



Regional Integrated Loop Phase 3C Pipeline FEASIBILITY AND ROUTING STUDY

MARCH 2022

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	6
1.0 INTRODUCTION	8
1.1 Background	8
1.2 Scope of Work	8
1.2.1 Schedule.....	10
1.2.2 Cooperative Funding.....	10
1.3 System Interconnects	10
2.0 ROUTE DEVELOPMENT PROCESS.....	12
2.1 Beginning and End Points.....	12
2.2 Existing Utilities	12
2.3 Data Review Summary.....	12
2.4 Field Reconnaissance.....	13
2.5 Route Evaluation Considerations/Criteria.....	18
2.5.1 Pump Station and Associated Facilities Siting.....	18
2.5.2 Public Impact.....	19
2.5.3 Safety.....	19
2.5.4 Operation and Maintenance.....	20
2.5.5 Consistency with Long Range Planning.....	20
2.5.6 Environmental and Permitting	20
2.5.7 Land Requirements	21
2.5.8 Impacts to Cultural Resources.....	21
2.6 ALTERNATIVE ROUTES	21
2.6.1 Phase 1 Alternative Route A1	27
2.6.2 Phase 1 Alternative Route B1	27
2.6.3 Phase 1 Alternative Route C1	28
2.6.4 Phase 2 Alternative Route A2	28
2.6.5 Phase 2 Alternative Route B2	28
2.6.6 Phase 2 Alternative Route C2	28
3.0 ROUTE SELECTION PROCESS.....	29
3.1 Evaluation Criteria and Weighting.....	29
3.2 Ranking the Routes Against the Evaluation Criteria	31
3.3 Comparative Costs and Selected Alternative	32
3.4 Recommended Phase 1 Route Alternative	32
3.5 Additional Phase 2 Route Discussion	33
4.0 PIPELINE DESIGN CRITERIA	34
4.1 Pipeline Size and Pressures	34
4.1.1 Hydraulic Modeling Scenarios.....	34

4.1.2 Demands	35
4.1.3 Hydraulic Model Results	36
4.2 Pipeline Bedding and Backfill Requirements	41
4.3 Thrust Restraint.....	41
4.4 Pipeline Appurtenances.....	41
4.4.1 Line Valves	41
4.4.2 Air Release Valves.....	41
4.5 Permit Requirements	42
4.6 Hazardous Waste Sites.....	42
4.7 Pipe Installation Methodology	44
4.7.1 Open-Cut Trench Installation.....	44
4.7.2 Trenchless Installation.....	44
4.8 Environmental Considerations	45
4.8.1 Wetland Impact.....	46
4.8.2 Wildlife Habitat Impact	47
5.0 FINAL RECOMMENDATIONS.....	49

LIST OF FIGURES

Figure 0-1 – Recommended Route and Phase 1 Facilities.....	7
Figure 2-1 – Proposed Pump Station and Facilities Site.....	18
Figure 2-2 – Route Study Area	23
Figure 2-3 – Potential Routes Identified	24
Figure 2-4 – Shortlisted Routes	26
Figure 4-1 – Contamination Locator Map (CLM)	43

LIST OF TABLES

Table 2-1 Public Impact – Average Annual Daily Traffic.....	19
Table 2-2 Property Acquisition	21
Table 3-1 Non-Cost Identifiable Route Evaluation Criteria.....	30
Table 3-2 Route Ranking Summary.....	32
Table 3-3 Alternative Route Comparative Cost and Non-Cost Criteria Ranking	32
Table 4-1: Peace River Delivery Out of Carlton WTP.....	35
Table 4-2: 2025 Max Day Scenario Results, Phase 3C as 42-inch Pipe.....	36
Table 4-3: 2025 Max Day Scenario Results, Phase 3C as 48-inch Pipe.....	36
Table 4-4: 2040 Max Day Normal Delivery Scenario Results, Phase 3C as 42-inch Pipe.....	37
Table 4-5: 2040 Max Day Normal Delivery Scenario Results, Phase 3C as 48-inch Pipe.....	38
Table 4-6: 2040 Max Day Emergency Delivery Scenario Results, Phase 3C as 42-inch Pipe.....	39
Table 4-7: 2040 Max Day Emergency Delivery Scenario Results, Phase 3C as 48-inch Pipe.....	39

Table 4-8: 2040 Max Day Emergency Delivery (Sub)Scenario Results, Phase 3C as 42-inch Pipe, Delivery to Manatee County only at Lakewood Ranch Boulevard	40
Table 4-9 Wetland and Other Surface Water (OSW) Impacts	46
Table 4-10 Protected Species Potentially Occurring Along the Pipeline Routes	47

LIST OF APPENDICES

Appendix A. 1" =100' Scale Conceptual Plans	A-1
Appendix B. Comparable Cost Details for Alternative Routes and Cost Estimates	C-1
Appendix C. Environmental Features Map	C-1

Acronyms	
Table text	
FDOT	Florida Department of Transportation
SWFWMD	Southwest Florida Water Management District
FP&L	Florida Power and Light
POC	Point of Connection

EXECUTIVE SUMMARY

After meetings with Sarasota and Manatee Counties, as well as running several scenarios using the regional integrated hydraulic model, it was learned that Sarasota County would require additional supply from the Authority at the newly planned point of connection (POC) near Fruitville Road and Lorraine Road earlier than previously projected. This water supply will be required when Manatee County ceases supplying Sarasota County up to 5MGD, mostly at Sarasota County's University Pump Station No. 1 located at Lockwood Ridge Road and University Parkway. The interlocal agreement for this County to County supply is set to expire in April 2025.

To meet this pending requirement, the Phase 3C and 3C Extension pipeline projects have been split into phases 1 and 2. Phase 1 includes the Phase 3C pipeline, the Pumping Station, storage and Facilities site and the pipeline from the pumping station to a new Sarasota POC near Fruitville Road and Lorraine Road. Phase 2 includes the Phase 3C Extension pipeline from the new Sarasota County POC to a new Manatee County POC at University Parkway and Lakewood Ranch Road. The main purpose of this Phase is to connect the regions two largest water distribution systems for resiliency allowing water exchange for emergencies, drought and planned maintenance shutdowns as needed. Manatee County does not project a need for normal water supply until 2037, so to keep water quality satisfactory in this sizeable pipeline, a water swap arrangement is recommended. This water swap would include the Authority supplying Manatee County with at least 3 MGD of supply through the new POC, and since Manatee County does not need this water, they would supply it back to Sarasota County through any of their existing four interconnections, with preference to the University Pump Station No. 1 interconnection.

To further expedite completion of the Phase 1 facilities, the delivery method has been changed to Design-Build. It is recommended that easement acquisition and the process of securing a design-build firm be initiated as soon as practicable. Alternative Route B1 is the highest ranked with respect to non-cost criteria and it also has the lowest comparative Cost.

It is recommended the Authority proceed with construction of the Phase 1 facilities including Route B1 (41,306 LF of 42-inch water transmission main), the pumping station, at least 5 MG of ground storage (10 MG ultimate) and associated site facilities including electrical equipment, generator, chemical injection, administrative building, stormwater system, driveway and parking, site utilities, etc. If the POC to Sarasota County's distribution system is moved to near the intersection of Lorraine Road and Blue Lake Road an additional 6,850 LF of 42-inch water transmission main at an estimated cost of \$3,253,750 should be added to Phase 1. This second location for the POC coincides with the intersection of a 24-inch water main and a 30-inch water main.

Description	Estimated Project Cost
Phase 1 Facilities including property acquisition & 25% Contingency	\$46,358,300
Optional extension to 2 nd Location for POC	\$3,253,750

See following Figure.

