DRAFT

SEWER MASTER PLAN EXECUTIVE SUMMARY

Charlotte County Utilities Department | 2017

photo credit: John Elias Photography

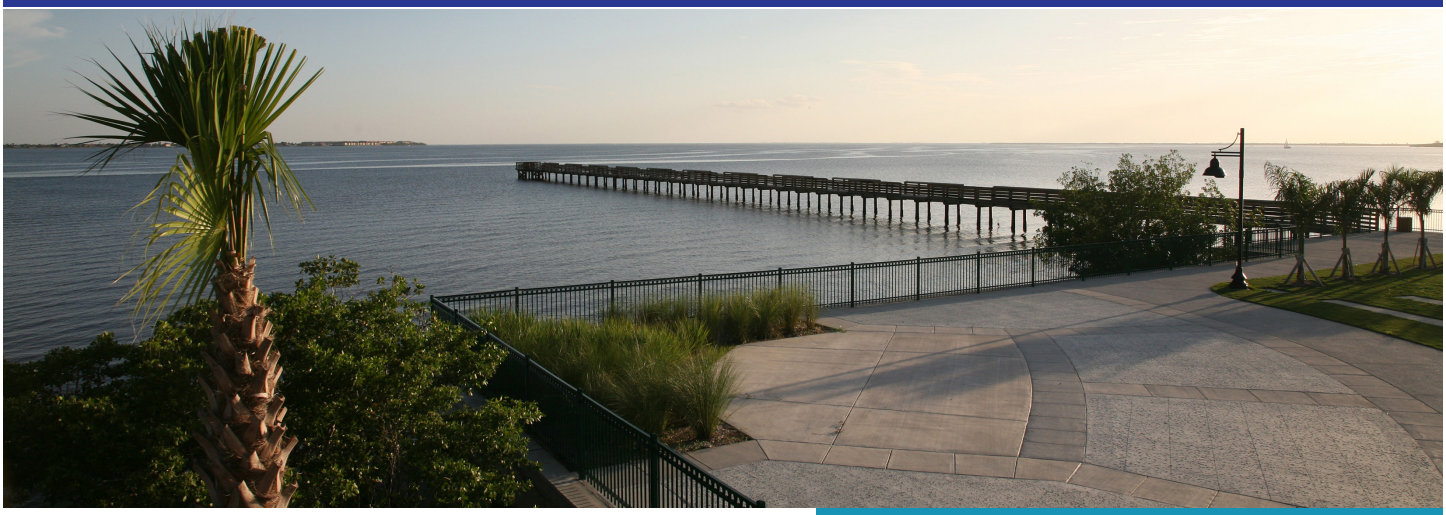
JONES EDMUNDS

RAFTELIS
FINANCIAL CONSULTANTS, INC

GWE
Giffels-Webster
Engineers, Inc.

CHARLOTTE COUNTY FLORIDA 1921

WHY IS A SEWER MASTER PLAN NEEDED?



PURPOSE

The water quality in Charlotte Harbor, Peace River and Myakka River has a significant impact on our community. A regional effort is underway to improve and protect this crucial natural resource which impacts ecosystems, fisheries, marine and wildlife habitats, beaches, coastal wetlands, our tourism industry, home values and overall quality of life.

As a part of this effort, the Charlotte County Board of County Commissioners developed the Blue Water Strategy to ensure and sustain the quality of natural water resources to protect and provide a safe water supply, a recreational haven and an environmental resource. The Blue Water Strategy consists of four key components: wastewater, reclaimed water, stormwater and drinking water.

In accordance with the BCC's Blue Water Strategy, the Charlotte County Utilities Department (Utilities) contracted Jones Edmunds & Associates, Inc. to prepare a Sewer Master Plan to reduce pollution by converting septic to sewer (S2S) for the Utilities' service areas.

OVERVIEW

Charlotte Harbor's rich historical and aesthetic features have been key to attracting businesses and residents to the area. However, population increases have impacted our water quality.

Creating an affordable, reliable and efficient wastewater collection and treatment system is key to sustainable population growth, economic development and the health of the County's natural resources and landscape.

This Sewer Master Plan is a local and regional collaborative effort to improve and protect the region's water quality in an affordable, sustainable, efficient and reliable manner.

As per the Blue Water Strategy, the primary goal of this project is to collaboratively develop an initial 15-year plan to implement an affordable, reliable and efficient wastewater collection and treatment system for a sustainable environment.

HISTORY AND THE IMPACT OF GROWTH ON CHARLOTTE COUNTY

BACKGROUND

The Charlotte Harbor area was originally explored by Ponce de Leon in 1515 and 1521. In 1565, Spanish explorers named the area Carlos Bay after the Native American Calusa Tribe who inhabited Florida's southwest coast at the time. Early settlements on the outer islands failed due to confrontations with the local inhabitants, but Spanish and English settlements slowly developed along the banks of the Peace River. English settlers renamed the bay "Charlotte" in 1775 as a tribute to Queen Charlotte Sophia. In 1819, Florida was ceded to the United States by the Spanish and 26 years later became the 27th state. Col. Isaac Trabue purchased 30 acres on the south shore of Charlotte Harbor and established the Town of Trabue in 1885; today we know it as Punta Gorda.

Real change started in 1886 when the Florida Southern Railroad arrived, connecting the area to the rest of the state. As the century ended, Punta Gorda became an important port for Cuban cattle shipments, and the harbor served as a fishing resource for mullet, Spanish mackerel and channel bass.

