

Preliminary Engineering Report

for

Sewer Interconnection to Mainland from Knight Island/Don Pedro/Gasparilla Island

SUBMITTED TO

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KNIGHT/DON PEDRO/LITTLE GASPARILLA ISLAND CONNECTIONS TO PUBLIC UTILITIES

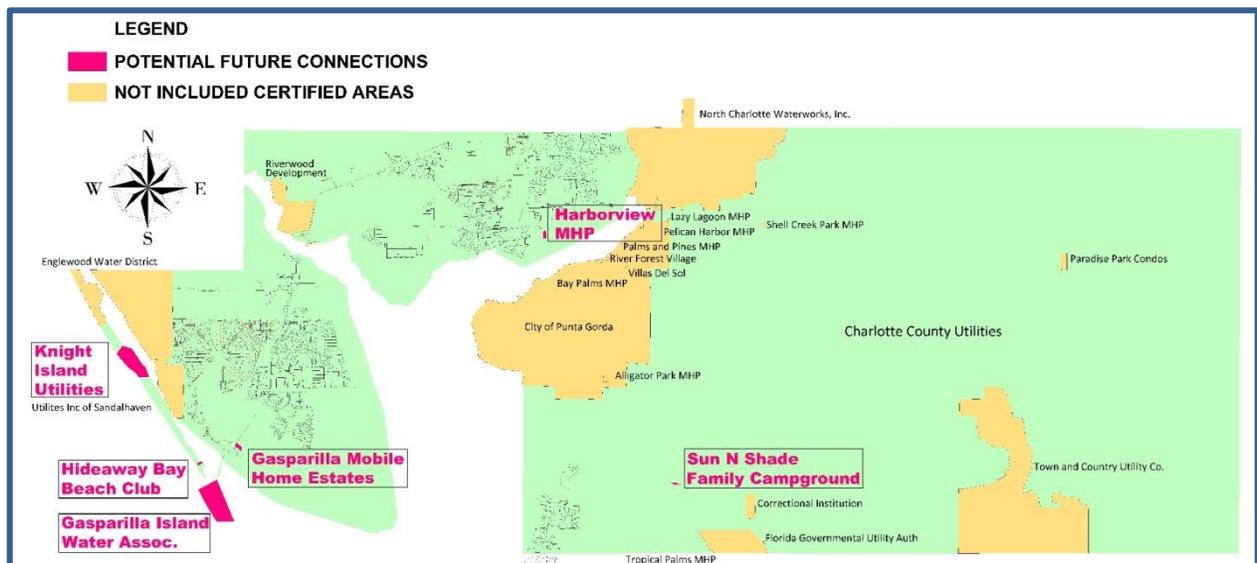
The island of Knight/Don Pedro and Little Gasparilla islands (herein after generally called the Island) is a bridgeless barrier island that has three distinct communities.

The northern portion contains the Palm Island Resort condominiums with central sewer services provided by Knight Island Utilities. Just to the south of Knight Island is the Bocilla Utility area that is mostly a residential area with central water provided, but not sewer. Wastewater disposal is provided by onsite septic systems and central water is provided by Bocilla Utilities.

The middle section of the island has The Don Pedro State Park with a bathroom that uses onsite septic disposal and water service provided by Charlotte County Utilities.

The southern part (Little Gasparilla Island) is a mix of residential homes and vacant lots served by onsite septic systems. Only a small portion of that area, namely the Hideaway Bay Beach Club and Placida Harbor has central sewer that is treated at the Hideaway Beach Club.

The location of Knight Island Utilities and Hideaway Bay Beach Club within Charlotte County is indicated on the following map.



The goal of this Preliminary Engineering Report is to determine what the most feasible method is to connect the entire island to the mainland, so that sewer treatment will no longer be on the island using onsite septic systems, or the existing package treatment plants. This option analysis only compares potential connections to cross the intra-coastal with force mains to the applicable CCU connection points. It does not analyze the internal collection network, the type of collection system nor will the pumping system because regardless of force main connection option those items be consistant.

