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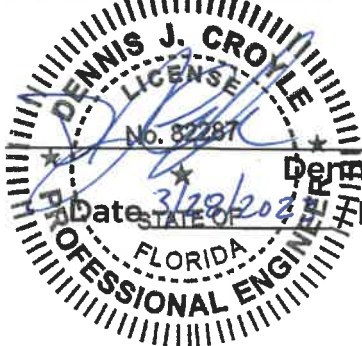
GWE
Giffels-Webster
Engineers, Inc.



Lake View - Midway Water Quality Improvements

Preliminary Engineering Report

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Florida.



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Abbreviations

BCC	Board of County Commissioners
CCPW	Charlotte County Public Works
CCSMP	Charlotte County Sewer Master Plan
CCU	Charlotte County Utilities
CWSRF	Clean Water State Revolving Fund
EOPC	Engineer's Opinion of Probable Cost
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FIRM	Flood Insurance Rate Map
GPM	Gallons per minute
GWE	Giffels-Webster Engineers, Inc.
L.F.	Linear Feet
LPS	Low-pressure Sewer
MOT	Maintenance of Traffic
MSBU	Municipal Service Benefit Unit
NAVD 88	North American Vertical Datum of 1988
NRCS	National Resources Conservation Service
NWI	National Wetlands Inventory
O&M	Operation & Maintenance
OSTDS	On-Site Treatment and Disposal System
PER	Preliminary Engineering Report
PS	Pump Station
PVC	Polyvinyl Chloride Pipe
ROW	Right of way
WWTP	Wastewater Treatment Plant

1.0 Summary of Findings and Recommendations

Giffels-Webster Engineers, Inc. (GWE) prepared this Preliminary Engineering Report (PER) for Charlotte County Utilities (CCU) to fulfill the requirements of the Clean Water State Revolving Fund (CWSRF) according to section 62-503.700(2) Florida Administrative Code (FAC).

This PER focuses on one area within central Charlotte County, specifically the Lake View – Midway project area. The Lake View – Midway area is highly developed with primarily existing residential homes that use on-site septic systems or low-pressure sewers for wastewater disposal.

This PER consists of evaluating options for installing a centralized sewer system or systems that collect sewage from individual homes and transmit it to an existing County treatment facility. The installation of a central sewer collection system will allow the elimination of on-site septic systems to protect surface and ground waters, a priority of the Clean Water Act. This PER uses the recommendations outlined in the Charlotte County Sewer Master Plan (CCSMP) as the basis of our recommendations and project justification. The CCSMP can be found on the Charlotte County website and the CCSMP Executive Summary is included in Appendix A of this PER for reference.

Based on the findings of the CCSMP and the results of the comparative analyses performed on specific areas in the project boundary, we determined that the best system for the Lake View – Midway area is a combination of vacuum sewer, gravity sewer, and low-pressure sewer (LPS).

2.0 Introduction

2.1 Background

In June of 2021, CCU made a presentation to the Charlotte County Board of County Commissioners (BCC) providing an overview of the Lake View – Midway Water Quality Improvements septic to sewer project. The BCC approved the fourth septic-to-sewer design and replacement of the aging water lines in the area.

CCU retained GWE to provide professional engineering services for this project. The first task of the scope of services is to provide a PER to outline and make recommendations for the centralized wastewater collection options for the project area.

2.2 Need

The CCSMP identified 217 project areas and developed environmental scoring criteria including proximity to surface waters, age of septic tanks, and nitrogen loading to establish an impact score for each area. The CCSMP used the average impact score to prioritize project areas and develop improvement plans.

The Lake View – Midway project boundary includes eight of the project areas identified in the CCSMP, namely M61, M62, M63, M64, M67, M68, M69, and M70. The CCSMP justifies that the areas encompassed in the project boundary are “high impact” and in need of a central sewer system.

Although not part of the MSBU (or SRF financing), investigation and feasibility of serving the adjacent low-pressure sewer area with a new central sewer system was also included, as CCU does not prefer

LPS due to the high operation and maintenance (O&M) cost associated with it and the numerous problems that they have experienced with low-pressure systems.

2.3 Scope of Study

The scope of this PER includes an evaluation of the following:

- Sewer collection system concepts
- Pump station sites
- Sewer transmission concepts
- Construction sequencing
- Impacts to and recommendations regarding the potable water main system and storm drainage facilities
- Preliminary cost estimates
- Changes to existing sewer areas that may benefit the project design

3.0 Environmental Impacts

3.1 Description of Planning Area

3.1.1 Planning Area

The project area is located in central Charlotte County and is bordered by US 41, Cochran Boulevard, Pellam Waterway, West Spring Lake, and Countryman Waterway. The entire area consists primarily of residential homes with some commercial properties along US 41. The homes range in age from being built in the mid-fifties to the present day.

The MSBU boundary map is located in Appendix B.

3.1.2 Climate

Charlotte County is humid with mild winters and long summers. The average temperature is 71 degrees F. with an average annual high and low of 91.7 and 50.6 degrees, respectively. The average annual rainfall is approximately 51 inches. Rainfall is seasonally distributed. Nearly half of the average annual precipitation falls during the months of June through September. The most rainfall in summer comes as thunderstorms of short duration during the afternoon and early evening hours.

3.1.3 Topography and Drainage

The geography of the service area has a mild topographic change generally sloping and draining from the north to the south. Elevations range from an elevation of 12 feet North American Vertical Datum of 1988 (NAVD 88) in the northern portion to an elevation of 4 NAVD 88 in the southern region. Elevation change is consistent with most regions in the southwesterly regions of Florida.

3.1.4 Geology, Soils, and Physiography

The predominant soils within the project area consist of Oldsmar sand, Matlacha gravelly fine sand, Boca fine sand, and Wabasso sand according to the Natural Resources Conservation Service (NRCS) soil mappings. There are no significant challenges anticipated with this soil characterization.

The soil map for the project area is located in Appendix C.

3.1.5 Environmentally Sensitive Areas and Features

3.1.5.1 Wetlands

Based on the National Wetlands Inventory (NWI) for the project area, it appears that there are some minor wetland areas located within the project boundary at parks and surrounding the project area but we do not anticipate any significant wetland impacts at this time.

The areas to be served with sewer collection systems are located in previously disturbed road systems and developed residential areas. All pipe networks will be installed in County Right-of-Way or within easements. No pipeline or improvements will be affecting the known wetlands identified.

See Appendix D for the NWI wetlands map.

3.1.5.2 Plant and Animal Communities (Endangered Species)

The proposed project area has been evaluated by Suncoast Ecological Services, LLC to determine future impacts on threatened and endangered species and natural habitats including wetlands before construction. While the project will impact existing environmental conditions during construction, no negative long-term impacts are anticipated. Nearly all of the construction activity is expected to occur within previously disturbed areas and measures will be incorporated in the design and construction phases to minimize or avoid long-term environmental damage or harm.

Potential concerns identified include:

- Scrub jay
- Gopher tortoise
- Eagle nesting
- Wetlands
- Heritage Trees

If any of the above would be impacted by construction, mitigation procedures will be implemented following regulatory guidelines. Potential cost impacts could include permit fees, specialized environmental expertise, relocation expenses, and mitigation fees. Once design begins and location specifics are determined, environmental expertise will be sought to finalize specific environmental impacts and related costs for mitigation. Based on the findings, an allowance for these environmental impacts has been provided for in the project costs. Another environmental evaluation will be completed immediately before construction to confirm no change from when the initial environmental evaluation was completed.

Refer to Appendix E for the protected species assessment.

3.1.5.3 Archeological and Historical Sites

Cultural resource assessment desktop analysis was performed by Archeological Consultants, Inc. for the project area as due diligence. The analysis revealed that there is a low probability for the potential of aboriginal archaeological sites and a moderate potential for the occurrence of historical archaeological sites.

The study concluded no significant area or potential effects are present in the planning area. The assessments were divided into the MSBU and Force Main areas.

Refer to Appendix F for the cultural resource assessments.

3.1.6 Flood Plain

Flood zones for the project area are designated on the Flood Insurance Rate Map (FIRM) located in Appendix G. Approximately half of the project area is located in Zone X and the remainder of the area is in Zone AE 8 or 9.

Most of the project area lies well outside any special 100-year flood-prone areas.

A portion of the southeast area lies in FEMA Zone X or Zone AE where the 100-year flood is anticipated to have water depths of less than one foot. Being a pipeline project, this project is not anticipated to have any net filling or significant impact on the flood plain. The finished floor of vacuum pump stations will be located above the FEMA 100-year flood elevation or flood proofed following FEMA regulations.

3.1.7 Air Quality

There are no known major sources of air pollution within the project boundary. The air quality in Charlotte County is generally good and according to FAC Chapter 62-204.340 is classified as an area of attainment concerning the National Ambient Air Quality Standards. The proposed projects will have no significant impact on the existing ambient air quality.

3.2 Socio-Economic Conditions

3.2.1 Population

The estimated population that will be served by the Lake View – Midway project is approximately 3,709 total connections (including the existing LPS area); however, the MSBU includes only about 3,253 connections.

3.2.2 Land Use and Development

The existing land uses in the proposed service areas include single-family residential, vacant residential, public county schools, churches, county-owned land, and some commercial users along US-41. Residential development is expected to continue across the majority of the area.

Refer to Appendix H for the existing and future land use maps.

4.0 Existing Facilities

4.1 Location Map

The project area is highly developed and has multiple existing utilities installed within the ROW. Major utilities that we are aware of include water mains, gravity mains, force mains, low-pressure mains, and storm drainage infrastructure.

Mappings for some of these existing utilities are located in Appendix I.

There are additional utilities that are not owned by the County such as power lines and fiber optic cables which will require coordination with utility owners during the design phase to prevent conflicts, disruptions, or damage to any existing facilities.

4.2 Condition of Existing Facilities

CCU desires to replace all existing water mains in the project area due to the age of the system. It is preferable to replace the water mains in coordination with the installation of a central sewer to save money on restoration costs and minimize future disruptions to the area.

There are some existing LPS systems in the area that were installed at various times under the County line extension program. Sewer service was extended in these instances because of failing OSTDS. Excluding these few areas with line extensions, the rest of the area is serviced by OSTDS of various ages and conditions.

Considering the age of most of the developments within the area, the assumed condition of the existing OSTDS, and the impact of septic systems on the environment and water bodies, CCU intends to convert the entire area to a central sewer. This PER investigates the best options for the area based on cost and other considerations to provide the Lake View – Midway area with reliable and cost-effective central sewer service.

4.3 Ownership of Existing Facilities

The existing central water system is owned and operated by CCU. The existing OSTDS are privately owned. Existing centralized wastewater facilities within the area are owned by CCU.

4.4 Stormwater

Project area stormwater is collected and treated via a system of grassy swales and canals, some retrofitted with control structures to provide preliminary stormwater treatment. The overall stormwater system generally includes driveway pipes, roadway crossing pipes, and outfall pipes to adjacent waterways. The system was designed and installed more than 30 years ago and over the years, the system has deteriorated and may not be working as effectively. Existing stormwater system improvements are anticipated to restore the system to its original design parameters. Any driveway or road crossing stormwater pipe features impacted by this project will be restored in kind. At the time of preparing construction plans, specific corrective upgrades will be incorporated as determined by CCU and PW.

4.5 Paving

Public Works prepares a county-wide paving improvement and repair schedule on an annual basis. Priority is given to areas with the oldest roads on a 20-year cycle. Some of the roads in the area have been resurfaced/repaved within the last 10 years while other roads are on the priority list to be repaved, including the Ellicott Circle and Rock Creek Drive areas. CCU has been coordinating with PW to schedule wastewater improvements, based on the paving improvement program to try to minimize disruption by postponing paving if possible until after the utilities are installed.

The paving program for the project area is located in Appendix J.

4.5.1 Programmed ROW Improvements

The construction of this project will be phased to coordinate construction efforts with other public works projects such as:

- Edgewater Widening
- Ellicott Circle sidewalks
- Midway (Lake View to US-41) sidewalk

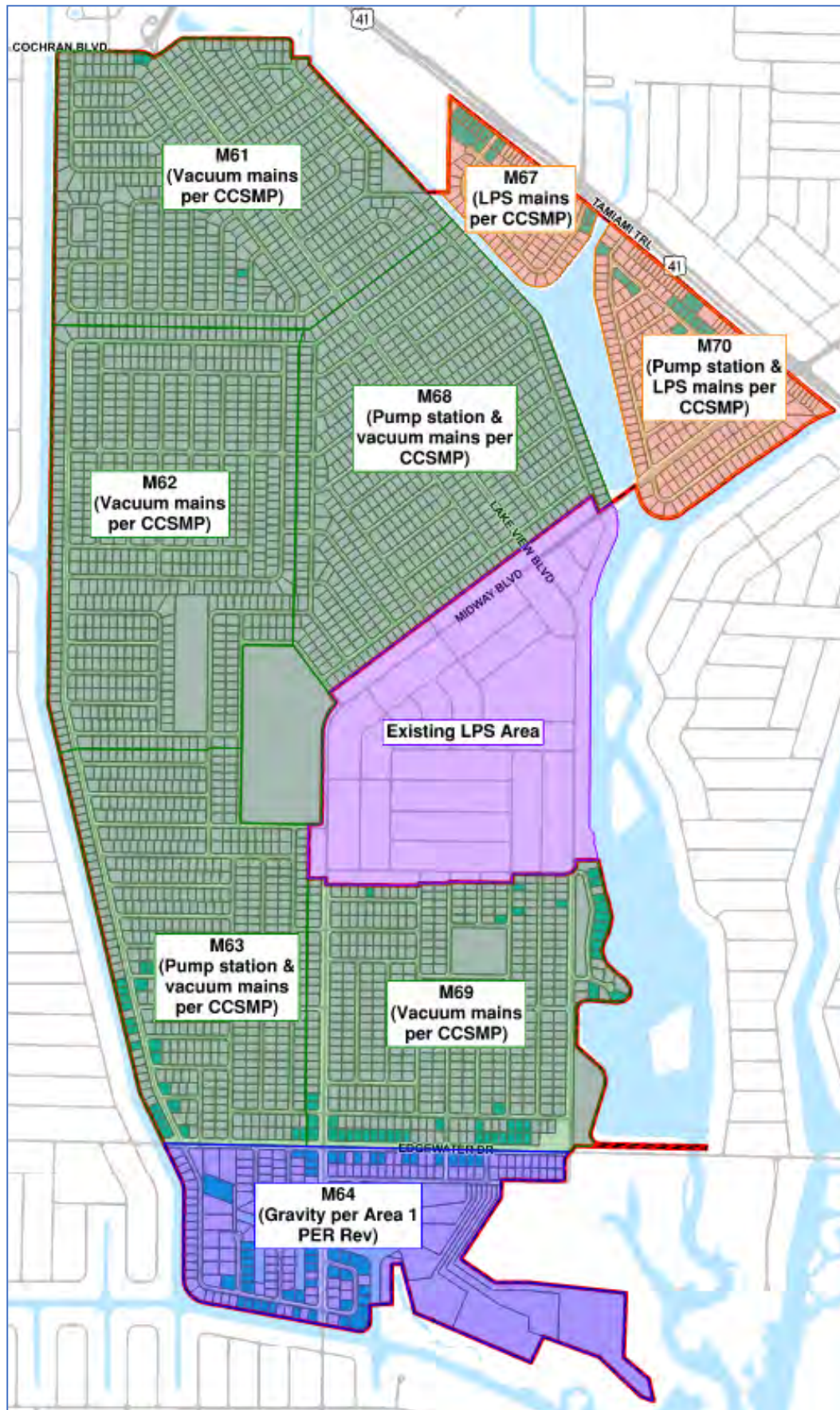
5.0 Development of Alternatives

The CCSMP developed recommendations for the specific project areas which comprise our project area for which type of collection system should be used to serve each area.

The CCSMP recommended that areas M61, M62, M63, M68, and M69 should be served with two vacuum collection systems and that areas M67 and M70 should be served with a pump station and low-pressure mains. Area M64 was originally intended to be served by the Ackerman Wastewater Expansion Phase 2 but was amended in the “Preliminary Engineering Report Update to FDEP Area 1 Preliminary Engineering Report” dated April 26, 2016, to recommend serving the area with gravity sewer instead of vacuum sewer due to existing sewer infrastructure and problematic bridge crossings. These areas and their recommended sewer systems are detailed on the following page.

Generally, we agree with the recommendations set forth by the CCSMP, but this report will further investigate the specific project areas to ensure that the best system or systems are selected for this project.

The following sections provide a brief overview of each type of central sewer system to be included in our analyses followed by an investigation into the project areas and the existing LPS area to determine which alternative is best for each location.



5.1 “Do Nothing”

5.1.1 General Description

This alternative would leave OSTDS systems in place “as-is” and allow on-site wastewater treatment to be handled only by OSTDS. Any centralized wastewater service expansion will only continue based on existing CCU policies.

5.1.2 Advantages & Disadvantages

5.1.2.1 Advantages

This alternative costs nothing, but it also does nothing to help improve water quality. The Health Department programs, policies, and procedures will dictate the ongoing inspection program. CCU will continue its current policy for line extensions and maintain its current standards for the operational performance of its existing systems.

5.1.2.2 Disadvantages

As identified in the CCSMP, there are environmental and ecological concerns relating to the status quo of OSTDS within the project area. The negative ecological impacts will likely continue to accumulate at the current rate.

The immediate cash outlay to most individual property owners will be minimized. However, future repair and replacement costs will be borne by the individual property owners and can be significant. These costs include the actual repair or replacement cost to upgrade to current standards as well as operation and permit fees at the time of replacement.

5.2 “Vacuum Sewer” Alternative

5.2.1 General Description

Vacuum collection systems rely on a central station providing energy (vacuum) in the collection pipe network pulling all flow to a central station and conveying the collected sewage to a wastewater treatment plant. Since the velocities are higher due to the vacuum propelling the flows, the main lines can be smaller as compared to a gravity system and typically range in size from 4” to 10” for an average system. In addition, because the vacuum-assisted sewage can be physically lifted (to a limit), the main lines do not have to be installed at excessive depths.

Vacuum main lines are normally installed at a depth of 3 to 6 feet, allowing them to be installed in the grass shoulder of the road network minimizing disruption of the pavement. Vacuum mains that cross side street intersections and gravity laterals from the valve pits cross the pavement using open-cut methods. Backfilling and restoration of the road at these trench crossings need to be restored to current standards.

Since the vacuum main is normally installed on one side of the road, typically only half of the driveways are impacted by the construction. Usually, the sod will need to be restored along the entire side of the main line, as well as portions of the opposite side of the roadway where the gravity lateral is installed.

Engineered custom vacuum stations are typically installed on a vacant lot and can be designed to blend into the neighborhood. These stations are constructed with concrete foundations, masonry walls, and a wood truss system, like a conventional residential home. These stations are suitable for both small and large service areas.

Inside the vacuum station are a series of vacuum pumps that pull air from the top of a large collection tank. The sewage from the collection lines drops to the tank bottom and when the appropriate level is reached, adjacent sewage pumps draw down the tank sewage discharging it into a force main that eventually goes to the treatment plant.

5.2.2 Advantages & Disadvantages

5.2.2.1 Advantages

Vacuum collection systems are advantageous in highly developed areas with high groundwater or hardpan/rock. Collection lines can be installed within the right-of-way (R-O-W) eliminating the need for total road reconstruction assuming the roads and rights of way are wide enough. More importantly, vacuum mains can be installed at shallower depths, generally from 3 to 6 feet in depth, minimizing dewatering during construction. Since velocities within the pipes will be much higher than in a gravity system, the collection pipe diameter can be reduced using 4", 6", and 8" mains.

One vacuum station can serve up to 2,500 ERCs, replacing multiple gravity lift stations. With one central station, there is no need for electrical connections or individual pumps at each home. Moreover, only one large generator is needed to run the entire station during a power outage event rather than multiple generators at multiple gravity lift stations or individual generators at every LPS pump.

The O&M of vacuum systems is relatively clean because it is a sealed airtight system and the operators do not need to enter manholes or wet wells to maintain the system operation. In the event of a leak, the negative pressure (vacuum) assures that sewage is pulled into the system rather than pushed out, making large-scale environmental spills virtually nonexistent on the collection mains within the system.

5.2.2.2 Disadvantages

Vacuum systems are normally not cost-competitive for independent small areas, primarily because of the cost of the central station. Operation and maintenance (O&M) costs are higher for small areas than for gravity systems because energy is needed to assist the sewage flow. Pipe slopes and tolerances are critical during the installation process.

Although small areas can be placed online and construction divided into phases if only the first phase is implemented then funds must be fronted to carry the cost of the vacuum station until future phases are assessed. Operations and maintenance personnel who are not familiar with a vacuum system may be reluctant and concerned with their first system.

Street repairs will be a patchwork of overlays rather than a completely new roadway.

5.3 “Low-Pressure Sewer” Alternative

5.3.1 *General Description*

Low-pressure systems consist of relatively small diameter pipes normally installed in the road shoulder, with individual pumping units at each home or parcel to convey the sewage to a central station. Generally, the low-pressure units cannot overcome the higher pressures in a transmission network and therefore an intermediate master pump station is necessary.

Since the LPS mains are under pressure, the velocities are higher than gravity mains, meaning that the pipe sizes can be considerably smaller to convey the equivalent amount of flow. Moreover, because the mains are under pressure, they can be installed in the shoulder areas at a minimal depth making installation relatively easy and inexpensive.

5.3.2 *Advantages & Disadvantages*

5.3.2.1 *Advantages*

Low-pressure systems are inexpensive to install in the right-of-way because pipes can be smaller in diameter and pipe slopes are not as critical as vacuum or gravity. Road disruption is minimized.

Low-pressure sewer is advantageous in areas with high groundwater and level lands. It is also well suited to areas bisected by canals, as the sewage can be pumped up and over bridges and obstacles as well as under canals and water courses. Main lines can be installed shallow and pipe elevations or slope is not critical to their installation. Both vertical and horizontal alignment is more flexible than other collection systems.

5.3.2.2 *Disadvantages*

Low-pressure sewer systems require the installation of a pump at each parcel or property. During power outages, each pump should have a backup generator or special arrangements made to pump out systems, so they do not back up. Charlotte County was recently impacted by Hurricane Ian which caused county-wide power outages that lasted for several days. During this time, CCU received numerous calls from LPS customers experiencing issues with sewer backups. It is problematic to supply each pump with an individual generator and maintain operations for an extended period and is generally not a practical solution during the aftermath of a disaster.

Operation and maintenance costs for low-pressure systems are normally considerably more than other collection systems that have only one central pump station with only a few larger pumps. Pump stations that receive flow from LPS systems generally require increased odor control measures and may deteriorate faster due to the hydrogen sulfide gases produced. LPS systems are prone to hydrogen sulfide production because of the small diameter pipes and low velocities.

5.4 “Gravity Sewer” Alternative

5.4.1 General Description

A gravity sewer network generally consists of 8” gravity mains normally installed at a slope of 0.4% (CCU uses a slighter flatter slope) with manholes spaced at bends and intersections at intervals of no more than 400 feet. In addition to the main slope, there is normally a 0.1-foot drop between inverts at each manhole. All mains eventually lead to a lift (pump) station. Each pump station has a receiving wet well that collects the sewage from the pipe system. Normally, two (duplex) pumps transmit the collected sewage through force mains that are connected to the existing force mains, which eventually discharge to the wastewater treatment plant (WWTP).

Depths of the gravity collection mains are assumed to range from about 4 feet of cover at the terminal manhole to about 15 feet of cover at the pump station. Gravity main depths greater than 16 feet can be problematic and expensive to install. Using the slope and depth parameters as well as the drop losses across each manhole, a practical planning level length of the pipe/manhole’s longest run from the lift station to the last manhole is approximately 2,500 feet.

While short and shallow runs of gravity mains and manholes can be installed in the grass shoulder, any installation over about 8 feet in depth will affect the existing pavement. Installing gravity mains at deeper depths requires the road asphalt base and subbase to be completely excavated and replaced. If the main line is placed in the center of the road, impacts on the driveways are assumed to be eliminated. Restoration consists of the rebuilding of the roads and the establishment of grass or sod along the shoulders where the laterals are installed.

5.4.2 Advantages & Disadvantages

5.4.2.1 Advantages

Gravity sewers do not require individual pumps at each parcel, nor do they require vacuum assistance to convey flow. Since gravity drives the flow, they are the most efficient regarding electrical costs for sewage transport. Gravity sewers are most advantageous in new subdivisions or where the roads are scheduled to be reconstructed after the installation of the pipe system. Additionally, since gravity sewers serve fewer homes (per pump station) as compared to a large vacuum system, smaller projects can be bid on and independently completed.

In addition to having a brand new utility collection system, there is also the benefit of having a brand new road system that aesthetically looks nicer than a series of trench repairs and overlays typical for a vacuum sewer installation. Operations staff are familiar and comfortable with gravity systems.

5.4.2.2 Disadvantages

The biggest challenges associated with installing a conventional gravity sewer system include deep excavation depths, conflicts with other existing utilities, rock, or marl excavation and replacement with suitable soils, dewatering during construction, and entire road reconstruction. In relatively flat areas, gravity mains must be installed at significant depths to maintain the minimum grade needed for flow.

6.0 Selection of Alternatives

The “do nothing” alternative was not considered a viable option for any of the areas due to the apparent water quality issues and concerns raised by the CCSMP. No further analysis was performed on this option.

6.1 Areas M61, M62, and M68

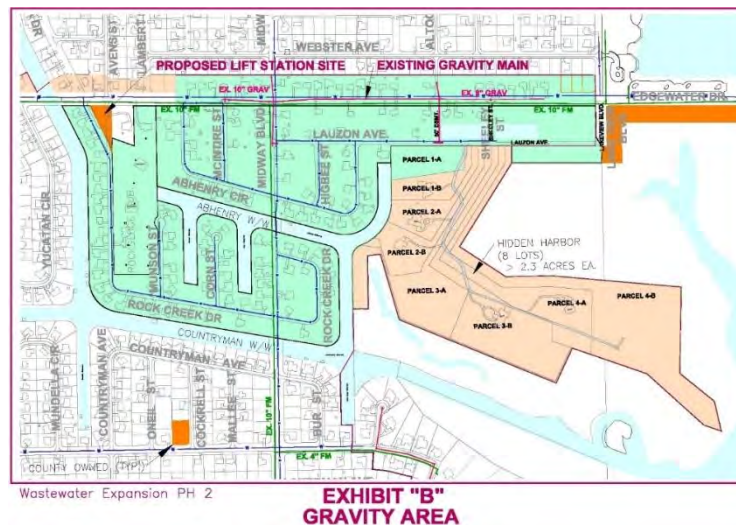
The CCSMP recommended that the three northern areas, M61, M62, and M68, should be served by a vacuum system with one central vacuum station. We believe, based on a preliminary review of the proposed vacuum area, that a vacuum system is certainly feasible. There are no major conflicts, such as bridge crossings, to contend with and the longest vacuum main length from the proposed vacuum station site at 700 & 712 Chevy Chase Street is approximately 7,000 feet. Therefore, based on these findings and the CCSMP conclusions, we concur with the recommendation to use vacuum.

6.2 Areas M63 and M69

The CCSMP also suggested that areas M63 and M69 should be served by a vacuum system with one central vacuum station. A preliminary review of the proposed vacuum area determined that a vacuum system of this size should be feasible for this area as there are no major conflicts anticipated and the longest vacuum main length from the proposed vacuum station site at 155 & 161 Grenada Street is approximately 7,500 feet. Therefore, based on these findings and the CCSMP conclusions, we concur with the recommendation to use a vacuum system.

6.3 Area M64 Analysis

This area located south of Edgewater Drive was initially intended to be served by the Ackerman vacuum sewer system but was removed from the service area due to problematic bridge crossings. A revision to the “*Area 1 Preliminary Engineering Report*” recommended serving the area with gravity. The area shown in green on the exhibit from the updated report designates the properties proposed to be served by gravity. The southeast area in orange, known as “Hidden Harbor”, was proposed as a future area to be served. Due to the large parcel sizes and relatively newer age of septic systems, this area was considered to be a lower priority at that time.



Due to the unique features of the M64 area such as the canals, existing sewer infrastructure, and the “Hidden Harbor” service area, we have subdivided the area further to analyze each sub-area on a case-by-case basis as follows.

6.3.1 Sub-Area 1: Rock Creek Drive

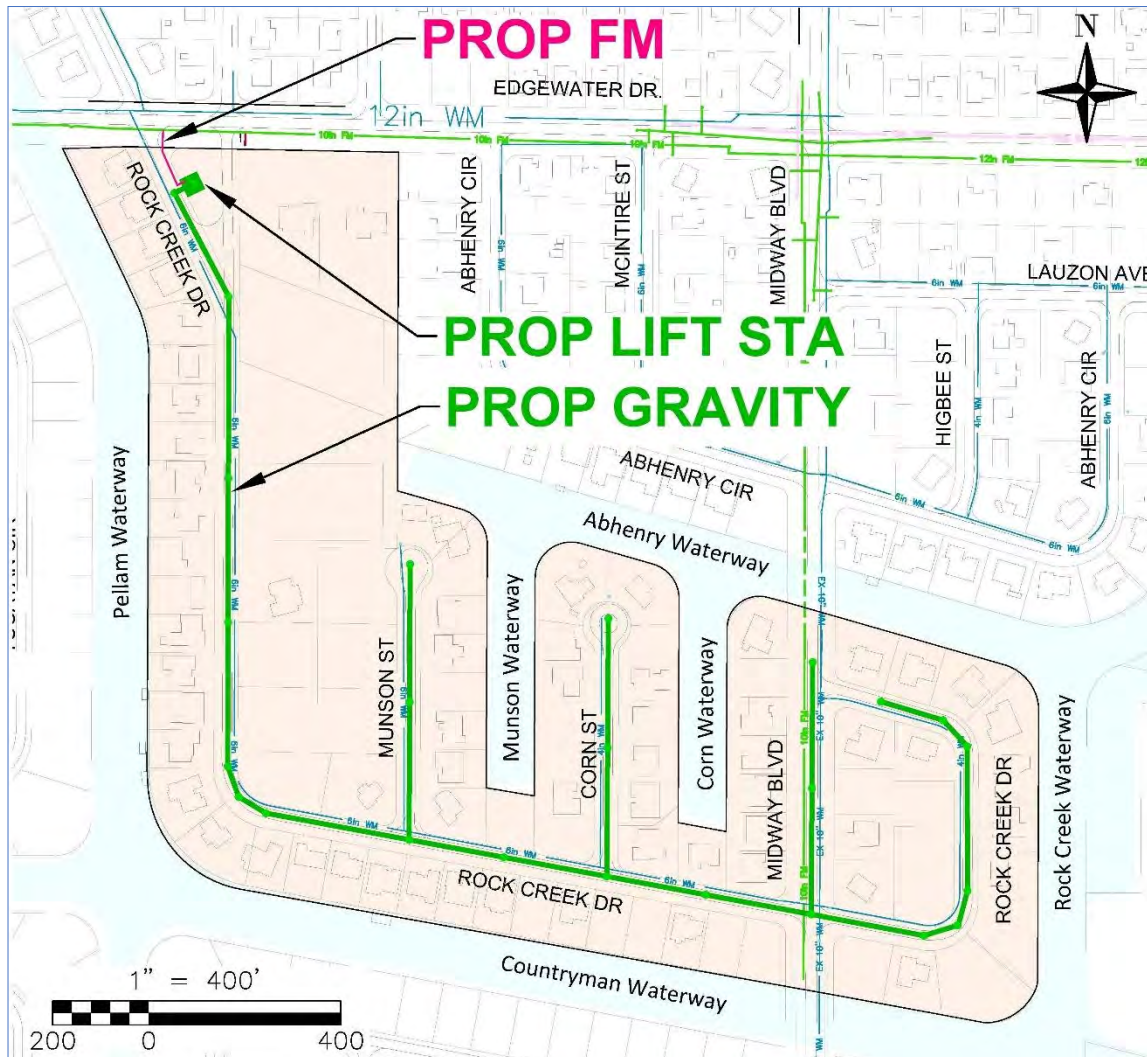
The three alternatives for this area are:

- Do nothing
- Extend vacuum sewer
- Gravity sewer

6.3.1.1 Gravity

The revision to the Area 1 PER recommended serving the Rock Creek Drive area with a new lift station and gravity sewer. The report identified land already owned by the County to be used as a lift station site.

A conceptual gravity layout for the Rock Creek area using the County owned site is shown below:



A summary of the estimated costs for the gravity system is tabulated below:

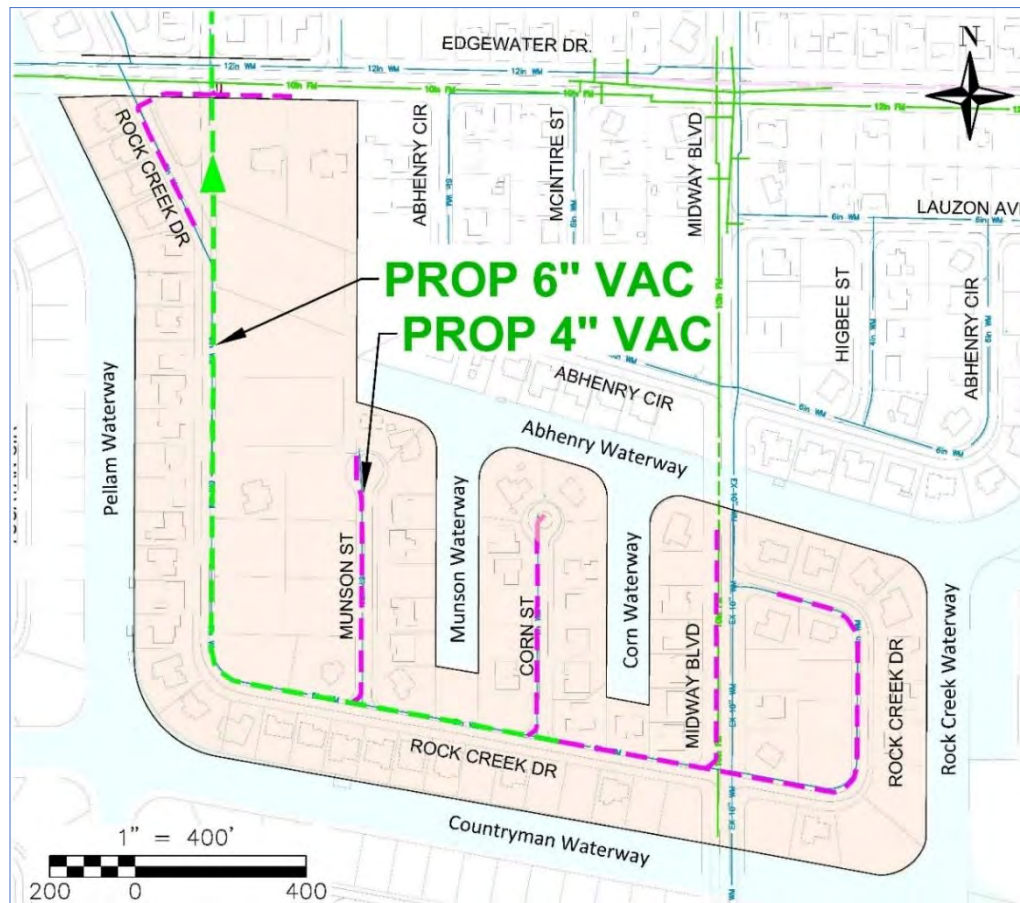
Area M64 - Rock Creek Drive Analysis	
	Gravity
Base Cost	\$2,364,484
(+) Present Worth O&M	\$180,170
(-) Present Worth Salvage Value	\$83,378
= Net Present Value	\$2,461,276

6.3.1.2 Vacuum

Based on reasonable preliminary design limitations of vacuum sewers of maximum line lengths of 10,000 feet with no major conflicts (i.e. canals, bridge crossings), we believe the Rock Creek area can be reached by the proposed vacuum station on Grenada Street. The maximum line length from the vacuum station to reach this area, approximately 7,600 feet, is well within the preliminary design limits and there are no major conflicts anticipated.

We suspect that extending vacuum mains to serve this area will be easier to construct than installing a gravity sewer system in this low-lying area surrounded by water. Excavation depths are expected to be deep and dewatering costs will be significant.

A conceptual vacuum layout for the Rock Creek area is shown below:



A summary of the estimated costs for the vacuum system extension is tabulated below:

Area M64 - Rock Creek Drive Analysis	
	Vacuum
Base Cost	\$2,085,473
(+) Present Worth O&M	\$120,114
(-) Present Worth Salvage Value	\$75,794
= Net Present Value	\$2,129,792

A complete summary of the analysis of the estimated costs for each alternative considered is located in Appendix K.

6.3.2 Sub-Area 2: Abhenry Circle

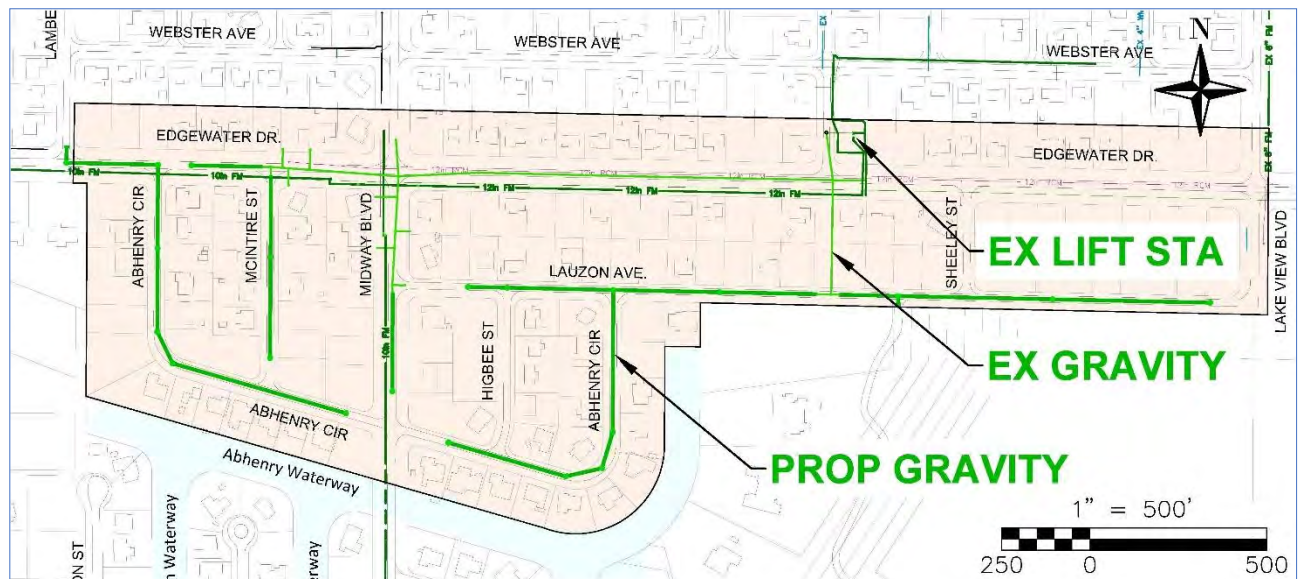
The three alternatives for this area are:

- Do nothing
- Extend vacuum sewer
- Extend gravity sewer

6.3.2.1 Gravity

The revision to the Area 1 PER also recommended that this area be served by extending the existing gravity sewer main on Edgewater Drive to service the homes within this sub-area. Since there is already an existing lift station, LS 139, and gravity sewer infrastructure in place, this alternative is logical and cost-competitive.

A conceptual gravity extension layout for the Abhenry Circle area is shown below:



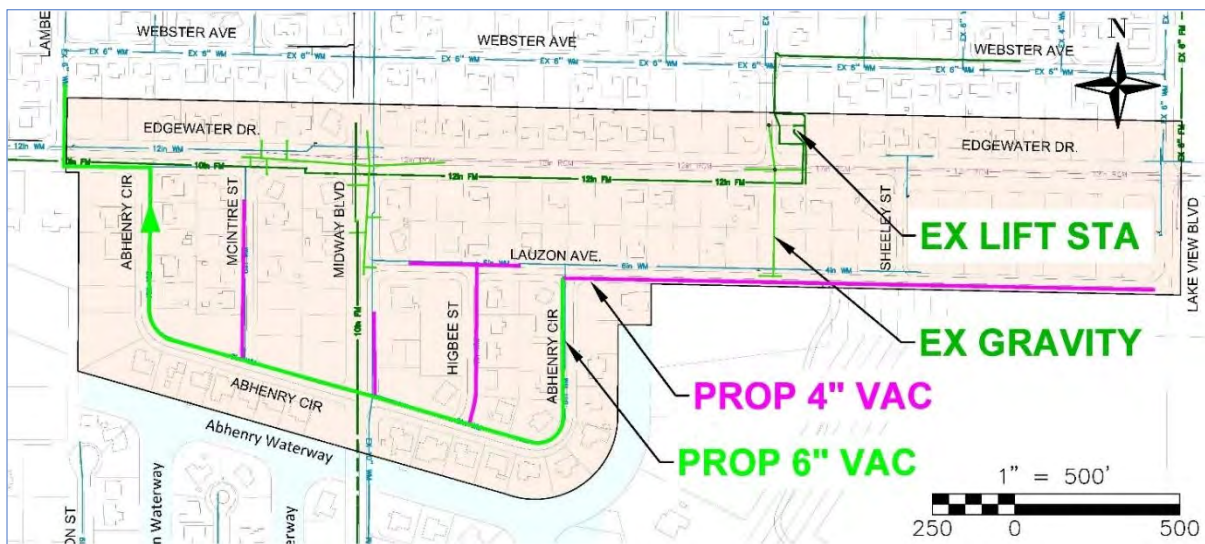
A summary of the estimated costs for the gravity system extension is tabulated below:

Area M64 - Abhenry Circle Analysis	
	Gravity
Base Cost	\$1,969,762
(+) Present Worth O&M	\$58,341
(-) Present Worth Salvage Value	\$72,081
= Net Present Value	\$1,956,022

6.3.2.2 Vacuum

It is also possible to extend vacuum mains from the southern vacuum system to service this area as discussed in the Rock Creek Drive area. The maximum distance from the proposed vacuum station, approximately 8,700 feet, is reasonable to assume the vacuum hydraulics should be within the required limits; however, final hydraulic losses should be verified if selected.

A conceptual vacuum layout for the Abhenry Circle area is shown below:



A summary of the estimated costs for the vacuum system extension is tabulated below:

Area M64 - Abhenry Circle Analysis	
	Vacuum
Base Cost	\$1,896,024
(+) Present Worth O&M	\$113,250
(-) Present Worth Salvage Value	\$71,068
= Net Present Value	\$1,938,206

A complete summary of the analysis of the estimated costs for each alternative considered is located in Appendix K.

6.3.3 Sub-Area 3: Hidden Harbor

The three alternatives for this area are:

- Do nothing
- Extend gravity sewer – LPS hybrid
- Low-pressure sewer

Hidden Harbor is a unique area in the project boundary because this subdivision has large lots (over two acres), and private accesses, and is relatively low-lying although the homes are elevated. Also, the area is unique because each lot technically fronts Lauzon Avenue but the houses are actually set back a substantial distance and only accessible by the common private road which crosses each parcel and appears to be shared by the residents. The logistics and rights of easements and agreements needed to serve the parcels are not considered in this report, but a comparative analysis between system types was performed to recommend a collection system alternative.

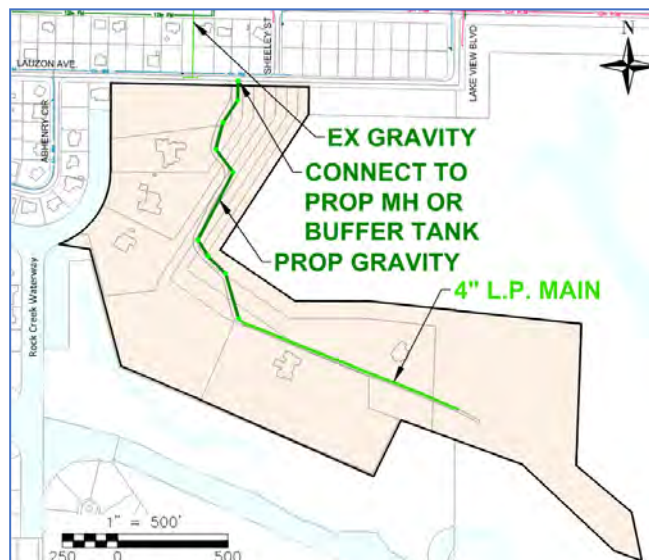
6.3.3.1 Vacuum

First, we do not think we can serve this area with the southern vacuum station. The longest line length required (to minimize multiple major road crossings) is nearly 10,000 feet which can only be achieved in a perfectly flat area with no additional conflicts. We suspect that based on our experience with vacuum sewer design and the elevation difference between the vacuum station and the end of the line that this area would be better served by an alternative system. Also, it is generally not cost-effective to extend vacuum mains an additional 2,300 feet to serve only 8 parcels.

6.3.3.2 Hybrid Gravity – LPS

If a gravity system is selected for Abhenry Circle, this proposed system could be extended to serve Hidden Harbor. Based on a preliminary conceptual design, gravity mains could be extended about 1,200 feet before becoming too shallow. From the last manhole, a low-pressure sewer main would be needed to reach the remaining parcels. This option is the hybrid gravity – LPS alternative.

A conceptual layout for the hybrid gravity – LPS system is shown below:



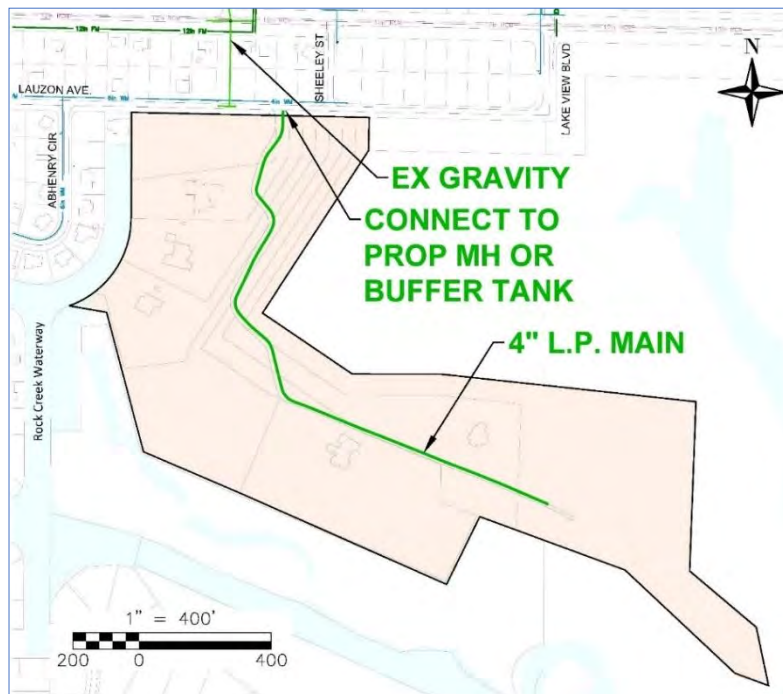
A summary of the estimated costs for the hybrid gravity – LPS system is tabulated below:

Area M64 - Hidden Harbor Analysis	
	Gravity - LPS
Base Cost	\$486,378
(+) Present Worth O&M	\$25,739
(-) Present Worth Salvage Value	\$18,058
= Net Present Value	\$494,059

6.3.3.3 Low-Pressure

Regardless of the system type selected for Abhenry Circle, a low-pressure system can be used to serve Hidden Harbor and can tie into the selected system as required.

A conceptual layout for the LPS system is shown below:



A summary of the estimated costs for the LPS system is tabulated below:

Area M64 - Hidden Harbor Analysis	
	LPS
Base Cost	\$192,930
(+) Present Worth O&M	\$46,330
(-) Present Worth Salvage Value	\$8,352
= Net Present Value	\$230,907

A complete summary of the analysis of the estimated costs for each alternative considered is located in Appendix K.