In April 1921, the State approved dividing the original DeSoto County into five counties including Glades, Hardee, Highlands, and Charlotte – which was named by the citizens of Punta Gorda after the bay. Today, Charlotte County covers 694 square miles with approximately 126 square miles of waterways.

WATER QUALITY & ENVIRONMENTAL CHALLENGES

Growth took off after the General Development Corporation established the unincorporated community of Port Charlotte in the 1950s, offering affordable homesites. Attracted by the beautiful rivers, beaches, estuaries, and resources of Charlotte Harbor, the population grew rapidly and increased from fewer than 5,000 in 1950 to more than 170,000 residents today.

Increases in population have impacted Charlotte County's water bodies and rivers. The harbor's historically pristine waters and thriving ecology are being threatened by excess nutrients, bacteria, viruses, lack of dissolved oxygen, toxic organic compounds, harmful algae blooms, and decreasing water clarity.

The Peace and Myakka rivers, which flow through Charlotte County and discharge into Upper Charlotte Harbor, and Charlotte Harbor, are now listed as impaired by the US Environmental Protection Agency.

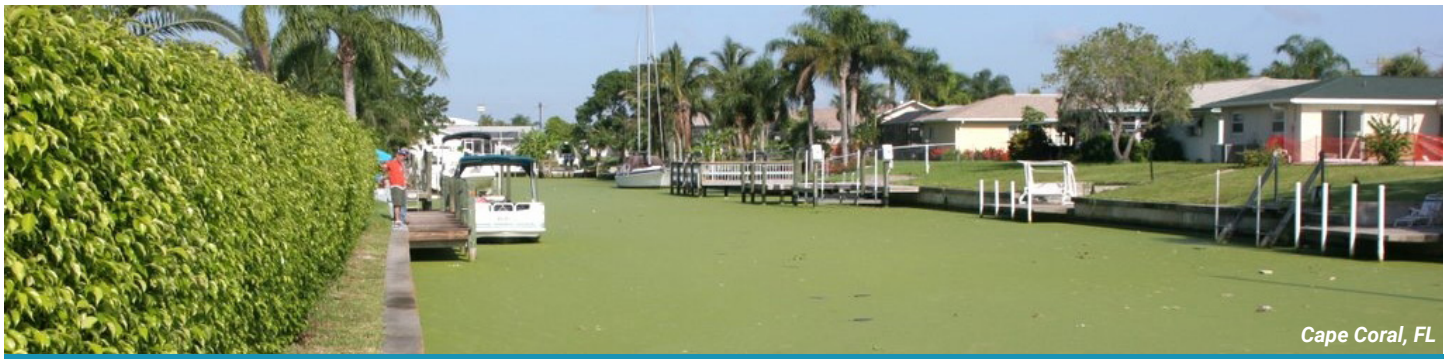
A SCIENTIFIC LOOK AT SEPTIC SYSTEMS AND THEIR IMPACT ON THE HARBOR'S WATER QUALITY

The deteriorating water quality in Charlotte County has been largely attributed to nutrient and bacteria loads originating from on-site treatment and disposal systems, more commonly referred to as septic systems (CHEC, 2003). The majority of Charlotte County's septic systems were installed in the 1970s and 1980s. Currently, there are approximately 27,000 septic system within the Utilities' service area and more than 45,000 septic systems County-wide (Utilities, 2010).

Recent studies conducted by the Harbor Branch Oceanographic Institute at the Florida Atlantic University Marine Ecosystem Health Program have shown that the presence of fecal coliform and concentrations of chlorophyll-a in Charlotte Harbor have increased over the years. The increased levels of sewage tracers are strongly correlated to the increase in population and septic system installations.

Fecal coliform bacteria concentrations in some of Charlotte County's waterways exceed the limits of surface water quality criteria established by the Florida Department of Environmental Protection in the Florida Statutes, not meeting the standard needed to protect the health of swimmers and other recreational uses.

Increasing levels of nitrogen, fecal coliform, and chlorophyll-a reveal that the level of treatment provided by most of the septic systems in Charlotte County is not sufficient to protect the water quality of receiving water bodies.



Cape Coral, FL

Excessive amounts of nitrogen promote excess algae growth within the waterways – contributing to and sustaining the formation of harmful algae blooms. Harmful algae blooms can lead to aquatic hypoxia causing red tide events and significant ecological destruction (Gilbert P., 2009; GCOOS, 2013).

All septic systems release nitrogen and phosphorus to the subterrain from their drainfield. In a properly operating system, nitrifying bacteria in the upper portions of the drainfields convert ammonia to nitrate in the presence of oxygen above the groundwater table.

Ideally, as the wastewater percolates deeper into the ground, another group of bacteria, denitrifiers, converts the nitrate to nitrogen gas, which escapes to the atmosphere. This denitrification process occurs under conditions without oxygen present. However, in many coastal regions of Florida, such as much of Charlotte County, the soil is very porous and high groundwater levels exist. The porous soil and high groundwater table do not provide the correct conditions for the natural decomposition of the sewage. As a result, the denitrification process is not able to complete its course. In these cases, sewage is only partially treated, and nitrogen levels increase in the soil, further deteriorating water quality.

Groundwater flow models show that groundwater in Charlotte County flows to Charlotte Harbor or to connecting surface waters. Therefore, nearly all of the County's septic system effluents are ultimately conveyed to Charlotte Harbor once it enters the groundwater.

HOW DO SEPTIC SYSTEMS WORK IN AREAS WITH HIGHLY POROUS SOILS?