1.0 ALTERNATE ROUTE EVALUATIONS

Option 1

There are two fundamental options to connect the entire island to the mainland. The first option is in general accordance with the 2017 *Charlotte County Sewer Master Plan* and consists of two separate crossings of the intra-costal, a northerly crossing near the barge across from Panama Blvd. and a southerly crossing of the intra-costal waterway generally parallel to the Boca Grande Causeway. Both these crossings are shown on Figure 1.1

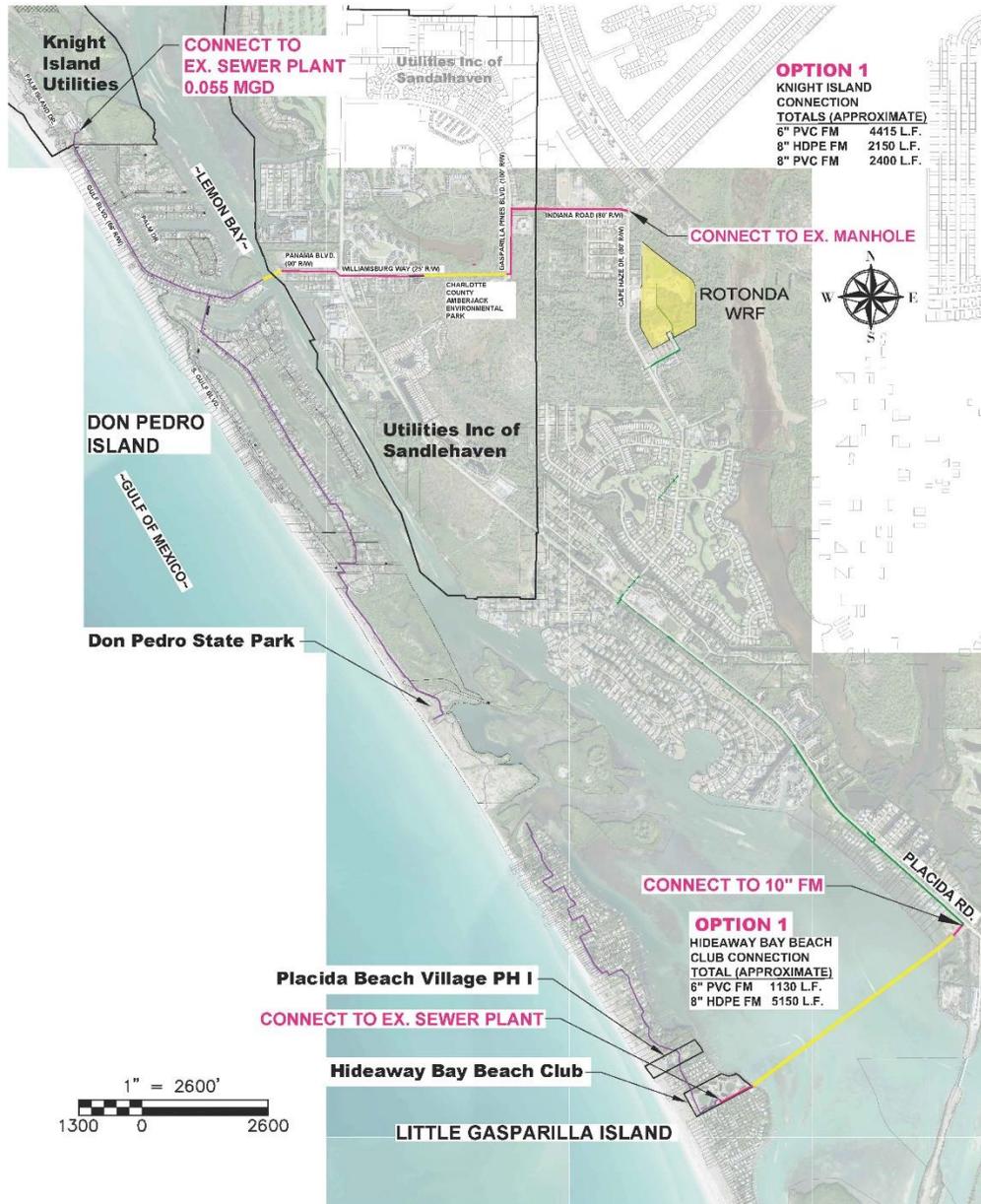


Figure 1.1

Option 2

This second option utilizes one crossing for the entire island. That crossing is proposed near the center at the Don Pedro Park area directly across from Cape Haze Drive on the mainland. In addition to this crossing, a connection from Little Gasparilla Island under a wetland would be necessary to connect the southerly area to the park area and is depicted on Figure 1.2 below.