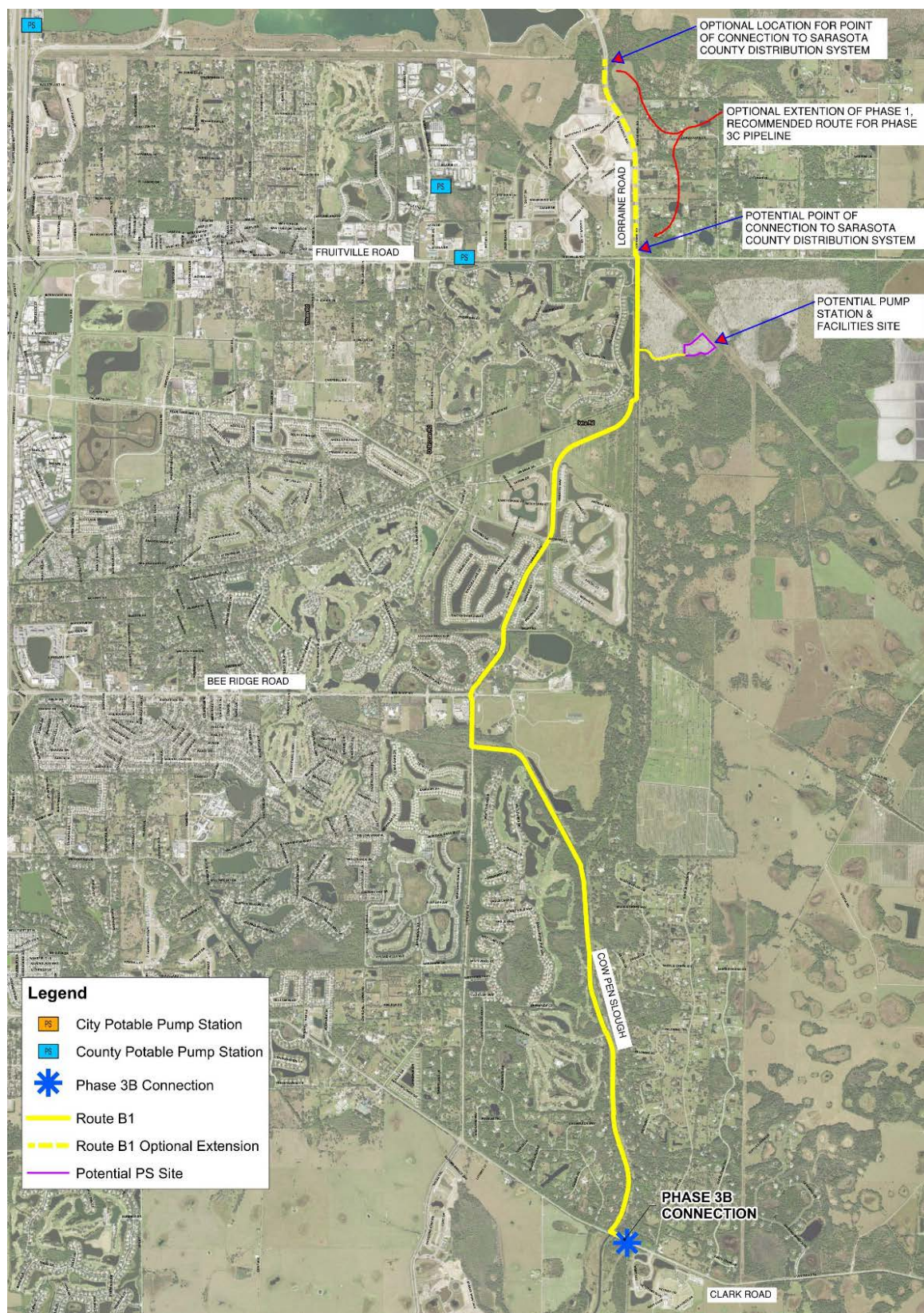


Figure 0-1 – Recommended Route and Phase 1 Facilities

1.0 INTRODUCTION

1.1 Background

Regional Integrated Loop Phase 3 of the Regional Interconnect System extends the Peace River Manasota Regional Water Supply Authority's transmission system from the Carlton Water Treatment Plant to Manatee County. Phase 3 is divided into three phases A, B and C. Phase 3A, a 48-inch diameter transmission main, was completed in 2011 extending between the Carlton Water Treatment Plant and the Preymore/State Road 681 Interconnect; Regional water is delivered to a Point of Connection (POC) to Sarasota County located just west of the Central County Solid Waste Disposal Complex. Phase 3B, a 48-inch and 36-inch diameter transmission main, completed in 2020 extends the Authority's transmission system north to State Road 72 (Clark Road) near Cow Pen Slough just west of the Sarasota National Cemetery. Regional water is delivered to another Sarasota County POC located here which serves a 30" County distribution line to the west along Clark Rd. Phase 3C will extend the transmission system north to State Road 780 better known as Fruitville Road. Regional water will supply a new Sarasota County POC located near the terminus of Phase 3C near the intersection of Fruitville Rd and Lorraine Rd. Phase 3C also includes a pumping facility site with storage and chemical feed capability for water quality enhancement. The Phase 3C Extension (future) will be constructed north from Fruitville Road north to Manatee County at a later date. Manatee County currently does not predict a need for regional water supply from the Authority until 2037 however, a connection to Manatee County's system will be a valuable resiliency feature connecting the regions two largest water systems allowing water exchange for emergencies, drought and planned maintenance shutdowns as needed. The Integrated Regional Water Supply Plan originally included a Phase 3D pipeline segment planned to extend between Fruitville Road and University Ave along Lorraine Rd to Manatee County. However, increased growth in northern Sarasota County required water sooner than expected which obligated the developer to construct a 24-inch water main in Lorraine Road from Fruitville Road to Manatee County in order to meet demands. That main is now part of Sarasota County's distribution system and is supplied from a connection to Manatee County at Lorraine Rd and University Ave. While the Phase 3C extension will be part of the Authority's transmission system to provide water to Manatee County, Sarasota County's 24-inch water main in Lorraine Road remains a significant element of the regional water distribution network.

1.2 Scope of Work

In the scope of services for Regional Integrated Loop Phase 3C Pipeline, Feasibility and Routing Study, Work Order No. 1 identifies the following general objectives:

- Identify and update (as available) water demands and delivery milestone dates at regional delivery point locations for Sarasota County and Manatee County including minimum acceptable delivery pressures;

- Meet with relevant stakeholders and developers as applicable on their own master planning efforts with the intent to capture the latest intelligence on local government long range planning or master planning improvements either planned or underway including the ability to collocate pipelines within other utility corridors;
- Identify and preliminarily evaluate no more than eight (8) possible routes defined by linked segments for the pipeline, develop preliminary screening criteria and in a workshop with Authority staff, eliminate nonviable routes and narrow the route choices to no more than three (3) plausible shortlisted routes for further consideration;
- Evaluate land acquisition requirements for each shortlisted route, delineating the relative proportion of each shortlisted route which falls upon public lands, within ROW or across private property;
- Develop multivariate qualitative criteria with weighting of criteria and scoring for the shortlisted routes relative to the qualitative concerns, costs are to be excluded from this portion of the evaluation;
- Using the regional hydraulic model, confirm delivery capability and residual pressure of the existing regional transmission system to convey water to the Phase 3C point of commencement and how these capabilities improve upon implementation of Phase 2B/2C (Authority to provide guidance on Phase 2B/2C routing, pipeline diameters and any booster pumping);
- Using the regional hydraulic model, with and without Phase 2B/2C improvements switched on, preliminarily assess pipeline diameters and the need for booster pump stations or storage and repump facilities for each of the shortlisted routes to meet defined demands and residual pressures at regional connection points;
- Project a schedule for implementation and explore how the time likely to be required for land acquisition and construction might be expected to vary between the shortlisted routes;
- Prepare maps for each shortlisted route which identify the major transportation, waterway or other utility crossings and/or challenges associated with each route;
- Develop preliminary capital costs (engineering, construction and land acquisition) for each shortlisted route identified inclusive of any booster or storage and repump facilities; and
- Prepare, deliver and reconcile review comments on the draft Feasibility and Routing Study document, finalize the report to include up to three (3) presentations to present results.