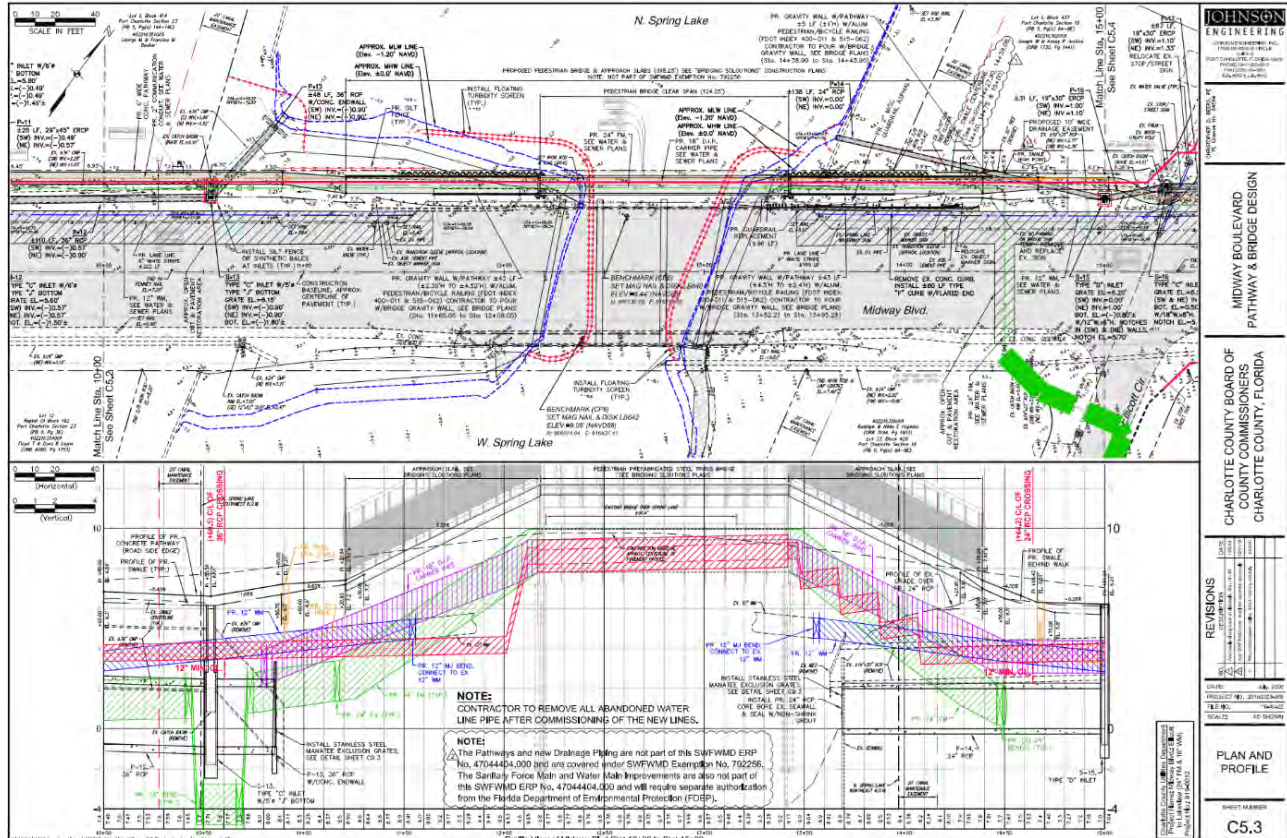
6.4 Areas M67 and M70 Analysis

These two areas are relatively small, isolated regions in the northeast area of the project boundary that the CCSMP had intended to serve with low-pressure sewer systems. These areas were chosen to do additional research on and the systems that were selected to compare are:

- Do nothing
- Vacuum sewer
- Low-pressure sewer
- Gravity sewer

6.4.1.1 Vacuum

We investigated the feasibility of extending vacuum mains from the proposed vacuum station serving areas M61, M62, and M68 to also serve areas M70 and M67. We performed a preliminary hydraulic analysis to estimate the static losses incurred from the bridge crossing on Midway Boulevard and standard maintenance lifts to keep the vacuum mains relatively shallow. Based on the pedestrian bridge design plans provided by Johnson Engineering, we estimated that four 1.5-foot lifts are needed to cross the bridge. In addition to the bridge lifts, we estimate that at least eleven maintenance lifts would be needed along the main run which would exceed the recommended allowable static loss limits. This analysis also assumes that the area is relatively flat and does not consider any unforeseen conflicts that may result in additional lifts. For these reasons, we do not believe it is achievable to extend vacuum mains across the bridge to serve this area.



An alternative option to provide vacuum sewer service to areas M67 and M70 was also considered. There are approximately 300 ERCs in these two areas which makes the combined area a viable candidate for a small custom-engineered vacuum station. A vacuum station located on county-owned land at 660 N Ellicott Circle can certainly serve the M70 area and we believe that it can also serve Area M67. To serve M67 with the vacuum station, a vacuum main bridge crossing will be needed. It is not usually preferred to cross bridges with vacuum mains because they use up a lot of static loss in the line and they are difficult to install because of the specific slope requirements of vacuum mains. In this specific instance, however, we believe that we can cross the “US 41 over Sunset Canal” bridge and serve the M67 area without exceeding static loss limitations. The bridge is relatively flat (see the below image) and the vacuum main length is around 4,000 feet which allows flexibility in additional lifts to cross the bridge.

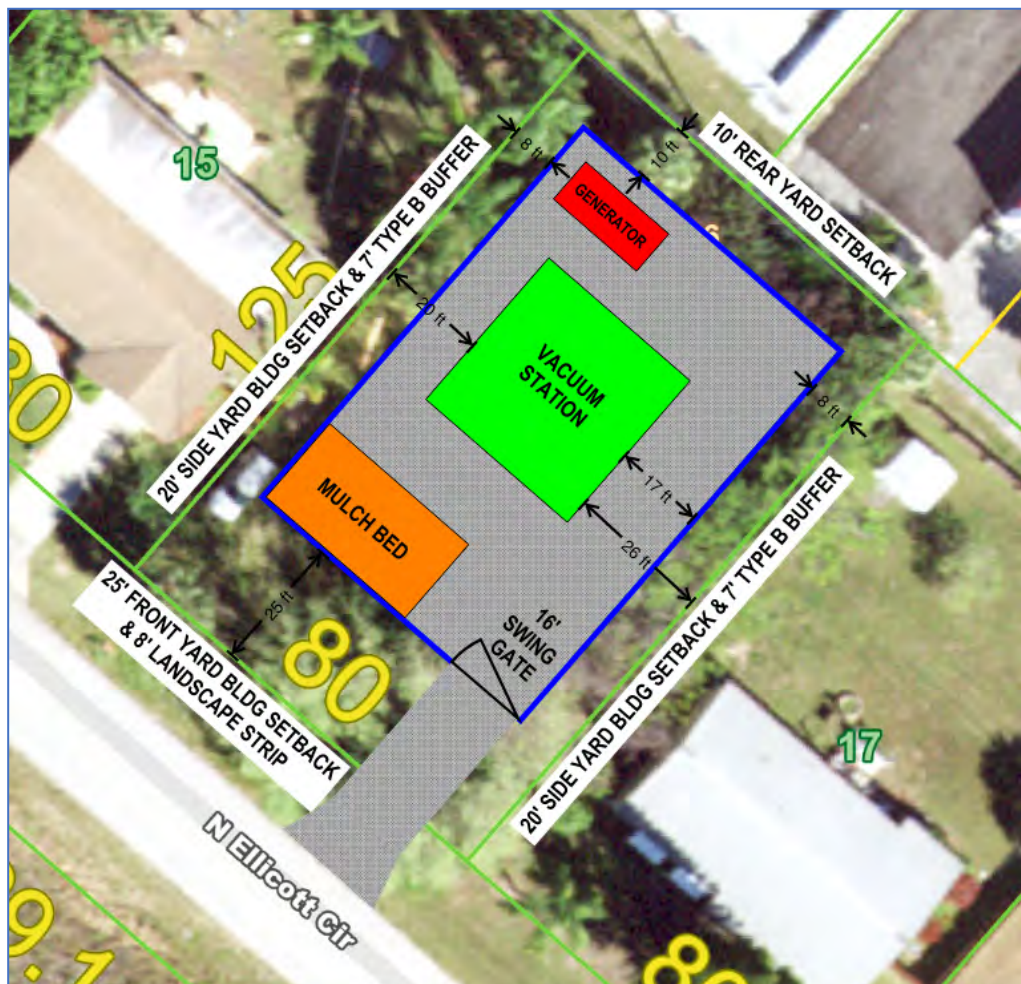


We do not recommend installing vacuum mains along the parcels fronting US-41. There is a limited amount of space, it is along an FDOT roadway, and many businesses would be significantly impacted. There are some existing LPS mains along US-41 and there is an existing 6" force main stub-out that can be extended to serve the remainder of the businesses fronting US-41. We believe it would be less disruptive and more cost-effective to serve the businesses along US-41 with LPS instead of a vacuum system which is more difficult to install. In general, commercial properties with frontage on US-41 will not be served with the vacuum system, rather they will connect to existing or proposed LPS mains. There are some residential properties connected to an existing LPS main

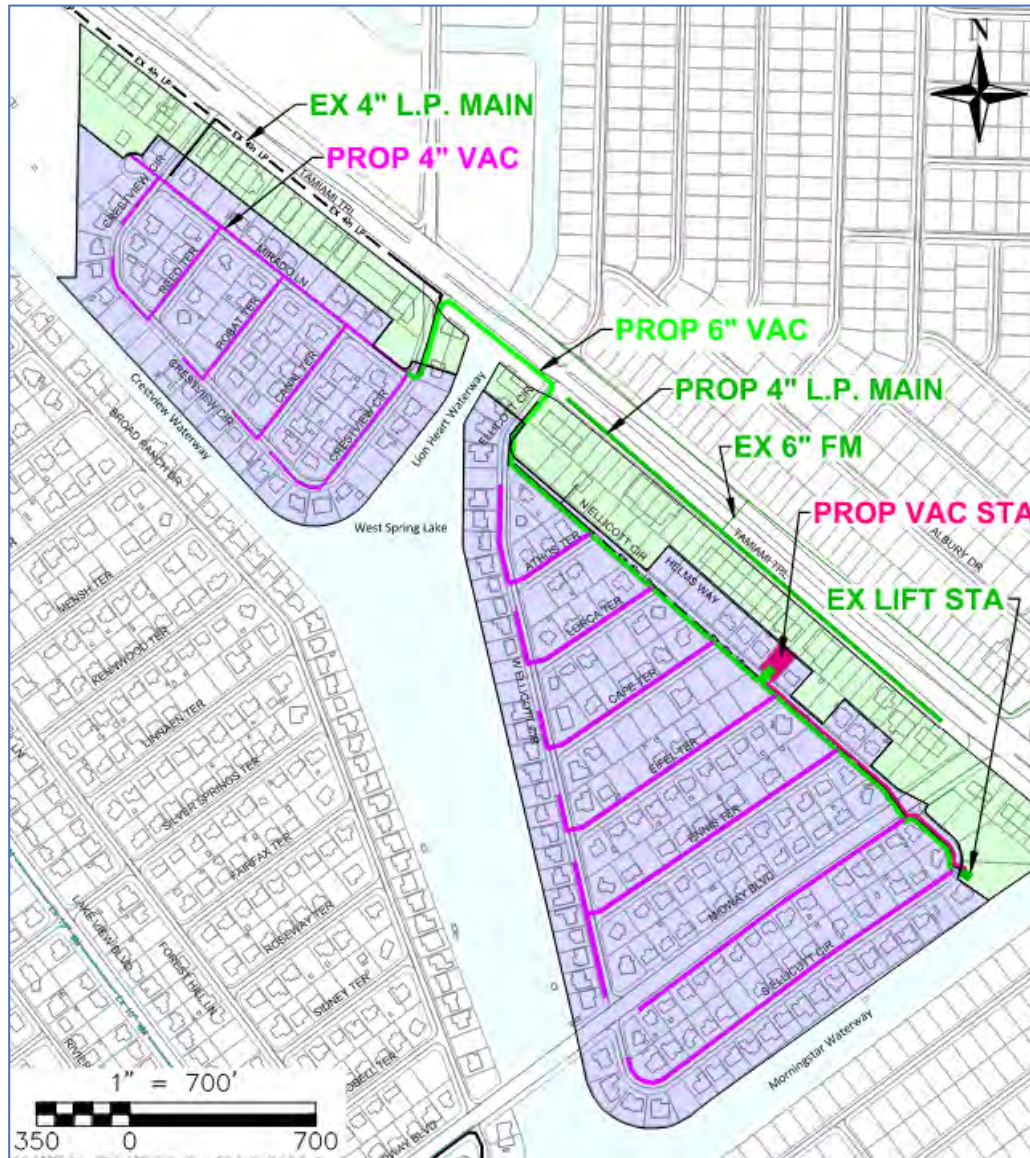
which would be re-connected to the vacuum system. The intent is to minimize the number of properties connected to LPS where feasible.

The proposed site for the vacuum station is a single standard residential lot located within the US 41 zoning district overlay. Based on our review of the Charlotte County Code of Ordinances (dated December 14, 2022), we believe a pump station is a permitted use on the lot as long as it is developed within the requirements stated in Section 3-9-49 of the Code in addition to the County site planning process. There are more stringent yard setback requirements for the overlay district, but we think the lot could still work since the station will be smaller than a standard vacuum station. Currently, we estimate that the station would be sized and look similar to the Spring Lake Wastewater Expansion Contract D vacuum station. We suspect that the pit which holds the tank may not need to be as deep as a typical vacuum station which would result in additional cost savings.

We created a preliminary conceptual layout to determine if the vacuum station can reasonably be built with consideration to the assumed zoning district overlay requirements (Section 3-9-49), buffer requirements (Section 3-9-100), and the assumption that the proposed wall is permitted to be placed within the required yards (Section 3-9-5.3). If these assumptions are correct, we think the site could work as conceptually shown below.



A conceptual layout for the vacuum system is shown below:



A summary of the estimated costs for the vacuum system is tabulated below:

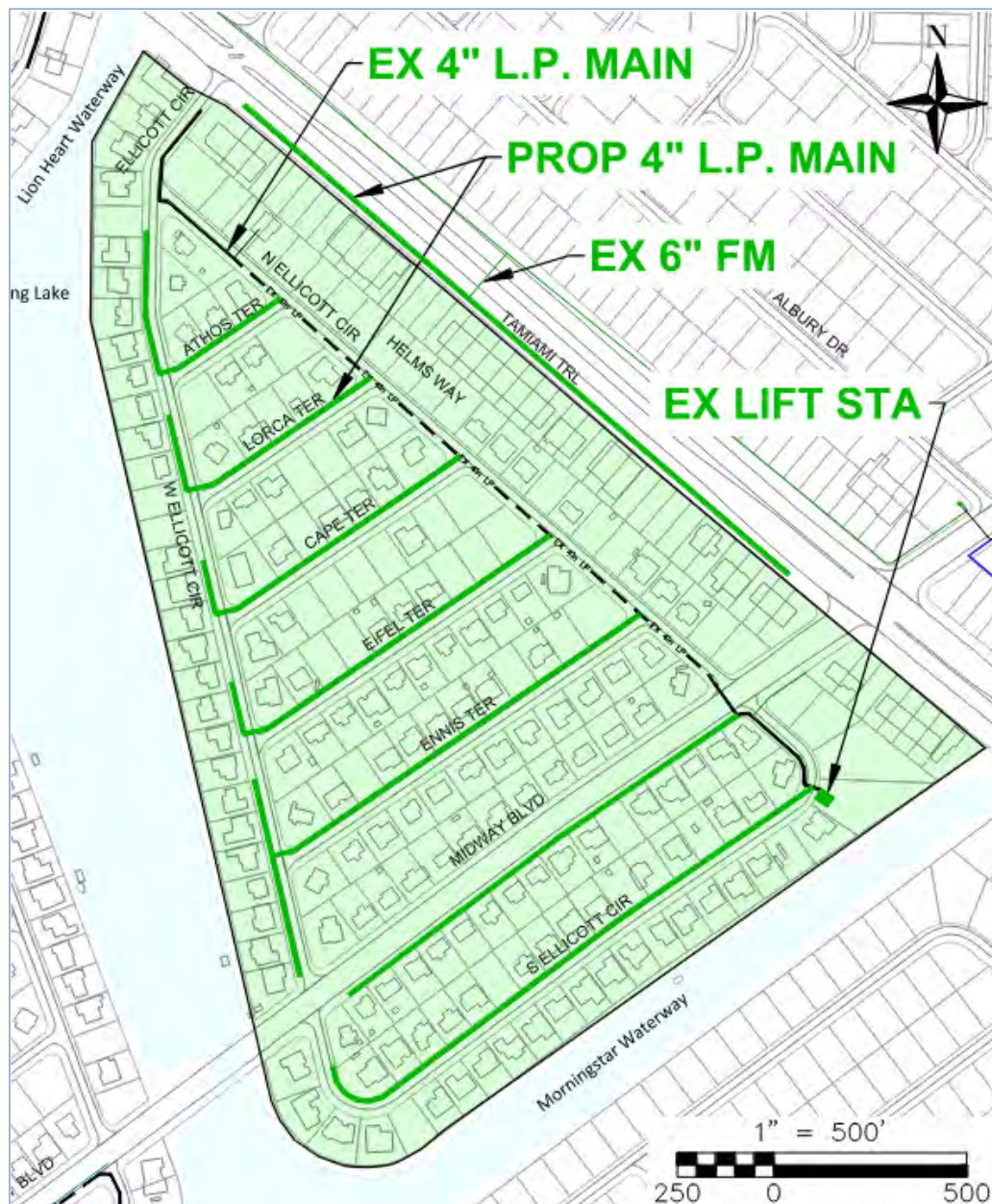
Areas M67 & M70 Analysis	
	Vacuum
Base Cost	\$6,374,844
(+) Present Worth O&M	\$610,863
(-) Present Worth Salvage Value	\$211,068
= Net Present Value	\$6,774,639

6.4.1.2 Low-Pressure

Both areas M67 and M70 have some existing low-pressure mains which can be extended to serve the remaining properties.

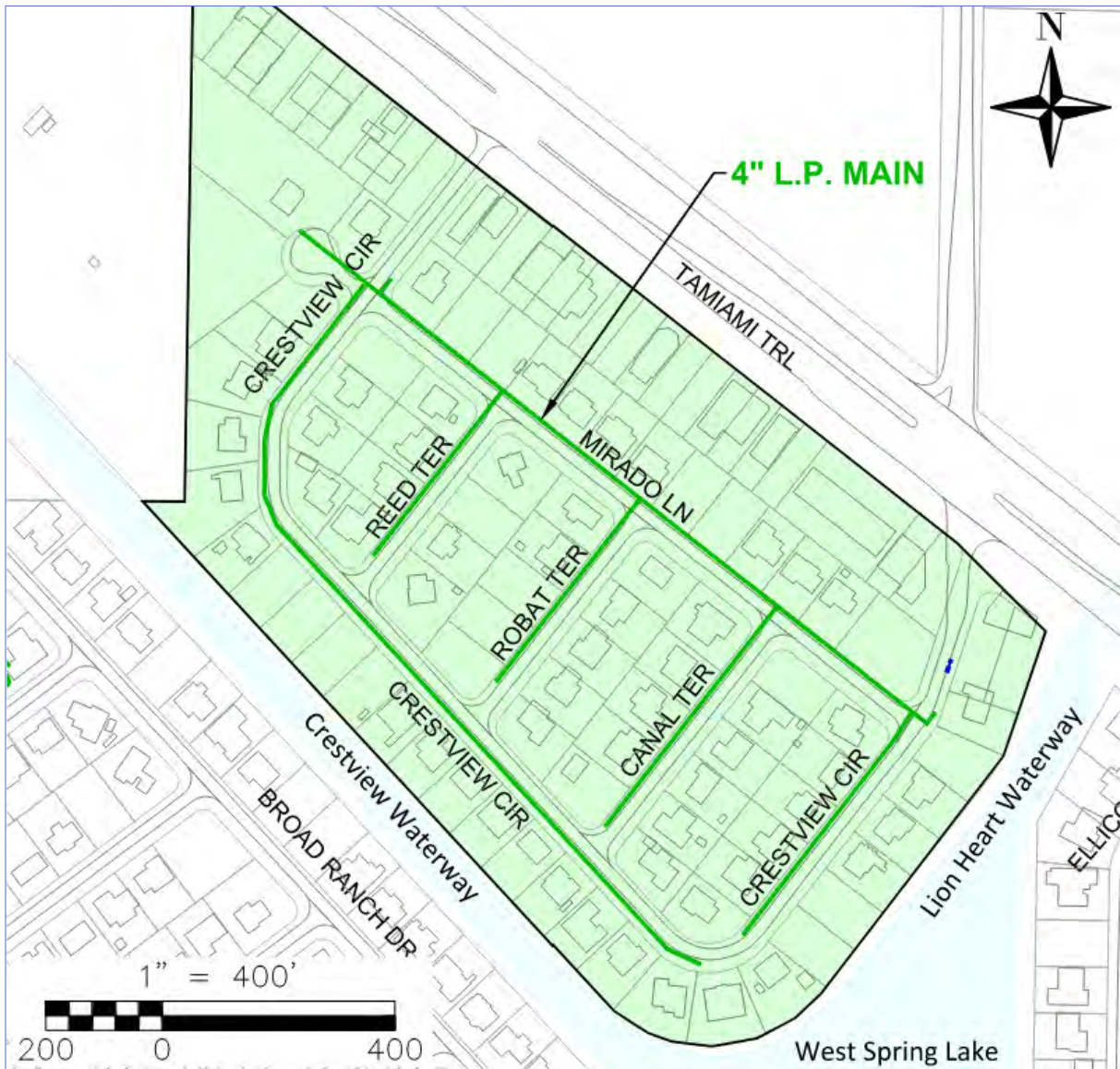
For Area M70, the existing 4" line is served by LS 93 and CCU confirmed that this lift station is sized to receive the flow from this area.

A conceptual layout for the Area M70 LPS extension is shown below:



In Area M67, there is an existing 4-inch low-pressure sewer main stub-out along Crestview Circle that is served by existing LS 41. CCU confirmed that this lift station is capable of receiving the flow from Area M67.

A conceptual layout for the Area M67 LPS extension is shown below:



A summary of the estimated costs for the LPS extension option is tabulated below:

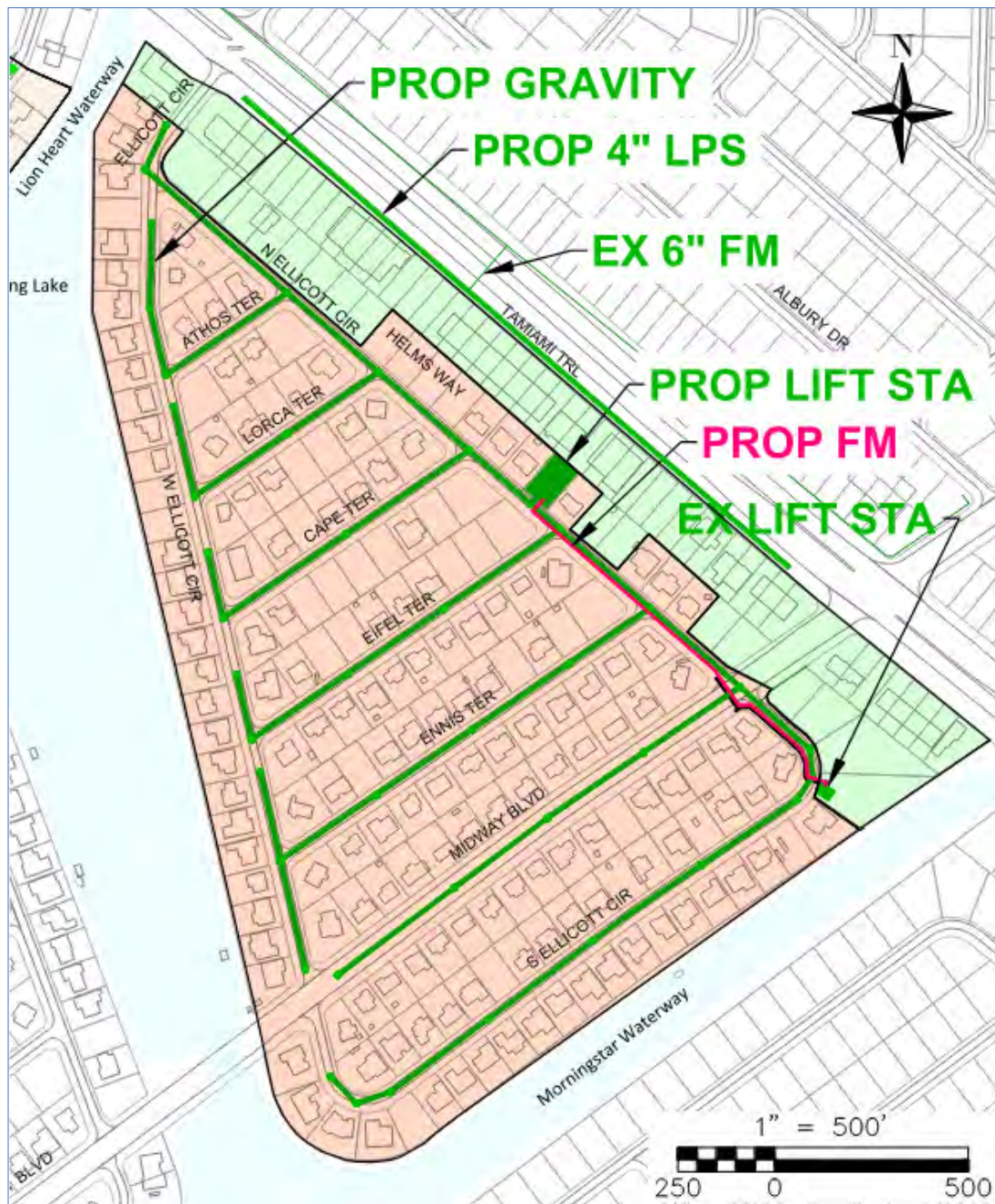
Areas M67 & M70 Analysis	
	LPS
Base Cost	\$4,317,219
(+) Present Worth O&M	\$996,943
(-) Present Worth Salvage Value	\$108,529
= Net Present Value	\$5,205,632

6.4.1.3 Gravity

We analyzed using two individual gravity systems to provide sewer service to the M67 and M70 areas. There is a county-owned lot in each area which is suitable for the proposed lift stations.

The Area M70 lot is located at 660 N Ellicott Circle. The longest line length from this site is approaching 2,600 feet which would likely require deeper gravity installation and/or reduced cover requirements. Another option is to extend a gravity main from the existing LS 93 to reach the homes which are furthest from the proposed lift station. For this comparative analysis, we assumed that one lift station was feasible.

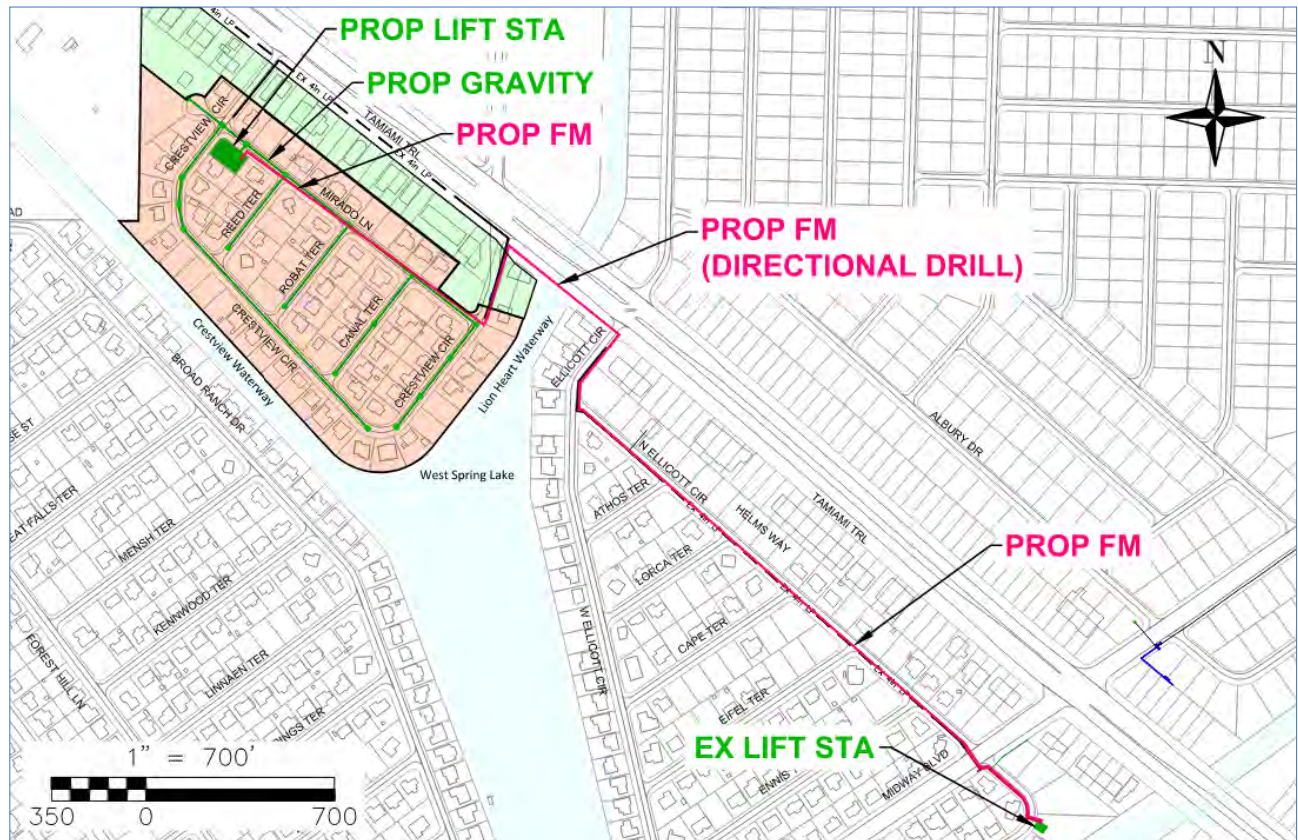
A conceptual layout for the gravity system is shown below:



The properties fronting US-41 are planned to be served with LPS. We have proposed LPS for these parcels because a gravity system along US-41 is not feasible. Installing a gravity system within FDOT ROW would be expensive and difficult to construct with all of the existing utilities and would cause hardships to the businesses fronting the road. Installing LPS is less disruptive and more cost-effective.

We believe that the M67 area can be served with one gravity lift station located on the County owned parcel at 781 Mirado Lane. Through discussion with CCU, it was determined that it would be preferred to send the flow from the proposed lift station to the existing LS 93.

A conceptual layout for the M67 gravity system is shown below:



A summary of the estimated costs for the Areas M67 and M70 gravity systems is tabulated below:

Area M67 & M70 Analysis	
	Gravity
Base Cost	\$7,118,244
(+) Present Worth O&M	\$356,909
(-) Present Worth Salvage Value	\$265,702
= Net Present Value	\$7,209,451

A complete summary of the analysis of the estimated costs for each alternative considered is located in Appendix K.

6.5 Existing LPS Area

Although not within the MSBU (not SRF funded), CCU has requested that we investigate the feasibility of converting the existing LPS system to the east of Kiwanis Park to vacuum sewer due to aging infrastructure, high operation and maintenance costs, and CCU system preference.

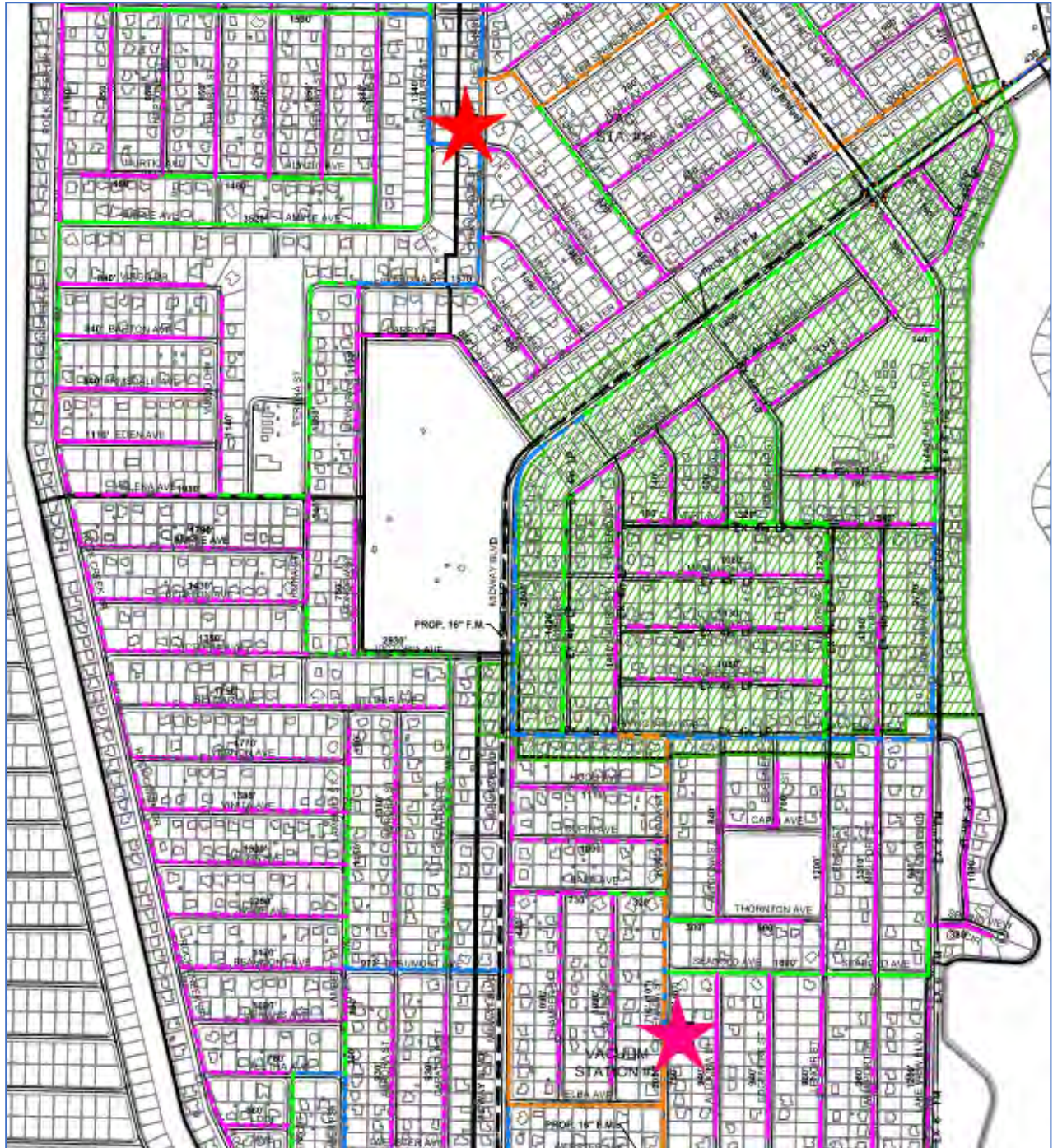
The existing LPS system is shown below:



6.5.1.1 Vacuum

Based on the location of the existing LPS area between the two proposed vacuum stations, we believe this area can be served from either or both vacuum stations. However, we recommend sending the flow to the southerly vacuum station because there are fewer ERCs planned to be served by that station and it will eliminate the need to install large vacuum mains across Midway Boulevard. This will result in two conventional, similarly sized vacuum stations.

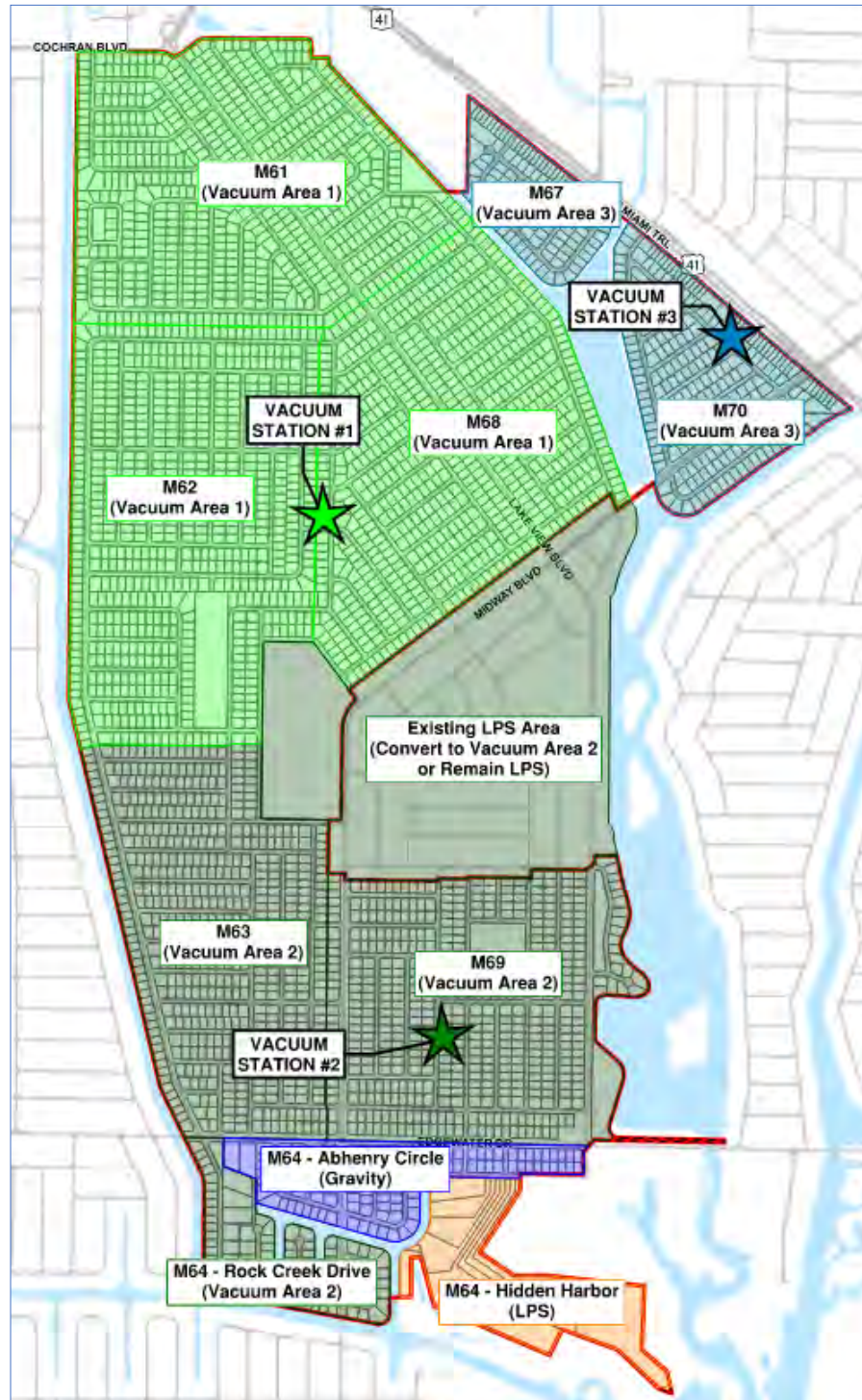
A conceptual vacuum layout for the existing LPS area is shown on the following page.



7.0 The Selected Plan

7.1 Description of Proposed Facilities

A combination of primarily vacuum sewer and some gravity sewer and LPS is the recommended alternative for providing centralized wastewater service to the Lake View – Midway area as designated below.



We recommend the installation of three vacuum collection systems and the extension of the existing gravity infrastructure to serve the Lake View – Midway area.

In accordance with the CCSMP and our preliminary review of the planned vacuum area, we recommend one vacuum area in the northern region to serve areas M61, M62, and M68 with a vacuum pump station located at 700 and 712 Chevy Chase Street (Vacuum Station #1).

Similarly, the CCSMP proposed a southern vacuum station to serve areas M63 and M69. We recommend proceeding with this proposed concept with the vacuum station located at 155 and 161 Grenada Street (Vacuum Station #2). Additionally, we recommend extending vacuum service to the M64 – Rock Creek Drive area which was found to be slightly more cost-effective than installing a new gravity system. Additionally, serving Rock Creek Drive with vacuum eliminates the need for an additional pump station to maintain.

For areas M67 and M70, we recommend serving the areas with a smaller conventional vacuum station (Vacuum Station #3). This option is more expensive than extending existing low-pressure mains, but we believe that it will provide the best service to the residents and it is aligned with CCU sewer system preferences. Installing two new gravity systems by comparison only costs slightly more than a small vacuum system, but we are recommending the vacuum system because there is only one pump station to maintain and one generator to supply power to the whole system (compared to two gravity lift stations and two generators) and essentially eliminates potential inflow and infiltration issues experienced with gravity systems. We know from experience with existing vacuum systems in Charlotte County that a vacuum system offers practical long-term reliability and dependability that is unmatched by the alternative options.

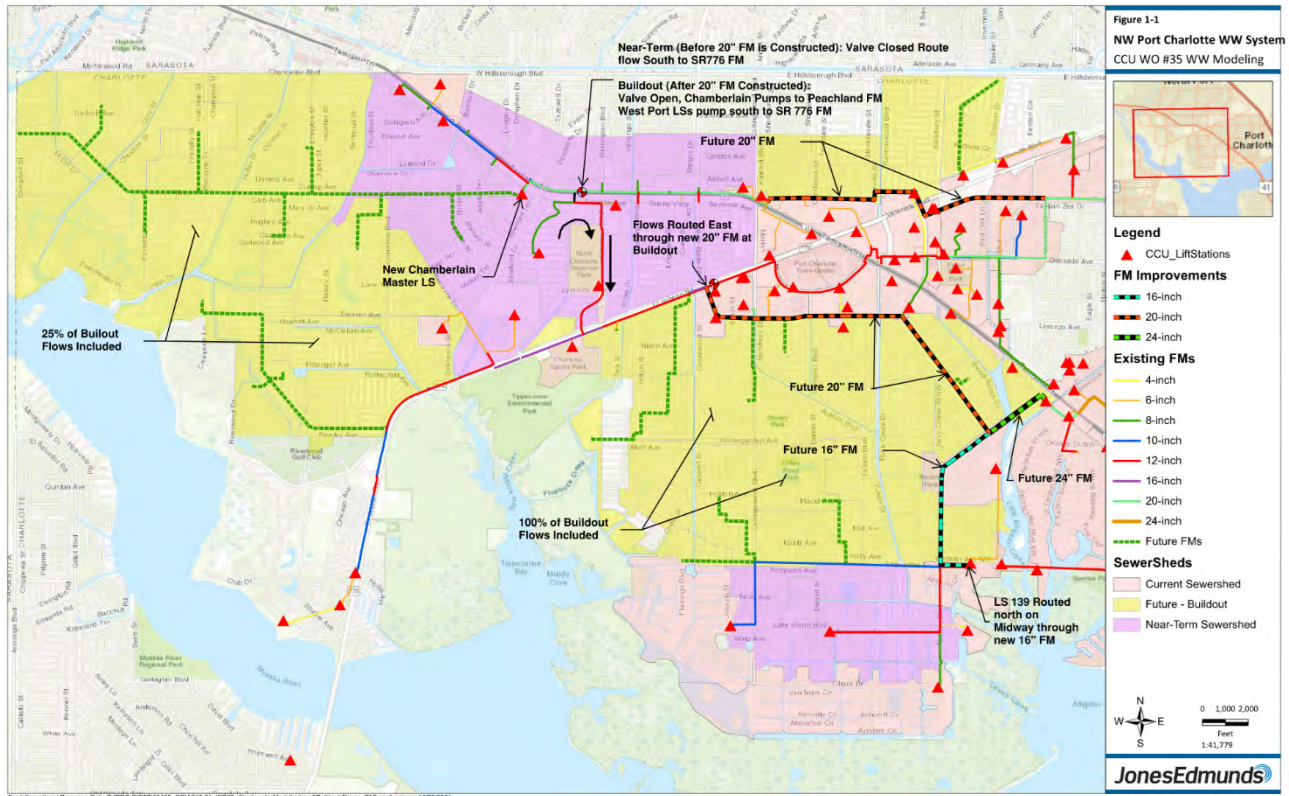
The M64 – Abhenry Circle area is proposed to be served by extending the existing gravity sewer infrastructure as recommended by the revision to the Area 1 PER. The cost to extend vacuum or gravity in this area is relatively the same; however, we are recommending gravity because there is already an existing lift station and gravity mains, gravity O&M costs are lower than vacuum, and it will reduce the load on the vacuum station.

We recommend that the M64 – Hidden Harbor area be served with a low-pressure sewer. It is the most cost-effective option for serving the area with a central sewer. The schematic layout of the selected plan proposes a stub-out to the private roadway shared by the residents. The logistics of installing sewer on the private properties will need to be settled between CCU and the residents and is not considered in this PER.

The schematic layout of the overall proposed plan is located in Appendix L.

7.1.1 Sewer Transmission Concepts

To be constructed alongside this septic to sewer project, but excluded from the MSBU, is the installation of large diameter force mains to accommodate future buildout flows from Lake View – Midway and surrounding areas. Hydraulic modeling and sizing of the proposed force mains were performed by Jones-Edmunds and the results of the modeling are shown below.



By the results of the modeling, this project will include the construction of approximately 8,000 feet of 16" force main, 15,800 feet of 20" force main, and 1,700 feet of 24" force main.

This project will also include the extension of an existing 8" force main from LS 92 to be directionally drilled under Tamiami Trail (FDOT ROW) as an 8" HDPE pipe to re-route flow to LS 93.

7.1.2 Impacts on Existing Facilities

7.1.2.1 Water

The entire project area is currently served with existing water mains. CCU has requested to replace all existing water mains within the project area to address the aging infrastructure along with the sewer installation.

7.1.2.2 Sewer

Some areas within the MSBU have short runs of existing LPS and one area along Edgewater Drive with an existing gravity sewer. As described in the selected plan, we recommend utilizing some of the existing infrastructure, specifically the gravity sewer on Edgewater. The remaining areas of

existing sewer will be converted to the selected system for that area and the existing infrastructure will be removed accordingly.

7.1.2.3 Storm

We are aware of the existing stormwater infrastructure within the area and there will be extensive coordination with Charlotte County Public Works (CCPW) to coordinate drainage improvements with the construction of this project.

7.2 Environmental Impacts of Proposed Facilities

The short-term impacts during construction include increased noise levels, increased airborne particulates, and surface run-off during rainfall on the site. Control measures will be implemented to minimize these temporary effects.

The long-term impacts of the project are beneficial. The Lake View – Midway area will be completely converted to central sewer, effectively eliminating nearly 2,200 septic tanks in the process and improving the water quality of the surrounding area.

The proposed project is not expected to have significant adverse environmental impacts.

7.3 Cost to Construct Facilities

The estimated construction costs for the recommended sewer installation project are difficult to quantify at this preliminary stage for many reasons. First, we have seen a recent surge in prices due to material shortages and increasing labor costs. Compared to previous bids for similar projects, unit prices have increased by up to 50% across the board for all sewer installation types. The future of these unit costs is unpredictable and may change significantly before this project is ready to be built.

Since there is so much uncertainty and variability around the costs to construct this project, especially considering that construction won't begin for at least two years from now, we have prepared two base estimates for the MSBU sewer area based on the following:

1. The “average” unit prices bid on five vacuum sewer projects. This estimate represents 2020 average unit prices.
2. A recent septic-to-sewer project went to bid in July 2022 in Martin County, Florida. This estimate represents the most current price data available.

At this preliminary design stage and with the price data available, we estimate that the MSBU area septic to sewer project will cost between \$48.4M (2020 average prices) and \$64.2M (2022 estimate).

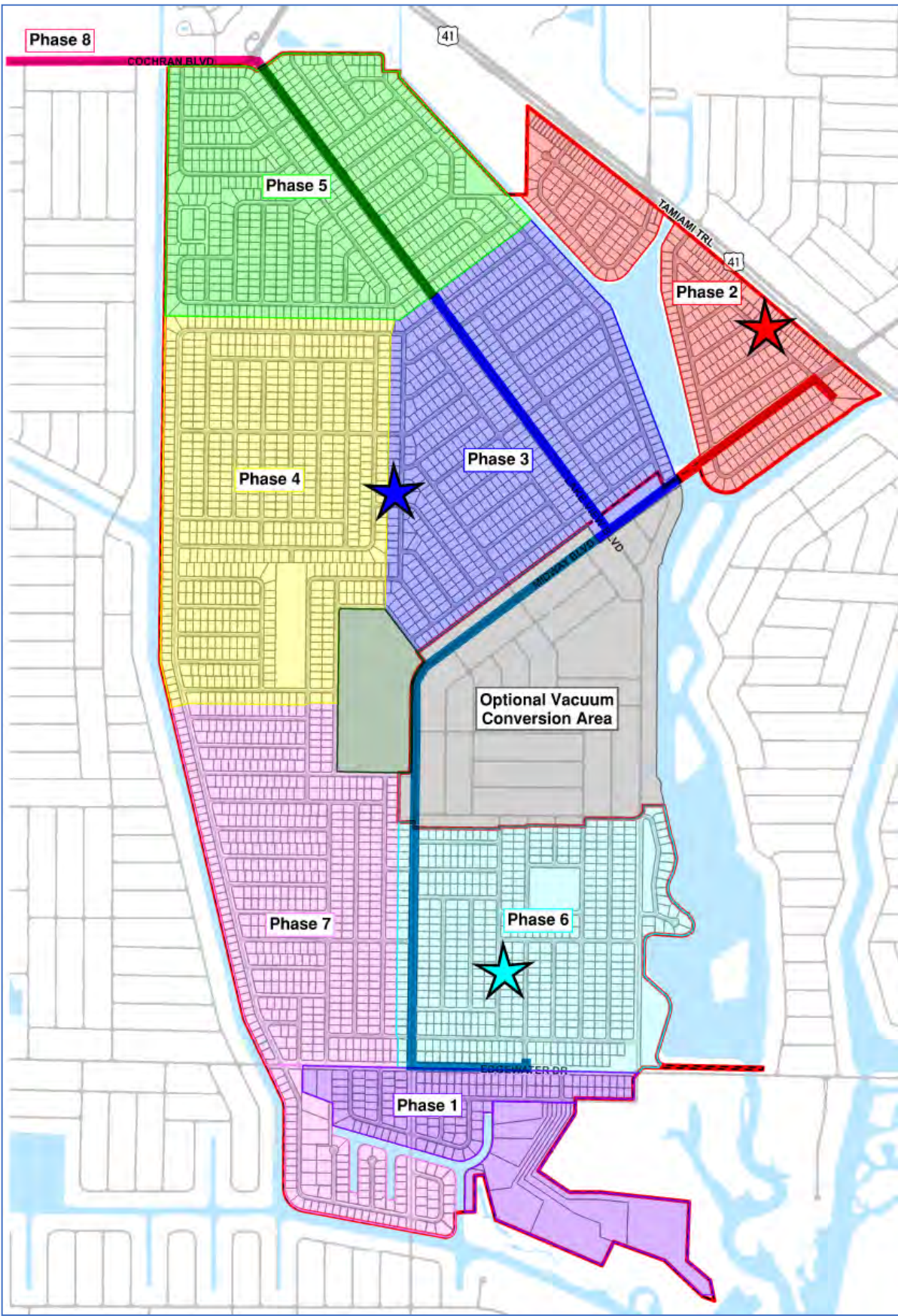
The detailed project cost estimates, including additional improvements not funded by SRF, are presented in Appendix M.