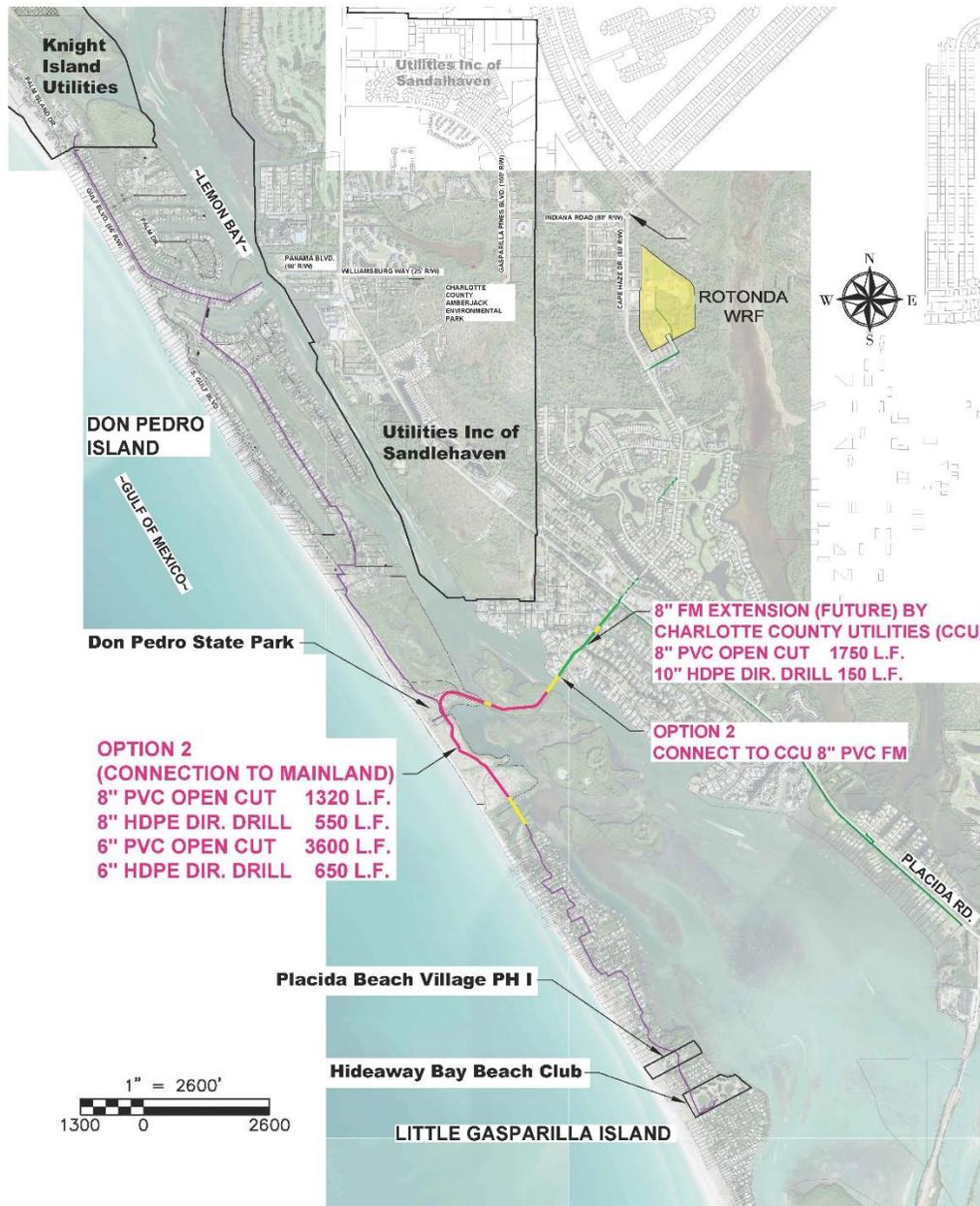


Figure 1.2

2.0 ENVIRONMENTAL ANALYSIS OF ALTERNATIVE ROUTES

Option 1

The primary environmental issues for both options is the crossing of either wetlands or the intra-coastal waterway.

The Knight Island connection can utilize an existing 6" force main that was previously drilled across the intra-coastal. However, in order to access CCU facilities the route must cross the certificated area of Sandalhaven in order to tie into a CCU manhole near Rotonda. That crossing includes a long directional drill across wetlands in the Amberjack Environmental Park for a distance of 2150 feet.

The southerly Hideaway Beach crossing includes a long directional drill of the intra-coastal waterway for a total distance of 5150 lf.

Option 2

This route involves three crossings of either wetlands or water bodies. The first is located on the island and is necessary to connect the Little Gasparilla Area to Don Pedro Park area. While the force main could be installed further to the west, it is not deemed prudent due to beach erosion concerns. The proposed wetland crossing on the island is about 650 feet of 6" HDPE.

In addition, a small crossing of the water is needed at the existing bridge, either aerially or directionally drilled. The total crossing length is approximately 50 feet of 8" HDPE.

Finally, a relatively short crossing of the intra-coastal at the end of Cape Haze drive will be necessary and the estimated length is approximately 500 feet of 8" HDPE

The following table summarizes the crossing lengths for each option:

