

SEPTIC TANK ELIMINATION PROGRAM (STEP)



Prepared for:



CITY OF GULF BREEZE
1070 SHORELINE DR
GULF BREEZE, FL 32561

Prepared by:

 **BASKERVILLE-DONOVAN, INC.**
Innovative Infrastructure Solutions
449 W. MAIN STREET
PENSACOLA, FL 32502
(850) 438-9661
EB-0000340

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1 Introduction

Baskerville-Donovan, Inc. (BDI) was tasked to develop an overview of areas within the City of Gulf Breeze that are currently being served by on-site sewer systems (septic tanks). Septic tanks may not treat to high effluent standards, which can be problematic in areas with a high density of septic tanks, especially in environmentally sensitive areas such as coastal communities. Therefore, the replacement of septic tanks with gravity sewers conveying water to the South Santa Rosa Utilities System's treatment facility should be considered for areas where feasible.

This analysis includes the review and categorization of unsewered areas within the Gulf Breeze city limits, west of the Naval Live Oaks area, which may be candidates for the conversion to sanitary sewer. Judgements on environmental sensitivity will be based on parcel locations relative to areas with low elevation, high groundwater, and proximity to surface water. Areas which are frequently subject to flooding are also considered to be more environmentally sensitive.

The existing sanitary sewer system currently serves several areas within the City and includes both gravity sanitary sewer and low pressure sanitary sewer, however a patchwork of unsewered areas remain within the City. Gravity or low pressure sanitary sewer systems were considered for the areas which are unsewered.

Finally, this report assumes that any potential required upgrades to the conveyance system downstream of the proposed new sanitary sewer systems will be evaluated in a future design analysis specific to the transmission system.

2 Feasibility of Sewer Development for Unserved Areas

2.1 Gravity Sanitary Sewer Evaluation Criteria

Many municipalities consider gravity sanitary sewer to be the most preferable sanitary sewer design due to its ease of operation and low maintenance costs. Sanitary sewer can be problematic to install if the topography does not allow for cost effective placement of pipe to locations which can be used for lift stations. Sufficient elevation and grade are required for cost-effective development of gravity sewer systems. Additionally, sanitary sewer can be difficult to install if there are many obstacles or routing issues for the sanitary sewer itself.

This analysis assumed that the top of a sanitary sewer pipe must be at least three feet below grade. The sanitary main would also need to meet the minimum slope, based on diameter, as documented in the Ten-State standards. For the purposes of this report, it was assumed that all new gravity mains would need to meet the most stringent slope of 0.004ft/ft as required for 8" pipe. The placement of sanitary sewer main will require manholes to be spaced no further than every 400'. Additional manholes will be needed if the flow of the sanitary sewer changes direction or at intersections where sewers are added from a different direction. Typical design practice assumes that each manhole will result in 0.1' of elevation



loss. Grade and topography, obtained via Santa Rosa County GIS mapping, was analyzed for conceptual sewer routing.

Sanitary sewer systems require lift stations at various low points in the system. Lift stations will need to be located on public land or land the City may utilize via permanent easement. Because Gulf Breeze is mostly “built out”, the ideal location of lift stations was difficult to determine for some areas. Generally, proposed lift station locations are believed to be reasonable, however, the ultimate selection and acquisition of lift station sites will require input from utility staff, public engagement, and a complete design effort for each basin of proposed gravity sewer. For this report, Santa Rosa County GIS mapping and Santa Rosa County Property Appraiser records were used to determine the occupancy of parcels, identifying vacant and public parcels as potential lift station sites. In some cases, conceptual lift stations are proposed within public rights of way.

2.2 Low Pressure Sanitary Sewer Evaluation Criteria

Low pressure sanitary sewer systems were considered to be an alternative to gravity sewer systems. Low pressure systems use individual grinder pump systems for each house (or small set of houses) to send flow via a small diameter force main to a receiving gravity system, pump station, or downstream larger diameter force main.

Low pressure systems are typically more complex and have higher maintenance costs than gravity sewer systems due to the high number of small pump stations installed, but are practical for areas with topographies which do not allow for cost-effective conveyance using gravity. Low pressure systems offer more flexibility than traditional gravity sewers because the installed force main can change direction and elevation in order to avoid any points of conflict with other utilities or obstacles. Typically, all areas can be served by low pressure sewer, but at a cost of greater future maintenance.

