Capacity	Project	$500,000 - $1,000,000	Plaquemines Parish

Medium Term Plan and Recommendation 1 –*Conduct a Regular Inflow and Infiltration Analysis and Remedy Accordingly:* Similar to water losses, the impact of extraneous flows entering the sewer system can represent a significant cost to a utility. Remedies for such flows, (known as infiltration and inflow or I/I), can be cost-effective or very expensive per gallon of I/I removed; the only way to determine the potential benefit of such programs is to conduct an I/I analysis.

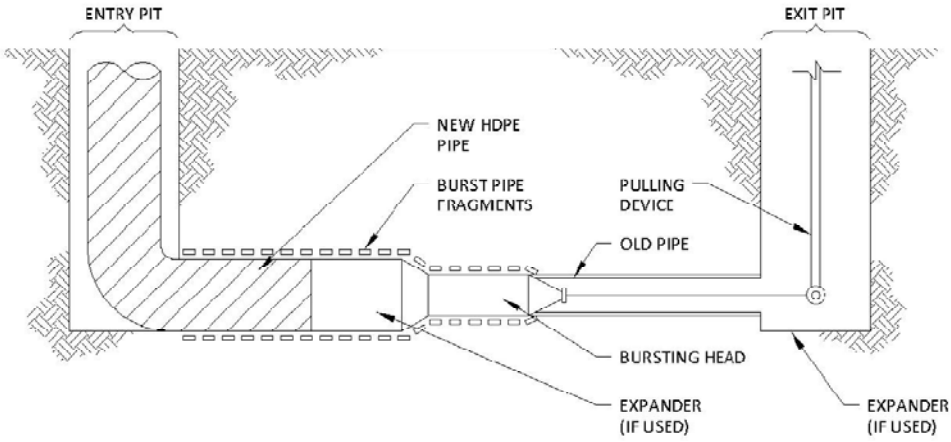
Plaquemines Parish has performed several Sanitary Sewer Evaluation Surveys (SSES) which identify defects within the sanitary sewer collection system which are sources of Inflow and Infiltration (I/I). Rehabilitation measures are generally recommended as a result of an SSES and those rehabilitation measures should be implemented. Rainwater enters the sanitary sewer

system through these defects during wet weather conditions and causes the system to be overwhelmed with the increased flow and pumping stations and the wastewater treatment plants. The result can be overflowing sanitary sewers in streets and homes. In past years, the Parish's Contract Operator STS has indicated that approximately $1,000,000.00 per year is spend on I&I identification and abatement, but that they would prefer to increase that annual funding to $3,000,000.00 per year.

Plaquemines Parish Water and Sewer Planning for Plaquemines Parish Government prepared by Linfield, Hunter, and Junius, Inc. (LH&J) in 2002 indicated that due to I&I in the collection system, the Belle Chasses, Port Sulphur, and Buras WWTP's exceeded their design capacity 12, 19, and 7% of the time. The Boothville plant exceeded its capacity 40% of the time due to I&I problems. The report indicated that the focus of future corrective measures should reduction of inflow instead of increases in pumping capacities throughout the collection system.



I&I Abatement – CIPP Method



I&I Abatement – Pipe Bursting Method

Historically, Plaquemines Parish has been proactive with respect to addressing I&I concerns. The Parish has implemented a program of funding annual contracts to address areas of the sewage collection system that have been identified as generating excessive I&I. However, it is recommended that the Parish formally adopt and fully fund a program of regularly scheduled I&I assessment and abatement work. I&I repairs would be conducted via trenchless technologies such as cured – in – place pipe (CIPP) and pipe bursting.

Estimated Timeline: 5-10 Years

Estimated Cost: $15 Million - $30 Million

Medium Term Plan and Recommendation 2 –*Ensure that the Water/Wastewater Fund is Self – Sustaining:* As detailed above, one of the basic economic principles applicable to the operation of public utilities, whether publicly owned or investor owned, is that utilities should be operated as independent enterprises. The corollary is that public water and sewer systems should minimize reliance on general funds from the general fund sources and instead should charge customers the full cost of providing utility services.