Work Order No. 2

On July 19, 2021, The Authority authorized Work Order No. 2 for additional scope of services associated with Property Acquisition assistance for the proposed pumping station and storage facilities. The identification of a satisfactory location for the pumping station is a critical component to the Feasibility and Routing Study due to the extremely high level of activity in the local real estate market at the present time. Due to market conditions, this effort required professional services to locate a parcel of the right size, zoning and location to meet project goals. This scope includes the services of a real estate agent, surveying services for legal description and acquisition sketches, Phase 1 environmental assessment, ecological assessment, and an owner's contingency.

1.2.1 Schedule

The schedule for completion of the scope of services in the agreement and issued Work Order No. 1 is 15 months from notice to proceed. The notice to proceed letter was dated January 7, 2021 corresponding to a completion date of April 7, 2022. A presentation to the Peace River Manasota Regional Water Supply Authority Board is scheduled to present the Feasibility and Routing Study on April 6th. A detailed schedule was developed early on in the project execution that indicated a completion date a month earlier; however, the original schedule proved more accurate. Several factors have influenced the schedule. The most significant was when hydraulic modeling indicated an earlier requirement for additional water supply delivery to Sarasota County. To facilitate the earlier completion of construction, Phase 3C and the Phase 3C extension were broken into construction phases 1 and 2 in order to advance completion of the Phase 3C facilities to meet Sarasota County demands in north county. To further advance construction completion, the delivery method for these facilities, originally envisioned as design, bid and build, was switched to the design-build delivery method and the consultant was requested to recommend a preferred route rather than just presenting three shortlisted routes with their characteristics. The desired milestone for placing the Phase 1 facilities into operation is April 2025 and as such, recommending a preferred route as part of this study allows project activities such as property acquisition and soliciting for a Design-Build team to take place in a timely manner to meet the project schedule. Additionally, April 2025 is currently the date which the water purchase agreement between Sarasota and Manatee counties is scheduled to expire. This will be described in greater detail in the subsection 1.3 hereinafter headed “System Interconnects”.

1.2.2 Cooperative Funding

Cooperative funding for the project is being provided by the Southwest Florida Water Management District (SWFWMD). While all funding is not guaranteed at this point due to the iterative nature of the application process, the funding is expected to approach 50% of the design and construction costs. The funding is subject to schedule milestones and certain qualitative reviews. This cooperative funding demonstrates the truly regional benefits of the project.

1.3 System Interconnects

For Sarasota County, the Authority currently supplies water through three existing Points of Connection (POC's) as follows:

1. Carlton Water Treatment Facility
2. Preymore Interconnect, and
3. Clark Road Interconnect near Cow Pen Slough.

Currently, all water delivered by the Authority is metered and billed at the Carlton WTP location. Upon connection to Manatee County's system, additional metering locations may be required to properly account for all delivered water. After completion of Phase 1 of the Phase 3C facilities, another Sarasota County POC will be established in Lorraine Road right-of-way just north of Fruitville Road.

2025 max. day flow to this POC will be approximately 6.0 MGD and the demands at Preymore POC and Clark Road POC will be reduced.

Manatee County has no current interconnects with the Authority's transmission system. However, Manatee County does have four interconnects with Sarasota County; three of which fall in the route study area and are located as follows:

1. University Parkway at Lockwood Ridge Road (Sarasota County University Pump Station No.1).
2. University Parkway at Lakewood Ranch Boulevard.
3. University Parkway and Lorraine Road.

These interconnects are shown in Figure 2-2. Presently, Manatee County has an agreement with Sarasota County to provide up to 5 MGD of water supply to Sarasota County, with a majority of that supply delivered at Pump Station No. 1 where it is blended with the Sarasota County groundwater supply via their University Wellfield. This agreement is due to expire in April 2025. At the present time, Sarasota County and Manatee County have not entered into a contract to renew the agreement. Manatee County may need to retain that capacity in the future in order to maintain adequate supply for their own projected needs. The other two relevant interconnects currently transfer minor quantities from Manatee to Sarasota, but all three interconnects represent opportunities for transfer of emergency water supplies.

At the University Pump Station interconnect, Manatee County has a 36-inch water main extending northward and a 30-inch water main extending eastward. At the Lakewood Ranch Boulevard interconnect, Manatee County has a 36-inch water main extending northward and a 36-inch water main extending westward. Both of these two interconnects would be hydraulically capable of sharing significant quantities of water (up to 25 MGD) during an emergency. The interconnect at Lorraine Road only has a 16-inch Manatee County water main extending northward and it includes a short segment of 12-inch water main. Sharing emergency water here is hydraulically limited to less than 3 MGD. All three locations would require future improvements to pumping equipment and yard piping to allow for bi-directional water delivery from north to south, and south to north.

Additional details on flows and hydraulics can be found in Section 4.0.

2.0 ROUTE DEVELOPMENT PROCESS

2.1 Beginning and End Points

The start point for the route study is the end of the Phase 3B pipeline for which construction was finished in 2020. This end of the Phase 3B pipeline is 36 inches in diameter. Approximately 5,600 linear feet south of this end point a 48" x 42" tee was constructed presumably anticipating that the Phase 3C pipeline would start there. Both potential start points were considered. One point has a slight hydraulic advantage and the other has a closer location to the end point which results in less route length.

The original end point of the route was University Pump Station (Sarasota County Pump Station No. 1) located at the intersection of Lockwood Ridge Road and University Parkway. This location is where Manatee County currently supplies up to 5 MGD of water to Sarasota County through 2025. Existing distribution system piping in both Manatee and Sarasota Counties also make this a good location for connecting to and potentially providing emergency water to and from Manatee County. During the route development process, it was determined that another location at University Parkway and Lakewood Ranch Boulevard (Sarasota County Interconnect No. 2) was also a good location for potentially providing water to Manatee County and this location would result in a shorter route, however, it did not directly feed Sarasota County Pump Station No. 1 where the majority of the water is currently provided by Manatee County which may cease in 2025. After discussions with stakeholders from Sarasota and Manatee County as well as a review of hydraulic modeling results, satisfactory water supply can be achieved when The Phase 1 facilities come online combined with other Sarasota capital improvement projects designed to provide improved flows and pressures to the northwest area of the county.

2.2 Existing Utilities

Sarasota County and Manatee County interactive maps were used to identify major water main, reclaimed water main, gravity sewer, and force main pipelines along the potential route corridors. Utility congestion was considered especially due to the size of the future transmission water main. Lorraine Road, Blue Lake Road, Desoto Road, and Lakewood Ranch Road have significant existing utilities.

2.3 Data Review Summary

A desktop evaluation was performed using readily available public information that includes:

- Existing utility data from Sarasota County and Manatee County interactive maps.
- Right-of-way and parcel data from Sarasota County property appraiser interactive map.
- Aerial and street view data from Google Earth.
- Average Annual Daily Traffic (AADT) from Florida Department of Transportation's (FDOT) Open Data Hub application.