Table 2.1 Wetland/Water Course Crossing Lengths

Route Option	Wetland crossing Distance	Open water crossing	Total crossing length
Option 1	2150	5150	7300
Option 2	650	550	1200

From an environmental wetland crossing consideration, Option 2 will have significantly less wetland crossings than Option 1, reducing the potential of affecting wetlands or watercourses in the event that there is ever a leak.

3.0 PRELIMINARY DESIGN SECTION FOR PROJECTED SEWER FLOWS

The total future flow for the Island based on current developed and platted vacant lots can be summarized as follows:

Table 3.1

Area on Island	Current ERC's	Future Est	Total ERC's	Comments
Knight Island utilities	230	270	500	Permitted capacity 0.055 mgd
Bocilla Utilities	440	310	750	Water only
Little Gasparilla Island	515	185	<u>700</u>	
Total			1950	ERC's

Using the CCU average daily flow per ERC at 160 gallons/day/erc (pursuant to 5.3.3.1 of the 2017 *Charlotte County Sewer Master Plan*) and peaking factor of 3.5 yields the following estimated flows at buildout.

Table 3.2

Area on Island	Total ERC's	Average daily flow gpd	Peak flow gpm	Peak flow CFM
Knight Island utilities	500	80,000	195	26
Bocilla Utilities	750	120,000	292	39
Little Gasparilla Island	700	112,000	<u>272</u>	<u>36</u>
Total			757	101

Assuming a maximum velocity of 8 fps (pursuant to section 5.3.3.2 of the 2017 *Charlotte County Master Plan*) yields the following approximate force main inside diameters. Force main sizes will be rounded up to a practical available size.