Experience with a wide variety of systems in a wide variety of situations indicates that the water and sewer enterprise fund is unlikely to become self-sustaining without significant rate increases. Any opportunities for cost control or increased efficiency are likely to be small in comparison to the fundamental problem of insufficient revenues. This is the most common situation facing local government utilities in the US. Municipal utilities throughout the country are finding the need to increase water and sewer rates faster than other taxes, fees, and charges, and that these water and sewer rate increases necessarily have been larger than the price increases for non-governmental products and services as well. Additionally, it is very frequently the case that sewer rates are found to need to increase more than water rates. Given the apparent magnitude of the shortfall in rate revenues, the Parish could have confidence that virtually any politically acceptable rate increase would be a movement in the right direction, and that the revenue sufficiency study recommended above would be very likely to recommend a series of additional rate increases to be implemented over the next several years. These rate increases would lead to self – sufficiency of the water and wastewater enterprise fund and should be implemented as such.

Estimated Timeline: 5-10 Years

Estimated Cost: $250,000 - $500,000

Medium Term Plan and Recommendation 3 –*Replace Intakes at Belle Chasse, Boothville, Dalcour, and Pointe 'a la Hache WTPs:* The intake structures are generally pumping stations positioned along the Mississippi River which provide raw water to each of the water treatment plants. Several of these intake structures are in need of upgrades and are listed below, as detailed in *Plaquemines Parish Water and Sewer Planning for Plaquemines Parish Government* prepared by Linfield, Hunter, and Junius, Inc. (LH&J) in 2002 and indicated in discussions with the Parish's contract operator, STS:

- Belle Chasse WTP
- Boothville WTP
- Dalcour WTP
- Pointe a la Hache WTP

Upgrades would include replacement of intake pumps and other general improvement to the structural, mechanical and electrical systems at these aging facilities. It is recommended that the Parish replace these facilities due to their age and state of disrepair

Estimated Timeline: 5-10 Years

Estimated Cost: $10 Million - $25 Million

Medium Term Plan and Recommendation 4 –*Maintain the Current WTP Scheme that places Multiple WTPs along the Mississippi River:* Initially, some consideration was given to the consolidation of WTP facilities to reduce operational and maintenance costs. While it is certainly true that the maintenance of several WTP facilities separated geographically certainly poses some operational challenge, experience has shown that this arrangement generally works to the advantage of Plaquemines Parish. Given the threats to the raw water supply posed by hurricanes, chemical spills, and salt water intrusion within the Mississippi River, the current scheme of smaller WTP facilities distributed along the length of the Parish appears to be prudent from a redundancy standpoint. Under the current scheme, a spill at the intake of one WTP would cause the closure of just that one WTP and, therefore, not result in a Parish-wide water outage.

Estimated Timeline: 5-10 Years

Estimated Cost: $<250,000

Medium Term Plan and Recommendation 5 –*Develop a Wastewater Treatment Facilities Consolidation Plan:* Consolidation of the wastewater treatment facilities within Plaquemines Parish would reduce maintenance workloads and provide for more cost-effective operation of facilities over the planning period. Generally speaking, consolidation of smaller WWTP's into larger, regional WWTP's is a national trend that has been adopted by many neighboring parishes such as Jefferson Parish (1980'S) and St. Bernard Parish (2000's). While these consolidation efforts were the result of compliance issues with the United States Environmental Protection Agency, they have resulted in lower operational and maintenance costs for these parishes. Also, consolidation of treatment services into larger regional plants is generally a more sustainable option moving forward into the future.

The proposed consolidation of wastewater facilities would potentially reduce the ten (10) treatment facilities into three (3). Two facilities would be located on the west bank of the Mississippi River and one (1) would be located on the east bank of the Mississippi River.