7.4 Construction Sequencing

We recommend completing the smaller areas first followed by the larger vacuum areas and finishing the force main improvements last. The following list is a general outline of the suggested sequencing for the project area:

- Phase 1: Abhenry Circle & Hidden Harbor
 - o Extend the existing gravity sewer system to serve Abhenry Circle and provide sewer service to the lot frontages of Hidden Harbor.
- Phase 2: Crestview (M67) & Ellicott (M70)
 - o Construct Vacuum Station #3 and force main.
 - o Install vacuum system.
 - o Install a portion of the proposed 24" force main included in the force main upgrades.
- Phase 3: Area M68
 - o Construct Vacuum Station #1 and force main.
 - o Install vacuum system.
 - o Install 20" force main along Lake View Boulevard and 24" force main to connect to the 24" force main installed in Phase 2.
- Phase 4: Area M62
 - o Install vacuum system.
- Phase 5: Area M61
 - o Install vacuum system.
 - o Install 20" force main along Lake View Boulevard and connect to the 20" force main installed in Phase 3.
- Phase 6: Area M69
 - o Construct Vacuum Station #2 and force main.
 - o Install vacuum system.
 - o Install 16" force main from LS 139 to the force main installed in Phase 3.
 - o *Optional: Convert the existing LPS area to vacuum. This area can be completed at the same time as this project or in the future.*
- Phase 7: Area M63 & Rock Creek Drive
 - o Install vacuum system.
- Phase 8: Off-Site Force Main
 - o Install 20" off-site force main along Cochran Boulevard to the force main installed in Phase 5.

Refer to the proposed construction sequencing map on the following page.



7.5 Permit Requirements

The following list summarizes the permits that are anticipated to be required for this project:

- Florida Department of Environmental Protection (FDEP) – Construction permit for wastewater collection/transmission system.
- FDEP – Construction permit for the replacement of water mains.
- Florida Department of Transportation (FDOT) – Utility permit for installation of utility facilities within FDOT right-of-way.
- Charlotte County Public Works (CCPW) – Permit to install utilities in county-owned right of way.
- Florida Fisheries and Wildlife Conservation Commission (FWC) – Potential gopher tortoise permits required.

8.0 Implementation and Compliance

8.1 Public Hearing/Dedicated Revenue Hearing

In June of 2021, the Charlotte County Board of County Commissioners (BCC) approved the Lake View – Midway Water Quality Improvements septic to sewer project. An additional public meeting will be held to present the findings of this report to the public. This meeting will be advertised following Charlotte County public meeting requirements.

8.2 Regulatory Agency Review

To qualify for a subsidized loan from the SRF, various governmental agencies must be satisfied with the method of project implementation. Copies of the plan adopted by Charlotte County are to be sent to the following government agencies for review and comments.

- Florida Department of Environmental Protection
- Florida State Clearing House

8.3 Financial Planning

The Florida Department of Environmental Protection State Revolving Fund is expected to be a financing source for the project. A Business Plan will be prepared by others to explain to the public what the financial impact on the users of the sewer system will be.

8.4 Implementation

Charlotte County will have the responsibility and authority to implement the recommended facilities.

8.5 Implementation Schedule Items

1. Hold public hearings on the selected plans.
2. Submit PER to FDEP and other governmental agencies.
3. Publication of the Department's environmental information document in the Florida Administrative Weekly.

4. At the end of the 30-day comment period for the environmental information document and approval of planning documents, submit plans and specifications to the FDEP and submit a construction permit application to the FDEP.
5. Notice of Intent to Permit Construction of Project issued and project added to the priority list.
6. Submit a request for the addition of the project to the FDEP's project priority list.
7. Hearing to add the project to the fundable portion of the priority list.
8. Sign the SRF loan agreement.
9. Advertise for bids.
10. Open construction bids.
11. Award contracts.
12. Start project construction.
13. Maintain loan compliance during construction.
14. Complete construction of the project and certify completion.
15. Begin SRF loan repayments to the FDEP.
16. Certify the operational performance of the project and close out the project.

8.6 Compliance

- The collection system will be designed in compliance with regulatory requirements outlined in Chapter 62-604 F.A.C.
- The environmental aspects of the proposed facilities are satisfactory.
- The recommended facilities are consistent with the County's Comprehensive Plan.

**Appendix A: Charlotte County Utilities Sewer Master Plan
Executive Summary**

DRAFT

SEWER MASTER PLAN EXECUTIVE SUMMARY

Charlotte County Utilities Department | 2017



photo credit: John Elias Photography

JONES
EDMUNDS



GWE
Giffels-Webster
Engineers, Inc.





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.



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.

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.



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 subterranean 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?

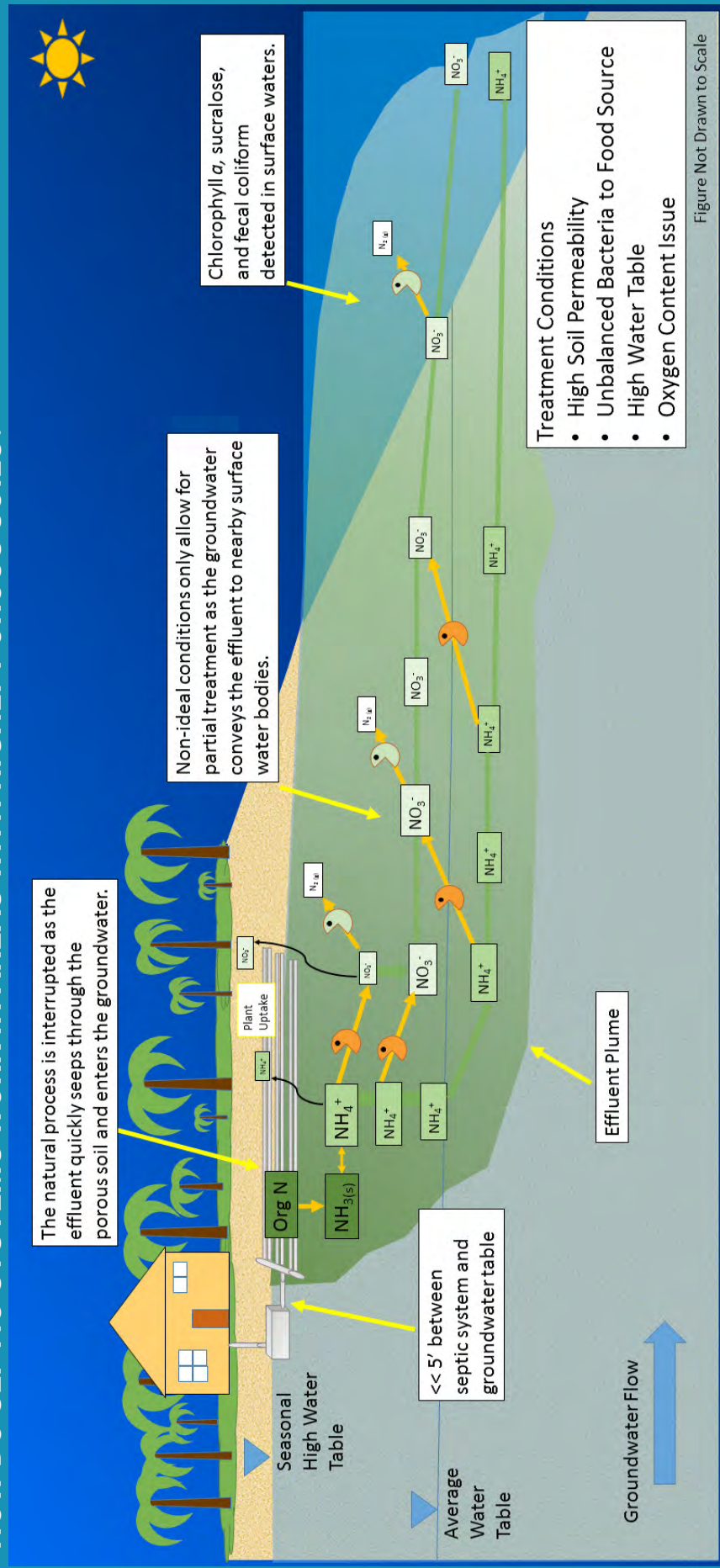




Photo Credit: Barbara Weibel/HoleintheDonut.com

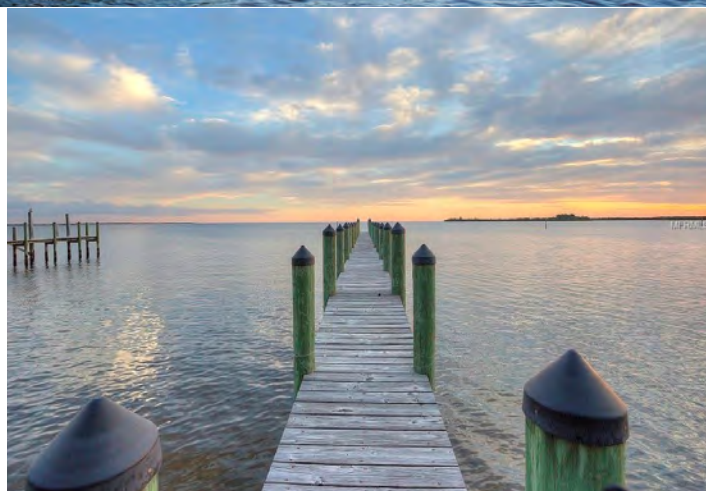
Maintaining the Charlotte Harbor Estuary's water quality is critical to the future of the community.

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.



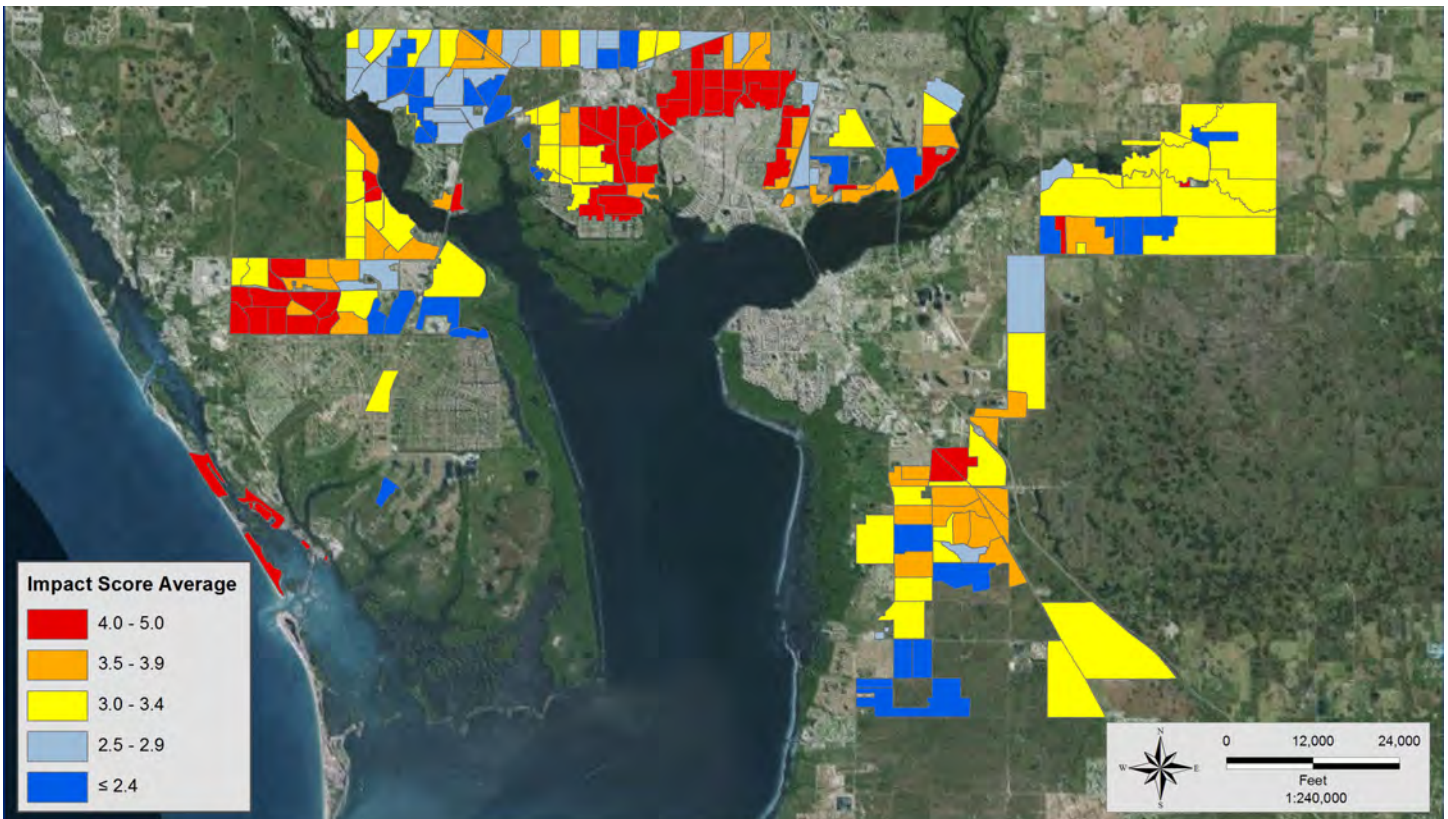
HOW DO WE REDUCE POLLUTANTS AND IMPROVE THE HARBOR'S WATER QUALITY FOR FUTURE GENERATIONS?

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.

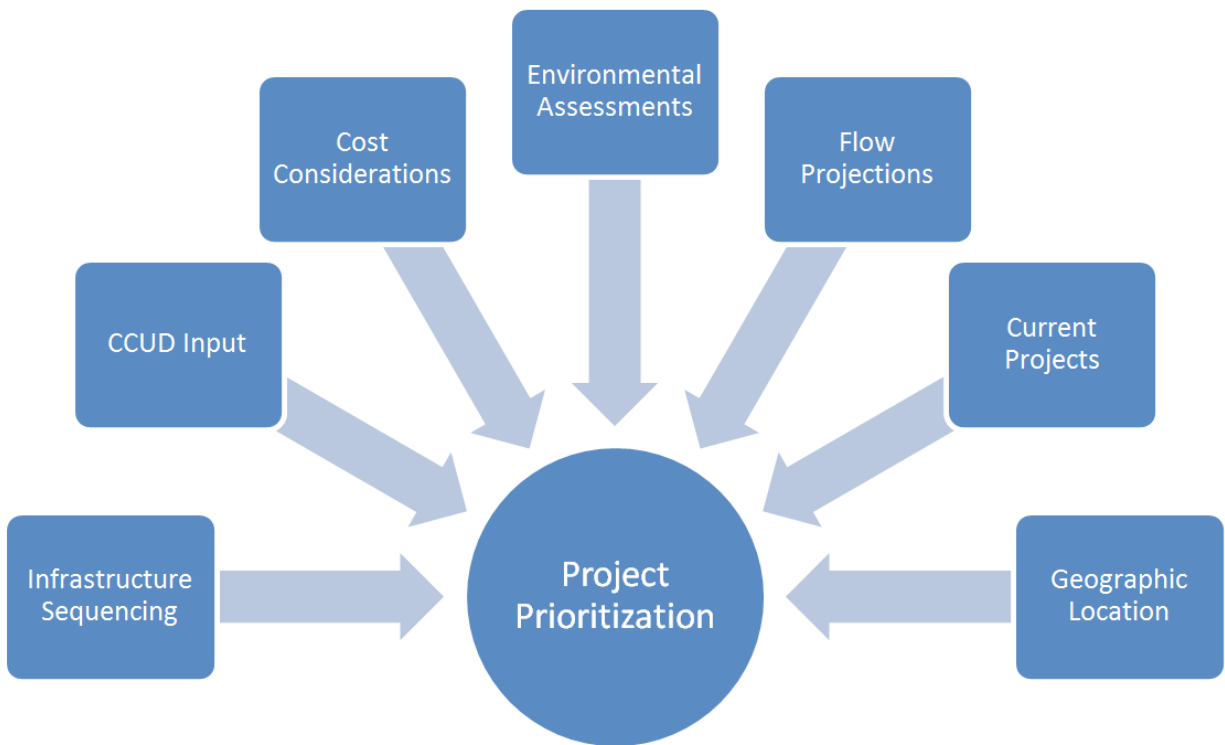
The environmental scoring criteria included the age of septic systems within the project area, proximity to surface waters, and the estimated nitrogen loading from septic systems within the project area. Septic system age has a significant impact on the system's functionality and effectiveness. Although 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.

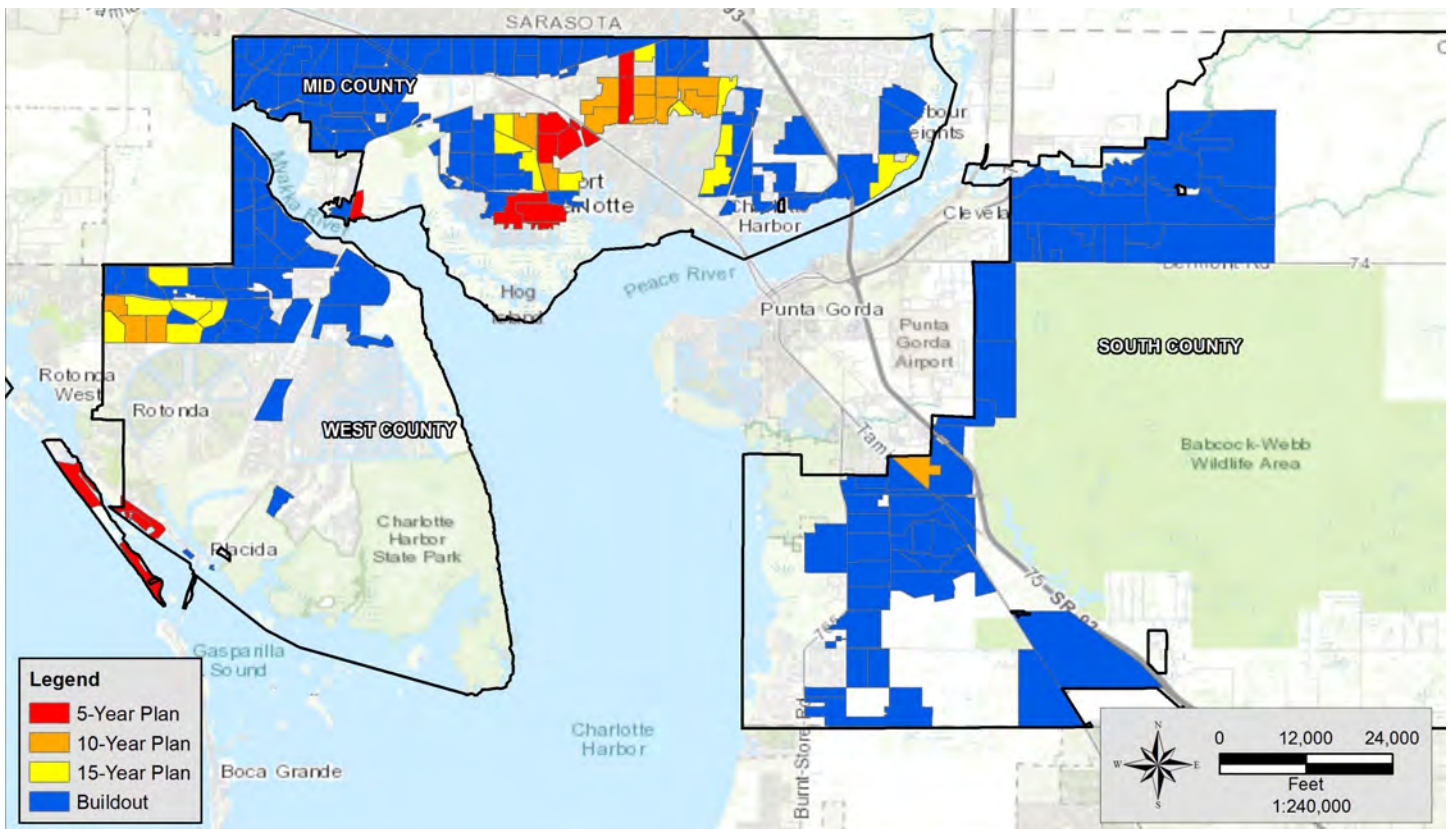
Cost assessments were conducted based on the number of lots within the project area and the infrastructure required to convert the area from S2S.

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 commercial 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?

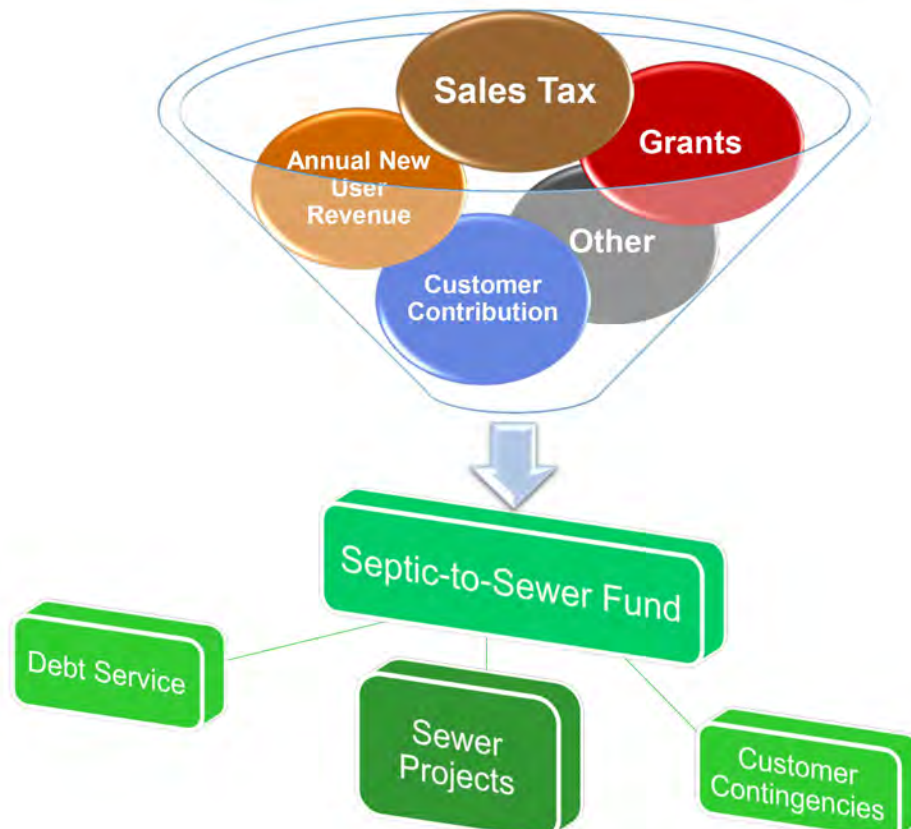
One objective of the Sewer Master Plan is to develop an affordable and realistic funding strategy that apportions just, equitable, and affordable costs to property owners while not having an adverse effect on existing Utilities ratepayers. Funding for S2S programs include two distinct elements:

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

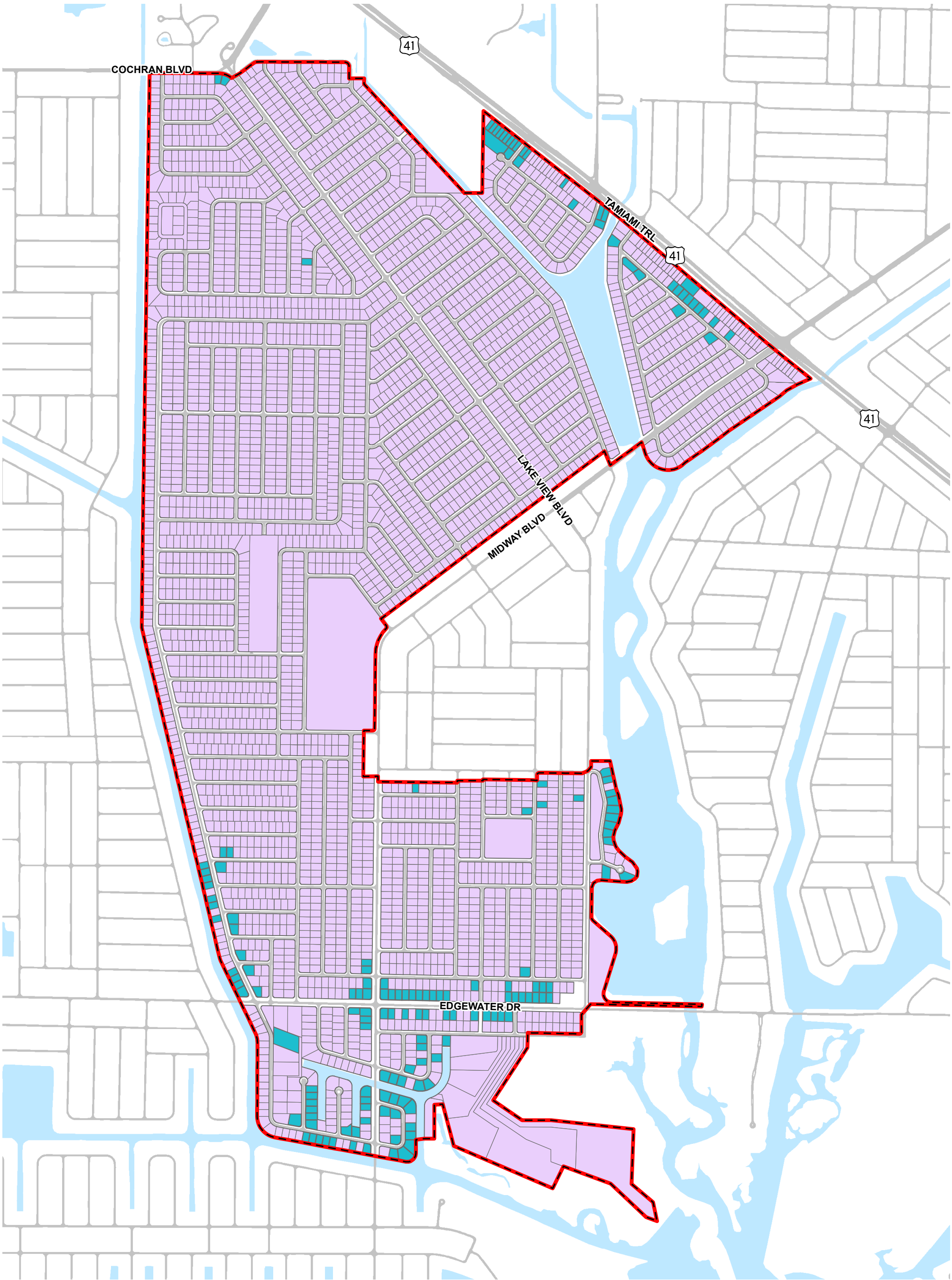
Charlotte DeSoto Building Industry Association
Charlotte County Chamber of Commerce
Charlotte County Economic Development Partnership
The Punta Gorda-Port Charlotte-North Port
Association of REALTORS® Inc.

For More Information Visit:

www.CharlotteCountyFL.gov > [Utilities](#) >
[Sewer Master Plan](#)

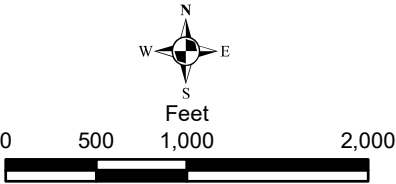
Appendix B: MSBU Boundary Map

CHARLOTTE COUNTY
PROPOSED LAKEVIEW MSBU

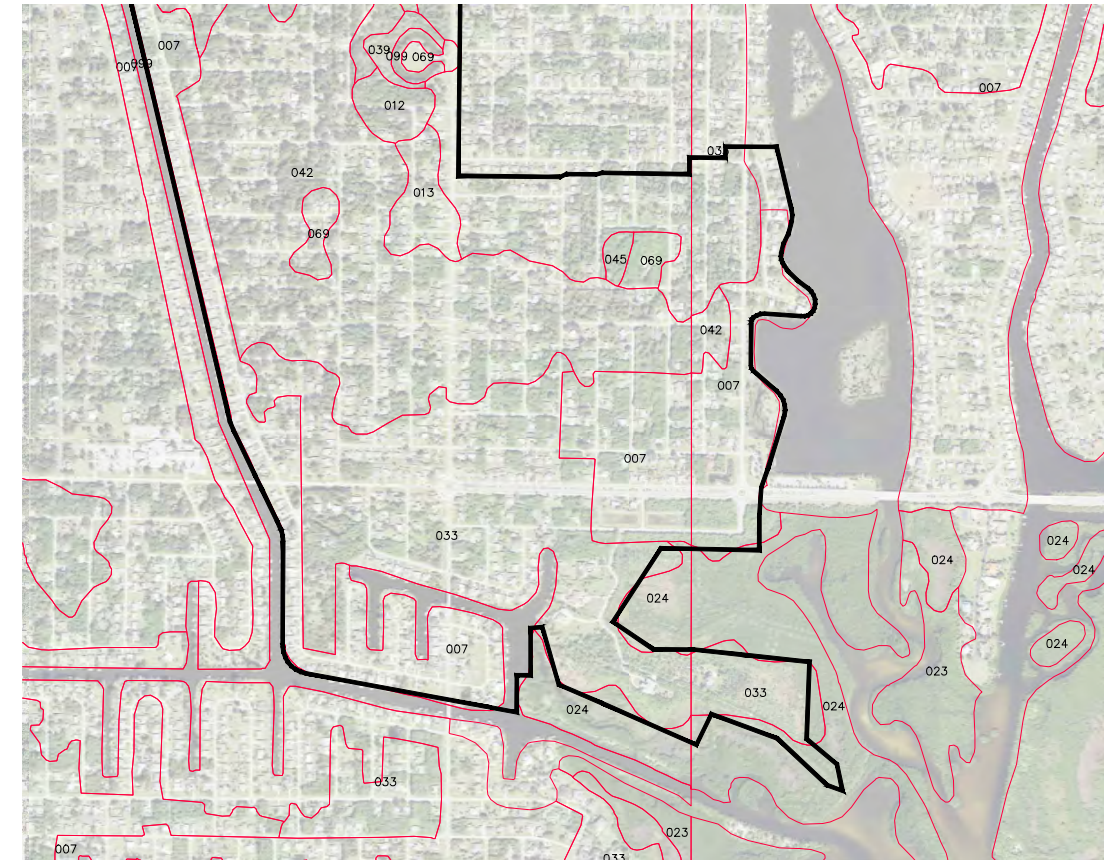
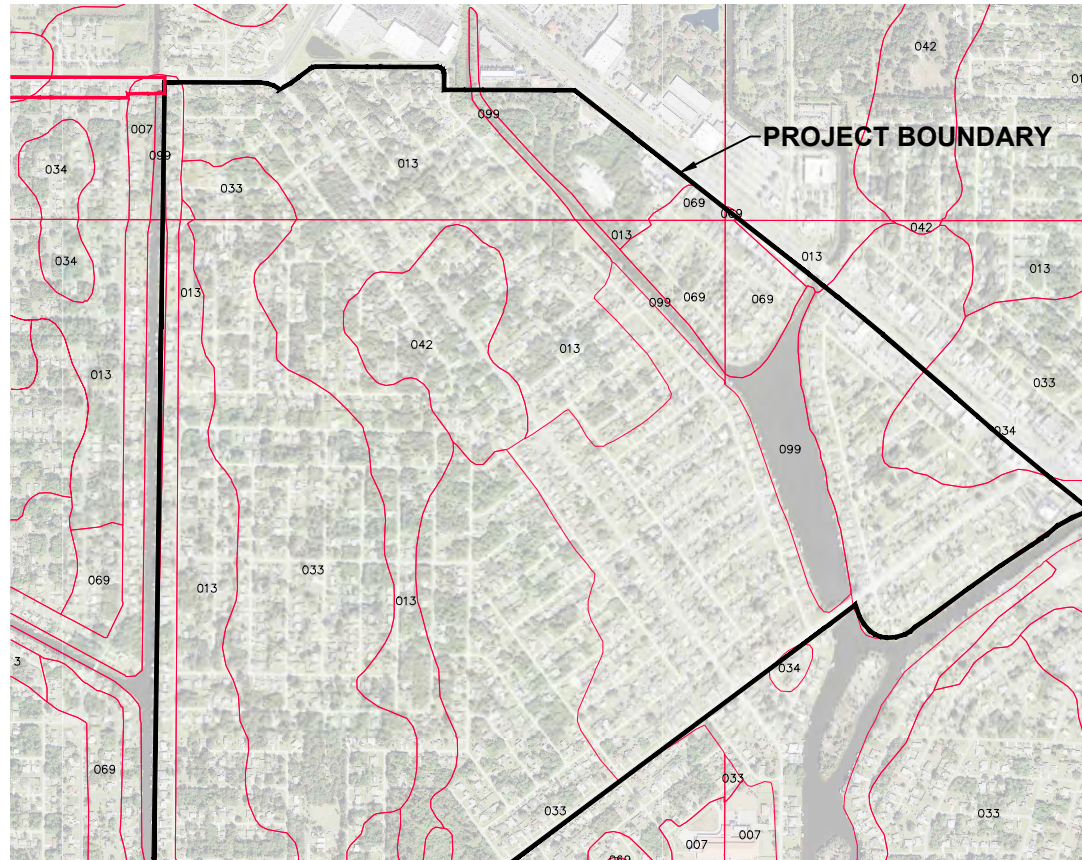
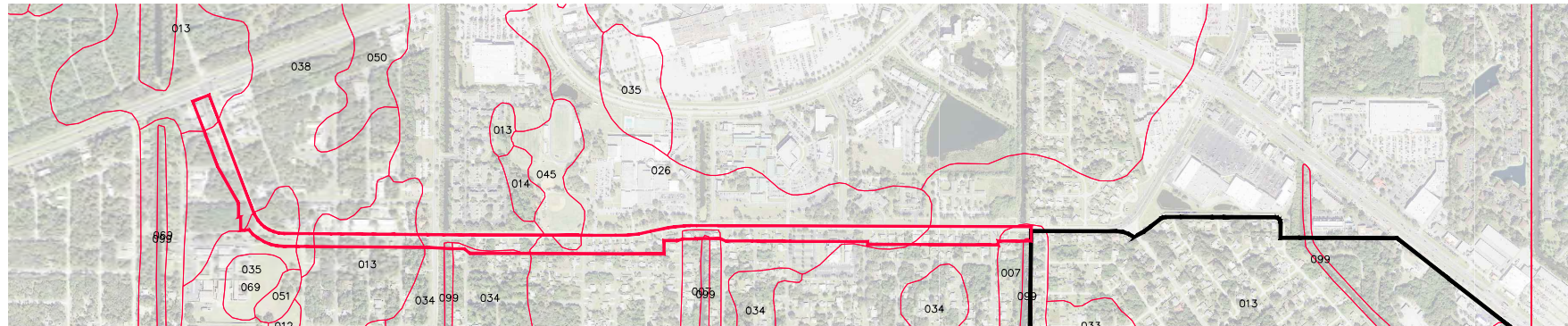


Title: LAKEVIEW MSBU
Date: 5/27/2022
Created By: D. CAIN
Coordinate System: NAD 1983 StatePlane Florida West FIPS 0902 Feet
Projection: Transverse Mercator
Center: 82°7'38.7732"W 26°5'06.9468"N
DISCLAIMER: This map is a representation of compiled information. It is believed to be an accurate and true depiction for the stated purpose, but Charlotte County Utilities and its employees make no guarantees, implied or otherwise to the accuracy or completeness. We therefore do not accept any responsibilities as to its use. This is not a survey or is it to be used for design. No part of this map may be reproduced or transmitted by any means without the expressed written permission from Charlotte County Utilities.
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- Legend
- T20220427_LAKEVIEW_BOUNDARY_2
 - PROPOSED MSBU ASSESSMENT
 - NOT ASSESSED



Appendix C: Soils Map



7 - MATLACHA-URBAN LAND COMPLEX

This complex consists of nearly level Matlacha gravelly fine sand and areas of Urban land. Typically, the surface layer of the Matlacha soils is about 40 inches of light gray, gray, very pale brown, grayish brown, very dark grayish brown and dark gray mixed gravelly fine sand and sandy material. Below this, to a depth of 80 inches or more, is undisturbed fine sand.

13 - BOCA FINE SAND

This is a nearly level, poorly drained soil on flatwoods. Typically, the surface layer is gray fine sand about 3 inches thick. The subsurface layer is fine sand about 22 inches thick. The upper 11 inches is light gray and the lower 11 inches is very pale brown. The subsoil, about 5 inches thick, is gray fine sandy loam with brownish yellow mottles and calcareous nodules. At a depth of 30 inches is a layer of fractured limestone.

12 - FELDA FINE SAND

This is a nearly level, poorly drained soil on broad, nearly level sloughs. Typically, the surface layer is dark gray fine sand about 8 inches thick. The subsurface layer is light gray and light brownish gray fine sand about 14 inches thick. The subsoil is light gray loamy fine sand about 16 inches thick and is underlain by gray and light gray fine sand that extends to a depth of 80 inches or more.

33 - OLDSMAR SAND

This is a nearly level, poorly drained soil on low, broad flatwoods areas. Typically, the surface layer is black sand about 3 inches thick. The subsurface layer is gray and light gray sand about 39 inches thick. The upper part of the subsoil is very dark gray sand about 5 inches thick. The lower part of the subsoil is yellowish brown and mixed light brownish gray and brown fine sandy loam about 11 inches thick. Pale brown sand extends to a depth of 80 inches or more. Some areas also have limestone at a depth of 70 to 80 inches below the surface.

34 - MALABAR FINE SAND

This is a nearly level, poorly drained soil on sloughs. Typically, the surface layer is dark gray fine sand about 5 inches thick. The next 12 inches is light gray and very pale brown fine sand. Below this area a 16-inch layer of light yellowish brown fine sand with yellow mottles and a 9-inch layer of brownish yellow fine sand. The subsoil layer is gray loamy fine sand about 9 inches thick with large yellowish brown mottles. The next 8 inches is gray fine sandy loam with large brownish yellow mottles. Below is light gray loamy fine sand with yellowish brown mottles to a depth of 80 inches or more. Included with this soil in mapping are scattered areas of Malabar soils with limestone at a depth of 60 to 80 inches.

SOILS CONSERVATION SERVICE GENERAL DESCRIPTION

39 - ISLES FINE SAND, DEPRESSIONAL

This is a nearly level, very poorly drained soil in depressions. Typically, the surface layer is very dark gray fine sand about 5 inches thick. The subsurface layer is about 5 inches of light gray fine sand. Next is 11 inches of very pale brown fine sand with yellowish brown mottle. The subsoil is 26 inches of gray fine sandy loam with brownish yellow mottles and pockets of light brownish gray loamy sand. Limestone bedrock is at a depth of 47 inches.

42 - WABASSO SAND, LIMESTONE SUBSTRATUM

This is a nearly level, poorly drained soil on broad flatwoods. Typically, the surface layer is black sand about 3 inches thick. The subsurface layer is sand about 16 inches thick. The upper 10 inches is gray and the lower 6 inches is light gray. The subsoil is about 32 inches thick. The upper 2 inches is dark brown sand that is well coated with organic matter. The next 2 inches is dark reddish brown friable sand. The next 14 inches is brown loose sand with dark brown streaks along root channels. The lower 14 inches is light brownish gray, firm fine sandy loam with light olive brown mottles. A hard fractured limestone ledge and boulders are at a depth of 51 inches.

45 - COPELAND SANDY LOAM, DEPRESSIONAL

This is a low, nearly level, very poorly drained soil in depressions. Typically, the surface layer is about 8 inches of very dark gray sandy loam. The subsoil is very dark gray sandy loam about 12 inches thick. Below this is 8 inches of light brownish gray sandy clay loam with soft calcium carbonate throughout. Fractured limestone bedrock is at a depth of 28 inches.

69 - MATLACHA GRAVELLY FINE SAND

This is a nearly level, somewhat poorly drained soil formed by fill and earthmoving operations. Typically, the surface layer is about 35 inches of black, olive brown, grayish brown, dark brown, light brownish gray, very dark gray, and very pale brown mixed gravelly fine sand and sandy mineral material. The surface layer contains lenses of loamy sand and coated sandy fragments of former subsoil horizons with about 25 to 30 percent limestone and shell fragments. Below this, to a depth of 80 inches or more, is undisturbed fine sand. The upper 5 inches is dark gray and the lower 40 inches is light gray with common, medium, distinct dark grayish brown stains along root channels.

NOTE:
GENERAL SOILS MAP ONLY.
REFER TO SPECIFIC SOIL BORINGS
FOR ADDITIONAL INFORMATION.

[illegible]

GWE **GIFFELS-WEBSTER**
ENGINEERS, INC.
Certificate of Authorization No. 3607

900 Pine Street, Suite 225
Englewood, Florida 34223
Phone (941)475-7981
Fax (941)474-4285

DATE	3/22	CKD. BY	DATE
DRAWN	MK	DC	3/22
DESIGN	DC	JHC	3/22
SEC.	17, 20 & 29	T. 40S.	R. 22E

CHARLOTTE COUNTY UTILITIES
ENGINEERING SERVICES DIVISION
25550 HARBOR VIEW RD.
PORT CHARLOTTE, FL. 33980
PH. 941-764-4516
FAX: 941-764-4969

LAKEVIEW / MIDWAY
WATER QUALITY IMPROVEMENT
SCS SOIL MAP

SCALE	1"= 500'
SHEET	4
GWE NO.	6272.00

ENGINEER OF RECORD
DENNIS J. CROYLE, P.E.
STATE OF FLORIDA NO. 82287

M:\6500's\6555 Lakeview Midway\DWGS\4-SOIL MAP.dwg, 3/28/2022 10:21:33 AM

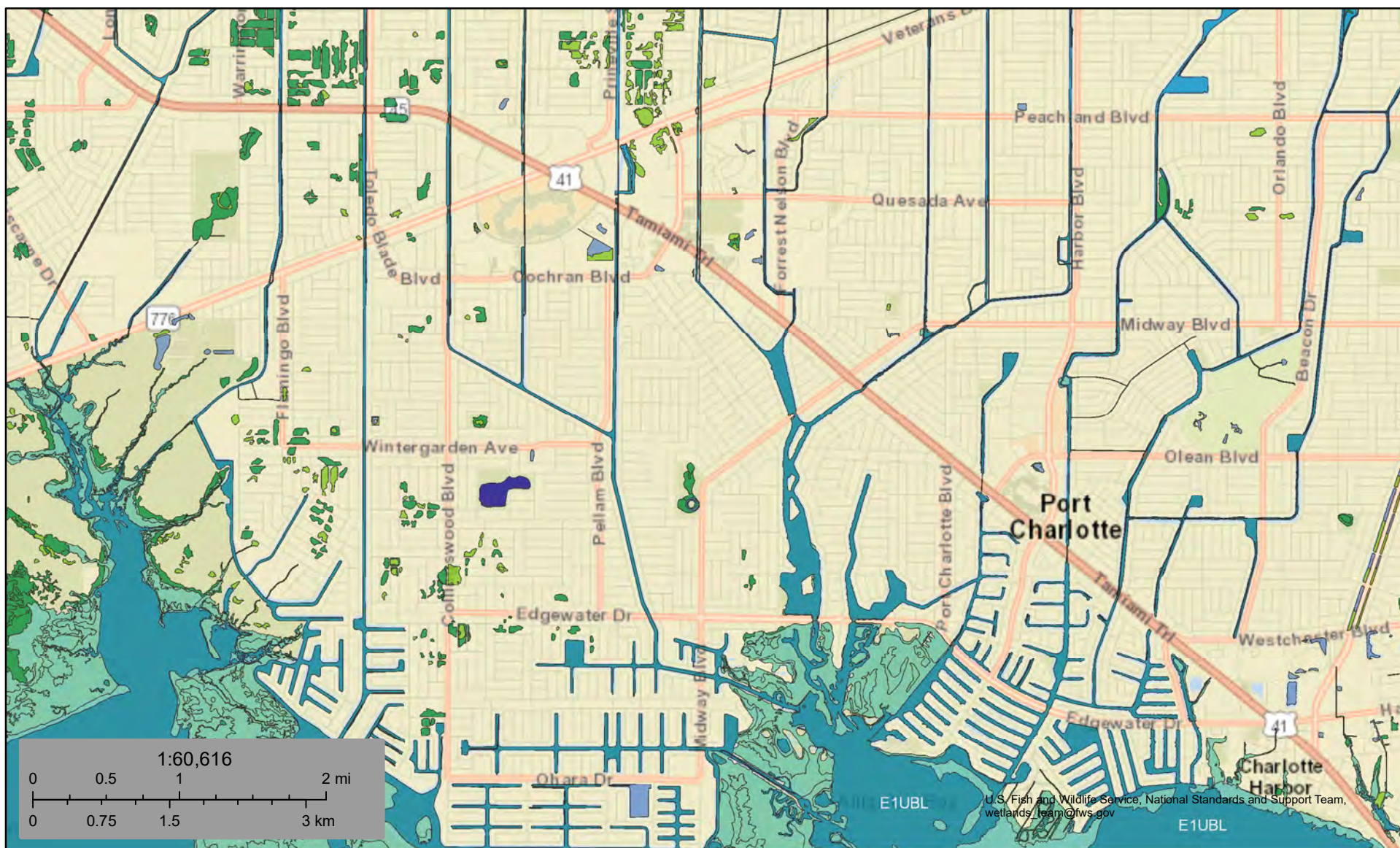
Appendix D: Wetlands Map



U.S. Fish and Wildlife Service

National Wetlands Inventory

Lake View Midway



August 29, 2022

Wetlands

	Estuarine and Marine Deepwater		Freshwater Emergent Wetland		Lake
	Estuarine and Marine Wetland		Freshwater Forested/Shrub Wetland		Other
	Freshwater Pond				Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Appendix E: Protected Species Assessment



Protected Species Assessment

Lakeview – Midway Project Area
Port Charlotte, FL 33982

November 2022

Prepared for:
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Giffels-Webster Engineers, Inc
941-475-7981

Prepared by:
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Suncoast Ecological Services, LLC
24123 Peachland Blvd Unit C4-242
Port Charlotte, FL 33954



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 - 2.1 Information Review
 - 2.2 Site Reconnaissance
3. Results
 - 3.1. Protected Species
 - 3.2. Site Habitat Evaluation
4. Findings
5. Conclusions & Recommendations
6. Standards of Care
7. References

List of Exhibits

- Exhibit 1: Project Area
- Exhibit 2: National Wetlands Inventory
- Exhibit 3: Protected Species
- Potential to occur
 - Habitat Requirements
 - Habitat Assessment
 - Scrub Jay
 - Bald Eagle
 - Biodiversity Matrix
 - Gopher Tortoise
 - Protected Trees
- Exhibit 4: Heritage Tree Information
- Exhibit 5: Site Photographs



1.0 INTRODUCTION

Giffels-Webster Engineers, Inc has submitted a proposal for the installation of sewer lines in an area of Port Charlotte, Florida, which requires evaluation of the potential for presence of protected species on or near the project area. Suncoast Ecological Services, LLC was retained by Giffels-Webster Engineers, Inc to conduct preliminary assessment of protected species for the project area.

This report provides an assessment of protected species that could potentially occur within the project area.

The project area was assessed during the month of July 2022. The evaluation included reviewing the frontage for all roadways within the project area for the presence of wetlands and protected plants and animal species.

1.1 GENERAL SITE DESCRIPTION

The project area includes approximately 219,400 linear feet of roadway inside of a 1,315 acre area. An aerial of the location, from Charlotte County GIS mapping, is attached as Exhibit 1.

1.2 PROJECT DESCRIPTION

The project includes disruption of the ROW on both sides of the roadways to the extent of the parcel boundaries as well as along the Force Main Only area and entire Pump Station parcels. The Pump Station parcels are to be located on 700 & 712 Chevy Chase Street and 155 & 161 Grenada Street. The existing sewer area is excluded. Refer to Exhibit 1 for a map of the project area

2.0 METHODOLOGY

Suncoast Eco initially reviews readily available published resources to preliminarily identify features in the project area and in the immediate vicinity. A field investigation is then performed to identify protected plant and animal species. Noted items are marked with GPS waypoints and appropriate information is provided to reduce or eliminate impact to both the species and project.

2.1 INFORMATION REVIEW

To evaluate the likelihood of protected species occurring within the project site, both animal and plant species were assessed. Since the distribution of a species is based on available habitat, a reasonable means of determining which species to include on the potential list of species for the project site is to include species listed for the county in which the project occurs.

A list of all potential species that could occur at the project site was compiled and is presented in Exhibit 3. The list includes aquatic species that could be impacted by the project where sewer line installation will cross canals/waterways. Also included are Oak Trees (*Quercus* spp) that meet the guidelines for Heritage Trees in Charlotte County.