Table 3.3

Area on Island	Peak CFM	Peak CFS	Theoretical pipe area (sq. in)	Minimum pipe ID (in)
Knight Island utilities	26	0.43	7.74	4
Bocilla Utilities	39	0.65	11.7	4
Little Gasparilla Island	36	0.60	10.8	4
Knight island + Bocilla Utilities	<u>65</u>	<u>1.08</u>	<u>19.5</u>	<u>6</u>
Total	101	1.68	30.2	6.25

4.0 PRELIMINARY COST ESTIMATES

Costs have been developed for the two fundamental options. The costs developed are only for the elements necessary to make the crossing to the mainland and do not include all elements of the project. For example, internal pump stations and internal line work within each area are excluded because those pumps and lines would be necessary regardless of which crossing option was selected. In addition, small differential costs for minor upsizing of force mains in each area, which may vary depending on flow direction, (for example from a 3 inch to a 4 inch) are also ignored as they are not significant. Survey and engineering design services are also not included and assumed to be approximately equivalent.

The intent is to estimate at the *differential* in costs for a comparative analysis in order to determine what the preferred option is. Unit costs applied are consistent with those used in the 2017 *Charlotte County Sewer Master Plan*.

Of special note, *the cost of easements are not included* in this evaluation and if there is a significant cost for easement acquisition then it could sway the results of this analysis.

Option 1

Table 4.1 Little Gasparilla South Connection Cost Estimate

Description	Quantity	Unit	Extension
6-inch PVC O.C	1130	\$ 45.00	\$ 50,850.00
8-inch HDPE DD	5150	\$100.00	\$515,000.00
Total			\$585,850

Knight Island Utilities North Crossing

The unused 6-inch directionally drilled main at the end of Panama Boulevard and the ferry landing could be extended to the existing KIU treatment plant. On the mainland, a new force main network running east across property within the Sandlehaven Utility area to an existing CCUD manhole is estimated.

Table 4.2 Knight Island Utilities Connection Cost Estimate

Description	Quantity	Unit	Extension
6-inch PVC O.C	4415	\$ 45.00	\$198,675
8-inch PVC O.C.	2,400	\$ 60.00	\$144,000
8-inch HDPE DD	2150	\$100.00	\$215,000
Total			\$557,675

Table 4.3 Summary of Option 1 Costs

Little Gasparilla Connection	\$565,850
Knight Island Connection	\$557,675
Option 1 total	\$1,123,525

Option 2

Costs for crossing at the Don Pedro State Park across from Cape haze drive is estimated as follows:

Table 4.4 Don Pedro Connection to mainland Cost Estimate*

Description	Quantity	Unit	Extension
6" PVC O.C	3600	\$ 45.00	\$162,000
6" HDPE DD	650	\$80.00	\$65,000
8" PVC O.C	1230	\$60.00	\$78,300
8" HDPE DD	550	\$100.00	\$55,000
Total			\$360,300

**Note, the above estimate does not include the cost to install a force main within the CCU boundary along Cape Haze drive.*

Table 4.5 Summary of Costs for Option 1 & 2

Option 1 total	\$1,123,525
Option 2 total	\$360,300

5.0 OPTION ADVANTAGES AND DISADVANTAGES

The advantages and disadvantages of each option can be summarized as follows:

Option 1

Advantages:

- Does not need additional force main connecting the southerly area from Little Gasparilla island drilled under the wetlands to connect to Don Pedro Park.

Disadvantages

- Requires two crossings of the intra-costal waterway, increasing chances of a frack out during construction.
- More costly than Option 2

Option 2

Advantages:

- Less crossing of wetlands and open water; less potential for environmental impact
- Significantly less cost

Disadvantages:

- Requires easements from Don Pedro State Park.
- Requires CCU construction along Cape Haze Drive to be complete in order to connect.

6.0 RECOMMENDATION AND PREFERRED OPTION

Due to the cost and potential for environmental impacts, the recommended and preferred option for connecting the Island to the mainland is Option 2, crossing at Don Pedro Park to Cape Haze drive.