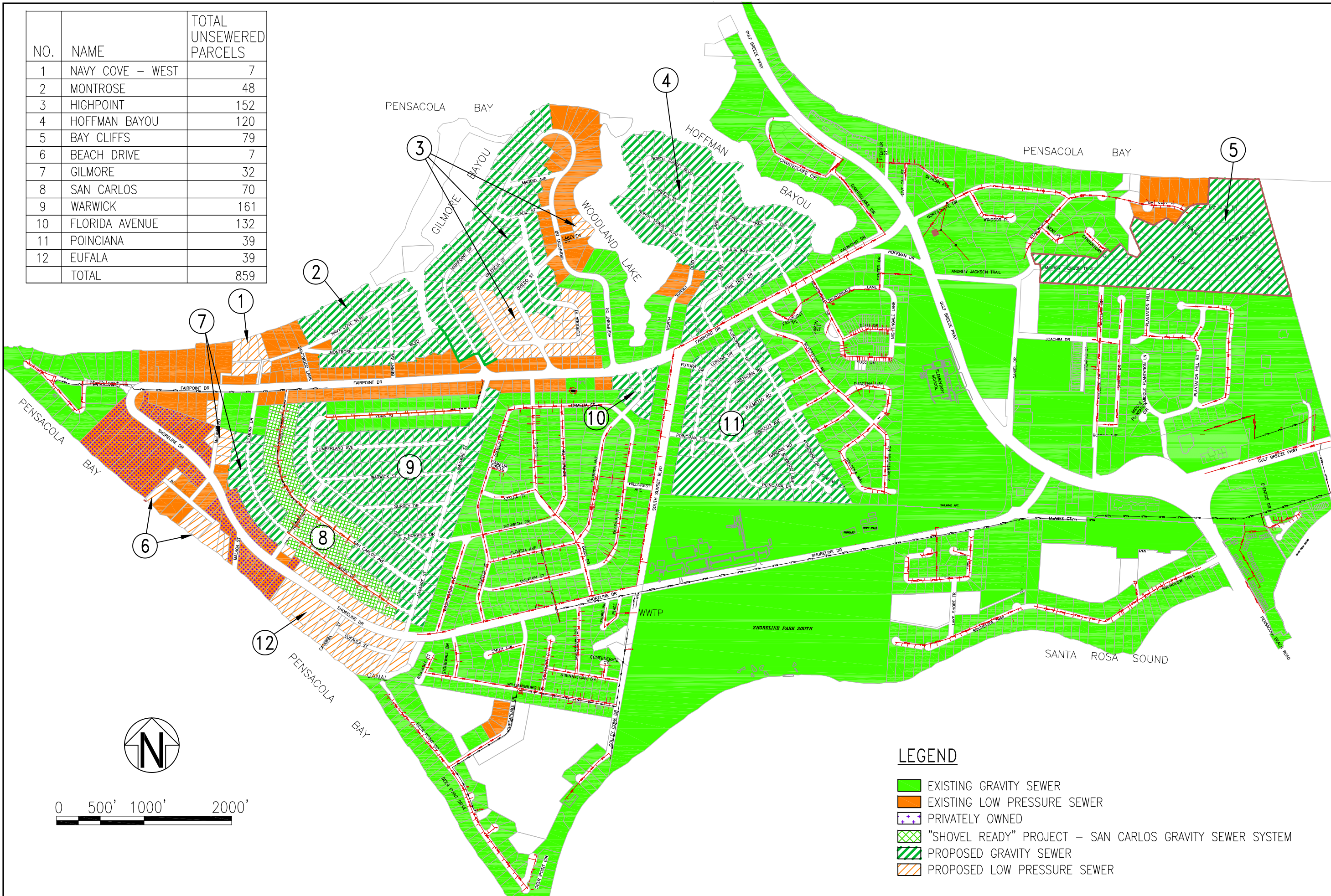
Gulf Breeze already contains areas equipped with low pressure sewer systems. These areas are most common in low-lying or otherwise closed-off areas without enough users to merit a lift station. Topographic data obtained from Santa Rosa County GIS mapping was used to determine low-lying areas ideal for low pressure sewer.