2.2 SITE RECONNAISSANCE

Biologists from Suncoast Ecological Services performed multiple visits between June and August 2022 to inspect both sides of each road inside the project area.



3.0 RESULTS

3.1 Protected Species

A review of the Florida Native Areas Inventory (FNAI) Biodiversity Matrix for the project area revealed one documented protected animal species and several protected plant and animal species that potentially may occur in the project area.

Federally listed animal species include bald eagle (*Haliaeetus leucocephalus*), red-cockaded woodpecker (*Picoides borealis*), and wood stork (*Mycteria americana*).

Although the bald eagle (*Haliaeetus leucocephalus*) is no longer on the Federal endangered species list, the species is listed as a “recovery” species and remains federally protected by the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and is also protected by the State of Florida. Nesting sites are considered “potentially active” even if a nest has been destroyed by weather or development. Nests are considered “active” if they are being attended by eagles from nest restoration through young fledging. No activity may occur within the 660’ radius of an active nest during nesting season without a Bald Eagle Management plan and monitoring. The BEMP and monitoring will be required to document nest status between September 1 and May 15. Regular assessment of an inactive nest is required through February 1st for possible nesting activity and increased monitoring must occur if a nest becomes active.

Wood Storks forage in flooded swales, retention areas, and in canals (and the adjacent yards). Care should be taken to ensure no impact to the animals during development.

The Red-cockaded woodpecker has Federal and State protection and is listed as “endangered”. While there are sightings in Charlotte County, there are no confirmed sightings within or near the project area. Refer to exhibit 3 for the FNAI map and table of species.

The Florida Scrub jay has Federal and State protection. Charlotte County has a Habitat Conservation Plan agreement with the USFWS to handle permitting locally. The project area is not located inside or near the Charlotte County Scrub Jay Habitat Conservation Plan areas. Additionally, no scrub jays were observed in the project area.

3.2 Protected Species Habitat Requirements

The following provides a summary of the habitat requirements for each protected animal species expected to be found in the project area.

3.2.1 Bald Eagle

Bald eagles require fresh, brackish, or marine open waters for foraging. Bald Eagles prefer large trees with an open limb structure for nesting, although many area nests have been found in Australian Pine trees. Nesting habitats usually have limited disturbance when selected. Prime habitat has shallow, slow moving water with abundant fish and prey species.

3.2.2 Wood Stork

Wood stork nests are usually large, up to 4 feet in diameter, and built in the upper branches of tall trees. They feed in shallow, fresh water marshes, tidal creeks, or flooded tidal pools. Their feeding technique requires areas with flooding alternating with dryer periods to concentrate prey species during receding water levels.



3.2.3 Gopher Tortoise

Gopher tortoises prefer upland scrub habitat but have been forced into the suburban habitat by extensive development. The animals are often found in yards and in the spoil banks along swales and greenways.

3.3 Site Habitat Evaluation

Multiple site visits were conducted to the project area between June and August 2022. Additionally, aerial photography was reviewed as part of the habitat evaluation.

3.3.1 Bald Eagle

The canals and proximity to Charlotte Harbor provide suitable habitat for nesting eagles. Two confirmed nesting sites were identified within the project area.

3.3.2 Wood Stork

The canals and swales provide suitable habitat for foraging wood storks. Standing water deters mammalian predators and is an essential element of wood stork foraging and nesting habitat. Their feeding technique requires areas with flooding alternating with dryer periods to concentrate prey species during receding water levels. Wood storks may be found in canals, retention ponds, and swales after rain. While none were observed during the site visits, they are likely to be found in the area.

3.3.3 Gopher Tortoise

Most of the project area contains suitable habitat for gopher tortoises. One tortoise was found basking in the burrow mouth at the top of the swale bank in a residential yard. Due to mobility, a tortoise survey is only recognized for 90 days and burrows may appear in as few as three days.

8. FINDINGS

4.1 Protected Species

Multiple occurrences of the protected species described in this report are expected to occur within the project area. The presence of multiple bald eagle nests, heritage oaks, and gopher tortoises has been confirmed and each will need to be either avoided or properly permitted.

4.2 Wetlands

In the area of Edgemere St where wetlands abut the ROW on six parcels, silt fencing must be installed to ensure no primary or secondary impacts to wetlands on those parcels. The force main does cross three bridges/canals on Cochran Blvd.



9. CONCLUSIONS & RECOMMENDATIONS

Multiple Heritage Oak Trees are located such that their canopy overhangs the area to be impacted. In cases where the impact occurs between the trunk and the first 50% of the canopy width, damage to the root system may cause death of the protected tree. Precautions should be made to avoid impact, specifically to trees in privately owned yards that have been preserved through development.

Bald Eagle nests CH070 and CH086 are located within the project area. These may become active at any point from September through February. Development within the 660' radius (1320' diameter) of the nests should be scheduled between May 15 and September 1 to ensure no potential requirement for additional daily/weekly monitoring and an approved Bald Eagle Management Plan. CH986 is very close to the planned force main, but not only is it just outside of the 660' protected area, no part of the development is located between the nest and the nearest body of water.

Tortoise burrows that cannot be avoided must be permitted using a temporary exclusion permit issued by the Florida Fisheries and Wildlife Conservation Commission (FWC).

10. STANDARD OF CARE

Suncoast Ecological Services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. Suncoast Ecological Services, LLC makes no warranties, express or implied, regarding the findings, conclusions, or recommendations. Please note that Suncoast Ecological Services does not warrant the work of laboratories, regulatory agencies, or other third party resources supplying information used in the preparation of this report. These services were performed in accordance with the scope of work agreed to with our client. Findings, conclusions, and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of wetlands may have been latent, inaccessible, unobservable, or not present during our services.

We appreciate the opportunity to provide services. If you have any questions concerning this report, or if we can assist in any other matter, please contact our offices.

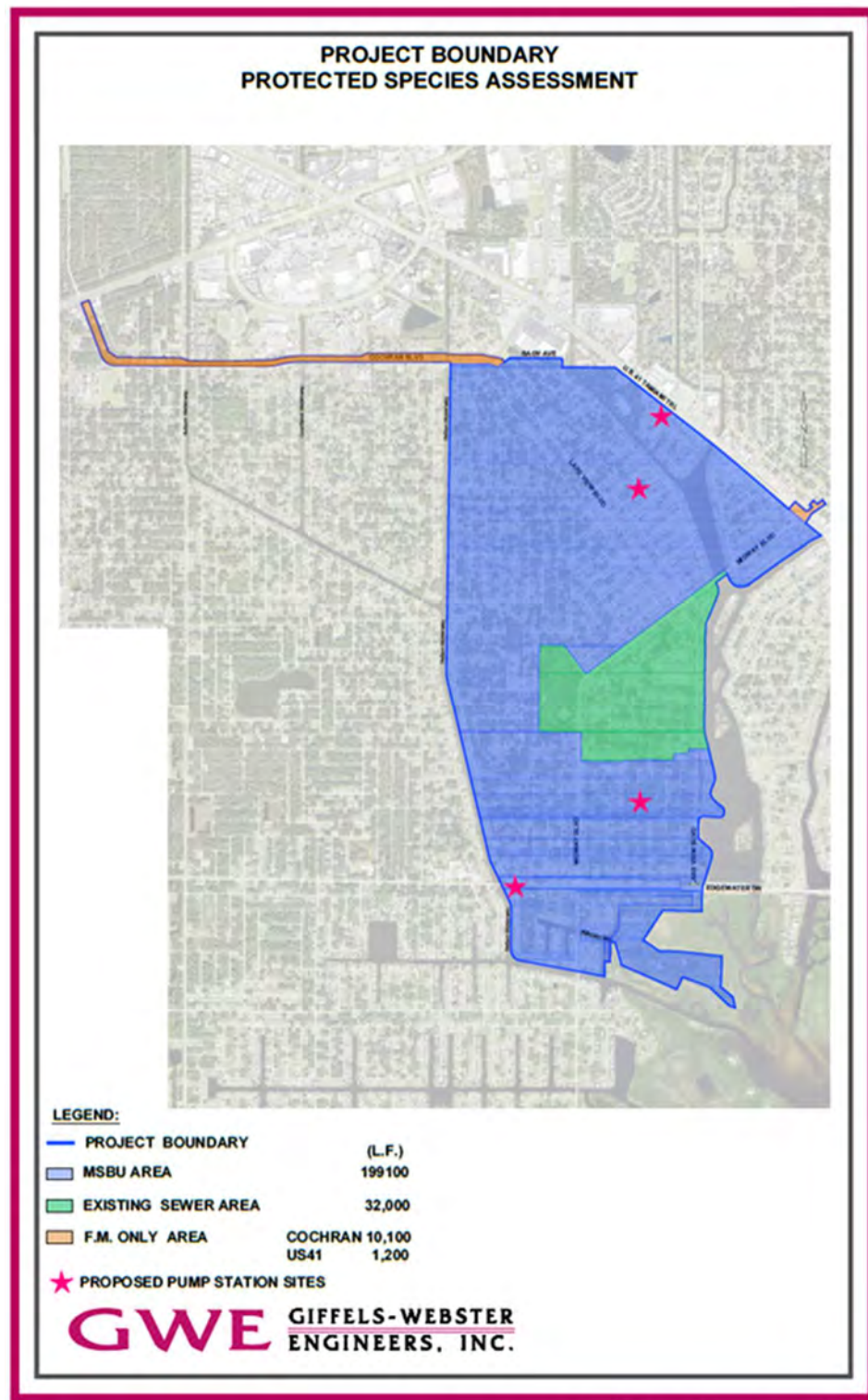
Sincerely

Jennifer K Krajcir
Senior Ecologist



Exhibit 1: Project Area

Note: Pump station locations are 700 & 712 Chevy Chase Street and 155 & 161 Grenada Street, not at the pink stars in this image.





Project Area represented by yellow outline. Assessment of this area completed August 2022.

Pump Station Locations (blue) updated July 2022

One location in the north part of the MSBU Area at 700 & 712 Chevy Chase Street

One location in the south part of the MSBU Area at 155 & 161 Grenada Street.

Eagle Nests (red circles represent protected 660' radius)

Green outlined area represents existing sewer area. Assessment of this area completed November 2022.

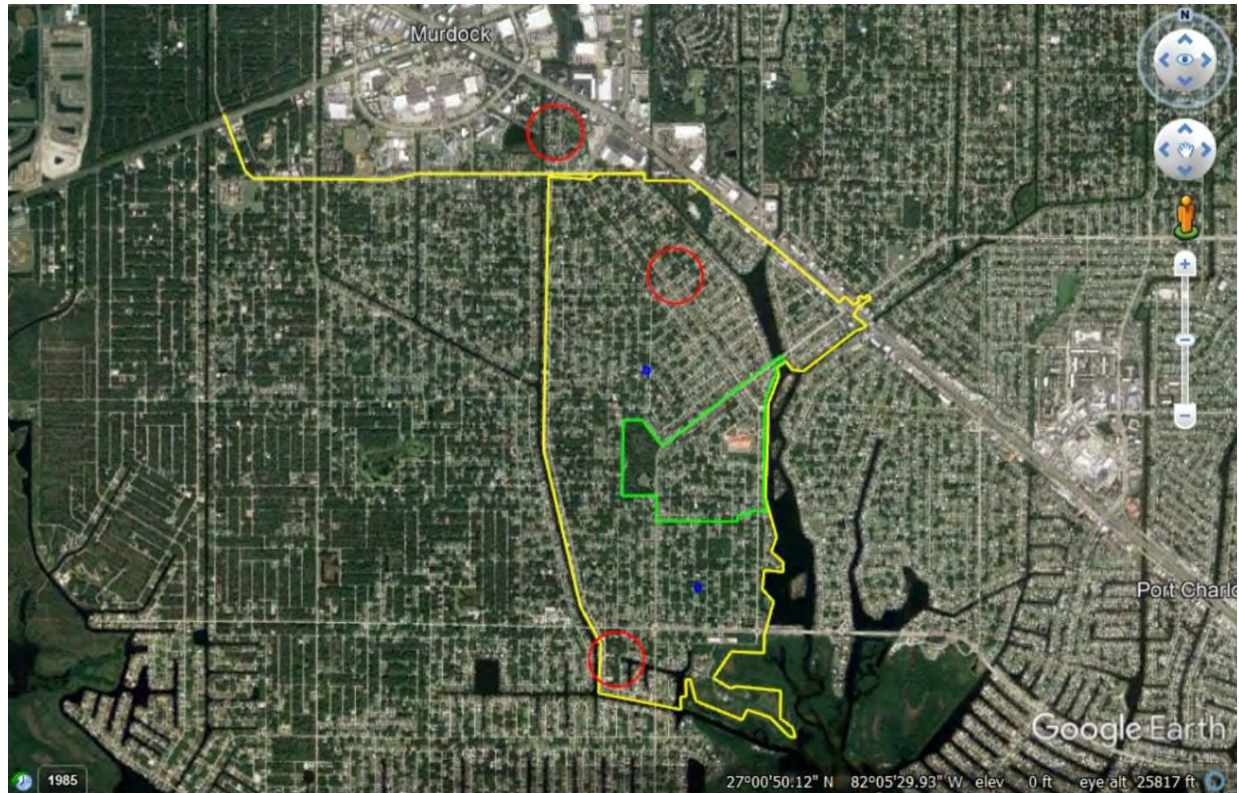




Exhibit 2 National Wetlands Inventory

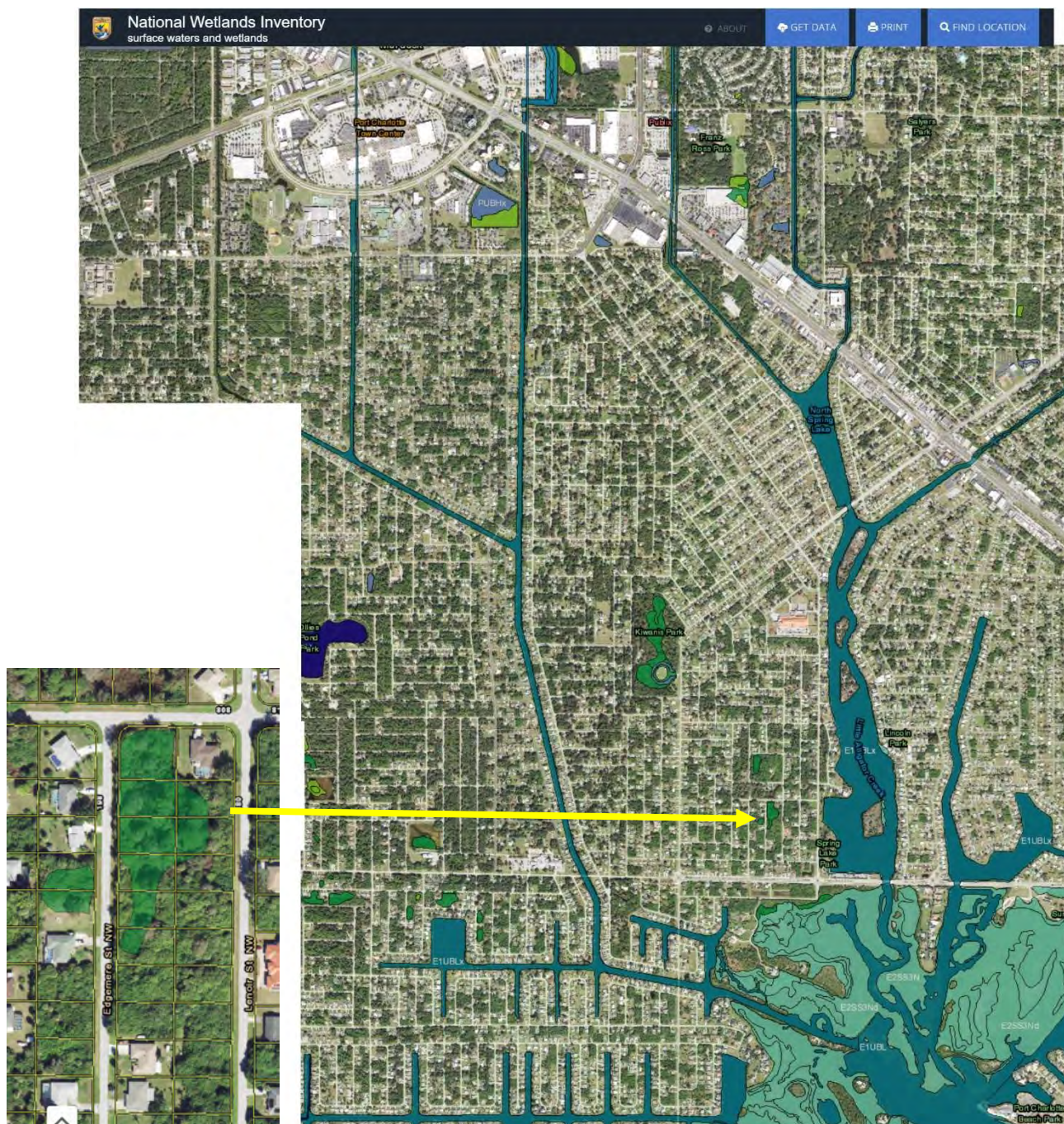
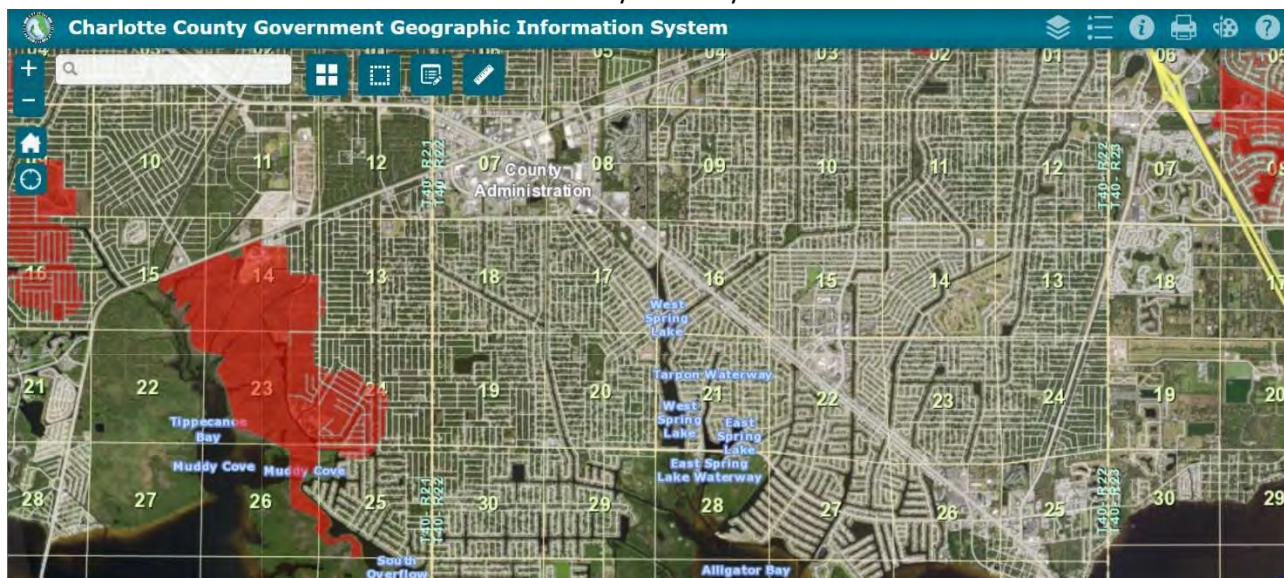


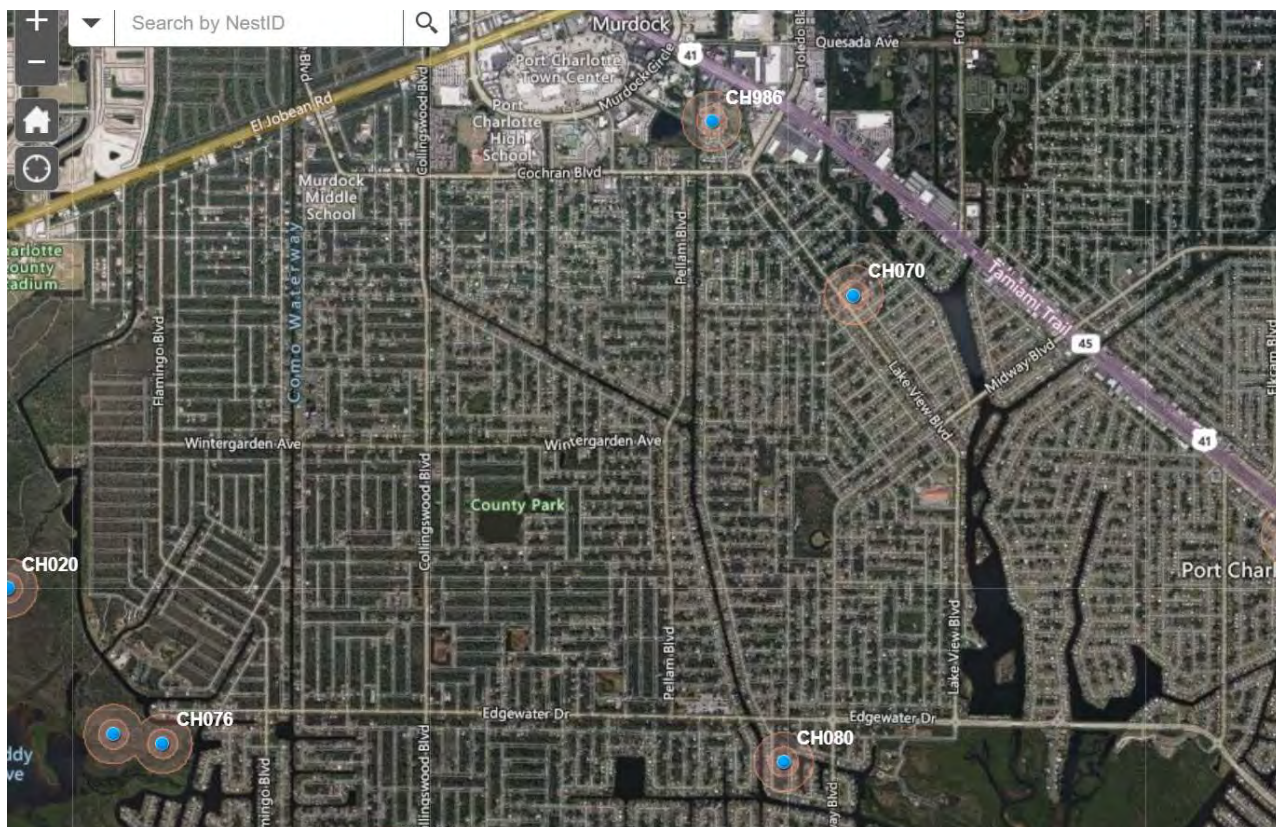


Exhibit 3 Protected Species

Scrub Jay Territory



Bald Eagle Nests





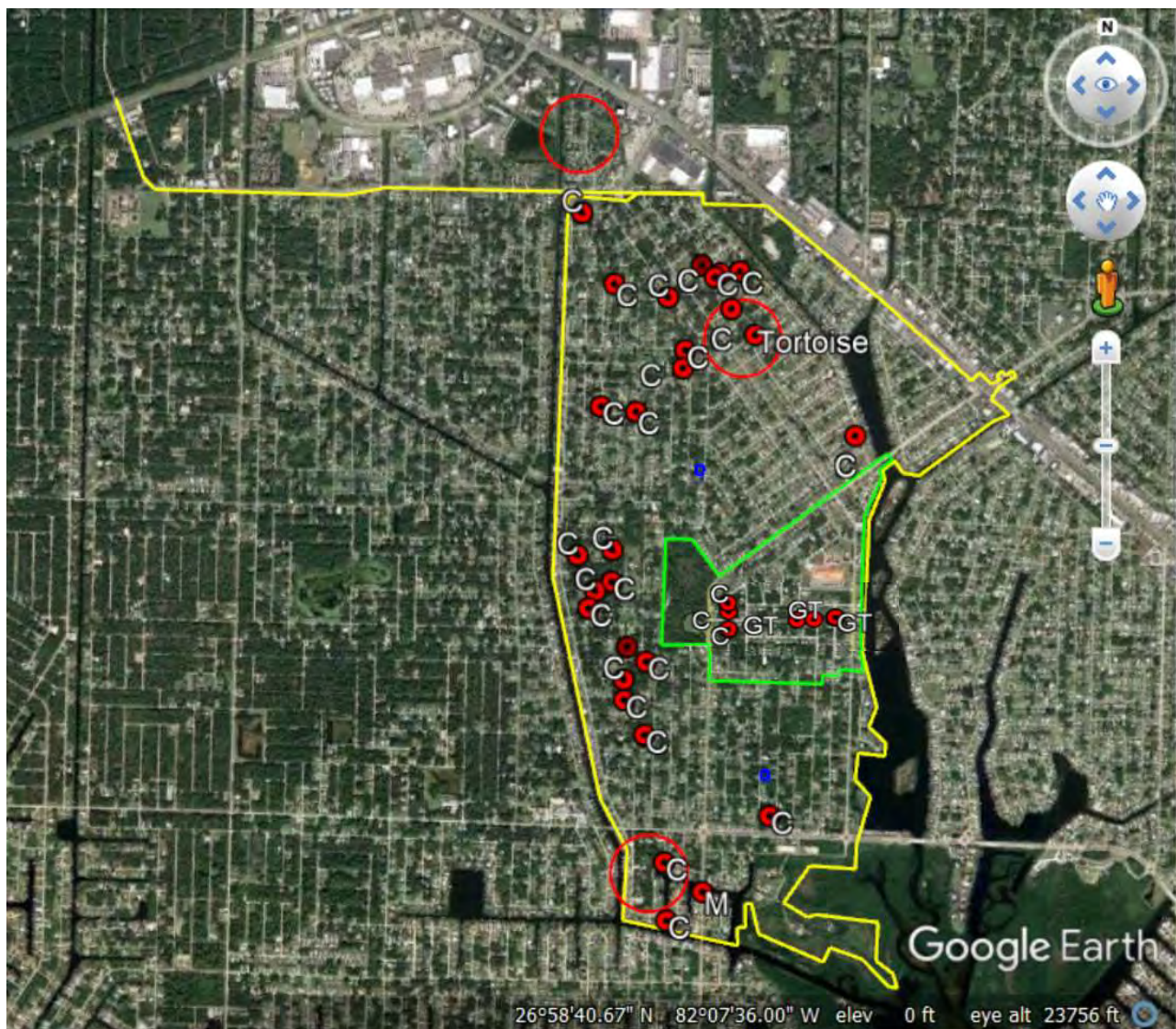
Protected Tree and Gopher Tortoise Burrow locations:

Each "C" represents a location where 50% of the canopy of at least one Heritage Oak overhangs the roadway and disruption of the root system could kill the tree.

The "M" represents mangroves in the water alongside the Midway bridge over the Abhenry Waterway. These mangroves may be impacted by the installation, depending on how that waterway is crossed by the installation.

Four active Gopher Tortoise Burrows were identified and are marked as either Tortoise or GT. These can be permitted with a Temporary Exclusion Permit to perform the installation while temporarily penning the tortoises nearby.

Two potentially active Bald Eagle nesting areas are located within the project boundary. While the nest tree and platform were impacted by Hurricane Ian on September 28, 2022, the eagles may return to the area and create new nests nearby.





FLORIDA
Natural Areas
INVENTORY

1018 Thackerfield Road
Suite 200-C
Tallahassee, FL 32303
850-224-6297
850-401-9364 fax
www.fnai.org

Florida Natural Areas Inventory

Biodiversity Matrix Query Results

UNOFFICIAL REPORT

Created 8/15/2022

(Contact [FNAI Data Services Coordinator](#)
for an official **Standard Data Report**)

NOTE: The Biodiversity Matrix includes only rare species and natural communities tracked by FNAI.

Report for 9 Matrix Units: **31137, 31138, 31139, 31429, 31430, 31431, 31730, 31731, 31732**



Descriptions

DOCUMENTED - There is a documented occurrence in the FNAI database of the species or community within this Matrix Unit.

DOCUMENTED-HISTORIC - There is a documented occurrence in the FNAI database of the species or community within this Matrix Unit; however the occurrence has not been observed/reported within the last twenty years.

LIKELY - The species or community is *known* to occur in this vicinity, and is considered likely within this Matrix Unit because:

1. documented occurrence overlaps this and adjacent Matrix Units, but the documentation isn't precise enough to indicate which of those Units the species or community is actually located in; or
2. there is a documented occurrence in the vicinity and there is suitable habitat for that species or community within this Matrix Unit.

POTENTIAL - This Matrix Unit lies within the known or predicted range of the species or community based on expert knowledge and environmental variables such as climate, soils, topography, and landcover.

1 Documented Element Found

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
<i>Haliaeetus leucocoryphus</i> Bald Eagle	G5	S3	N	N

1 Likely Element Found

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
<i>Nycticorax nycticorax</i> Wood Stork	G4	S2	T	FT

Matrix Unit IDs: **31137, 31138, 31139, 31429, 31430, 31431, 31730, 31731, 31732**

30 Potential Elements Common to Any of the 9 Matrix Units

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
<i>Acipenser oxyrinchus desotoi</i> Gulf Sturgeon	G3T2T3	S2?	T	FT
<i>Antigone canadensis pratensis</i> Florida Sandhill Crane	G5T2	S2	N	ST
<i>Aphelocoma coerulescens</i> Florida Scrub-Jay	G2?	S1S2	T	FT
<i>Ardea herodias occidentalis</i> Great White Heron	G5T2	S2	N	N
<i>Athene cucularia floridana</i> Florida Burrowing Owl	G4T3	S3	N	ST
<i>Calceogon multiflorus</i> many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosoma venicola</i> sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i> sand-dune spurge	G2	S2	N	E
<i>Charadrius melodus</i> Piping Plover	G3	S2	T	FT
<i>Chorizanthe pulchella</i> beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i> Eastern Indigo Snake	G3	S2?	T	FT
<i>Dryobates borealis</i> Red-cockaded Woodpecker	G3	S2	E, PT	FE
<i>Erethachelys imbricata</i> Hawksbill Sea Turtle	G3	S1	E	FE
<i>Eumops floridanus</i> Florida bonneted bat	G1	S1	E	FE
<i>Gopherus polyphemus</i> Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i> Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i> nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i> pine pinweed	G2	S2	N	E
<i>Linum carteri</i> var. <i>smallii</i> Small's flax	G2T2	S2	N	E
<i>Mustela frenata peninsulae</i> Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i> coastal lily	G2	S2	N	E
<i>Neovison vison pop. 1</i> American Mink, Southern Florida population	G5T2Q	S2	N	ST
<i>Nolina atonocarpa</i> Florida beargrass	G3	S3	N	T
<i>Rallus longirostris scotti</i> Florida Clapper Rail	G5T3?	S3?	N	N
<i>Schizachyrium nivium</i> scrub bluestem	G1G2	S1S2	N	E
<i>Sciurus niger niger</i> Southeastern Fox Squirrel	G5T5	S3	N	N
<i>Setophaga discolor paludicola</i> Florida Prairie Warbler	G5T3	S3	N	N
<i>Trichechus manatus latirostris</i> Florida Manatee	G2G3T2	S2S3	T	N
<i>Typocerus fulvinctus</i> Yellow-banded Typocerus Long-horned Beetle	G2G3	S2S3	N	N
<i>Ursus americanus floridanus</i> Florida Black Bear	G5T4	S4	N	N



Exhibit 4: Charlotte County Heritage Tree Information

Heritage Trees



Current Planning &
Zoning Division

□ What is a Heritage Tree?

A tree and its root system within the Cypress, Oak, or Pine species which has a minimum 30-inch trunk diameter at diameter at breast height (DBH). In the case of multi-stemmed trees where there is a union of wood above grade, the DBH shall be measured at each stem and added together to reach a minimum of a 45-inch diameter.

- Heritage Trees have additional protections provided in Section 3-9-100.3(e). No person shall cut down, remove, relocate, or in any way damage a Heritage Tree.

- In some cases, the removal of a Heritage Tree may be authorized. A determination from a certified arborist may be required if the tree is in advanced stages of decline. If the tree is causing substantial structural or infrastructural damage, a qualified engineer of record must provide documentation that removal of the tree is the only remedy. If the tree is located where a structure or improvement allowed as a permitted principal use under zoning regulations is to be located and the applicant has made every effort to accommodate the Heritage Tree within the design of the structure or improvement,

- Heritage Trees shall be replaced on a DBH-inch for DBH-inch basis. If site-specific conditions limit or prevent the replacement of trees on site, the applicant shall pay \$150.00 per DBH inch not replanted. These fees go into the Native Tree Replacement Fund.

Tree Permit Basics



All proposed site development must first obtain a Charlotte County Tree Permit approved by the Community Development Department before any clearing of the site may begin.

Charlotte County Government
Community Development Department
18400 Murdock Circle
Port Charlotte, FL 33948

Phone: 941.743.1964
Fax: 941.743.1598
www.charlottecountyfl.gov

Published September 2015

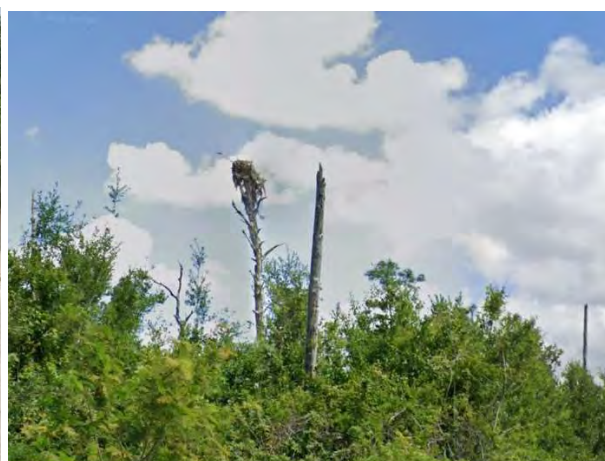


Exhibit 6: Site Photographs





Platform impacted by Hurricane Ian 9/28/22



Nest & Tree destroyed by Hurricane Ian 9/28/22



Saturday, June 25, 2022 8:57:05 AM
26.97224N 82.13300W
19265 Abhenry Cir, Port Charlotte, FL 33948, USA



Nov 14 2022 9:28:03 AM
26.9842 779N 82.13355449W
458 Donora Street
Port Charlotte
Charlotte County
Florida



Nov 15 2022 10:39:14 AM
26.98372297N 82.1262985W
924 McMahon Avenue Northwest
Port Charlotte
Charlotte County
Florida



Nov 15 2022 10:32:11 AM
26.982756 82N 82.1254185W
902 McMahon Avenue Northwest
Port Charlotte
Charlotte County
Florida



Nov 15 2022 10:41:16 AM
26.98383268N 82.1249982W
467 Milport Street Northwest
Port Charlotte
Charlotte County
Florida



Nov 15 2022 10:06:39 AM
26.98333844N 82.12990916W
943 McMahon Avenue Northwest
Port Charlotte
Charlotte County
Florida



7.0 REFERENCES

Florida Natural Areas Inventory – Biodiversity Matrix;
fnai.org/BiodiversityMatrix/index.html

Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute;
https://atoll.floridamarine.org/arcgis/rest/services/FWC_GIS/OpenData_FWSppLoc/MapServer/10

National Wetlands Inventory Mapper
fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/

Audubon Center for Birds Of Prey – Eagle Watch Program
<https://cbop.audubon.org/conservation/about-eaglewatch-program>

Charlotte County
GIS mapping & Tree Ordinance

Appendix F: Cultural Resource Assessments

**CULTURAL RESOURCE ASSESSMENT
DESKTOP ANALYSIS
MUNICIPAL SERVICE BENEFIT UNITS (MSBU) AREA
LAKE VIEW/MIDWAY
WATER QUALITY IMPROVEMENTS PROJECT
CHARLOTTE COUNTY, FLORIDA**

Prepared for:

**Giffels-Webster Engineers, Inc.
900 Pine Street, Suite 225
Englewood, Florida 34223**

Prepared by:



Florida's First Choice in Cultural Resource Management

**Archaeological Consultants, Inc.
8110 Blaikie Court, Suite A
Sarasota, Florida 34240
(941) 379-6206**

June 2022

**CULTURAL RESOURCE ASSESSMENT
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**Project Manager – Marion Almy
Project Archaeologist – Elizabeth A. Horvath
Project Architectural Historian – Kimberly M. Irby**

June 2022

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Introduction

A desktop analysis for the 1346-acre Municipal Service Benefit Units (MSBU) Area of the Lake View/Midway Water Quality Improvements project, located in Charlotte County, was conducted by Archaeological Consultants, Inc. (ACI) on behalf of Giffels-Webster Engineers, Inc. The project will provide design for a wastewater collection system and potable water distribution system improvements. The work involves underground pipelines that will remain within public right-of-way (ROW) except where wastewater lift stations or vacuum pump stations will be constructed on residential lots. Two locations, each consisting of adjacent residential lots, have been purchased for construction of wastewater lift stations or vacuum pump stations. One location in the north part of the MSBU Area at 700 and 712 Chevy Chase Street and the other location in the south part of the MSBU Area at 155 and 161 Grenada Street. This study, conducted as due diligence, included the identification and description of all known archaeological sites and historic resources located within or proximate to the Area of Potential Effects (APE), which consists of the 1346-acre MSBU Area, as well as a discussion of potential archaeologically sensitive areas.

There is a low probability for the occurrence of aboriginal archaeological sites based on the environmental setting and a moderate potential for the occurrence of historic archaeological sites considering development has occurred within the APE since 1959. Historical/architectural background research included a review of the Florida Master Site File (FMSF) and the National Register of Historic Places (NRHP) indicated that two historic linear resources, the Auburn Waterway Canal (8CH00670) and US 41/Tamiami Trail (8CH00670), were previously recorded immediately adjacent to the APE. Both linear resources were determined ineligible for listing in the NRHP by the State Historic Preservation Officer (SHPO). A review of the Charlotte County Property Appraiser's data and historic aerial photographs suggested the potential for approximately 123 historic resources, 50 years of age or older (constructed in 1972 or earlier), within the APE (Polk 2022). This includes 121 buildings constructed between circa (ca.) 1959 and 1972, a ca. 1968 historic bridge (Bridge No. 014036), and one linear resource, the Crestview Waterway, constructed prior to 1948. In addition, one historic linear resource, the Pellam Waterway, is located immediately adjacent to the western boundary of the APE. There is one unrecorded historic resource adjacent to the Granada Street site. None of these resources appear eligible for listing in the NRHP; however, a field survey will be necessary for proper identification and evaluation of historic resources located within the ROW or historic parcels that will contain a wastewater lift station or vacuum pump station.

A Cultural Resource Assessment Survey (CRAS) may be required as part of the permitting process. If it should be, the fieldwork should meet the requirements of Chapters 267, 373 and 872.05, *Florida Statutes (FS)*, Florida's *Coastal Management Program*, and implementing state regulations, for possible effects on historic properties listed, or eligible for listing, in the NRHP, or otherwise of historical, architectural, or archaeological value, as well as the standards contained in Florida Division of Historical Resources' (FDHR) *Cultural Resource Management Standards and Operational Manual* (FDHR 2003). The report should meet the specifications set forth in Chapter 1A-46, *Florida Administrative Code (FAC)*.

Location and Environmental Setting

The APE is located in Sections 8, 16, 17, 20, 21, 28, and 29 of Township 40 South, Range 22 East (United States Geological Survey [USGS] El Jobean, Murdock, Murdock SE, and Punta Gorda 2013). The APE is bound by the Pellam Waterway on the west and south, Cochran Boulevard on the north, and U.S. 41 and Little Alligator Creek on the east (**Figures 1 and 2**).



Figure 1. Location of the MSBU APE, Charlotte County.

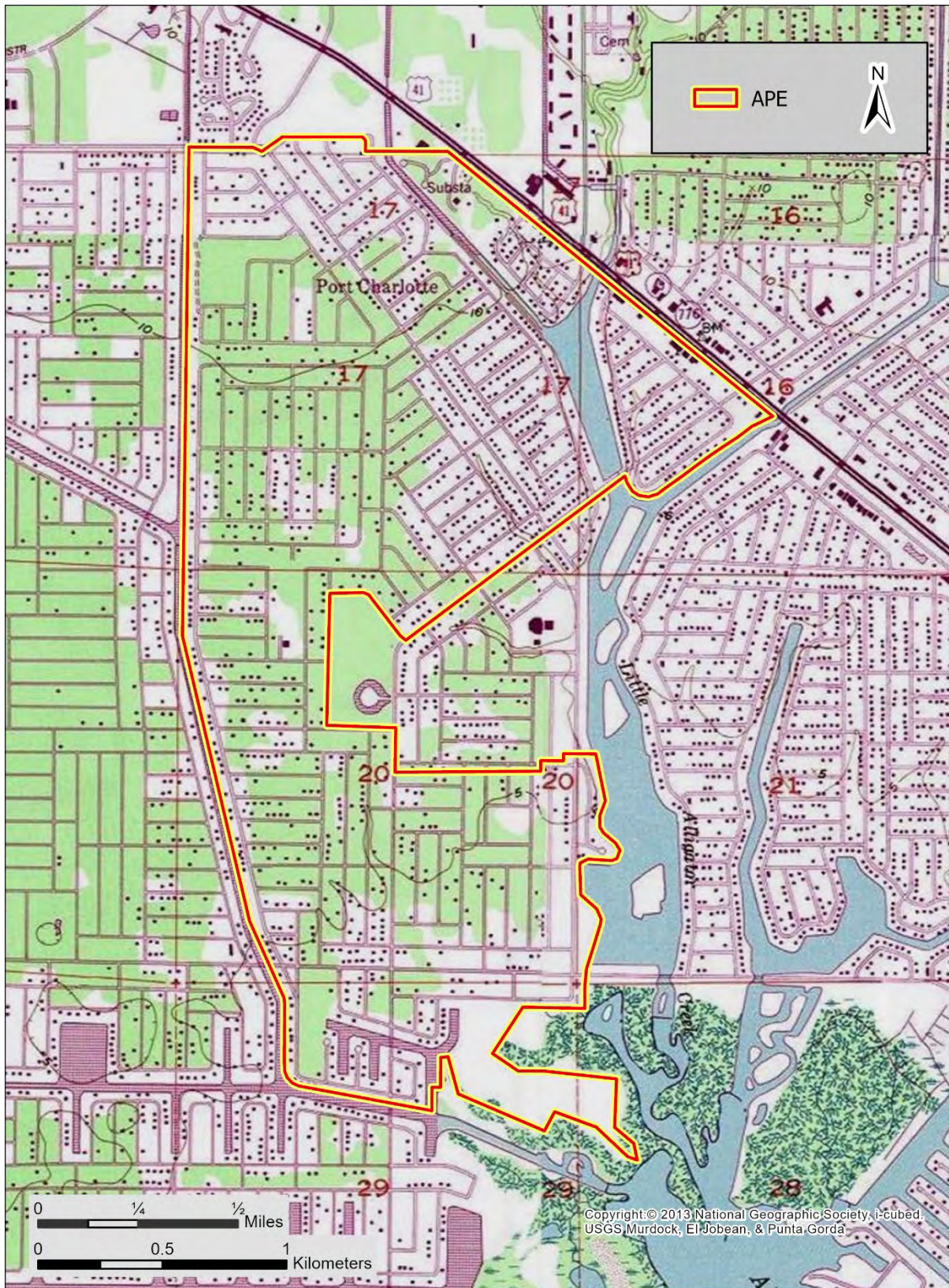


Figure 2. Environmental setting of the APE.

The APE sits at an elevation of sea level to 10 feet (ft) above mean sea level (amsl). It lies within the Gulf Coastal Lowlands physiographic region (White 1970). The APE is underlain by shelly sediments of the Plio-Pleistocene that are surficially evidenced by shelly sand and clay (Florida Department of Environmental Protection [FDEP] 2001a, 2001b).

According to the United States Department of Agriculture (USDA), the APE occurs within the Wabasso-Isles-Boca and Matlacha soil associations. The former consists of nearly level, poorly drained, deep and moderately deep, sandy soils that occur in sloughs and on flatwoods. Maidencane occurs in the sloughs and the flatwoods are covered with South Florida slash pine, sawpalmetto, and pineland threawn (Henderson 1984). The Matlacha soil association consists of nearly level, somewhat poorly drained soils that are mostly mixed sands, shell fragments, and limestone fragments that were formed from earthmoving activities. **Table 1** provides a list of the soils within the APE and their location is depicted on **Figure 3**. All of the soil types, except for Kesson fine sand, tidal, have an Urban land component; the table lists the natural setting of the soil type prior to development.

Table 1. Soil types within the APE.

Soil type, % slopes	Drainage	Setting
Boca fine sand-Urban land complex (ULC), 0-2%	Poor	Flatwoods
Felda fine sand-ULC, 0-2%	Poor	Broad, nearly level sloughs
Kesson fine sand, tidal	Very poor	Broad tidal swamps
Malabar fine sand-ULC, 0-2%	Poor	Sloughs
Matlacha gravelly fine sand-ULC	NA	Made land
Oldsmar sand-ULC, 0-2%	Poor	Flatwoods
Urban land, 0-2%	NA	>85% covered with parking lots, airports, shopping centers, large buildings, streets, and sidewalks
Wabasso sand, limestone substratum-ULC, 0-2%	Poor	Flatwoods

The soils support different vegetative regimes, which in turn provide habitats for the local animal population, and thus provide essential food resources. The vegetation maps of Florida indicates that the APE falls within prairie grasslands and pine flatwoods (Davis 1980). The soils have variable suitability for openland, woodland, and wetland habitats (Henderson 1984: Table 9). The habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses, and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, cottontail, and sandhill cranes. Boca, Felda, and Oldsmar sands are rated fair for openland habitats. Woodland wildlife habitat includes area of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include turkey, thrushes, woodpeckers, squirrels, gray fox, racoon, deer, bobcat. Oldsmar and Wabasso sands are rated fair for woodland habitats. The habitat for wetland wildlife includes areas of open, marshy, or swampy, shallow water areas. Wildlife in these areas include ducks, egrets, herons, shore birds, otter, mink, and ibis. Isles sand is well suited to wetlands; Boca, Felda, and Malabar sands are rated fair. Those soils not listed above are rated poor or very poor for that habitat.

Background Research and Literature Review

A review of pertinent archaeological and historical literature, records, and other documents and data pertaining to the general area was conducted. The focus of this desktop analysis was to ascertain the types of cultural resources known in the project vicinity, as well as the potential for the occurrence of yet unrecorded resources.

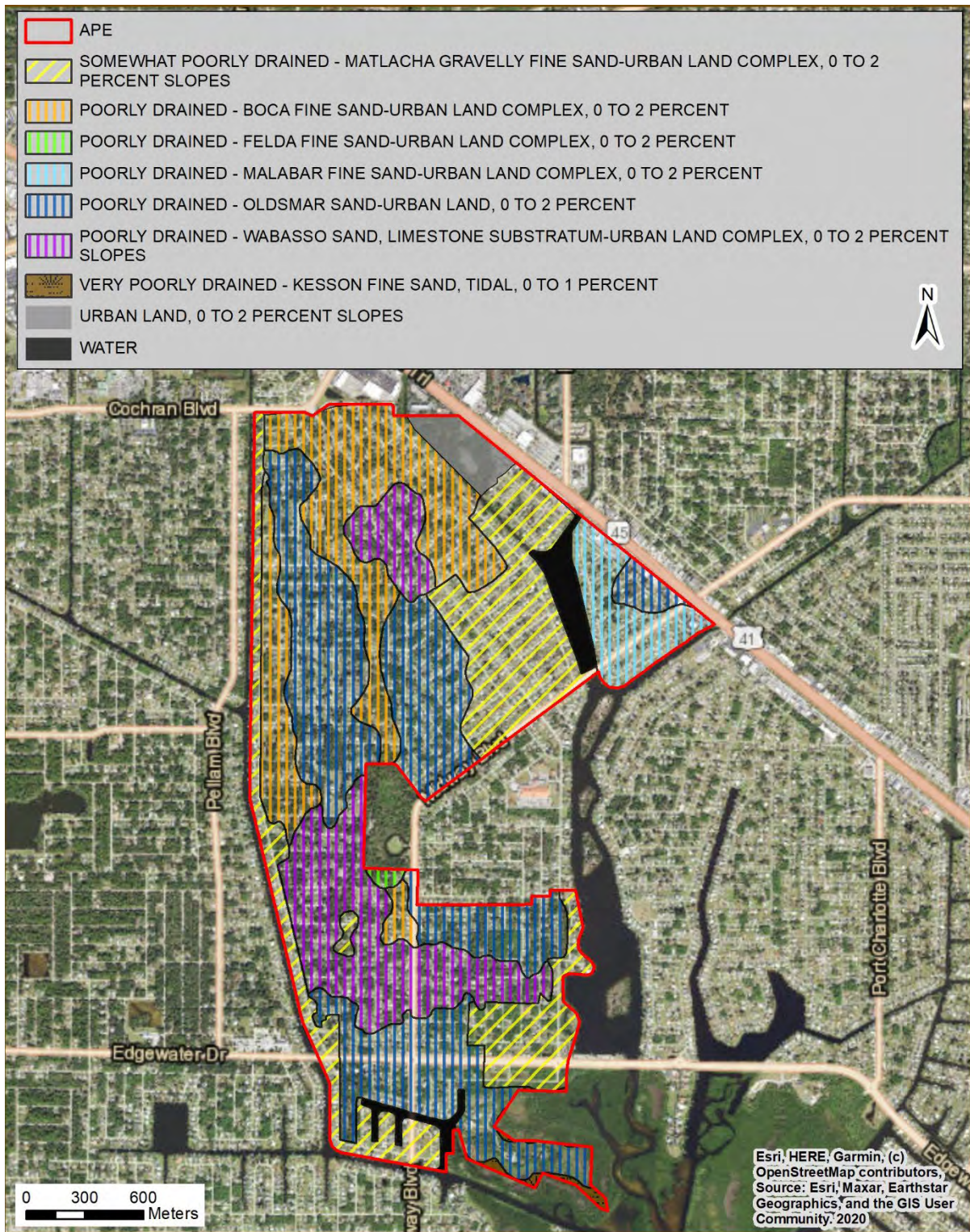


Figure 3. Soil type distribution within the APE.