- Proximity to schools, county facilities, playgrounds, and health/medical facilities via Sarasota County Geographic Information System (GIS)
- Location of contaminated sites from Florida Department of Environmental Protection (FDEP) Contamination database.
- Location of cultural resources from the National Register of Historic Places courtesy of the National Park Service.

2.4 Field Reconnaissance

Field reconnaissance was performed along all accessible corridors under consideration for routing including Clark Road (State Road 72), Lorraine Road, Dog Kennel Road, Palmer Boulevard, Desoto Road, Fruitville Road, Cow Pen Slough maintenance road between Clark Road and Bee Ridge Extension (aka Lorraine Road), Lockwood Ridge Road, Big Pine Road, 17th Street, Honore Avenue, Cattlemen Road, Tatum Road, Lakewood Ranch Boulevard, Delft Road and University Parkway. Less accessible corridors were reviewed on Google Earth or Sarasota County Property Appraisers mapping. These corridors included Utopia Road, Cow Pen Slough north of Delft Road, Hi Hat Ranch 500-foot wide buffer and cross country corridors on Hawkins property near the National Cemetery. Features of interest include evidence of other utilities, traffic, utility poles, drainage improvements, forested wetlands, large trees, staging areas for special crossings, construction activity, hydrology, and any other feature that would affect the suitability of the corridor for routing a 42 or 36 inch diameter pipeline. A few select photographs from Field Reconnaissance follow.



Looking west on Clark Road just east of Cow Pen Slough. Easement required along north right-of-way line.



View Along Cow Pen Slough just east of Lorraine Road.



View looking south along west side of Cow Pen Slough, the pole marks a 16-inch reclaimed water main.



Tee Box that would have to be crossed along Cow Pen Slough.



Looking North along Lorraine Road Just south of Bee Ridge Road



Looking northeast along Lorraine Road just north of Bee Ridge Road



Looking north along Lorraine Road just north of Fruitville Road. Wide right-of-way but opportunity exists for easement along east right-of-way line.



Looking west along University Parkway just west of Lorraine Road



Looking north along Lakewood Ranch Boulevard just north of Blue Lake Road.

2.5 Route Evaluation Considerations/Criteria

2.5.1 Pump Station and Associated Facilities Siting

In June 2021 the Authority and Sarasota County entered into an Interlocal Agreement for Authority acquisition of a pump station site that will serve both regional Phase 3C Transmission Main and local County needs. The Authority sought parcels within a 4,000 foot radius of the intersection of Fruitville Road and Lorraine Road. The first parcel accepted another offer before the team was able to perform due diligence. An offer was extended to the second parcel and the owner decided not to sell. A third site is being negotiated with the Hi Hat Ranch developer and is located approximately 2,800 feet south of Fruitville Road and 2,000 feet east of the proposed extension of Lorraine Road where all 3 shortlisted Phase 1 alternative routes converge. Appraisals, ecological assessments, and Phase 1 environmental assessments are underway. Site access still needs to be developed.

The site is proposed to contain a 26 MGD potable water pumping station with four horizontal split-case high service pumps and one spare. The site will also contain two 5 MG ground storage tanks, a sodium hypochlorite storage & feed system, backup generator, fuel storage tank, electrical building, and a minor administration building. Due to the proximity of the power transmission posts in the adjacent parcel, the site layout and yard piping have been designed to avoid any possible interference with the existing electrical infrastructure. See Figure 2-1.



Figure 2-1 – Proposed Pump Station and Facilities Site

2.5.2 Public Impact

To limit public inconvenience during construction, traffic congestion and lane closures were evaluated. The Florida Department of Transportation database was used to identify the Average Annual Daily Traffic (AADT) along each route alternative, see Table 2-1. AADT is the total volume of vehicle traffic in a year divided by 365 days and was used as an indicator of how highly trafficked a road is compared to others.

Table 2-1 Public Impact – Average Annual Daily Traffic		
Route	Road Name	AADT
A1	SR 72 (Clark Rd)	6,200
	Lorraine Rd	3,600
B1	SR 72 (Clark Rd)	6,200
	Lorraine Rd	11,200
	Lorraine Rd	4,900
	Lorraine Rd	3,600
C1	SR 72 (Clark Rd)	6,200
	Lorraine Rd	4,400
	Lorraine Rd	11,200
	Lorraine Rd	4,900
	Lorraine Rd	3,600
A2	Lorraine Rd	3,600
	University Pkwy	20,500
B2	Lakewood Ranch Blvd	6,100
C2	Cattlemen Rd	11,000
	Longwood Run Blvd	3,900
	Desoto Rd	6,900
	Lockwood Ridge Rd	26,000
	University Pkwy	41,000

2.5.3 Safety

The greatest threat to worker and public safety is moving vehicles, largely gauged by construction proximity to traffic. Many of the routes follow roadways and roadways, by state definition, house utilities. This relationship is consistent with Long Range Planning. Fortunately, maintenance of traffic plans are well developed to maximize safety by utilizing state and municipal standards. Another threat includes other utilities; especially high voltage electrical transmission lines/towers and gas mains. Implementation of construction safety protocols is an emphasis of the Authority. Later in this

report rankings of alternative routes against the evaluation criterion “safety” will be identified. Alternative routes crossing or in parallel with high voltage corridors are ranked lower accordingly as are routes that include mostly road rights-of-ways with high average annual daily traffic counts as noted in Table 2-1 above.

2.5.4 Operation and Maintenance

Operation and maintenance is another alternative evaluation criterion. The ease and safety of future maintenance will be critical as the community develops and depends on reliable water supply. While appurtenances such as isolation valves, air release valves and surge control facilities like vacuum relief valves are easy to mark and find in road rights-of-ways, vehicular traffic can make accessing these facilities troublesome. However, appurtenances located along cross country portions of an alternative route maybe be easy to access, but more effort is required to mark with bollards to make finding them easier. Cathodic protection test stations are notorious for being struck by off road vehicles and mowers. Specific details for Operation and Maintenance considerations of the pipeline, appurtenances and pumping station will be addressed during final design.

2.5.5 Consistency with Long Range Planning

In general, routing within or adjacent and parallel to established utility corridors is the definition of consistency with long range planning. Routing cross country and creating new corridors is typically not, but there are exceptions when the corridors are shared with the needs of other users and are properly aligned to avoid environmental features or conflicts with planned developments and zoning. One of the Phase 1 alternative routes utilizes the maintenance access dirt road along Cow Pen Slough, a man-made channel for regional drainage. This high and dry corridor already includes another pipeline 16 inches in diameter conveying reclaimed water. Conversely, another one of the Phase 1 alternative routes utilizes a 500 foot-wide buffer between existing development and the proposed Hi Hat Ranch development. This corridor contains significant pristine habitats including mesic hammock, forested and herbaceous wetlands and even habitat critical to the endangered species scrub jay.

2.5.6 Environmental and Permitting

Most of the alternative routes for both phases follow existing rights-of-way and only a few locations parallel said rights-of-way in adjacent easements. Sarasota County protects and regulates upland impacts when they include mesic hammock. Local, state and federal regulations all protect and regulate wetland impacts. Permitting impacts to forested wetlands is particularly difficult and expensive including mitigation requirements of creating areas of new quality replacement wetlands. Regulatory guidelines include factors that are typically in the range of a 3:1 mitigation to impact ratio. For example, one acre of forested wetland impacts might require three acres of uplands to be converted to wetlands and then monitored for 10 years to assure success. Fortunately, only one alternative route includes such large scale impacts. Other routes have small intermittent impacts often below thresholds allowing a more routine permitting process.