On the west bank, the Belle Chasse WWTP would be expanded to accommodate wastewater flows from the Health Department Package Plant and the Ironton Oxidation Ponds. This would also relieve the Ironton Oxidation ponds from the wastewater produced at the proposed oyster processing plant at Ironton. The Health Department Package Plant and the Ironton Oxidation Ponds would then be decommissioned and eliminated. The expanded Belle Chasse WWTP would have an Average Daily Flow (ADF) capacity of approximately 3.5 MGD, 0.5 MGD more than its current capacity.

Also on the west bank, the Buras WWTP would be expanded to accommodate wastewater flows from the Port Sulphur WWTP, Boothville WWTP, and Tidewater Package Plant. The Port Sulphur WWTP, Boothville WWTP, and Tidewater Package Plant would then be decommissioned and eliminated. The expanded Buras WWTP would have a ADF capacity of approximately 4.5 MGD, 2.0 MGD more than its current capacity.

On the east bank, the Davant Oxidation ponds would potentially be expanded and/or converted to mechanical process to accommodate wastewater flows from the Braithwaite and Woodlawn Package Plants. The Braithwaite and Woodlawn Package Plants would then be decommissioned and then eliminated. The new or expanded Davant WWTP would have an ADF capacity of approximately 0.25 MGD, approximately 0.07 MGD more than its existing capacity.

From a cost effective prospective, we do not believe the wastewater treatment consolidation will be feasible on the east bank of the Parish. The service areas are simply too small and too spread out to consolidate services in a cost effective manner. The west bank, however, is represents an excellent opportunity to consolidate services, reduce the number of WWTPs, and thereby significantly reduce the future costs of providing wastewater treatment services.

Without the benefit of a Wastewater Treatment Plant Consolidation Study, it is difficult to project conceptual level construction cost opinions for a consolidation effort. However, we do know that neighboring St. Bernard Parish recently implemented an approximate $60 million parish-wide consolidation effort. Given that St. Bernard Parish and Plaquemines Parish share similar development patterns and population density, we would expect that a consolidation effort on the West Bank of Plaquemines Parish would cost between $45 and $55 million.

Estimated Timeline: 5-10 Years

Estimated Cost: $250,000 - $500,000

Medium Term Plan and Recommendation 6 –*Study WTP Abilities to Meet Latest LDEQ WTP Requirements:* New criteria and guidelines are being implemented by the Louisiana Department of Environmental Quality which are more stringent than previous criteria. For example, the maximum allowable turbidity level dropped from 1.0 to 0.3. It is recommended that the Parish assess the ability of the current plant infrastructure to meet the latest requirements and determine which improvements may be necessary to meet the latest requirements.

Estimated Timeline: 5-10 Years

Estimated Cost: $250,000 - $500,000

Medium Term Plan and Recommendation 7 –*Upgrade East Bank WTP's for Additional Capacity:* A new prison facility is being installed on the East Bank of Plaquemines Parish. The capacities of the two water treatment plants on the East Bank (Dalcour and Pointe a la Hache) need to be upgraded to meet this new increased demand. Another benefit of these increases would be to eliminate the low pressure areas between the two plants.

Estimated Timeline: 5-10 Years

Estimated Cost: $500,000 - $1,000,000

D.4. Long Term Plans and Recommendations for Investment in Water and Wastewater Systems

The Long Term Plans and Recommendations for Investment in Water and Wastewater Systems are presented below:

Action	Action Type	Projected Cost	Responsible Party
Develop, Calibrate, and Maintain a System-wide Computer Model of the Water Distribution Network	Study	$250,000 - $500,000	Plaquemines Parish
Develop and Implement a Capital Improvements Program to address any identified deficiencies in pressure or flow throughout the water system	Policy	$500,000 - $1,000,000	Plaquemines Parish
Implement a Comprehensive Program to Interconnect and "Loop" the Water System for Increased Redundancy	Project	$5 Million - $10 Million	Plaquemines Parish
Install Two (2) Water Line Crossings under the Mississippi River to connect the Water Systems on the East and West Bank	Project	$5 Million - $10 Million	Plaquemines Parish