Research included a review of sites listed in the NRHP and the Florida Master Site File (FMSF) (April 2021 GIS update); an examination the Charlotte County Property Appraiser's data; soil survey information; plat map, field notes, and tract book records; historic aerial photos on file with the

Publication of Archival Library and Museum Materials (PALMM); regional culture histories and site location predictive models; and relevant CRAS reports and manuscripts.

Archaeological Considerations

A review of the FMSF data indicated that there are only three sites recorded within two miles of the APE; none is within one mile (**Figure 4**). The Unnamed (8CH00349) and Grassy Point (8CH00350) sites were recorded in 1988 during the Charlotte County survey (HPA 1989). 8CH00349 is a shell midden, campsite, and possible shipwreck site. It is a long narrow midden along the shoreline and into the tidal swamp. It has been severely eroded from tidal and storm action. Artifacts recovered from the eroded areas include a variety of shell tools and STP pottery. Human remains were exposed in the midden after a hurricane blew down some trees (Patton 2000). 8CH00350 is a small shell midden that has a possible Early Spanish period component. The midden was composed of oyster and Carolina marsh clam with some horse conch and left-handed whelk. Artifacts recovered included a Queen conch shell lip celt, horse conch shell hammer, shell tools, sand tempered plain (STP) pottery, a nail, and two fragments of square iron spikes (HPA 1989). The Waterway Circle Mound (8CH00494) is listed as being destroyed in the 1950s when a canal was dredged; human bones and pottery were reported to George Luer in 1979 (Austin et al. 2008; FMSF; Luer et al. 1996). None of the sites have been evaluated by the SHPO in terms of NRHP eligibility. **Table 2** provides a list of the CRAS project conducted near the APE.

Table 2. CRAS projects conducted near the APE.

REFERENCE	PROJECT	# of Newly Recorded Resources	# of Previously Recorded Resources
82 / Clausen et al. 1978	Cultural Resource Survey of Planned Additions to Como/Flamingo Waterway System	3	2
290 / Clausen 1981	Archaeological Reconnaissance of General Development Corporation's Bayview Property	1	1
1841 / Browning and Wiedenfeld 1989	Proposed Addition of Two Lanes in the Existing Median of US 41 from the Peace River to Toledo Blade Boulevard	0	0
2056 / HPA 1989	Historic Properties Survey of Charlotte County, Florida	13	16
3803 / Janus Research 1994	Cultural Resource Assessment Survey of the Proposed Improvements to State Road 776 (El Jobean Road) from Hollis Avenue to U.S. Highway 41 (Tamiami Trail) in Charlotte County, Florida	4	0
10623 / Driscoll 2004	An Archaeological and Historical Survey of the Proposed Peachland Boulevard Tower Location in Charlotte County, Florida	0	0
14844 / Cozzi 2005	Charlotte Harbor Shipwreck Survey for 2007	2	9
15264 / Florida History 2008	An Archaeological and Historical Survey of the 6FM1139 Coastal Church Tower in Charlotte County, Florida (Form 620)	0	0
16444 / Handley et al. 2008	Phase II of the Survey of Historic Resource, Charlotte County, Florida	251	41
25717 / ACI 2018	Cultural Resource Assessment Survey of the Olean Boulevard Widening From US 41 to Easy Street, Port Charlotte, Charlotte County, Florida	3	0

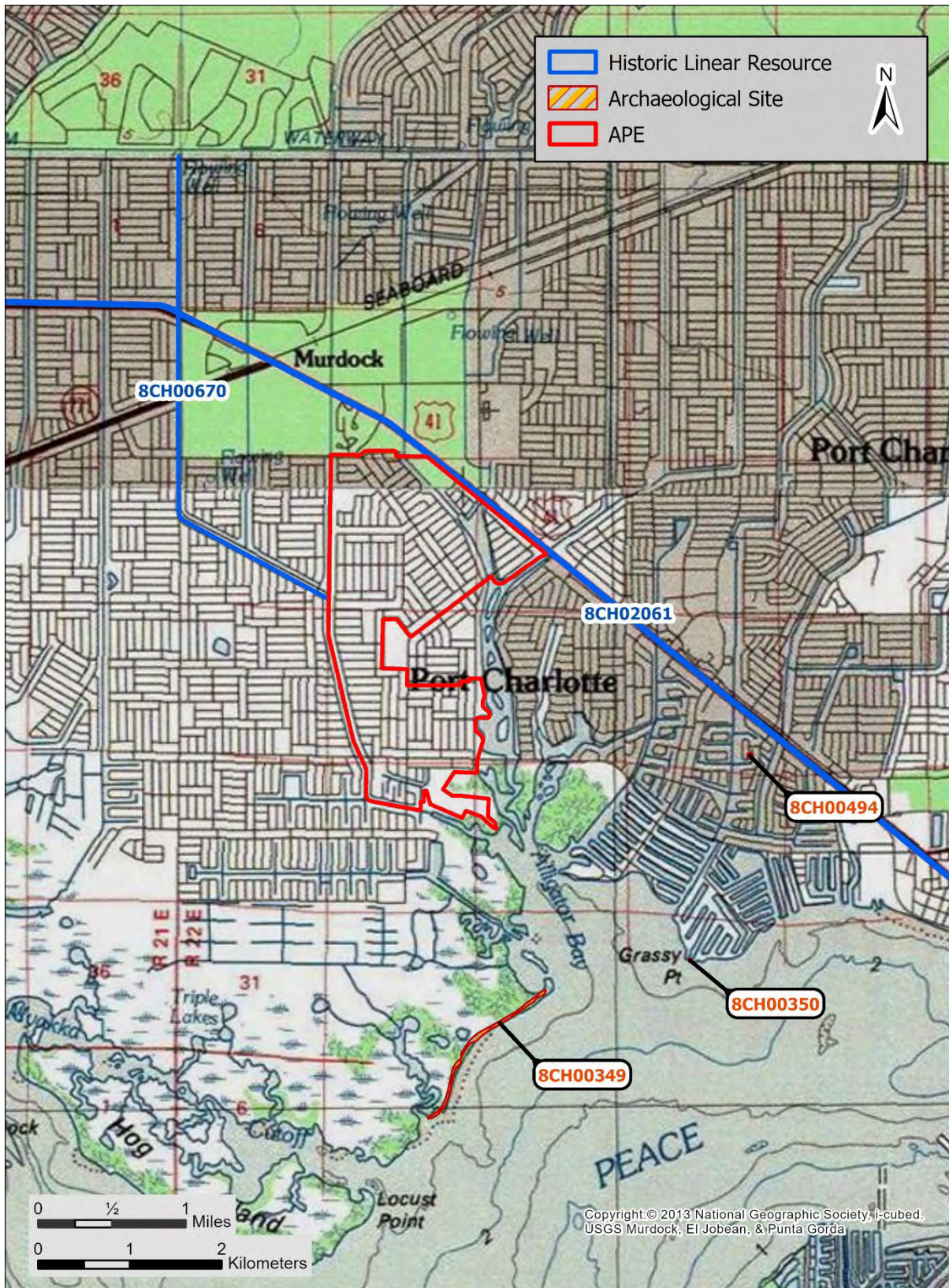


Figure 4. Previously recorded cultural resources proximate to the APE

ACI compiled the 2018 data available from all the recorded archaeological sites within the Gulf Coastal Lowlands physiographic region of Charlotte County to develop a better understanding the site distribution in this area. There are 182 aboriginal sites within the Gulf Coastal Lowlands that have confirmed site locations. Historic sites and those plotted “per vague verbal description” were deleted from the analysis.

Over 80% of the sites are located within 100 m of water, while another 15% are within 200 m of a water source (**Table 3**). Only six sites are located greater than 200 m of an identifiable water source. Almost half of the recorded sites are located along the sound or bayshore, with almost another quarter of the sites located proximate to a river or creek. The other 30 sites are proximate to a lake/pond or wetland/swamp.

Table 3. Site distribution by water type and distance.

	0-100 m		<200 m		<300 m		<400 m		Total	
Type	cnt	%	cnt	%	cnt	%	cnt	%	cnt	% of sites
bay	43	23.63%	2	1.10%		0.00%		0.00%	45	24.73%
creek	34	18.68%	14	7.69%	3	1.65%	2	1.10%	53	29.12%
lake	1	0.55%		0.00%		0.00%		0.00%	1	0.55%
pond	13	7.14%	5	2.75%		0.00%		0.00%	18	9.89%
river	10	5.49%	1	0.55%	1	0.55%		0.00%	12	6.59%
sound	42	23.08%		0.00%		0.00%		0.00%	42	23.08%
swamp	6	3.30%	5	2.75%		0.00%		0.00%	11	6.04%
Total	149	81.87%	27	14.84%	4	2.20%	2	1.10%	182	100.00%

A look at site distribution by elevation depicts most of the sites are situated along the shorelines with another 44 located at 1.5 m (5 ft) amsl (**Figure 5**). Only 18 sites are situated at elevations between 10 and 25 ft amsl.

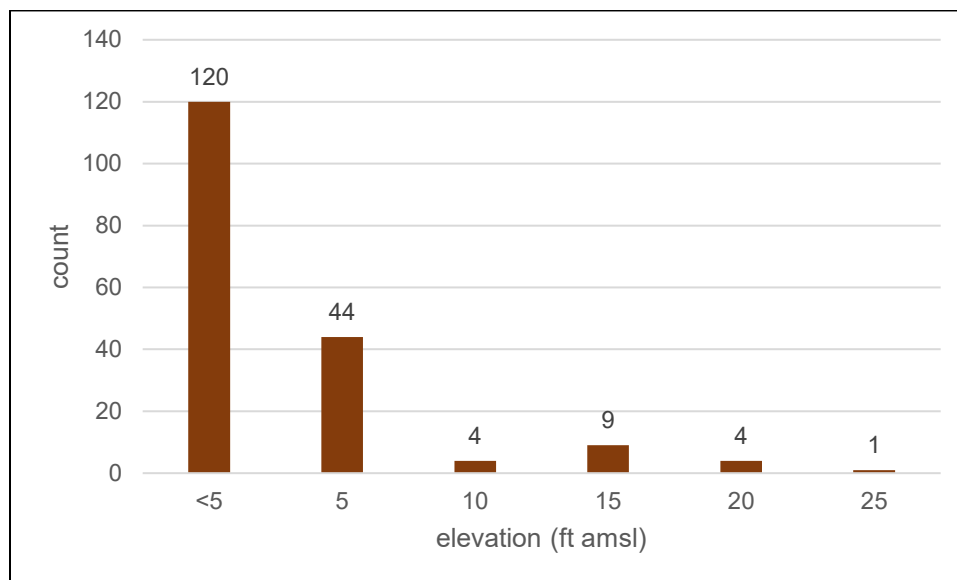


Figure 5. Site distribution by elevation (ft amsl).

Soil types and their drainage characteristics can also be used to assess the likelihood for aboriginal site occurrence (Almy 1978). There are 60 soil types within the Gulf Coastal Lowlands of Charlotte County; only 28 of which have recorded archaeological sites (**Table 4**). Those located within the APE are shaded orange on the table. Many of the sites occurred on more than one soil type. This

analysis only included the four types covering the greatest acreage for each site, which totaled 209 soil type occurrences. The first soil column indicates that this soil type had the greatest area of the site, and so on down the line, so that the 4th column had the smallest site acreage.

Table 4. Distribution of sites by drainage class and soil type within the Gulf Coastal Lowlands.

DRAINAGE/Soil Type, % slopes	% of Area	Soils					% of sites	Difference
		1	2	3	4	Total		
MODERATELY WELL DRAINED								
Caloosa fine sand (fs)	0.03%					0	0.00%	-0.03%
Daytona sand	0.47%	4	1			5	2.39%	1.92%
Orsino fs	0.88%	3	1	1		5	2.39%	1.51%
Total	1.39%	7	2	1	0	10	4.78%	3.40%
POORLY DRAINED								
Beaches	0.02%	1	1			2	0.96%	0.94%
Boca fs, 0-2%	2.31%	2	1			3	1.44%	-0.87%
Boca fs, slough	0.10%					0	0.00%	-0.10%
Boca fs, tidal	0.49%	7	1			8	3.83%	3.34%
Bradenton fs, 0-2%	0.03%					0	0.00%	-0.03%
Captiva fs	0.00%					0	0.00%	0.00%
EauGallie sand, 0-2%	2.31%	2				2	0.96%	-1.35%
Felda fs, 0-2%	2.21%					0	0.00%	-2.21%
Hallandale fs, tidal	0.12%					0	0.00%	-0.12%
Hallandale fs, wet, 0-2%	0.68%	1				1	0.48%	-0.20%
Heights fs	2.11%					0	0.00%	-2.11%
Immokalee sand, 0-2%	7.07%	12	5			17	8.13%	1.07%
Immokalee-Urban land complex	0.21%					0	0.00%	-0.21%
Isles fs, slough	1.00%					0	0.00%	-1.00%
Malabar fs, 0-2%	2.14%	1				1	0.48%	-1.66%
Malabar fs, high, 0-2%	5.01%					0	0.00%	-5.01%
Myakka fs, 0-2%	3.49%	10	2		1	13	6.22%	2.73%
Oldsmar fs, limestone substratum (ls)	0.16%					0	0.00%	-0.16%
Oldsmar sand, 0-2%	13.49%	7	1			8	3.83%	-9.66%
Pineda fs, 0-2%	6.21%	1				1	0.48%	-5.73%
Pompano fs, 0-2%	0.21%					0	0.00%	-0.21%
Punta fs	0.39%					0	0.00%	-0.39%
Smyrna fs, 0-2%	5.23%	11	1			12	5.74%	0.51%
Smyrna-Urban land complex	0.22%					0	0.00%	-0.22%
Valkaria fs, 0-2%	0.49%					0	0.00%	-0.49%
Wabasso sand, 0-2%	10.29%					0	0.00%	-10.29%
Wabasso sand, ls, 0-2%	2.72%	8				8	3.83%	1.11%
Total	68.72%	63	12	0	1	76	36.36%	-32.35%
SOMEWHAT POORLY DRAINED								
Canaveral fs	0.25%	3				3	1.44%	1.18%
Canaveral-Urban land complex	0.04%	1				1	0.48%	0.44%
Electra fs	0.17%					0	0.00%	-0.17%
Satellite fs, 0-2%	0.10%	1				1	0.48%	0.38%
Total	0.56%	5	0	0	0	5	2.39%	1.83%
VERY POORLY DRAINED								
Anclote sand, depressional (depr), 0-1%	0.09%	1				1	0.48%	0.39%
Chobee muck, depr, 0-1%	0.97%					0	0.00%	-0.97%
Copeland sandy loam, depr	0.33%					0	0.00%	-0.33%
Estero muck	1.65%	2				2	0.96%	-0.69%
Felda fs, depr	2.15%					0	0.00%	-2.15%

DRAINAGE/Soil Type, % slopes	% of Area	Soils					% of sites	Difference
		1	2	3	4	Total		
Floridana sand, depr	0.55%					0	0.00%	-0.55%
Gator muck, frequently ponded, 0-1%	0.02%					0	0.00%	-0.02%
Isles fs, depr	0.10%	1				1	0.48%	0.37%
Isles muck	1.36%	10	1			11	5.26%	3.90%
Kesson fs	0.69%	16	1			17	8.13%	7.44%
Malabar fs, depr, 0-1%	0.51%					0	0.00%	-0.51%
Myakka fs, depr	0.53%					0	0.00%	-0.53%
Peckish mucky fs	2.62%	27	2			29	13.88%	11.26%
Pineda fs, depressional, 0-1%	2.26%					0	0.00%	-2.26%
Pompano fs, depressional	0.28%					0	0.00%	-0.28%
Terra Ceia muck	0.02%					0	0.00%	-0.02%
Valkaria fs, depr	0.04%					0	0.00%	-0.04%
Winder sand, depr	1.81%					0	0.00%	-1.81%
Wulfert muck	2.03%	35	1			36	17.22%	15.19%
Total	18.00%	92	5	0	0	97	46.41%	28.41%
OTHER								
Matlacha gravelly fs	4.27%	6	1	2		9	4.31%	0.03%
Matlacha gravelly fs, ls	0.11%					0	0.00%	-0.11%
Matlacha-Urban land complex	1.75%	3	1	1		5	2.39%	0.64%
St. Augustine sand	0.17%	5	1			6	2.87%	2.70%
St. Augustine, organic substratum-Urban land complex	0.00%					0	0.00%	0.00%
Urban land	0.23%	1				1	0.48%	0.25%
Water	4.80%					0	0.00%	-4.80%
Total	11.33%	15	3	3	0	21	10.05%	-1.28%
Grand Total	100.00%	182	22	4	1	209	100.00%	0.00%

The Gulf Coastal Lowland is underlain by 68.7% poorly drained, 18.0% very poorly drained, 1.3% moderately well drained, and 0.6% somewhat poorly drained soils. The rest of the area included 4.8% water and 6.5% reworked or urban land. The soil types that have a higher percentage of sites compared to percent of area (> than 2%) are marked in red, while those soil types that appear to be avoided are marked in blue.

There is a variable distribution of sites across the landscape. However, the coastal areas are clearly preferred. The top four soils, which are very poorly drained, occur along the coast and include Wulfert muck, Peckish mucky fine sand, Kesson fine sand, and Isles muck. These four soils cover only 6.7% of the area but have 43.9% of the sites. Boca fine sand, tidal, is a poorly drained coastal soil that has another 3.8% of the sites, while covering only 0.5% of the area. The only other natural soil with a greater than 2% soil preference is Myakka fine sand, which accounts for 6.2% of the sites and 3.5% of the area. St. Augustine sand is formed by fill and earthmoving operations that were once sloughs or depressions. Sites located in these areas were likely located there due to the previously present water sources.

Based on these data, the APE has a low potential for the presence of aboriginal archaeological sites. Although there are water sources near the APE, the soils generally have a high negative correlation with sites. Kesson soil, however, has a high correlation with sites, and that area does not appear to have been heavily impacted by development. Most of the APE has been developed and any aboriginal archaeological sites present would have likely been destroyed. The potential for yet unrecorded historic period archaeological sites was also assessed and found to be moderate since

structures had been constructed within the APE since 1959, which does make them historic and thus, have the potential for historic archaeological remains.

There is a low potential for historic archaeological sites that predate the development of Murdock. The 1850 plat map reveal no historic features within or near the APE, lands around which were described and 3rd rate pine and/or prairie (Irwin 1849:85-87, 96, 29-99, 107, 110; Reid et al. 1850) (**Figure 6**). The mid-1950s USGS quadrangle maps revealed two structures in the northeast portion of the APE (USGS 1954, 1956a, 1956b, 1957) (**Figure 7**). A review of the historic aerial photographs available from the Publication of Archival and Museum Materials (PALMM) also revealed little development within the APE, other than along U.S. 41 and the drainage canals that had been excavated after 1913, when the Murdock Drainage District was approved by the DeSoto County Commissioners (**Figures 8 and 9**) (CharlotteCounty100.com 2021; USDA 1948, 1951, 1974). One structure had been built in the northeast portion of the APE by 1948. Development within the APE began in 1954 when General Development Corporation bought 80,000 acres for the planned community of Port Charlotte (CharlotteCounty100.com 2021).

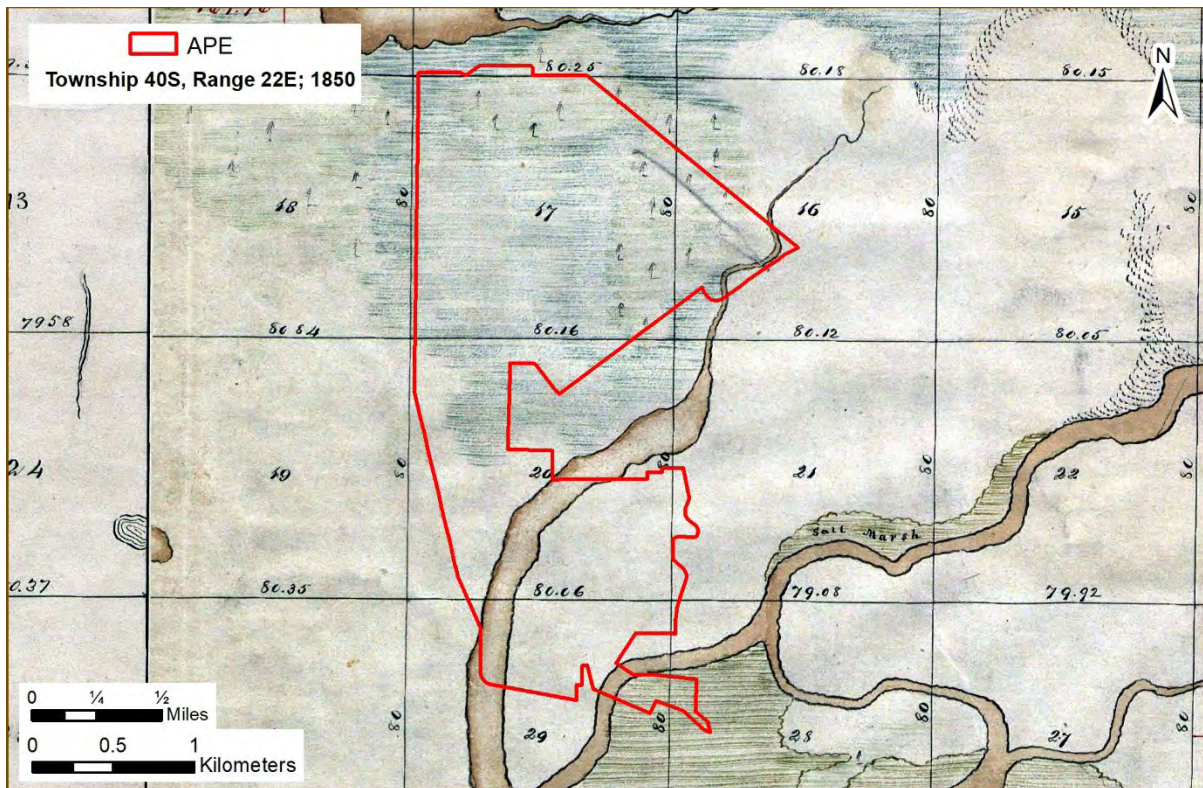


Figure 6. 1850 plat map showing the APE.

Historic/Architectural Considerations

Historical/architectural background research included a review of the FMSF and the NRHP indicated that two historic linear resources, the Auburn Waterway Canal (8CH00670) and US 41/Tamiami Trail (8CH00670), were previously recorded immediately adjacent to the APE (**Figure 4**). Both linear resources were determined ineligible for listing in the NRHP by the SHPO. A review of the Charlotte County Property Appraiser's data and historic aerial photographs suggested the potential for approximately 123 historic resources, 50 years of age or older (constructed in 1972 or earlier), within the APE (Polk 2022). This includes 121 buildings constructed between ca. 1959 and 1972 (**Figure 10**), a ca. 1968 historic bridge (Bridge No. 014036), and one linear resource, the Crestview Waterway,

constructed prior to 1948. In addition, one historic linear resource, the Pellam Waterway, is located immediately adjacent to the western boundary of the APE. There is one unrecorded historic resource adjacent to the Granda Street site; there are no historic resources within or adjacent to the Chevy Chase Street site.

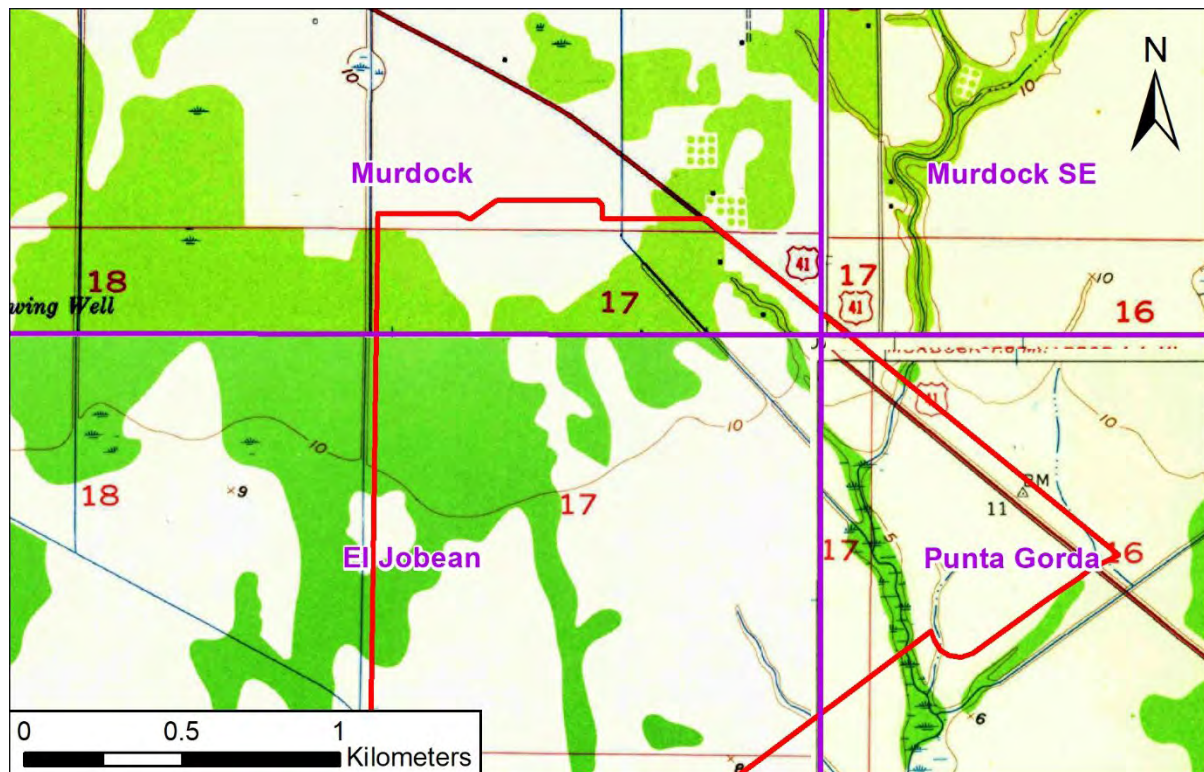


Figure 7. USGS quadrangle maps showing the APE.

Conclusions

There is a low probability for the occurrence of aboriginal archaeological sites based on the environmental setting and a moderate potential for the occurrence of historic archaeological sites since structures have been within the APE since 1959. A review of the Charlotte County Property Appraiser's data identified 121 parcels that have unrecorded historic resources within the APE (Polk 2022). In addition, the Crestview Waterway, constructed prior to 1948, and a ca. 1968 bridge (Bridge No. 014036), are located within the APE. The FMSF lists two linear resources (8CH00670 and 8CH02061) adjacent to the APE; both have been determined ineligible for listing in the NRHP by the SHPO. In addition, one historic linear resource, the Pellam Waterway, is located immediately adjacent to the western boundary of the APE. One unrecorded historic resource is adjacent to the Granada Street site. None of these resources appear eligible for listing in the NRHP; however, a field survey will be necessary for proper identification and evaluation of historic resources located within the ROW or historic parcels that will contain a wastewater lift station or vacuum pump station.

A CRAS may be required as part of the permitting process. If it is, the fieldwork should meet the requirements of Chapters 267, 373 and 872.05, *FS*, Florida's *Coastal Management Program*, and implementing state regulations, for possible effects on historic properties listed, or eligible for listing, in the NRHP, or otherwise of historical, architectural, or archaeological value, as well as the standards contained in FDHR's *Cultural Resource Management Standards and Operational Manual* (FDHR 2003). The report should meet the specifications set forth in Chapter 1A-46, *FAC*.

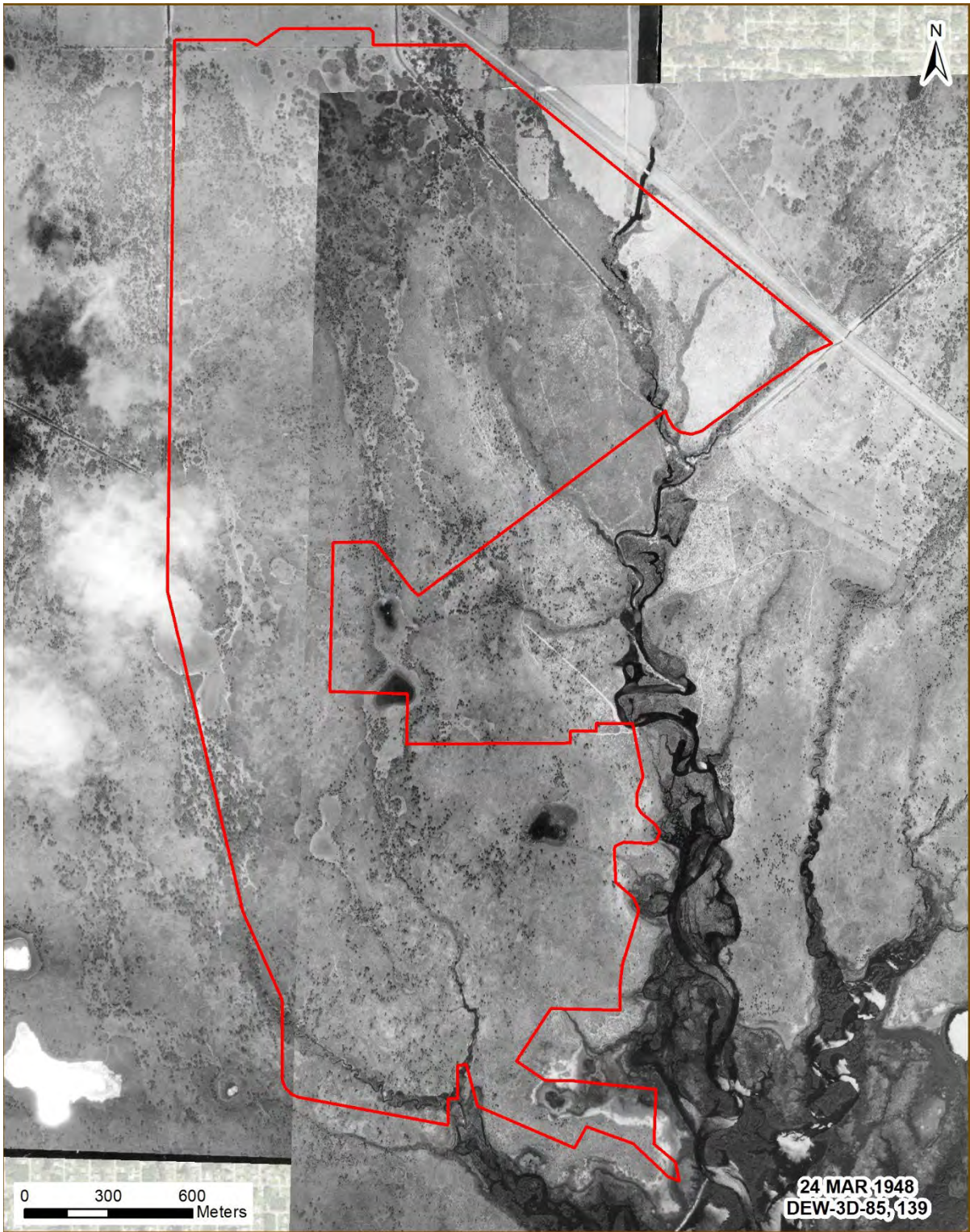


Figure 8. 1948 aerial photos showing the APE.

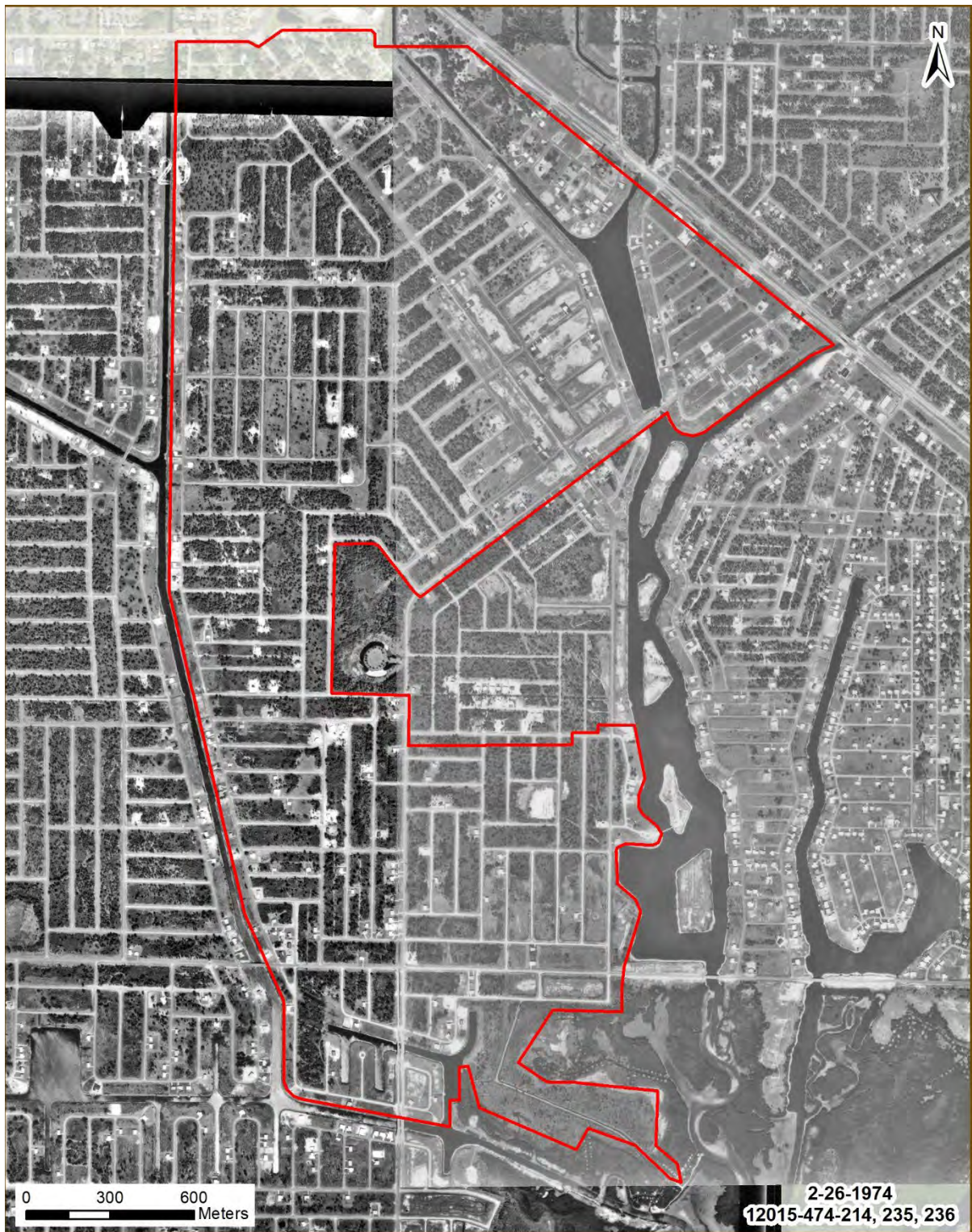


Figure 9. 1974 aerial photos showing the APE.

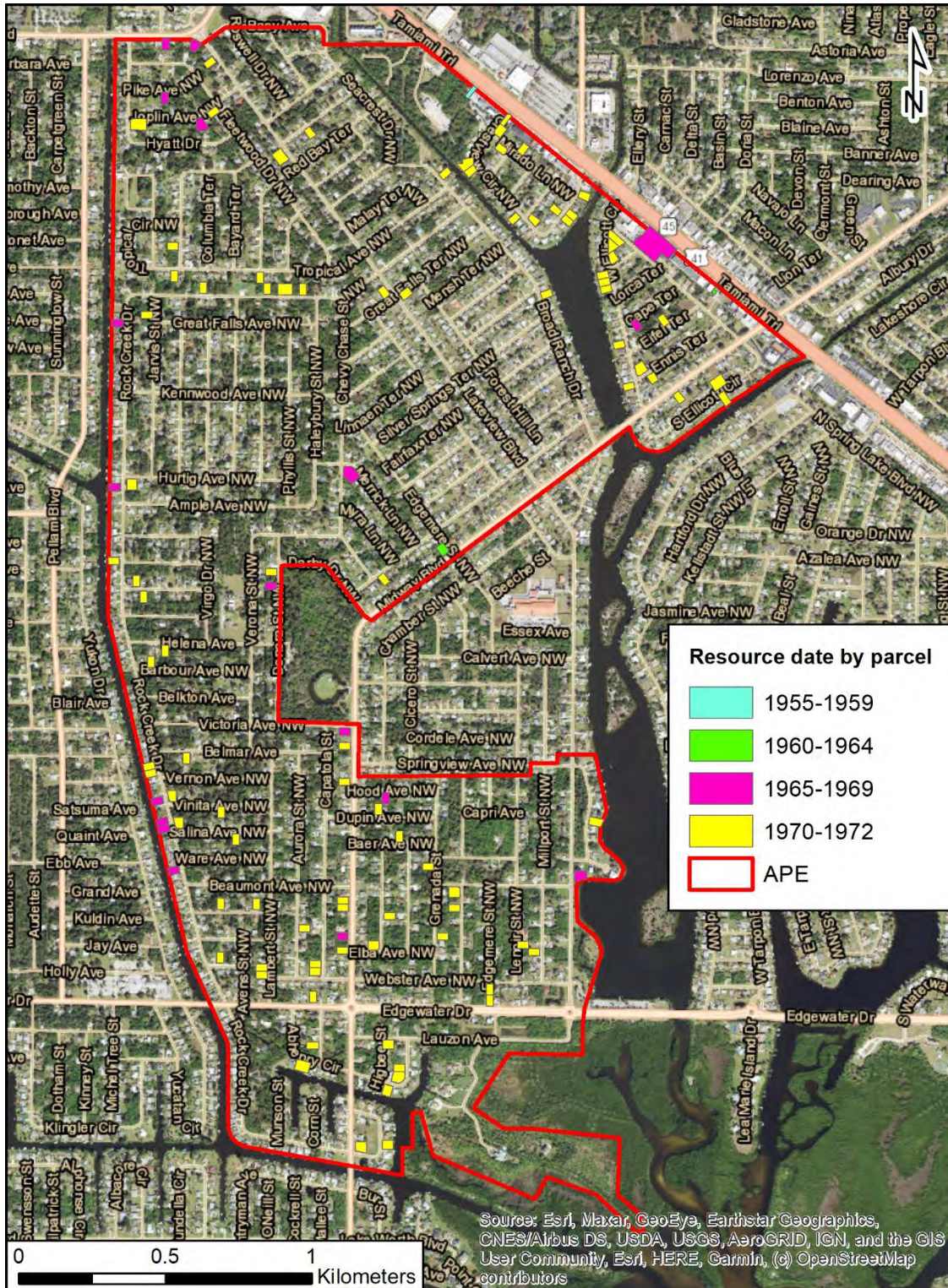


Figure 10. Location of newly Identified historic resources within the APE.

References Cited

Almy, Marion M.

- 1978 The Archaeological Potential of Soil Survey Reports. *The Florida Anthropologist* 31(3):75-91.

Archaeological Consultants, Inc. (ACI)

- 2018 Cultural Resource Assessment Survey of the Olean Boulevard Widening from US 41 to East Street, Port Charlotte, Charlotte County, Florida. ACI, Sarasota. MS# 25717.

Austin, Robert J., Travis Fulk, Nick Linville, Jon C. Endonino, and Debra Wells

- 2008 Survey of Historical Resources, Charlotte County, Florida. SEARCH, Jonesville. MS# 15868.

Browning, William D. and Melissa G. Wiedenfeld

- 1989 Proposed Addition of Two Lanes in the Existing Median of US 41 from the Peace River to Toledo Blade Boulevard. Florida Department of Transportation, Tallahassee. MS# 1841.

CharlotteCounty100.com

- 2021 Murdock: Charlotte County Crossroad. CharlotteCounty100, Port Charlotte.

Clausen, Carl J.

- 1981 Archaeological Reconnaissance of General Development Corporation's Bayview Property Charlotte County, Florida. On file, FDHR, Tallahassee. MS# 290.

Clausen, Carl J., Marion M. Almy, and Cynthia S. Clausen

- 1978 Cultural Resource Survey of Planned Additions to Como/Flamingo Waterway System (Section 44). On file, FDHR, Tallahassee. MS# 82.

Cozzi, J. COZ

- 2005 Charlotte Harbor Shipwreck Survey for 2005. *Report of Investigations* 3. Mote Marine Laboratory, Nautical Archaeology Program, Sarasota. MS# 14844.

Davis, John H.

- 1980 General Map of Natural Vegetation of Florida. *Circular S-178*. Agriculture Experiment Station, University of Florida, Gainesville.

Driscoll, Kelly A.

- 2004 An Archaeological and Historical Survey of the Proposed Peachland Boulevard Tower Location in Charlotte County, Florida. Panamerican Consultants, Inc., Tampa. MS# 10623.

Florida Department of Environmental Protection (FDEP)

- 2001a *Geology (Environmental)*. Florida Geographic Data Library, Gainesville.
2001b *Surficial Geology*. Florida Geographic Data Library, Gainesville.

Florida Division of Historical Resources (FDHR)

- 2003 *Cultural Resource Management Standards and Operational Manual*. Florida Division of Historical Resources, Tallahassee.

Florida History, LLC

- 2008 An Archaeological and Historical Survey of the 6FM1139 Coastal Church Tower in Charlotte County, Florida (Form 620). Florida History, LLC, Tampa. MS# 15264.

Florida Master Site File (FMSF)

Various site file forms. On file, FDHR, Tallahassee.

Handley, Brent M., Marissa Condosta Gordon, and Cory Campbell

- 2008 Phase II of the Survey of Historic Resource, Charlotte County, Florida. *ESI Report of Investigations* 1278. Environmental Services, Inc., Jacksonville. MS# 16444.

Henderson, Warren G., Jr.

- 1984 *Soil Survey of Charlotte County, Florida*. USDA, Soil Conservation Service.

Historical Property Associates (HPA)

- 1989 Historic Properties Survey of Charlotte County, Florida. Historic Property Associates, Inc., St. Augustine. MS# 2056.

Irwin, John M.

- 1849 *Field Notes*. Volume 118. On file, FDEP, Tallahassee.

Janus Research

- 1994 Cultural Resource Assessment Survey of the Proposed Improvements to State Road 776 (El Jobean Road) from Hollis Avenue to U.S. Highway 41 (Tamiami Trail) in Charlotte County, Florida. Janus Research, Inc., Tampa. MS# 3803.

Luer, George M., Robert B. Patton, Robert F. Edic, Corbett McP. Torrence, and Paul L. Jones

- 1996 The Charlotte Harbor Mounds Survey. Charlotte Harbor Environmental Center, Inc., Punta Gorda. MS# 4573.

Patton, Robert B.

- 2000 Charlotte Harbor Mound Survey, Phase II - Report of Investigations. Florida Museum of Natural History, Gainesville. MS# 6024.

Polk, Paul L.

- 2022 *Record Search*. Charlotte County Property Appraiser, Port Charlotte.
<https://www.ccappraiser.com/RPSearchEnter.asp?>

Reid, Sam, John M. Irwin, and Henry Washington

- 1850 *Plat. Township 40 South, Range 22 East*. On file, FDEP, Tallahassee.

United States Department of Agriculture (USDA)

- 1948 Aerial Photographs: 24 MAR '48, DEW-3D-85, 86, 138, 139. On file, PALMM, Gainesville.
1951 Aerial Photographs: DEC 30 1951, DMV-1H-58, 59, 72, 74. On file, PALMM, Gainesville.
1974 Aerial Photographs: 2-26-74, 12015-474-212, 236, 238. On file, PALMM, Gainesville.

United States Geological Survey (USGS)

- 1954 *El Jobean, Fla.* PR 1972, 1987.
- 1956a *Murdock SE, Fla.* PR 1972, PR 1987.
- 1956b *Murdock, Fla.* PR 1987,
- 1957 *Punta Gorda, Fla.* PR 1987 PR 1970.
- 2013a *El Jobean, Fla.* USA_Topo_Maps,
- 2013b *Murdock SE, Fla.* USA_Topo_Maps.
- 2013c *Murdock, Fla.* USA_Topo_Maps,
- 2013d *Punta Gorda, Fla.* USA_Topo_Maps.

White, William A.

- 1970 Geomorphology of the Florida Peninsula. *Geological Bulletin* 51. Florida Department of Natural Resources, Bureau of Geology, Tallahassee.

**CULTURAL RESOURCE ASSESSMENT
DESKTOP ANALYSIS
FORCE MAIN AREA LAKE VIEW/MIDWAY
WATER QUALITY IMPROVEMENTS PROJECT
CHARLOTTE COUNTY, FLORIDA**

Prepared for:

**Giffels-Webster Engineers, Inc.
900 Pine Street, Suite 225
Englewood, Florida 34223**

Prepared by:



Florida's First Choice in Cultural Resource Management

**Archaeological Consultants, Inc.
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June 2022

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Project Architectural Historian – Kimberly M. Irby**

June 2022

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Introduction

A desktop analysis for the Force Main Area of the Lake View/Midway Water Quality Improvements project, located in Charlotte County, was conducted by Archaeological Consultants, Inc. (ACI) on behalf of Giffels-Webster Engineers, Inc. The project will provide design for a wastewater collection system and potable water distribution system improvements. The work involves underground pipelines that will remain within public right-of-way (ROW). This study, conducted as due diligence, included the identification and description of all known archaeological sites and historic resources located within or proximate to the 40-acre Area of Potential Effects (APE), as well as a discussion of potential archaeologically sensitive areas. The archaeological and historical APE consists of the 1.8-mile-long force main corridor and the 3.4-acre tract to the southeast of the force main. No lift stations or vacuum pump stations are proposed to be constructed on residential lots within the force main APE.

There is a low probability for the occurrence of aboriginal archaeological sites based on the environmental setting and a moderate potential for the occurrence of historic archaeological sites considering development has occurred within the APE since 1965. Historical/architectural background research included a review of the Florida Master Site File (FMSF) and the National Register of Historic Places (NRHP) indicated that two historic linear resources, the Auburn Waterway Canal (8CH00670) and US 41/Tamiami Trail (8CH02061), were previously recorded within the APE. In addition, two previously recorded historic linear resources, State Road [SR] 776 (El Jobean Road) (8CH02050) and the Charlotte Harbor and Northern Railroad (8CH02063), are located immediately adjacent to, but outside of, the APE. Of these, the two linear resources within the APE were determined ineligible for listing in the NRHP by the State Historic Preservation Officer (SHPO), and the remaining two linear resources outside the APE have not been evaluated.

A review of the Charlotte County Property Appraiser's data and historic aerial photographs suggested the potential for approximately eight historic resources, 50 years of age or older (constructed in 1972 or earlier), within the APE (Polk 2022). This includes six buildings constructed between 1970 and 1972 as well as two linear resources, the Courtland Waterway and Pellam Waterway, both constructed after 1913. In addition, there are approximately 12 historic buildings located immediately adjacent to the APE. None of these resources appear eligible for listing in the NRHP; however, a field survey will be necessary for proper identification and evaluation of historic resources located within the ROW or historic parcels that will contain a wastewater lift station.

A Cultural Resource Assessment Survey (CRAS) may be required as part of the permitting process. If a CRAS is required, the fieldwork should meet the requirements of Chapters 267, 373 and 872.05, *Florida Statutes (FS)*, Florida's *Coastal Management Program*, and implementing state regulations, for possible effects on historic properties listed, or eligible for listing, in the NRHP, or otherwise of historical, architectural or archaeological value, as well as the standards contained in Florida Division of Historical Resources' (FDHR) *Cultural Resource Management Standards and Operational Manual* (FDHR 2003). The report should meet the specifications set forth in Chapter 1A-46, *Florida Administrative Code (FAC)*.

Location and Environmental Setting

The 40-acre APE is located in Section 12 of Township 40 South, Range 21 East and Sections 7, 8, and 16 of Township 40 South, Range 22 East (United States Geological Survey [USGS] Murdock and Punta Gorda 2013). One segment falls along Cochran Boulevard from El Jobean Road to Lake View Boulevard and the other area is at U.S. 41 and Midway Boulevard (**Figures 1 and 2**).