2.5.7 Land Requirements

Of the three Phase 1 shortlisted alternative routes, only two require easements. Approximately 61% of Alternative Route A1 is on proposed easements. Alternative Route B1 is approximately 21% on proposed easements, however, most of the proposed easements are on land that appears to already be encumbered by maintenance easements for maintenance of Cow Pen Slough, a manmade drainage canal/channel. This study does not include title searches to confirm this apparent encumbrance, but even if officially recorded easements are not discovered, it could be argued to be maintained right-of-way. Final design along Cow Pen Slough would require title searches and land survey to identify and locate current encumbrances including some Sarasota easements acquired for their reclaimed water main. A single easement is required of Phase 2 Alternative Route C2, but this is the least favorable alternative route. Table 2-2 shows a summary of easements required for all alternative routes.

Route	Route Length (miles)	Length of Easement (miles)	Percent of Route in Private Easement	Number of Easements
A1	10.25	6.28	61.3%	16
B1	8.66	1.83	21.1%	5
C1	8.75	0	0%	0
A2	4.13	0	0%	0
B2	4.84	0	0%	0
C2	9.47	0.07	0.7%	2

2.5.8 Impacts to Cultural Resources

Cultural resources include landscapes, structures, and archaeological sites that represent a culture or society. Florida has nearly 1,800 sites on the National Register of Historic Places and National Historic Landmarks list, 99 of which are in Sarasota County. These culturally significant sites should be protected and thus are a determining factor in route selection. The Florida Department of State Historical Resources database was reviewed, and it was determined that there are no historical sites along any of the route alternatives. However, it is a best practice to include language in contract documents to ensure that any artifacts/items which are discovered during construction are protected accordingly.

2.6 ALTERNATIVE ROUTES

As discussed, the project was split into two phases, Phase 1 and Phase 2 following the Notice to Proceed for WO No. 1. Phase 1 is the higher priority with the most urgent need for Sarasota County. Per direction from the Authority a recommended route is required only for Phase 1 and shortlisted routes are required for Phase 2.

With the beginning and end points being generally defined, the next step in development of alternative routes is to define the study area. This area is usually bound by man-made or natural boundaries that if crossed with a route would result in unnecessary costs or length. Such a boundary could be a river, an Interstate Highway, or a governmental delineation. For this project Figure 2-2 shows the route study area.

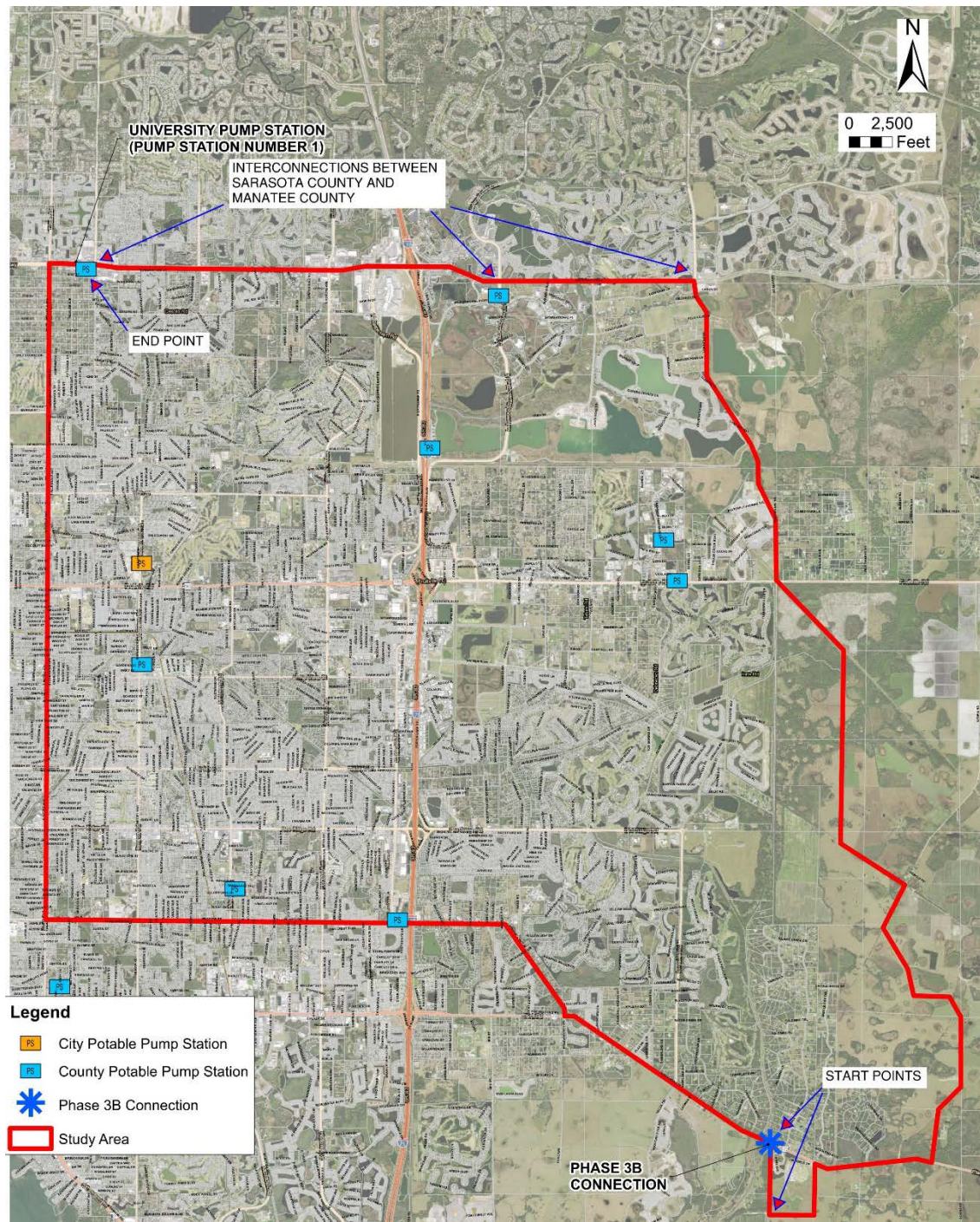


Figure 2-2 – Route Study Area

The next step is a wide open approach to identify every potential route corridor through the study area. Early on in this process, the routes had not been separated into Phase 1 and Phase 2 segments. Figure 2-3 shown all potential alternative routes that were identified.