Action	Action Type	Projected Cost	Responsible Party
Implement a Comprehensive Rehabilitation Program for Mechanical and Electrical Systems at the Parish's WWTPS	Project	$15,000,000 - $30,000,000	Plaquemines Parish
Upgrade Treatment Capacities at the Boothville , Ironton, and Phoenix WWTPs	Project	$1,000,000-$5,000,000	Plaquemines Parish
Replace Existing Package WWTP's at Braithwaite, Woodlawn, and Parish Health Unit	Project	$500,000 - $1,000,000	Plaquemines Parish
Upgrade Oxidation Ponds to Meet New Discharge Limitations at Ironton and Myrtle Grove	Project	$1,000,000 - $5,000,000	Plaquemines Parish
Provide Sewerage in Areas Without Collection Systems	Project	$10,000,000 - $25,000,000	Plaquemines Parish

Long Term Plan and Recommendation 1 –*Develop, Calibrate, and Maintain a System – Wide Computer Model of the Parish Water Distribution System:* In order to make networking and interconnection recommendations that are based upon science, the aforementioned computerized hydraulic model must be developed and calibrated. Using the hydraulic model as a tool, various outage scenarios can be tested to see how the distribution system responds and what new interconnections might best solve that scenario. Through a process of running various scenarios, a final "best solution" can be fashioned and used as a basis for development of a comprehensive networking plan.

Finally, the calibration phase of the development of the hydraulic model will help engineers identify the quantity and sources of water loss throughout the distribution system. Depending upon the severity and type of water losses, a plan and subsequent capital improvements program should be developed to address water loss issues throughout the water distribution system.

Development of a hydraulic model typically takes 9-12 months to complete and involves the use of specialized, sophisticated hydraulic modeling programs specifically developed for modeling of domestic water distribution systems. Once developed and calibrated, the model will be capable of predicting water pressure and flows at any given point within the system at any given time. This will allow for water system operators to predict the impact of line closures. It will also allow for Parish Engineers and Planners to advise potential developers on water

pressure and flow conditions at various sites throughout the Parish. Finally, the model will allow for the Parish to develop and implement a Capital Improvements Program to address any identified deficiencies in pressure and/or flow throughout the water distribution system. For a Parish the size of Plaquemines, we anticipate the water model development and calibration to cost between $250,000 and $500,000 depending upon software costs and the numbers of scenarios run for the "base line" condition.

Estimated Timeline: >10 Years

Estimated Cost: $250,000 - $500,000

Long Term Plan and Recommendation 2 –*Develop and Implement a Capital Improvements Program to Address any Identified Deficiencies in Pressure and/or Flow Throughout the Water Distribution System :*The model developed under Long Term Plan and Recommendation One will allow for the Parish to develop and implement a Capital Improvements Program to address any identified deficiencies in pressure and/or flow throughout the water distribution system. This program would include targeted improvements to address specific needs as identified by the model and correlated with real – world conditions.

Estimated Timeline: >10 Years

Estimated Cost: $500,000 - $1,000,000

Long Term Plan and Recommendation 3 –*Implement a Comprehensive Program to Interconnect and Loop the Water Distribution System to Allow for Redundancy:* A significant item of concern in the configuration of the existing system is the lack of system interconnectivity between both adjacent Parishes and the east bank and west banks of the Parish. While the east bank water systems and west bank water systems are connected to each other, there is currently no provision which connects the systems on opposite banks of the Mississippi River. Therefore, catastrophic events such as a flood can lead to water service outages until plants can be repaired. St. Charles Parish recently installed an underwater water line crossing across the Mississippi River, which connects the east and west banks of that Parish, allowing for water to be supplied between the two. A similar project is under design in St. James Parish, and it is likely that other Parishes with similar geographic arrangements will likely study and pursue similar installations.