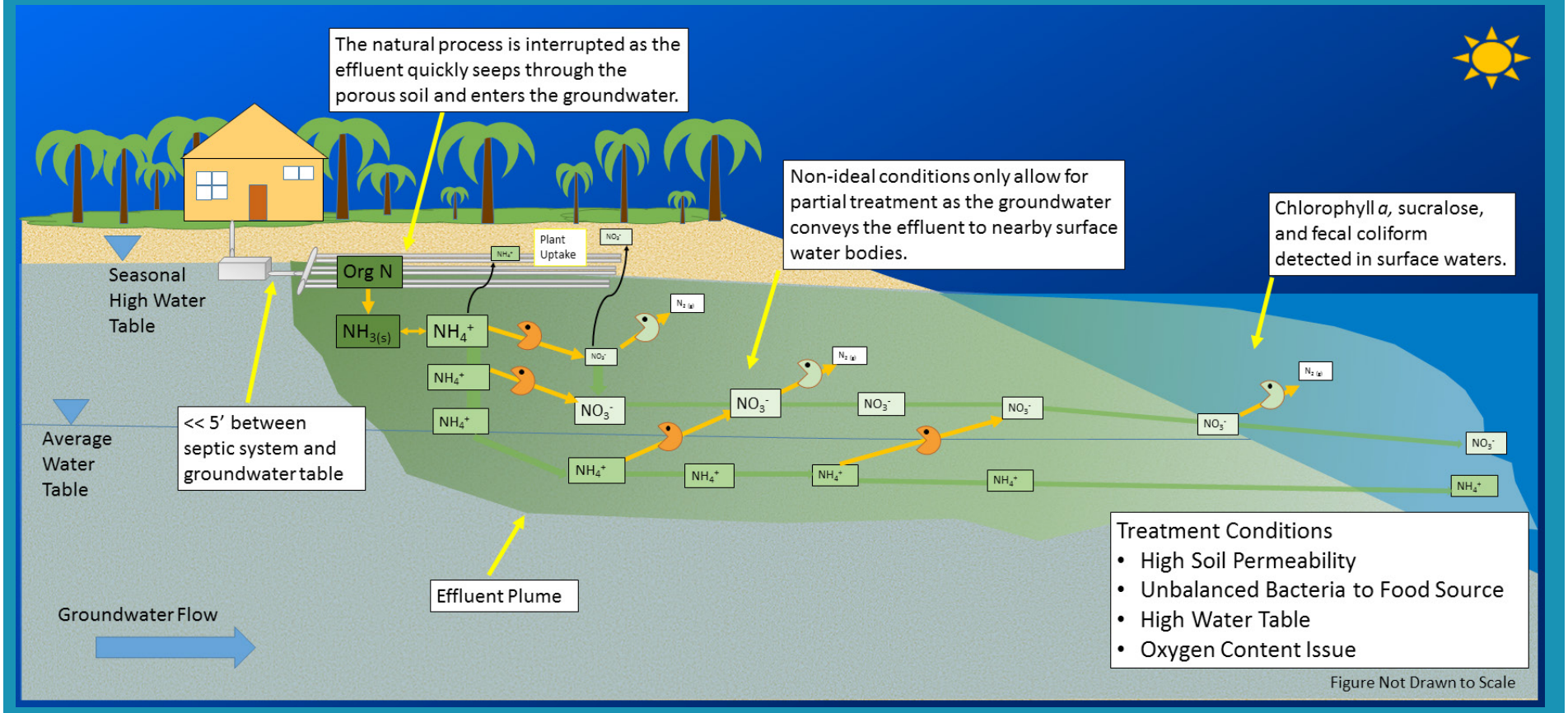


Photo Credit: Barbara Weibel/HoleintheDonut.com

Maintaining the Charlotte Harbor Estuary's water quality is critical to the future of the community.

Charlotte Harbor is known as a world-class destination for recreational fishing. The majority of visitors are drawn to the area for the harbor and local beaches, which generates an estimated economic impact of $526 million at local restaurants, hotels, and attractions (Research Data Services, 2016).
Reducing pollutants entering the water bodies translates into fewer beach closures and improved fishing and recreational opportunities, which improves the quality of life for residents and tourists enjoying these activities.

The harbor's health impacts not only fishing, retail, and travel industries, but also the real estate market and home values. Modeling studies have been used to estimate the impact of water quality on real estate value. Michael et al. (1996) found a 1-meter improvement in water clarity resulted in average property value increases ranging from $11 to $200 per linear foot of water frontage along lakes. Considering total water frontage within the study area, this translates to millions of dollars in improved property prices.

Similarly, increases in nitrogen loadings that cause poor water clarity could decrease home values by an average of $10,000 for non-waterfront property and up to $21,000 for waterfront property.

The Sewer Master Plan provides an affordable community solution that addresses the common goal of improving and restoring water quality in the Charlotte Harbor Estuary, and enhancing the community's quality of life.

To protect land and home values, the community must invest more into the future – the future of the harbor, rivers, aquifer, beaches and estuaries, as well as the underlying groundwater, depends on it.

SEWER MASTER PLAN OBJECTIVES

- Summarize the need to reduce nutrient and bacteria discharges.
- Review and compile historical data on the sewer system, water reclamation facilities, water quality and flows.
- Summarize the private sewer utilities and provide recommendations for regional connections.
- Model and predict system growth.
- Develop detailed consumer and wastewater flow estimates through buildout.
- Review existing wastewater collection and transmission systems.
- Review existing wastewater reclamation facilities and prepare an infrastructure assessment.
- Develop capital improvement plan recommendations based on existing infrastructure needs and guiding principles.
- Perform financial analysis and develop funding programs and options for the County to implement the recommended capital improvement plans.