2.3 Conceptual Sewer Method by Area

City staff provided a map showing the areas currently on sewer and the method of service. BDI staff reviewed the unsewered areas and identified areas where gravity sewer may be practical, based on potential for lift station installation within the area, length of proposed gravity sewer reaches, topography, and constructability. For each of the identified areas of gravity sewer, a conceptual sewer layout was developed. Force main and connections downstream of the lift station were not evaluated. Areas impractical to serve via gravity sewer and lift station were assumed to be candidates for low-pressure sewer. Figure 1, Proposed Sewer Areas, summarizes the findings.

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NO.	NAME	TOTAL UNSEWERED PARCELS
1	NAVY COVE – WEST	7
2	MONTROSE	48
3	HIGHPOINT	152
4	HOFFMAN BAYOU	120
5	BAY CLIFFS	79
6	BEACH DRIVE	7
7	GILMORE	32
8	SAN CARLOS	70
9	WARWICK	161
10	FLORIDA AVENUE	132
11	POINCIANA	39
12	EUFALA	39
	TOTAL	859



LEGEND

- EXISTING GRAVITY SEWER
- EXISTING LOW PRESSURE SEWER
- PRIVATELY OWNED
- "SHOVEL READY" PROJECT – SAN CARLOS GRAVITY SEWER SYSTEM
- PROPOSED GRAVITY SEWER
- PROPOSED LOW PRESSURE SEWER

BASKERVILLE-DONOVAN, INC.
 Innovative Infrastructure Solutions
 449 W. MAIN ST., PENSACOLA, FL 32502 (850)438-9681
 ENGINEERING BUSINESS: EB-0000340
 Pensacola - Panama City Beach - Tallahassee - Mobile - Brevard County - Tampa
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PREPARED FOR:
**CITY OF GULF BREEZE/
 SANTA ROSA UTILITIES SYSTEM**

FIGURE TITLE:
PROPOSED SEWER AREAS

FIGURE NO.:
1



For each of the twelve identified unsewered areas, parcel counts were conducted to determine the number of potential service connections to be gained by providing either form of sewer service to the area. The results of this analysis are in Table 1.

Table 1 - Potential Connection Counts by Sewer Type

Map Area No.	Area Name	Proposed Gravity	Proposed Low Pressure	Total Unsewered Parcel Count
1	Navy Cove - West	0	7	7
2	Montrose	48	0	48
3	Highpoint	101	51	152
4	Hoffman Bayou	120	0	120
5	Bay Cliffs	79	0	79
6	Beach Drive	0	7	7
7	Gilmore	24	8	32
8	San Carlos	70	0	70
9	Warwick	161	0	161
10	Florida Ave	12	0	12
11	Poinciana	132	0	132
12	Eufala	0	39	39
	Total	747	112	859

3 Environmental and Constructability Factors

To determine which areas may benefit most from sanitary sewers, consideration was given to environmental sensitivity of the unsewered areas. Specific factors that were considered include shallow groundwater, propensity for flooding, risk of migration to waterways, and potential ease of connection and construction. The method of evaluation of each factor and the results of the analysis of each is in the following sections.

3.1 Shallow Groundwater

Areas with shallow groundwater are less suitable for septic tanks as when groundwater levels are elevated, drainfield functionality is decreased, and may result in a higher concentration of biological and chemical pollutant transport offsite. While groundwater depth is not readily available information and is transient, topography data obtained from Santa Rosa County GIS was examined for determination of low-lying areas. Areas with low relative elevations are presumed to have higher groundwater levels relative to surface elevation, especially during periods of increased precipitation.

For areas proposed for conversion to sewer, a ranking between 1 and 5 was provided, with 1 indicating a low level of relative concern and 5 indicating a high level of relative concern. Table 2 outlines the results of the analysis.



Table 2 - Shallow Groundwater Concern

Map Area No.	Name	Shallow Groundwater (1-low concern, 5-high concern)
1	Navy Cove - West	3
2	Montrose	4
3	Highpoint	2
4	Hoffman Bayou	2
5	Bay Cliffs	4
6	Beach Drive	5
7	Gilmore	2
8	San Carlos	2
9	Warwick	3
10	Florida Ave	2
11	Poinciana	2
12	Eufala	5

3.2 Historical Flooding Events

Areas prone to flooding are another concern of on-site disposal systems. Flooding reduces the ability of septic tanks and drain fields to function, and can leave a dwelling without the ability to eliminate sanitary waste until flooding subsides. Many of the low-lying areas in the central portion of the western tip of the Gulf Breeze peninsula have been previously flooded, more recently in April 2014.