The potential interconnection between Plaquemines and water systems operated by adjacent political jurisdictions has been studied extensively in recent years. *Plaquemines Parish Water and Sewer Planning for Plaquemines Parish Government* prepared by Linfield, Hunter, and Junius, Inc. (LH&J) in 2002 recommended the installation of interconnections between the Plaquemines Parish potable water distribution system and the Orleans Parish system on the west bank and the St. Bernard Parish system on the east bank to supplement the existing interconnect on the west bank which connects the Plaquemines system to the Jefferson Parish potable water distribution system. In addition, these items were studied further in BKI's 2004 *Use Sewer – Water System Feasibility Study.*

Estimated Timeline: >10 Years

Estimated Cost: $250,000 - $1,000,000

Long Term Plan and Recommendation 4 –*Install Two (2) Water Line Crossings of the Mississippi River:* While the east bank water systems and west bank water systems are connected to each other, there is currently no provision which connects the systems on opposite banks of the Mississippi River. Therefore, catastrophic events such as a flood can lead to water service outages until plants can be repaired.

Even without the aid of the hydraulic model, a major aspect of any networking plan would include the installation of water lines to connect the East Bank with the West Bank. Such lines would be installed under the Mississippi River in two locations. Preliminarily, the most logical locations would be one in Belle Chasse and another in Port Sulphur. Many variables enter into the design of such crossings, most of which are governed by permit from the United States Army Corps of Engineers (USACE). A similar project was recently completed in St. Charles Parish at a total cost of approximately $4.0 million for two crossings. A similar project is also currently under design in St. James Parish. We would expect a project to install two water lines connecting the East Bank water distribution system to the West Bank water distribution system to cost approximately $5.0 million.

Estimated Timeline: >10 Years

Estimated Cost: $5,000,000 - $10,000,000

Long Term Plan and Recommendation 5 –*Implement a Comprehensive Rehabilitation Program for Mechanical and Electrical Systems for WWTPs:* The need for major rehabilitation or replacement of existing WWTP facilities is urgent. While the Parish has typically invested in capital repairs, the existing wastewater treatment facilities have been operating past their design life (typically 20-30 years for WWTP facilities) and are in need of significant capital investment in order to maintain their functionality.

Generally speaking, a complete rehabilitation of the mechanical and electrical components of a WWTP is needed every 15-20 years given that a strong preventative maintenance program is implemented by the operator. A comprehensive rehabilitation of the WWTP's mechanical and electrical systems can be roughly estimated to cost $2.00 per gallon treated daily. Therefore, we estimate the following costs for the implementation of the comprehensive WWTP rehabilitation program at the five (5) major WWTP's within Plaquemines Parish:

WWTP Name	WWTP Capacity	Comprehensive Rehabilitation Budgetary Estimate
Belle Chasse WWTP	3.0 MGD	$6.0 million
Port Sulphur WWTP	1.0 MGD	$2.0 million
Buras WWTP	2.5 MGD	$5.0 million
Boothville WWTP	0.5 MGD	$1.0 million
Davant WWTP	0.2 MGD	$0.4 million
TOTAL	7.2 MGD	$14.4 million
RECOMMENDED PROGRAM BUDGET		**$15.0 million**

Estimated Timeline: >10 Years

Estimated Cost: $15,000,000 - $30,000,000

Long Term Plan and Recommendation 6 –*Upgrade Treatment Capacities of the Boothville WWTP, Phoenix WWTP and Ironton Oxidation Pond:* The Boothville WWTP currently has a design capacity of 500,000 Gallons per Day (GPD), or 0.5 Million Gallons per Day (MGD). Currently, the facility receives an Average Daily Flow (ADF) of approximately 400,000 GPD (0.4 MGD). However during wet weather events, the increased flow from collection system I/I greatly exceeds the plant's hydraulic capacity and causes the plant to exceed its permitted discharge limits. Continued excursions from the permitted discharge limits as set forth in the plant's effluent discharge permit will cause regulatory agencies to take increasingly harsh action against the Parish until full compliance is obtained.

The Phoenix Oxidation Pond has a design capacity of 182,000 gallons per day. It has an average daily flow (ADF) of 160,000 gallons per day. However, a new prison in the area will cause the flow to exceed the capacity of the plant. A capacity of 250,000 will be required due to the new prison.