Together, we work towards achieving community goals through these guiding principles:

- **Affordability** – Each project identified in the Sewer Master Plan focuses on developing affordable solutions for residents and business owners.
- **Sustainability** – The Sewer Master Plan incorporates a balanced approach to prioritize septic system replacements to maximize environmental benefits and provide long-term reductions in nutrient loadings in a manner that is affordable to residents and business owners.
- **Efficiency** – The Sewer Master Plan considers existing utility infrastructure and implements efficient construction methods to decrease costs on road trenching and repair.
- **Reliability** – The Sewer Master Plan considers existing wastewater treatment and conveyance infrastructure and identifies which components will require updating to provide a reliable product to the County's residence and businesses.

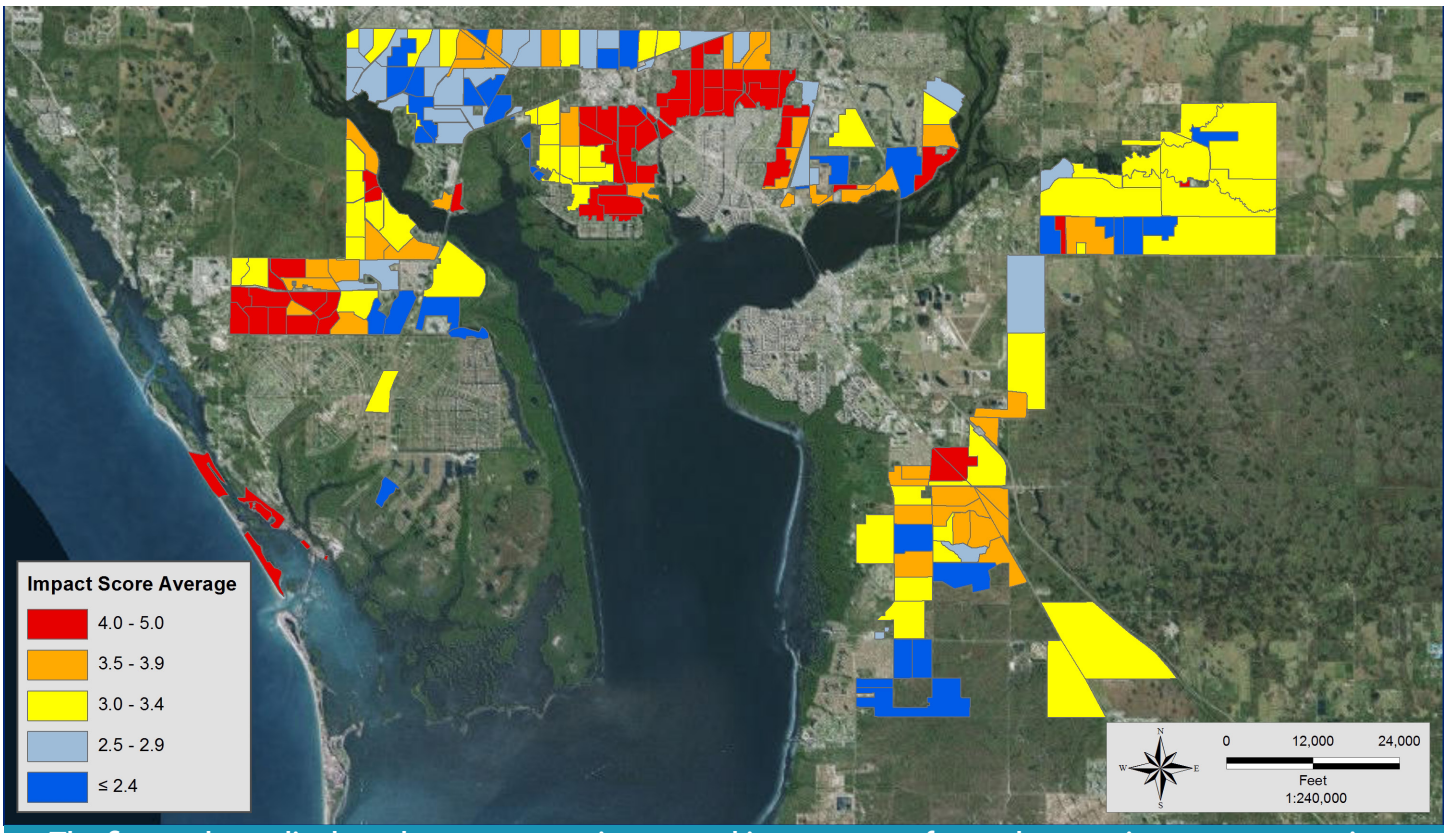
HOW DO WE REDUCE POLLUTANTS AND IMPROVE THE HARBOR'S WATER QUALITY FOR FUTURE GENERATIONS?

We begin at the source of the problem – by identifying which areas in the County have the greatest effect on the harbor's water quality and how severe their impact is on the environment.

Historical data, including population trends, property information, land use documents, building permit records and septic effluent loadings, were compiled and reviewed to assess the current impact of nutrient pollution in the County. These data were used to identify areas that would benefit the most from sewer improvements.