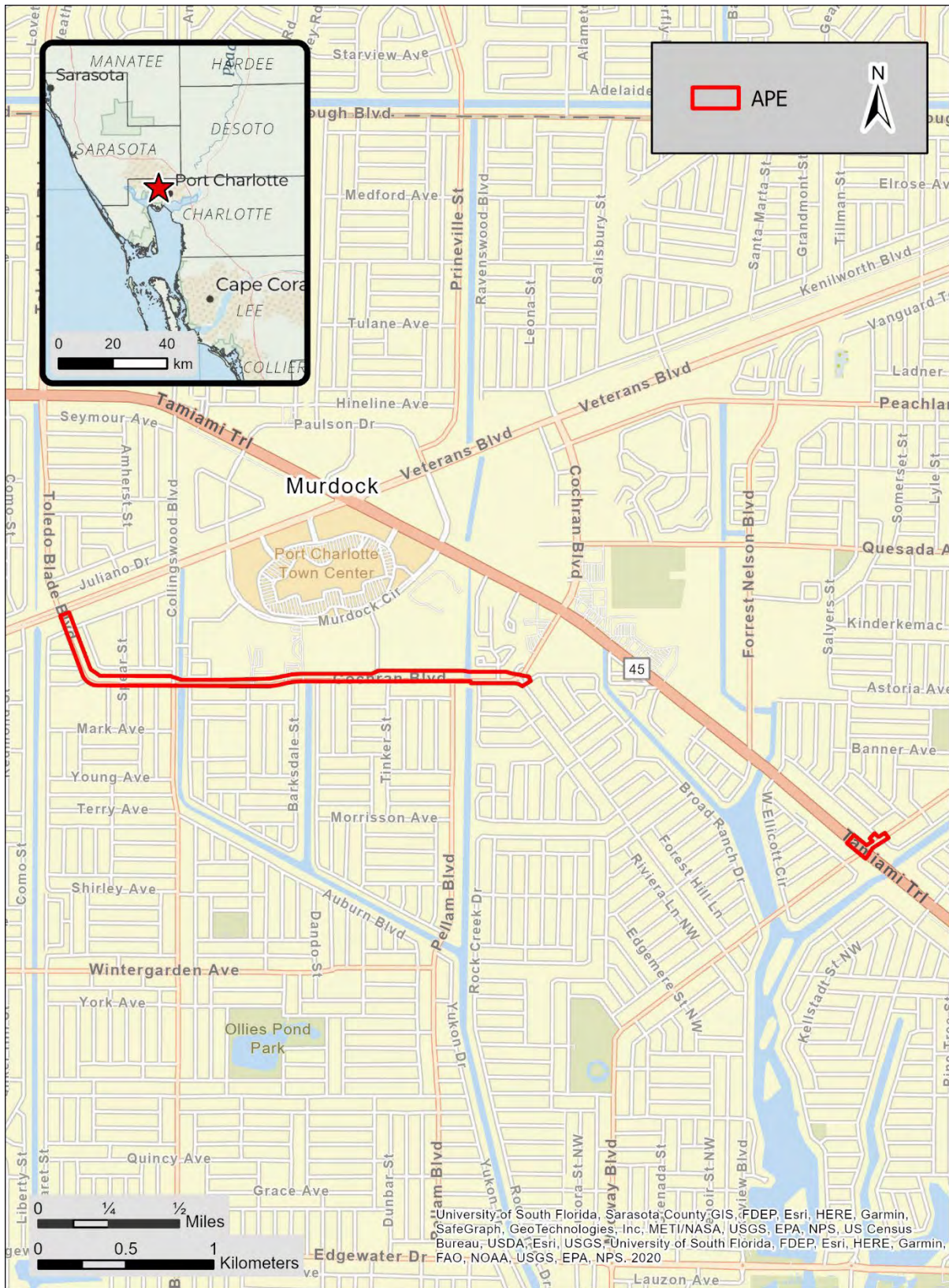


Figure 1. Location of the Force Main Area APE, Charlotte County.

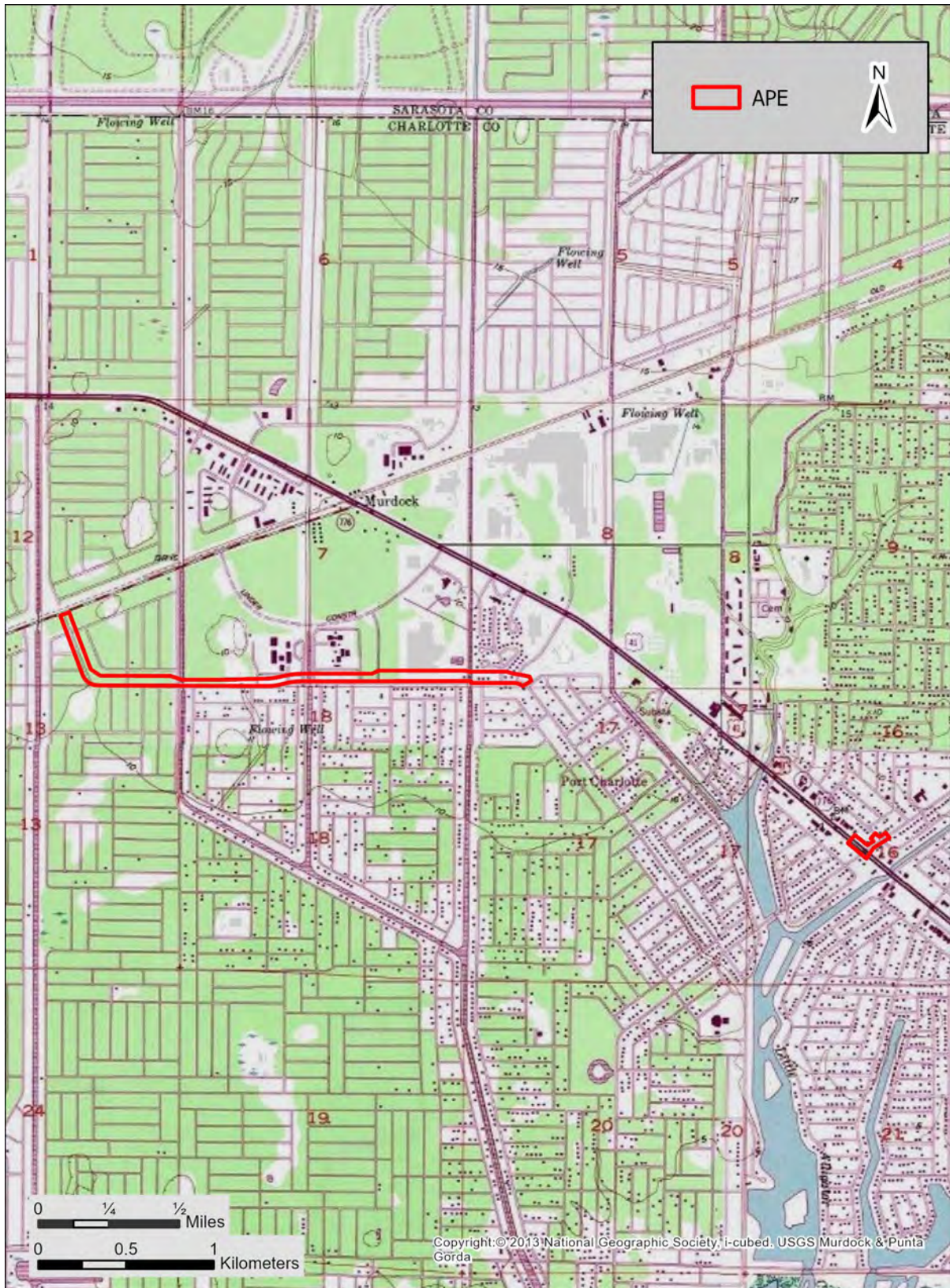


Figure 2. Environmental setting of the APE.

The APE sits at an elevation of 10 feet (ft) above mean sea level (amsl). It lies within the Gulf Coastal Lowlands physiographic region (White 1970). The APE is underlain by shelly sediments of the Plio-Pleistocene that are surficially evidenced by shelly sand and clay (Florida Department of Environmental Protection [FDEP] 2001a, 2001b).

According to the USDA, the long, linear portion of the APE is within the Wabasso-Isles-Boca soil association that consists of nearly level, poorly drained, deep and moderately deep, sandy soils that occur in sloughs and on flatwoods. Maidencane occurs in the sloughs and the flatwoods are covered with South Florida slash pine, sawpalmetto, and pineland threeawn (Henderson 1984). The eastern APE occurs within the Matlacha soil association that consists of nearly level, somewhat poorly drained soil that are mostly mixed sands, shell fragments, and limestone fragments that were formed from earthmoving activities. **Table 1** provides a list of the soils within the APE and their location is depicted on **Figure 3**. All of the soil types within the APE have an Urban land component; the table lists the natural setting of the soil type prior to development.

Table 1. Soil types within the APE.

Soil type, % slopes	Drainage	Setting
Boca fine sand-Urban land complex (ULC), 0-2%	Poor	Flatwoods
Felda fine sand-ULC, 0-2%	Poor	Broad, nearly level sloughs
Isles fine sand, depressional	Very poor	Depressions
Malabar fine sand-ULC, 0-2%	Poor	Sloughs
Matlacha gravelly fine sand-ULC	NA	Made land
Oldsmar sand-ULC, 0-2%	Poor	Flatwoods
Pineda fine sand-ULC, 0-2%	Poor	Sloughs
Urban land	NA	>85% covered with parking lots, airports, shopping centers, large buildings, streets, and sidewalks
Wabasso sand-ULC, 0-2%	Poor	Flatwoods

The soils support different vegetative regimes, which in turn provide habitats for the local animal population, and thus provide essential food resources. The vegetation maps of Florida indicates that the APE falls within prairie grasslands and pine flatwoods (Davis 1980). The soils have variable suitability for openland, woodland, and wetland habitats (Henderson 1984: Table 9).

The habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses, and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, cottontail, and sandhill cranes. Boca, Felda, Oldsmar, and Pineda sands are rated fair for openland habitats. Woodland wildlife habitat includes area of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include turkey, thrushes, woodpeckers, squirrels, gray fox, racoon, deer, bobcat. Oldsmar and Wabasso sands are rated fair for woodland habitats. The habitat for wetland wildlife includes areas of open, marshy, or swampy, shallow water areas. Wildlife in these areas include ducks, egrets, herons, shore birds, otter, mink, and ibis. Isles sand is well suited to wetlands; Boca, Felda, Malabar, and Pineda sands are rated fair. Those soils not listed above are rated poor or very poor for that habitat.

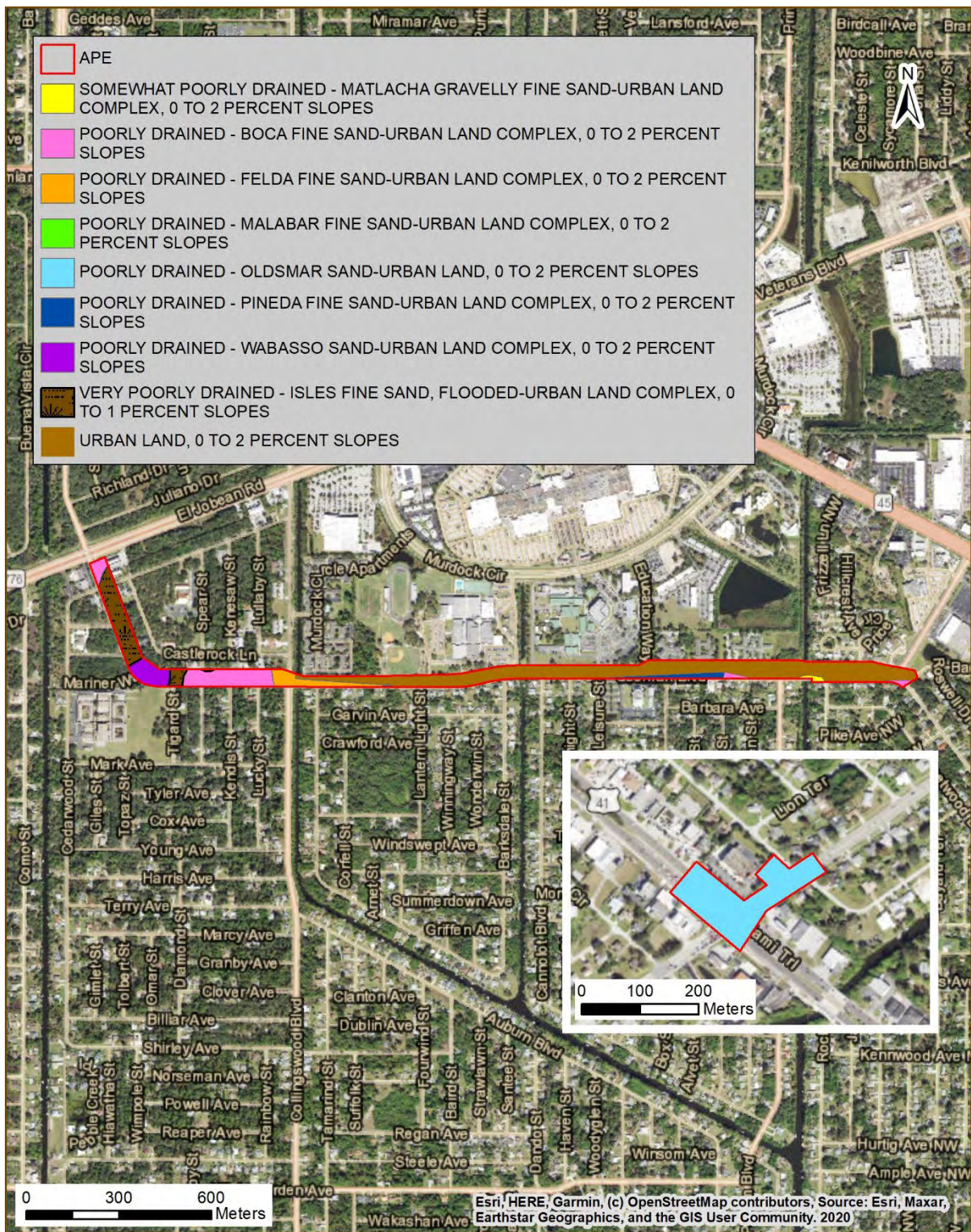


Figure 3. Soil type distribution within the APE.

Background Research and Literature Review

A review of pertinent archaeological and historical literature, records, and other documents and data pertaining to the general area was conducted. The focus of this desktop analysis was to ascertain the

types of cultural resources known in the project vicinity, as well as the potential for the occurrence of yet unrecorded resources. Research included a review of sites listed in the NRHP and the Florida Master Site File (FMSF) (April 20221 GIS update); an examination the Charlotte County Property Appraiser's data; soil survey information; plat map, field notes, and tract book records; historic aerial photos on file with the Publication of Archival Library and Museum Materials (PALMM); regional culture histories and site location predictive models; and relevant CRAS reports and manuscripts.

Archaeological Considerations

A review of the FMSF data indicated that there are only four sites recorded within two miles of the APE; none is within one mile (**Figure 4**). 8CH00070 (Huckaby Creek Mound) is an aboriginal burial mound that was discovered during the CRAS for the planned additions to the Como/Flamingo waterway system (Clausen et al. 1978). The mound was roughly 20 meters (m) in diameter and 1-1.2 m tall and had been subject to looting. The mound was relocated during the survey of State Park lands, but no archaeological investigations were conducted (Collins et al. 2017). 8CH00073B (Huckaby Creek East) consists of a burial mound and three associated middens that dates from the Manasota and Weeden Island periods. It was originally recorded during the CRAS of General Development Corporation's Bayview property (Clausen 1981). It was relocated during the county-wide surveys, a CARL Archaeological Survey, and by George Luer during his South Florida Research (Austin et al. 2008; HPA 1989; Luer 2002). The Waterway Circle Mound (8CH00494) is listed as being destroyed in the 1950s when a canal was dredged; human bones and pottery were reported to George Luer in 1979 (Austin et al. 2008; FMSF ; Luer et al. 1996). 8CH01937 (Tom's Mound) was recorded during the historic resources survey of Charlotte County (Handley et al. 2008). It had been heavily disturbed by earthmoving and land clearing. Aboriginal pottery and some faunal bones were recovered. None of the sites have been evaluated by the SHPO in terms of NRHP eligibility. **Table 2** provides a list of the CRAS project conducted near the APE.

ACI compiled the 2018 data available from all the recorded archaeological sites within the Gulf Coastal Lowlands physiographic region of Charlotte County to develop a better understanding the site distribution in this area. There are 182 aboriginal sites within the Gulf Coastal Lowlands that have confirmed site locations. Historic sites and those plotted "per vague verbal description" were deleted from the analysis.

Over 80% of the sites are located within 100 m of water, while another 15% are within 200 m of a water source (**Table 3**). Only six sites are located greater than 200 m of an identifiable water source. Almost half of the recorded sites are located along the sound or bayshore, with almost another quarter of the sites located proximate to a river or creek. The other 30 sites are proximate to a lake/pond or wetland/swamp.

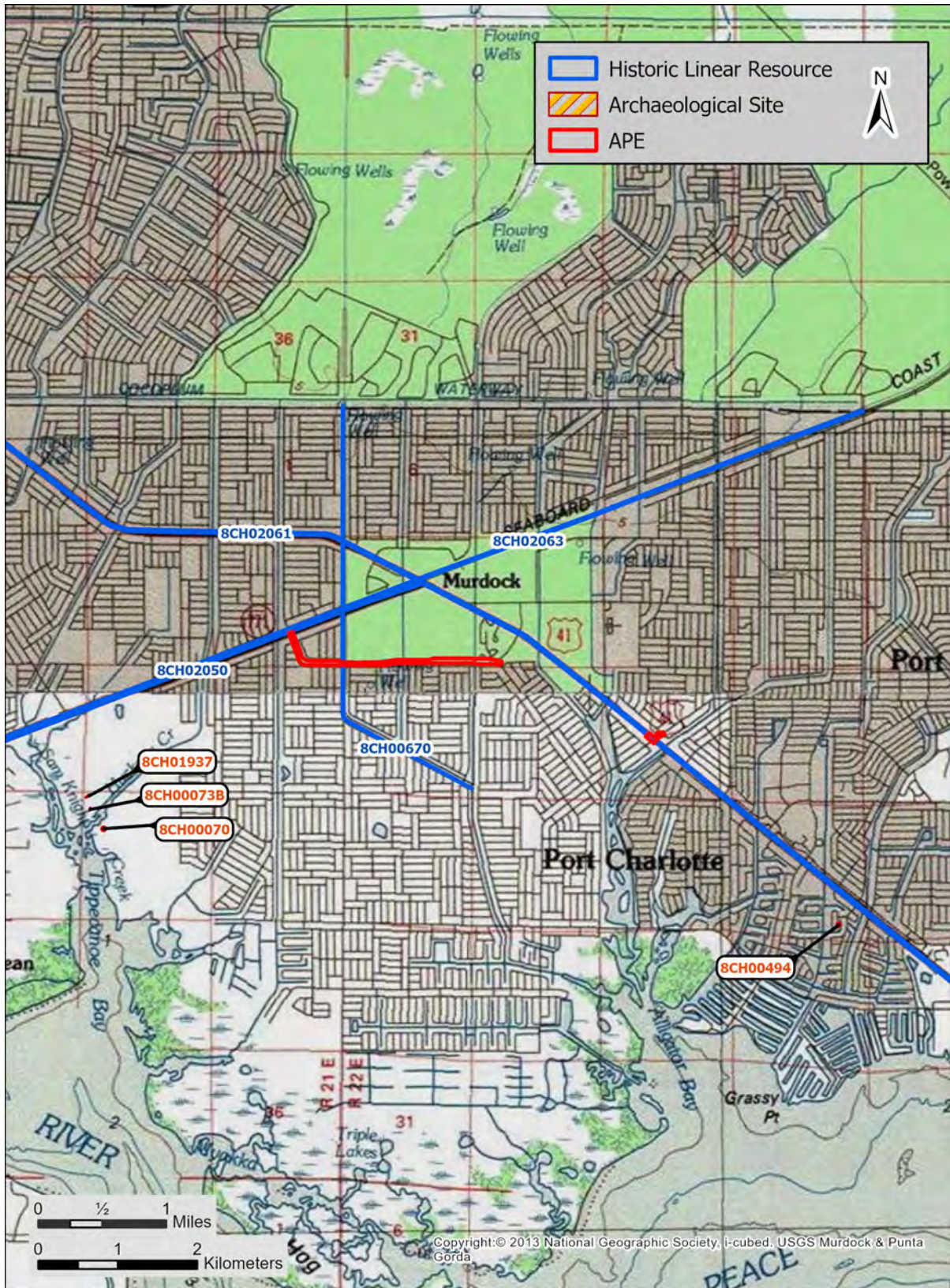


Figure 4. Location of the previously recorded cultural resources near the APE.

Table 2. CRAS projects conducted near the APE.

REFERENCE	PROJECT	# of Newly Recorded Resources	# of Previously Recorded Resources
290 / (Clausen 1981)	Archaeological Reconnaissance of General Development Corporation's Bayview Property	1	1
1841 / (Browning and Wiedenfeld 1989)	Proposed Addition of Two Lanes in the Existing Median of US 41 from the Peace River to Toledo Blade Boulevard	0	0
3803 / (Janus Research 1994)	Cultural Resource Assessment Survey of the Proposed Improvements to State Road 776 (El Jobean Road) from Hollis Avenue to U.S. Highway 41 (Tamiami Trail) in Charlotte County, Florida	4	0
10623 / (Driscoll 2004)	An Archaeological and Historical Survey of the Proposed Peachland Boulevard Tower Location in Charlotte County, Florida	0	0
13289 / (Hughes 2006)	An Archaeological and Historical Survey of the Murdock Village Project Area in Charlotte County, Florida	4	0
16444 / (Handley et al. 2008)	Phase II of the Survey of Historic Resource, Charlotte County, Florida	251	41
17663 / (ACI 2009b)	Cultural Resources Assessment Survey Technical Memorandum, Seven Stormwater Management Facilities (SMF), U.S. 41 from Enterprise Drive to South Sumter Boulevard, Charlotte and Sarasota Counties, Florida	0	0
17664 / (ACI 2009a)	Cultural Resource Assessment Survey Project Development and Environment (PD&E) Study U.S. 41 from Enterprise Drive to South Sumter Boulevard Charlotte and Sarasota Counties, Florida	1	1
19562 / (ACI 2011)	Cultural Resources Assessment Survey Technical Memorandum, Seven Pond Sites U.S. 41 from Enterprise Drive to Cranberry Boulevard, Charlotte and Sarasota Counties, Florida	0	0
25717 / (ACI 2018)	Cultural Resource Assessment Survey of the Olean Boulevard Widening from US 41 to Easy Street, Port Charlotte, Charlotte County, Florida	3	0

Table 3. Site distribution by water type and distance.

	0-100 m		<200 m		<300 m		<400 m		Total	
Type	cnt	%	cnt	%	cnt	%	cnt	%	cnt	% of sites
bay	43	23.63%	2	1.10%		0.00%		0.00%	45	24.73%
creek	34	18.68%	14	7.69%	3	1.65%	2	1.10%	53	29.12%
lake	1	0.55%		0.00%		0.00%		0.00%	1	0.55%
pond	13	7.14%	5	2.75%		0.00%		0.00%	18	9.89%
river	10	5.49%	1	0.55%	1	0.55%		0.00%	12	6.59%
sound	42	23.08%		0.00%		0.00%		0.00%	42	23.08%
swamp	6	3.30%	5	2.75%		0.00%		0.00%	11	6.04%
Total	149	81.87%	27	14.84%	4	2.20%	2	1.10%	182	100.00%

A look at site distribution by elevation depicts most of the sites are situated along the shorelines with another 44 located at 1.5 m (5 ft) amsl (**Figure 5**). Only 18 sites are situated at elevations between 10 and 25 ft amsl.

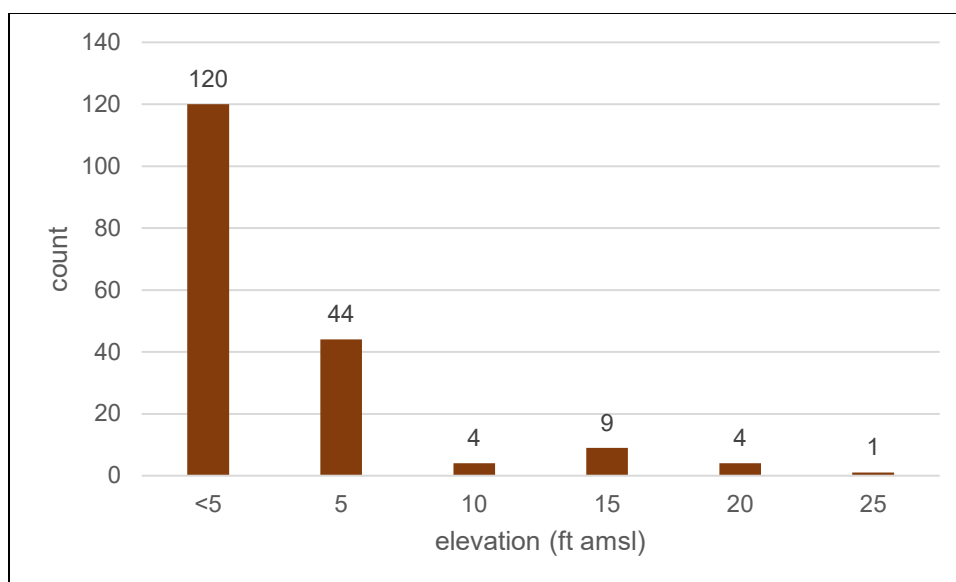


Figure 5. Site distribution by elevation (ft amsl).

Soil types and their drainage characteristics can also be used to assess the likelihood for aboriginal site occurrence (Almy 1978). There are 60 soil types within the Gulf Coastal Lowlands of Charlotte County; only 28 of which have recorded archaeological sites (**Table 4**). Those located within the APE are shaded orange on the table. Many of the sites occurred on more than one soil type. This analysis only included the four types covering the greatest acreage for each site, which totaled 209 soil type occurrences. The first soil column indicates that this soil type had the greatest area of the site, and so on down the line, so that the 4th column had the smallest site acreage.

Table 4. Distribution of sites by drainage class and soil type within the Gulf Coastal Lowlands.

DRAINAGE/Soil Type, % slopes	% of Area	Soils					% of sites	Difference
		1	2	3	4	Total		
MODERATELY WELL DRAINED								
Caloosa fine sand (fs)	0.03%					0	0.00%	-0.03%
Daytona sand	0.47%	4	1			5	2.39%	1.92%
Orsino fs	0.88%	3	1	1		5	2.39%	1.51%
Total	1.39%	7	2	1	0	10	4.78%	3.40%
POORLY DRAINED								
Beaches	0.02%	1	1			2	0.96%	0.94%
Boca fs, 0-2%	2.31%	2	1			3	1.44%	-0.87%
Boca fs, slough	0.10%					0	0.00%	-0.10%
Boca fs, tidal	0.49%	7	1			8	3.83%	3.34%
Bradenton fs, 0-2%	0.03%					0	0.00%	-0.03%
Captiva fs	0.00%					0	0.00%	0.00%
EauGallie sand, 0-2%	2.31%	2				2	0.96%	-1.35%
Felda fs, 0-2%	2.21%					0	0.00%	-2.21%
Hallandale fs, tidal	0.12%					0	0.00%	-0.12%
Hallandale fs, wet, 0-2%	0.68%	1				1	0.48%	-0.20%
Heights fs	2.11%					0	0.00%	-2.11%
Immokalee sand, 0-2%	7.07%	12	5			17	8.13%	1.07%
Immokalee-Urban land complex	0.21%					0	0.00%	-0.21%
Isles fs, slough	1.00%					0	0.00%	-1.00%
Malabar fs, 0-2%	2.14%	1				1	0.48%	-1.66%
Malabar fs, high, 0-2%	5.01%					0	0.00%	-5.01%

DRAINAGE/Soil Type, % slopes	% of Area	Soils					% of sites	Difference
		1	2	3	4	Total		
Myakka fs, 0-2%	3.49%	10	2		1	13	6.22%	2.73%
Oldsmar fs, limestone substratum (ls)	0.16%					0	0.00%	-0.16%
Oldsmar sand, 0-2%	13.49%	7	1			8	3.83%	-9.66%
Pineda fs, 0-2%	6.21%	1				1	0.48%	-5.73%
Pompano fs, 0-2%	0.21%					0	0.00%	-0.21%
Punta fs	0.39%					0	0.00%	-0.39%
Smyrna fs, 0-2%	5.23%	11	1			12	5.74%	0.51%
Smyrna-Urban land complex	0.22%					0	0.00%	-0.22%
Valkaria fs, 0-2%	0.49%					0	0.00%	-0.49%
Wabasso sand, 0-2%	10.29%					0	0.00%	-10.29%
Wabasso sand, ls, 0-2%	2.72%	8				8	3.83%	1.11%
Total	68.72%	63	12	0	1	76	36.36%	-32.35%
SOMEWHAT POORLY DRAINED								
Canaveral fs	0.25%	3				3	1.44%	1.18%
Canaveral-Urban land complex	0.04%	1				1	0.48%	0.44%
Electra fs	0.17%					0	0.00%	-0.17%
Satellite fs, 0-2%	0.10%	1				1	0.48%	0.38%
Total	0.56%	5	0	0	0	5	2.39%	1.83%
VERY POORLY DRAINED								
Anclote sand, depressional (depr), 0-1%	0.09%	1				1	0.48%	0.39%
Chobee muck, depr, 0-1%	0.97%					0	0.00%	-0.97%
Copeland sandy loam, depr	0.33%					0	0.00%	-0.33%
Estero muck	1.65%	2				2	0.96%	-0.69%
Felda fs, depr	2.15%					0	0.00%	-2.15%
Floridana sand, depr	0.55%					0	0.00%	-0.55%
Gator muck, frequently ponded, 0-1%	0.02%					0	0.00%	-0.02%
Isles fs, depr	0.10%	1				1	0.48%	0.37%
Isles muck	1.36%	10	1			11	5.26%	3.90%
Kesson fs	0.69%	16	1			17	8.13%	7.44%
Malabar fs, depr, 0-1%	0.51%					0	0.00%	-0.51%
Myakka fs, depr	0.53%					0	0.00%	-0.53%
Peckish mucky fs	2.62%	27	2			29	13.88%	11.26%
Pineda fs, depressional, 0-1%	2.26%					0	0.00%	-2.26%
Pompano fs, depressional	0.28%					0	0.00%	-0.28%
Terra Ceia muck	0.02%					0	0.00%	-0.02%
Valkaria fs, depr	0.04%					0	0.00%	-0.04%
Winder sand, depr	1.81%					0	0.00%	-1.81%
Wulfert muck	2.03%	35	1			36	17.22%	15.19%
Total	18.00%	92	5	0	0	97	46.41%	28.41%
OTHER								
Matlacha gravelly fs	4.27%	6	1	2		9	4.31%	0.03%
Matlacha gravelly fs, ls	0.11%					0	0.00%	-0.11%
Matlacha-Urban land complex	1.75%	3	1	1		5	2.39%	0.64%
St. Augustine sand	0.17%	5	1			6	2.87%	2.70%
St. Augustine, organic substratum-Urban land complex	0.00%					0	0.00%	0.00%
Urban land	0.23%	1				1	0.48%	0.25%
Water	4.80%					0	0.00%	-4.80%
Total	11.33%	15	3	3	0	21	10.05%	-1.28%
Grand Total	100.00%	182	22	4	1	209	100.00%	0.00%

The Gulf Coastal Lowland is underlain by 68.7% poorly drained, 18.0% very poorly drained, 1.3% moderately well drained, and 0.6% somewhat poorly drained soils. The rest of the area included 4.8% water and 6.5% reworked or urban land. The soil types that have a higher percentage of sites compared to percent of area (> than 2%) are marked in red, while those soil types that appear to be avoided are marked in blue.

There is a variable distribution of sites across the landscape. However, the coastal areas are clearly preferred. The top four soils, which are very poorly drained, occur along the coast and include Wulfert muck, Peckish mucky fine sand, Kesson fine sand, and Isles muck. These four soils cover only 6.7% of the area but have 43.9% of the sites. Boca fine sand, tidal, is a poorly drained coastal soil that has another 3.8% of the sites, while covering only 0.5% of the area. The only other natural soil with a greater than 2% soil preference is Myakka fine sand, which accounts for 6.2% of the sites and 3.5% of the area. St. Augustine sand is formed by fill and earthmoving operations that were once sloughs or depressions. Sites located in these areas were likely located there due to the previously present water sources.

Based on these data, the APE has a low potential for the presence of aboriginal archaeological sites. Although there are water sources near the APE, the soils generally have a high negative correlation with sites. Most of the area has been developed and any aboriginal archaeological sites present would have likely been destroyed. The potential for yet unrecorded historic period archaeological sites was also assessed and found to be moderate since structures had been constructed along Cochran Boulevard by 1965, which does make them historic and thus, have the potential for historic archaeological remains.

There is a low potential for historic archaeological sites that predate the development of Port Charlotte. The 1850 plat maps reveal no historic features within or near the APE (Reid and Irwin 1850; Reid et al. 1850) (**Figure 6**). The land near the APE was described as third-rate pine and prairie; no historic features were noted within the field notes (Irwin 1849a:408, 1849b:76, 85-86, 88, 95; Reid 1843:159). The 1956 and 1957 USGS Murdock and Punta Gorda quadrangle maps revealed that neither Cochran Boulevard nor Midway Boulevard were in existence at that time (USGS 1956, 1957) (**Figure 7**). A review of the historic aerial photographs available from the Publication of Archival and Museum Materials (PALMM) also revealed no development within the APE, other than U.S. 41 and the drainage canals that had been excavated after 1913 (CharlotteCounty100.com 2021; USDA 1948, 1951, 1957, 1974) (**Figures 8 and 9**).

Historical/Architectural Considerations

Historical/architectural background research included a review of the of the FMSF and the NRHP indicated that two historic linear resources, the Auburn Waterway Canal (8CH00670) and US 41/Tamiami Trail (8CH02061), were previously recorded within the APE. In addition, two previously recorded historic linear resources, SR 776 (El Jobean Road) (8CH02050) and the Charlotte Harbor and Northern Railroad (8CH02063), are located immediately adjacent to, but outside of, the APE (**Figure 4**). Of these, the two linear resources within the APE were determined ineligible for listing in the NRHP by the SHPO, and the remaining two linear resources outside the APE have not been evaluated.

A review of the Charlotte County Property Appraiser's data and historic aerial photographs suggested the potential for approximately eight historic resources, 50 years of age or older (constructed in 1972 or earlier), within the APE (Polk 2022). This includes six buildings constructed between 1970 and 1972 (**Figure 10**) as well as two linear resources, the Courtland Waterway and Pellam Waterway, both constructed after 1913. In addition, there are approximately 12 historic buildings located immediately adjacent to the APE.

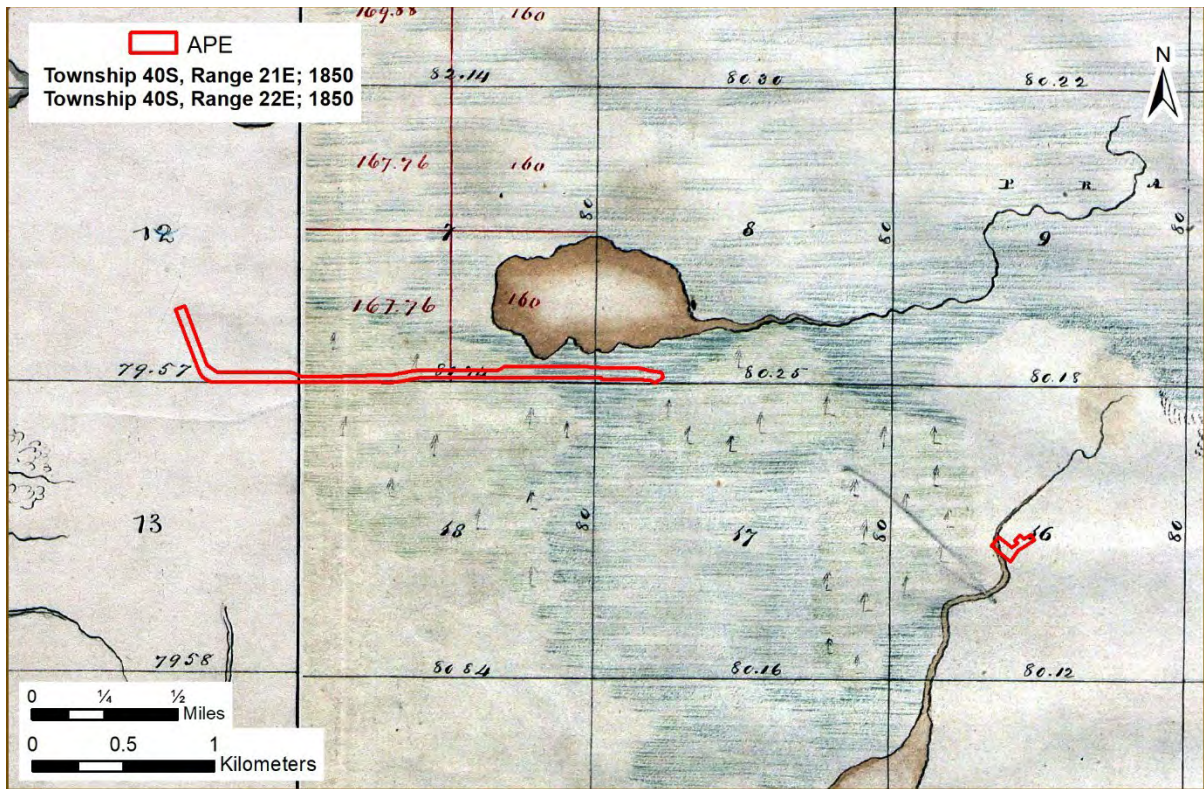


Figure 6. 1850 plats showing the APE.

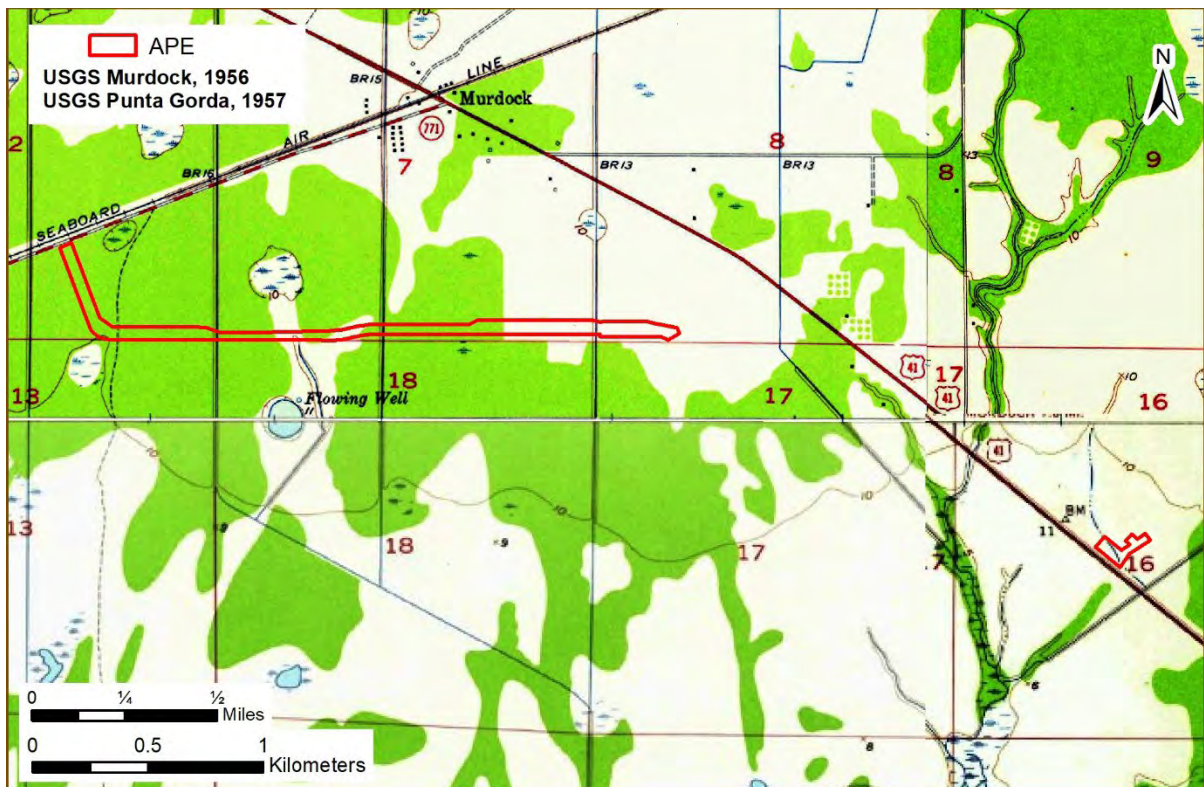


Figure 7. 1956 and 1957 USGS quadrangle maps showing the APE.

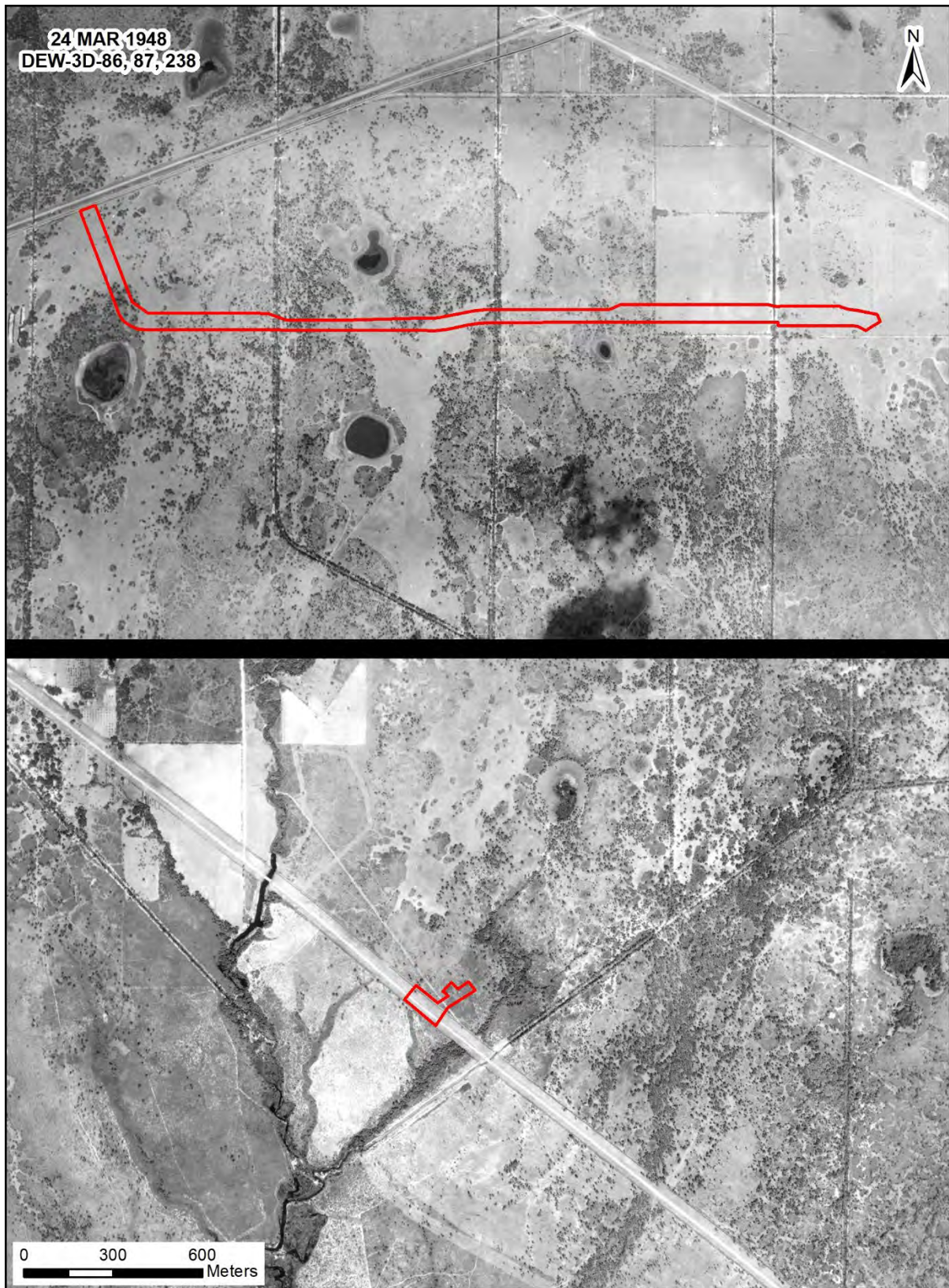


Figure 8. 1948 aerial photos showing the APE.

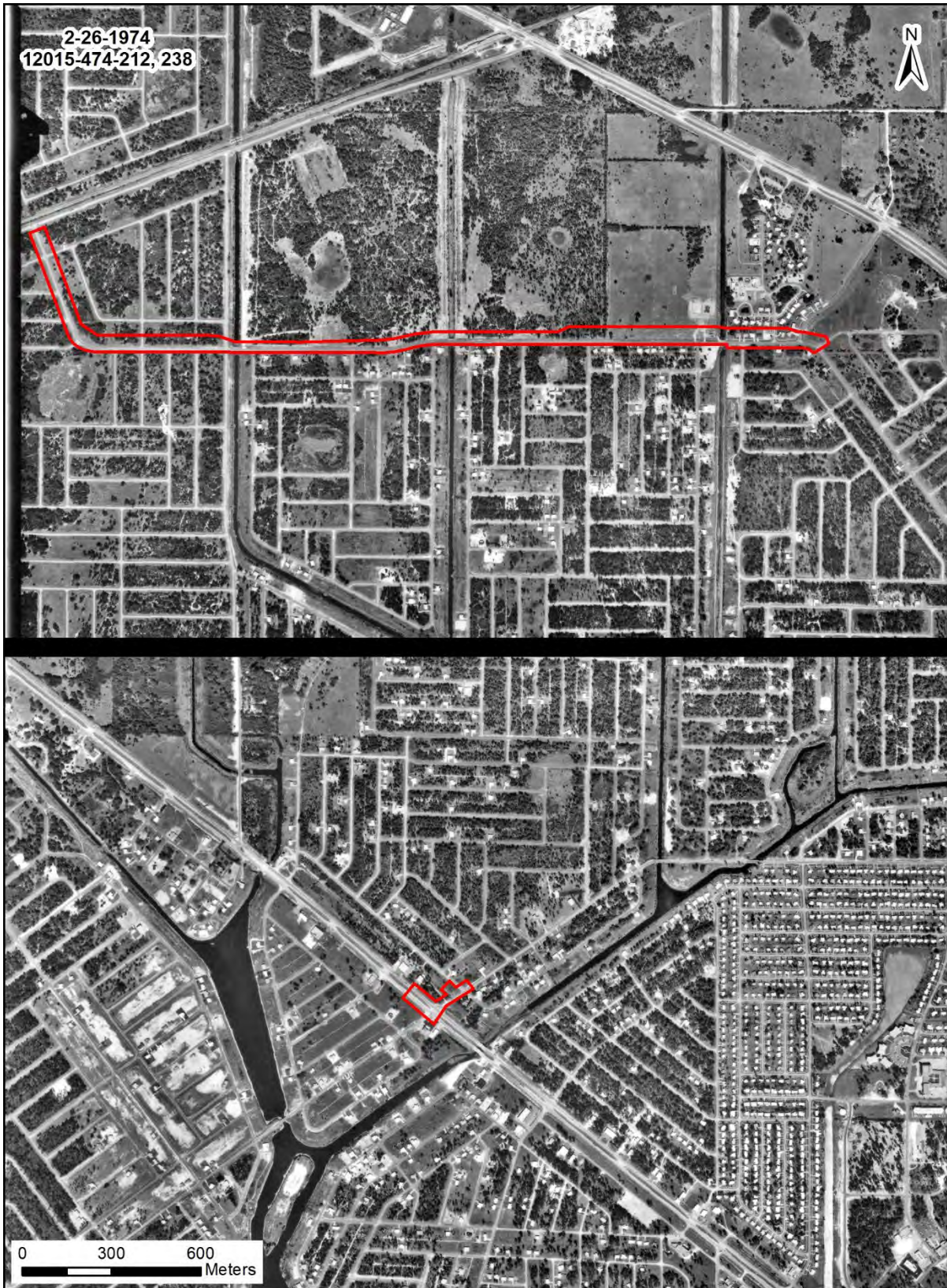


Figure 9. 1974 aerial photographs showing the APE.