The Ironton Oxidation Pond WWTP has a design capacity of 40,000 GPD (0.04 MGD). The ADF experienced at the WWTP currently exceeds this design capacity by 15,000 PGD (0.015 MGD). As a result, the facility is currently experiencing difficulty in meeting its effluent discharge limits as established by the Louisiana Department of Environmental Quality (LDEQ). Continued excursions from the requirements of the LDEQ discharge permit will result in compliance actions against Plaquemines Parish.

WWTP Name	Required Upgrade	Oxidation Pond Retrofit Budgetary Estimate
Boothville WWTP	100,000 GPD	$500,000
Phoenix WWTP	70,000 GPD	$350,000
Ironton WWTP	15,000 GPD	$75,000
TOTAL	185,000 GPD	$925,000
RECOMMENDED EXPANSION PROGRAM BUDGET		**$1,000,000**

Estimated Timeline: >10 Years

Estimated Cost: $1,000,000 - $5,000,000

Long Term Plan and Recommendation 7 –*Replace Existing Package Type WWTPs for Braithwaite, Woodlawn, and the Parish Health Unit:* While package WWTP's fill a definite need for providing sewage treatment services to very small populations and/or industries, they are limited in their ability to cost effectively remove pollutants from the wastewater stream. While we are unaware of any official notifications from LDEQ that discharge limits will become more stringent, our experience with neighboring communities and parishes tells us that such notifications are imminent.

Typically, package type WWTP's are simply replaced rather than rehabilitated or expanded. Replacement is usually the most cost effective course of action. Should replacement of the package type WWTP's be needed to meet more stringent discharge requirements, we would estimate the replacement costs would be approximately $4.00 per treated gallon for an advanced package WWTP capable of meeting strict LDEQ discharge limits. Therefore, we expect that the Parish will need to replace all of its existing package type WWTPs within the next 5 years at costs as outlined below:

WWTP Name	WWTP Capacity	Package WWTP Replacement Budgetary Estimate
Braithwaite WWTP	30,000 GPD	$120,000
Woodlawn WWTP	5,000 GPD	$20,000
Parish Health Unit WWTP	5,000 GPD	$20,000
TOTAL	40,000 GPD	$160,000
RECOMMENDED REPLACEMENT PROGRAM BUDGET		**$200,000**

Estimated Timeline: >10 Years

Estimated Cost: $200,000-$500,000

Long Term Plan and Recommendation 8 –*Upgrade Existing Oxidation Ponds to Meet New Discharge Limitations at Ironton and Myrtle Grove WWTP:* Oxidation ponds are a bit more forgiving with respect to meeting stricter LDEQ discharge limits. By sheer size (often 10-20 acres in size), many oxidation ponds achieve high levels of treatment given typically high retention times within the pond. Oxidation ponds are a good option for sewage treatment in areas with flows are small and land available for sewage treatment is readily available. However, the LDEQ implementing year-around total nitrogen and phosphorus limitations in many new oxidation pond discharge limits, Plaquemines Parish should plan for the need to retrofit these ponds with technologies that will remove nitrogen and phosphorus from the waste stream. Currently the accepted method to remove nitrogen and phosphorus from domestic wastewater is to use a biological type process. There are many proprietary variations upon this theme and it is beyond the scope of the plan to discuss the options in detail.

However, most technologies achieve the same goal and generally fall with the same cost parameters. Therefore, we would estimate that the Parish will need to expend the following at each oxidation pond site to prepare for year-around nitrogen and phosphorus discharge limits:

WWTP Name	WWTP Capacity	Oxidation Pond Retrofit Budgetary Estimate
Ironton WWTP	40,000 GPD	$200,000
Myrtle Grove WWTP	40,000 GPD	$200,000
TOTAL	80,000 GPD	$400,000
RECOMMENDED OXIDATION POND PROGRAM BUDGET		**$400,000**

Estimated Timeline: >10 Years

Estimated Cost: $400,000-$100,000

Long Term Plan and Recommendation 9 –*Provide Sewerage to Areas without Collection Systems:* Several populated areas in the Parish have no sewerage service. These unsewered areas should be provided with a collection system to allow for the removal of private septic systems. These areas generally include undeveloped areas in the area of Woodland Highway near Belle Chasse, Cedar Grove to La Reussite, West Pointe 'a la Hache including Pointe Celeste, Nairn to Venice, Braithwaite to White Ditch, and gaps from Phoenix to Bohemia.