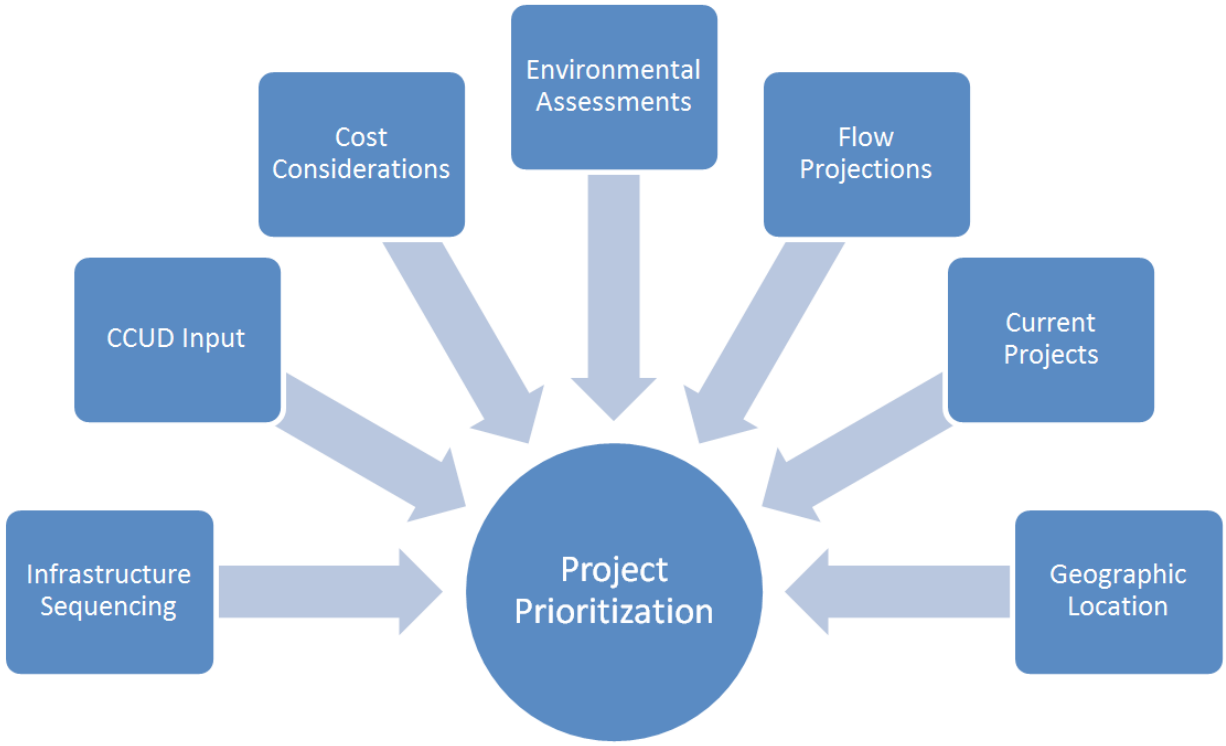
Environmental scoring criteria were developed to prioritize the importance of converting septic systems to sewer for each project area.

The environmental scoring criteria included the age of septic systems within the project area, proximity to surface waters, and the estimated nitrogen loading from septic systems within the project area. Septic system age has a significant impact on the system's functionality and effectiveness. Although newer septic systems can be more effective at treatment in the right conditions, all septic systems discharge to drainfields. The location of the project area relative to surface water is relevant because the drainfield effluent eventually enters the groundwater, which flows through the soil and into the surface water. The porous Floridian soils and high groundwater table inhibit the treatment process and allow for partially treated sewage to enter surface waters. Lastly, the population density and septic system use within each project area also has a significant impact on the amount of nitrogen that enters the environment.



The figure above displays the average environmental impact score for each sewer improvement project within the Utilities' service area. Scores range from 0 to 5, with 5 representing the areas that have the most negative impact on the environment. These project areas were typically located near surface waters, contained older septic systems, and contributed large amounts of nitrogen into the environment.

HOW WERE PROJECTS PRIORITIZED UNDER THE SEWER MASTER PLAN?