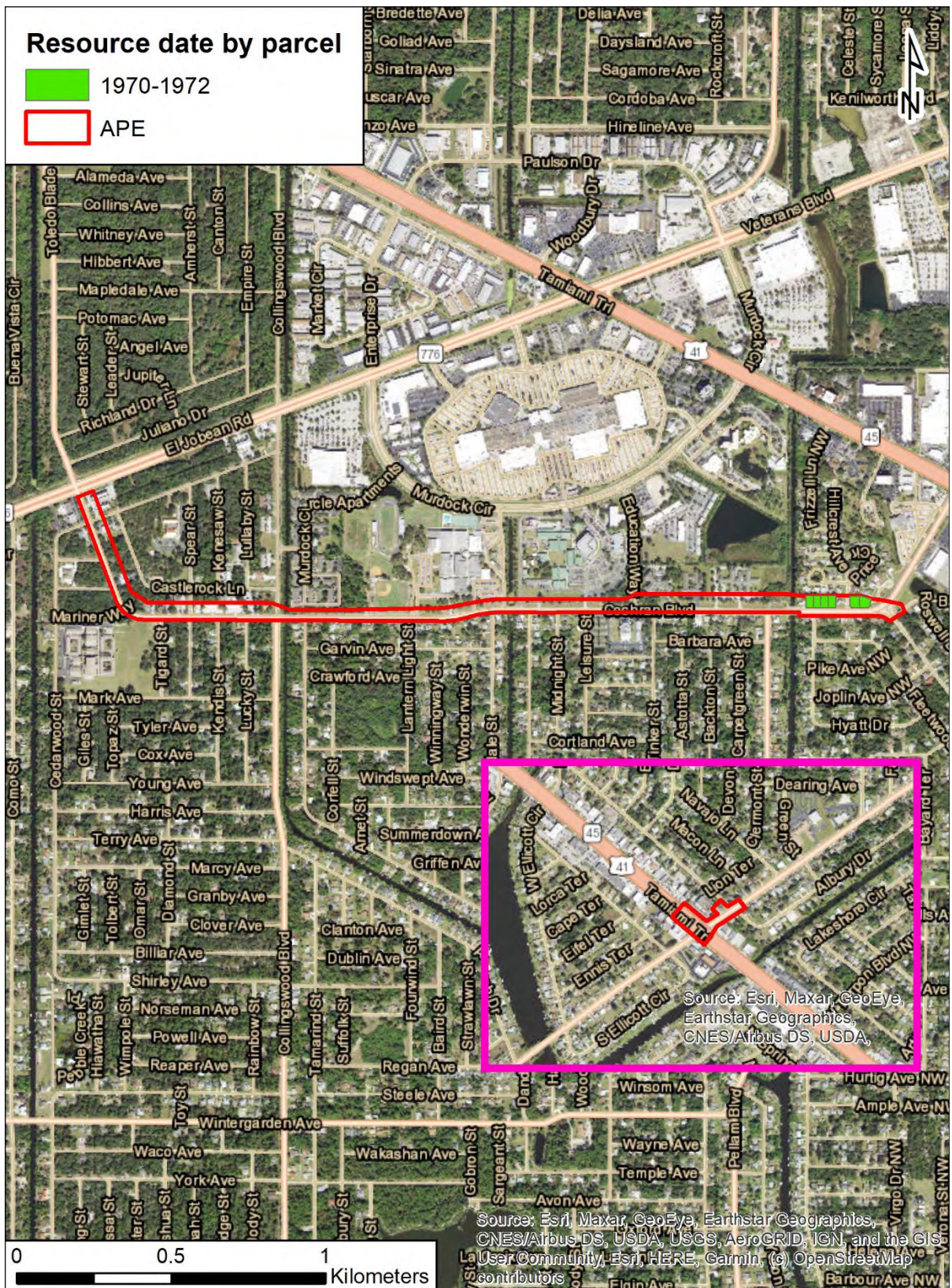


Figure 10. Location of newly Identified historic resources within the APE.

Conclusions

The desktop analysis revealed that there is a low probability for the occurrence of aboriginal archaeological sites based on the environmental setting and a moderate potential for the occurrence of historic archaeological sites considering development has occurred within the APE since 1965. A review of the Charlotte County Property Appraiser's data suggested the potential for six unrecorded historic buildings within the APE (Polk 2022) (**Figure 10**). In addition, two unrecorded canals (Courtland Waterway and Pellam Waterway) were identified within the APE. The FMSF lists four linear resources (8CH00670, 8CH02050, 8CH02061, 8CH02063) within or adjacent to the APE. The two within the APE (8CH00670 and 8CH00670) were determined ineligible for listing in the NRHP by the SHPO and the two outside of the APE (8CH02050 and 8CH02063) have not been evaluated. None of these resources appear eligible for listing in the NRHP; however, a field survey will be necessary for proper identification and evaluation of historic resources located within the ROW.

A CRAS may be required as part of the permitting process. If a CRAS is required, the fieldwork should meet the requirements of Chapters 267, 373 and 872.05, *FS*, Florida's *Coastal Management Program*, and implementing state regulations, for possible effects on historic properties listed, or eligible for listing, in the NRHP, or otherwise of historical, architectural, or archaeological value, as well as the standards contained in FDHR's *Cultural Resource Management Standards and Operational Manual* (FDHR 2003). The report should meet the specifications set forth in Chapter 1A-46, *FAC*.

References Cited

Almy, Marion M.

- 1978 The Archaeological Potential of Soil Survey Reports. *The Florida Anthropologist* 31(3):75-91.

Archaeological Consultants, Inc. (ACI)

- 2009a Cultural Resource Assessment Survey Project Development and Environment (PD&E) Study U.S. 41 from Enterprise Drive to South Sumter Boulevard Charlotte and Sarasota Counties, Florida. FPID No.: 422710 1 22 01; FAP No.: 301. ACI, Sarasota. MS# 17664.
- 2009b Cultural Resource Assessment Survey, Technical Memorandum Seven Stormwater Management Facilities (SMF), U.S. 41 from Enterprise Drive to South Sumter Boulevard, Charlotte and Sarasota Counties, Florida. FPID No. 722710-1-22, FAP No.: 30. ACI, Sarasota. MS# 17663.
- 2011 Cultural Resource Assessment Survey Technical Memorandum Seven Pond Sites U.S. 41 from Enterprise Drive to Cranberry Boulevard, Charlotte and Sarasota Counties, Florida. ACI, Sarasota. MS# 19562.
- 2018 Cultural Resource Assessment Survey of the Olean Boulevard Widening from US 41 to East Street, Port Charlotte, Charlotte County, Florida. ACI, Sarasota. MS# 25717.

Austin, Robert J., Travis Fulk, Nick Linville, Jon C. Endonino, and Debra Wells

- 2008 Survey of Historical Resources, Charlotte County, Florida. SEARCH, Jonesville. MS# 15868.

Browning, William D. and Melissa G. Wiedenfeld

- 1989 Proposed Addition of Two Lanes in the Existing Median of US 41 from the Peace River to Toledo Blade Boulevard. Florida Department of Transportation, Tallahassee. MS# 1841.

CharlotteCounty100.com

2021 Murdock: Charlotte County Crossroad. CharlotteCounty100, Port Charlotte.

Clausen, Carl J.

1981 Archaeological Reconnaissance of General Development Corporation's Bayview Property Charlotte County, Florida. On file, FDHR, Tallahassee. MS# 290.

Clausen, Carl J., Marion M. Almy, and Cynthia S. Clausen

1978 Cultural Resource Survey of Planned Additions to Como/Flamingo Waterway System (Section 44). On file, FDHR, Tallahassee. MS# 82.

Collins, Lori D., Steven Fernandez, Jeffrey P. Du Vernay, James "Bart" McLeod, and Travis F. Doering

2017 Archaeological Resource Sensitivity Modeling in Florida State Parks Districts 4 and 5: The Southwest and Southeast Florida Regions. Alliance for Integrated Spatial Technologies, University of South Florida, Tampa. MS# 24692.

Davis, John H.

1980 General Map of Natural Vegetation of Florida. *Circular S-178*. Agriculture Experiment Station, University of Florida, Gainesville.

Driscoll, Kelly A.

2004 An Archaeological and Historical Survey of the Proposed Peachland Boulevard Tower Location in Charlotte County, Florida. Panamerican Consultants, Inc., Tampa. MS# 10623.

Florida Department of Environmental Protection (FDEP)

2001a *Geology (Environmental)*. Florida Geographic Data Library, Gainesville.

2001b *Surficial Geology*. Florida Geographic Data Library, Gainesville.

Florida Division of Historical Resources (FDHR)

2003 *Cultural Resource Management Standards and Operational Manual*. Florida Division of Historical Resources, Tallahassee.

Florida Master Site File (FMSF)

Various site file forms. On file, FDHR, Tallahassee.

Handley, Brent M., Marissa Condosta Gordon, and Cory Campbell

2008 Phase II of the Survey of Historic Resource, Charlotte County, Florida. *ESI Report of Investigations* 1278. Environmental Services, Inc., Jacksonville. MS# 16444.

Henderson, Warren G., Jr.

1984 *Soil Survey of Charlotte County, Florida*. USDA, Soil Conservation Service.

Historic Property Associates (HPA)

1989 Historic Properties Survey of Charlotte County, Florida. Historic Property Associates, Inc., St. Augustine. MS# 2056.

Hughes, Skye W.

2006 An Archaeological and Historical Survey of the Murdock Village Project Area in Charlotte County, Florida. Panamerican Consultants, Inc., Tampa. MS# 13289.

Irwin, John M.

1849a *Field Notes*. Volume 150. On file, FDEP, Tallahassee.

1849b *Field Notes*. Volume 118. On file, FDEP, Tallahassee.

Janus Research

1994 Cultural Resource Assessment Survey of the Proposed Improvements to State Road 776 (El Jobean Road) from Hollis Avenue to U.S. Highway 41 (Tamiami Trail) in Charlotte County, Florida. Janus Research, Inc., Tampa. MS# 3803.

Luer, George M.

2002 Archaeology and Faunal Analysis at Tippecanoe Bay. *Florida Anthropological Society Publications* 15:49-72.

Luer, George M., Robert B. Patton, Robert F. Edic, Corbett McP. Torrence, and Paul L. Jones

1996 The Charlotte Harbor Mounds Survey. Charlotte Harbor Environmental Center, Inc., Punta Gorda. MS# 4573.

Polk, Paul L.

2022 *Record Search*. Charlotte County Property Appraiser, Port Charlotte.
<https://www.ccappraiser.com/RPSearchEnter.asp?>

Reid, Sam

1843 *Field Notes*. Volume 77. On file, FDEP, Tallahassee.

Reid, Sam and John M. Irwin

1850 *Plat. Township 40 South, Range 21 East*. On file, FDEP, Tallahassee.

Reid, Sam, John M. Irwin, and Henry Washington

1850 *Plat. Township 40 South, Range 22 East*. On file, FDEP, Tallahassee.

United States Department of Agriculture (USDA)

1948 Aerial Photographs: 24 MAR '48, DEW-3D-87, 138. On file, PALMM, Gainesville.

1951 Aerial Photographs: DEC 30 1951, DMV-1H-59, 72. On file, PALMM, Gainesville.

1957 Aerial Photograph: 3-23-57, DEW-1T-72. On file, PALMM, Gainesville.

1974 Aerial Photographs: 2-26-74, 12015-474-212, 238. On file, PALMM, Gainesville.

United States Geological Survey (USGS)

1956 *Murdock, Fla.* PR 1987,

1957 *Punta Gorda, Fla.* PR 1987 PR 1970.

2013a *Murdock, Fla.* USA_Topo_Maps,

2013b *Punta Gorda, Fla.* USA_Topo_Maps.

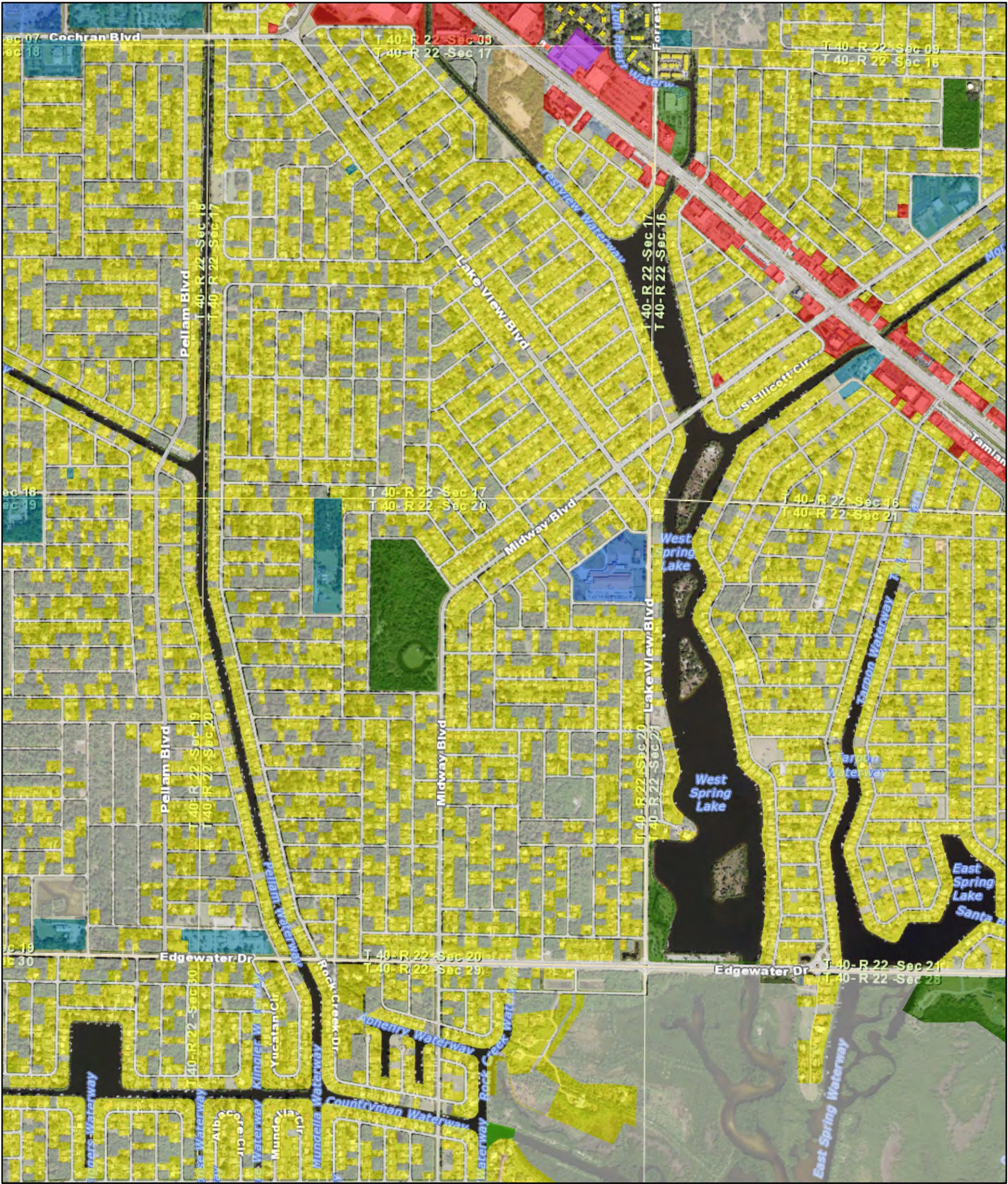
White, William A.

1970 Geomorphology of the Florida Peninsula. *Geological Bulletin* 51. Florida Department of Natural Resources, Bureau of Geology, Tallahassee.

Appendix G: FEMA Flood Insurance Rate Maps

Appendix H: Existing and Future Land Use Maps

Lake View Midway - Existing Land Use

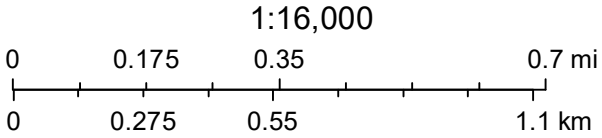


August 10, 2022

Existing Land Use

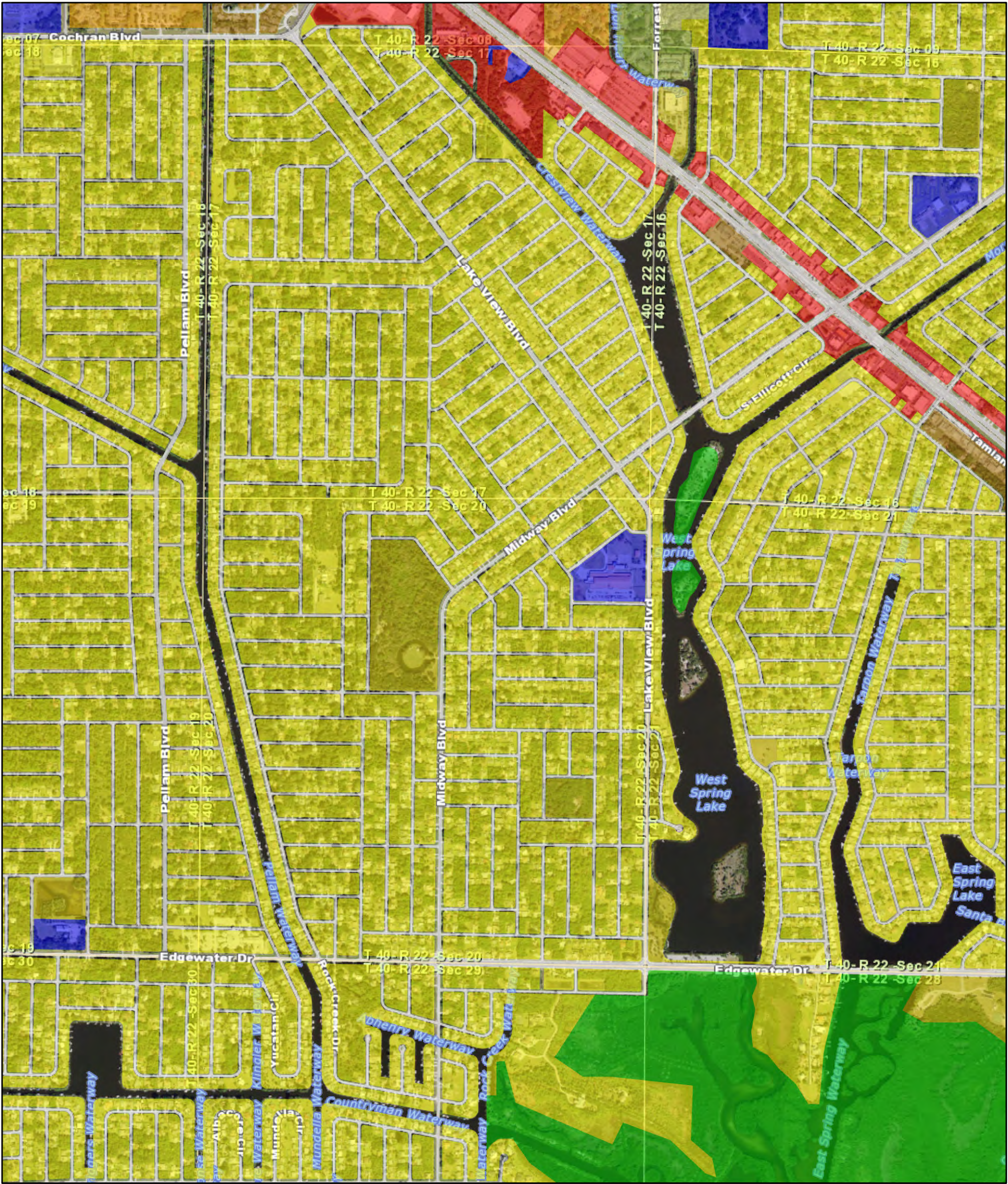
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- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- AGRICULTURAL
- RECREATIONAL
- CONSERVATION
- EDUCATIONAL
- MEDICAL
- PUBLIC BUILDINGS & GROUNDS
- MINING SITES
- BURIAL GROUNDS
- MARINA

- INSTITUTIONAL
- WATER
- MISCELLANEOUS
- VACANT



Charlotte County
Charlotte County GIS

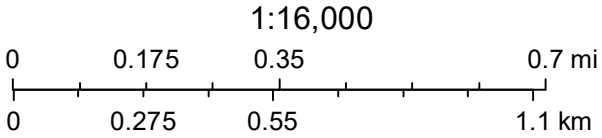
Lake View Midway - Future Land Use



August 10, 2022

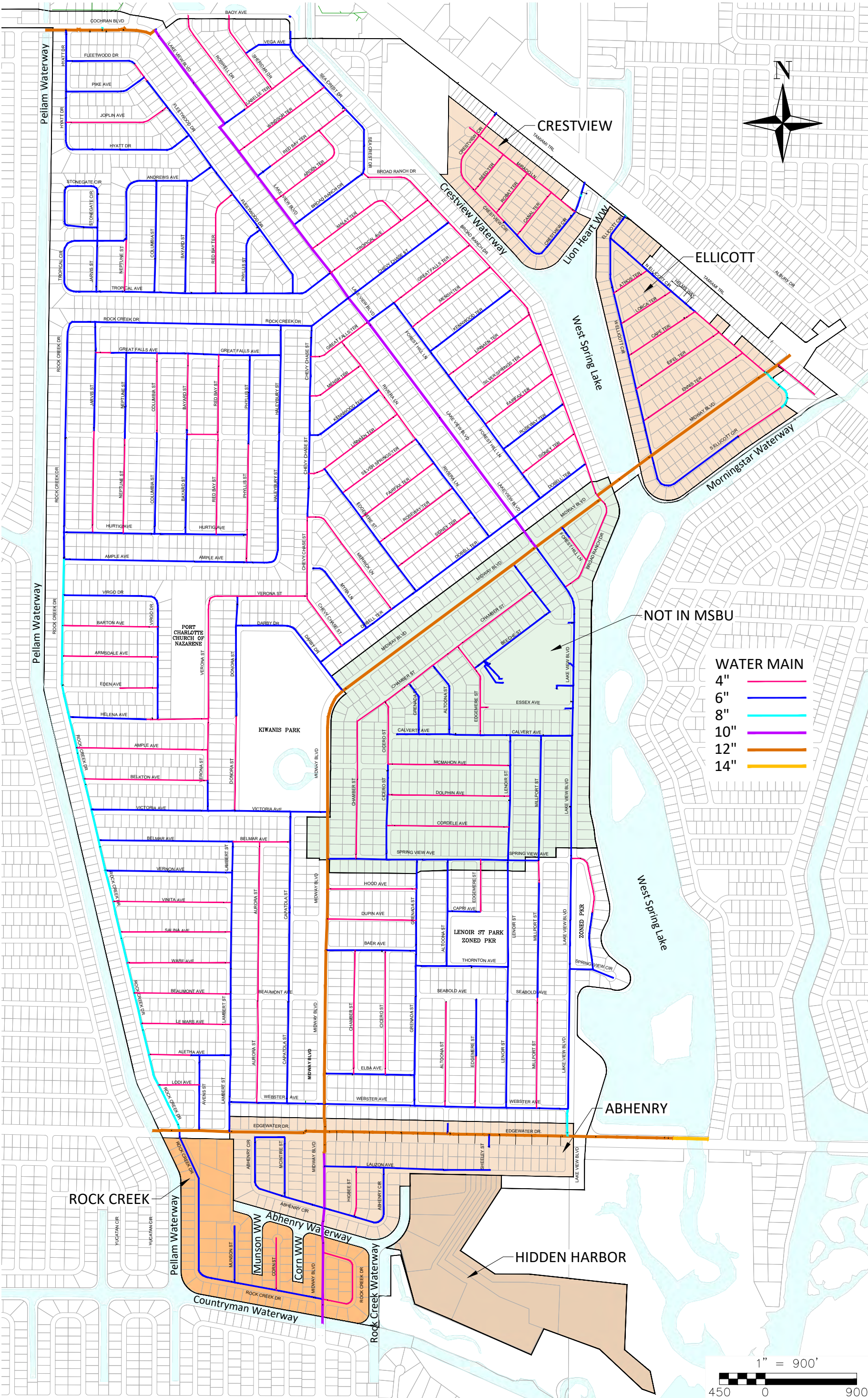
Future Land Use

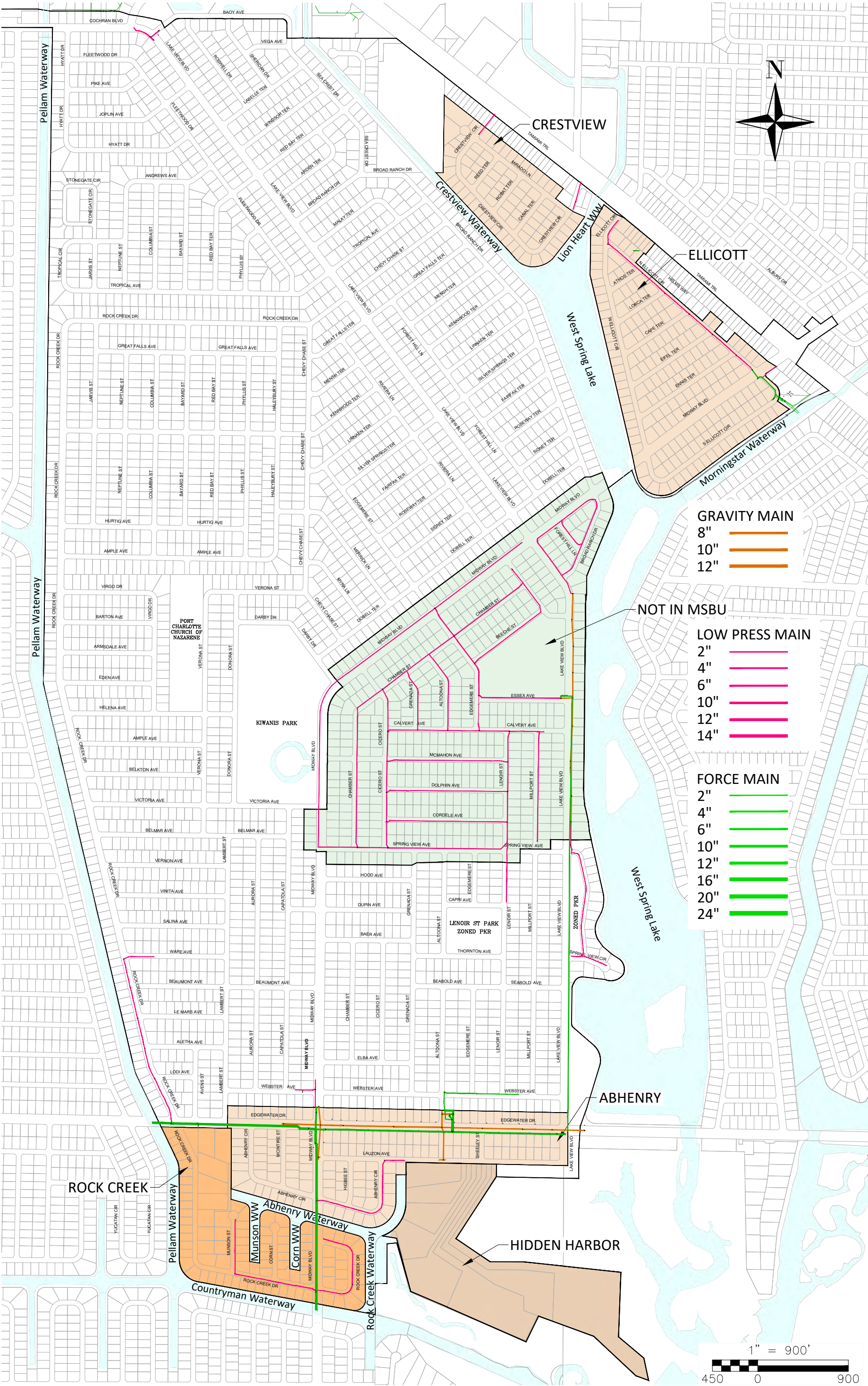
- | | |
|-----------------------------------|--|
| Agriculture | Compact Growth Mixed Use |
| Babcock Mixed Use | Parks & Recreation |
| Burnt Store Limited Development | Preservation |
| Burnt Store Village Residential | Public Lands & Facilities |
| City | Resource Conservation |
| Commercial | Rural Community Mixed Use |
| Office & Institutional | US 41 Mixed Use |
| Enterprise Charlotte Airport Park | Charlotte Harbor Coastal Residential |
| Mineral Resource Extraction | Charlotte Harbor Tourist |
| Low Density Residential | Charlotte Harbor Mixed Use |
| Medium Density Residential | Charlotte Harbor Commercial |
| High Density Residential | Charlotte Harbor Neighborhood Business/Residential |
| Low Intensity Industrial | Charlotte Harbor Industrial (inactivated) |
| High Intensity Industrial | Recreational Vehicle Park (inactivated) |
| Murdock Village Mixed Use | Coastal Residential (Inactivated) |
| DRI Mixed Use | Rural Estate Residential (inactivated) |



Charlotte County
Charlotte County GIS

Appendix I: Existing Infrastructure

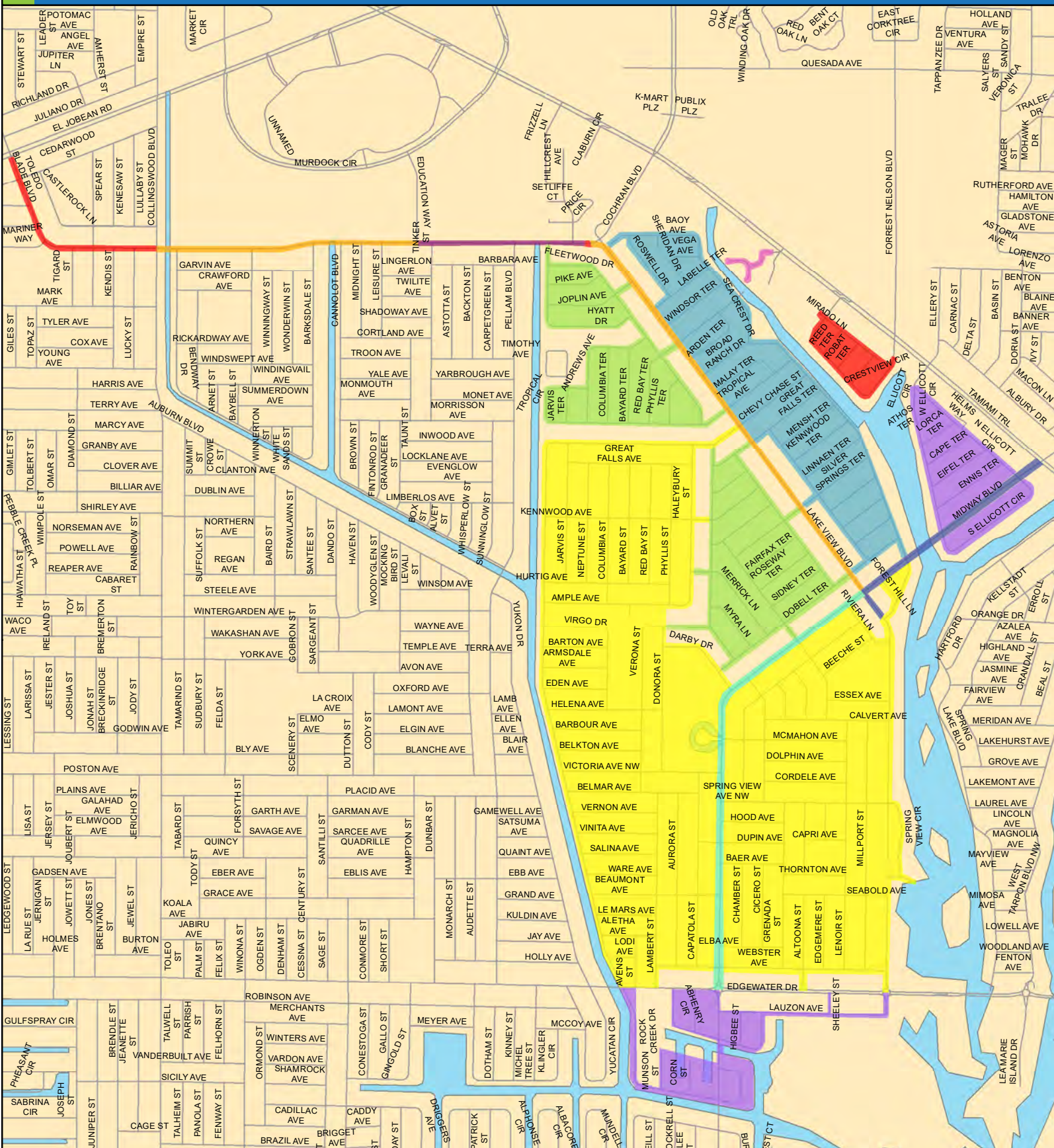




Appendix J: Paving Program

Lakeview

Paving Program - FY 2022

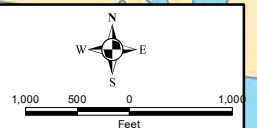
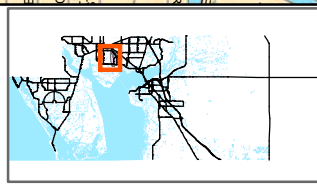


Stateplane Projection
Datum: NAD83
Units: Feet

Source: Public Works

Metadata available upon request

Pavement Year		2004/2005	2012	2019
1979	2006	2014	2016	Future
2002/2003	2011			



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Updated: 3/30/2022 2:29:37 PM by: D Jorge
M:\publicworks\ArcProjects\10\PavMan\Lakeview.mxd

Appendix K: Selection of Alternatives – Estimated Costs

Project

Areas M67 & M70

Planning Time Frame

40

Interest Rate

5.00

Total ERC's / Parcels

286

Occupied Parcels

248

No. Parcels Assessed

23

No. Parcels in Analysis

254

Occupied Parcels

219

No. Parcels Assessed

10

years

percent

For comparative analysis only.

(Does not include all costs)

System Type

Base Cost

Other Costs

Legal, Engrg, Survey

Const Services/ Contingency

Total Initial Cost "C"

Annual O&M

O&M Uniform Series Present Worth Factor

USPW (O&M)

Salvage Value (SV)

SPPW (SV)

Present Worth of Salvage Value

NET PRESENT VALUE

Vacuum

\$6,374,844

\$0

\$0

\$0

\$6,374,844

\$35,600

17.1591

\$610,863

\$1,485,916

0.1420

\$211,068

\$6,774,639

LPS

\$4,317,219

\$0

\$0

\$0

\$4,317,219

\$58,100

17.1591

\$996,943

\$764,046

0.1420

\$108,529

\$5,205,832

Gravity

\$7,118,244

\$0

\$0

\$0

\$7,118,244

\$20,800

17.1591

\$356,909

\$1,870,536

0.1420

\$265,702

\$7,209,451

NPV = C + USPW (O&M) - SPPW (SV)

NPV Net Present Value

C Capital Cost

n (years) = 40

i = 5%

USPW (O&M)

Uniform Series Present Worth (O&M)

$$P = F(P/A, i, n) = A \frac{(1+i)^n - 1}{i(1+i)^n}$$

(1+i)ⁿ = 7.039988712

P*(1+i)ⁿ = 0.351999436

(P/A, i, n) = 17.1591

(P/F, i, n) = 0.1420

SPPW (SV)

Single Payment Present Worth (SV)

$$P = F(P/F, i, n) = \frac{F}{(1+i)^n}$$

Vacuum

Description

Unit

Qty

Unit Price

Total

Building Site Work and Material - Install

EA

1

\$875,000

\$875,000

Pumps, Tank and Controls / Monitoring - Material Only

EA

1

\$460,000

\$460,000

4" Vacuum Main

LF

12,236

\$60

\$611,800

6" Vacuum Main

LF

3,636

\$60

\$218,160

8" Vacuum Main

LF

0

\$75

\$0

10" Vacuum Main

LF

0

\$110

\$0

Force Main (Average 6" / 8")

LF

1,105

\$70

\$77,350

18" Steel Casing

LF

0

\$300

\$0

Valve Pits (2.5 ERC's / 1 Valve Pit)

EA

102

\$8,850

\$902,700

3" Valve Pit Connections (15' / ERC)

EA

254

\$750

\$190,500

Gravity Laterals (60' / Valve Pit)

EA

102

\$2,700

\$275,400

Air Terminals and 6" Line (15' / Valve Pit)

EA

102

\$1,250

\$127,500

Bridge Crossing - Vacuum

EA

1

\$20,000

\$20,000

Main Line Road Crossings Trench Repair

LF

480

\$100

\$48,000

Open Cut Trench Repair (Service Laterals) - Avg. 22' road

EA

102

\$2,200

\$224,400

Restoration - Concrete Driveways (20 SY / driveway)

EA

110

\$1,850

\$203,500

Restoration - Sod (150 SY / ERC)

EA

254

\$1,150

\$292,100

On-Lot Costs

Pump, Crush and Fill Existing Septic / LPS Tank

EA

219

\$2,250

\$492,750

On Site 4" Gravity Lateral Connection

EA

219

\$1,750

\$383,250

Other Costs

Miscellaneous (Mobilization / MOT / Bonds / Permits)

18%

\$972,434

Total

\$6,374,844

Element

Life Span

Value New

40 Year Dep

Remaining Value

Building Site Work and Material - Install

50

\$875,000

\$700,000

\$175,000

4" Vacuum Main

100

\$611,800

\$244,720

\$367,080

6" Vacuum Main

100

\$218,160

\$87,264

\$130,896

8" Vacuum Main

100

\$0

\$0

\$0

10" Vacuum Main

100

\$0

\$0

\$0

Force Main (Average 6" / 8")

100

\$77,350

\$30,940

\$46,410

18" Steel Casing

100

\$0

\$0

\$0

Valve Pits (2.5 ERC's / 1 Valve Pit)

50

\$902,700

\$722,160

\$180,540

3" Valve Pit Connections (15' / ERC)

100

\$190,500

\$76,200

\$114,300

Gravity Laterals (60' / Valve Pit)

100

\$275,400

\$110,160

\$165,240

Air Terminals and 6" Line (15' / Valve Pit)

100

\$127,500

\$51,000

\$76,500

On Site 4" Gravity Lateral Connection

100

\$383,250

\$153,300

\$229,950

Total

\$1,485,916

LPS

Description

Unit

Qty

Unit Price

Total

Lift Station Complete

EA

1

\$300,000

\$300,000

4" Low Pressure Sewer Main

LF

12,626

\$35

\$441,910

Connect to Existing Low Pressure Sewer Main (4" or less)

EA

16

\$5,000

\$80,000

Main Line Road Crossings Trench Repair

LF

240

\$100

\$24,000

Open Cut Trench Repair (Service Laterals) - Avg. 22' road

EA

127

\$2,200

\$279,400

Restoration - Concrete Driveways (20 SY / driveway)

EA

110

\$1,850

\$203,500

Restoration - Sod (150 SY / ERC)

EA

254

\$1,150

\$292,100

On-Lot Costs

Pump, Crush and Fill Existing Septic / LPS Tank

EA

209

\$2,250

\$470,250

LPS Tank Package

EA

209

\$6,000

\$1,254,000

On Site Low Pressure Connection

EA

209

\$1,500

\$313,500

Other Costs

Miscellaneous (Mobilization / MOT / Bonds / Permits)

18%

\$658,559

Total

\$4,317,219

Element

Life Span

Value New

40 Year Dep

Remaining Value

Lift Station Complete

50

\$300,000

\$240,000

\$60,000

4" Low Pressure Sewer Main

100

\$441,910

\$176,764

\$265,146

LPS Tank Package

50

\$1,254,000

\$1,003,200

\$250,800

On Site Low Pressure Connection

100

\$313,500

\$125,400

\$188,100

Total

\$764,046

Gravity

Description

Unit

Qty

Unit Price

Total

Lift Station Complete

EA

2

\$300,000

\$600,000

8" Gravity Mains

LF

15,407

\$100

\$1,540,700

Standard Manholes

EA

60

\$9,000

\$540,000

Gravity Service Lines (Average Double / Single)

EA

254

\$1,600

\$406,400

Force Main (Average 6" / 8")

LF

5,503

\$70

\$385,210

Force Main (Average 6" / 8") - Directional Drill

LF

200

\$110

\$22,000

Connect to Existing Force Main (6" or larger)

EA

2

\$15,000

\$30,000

Connect to Existing Gravity Main

EA

0

\$10,000

\$0

Connect to Existing Manhole

EA

0

\$10,000

\$0

Total Road Reconstruction (20' wide road)

LF

14,110

\$90

\$1,269,900

Total Road Reconstruction (24' wide road)

LF

0

\$100

\$0

Total Road Reconstruction (56' wide road)

LF

1,300

\$220

\$286,000

Restoration - Concrete Driveways (20 SY / driveway)

EA

0

\$1,850

\$0

Restoration - Sod (35 SY / ERC)

EA

254

\$300

\$76,200

On-Lot Costs

Pump, Crush and Fill Existing Septic / LPS Tank

EA

219

\$2,250

\$492,750

On Site 4" Gravity Lateral Connection

EA

219

\$1,750

\$383,250

Other Costs

Miscellaneous (Mobilization / MOT / Bonds / Permits)

18%

\$1,085,834

Total

\$7,118,244

Element

Life Span

Value New

40 Year Dep

Remaining Value

Lift Station Complete

50

\$600,000

\$480,000

\$120,000

8" Gravity Mains

100

\$1,540,700

\$616,280

\$924,420

Standard Manholes

50

\$540,000

\$432,000

\$108,000

Gravity Service Lines (Average Double / Single)

100

\$406,400

\$162,560

\$243,840

Force Main (Average 6" / 8")

100

\$385,210

\$154,084

\$231,126

Force Main (Average 6" / 8") - Directional Drill

100

\$22,000

\$8,800

\$13,200

On Site 4" Gravity Lateral Connection

100

\$383,250

\$153,300

\$229,950

Total

\$1,870,536

O & M Costs per Year

\$ / Year / ERC

ERC's

\$ / Year

Vacuum

\$140

254

\$35,600

LPS

\$229

254

\$58,100

Gravity

\$82

254

\$20,800

Includes 1/4 LS O&M costs since flow going to existing LS.

Includes 1 LS O&M costs.

GWE # 6565

Lake View Midway - M67 & M70

connections 254
EDU's 254

ANNUAL O&M ESTIMATE

M67 & M70
GRAVITY SEWER

		LABOR		
Item	Labor effort	Quantity	Annual Labor	
Lift Station - (if req'd)	180 hrs/yr/station	x 2 station	=	360 hrs/yr
Piping	20 hrs/yr/system	x 1 system	=	20 hrs/yr
			=	0 hrs/yr
				380 hrs/yr
			x	\$20 /hr
			x	1.25 Overhead
				\$9,500 /yr
ROUND TO:				\$9,500 /yr

		POWER		
Item	Unit cost	EDU	Duration	Annual Power
Lift Station - (if req'd)				
Flat rate	\$125.00 /mo	x 2 station	12 mo	\$3,000 /yr
Consumption	\$0.50 /mo/EDU	x 254 EDU	x 12 mo	= \$1,524 /yr
				\$4,524
ROUND TO:				\$4,500 /yr

		EQUIPMENT REPLACEMENT		
Item	Replacement cost	Useful life	Quantity	Annual R&R
LIFT STATION (if req'd)				
Sewage Pumps	\$12,000 /ea	/ 15 years	x 4 pumps	= \$3,200 /yr
Wetwell	\$10,000 /ea	/ 20 years	x 2 ea	= \$1,000 /yr
Control Panel	\$25,000 /ea	/ 20 years	x 2 ea	= \$2,500 /yr
Misc. Equip	\$1,000 /ea	/ 15 years	x 1 ea	= \$67 /yr
				\$6,767 /yr
ROUND TO:				\$6,800 /yr

SUMMARY	
LABOR	\$9,500 /yr
POWER	\$4,500 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$6,800 /yr
	\$20,800 /yr
ANNUAL O&M	\$82 /yr/EDU

Lake View Midway - M67 & M70

connections 254
EDU's 254

ANNUAL O&M ESTIMATE M67 & M70 LOW PRESSURE SYSTEM

		LABOR			
Item	Labor effort		Quantity		Annual Labor
Lift Station - (if req'd)	180 hrs/yr/station	x	0.5 station	=	90 hrs/yr
Piping	60 hrs/yr/system	x	1.00 system	=	60 hrs/yr
Grinder pumps	1.50 hrs/yr/GP	x	254 GP's	=	381 hrs/yr
					531 hrs/yr
				x	\$20 /hr
				x	1.25 Overhead
					\$13,275 /yr
ROUND TO:					\$13,300 /yr

		POWER			
Item	Unit cost		EDU	Duration	Annual Power
Lift Station - (if req'd)					
Flat rate	\$125.00 /mo	x	0.5	12 mo	\$750 /yr
Consumption	\$0.50 /mo/EDU	x	254 EDU	x 12 mo	= \$1,524 /yr
					\$2,274
Grinder Pumps	\$0.75 /mo/EDU	x	254 EDU	x 12 mo	\$2,286 /yr
					\$4,560
ROUND TO:					\$4,600 /yr

		EQUIPMENT REPLACEMENT			
Item	Replacement cost		Useful life	Quantity	Annual R&R
LIFT STATION (if req'd)					
Sewage Pumps	\$12,000 /ea	/	15 years	x 1.0 pumps	= \$800 /yr
Wetwell	\$10,000 /ea	/	20 years	x 0.5 ea	= \$250 /yr
Control Panel	\$25,000 /ea	/	20 years	x 0.5 ea	= \$625 /yr
Misc. Equip	\$1,000 /ea	/	15 years	x 1.0 ea	= \$67 /yr
					\$1,742 /yr
ROUND TO:					\$1,700 /yr
GRINDER PUMPS					
Rebuild pump core	\$750 /ea	/	7 years	x 254 GP's	= \$27,214 /yr
Replace controls	\$300 /ea	/	7 years	x 254 GP's	= \$10,886 /yr
Misc. Parts	\$15 /yr	/	10 years	x 254 GP's	= \$381 /yr
					\$38,481 /yr
ROUND TO:					\$38,500 /yr

SUMMARY	
LABOR	\$13,300 /yr
POWER	\$4,600 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$1,700 /yr
EQUIPMENT REPLACEMENT (GP'S)	\$38,500 /yr
	\$58,100 /yr
ANNUAL O&M	\$229 /yr/EDU

Lake View Midway - M67 & M70

connections 254
EDU's 254

ANNUAL O&M ESTIMATE M67 & M70 VACUUM SYSTEM

LABOR					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	450 hrs/yr/station	x	1 station	=	450 hrs/yr
Piping	60 hrs/yr/system	x	1 system	=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	102 valves	=	179 hrs/yr
					689 hrs/yr
				x	\$20 /hr
				x	1.25 Overhead
					\$17,225 /yr
ROUND TO:					\$17,200 /yr

POWER					
Item	Unit cost		EDU	Duration	Annual Power
Vacuum Station					
Flat rate	\$125.00 /mo	x	1 Vac Sta	12 mo	\$1,500 /yr
Consumption	\$2.50 /mo/EDU	x	254 EDU	x 12 mo	= \$7,620 /yr
					\$9,120
ROUND TO:					\$9,100 /yr

EQUIPMENT REPLACEMENT					
Item	Replacement cost		Useful life	Quantity	Annual R&R
VACUUM STATION					
Vacuum Pumps	\$21,500 /ea	/	15 years	x 3 pumps	= \$4,300 /yr
Sewage Pumps	\$10,000 /ea	/	15 years	x 2 pumps	= \$1,333 /yr
Collection Tank	\$30,000 /ea	/	30 years	x 1 ea	= \$1,000 /yr
Control Panel	\$30,000 /ea	/	20 years	x 1 ea	= \$1,500 /yr
Misc. Equip	\$3,000 /ea	/	15 years	x 1 ea	= \$200 /yr
					\$8,333 /yr
ROUND TO:					\$8,300 /yr
VACUUM VALVES					
Vacuum Valves	\$45 /ea	/	15 years	x 102 valves	= \$306 /yr
Controller	\$45 /ea	/	10 years	x 102 valves	= \$459 /yr
Misc. Parts	\$20 /ea	/	10 years	x 102 valves	= \$204 /yr
					\$969 /yr
ROUND TO:					\$1,000 /yr

SUMMARY	
LABOR	\$17,200 /yr
POWER	\$9,100 /yr
EQUIPMENT REPLACEMENT (STATION)	\$8,300 /yr
EQUIPMENT REPLACEMENT (VALVES)	\$1,000 /yr
	\$35,600 /yr
ANNUAL O&M	\$140 /yr/EDU