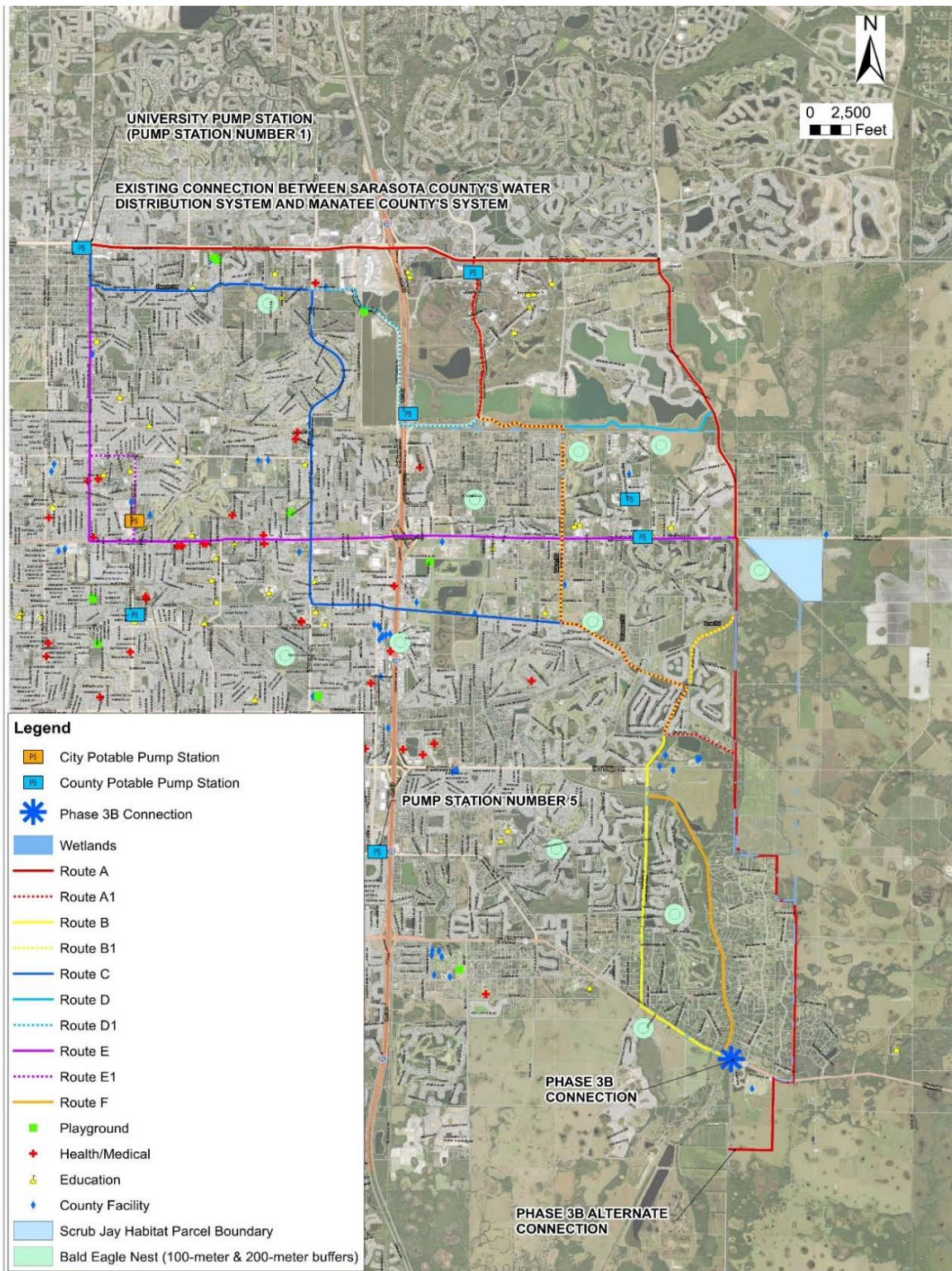


Figure 2-3 – Potential Routes Identified

The potential routes are pared down by eliminating routes with perceived fatal flaws and eliminating routes that are clearly inferior to another route. An example of a fatal flaw included routes within the

Florida Power and Light (FP&L) high voltage transmission corridor. Meetings early in the route selection process with FP&L revealed strong objection by FP&L staff to the co-location of the 3C TM within the FP&L corridor and enforcing eminent domain is not an option for the acquisition of an FP&L easement. Eventually the best routes emerge, and the shortlisted routes are defined. A version of the shortlisted routes was presented to the Authority Board on February 2, 2022. A minor change was made subsequent to that presentation to include an additional optional segment in Clark Road and Lorraine Road. This segment had been left out of the presentation because of challenges routing the pipe along Clark Road, State Road 72. Sarasota County recently acquired easements along the south right-of-way line, and it was assigned and filled up with various utilities. Acquiring easements along the north side was also not favorable due to numerous residential parcels often with forested wetlands. Routing within State Road 72 would subject the Authority to future costs and burden of replacing or relocating their pipeline should the FDOT decide to upgrade the roadway and opine that the pipeline was in conflict. This last unfavorable characteristic was weighed against the potential unfavorable characteristic on an alternative route utilizing Cow Pen Slough corridor which could be slower to implement due to potential environmental permitting and property acquisition. The shortlisted Routes are shown on Figure 2-4. This figure does recognize the implementation of Phase 1 and Phase 2 for the Phase 3C Feasibility and Routing Study.

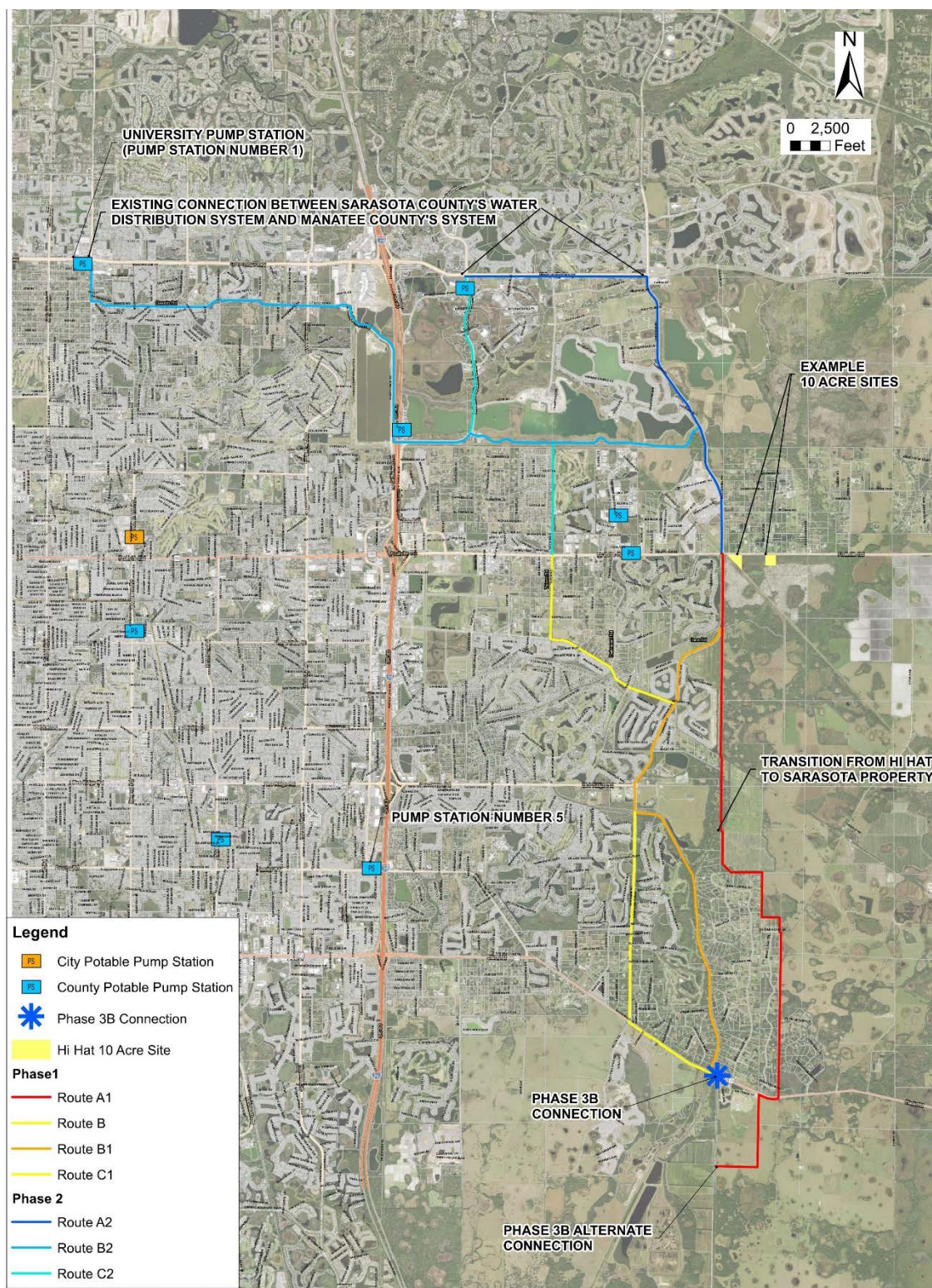


Figure 2-4 – Shortlisted Routes

Now that the shortlisted routes have been identified, the detailed evaluation of each proceeds. Specific details of each route are documented such as overall length, extents of special crossings, lengths along traffic, surface restoration requirements, estimated wetland impacts delineated into forested and herbaceous, mesic hammock impacts, easements required (both in number and area), and permitting requirements. One of the tools used to arrive at these metrics are the one inch equals 100 feet scale conceptual plans which can be found in Appendix A.