Estimated Timeline: >10 Years

Estimated Cost: $10 Million - $25 Million

D.5. Potential Funding Strategies for Future Investment in Water and Wastewater Systems

Funding sources for sewer related capital projects can come from a variety of sources. Most common for communities similar to Plaquemines Parish are the following:

- Municipal Bonds (revenue anticipation based on a millage or sales tax source)
- Federal Grants
- State Capital Outlay
- Low Interest Clean Water State Revolving Fund Loans

All four sources have unique requirements that will be explained briefly in the subsequent paragraphs.

a. Municipal Bonds

Some communities subsidize their utility enterprise funds through sales and use taxes and/or property tax assessments. The thought process behind this is to keep utility rates affordable for low-income residents by subsidizing the enterprise fund through these tax revenues. Occasionally, communities have dedicated portions of their sales and/or property taxes to water and sewer utilities. More common, however, is that these taxes contribute to the community general fund for allocation to various sources as deemed appropriate by the government.

Municipal bonds are a means by which a government can borrow against anticipated future tax revenue. These bonds are typically sold at relatively low interest rates, depending upon community credit worthiness, and can provide needed cash for capital projects at a relatively low cost of borrowing. Bond issues typically require voter approval and for the specific projects that the monies will be used for to be defined within the bond election. Municipal bonds represent the most common method for communities to raise funds for capital improvement projects.

b. Federal Grants

Historically, grants from the United States Government have been a key source of funding for communities to construct projects that are required for compliance with the Clean Water Act. Throughout the 1980s, federal grants were available with no or very low match requirements so that communities had an opportunity to construct sewer works necessary for compliance with the Clean Water Act. Federal grant funds are still available through the Environmental Protection Agency. However, the total funds available are very limited and extremely competitive. If a grant is awarded, a typical required match is 40-50% of the total project cost (i.e., the grant would cover 50-60% of the project costs and the local government would be required to match the remaining 40-50%). While federal grants cannot realistically be counted upon for financing of a major capital program, Plaquemines Parish Government should seek these grants to potentially fund portions of a capital program.

c. State Capital Outlay

Funds are available from the State of Louisiana through the State Capital Outlay process. This process is highly political and requires continual involvement by government officials to secure these funds. Through the capital outlay process, projects are included within the capital outlay bill with various priority ratings assigned to them. Depending upon the priority, projects are funded through the sale of bonds. Inclusion within the capital outlay bill does not guarantee funding. Depending upon the availability of funds through bond sales, projects are funded based upon their assigned priority rating.

Given the current status of the Louisiana state budget, it would be highly unlikely that any significant funds could be secured through the State Capital Outlay process. However, Plaquemines Parish should continue to pursue those funds in the event that economic conditions reverse and budget surplus funds are realized.

d. Low Interest Clean Water State Revolving Fund Loans

Louisiana's Clean Water State Revolving Fund (CWSRF) loan program offers low-interest loans to communities for the construction of or upgrade of wastewater treatment works and other water quality improvement projects. The program is administered through the Louisiana Department of Environmental Quality (LDEQ).

The program was created by the Clean Water Act Amendments of 1987 and the first loans in Louisiana were made in 1990. Since 1990, over $400 million in loans have been made to Louisiana communities.

Currently, the effective interest rate of a 20 year term loan through the program is 0.95%. The total amount available for loans varies from year to year and is included within an annually updated Intended Use Plan (IUP). In 2010, approximately 30 projects were funded for a total program loan amount of $120 million.