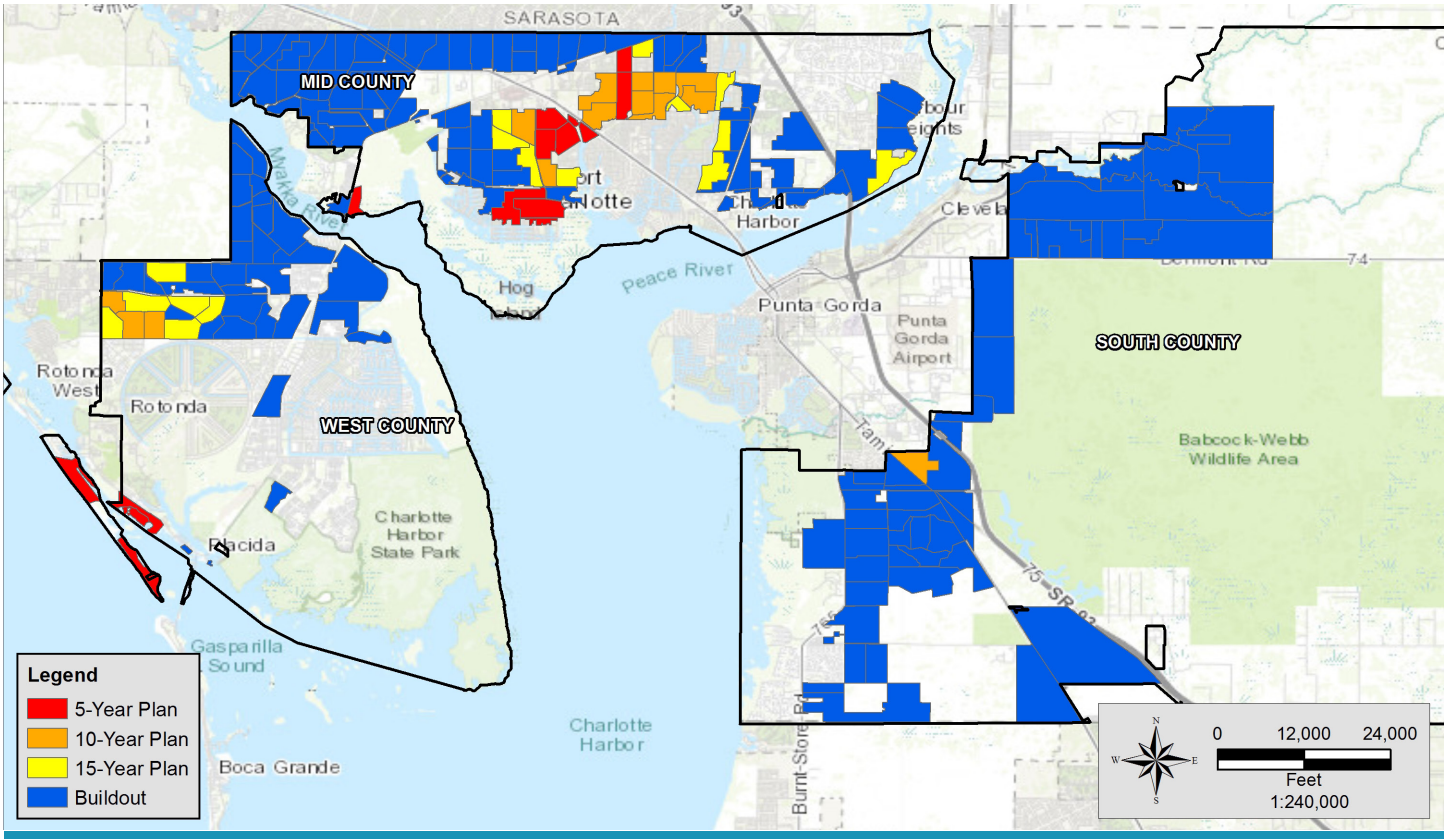
Individual scores were determined for each criteria and each project area. The individual scores were used to develop an overall average environmental score for the project areas throughout the Utilities' service area.

Cost assessments were conducted based on the number of lots within the project area and the infrastructure required to convert the area from S2S.

Affordability. Sustainability. Efficiency. Reliability. With these guiding principles in mind, we engaged with the community - listening to its needs through various public outreach and educational workshops.

Once project areas were identified based on environmental and cost assessments, they were prioritized to develop a flexible and practical implementation sequence.

As illustrated in the diagram above, several factors were considered in prioritizing projects to identify and develop consecutive 5-year, 10-year, 15-year, and buildout improvement plans.



The figure above identifies the project areas for each improvement plan period. Fourteen project areas are included for the 5-year plan resulting in the conversion of 4,769 septic systems to sewer. An additional 30 project areas have been identified for the 10- and 15-year plans, while buildout refers to the project areas that extend beyond the 15-year plan, but that could be implemented in the future planning.

The Sewer Master Plan outlines the yearly capital improvement projects required for the specified period, including collection system, transmission system, utility connections and wastewater reclamation facility improvements for each of these plans.

Collections systems refer to the infrastructure required to transmit the wastewater from individual homes and businesses to a centralized pump station. The main collection system technologies include low-pressure, vacuum and gravity systems.

S2S conversions require not only installing collection systems for each project area but additional infrastructure for conveyance and treatment.

Once the flows are collected, pump stations are used to convey the wastewater through transmission mains to the wastewater reclamation facilities. These facilities accept the higher flows and produce more reclaimed water for commerical customers.

As more collection systems are added to the system, the flows at these facilities increase and additional treatment components are often required. Flow projections were conducted for the Utilities' four wastewater reclamation facilities. With the exception of the East Port facility, flow projection analyses indicated that expansions at the other facilities would not be necessary, however, operational maintenance needs to continue during the 15-year period. The design for the East Port facility improvements has already been completed and accounted for in the County's budget.

The Sewer Master Plan identifies the capital improvement projects for collections systems, transmission systems, utility connections and wastewater reclamation for the first 5 years.

After completing the 5-year plan, annual septic system effluent nitrogen loadings will decrease by approximately 114,000 pounds.

The projects include upgrading three existing lift stations and the construction of 12 transmission mains.

The table below lists the S2S project areas identified in the 5-year Improvement Plan, including the project area name and estimated project costs in 2017 dollars. The project costs include the costs for on- and off-lot connections, collection piping, pump stations, restoration, mobilization and general conditions (8%), contingency (20%), and professional services (20%).

Project Name		Project Cost
El Jobean East		$9,180,795
Crestview Circle		$1,100,000
Ellicott Circle		$3,600,000
Seacrest		$7,300,000
Lakeview Corridor		$10,000,000
Yorkshire Ph I		$10,400,000
Hurtig		$7,400,000
Yorkshire Ph II		$4,600,000
Ackerman East		$12,900,000
Ackerman West		$13,500,000
Cape Haze Ph I		$2,100,000
Cape Haze Ph II		$3,300,000
	Total	**$85,380,795**
L.G.I.*		$10,400,000
Don Pedro*		$6,300,000
	Total	**$16,700,000**

* Private Utility

The table below identifies the transmission facility projects that will be required within the 5-year plan to convey the flows from the collection system to the water reclamation facilities. Project costs account for the transmission main installation, valves, restoration, contingency (20%) and professional services (20%) in 2017 dollars. The financing for these improvements is not included in S2S Project Funding but accounted for in a separate fund.