2.6.1 Phase 1 Alternative Route A1

This route commences at the 48" x 42" tee constructed under Phase 3B located approximately 5,600 feet south of Clark Road and proceeds easterly along the southern border of the National Cemetery in an easement on private land owned by the Hawkins trust. This land is currently in agricultural use. This easement continues turning northward along the eastern boundary of the National cemetery until just before it reaches the right-of-way line of Clark Road where it turns easterly parallel to Clark Road and still with the proposed easement. Right after it crosses the FP&L high voltage transmission corridor, the route turns northward across Clark Road and onto a series of approximately 10 easements from community property of The Forest at Hi Hat Ranch development and individual residential properties. North of this community the route would enter Hi Hat Ranch proper which is designated for development. The route continues in the proposed easement north until reaching a point where it turns westerly across the FP&L corridor and into a 500 foot-wide buffer around the proposed Hi Hat Ranch development. The route still in proposed easement continues west and then north within the buffer about 3,000 feet where it jogs to the west and enters a series of Sarasota County rights-of-way and easements associated with a branch of Cow Pen Slough until it reaches Fruitville Road and terminates.

2.6.2 Phase 1 Alternative Route B1

This route commences at the north end of the Phase 3B pipeline and crosses Clark Road (SR 72) right-of-way to a proposed easement on a residential property where the route turns westerly in the easement adjacent to Clark Road right-of-way until it reached Cow Pen Slough right-of-way. The route continues westerly across the slough to the west side into an unmaintained maintenance road for Cow Pen Slough running north. The route follows this corridor north for approximately 4,300 linear feet where the route enters a proposed easement on property owned by Gator Creek Golf Club, Inc. The route continues northward along the Cow Pen Slough maintenance road another approximate 2,700 linear feet before entering back into Cow Pen Slough right-of-way for approximately 5,100 before entering another proposed easement on property owned by The Preserve at Misty Creek Homeowners Association, Inc. This easement also follows the Cow Pen Slough maintenance road northward and then northwesterly approximately 6,300 linear feet before entering Lorraine Road right-of-way and turning northward. In Lorraine Road right-of-way the route crosses Bee Ridge Road and Palmer Boulevard and enters the currently unimproved right -of-way of Iona Road/Lorraine Road extension which is under design by Sarasota County. The route follows this proposed roadway until reaching Fruitville Road, the route's terminus.

2.6.3 Phase 1 Alternative Route C1

This route also commences at the northern end of the Phase 3B pipeline and heads northerly where it crosses into the State Road right-of-way of Clark Road (S.R. 72). Within the State Road right-of-way, the route heads westerly approximately 6,400 linear feet to Lorraine Road where it turns northward within the right-of-way of Lorraine Road for approximately 13,200 linear feet to the intersection of Lorraine Road and a branch of Cow Pen Slough. From this point to the terminus of the route, this alternative is identical to Alternative Route B1. Previously a leg of route C1 turned westerly in Palmer Boulevard to Tatum Road where it headed northward, however, Sarasota County advised that this area was too far west for the proposed point of connection and too far west for the proposed cooperative use of the proposed pumping station and storage facility site. Hence this western leg of alternative Route C1 was eliminated from further evaluation.

2.6.4 Phase 2 Alternative Route A2

This route commences at the intersection of Fruitville Road and Lorraine Road and heads north in Lorraine Road. Alternatively, a corridor of easements could be acquired along the east side of the right-of-way. There are some retention ponds that would require rather narrow easements approximately 25 feet wide. The route follows Lorraine Road north to University Parkway thence turns west in University Parkway right-of-way along the southern boundary to Lakewood Ranch Boulevard where the route terminates at a proposed point of connection to Manatee County's water distribution system. This location is also a current interconnection between Sarasota and Manatee County (PS No. 3).

2.6.5 Phase 2 Alternative Route B2

This route commences at the intersection of Fruitville Road and Lorraine Road and heads north in Lorraine Road to a point approximately 1,350 feet short of Blue Lake Road where the route intersects a Sarasota County utility easement running east-west. The route turns west here and follows the utility easement to Lakewood Ranch Boulevard. Alternatively, this east-west leg could be located in Blue Lake Road. At Lakewood Ranch Boulevard the route turns north to University Parkway at a proposed point of connection to Manatee County's water distribution system. This location is also a current interconnection between Sarasota and Manatee County (PS No. 3).

2.6.6 Phase 2 Alternative Route C2

This route follows Alternative Route B2 to Lakewood Ranch Boulevard, but instead of turning northward, this route continues westerly and across Interstate 75 to Cattlemen Road; thence north in Cattlemen Road to its intersection with DeSoto Road near University Town Center Mall. Here the route turns west in DeSoto Road to the end of the pavement where it enters a portion of unimproved right-of-way until the route reaches Longwood Run Boulevard which quickly becomes DeSoto Road again. The route follows DeSoto Road to Lockwood Ridge Road where it turns north in Lockwood Ridge Road to its intersection with University Parkway at a proposed point of connection to Manatee County's water distribution system. This location is also a current interconnection between Sarasota

and Manatee County at PS No. 1. Due to the additional cost and length of this alternative route and its limited additional benefits, this route is the least favorable Phase 2 alternative route.

3.0 ROUTE SELECTION PROCESS

3.1 Evaluation Criteria and Weighting

Construction techniques, project location, and existing conditions all have impacts on the outcome of a project. The first step in developing a route selection protocol is to determine which aspects of the overall project to evaluate. The different aspects that effect a projects outcome are termed criteria, and the criteria can be compared against one another. A participant in the process compares one criterion versus another to determine which is more important to this individual in order to determine weighting criteria. For this project, the criteria weighting was a collaborative effort involving Authority staff, consultant staff for this project and consultant staff for another pipeline project which is being implemented simultaneously. On November 9th, 2021, forms were collected from all who participated, and the results were determined. The weighting process showed that the “Operation and Maintenance Considerations” criterion ranked highest in terms of “Weighting Factor” and “Public Impacts” ranked lowest. These results are understandable because the Authority wants low maintenance and with a pipeline of this magnitude public impact is inevitable but is limited in the rural nature of the route and can be further limited by certain construction techniques. The results of this weighting task is as shown in **Table 3-1**. The criteria are identified on the left side of the table as well as the weighting factor for each criterion. The impact(s) of the criteria on the overall project are identified on the right.