Present Worth Analysis													
Project Planning Time Frame Interest Rate Total ERC's / Parcels Occupied Parcels No. Parcels Assessed	Area M64 Rock Creek Drive		For comparative analysis only. (Does not include all costs)										
	40		years percent										
	5.00												
	95												
	78												
	33												
System Type	Base Cost	Other Costs	Legal, Engr, Survey	Const Services/ Contingency	Total Initial Cost "C"	Annual O&M	O&M Uniform Series Present Worth Factor	USPW (O&M)	Salvage Value (SV)	SPPW (SV)	Present Worth of Salvage Value	NET PRESENT VALUE	
Do Nothing	\$0	\$0	\$0	\$0	\$0	\$0	17.1591	\$0	\$0	0.1420	\$0	\$0	
Vacuum	\$2,085,473	\$0	\$0	\$0	\$2,085,473	\$7,000	17.1591	\$120,114	\$533,590	0.1420	\$75,794	\$2,129,792	
Gravity	\$2,364,484	\$0	\$0	\$0	\$2,364,484	\$10,500	17.1591	\$180,170	\$586,980	0.1420	\$83,378	\$2,461,276	
NPV = C + USPW (O&M) - SPPW (SV) NPV Net Present Value C Capital Cost n (years) = 40 i = 5%													
USPW (O&M)	Uniform Series Present Worth (O&M)	$P = F \left(\frac{P}{A}, i, n \right) = A \frac{(1+i)^n - 1}{i(1+i)^n}$				(1+i) ⁿ = 7.039988712	(P/A, i, n) = 17.1591						
SPPW (SV)	Single Payment Present Worth (SV)	$P = F \left(\frac{P}{F}, i, n \right) = \frac{F}{(1+i)^n}$				i*(1+i) ⁿ = 0.351999436	(P/F, i, n) = 0.1420						
Vacuum													
Cost Estimates					Salvage Value								
Description	Unit	Qty	Unit Price	Total	Element	Life Span	Value New	40 Year Dep	Remaining Value				
Vacuum Station Building (1,000+ ERC's)					Building Site Work and Material - Install	50	\$200,000	\$160,000	\$40,000				
Building Site Work and Material - Install	EA	0.10	\$2,000,000	\$200,000									
Pumps, Tank and Controls / Monitoring - Material Only	EA	0.10	\$700,000	\$70,000									
4" Vacuum Main	LF	3,646	\$50	\$182,300	4" Vacuum Main	100	\$182,300	\$72,920	\$109,380				
6" Vacuum Main	LF	2,393	\$60	\$143,580	6" Vacuum Main	100	\$143,580	\$57,432	\$86,148				
8" Vacuum Main	LF	0	\$75	\$0	8" Vacuum Main	100	\$0	\$0	\$0				
10" Vacuum Main	LF	0	\$110	\$0	10" Vacuum Main	100	\$0	\$0	\$0				
Force Main (Average 6" / 8")	LF	126	\$70	\$8,820	Force Main (Average 6" / 8")	100	\$8,820	\$3,528	\$5,292				
18" Steel Casing	LF	60	\$300	\$18,000	18" Steel Casing	100	\$18,000	\$7,200	\$10,800				
Valve Pits (2.5 ERC's / 1 Valve Pit)	EA	38	\$8,850	\$336,300	Valve Pits (2.5 ERC's / 1 Valve Pit)	50	\$336,300	\$269,040	\$67,260				
3" Valve Pit Connections (15' / ERC)	EA	95	\$750	\$71,250	3" Valve Pit Connections (15' / ERC)	100	\$71,250	\$28,500	\$42,750				
Gravity Laterals (60' / Valve Pit)	EA	38	\$2,700	\$102,600	Gravity Laterals (60' / Valve Pit)	100	\$102,600	\$41,040	\$61,560				
Air Terminals and 6" Line (15' / Valve Pit)	EA	38	\$1,250	\$47,500	Air Terminals and 6" Line (15' / Valve Pit)	100	\$47,500	\$19,000	\$28,500				
Bridge Crossing - Vacuum	EA	0	\$20,000	\$0									
Main Line Road Crossings Trench Repair	LF	100	\$100	\$10,000									
Open Cut Trench Repair (Service Laterals) - Avg. 22' road	EA	38	\$2,200	\$83,600									
Restoration - Concrete Driveways (20 SY / driveway)	EA	39	\$1,850	\$72,150									
Restoration - Sod (150 SY / ERC)	EA	95	\$1,150	\$109,250									
On-Lot Costs													
Pump, Crush and Fill Existing Septic / LPS Tank	EA	78	\$2,250	\$175,500									
On Site 4" Gravity Lateral Connection	EA	78	\$1,750	\$136,500	On Site 4" Gravity Lateral Connection	100	\$136,500	\$54,600	\$81,900				
Other Costs													
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$318,123									
Total				\$2,085,473					Total		\$533,590		
Gravity													
Cost Estimates					Salvage Value								
Description	Unit	Qty	Unit Price	Total	Element	Life Span	Value New	40 Year Dep	Remaining Value				
Lift Station Complete	EA	1	\$300,000	\$300,000	Lift Station Complete	50	\$300,000	\$240,000	\$60,000				
8" Gravity Mains	LF	5,080	\$100	\$508,000	8" Gravity Mains	100	\$508,000	\$203,200	\$304,800				
Standard Manholes	EA	24	\$9,000	\$216,000	Standard Manholes	50	\$216,000	\$172,800	\$43,200				
Gravity Service Lines (Average Double / Single)	EA	95	\$1,600	\$152,000	Gravity Service Lines (Average Double / Single)	100	\$152,000	\$60,800	\$91,200				
Force Main (Average 6" / 8")	LF	140	\$70	\$9,800	Force Main (Average 6" / 8")	100	\$9,800	\$3,920	\$5,880				
Force Main (Average 6" / 8") - Directional Drill	LF	0	\$110	\$0	Force Main (Average 6" / 8") - Directional Drill	100	\$0	\$0	\$0				
Connect to Existing Force Main (6" or larger)	EA	1	\$15,000	\$15,000									
Connect to Existing Gravity Main	EA	0	\$10,000	\$0									
Connect to Existing Manhole	EA	0	\$10,000	\$0									
Total Road Reconstruction (20' wide road)	LF	4,550	\$90	\$409,500									
Total Road Reconstruction (24' wide road)	LF	530	\$100	\$53,000									
Total Road Reconstruction (56' wide road)	LF	0	\$220	\$0									
Restoration - Concrete Driveways (20 SY / driveway)	EA	0	\$1,850	\$0									
Restoration - Sod (35 SY / ERC)	EA	95	\$300	\$28,500									
On-Lot Costs													
Pump, Crush and Fill Existing Septic / LPS Tank	EA	78	\$2,250	\$175,500									
On Site 4" Gravity Lateral Connection	EA	78	\$1,750	\$136,500	On Site 4" Gravity Lateral Connection	100	\$136,500	\$54,600	\$81,900				
Other Costs													
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$360,684									
Total				\$2,364,484					Total		\$586,980		
O & M Costs per Year													
	\$ / Year / ERC	ERC's	\$ / Year										
Do Nothing	\$0	95	\$0										
Vacuum	\$74	95	\$7,000	Includes 1/10 VS O&M costs since ERC's make up <10% of total ERC's served by propped VS.									
Gravity	\$111	95	\$10,500	Includes 1 LS O&M costs.									
GWE # 6565													

Lake View Midway - M64

connections 95
EDU's 95

ANNUAL O&M ESTIMATE

M64 - Rock Creek Drive
GRAVITY SEWER

		LABOR		
Item	Labor effort	Quantity	Annual Labor	
Lift Station - (if req'd)	180 hrs/yr/station	x 1.0 station	=	180 hrs/yr
Piping	20 hrs/yr/system	x 1.0 system	=	20 hrs/yr
			=	0 hrs/yr
				200 hrs/yr
			x	\$20 /hr
			x	1.25 Overhead
				\$5,000 /yr
ROUND TO:				\$5,000 /yr

		POWER		
Item	Unit cost	EDU	Duration	Annual Power
Lift Station - (if req'd)				
Flat rate	\$125.00 /mo	x 1 station	12 mo	\$1,500 /yr
Consumption	\$0.50 /mo/EDU	x 95 EDU	x 12 mo	= \$570 /yr
				\$2,070
ROUND TO:				\$2,100 /yr

		EQUIPMENT REPLACEMENT		
Item	Replacement cost	Useful life	Quantity	Annual R&R
LIFT STATION (if req'd)				
Sewage Pumps	\$12,000 /ea	/ 15 years	x 2 pumps	= \$1,600 /yr
Wetwell	\$10,000 /ea	/ 20 years	x 1 ea	= \$500 /yr
Control Panel	\$25,000 /ea	/ 20 years	x 1 ea	= \$1,250 /yr
Misc. Equip	\$1,000 /ea	/ 15 years	x 1 ea	= \$67 /yr
				\$3,417 /yr
ROUND TO:				\$3,400 /yr

SUMMARY	
LABOR	\$5,000 /yr
POWER	\$2,100 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$3,400 /yr
	\$10,500 /yr
ANNUAL O&M	\$111 /yr/EDU

Lake View Midway - M64

connections 95
EDU's 95

ANNUAL O&M ESTIMATE

M64 - Rock Creek Drive
VACUUM SYSTEM

LABOR					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	450 hrs/yr/station	x	0.1 station	=	45 hrs/yr
Piping	60 hrs/yr/system	x	0.1 system	=	6 hrs/yr
Valves	1.75 hrs/yr/valve	x	38 valves	=	67 hrs/yr
					118 hrs/yr
				x	\$20 /hr
				x	1.25 Overhead
					\$2,950 /yr
ROUND TO:					\$3,000 /yr

POWER					
Item	Unit cost		EDU	Duration	Annual Power
Vacuum Station					
Flat rate	\$125.00 /mo	x	0.1 Vac Sta	12 mo	\$150 /yr
Consumption	\$2.50 /mo/EDU	x	95 EDU	x 12 mo	= \$2,850 /yr
					\$3,000
ROUND TO:					\$3,000 /yr

EQUIPMENT REPLACEMENT							
Item	Replacement cost		Useful life		Quantity		Annual R&R
VACUUM STATION							
Vacuum Pumps	\$12,500 /ea	/	15 years	x	0.3 pumps	=	\$250 /yr
Sewage Pumps	\$6,000 /ea	/	15 years	x	0.2 pumps	=	\$80 /yr
Collection Tank	\$20,000 /ea	/	30 years	x	0 ea	=	\$67 /yr
Control Panel	\$30,000 /ea	/	20 years	x	0 ea	=	\$150 /yr
Misc. Equip	\$3,000 /ea	/	15 years	x	0 ea	=	\$20 /yr
							\$567 /yr
ROUND TO:							\$600 /yr
VACUUM VALVES							
Vacuum Valves	\$45 /ea	/	15 years	x	38 valves	=	\$114 /yr
Controller	\$45 /ea	/	10 years	x	38 valves	=	\$171 /yr
Misc. Parts	\$20 /ea	/	10 years	x	38 valves	=	\$76 /yr
							\$361 /yr
ROUND TO:							\$400 /yr

SUMMARY	
LABOR	\$3,000 /yr
POWER	\$3,000 /yr
EQUIPMENT REPLACEMENT (STATION)	\$600 /yr
EQUIPMENT REPLACEMENT (VALVES)	\$400 /yr
	\$7,000 /yr
ANNUAL O&M	\$74 /yr/EDU

Present Worth Analysis														
Project		Area M64 Abhenry Circle		For comparative analysis only. (Does not include all costs)										
Planning Time Frame		40		years										
Interest Rate		5.00		percent										
Total ERC's / Parcels		146												
Occupied Parcels		85												
No. Parcels Assessed		44												
No. Parcels in Analysis		88												
Occupied Parcels		53												
No. Parcels Assessed		11												
System Type		Base Cost		Other Costs	Legal, Engr, Survey	Const Services/ Contingency	Total Initial Cost "C"	Annual O&M	O&M Uniform Series Present Worth Factor	USPW (O&M)	Salvage Value (SV)	SPPW (SV)	Present Worth of Salvage Value	NET PRESENT VALUE
Do Nothing		\$0		\$0	\$0	\$0	\$0	\$0	17.1591	\$0	\$0	0.1420	\$0	\$0
Vacuum		\$1,896,024		\$0	\$0	\$0	\$1,896,024	\$6,600	17.1591	\$113,250	\$500,320	0.1420	\$71,068	\$1,938,206
Gravity		\$1,969,762		\$0	\$0	\$0	\$1,969,762	\$3,400	17.1591	\$58,341	\$507,450	0.1420	\$72,081	\$1,956,022
NPV = C + USPW (O&M) - SPPW (SV)														
NPV Net Present Value		n (years) = 40												
C Capital Cost		i = 5%												
USPW (O&M)		Uniform Series Present Worth (O&M)		$P = F \left(\frac{P}{A}, i, n \right) = A \frac{(1+i)^n - 1}{i(1+i)^n}$		(1+i) ⁿ = 7.039988712		i*(1+i) ⁿ = 0.351999436		(P/A, i, n) = 17.1591		(P/F, i, n) = 0.1420		
SPPW (SV)		Single Payment Present Worth (SV)		$P = F \left(\frac{P}{F}, i, n \right) = \frac{F}{(1+i)^n}$										
Vacuum														
Cost Estimates					Salvage Value									
Description		Unit	Qty	Unit Price	Total	Element		Life Span	Value New	40 Year Dep	Remaining Value			
Vacuum Station Building (1,000+ ERC's)						Building Site Work and Material - Install		50	\$200,000	\$160,000	\$40,000			
Building Site Work and Material - Install					EA	0.10	\$2,000,000	\$200,000						
Pumps, Tank and Controls / Monitoring - Material Only					EA	0.10	\$700,000	\$70,000						
4" Vacuum Main					LF	3,355	\$50	\$167,750	100	\$167,750	\$67,100	\$100,650		
6" Vacuum Main					LF	2,758	\$60	\$165,480	100	\$165,480	\$66,192	\$99,288		
8" Vacuum Main					LF	0	\$75	\$0	100	\$0	\$0	\$0		
10" Vacuum Main					LF	0	\$110	\$0	100	\$0	\$0	\$0		
Force Main (Average 6" / 8")					LF	126	\$70	\$8,820	100	\$8,820	\$3,528	\$5,292		
18" Steel Casing					LF	60	\$300	\$18,000	100	\$18,000	\$7,200	\$10,800		
Valve Pits (2.5 ERC's / 1 Valve Pit)					EA	36	\$8,850	\$318,600	50	\$318,600	\$254,880	\$63,720		
3" Valve Pit Connections (15' / ERC)					EA	88	\$750	\$66,000	100	\$66,000	\$26,400	\$39,600		
Gravity Laterals (60' / Valve Pit)					EA	36	\$2,700	\$97,200	100	\$97,200	\$38,880	\$58,320		
Air Terminals and 6" Line (15' / Valve Pit)					EA	36	\$1,250	\$45,000	100	\$45,000	\$18,000	\$27,000		
Bridge Crossing - Vacuum					EA	0	\$20,000	\$0						
Main Line Road Crossings Trench Repair					LF	120	\$100	\$12,000						
Open Cut Trench Repair (Service Laterals) - Avg. 22' road					EA	34	\$2,200	\$74,800						
Restoration - Concrete Driveways (20 SY / driveway)					EA	27	\$1,850	\$49,950						
Restoration - Sod (150 SY / ERC)					EA	88	\$1,150	\$101,200						
On-Lot Costs														
Pump, Crush and Fill Existing Septic / LPS Tank					EA	53	\$2,250	\$119,250						
On Site 4" Gravity Lateral Connection					EA	53	\$1,750	\$92,750	100	\$92,750	\$37,100	\$55,650		
Other Costs														
Miscellaneous (Mobilization / MOT / Bonds / Permits)					18%				\$289,224					
Total					\$1,896,024				Total \$500,320					
Gravity														
Cost Estimates					Salvage Value									
Description		Unit	Qty	Unit Price	Total	Element		Life Span	Value New	40 Year Dep	Remaining Value			
Lift Station Complete					EA	0	\$300,000	\$0	50	\$0	\$0	\$0		
8" Gravity Mains					LF	5,492	\$100	\$549,200	100	\$549,200	\$219,680	\$329,520		
Standard Manholes					EA	21	\$9,000	\$189,000	50	\$189,000	\$151,200	\$37,800		
Gravity Service Lines (Average Double / Single)					EA	88	\$1,600	\$140,800	100	\$140,800	\$56,320	\$84,480		
Force Main (Average 6" / 8")					LF	0	\$70	\$0	100	\$0	\$0	\$0		
Force Main (Average 6" / 8") - Directional Drill					LF	0	\$110	\$0	100	\$0	\$0	\$0		
Connect to Existing Force Main (6" or larger)					EA	0	\$15,000	\$0						
Connect to Existing Gravity Main					EA	5	\$10,000	\$50,000						
Connect to Existing Manhole					EA	0	\$10,000	\$0						
Total Road Reconstruction (20' wide road)					LF	4,731	\$90	\$425,790						
Total Road Reconstruction (24' wide road)					LF	761	\$100	\$76,100						
Total Road Reconstruction (56' wide road)					LF	0	\$220	\$0						
Restoration - Concrete Driveways (20 SY / driveway)					EA	0	\$1,850	\$0						
Restoration - Sod (35 SY / ERC)					EA	88	\$300	\$26,400						
On-Lot Costs														
Pump, Crush and Fill Existing Septic / LPS Tank					EA	53	\$2,250	\$119,250						
On Site 4" Gravity Lateral Connection					EA	53	\$1,750	\$92,750	100	\$92,750	\$37,100	\$55,650		
Other Costs														
Miscellaneous (Mobilization / MOT / Bonds / Permits)					18%				\$300,472					
Total					\$1,969,762				Total \$507,450					
O & M Costs per Year														
\$ / Year / ERC		ERC's	\$ / Year											
Do Nothing		88	\$0											
Vacuum		88	\$6,600	Includes 1/10 VS O&M costs since ERC's make up <10% of total ERC's served by proposed VS.										
Gravity		88	\$3,400	Includes 1/4 LS O&M costs since flow going to existing LS.										
GWE # 6565														

Lake View Midway - M64

connections 88
EDU's 88

ANNUAL O&M ESTIMATE

M64 - Abhenry Circle
GRAVITY SEWER

		LABOR		
Item	Labor effort	Quantity	Annual Labor	
Lift Station - (if req'd)	180 hrs/yr/station	x 0.25 station	=	45 hrs/yr
Piping	20 hrs/yr/system	x 1 system	=	20 hrs/yr
			=	0 hrs/yr
				65 hrs/yr
			x	\$20 /hr
			x	1.25 Overhead
				\$1,625 /yr
ROUND TO:				\$1,600 /yr

		POWER		
Item	Unit cost	EDU	Duration	Annual Power
Lift Station - (if req'd)				
Flat rate	\$125.00 /mo	x 0.25 station	12 mo	\$375 /yr
Consumption	\$0.50 /mo/EDU	x 88 EDU	x 12 mo	= \$528 /yr
				\$903
ROUND TO:				\$900 /yr

		EQUIPMENT REPLACEMENT		
Item	Replacement cost	Useful life	Quantity	Annual R&R
LIFT STATION (if req'd)				
Sewage Pumps	\$12,000 /ea	/ 15 years	x 0.5 pumps	= \$400 /yr
Wetwell	\$10,000 /ea	/ 20 years	x 0.25 ea	= \$125 /yr
Control Panel	\$25,000 /ea	/ 20 years	x 0.25 ea	= \$313 /yr
Misc. Equip	\$1,000 /ea	/ 15 years	x 1 ea	= \$67 /yr
				\$904 /yr
ROUND TO:				\$900 /yr

SUMMARY	
LABOR	\$1,600 /yr
POWER	\$900 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$900 /yr
	\$3,400 /yr
ANNUAL O&M	\$39 /yr/EDU

Lake View Midway - M64

connections 88
EDU's 88

ANNUAL O&M ESTIMATE

M64 - Abhenry Circle
VACUUM SYSTEM

LABOR					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	450 hrs/yr/station	x	0.10 station	=	45 hrs/yr
Piping	60 hrs/yr/system	x	0.10 system	=	6 hrs/yr
Valves	1.75 hrs/yr/valve	x	36 valves	=	63 hrs/yr
					114 hrs/yr
				x	\$20 /hr
				x	1.25 Overhead
					\$2,850 /yr
ROUND TO:					\$2,900 /yr

POWER					
Item	Unit cost		EDU	Duration	Annual Power
Vacuum Station					
Flat rate	\$125.00 /mo	x	0.10 Vac Sta	12 mo	\$150 /yr
Consumption	\$2.50 /mo/EDU	x	88 EDU	x 12 mo	= \$2,640 /yr
					\$2,790
ROUND TO:					\$2,800 /yr

EQUIPMENT REPLACEMENT					
Item	Replacement cost		Useful life	Quantity	Annual R&R
VACUUM STATION					
Vacuum Pumps	\$12,500 /ea	/	15 years	x 0.30 pumps	= \$250 /yr
Sewage Pumps	\$6,000 /ea	/	15 years	x 0.20 pumps	= \$80 /yr
Collection Tank	\$20,000 /ea	/	30 years	x 0.10 ea	= \$67 /yr
Control Panel	\$30,000 /ea	/	20 years	x 0.10 ea	= \$150 /yr
Misc. Equip	\$3,000 /ea	/	15 years	x 0.10 ea	= \$20 /yr
					\$567 /yr
ROUND TO:					\$600 /yr
VACUUM VALVES					
Vacuum Valves	\$45 /ea	/	15 years	x 36 valves	= \$108 /yr
Controller	\$45 /ea	/	10 years	x 36 valves	= \$162 /yr
Misc. Parts	\$20 /ea	/	10 years	x 36 valves	= \$72 /yr
					\$342 /yr
ROUND TO:					\$300 /yr

SUMMARY	
LABOR	\$2,900 /yr
POWER	\$2,800 /yr
EQUIPMENT REPLACEMENT (STATION)	\$600 /yr
EQUIPMENT REPLACEMENT (VALVES)	\$300 /yr
	\$6,600 /yr
ANNUAL O&M	\$75 /yr/EDU

Present Worth Analysis												
Project Planning Time Frame Interest Rate Total ERC's / Parcels Occupied Parcels No. Parcels Assessed	Area M64 Hidden Harbor		For comparative analysis only. (Does not include all costs)									
	40		years									
	5.00		percent									
	8											
	5											
0												
System Type	Base Cost	Other Costs	Legal, Engr, Survey	Const Services/ Contingency	Total Initial Cost "C"	Annual O&M	O&M Uniform Series Present Worth Factor	USPW (O&M)	Salvage Value (SV)	SPPW (SV)	Present Worth of Salvage Value	NET PRESENT VALUE
Do Nothing	\$0	\$0	\$0	\$0	\$0	\$0	17.1591	\$0	\$0	0.1420	\$0	\$0
LPS	\$192,930	\$0	\$0	\$0	\$192,930	\$2,700	17.1591	\$46,330	\$58,800	0.1420	\$8,352	\$230,907
Gravity - LPS Hybrid	\$486,378	\$0	\$0	\$0	\$486,378	\$1,500	17.1591	\$25,739	\$127,131	0.1420	\$18,058	\$494,059
NPV = C + USPW (O&M) - SPPW (SV)												
NPV Net Present Value		n (years) = 40										
C Capital Cost		i = 5%										
USPW (O&M)	Uniform Series Present Worth (O&M)	$P = F(P/A, i, n) = A \frac{(1+i)^n - 1}{i(1+i)^n}$										
				(1+i)^n = 7.039988712	(P/A, i, n) = 17.1591							
SPPW (SV)	Single Payment Present Worth (SV)	$P = F(P/F, i, n) = \frac{F}{(1+i)^n}$										
				i*(1+i)^n = 0.351999436	(P/F, i, n) = 0.1420							
LPS												
Cost Estimates					Salvage Value							
Description	Unit	Qty	Unit Price	Total	Element	Life Span	Value New	40 Year Dep	Remaining Value			
Lift Station Complete	EA	0	\$300,000	\$0	Lift Station Complete	50	\$0	\$0	\$0			
4" Low Pressure Sewer Main	LF	2,300	\$35	\$80,500	4" Low Pressure Sewer Main	100	\$80,500	\$32,200	\$48,300			
Connect to Existing Low Pressure Sewer Main (4" or less)	EA	0	\$5,000	\$0								
Connect to Existing Manhole	EA	1	\$10,000	\$10,000								
Main Line Road Crossings Trench Repair	LF	0	\$100	\$0								
Open Cut Trench Repair (Service Laterals) - Avg. 22' road	EA	6	\$2,200	\$13,200								
Restoration - Concrete Driveways (20 SY / driveway)	EA	1	\$1,850	\$1,850								
Restoration - Sod (150 SY / ERC)	EA	8	\$1,150	\$9,200								
On-Lot Costs												
Pump, Crush and Fill Existing Septic / LPS Tank	EA	5	\$2,250	\$11,250								
LPS Tank Package	EA	5	\$6,000	\$30,000	LPS Tank Package	50	\$30,000	\$24,000	\$6,000			
On Site Low Pressure Connection	EA	5	\$1,500	\$7,500	On Site Low Pressure Connection	100	\$7,500	\$3,000	\$4,500			
Other Costs												
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$29,430								
				Total					Total			
				\$192,930					\$58,800			
Gravity - LPS Hybrid												
Cost Estimates					Salvage Value							
Description	Unit	Qty	Unit Price	Total	Element	Life Span	Value New	40 Year Dep	Remaining Value			
Lift Station Complete	EA	0	\$300,000	\$0								
8" Gravity Mains	LF	1,220	\$100	\$122,000	8" Gravity Mains	100	\$122,000	\$48,800	\$73,200			
Standard Manholes	EA	9	\$9,000	\$81,000	Standard Manholes	50	\$81,000	\$64,800	\$16,200			
Gravity Service Lines (Average Double / Single)	EA	8	\$1,600	\$12,800	Gravity Service Lines (Average Double / Single)	100	\$12,800	\$5,120	\$7,680			
Force Main (Average 6" / 8")	LF	0	\$70	\$0	Force Main (Average 6" / 8")	100	\$0	\$0	\$0			
Force Main (Average 6" / 8") - Directional Drill	LF	0	\$110	\$0	Force Main (Average 6" / 8") - Directional Drill	100	\$0	\$0	\$0			
Connect to Existing Force Main (6" or larger)	EA	0	\$15,000	\$0								
Connect to Existing Gravity Main	EA	0	\$10,000	\$0								
Connect to Existing Manhole	EA	1	\$10,000	\$10,000								
Total Road Reconstruction (20' wide road)	LF	1,220	\$90	\$109,800								
Total Road Reconstruction (24' wide road)	LF	0	\$100	\$0								
Total Road Reconstruction (56' wide road)	LF	0	\$220	\$0								
Restoration - Concrete Driveways (20 SY / driveway)	EA	0	\$1,850	\$0								
Restoration - Sod (35 SY / ERC)	EA	3	\$300	\$900								
Lift Station Complete	EA	0	\$300,000	\$0								
4" Low Pressure Sewer Main	LF	1,081	\$35	\$37,835	4" Low Pressure Sewer Main	100	\$37,835	\$15,134	\$22,701			
Connect to Existing Low Pressure Sewer Main (4" or less)	EA	0	\$5,000	\$0								
Main Line Road Crossings Trench Repair	LF	0	\$100	\$0								
Open Cut Trench Repair (Service Laterals) - Avg. 22' road	EA	1	\$2,200	\$2,200								
Restoration - Concrete Driveways (20 SY / driveway)	EA	1	\$1,850	\$1,850								
Restoration - Sod (150 SY / ERC)	EA	2	\$1,150	\$2,300								
On-Lot Costs												
Pump, Crush and Fill Existing Septic / LPS Tank	EA	5	\$2,250	\$11,250								
LPS Tank Package	EA	2	\$6,000	\$12,000	LPS Tank Package	50	\$12,000	\$9,600	\$2,400			
On Site Low Pressure Connection	EA	2	\$1,500	\$3,000	On Site Low Pressure Connection	100	\$3,000	\$1,200	\$1,800			
On Site 4" Gravity Lateral Connection	EA	3	\$1,750	\$5,250	On Site 4" Gravity Lateral Connection	100	\$5,250	\$2,100	\$3,150			
Other Costs												
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$74,193								
				Total					Total			
				\$486,378					\$127,131			
O & M Costs per Year												
	\$ / Year / ERC	ERC's	\$ / Year									
Do Nothing	\$0	8	\$0									
LPS	\$338	8	\$2,700	Includes 1/10 LS O&M costs since flow going to existing LS.								
Gravity - LPS Hybrid	\$188	8	\$1,500	Includes 1/10 LS O&M costs since flow going to existing LS.								

GWEE # 6565

Lake View Midway - M64

connections 8
EDU's 8

ANNUAL O&M ESTIMATE M64 - Hidden Harbor LOW PRESSURE SYSTEM

		LABOR			
Item	Labor effort		Quantity	Annual Labor	
Lift Station - (if req'd)	180 hrs/yr/station	x	0.10 station	=	18 hrs/yr
Piping	60 hrs/yr/system	x	0.10 system	=	6 hrs/yr
Grinder pumps	1.50 hrs/yr/GP	x	8 GP's	=	12 hrs/yr
					36 hrs/yr
				x	\$20 /hr
				x	1.25 Overhead
					\$900 /yr
ROUND TO:					\$900 /yr

		POWER			
Item	Unit cost		EDU	Duration	Annual Power
Lift Station - (if req'd)					
Flat rate	\$125.00 /mo	x	0.1	12 mo	\$150 /yr
Consumption	\$0.50 /mo/EDU	x	8 EDU	x 12 mo	= \$48 /yr
					\$198
Grinder Pumps	\$0.75 /mo/EDU	x	8 EDU	x 12 mo	\$72 /yr
					\$270
ROUND TO:					\$300 /yr

		EQUIPMENT REPLACEMENT			
Item	Replacement cost		Useful life	Quantity	Annual R&R
LIFT STATION (if req'd)					
Sewage Pumps	\$12,000 /ea	/	15 years	x 0.2 pumps	= \$160 /yr
Wetwell	\$10,000 /ea	/	20 years	x 0.1 ea	= \$50 /yr
Control Panel	\$25,000 /ea	/	20 years	x 0.1 ea	= \$125 /yr
Misc. Equip	\$1,000 /ea	/	15 years	x 0 ea	= \$0 /yr
					\$335 /yr
ROUND TO:					\$300 /yr
GRINDER PUMPS					
Rebuild pump core	\$750 /ea	/	7 years	x 8 GP's	= \$857 /yr
Replace controls	\$300 /ea	/	7 years	x 8 GP's	= \$343 /yr
Misc. Parts	\$15 /yr	/	10 years	x 8 GP's	= \$12 /yr
					\$1,212 /yr
ROUND TO:					\$1,200 /yr

SUMMARY	
LABOR	\$900 /yr
POWER	\$300 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$300 /yr
EQUIPMENT REPLACEMENT (GP'S)	\$1,200 /yr
	\$2,700 /yr
ANNUAL O&M	\$338 /yr/EDU

Lake View Midway - M64

connections 6
EDU's 6

ANNUAL O&M ESTIMATE

M64 - Hidden Harbor
GRAVITY SEWER

		LABOR		
Item	Labor effort		Quantity	Annual Labor
Lift Station - (if req'd)	180 hrs/yr/station	x	0.1 station	= 18 hrs/yr
Piping	20 hrs/yr/system	x	0.1 system	= 2 hrs/yr
				= 0 hrs/yr
				20 hrs/yr
				x \$20 /hr
				x 1.25 Overhead
				\$500 /yr
ROUND TO:				\$500 /yr

		POWER					
Item	Unit cost		EDU		Duration		Annual Power
Lift Station - (if req'd)							
Flat rate	\$125.00 /mo	x	0.1 station		12 mo		\$150 /yr
Consumption	\$0.50 /mo/EDU	x	6 EDU	x	12 mo	=	<u>\$36 /yr</u>
							\$186
ROUND TO:							\$200 /yr

		EQUIPMENT REPLACEMENT						
Item	Replacement cost		Useful life			Quantity	Annual R&R	
LIFT STATION (if req'd)								
Sewage Pumps	\$12,000 /ea	/	15 years	x	0.2 pumps	=	\$160 /yr	
Wetwell	\$10,000 /ea	/	20 years	x	0.1 ea	=	\$50 /yr	
Control Panel	\$25,000 /ea	/	20 years	x	0.1 ea	=	\$125 /yr	
Misc. Equip	\$1,000 /ea	/	15 years	x	0.10 ea	=	\$7 /yr	
								\$342 /yr
							ROUND TO:	\$300 /yr

SUMMARY	
LABOR	\$500 /yr
POWER	\$200 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$300 /yr
	\$1,000 /yr
ANNUAL O&M	\$167 /yr/EDU

Lake View Midway - M64

connections 2
EDU's 2

ANNUAL O&M ESTIMATE M64 - Hidden Harbor HYBRID LOW PRESSURE SYSTEM

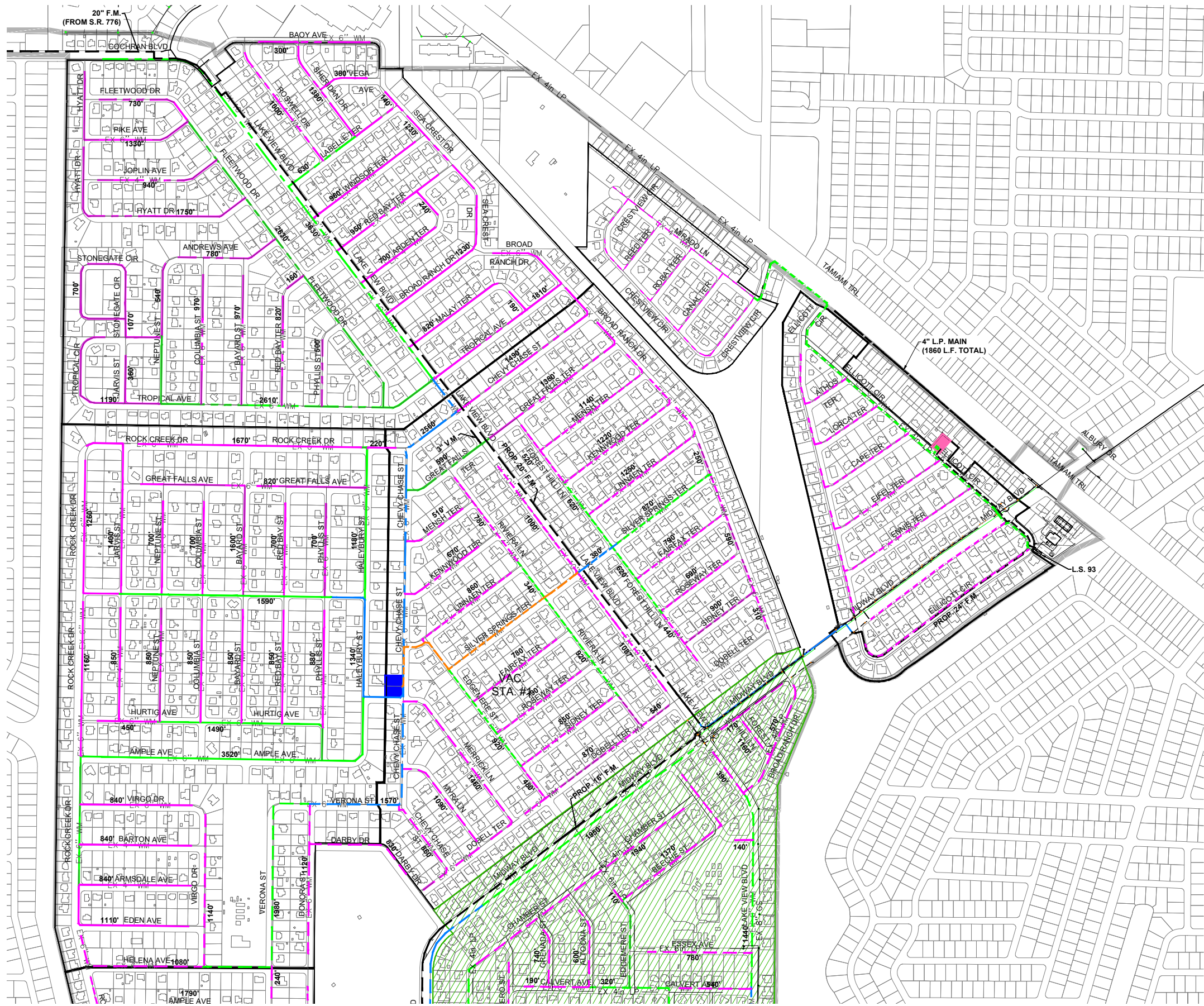
LABOR					
Item	Labor effort		Quantity		Annual Labor
Lift Station - (if req'd)	180 hrs/yr/station	x	0 station	=	0 hrs/yr
Piping	60 hrs/yr/system	x	0.1 system	=	6 hrs/yr
Grinder pumps	1.50 hrs/yr/GP	x	2 GP's	=	3 hrs/yr
					9 hrs/yr
				x	\$20 /hr
				x	1.25 Overhead
					\$225 /yr
ROUND TO:					\$200 /yr

POWER					
Item	Unit cost		EDU	Duration	Annual Power
Lift Station - (if req'd)					
Flat rate	\$125.00 /mo	x	0.00	12 mo	\$0 /yr
Consumption	\$0.50 /mo/EDU	x	2 EDU	x 12 mo	= \$12 /yr
					\$12
Grinder Pumps	\$0.75 /mo/EDU	x	2 EDU	x 12 mo	= \$18 /yr
					\$30
ROUND TO:					\$0 /yr

EQUIPMENT REPLACEMENT					
Item	Replacement cost		Useful life	Quantity	Annual R&R
LIFT STATION (if req'd)					
Sewage Pumps	\$12,000 /ea	/	15 years	x 0 pumps	= \$0 /yr
Wetwell	\$10,000 /ea	/	20 years	x 0 ea	= \$0 /yr
Control Panel	\$25,000 /ea	/	20 years	x 0 ea	= \$0 /yr
Misc. Equip	\$1,000 /ea	/	15 years	x 0 ea	= \$0 /yr
					\$0 /yr
ROUND TO:					\$0 /yr
GRINDER PUMPS					
Rebuild pump core	\$750 /ea	/	7 years	x 2 GP's	= \$214 /yr
Replace controls	\$300 /ea	/	7 years	x 2 GP's	= \$86 /yr
Misc. Parts	\$15 /yr	/	10 years	x 2 GP's	= \$3 /yr
					\$303 /yr
ROUND TO:					\$300 /yr

SUMMARY	
LABOR	\$200 /yr
POWER	\$0 /yr
EQUIPMENT REPLACEMENT (LIFT STATION)	\$0 /yr
EQUIPMENT REPLACEMENT (GP'S)	\$300 /yr
	\$500 /yr
ANNUAL O&M	\$250 /yr/EDU

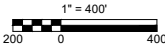
Appendix L: The Selected Plan – Conceptual Layout



F.M. QUANTITIES -
16" F.M. - 7,940 L.F. (Lake View Blvd. to L.S. 139)
20" F.M. - 15,790 L.F. (S.R. 776 to Midway Blvd.)
24" F.M. - 1,660 L.F. (Midway Bridge to L.S. 93)
GRAVITY QUANTITIES -
8" G.S. - 5,492 L.F. (TOTAL)

VACUUM STATION #3
4" VAC. MAIN - LINE E (12,236 L.F.)
LEGEND:
4" VAC. MAIN - LINE E (12,236 L.F.)
6" VAC. MAIN - LINE E (3,636 L.F.)
FORCE MAIN (1,105 L.F.)
4" L. P. MAIN (1,860 L.F.)
VACUUM STATION #3

VACUUM STATION #1
LEGEND:
4" VAC. MAIN - LINE A (20,140 L.F.)
6" VAC. MAIN (7,780 L.F.)
8" VAC. MAIN (1,340 L.F.)
4" VAC. MAIN - LINE B (7,820 L.F.)
6" VAC. MAIN (1,980 L.F.)
8" VAC. MAIN (1,570 L.F.)
4" VAC. MAIN - LINE C (16,154 L.F.)
6" VAC. MAIN (4,290 L.F.)
8" VAC. MAIN (365 L.F.)
10" VAC. MAIN (1,944 L.F.)
4" VAC. MAIN - LINE D (28,190 L.F.)
6" VAC. MAIN (10,250 L.F.)
8" VAC. MAIN (2,560 L.F.)
L. P. MAIN
FORCE MAIN
GRAVITY SEWER
PROJECT BOUNDARY
EXISTING SEWERED AREA
VACUUM STATION #1



SEE SHEET 2

DATE	REVISION	BY	DATE	REVISION	BY

GWE **GIFFELS-WEBSTER**
ENGINEERS, INC.
Certificate of Authorization No. 3607

900 Pine Street, Suite 225
Englewood, Florida 34223
Phone (941)475-7981
Fax (941)474-4285

DATE	8/22	CKD. BY	DATE
DRAWN	KF	DC	8/22
DESIGN	DC	JHC	8/22
SEC.	17, 20 & 29	T. 40S. R. 22E.	

CHARLOTTE COUNTY UTILITIES
ENGINEERING SERVICES DIVISION
25550 HARBOR VIEW RD.
PORT CHARLOTTE, FL 33980
PH. 941-764-4516
FAX: 941-764-4969

LAKEVIEW / MIDWAY
WATER QUALITY IMPROVEMENT
OVERALL SCHEMATIC MAP

SCALE	1"= 400'
SHEET	1
GWE NO.	6565.00

ENGINEER OF RECORD
DENNIS J. GROYLE, P.E.
STATE OF FLORIDA NO. 82287

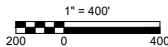
M:\6500's\6565 Lakeview Midway\MASTERS\6565 SCHEMATIC REVISED.dwg, 8/31/2022 4:12:28 PM



VACUUM STATION #2

LEGEND:

- 4" VAC. MAIN - LINE A (8,860 L.F.)
- 6" VAC. MAIN (2,100 L.F.)
- 8" VAC. MAIN (720 L.F.)
- 4" VAC. MAIN - LINE B (19,600 L.F.)
- 6" VAC. MAIN (7,680 L.F.)
- 8" VAC. MAIN (5,380 L.F.)
- 10" VAC. MAIN (2,030 L.F.)
- 4" VAC. MAIN - LINE C (24,560 L.F.)
- 6" VAC. MAIN (7,730 L.F.)
- 8" VAC. MAIN (2,960 L.F.)
- 10" VAC. MAIN (2,050 L.F.)
- 4" VAC. MAIN - LINE D (4,010 L.F.)
- 6" VAC. MAIN (860 L.F.)
- 8" VAC. MAIN (340 L.F.)
- 10" VAC. MAIN (750 L.F.)
- L. P. MAIN
- FORCE MAIN
- GRAVITY SEWER
- PROJECT BOUNDARY
- EXISTING SEWERED AREA



DATE	REVISION	BY	DATE	REVISION	BY

GWE GIFFELS-WEBSTER
ENGINEERS, INC.
Certificate of Authorization No. 3607

900 Pine Street, Suite 225
Englewood, Florida 34223
Phone (941)475-7981
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DATE	8/22	CKD. BY	DATE
DRAWN	KF	DC	8/22
DESIGN	DC	JHC	8/22
SEC.	17, 20 & 29	T. 40S. R. 22E.	

CHARLOTTE COUNTY UTILITIES
ENGINEERING SERVICES DIVISION
25550 HARBOR VIEW RD.
PORT CHARLOTTE, FL. 33980
PH: 941-764-4516
FAX: 941-764-4969

LAKEVIEW / MIDWAY
WATER QUALITY IMPROVEMENT
OVERALL SCHEMATIC MAP

SCALE	1"= 400'
SHEET	2
GWE NO.	6565.00

ENGINEER OF RECORD
DENNIS J. GROYLE, P.E.
STATE OF FLORIDA NO. 82287

Appendix M: The Selected Plan – Cost Estimate

LAKE VIEW - MIDWAY PRELIMINARY COST ESTIMATE: MSBU AREA (SEWER)						
Description	Quantity	Unit	2022 Estimate		2020 Average Prices	
			Unit Price	Total	Unit Price	Total
Vacuum Sewer						
Vacuum Station Building (1,000+ ERC's)						
Building Site Work and Material - Install	2	EA	\$2,000,000	\$4,000,000	\$1,800,000	\$3,600,000
Pumps, Tank and Controls / Monitoring - Material Only	2	EA	\$700,000	\$1,400,000	\$500,000	\$1,000,000
Small Vacuum Station Building (<300 ERC's)						
Building Site Work and Material - Install	1	EA	\$875,000	\$875,000	\$625,000	\$625,000
Pumps, Tank and Controls / Monitoring - Material Only	1	EA	\$460,000	\$460,000	\$325,000	\$325,000
4" Vacuum Main	127,850	LF	\$50	\$6,392,500	\$35	\$4,474,750
6" Vacuum Main	38,946	LF	\$60	\$2,336,760	\$40	\$1,557,840
8" Vacuum Main	9,865	LF	\$75	\$739,875	\$50	\$493,250
10" Vacuum Main	6,374	LF	\$110	\$701,140	\$55	\$350,570
Force Main (Average 6" / 8")	4,585	LF	\$70	\$320,950	\$40	\$183,400
18" Steel Casing	60	LF	\$300	\$18,000	\$250	\$15,000
Valve Pits (2.5 ERC's / 1 Valve Pit)	1,240	EA	\$8,850	\$10,974,000	\$6,250	\$7,750,000
3" Valve Pit Connections (15' / ERC)	3,099	EA	\$750	\$2,324,250	\$450	\$1,394,550
Gravity Laterals (60' / Valve Pit)	1,240	EA	\$2,700	\$3,348,000	\$1,750	\$2,170,000
Air Terminals and 6" Line (15' / Valve Pit)	1,240	EA	\$1,250	\$1,550,000	\$1,100	\$1,364,000
Main Line Road Crossings Trench Repair (9' wide trench)	3,200	LF	\$100	\$320,000	\$95	\$304,000
Open Cut Trench Repair - Service Laterals (9' wide trench, 20' wide road)	1,191	EA	\$2,000	\$2,382,000	\$1,900	\$2,262,900
Open Cut Trench Repair - Service Laterals (9' wide trench, 24' wide road)	31	EA	\$2,400	\$74,400	\$2,300	\$71,300
Open Cut Trench Repair - Service Laterals (9' wide trench, 34' wide road)	18	EA	\$3,400	\$61,200	\$3,200	\$57,600
Restoration - Concrete Driveways (20 SY / driveway)	1,113	EA	\$1,850	\$2,059,050	\$1,100	\$1,224,300
Restoration - Sod (150 SY / ERC)	3,099	EA	\$1,150	\$3,563,850	\$700	\$2,169,300
Gravity Sewer Extension (Abhenry Circle)						
8" Gravity Mains	5,492	LF	\$100	\$549,200	\$75	\$411,900
Standard Manholes	21	EA	\$9,000	\$189,000	\$5,200	\$109,200
Gravity Service Lines (Average Double / Single)	88	EA	\$1,600	\$140,800	\$900	\$79,200
Connect to Existing Gravity Main	5	EA	\$10,000	\$50,000	\$8,000	\$40,000
Total Road Reconstruction (20' wide road)	4,731	LF	\$90	\$425,790	\$90	\$425,790
Total Road Reconstruction (24' wide road)	761	LF	\$100	\$76,100	\$100	\$76,100
Restoration - Sod (35 SY / ERC)	88	EA	\$300	\$26,400	\$150	\$13,200
Existing LPS Removal						
Removal & Disposal of Existing 4" / 6" LPS Mains	11,600	LF	\$10	\$116,000	\$8	\$92,800
On-Lot Costs						
Pump, Crush and Fill Existing Septic Tank / LPS Tank	2,225	EA	\$2,250	\$5,006,250	\$2,250	\$5,006,250
On Site 4" Gravity Lateral Connection	2,225	EA	\$1,750	\$3,893,750	\$1,500	\$3,337,500
Other Costs						
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$9,787,368	18%	\$7,377,246
TOTAL				\$64,170,000		\$48,370,000

* *Italicized items are estimates and not based on actual bid prices.*

LAKE VIEW - MIDWAY PRELIMINARY COST ESTIMATE: EX LPS AREA (SEWER)				
Description	Quantity	Unit	Unit Price	Total
Vacuum Sewer				
4" Vacuum Main	13,720	LF	\$50	\$686,000
6" Vacuum Main	7,360	LF	\$60	\$441,600
8" Vacuum Main	5,370	LF	\$75	\$402,750
10" Vacuum Main	400	LF	\$110	\$44,000
Valve Pits (2.5 ERC's / 1 Valve Pit)	183	EA	\$8,850	\$1,619,550
3" Valve Pit Connections (15' / ERC)	456	EA	\$750	\$342,000
Gravity Laterals (60' / Valve Pit)	183	EA	\$2,700	\$494,100
Air Terminals and 6" Line (15' / Valve Pit)	183	EA	\$1,250	\$228,750
Main Line Road Crossings Trench Repair (9' wide trench)	700	LF	\$100	\$70,000
Open Cut Trench Repair - Service Laterals (9' wide trench, 20' wide road)	149	EA	\$2,000	\$298,000
Open Cut Trench Repair - Service Laterals (9' wide trench, 24' wide road)	34	EA	\$2,400	\$81,600
Restoration - Concrete Driveways (20 SY / driveway)	164	EA	\$1,850	\$303,400
Restoration - Sod (150 SY / ERC)	456	EA	\$1,150	\$524,400
Existing LPS Removal				
Removal & Disposal of Existing 4" / 6" LPS Mains	28,700	LF	\$10	\$287,000
On-Lot Costs				
Pump, Crush and Fill Existing Septic Tank / LPS Tank	328	EA	\$2,250	\$738,000
On Site 4" Gravity Lateral Connection	328	EA	\$1,750	\$574,000
Other Costs				
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$1,284,327
TOTAL				\$8,420,000

* *Italicized items are estimates and not based on actual bid prices.*

LAKE VIEW - MIDWAY PRELIMINARY COST ESTIMATE: FORCE MAIN IMPROVEMENTS				
Description	Quantity	Unit	Unit Price	Total
Force Mains				
16" Force Main	7,940	LF	\$150	\$1,191,000
20" Force Main	15,790	LF	\$200	\$3,158,000
24" Force Main	1,660	LF	\$250	\$415,000
Other Costs				
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$857,520
TOTAL				\$5,630,000

* *Italicized items are estimates and not based on actual bid prices.*

LAKE VIEW - MIDWAY PRELIMINARY COST ESTIMATE: EX LPS AREA (WATER)				
Description	Quantity	Unit	Unit Price	Total
Water Main Replacement				
Water Main Replacement	456	ERC	\$5,500	\$2,508,000
Other Costs				
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$451,440
TOTAL				\$2,960,000

LAKE VIEW - MIDWAY PRELIMINARY COST ESTIMATE: MSBU AREA (WATER)				
Description	Quantity	Unit	Unit Price	Total
Water Main Replacement				
Water Main Replacement	3,253	ERC	\$5,500	\$17,891,500
Other Costs				
Miscellaneous (Mobilization / MOT / Bonds / Permits)			18%	\$3,220,470
TOTAL				\$21,120,000