Project Name	Project Cost	Project Name	Project Cost
LS 123 "KHW" to Kings Highway	$27,000	LS 805 Windward Preserve Upgrade	$250,000
Toledo Blade Boulevard	$807,000	LS 815 "Z" Upgrade	$250,000
Tamiami Trail	$58,000	Quesada Ave to Peachland Blvd	$601,000
Mensh Terrace	$174,000	Little Gasparilla Island and Placida Rd	$739,000
Lakeview Blvd to US 41	$2,327,000	Ackerman Ave	$871,000
Ellicott Circle to W. Tarpon Blvd NW	$661,000	Indiana Rd and Cape Haze Dr	$1,732,000
LS 403 Islamorada Upgrade	$250,000	Green Dolphin and Placida Rd	$221,000
Oldsmar Circle	$198,000		
		Total	$9,108,000

HOW WILL THE S2S PROJECTS BE PAID FOR?

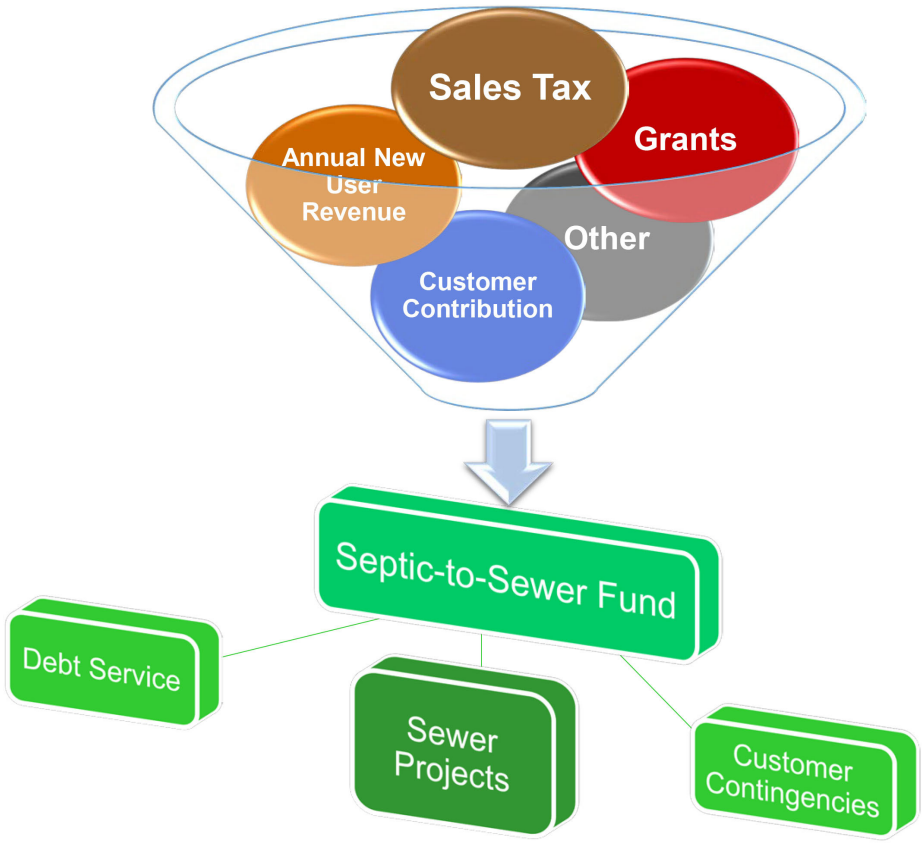
One objective of the Sewer Master Plan is to develop an affordable and realistic funding strategy that apportions just, equitable, and affordable costs to property owners while not having an adverse effect on existing Utilities ratepayers. Funding for S2S programs include two distinct elements:

1. The funding of infrastructure improvements by the County/Utilities and associated planning, design, and project management.

2. The methods by which any borrowed funds for such infrastructure are repaid by property owners, end users and/or other future revenue streams. The funding sources for the former include loans, bonds, grants, etc., and the latter include the assessments, loan installments, rates and taxes that support the repayment of debt obligations.

The financial strategy for the Sewer Master Plan is to assign just, equitable, and affordable costs to property owners and find an achievable level of outside funding while having no adverse effect on existing Utilities ratepayers. The plan includes funding options for the 5-year collection system while the funding plan for the transmission systems, utility connections, and reclamation facilities are accounted for in a separate fund.

Charlotte County S2S Project Funding



An interactive financial model was developed to evaluate the financial viability of various sewer expansion segments. The financial model provides for input assumptions and projections in terms of level of self-sufficiency under various scenarios.

After a variety of funding strategies were reviewed, an initial 5-year plan was developed based on achievable funding levels that balances property owner affordability with funding sources that match well with the infrastructure costs. The initial 5-year forecast for the sewer improvement plan includes 4,008 existing developed units out of 5,928 total lots.

The annual project construction costs (in 2017 dollars) range from $17 million to $19 million per year for a 5-year total cost of $89 million, or an average cost per lot (vacant and occupied) of $15,013.

These estimated project costs include the on-site costs of decommissioning the homeowner's septic tank, the cost for lateral connection installation, and the cost of the sewer collection system.

As of 2017, the major cost to the homeowner (labeled 'customer contribution' in the illustration on page 12) to connect to the sewer system is $11,201.

The proposed financial model outlines $11,201 as the base customer contribution, with annual staged increases to reflect inflation. The proposed plan gives customers the option to finance the connection fee, pay it up front to lock in the current rate, or to request a financial hardship deferral.