As part of previous “Project RESTORE” efforts, a map was produced showing dwelling units that incurred structural damage from flooding. This map was used to determine which housing units suffered from multiple floods as well as single floods. The data does not characterize non-structural flooding that would impact the usability of septic systems, but the structural flooding record provides an indicator that the area is susceptible to flood damage in general. A summary of the findings is provided in Table 3.

Table 3 - History of Structure Flooding

Map Area No.	Name	Total Unsewered Parcels	Single Flooding Events	Multiple Flooding Events	Total Structures w/ Flood History	% Structures w/ Flood History
1	Navy Cove - West	7	0	0	0	0%
2	Montrose	48	3	1	4	8%
3	Highpoint	152	2	0	2	1%
4	Hoffman Bayou	120	0	0	0	0%
5	Bay Cliffs	79	7	0	7	9%
6	Beach Drive	7	3	0	3	43%
7	Gilmore	32	0	0	0	0%
8	San Carlos	70	3	0	3	4%
9	Warwick	161	3	2	5	3%
10	Florida Ave	12	0	0	0	0%
11	Poinciana	132	2	0	2	2%
12	Eufala	39	1	3	4	10%
	Total	859	24	6	30	3%



3.3 Areas with Short Migration Paths to Surface Water

Residential areas that are equipped with on-site disposal systems and also located adjacent to surface waters may become non-point sources of water pollution via leachate transport. This report does not assume that all coastal septic tank systems are damaging to the environment, however the risk of environmental pollution is greater from these systems. To evaluate this aspect of the analysis, coastal areas, including the Sound and bayous, were reviewed relative to the distance from unsewered housing to gauge the level of environmental sensitivity. Data used in this portion of the evaluation was obtained from Santa Rosa County GIS.

For areas proposed for conversion to sewer, a ranking between 1 and 5 was provided, with 1 indicating a low risk of pollutant migration to surface waters. A ranking of 5 indicates a short migration path and inherently higher level of relative concern for pollution migrating to surface waters. As many of the unsewered areas contain coastal homes, most of the areas earned an increased level of concern. The results of this analysis are provided in Table 4.

Table 4 - Relative Risk of Pollutant Migration

Map Area No.	Name	Risk of Migration to Waterways (1-low concern, 5-high concern)
1	Navy Cove - West	5
2	Montrose	5
3	Highpoint	5
4	Hoffman Bayou	5
5	Bay Cliffs	5
6	Beach Drive	5
7	Gilmore	1
8	San Carlos	1
9	Warwick	1
10	Florida Ave	3
11	Poinciana	1
12	Eufala	5

3.4 Ease of Connection/Ease of Construction

A general characterization of the ease of connection and the ease of construction for sewer systems within unsewered areas was determined. This is a subjective value based on the sewer type, with gravity sewer being more difficult to construct than low pressure sewer, as well as the proximity to the nearest possible connection to either a neighboring sewer area or nearby force main. Additionally, areas with the most feasible lift station locations were scored higher than areas where lift station site acquisition may be more difficult. Finally, where designs have been completed for sewer system expansions, this was considered “shovel ready”. The subjective scoring for ease of connection/ease of construction is shown in the following Table 5.



Table 5 - Ease of Construction/Ease of Connection for Unsewered Areas

Map Area No.	Name	Ease of Connection/ Construction (1-Difficult, 5 - Relatively Easy)	Connection/ Construction Comments	"Shovel Ready"? (Design Complete)
1	Navy Cove - West	5	FM on Fairpoint.	No
2	Montrose	3	FM on Fairpoint. Proposed LS on City lot.	No
3	Highpoint	1	No nearby FM; proposed LS on vacant lot	No
4	Hoffman Bayou	1	No nearby FM; proposed LS on vacant lot	No
5	Bay Cliffs	3	No nearby FM; proposed LS w/in R/W	No
6	Beach Drive	5	Assume connection to existing LPS FM	No
7	Gilmore	4	Assume connection to existing LS for gravity sewer. Nearby FM for LPS connection	No
8	San Carlos	5	Design complete. Proposed LS in R/W.	Yes
9	Warwick	2	No nearby FM; Proposed LS w/in R/W	No
10	Florida Ave	4	Nearby sewer for FM discharge. Proposed LS on vacant lot.	No
11	Poinciana	3	Nearby sewer for FM discharge. Proposed LS w/in City park site.	No
12	Eufala	5	Nearby sewer for LPS FM discharge.	No

4 Summary, Recommendations, and Conceptual Costs

The unsewered areas within Gulf Breeze west of Naval Live Oaks are suitable for incorporation into a municipal sewer system. Table 6 is a ranking of the identified areas based upon the evaluation categories. While the areas can be addressed in any order, the table below is intended to provide some value to the urgency of connecting one particular area over another.