A new Priority List is prepared each fiscal year and included within the IUP. The Priority List includes a listing, in priority ranking order, of all potential projects or segments of projects that have not yet been funded, and that have submitted the required pre-application documents. The Priority List is presented at a Public Hearing and is then submitted to the U.S. Environmental Protection Agency each year.

It is not necessary to re-apply each fiscal year. Once pre-application documents have been accepted, the project will remain on the Priority List until funded, as long as progress continues to be made toward funding. No project can be placed on the fundable portion of the Intended Use Plan unless it is also on the Priority List for that year.

Projects may be removed from the Priority List if any of these events occur:

- The project is funded through the CWSRF or receives funding from another source.
- The project is constructed, regardless of the funding source.
- There is no evidence of progress toward funding for a period of five years (project is assumed to be abandoned).
- There are three categories of program requirements for the CWSRF program, Financial, Environmental, and Engineering. These are designed to ensure the following:
    - that the borrower has the financial and managerial capability to construct the project, operate and maintain the facilities for their design life, and to repay the loan within the repayment period;
    - that the project is planned, designed, and constructed to meet the needs of the borrower's community for its design life; and,
    - that the construction, operation, and maintenance of the project will not result in any adverse environmental impacts.

Borrowers must demonstrate fiscal responsibility through a review of the last three years of audited financial statements and must obtain permission to make the proposed loan from the State Bond Commission. Borrowers must establish a user charge system that will provide sufficient revenue to operate and maintain the system throughout the life of the facility. Borrowers must have or establish a dedicated revenue source sufficient to repay the loan (including principal, interest and administrative fees) within the prescribed repayment period. Dedicated revenue sources include one or more of the following: user fee, sales tax, ad valorem (fixed), general obligation, or front foot assessment. The department must have first lien or equal parity on material revenue debt with reasonable revenue coverage requirements as follows: revenue coverage requirements are set by state law and include 133% for sales tax, 100% with an allowance for bad debt for General Obligation and 125% for all others. Debt service reserves not exceeding the smaller of ten percent of the loan or the highest year's principal and interest is also required. A maximum of twenty-two years is allowed for repayment of the loan, two of which are for construction. (Note that the maximum repayment period allowed on front foot assessments is 10 years.)

The Environmental Information Document is an analysis of the effects on the environment of the action recommended in the Facility Plan. The Environmental Information Document must demonstrate that the project will not result in any adverse environmental impacts and is in compliance with the National Environmental Policy Act.

A Section 201 Facility Plan (Facility Plan) is prepared first. This is a comprehensive study of existing conditions in the community, an evaluation of any existing facilities currently in use, and a projection of future needs for the twenty year planning period. The Facility Plan will include a recommendation for the construction of any facilities that will be needed by the community during the planning period. Documents that are often submitted separately but are considered part of the Facility Plan may include an Infiltration/Inflow Analysis (if required) and an Inter-municipal Agreement (if more than one entity is involved in a project).
Plans and Specifications are prepared for the construction of any facilities recommended in the Facilities Plan. Plans and Specifications are often prepared as two or more contracts, depending on how much construction is needed and how the construction is to be scheduled.
Bid Documents are prepared to demonstrate that the bidders (especially the successful bidder) has complied with program requirements regarding contracting and subcontracting.
Addenda and Change Orders are prepared as necessary to make corrections to the design or the construction contracts.

Construction Inspections are performed by DEQ to verify that construction is on schedule and conforms with the approved design. A final inspection is performed when construction is complete.

An Operation and Maintenance Manual is prepared so the operations personnel will have the information needed to properly operate and maintain the facilities.

A Sewer Use Ordinance and User Charge System are needed to regulate the use of the system and so the community will have sufficient funds to properly operate and maintain the system.

For Plaquemines Parish, utilization of funds through the CWSRF represents the lowest cost and most immediately available source of funds for a sewer capital improvements program. The first step in the process is to prepare a 201 Facility Plan (Facility Plan) which would serve as the basis for justification for the necessity of the loan funds. The Facility Plan is required for CWSRF funding. The Facility Plan will serve as the foundation document on with a sewer capital improvements program can be developed.