The funding strategy considered homeowners' monthly sewer bills and financed expenditure amounts to determine an affordable fee consistent with an affordable monthly cost of 2.5% MHI as defined by the U.S. Department of Housing and Urban Development. For more information on affordability and cost for property owners see Chapter 8 of the Sewer Master Plan.

The sources of outside funding proposed in the plan include: State Revolving Fund (SRF) low-interest loans, 1-percent local option sales tax (use 0.25% of the 1% tax starting in 2020), and grants (such as RESTORE). The proposed plan assumes the entire amount of project costs during the initial 5-year forecast is funded through SRF loan proceeds.

The SRF loan program would be advantageous to Utilities because of the low interest rates (2% or less) currently offered and the program being firmly established in Florida for utilities infrastructure improvements.

The other sources of outside funding (taxes and grants) are proposed to help fund the debt service associated with the proposed SRF loans.

The table below provides the assumptions used for the SRF loan issuances and adjusts for inflation.

	Year 1	Year 2	Year 3	Year 4	Year 5
Construction Reimbursement	$17,000,000	$17,400,000	$17,800,000	$18,200,000	$18,600,000
Loan Costs	$2,040,000	$2,088,000	$2,136,000	$2,184,000	$2,232,000
Capitalized Interest	$680,000	$696,000	$712,000	$728,000	$744,000
Total Loan Amount	$19,720,000	$20,184,000	$20,648,000	$21,112,000	$21,576,000
Term	20	20	20	20	20
Interest Rate	2.00%	2.00%	2.00%	2.00%	2.00%

Note: Loan costs include financing and administrative costs and a construction contingency.

The table below summarizes the annual project expenses and project revenues for the initial 5-year improvement plan.

	Total	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Total Project Expenses:							
SRF Design Loan Debt Service	$1.60	$0.00	$0.10	$0.21	$0.32	$0.43	$0.54
SRF Construction Loan Debt Service	$6.69	$0.00	$0.00	$0.00	$1.10	$2.22	$3.37
Septic Maintenance Expense	$1.30	$0.10	$0.20	$0.25	$0.25	$0.25	$0.25
Hardship	$0.11	$0.00	$0.01	$0.01	$0.02	$0.03	$0.04
Total Expenses	$9.70	$0.10	$0.31	$0.47	$1.69	$2.93	$4.20
Total Project Revenue:							
Customer Contribution	$5.67	$0.00	$0.36	$0.74	$1.12	$1.52	$1.93
Annual User Rev. (Rate Revenue)	$4.61	$0.00	$0.00	$0.00	$1.33	$1.62	$1.66
Grants	$7.97	$0.00	$0.85	$1.72	$1.76	$1.80	$1.84
Sales Tax Revenue	$5.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.00
General Fund Revenue	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue	$23.25	$0.00	$1.21	$2.46	$4.21	$4.94	$10.43
Variance	$13.55	($0.10)	$0.90	$1.99	$2.52	$2.01	$6.23

Note: All amounts are in $M; Debt service assumptions shown in previous table; Grants assumed at 10% of average annual project costs.

OUR HARBOR: PROTECTING THE HEART OF CHARLOTTE COUNTY

Charlotte Harbor is Florida's second largest open water estuary and is home to a large population of snook, tarpon, redfish and spotted seatrout, as well as numerous species of aquatic organisms, plants, birds, and wildlife.

The harbor is a focal point of the county, and restoring it is a high priority for the local, state, and national officials.

The combination of unsuitable soils, high water tables and aging septic systems allows untreated sewage to percolate through the soil. It enters the groundwater where it is conveyed to canals, rivers, creeks and estuarine shorelines – transporting high levels of nitrogen, phosphorus, fecal microbes, and organic sewage contaminants to the harbor. These contaminants decrease water clarity, contribute to excess algae growth, sustain harmful algae blooms, and lead to red tide events.

Removing the existing septic systems, installing a central sewer system, and connecting residential and commercial units within the service area will alleviate problems with the existing septic systems and protect the public health of the community. S2S conversions will also improve the water quality of surrounding water bodies, and promote economic growth within the community for current and future generations.

The result...
a **cleaner** harbor,
healthier lifestyle,
and a **sustainable** future.

THANK YOU TO OUR PARTNERS

We thank the following parties from Charlotte County government, research and environmental institutions, regulatory partners, professional associations, stakeholders, and general public for their input and assistance in preparing the Charlotte County Sewer Master Plan.

CHARLOTTE COUNTY GOVERNMENT

Board of County Commissioners
Community Development
Economic Development
Property Appraiser
Public Works
Tourism Development
CCTV
Utilities Department

RESEARCH AND ENVIRONMENTAL INSTITUTIONS

Charlotte Harbor National Estuary Program
Charlotte Soil & Water Conservation District
FAU's Harbor Branch Oceanographic Institute
MOTE – Marine Laboratory & Aquarium
Sarasota Operations Coastal Oceans Observation Lab
Water Resources - UF/IFAS Extension
Charlotte Harbor Flatwoods Initiative
Charlotte Harbor Environmental Center

REGULATORY PARTNERS

Florida Department of Environmental Protection
Florida Department of Health
FWS Fisheries Program
South Florida Water Management District
Southwest Florida Water Management District

PROFESSIONAL ASSOCIATIONS

Charlotte DeSoto Building Industry Association
Charlotte County Chamber of Commerce
Charlotte County Economic Development Partnership
The Punta Gorda-Port Charlotte-North Port Association of REALTORS© Inc.

For More Information Visit:

www.CharlotteCountyFL.gov > Utilities > Sewer Master Plan