Table 6 - Priority Ranking of Areas Considered for Sewer Construction

Map Area No.	Name	Total Unsewered Parcels	% Structures w/ Flood History	Shallow Groundwater (1-low concern, 5-high concern)	Risk of Migration to Waterways (1-low concern, 5-high concern)	Ease of Connection/Construction (1-Difficult, 5 - Relatively Easy)	Priority Score (Sum of Subjective Scores)
6	Beach Drive	7	43%	5	5	5	15
12	Eufala	39	10%	5	5	5	15
1	Navy Cove - West	7	0%	3	5	5	13
2	Montrose	48	8%	4	5	3	12
5	Bay Cliffs	79	9%	4	5	3	12
10	Florida Ave	12	0%	2	3	4	9
3	Highpoint	152	1%	2	5	1	8
4	Hoffman Bayou	120	0%	2	5	1	8
8	San Carlos	70	4%	2	1	5	8
7	Gilmore	32	0%	2	1	4	7
9	Warwick	161	3%	3	1	2	6
11	Poinciana	132	2%	2	1	3	6

It is recommended that the City determine from homeowners the level of interest for making sewer connections in each identified area. The City should also contemplate funding availability and programs that may assist the City or homeowners in covering part of the cost of converting from septic tanks to central sewer.

With the exception of the “San Carlos” area, for which a detailed design has already been completed, all areas will require a full design effort before sewer conversion can begin. While this report attempted to anticipate site conditions that would preclude one form of sewer over another, a detailed design effort will be required to determine the optimum layout and method for each given area.

Finally, a detailed engineering design will be required to best determine the actual anticipated costs associated with providing sewer service to any given area. Until that effort is concluded, budgetary costs of converting unsewered areas can be approximated. Based upon historic construction costs for similar projects, the values in Table 7 are representative of costs per dwelling for conversion from on-site disposal. These costs may be revised as required as updated construction cost data is obtained.

Table 7 - Conceptual Unit Costs

Estimated Unit Costs for Sanitary Sewer:	
Gravity Sewer/Connection	\$18,000
Low Pressure Sewer/Connection	\$22,000

Combining the costs in Table 7 with the area prioritization from Table 6, a summary table can be developed to indicate overall project costs and the approximate funding that will be required to convert each area. While the projects can be developed in any order, Table 8



reflects conceptual costs per map area with prioritization based upon the criteria considered in this report.

Table 8 - Conceptual Conversion Costs and Area Prioritization

Map Area No.	Name	Priority Score	Parcels for Connection			Estimated Costs for Conversion		
			Proposed Gravity	Proposed Low Pressure	Total Unsewered Parcels	Gravity Sewer Installation	Pressure Sewer Installation	Total Area Cost for Sewer Installation
6	Beach Drive	15	0	7	7	\$0	\$154,000	\$154,000
12	Eufala	15	0	39	39	\$0	\$858,000	\$858,000
1	Navy Cove - West	13	0	7	7	\$0	\$154,000	\$154,000
2	Montrose	12	48	0	48	\$864,000	\$0	\$864,000
5	Bay Cliffs	12	79	0	79	\$1,422,000	\$0	\$1,422,000
10	Florida Ave	9	12	0	12	\$216,000	\$0	\$216,000
3	Highpoint	8	101	51	152	\$1,818,000	\$1,122,000	\$2,940,000
4	Hoffman Bayou	8	120	0	120	\$2,160,000	\$0	\$2,160,000
8	San Carlos	8	70	0	70	\$1,260,000	\$0	\$1,260,000
7	Gilmore	7	24	8	32	\$432,000	\$176,000	\$608,000
9	Warwick	6	161	0	161	\$2,898,000	\$0	\$2,898,000
11	Poinciana	6	132	0	132	\$2,376,000	\$0	\$2,376,000
	Total		747	112	859	\$13,446,000	\$2,464,000	\$15,910,000