Table 3-1 Non-Cost Identifiable Route Evaluation Criteria

Criteria and Weighting Factors	Impacts
Constructability – 15%	<ul style="list-style-type: none"> • Pipeline length • Geotechnical considerations • Right-of-way/easement availability • Proximity to overhead power lines • Pipe corridor infrastructure congestion • Trenchless installations
Public Impacts – 5%	<ul style="list-style-type: none"> • Maintenance of traffic • Traffic congestion and lane closures • Public inconvenience during construction • Coordination with traffic agencies
Safety – 15%	<ul style="list-style-type: none"> • Construction crew and pedestrian safety • Emergency services impacted • Comparative accessibility for future operation and maintenance
Operation and Maintenance Considerations – 20%	<ul style="list-style-type: none"> • Ease of operation of future appurtenances and future maintenance access/egress • Impact on critical access or evacuation corridors • Number of valves and air release valves required • O&M based on pipeline length and number of water crossings or large intersection crossings
Consistency with Long Range Planning – 15%	<ul style="list-style-type: none"> • Consistency and adaptability of route with local/regional planning documents • Regional water supply and resiliency goals • Planned regional infrastructure improvements • Consistency with regional comprehensive plans • Consistency with approved planning for future development
Environmental and Permitting Complexities – 10%	<ul style="list-style-type: none"> • With respect to obtaining appropriate permits for construction and operation • Ability to minimize environmental impact • Excavated soil contamination

Criteria and Weighting Factors	Impacts
	<ul style="list-style-type: none"> • Permitting • Wetland impacts • Critical habitat or endangered species • Environmental considerations for wetland crossing alternatives • Environmental considerations for dewatering
Land Requirements – 10%	<ul style="list-style-type: none"> • Easements • Right-of-way and easement availability • Permitting complexities at wetland crossings • Siting opportunities for meters, booster pumping and storage • Property acquisition
Impacts to Cultural Resources – 10%	<ul style="list-style-type: none"> • Known historical and archeological sites from public data bases

3.2 Ranking the Routes Against the Evaluation Criteria

The next step of the process is to rank each route based on the criteria. Where each participant ranks the characteristics and metrics of each route versus each criterion. The routes are listed in a row across the top of the table and the criteria are listed in the left column. The participant considers each criterion, how the route impacts each criterion, and ranks the relationship from 1 to 5 with 5 being the best. For this project, three experienced pipeline engineers ranked the routes collaboratively. A summary table of the ranking is attached as Table 3-2. This table includes the weighting factors for each criterion and sums the product of the criterion rank times the weighting factors to provide a highest ranked route.

Table 3-2 Route Ranking Summary

Evaluation Criteria	Avg Weighting Factor	Route A1 Rank	Route A1 Score	Route B1 Rank	Route B1 Score	Route C1 Rank	Route C1 Score
1-Constructability	20.00%	3.00	0.600	4.00	0.800	4.00	0.800
2-Public Impacts	5.00%	5.00	0.250	4.00	0.200	3.00	0.150
3-Safety	10.00%	2.00	0.200	4.00	0.400	3.00	0.300
4-Operations & Maintenance	20.00%	2.00	0.400	4.00	0.800	3.00	0.600
5-Consistency with Long Range Planning	20.00%	2.00	0.400	4.00	0.800	3.00	0.600
6-Environmental and Permitting	10.00%	2.00	0.200	4.00	0.400	5.00	0.500
7-Land Requirement	10.00%	1.00	0.100	3.00	0.300	5.00	0.500
8-Impacts to Cultural Resources	5.00%	5.00	0.250	5.00	0.250	5.00	0.250
Totals	100%		2.400		3.950		3.700

Rank - Scale of 1 to 5, with 5 being the best

The best route from a non-cost criteria evaluation is the route with the highest score. Please note the comparative cost of each route is considered independently from the non-cost evaluation. The selected route may not be the highest rated route and likewise, the selected route may not be the least expensive.

3.3 Comparative Costs and Selected Alternative

Estimated comparative costs were prepared and are included in Appendix B. A summary of the Non-Cost Identifiable Criteria rankings for each route and the comparable cost for each Phase 1 Alternative Route are summarized in Table 3-3.

Table 3-3 Alternative Route Comparative Cost and Non-Cost Criteria Ranking

Alternative Route	Comparative Cost	Non-Cost Criteria Ranking
Phase 1 Route A1	\$32,469,300	2.40
Phase 1 Route B1	\$22,411,900	3.95
Phase 1 Route C1	\$22,743,000	3.70
Phase 2 Route A2	\$13,974,000	Not ranked
Phase 2 Route B2	\$18,227,000	Not ranked
Phase 2 Route C2	\$29,100,000	Not ranked

3.4 Recommended Phase 1 Route Alternative

Alternative Route B1 is recommended for implementation. This route is based on a 42-inch diameter transmission main. The first segment connects Phase 3B to the new pumping station and facilities site. The second segment connects the pump station to the proposed Sarasota County point of connection (POC) north side of Fruitville Road in Lorraine Road right-of-way. Optionally the Sarasota County POC could be extended to a point approximately 6,850 feet north. The unique characteristic of this alternative route is it use of the Cow Pen Slough drainage canal/channel corridor for approximately 3.5 miles. Along this segment there is only one utility to our knowledge, a 16-inch

reclaimed water main. As can be seen in the second, third and fourth photographs in section 2.4 headed Field Reconnaissance, there is also no pavement. Pipe installation here is efficient and less expensive than laying pipe in road rights-of-way where many utilities may exist, traffic must be maintained, and pavement must be restored. For this entire alternative route, only five easements are required; one from a private residential property adjacent to Clark Road, and the rest from two separate residential golfing community association properties that are apparently already encumbered by the Cow Pen Slough maintained right-of-way or officially recorded right-of-way. The rest of the route is in FDOT right-of-way (crossing), Sarasota County right-of-way or Sarasota County easements. The recommended route also includes a microtunnel crossing beneath Cow Pen Slough and trenchless crossings of Clark Road (S.R. 72), Bee Ridge Road (roundabout) and Fruitville Road (S.R. 780). Jacking and augering (aka jack and bore) may be the most cost effective way to accomplish these trenchless crossings.

3.5 Additional Phase 2 Route Discussion

Phase 2 of the 3C route will complete the final segment of regional transmission main to Manatee County's system. Manatee County currently does not project a need for regional water from the Authority until 2037. As such, this segment of TM is scheduled for a later date yet to be determined. However, installation of this segment to provide an emergency connection between the region's two largest water distribution systems for increased resiliency will provide the ability to transfer water during drought, emergencies and planned maintenance outages for the Authority and Members. Until such time that Manatee County begins purchases of water from the Authority, it is recommended to implement a no-cost water "exchange" to routinely deliver flow to Manatee County at a proposed POC located at the intersection of Lakewood Ranch Boulevard and University Parkway and conversely Manatee County will supply an equal flow to Sarasota County at the existing interconnection between the two counties at University Pump Station (Sarasota County PS No. 1) located at Lockwood Ridge Road and University Parkway. It is recommended the Authority further evaluate the need to construct a pipeline directly to this same pumping station. Hydraulic modeling indicates that the Phase 1 facilities and other Sarasota County capital improvement projects will be sufficient to provide ample service after Manatee County ceases delivery of up to 5MGD of supply in accordance with the expiring agreement in 2025. It is suggested the Phase 2 pipeline be 36 inches in diameter and extend between the POC to Sarasota County and the POC to Manatee County.

If additional emergency water supply is required by Manatee County, Sarasota County may be able to provide such at the existing interconnects located at the intersection of Lorraine Road and University Parkway or at Sarasota County Pump Station No. 1.

4.0 PIPELINE DESIGN CRITERIA

4.1 Pipeline Size and Pressures

4.1.1 Hydraulic Modeling Scenarios

The regional hydraulic model developed for the Authority by HDR, Inc. was used as a starting point to define the hydraulic delivery characteristics (available flows and pressures) at the point of commencement for the Phase 3C project. In addition to incorporating the Phase 3C and Phase 3C extension pipelines and pump station, the model's topology for the 2040 scenarios was updated to include additional active water mains and junctions from the Sarasota/Manatee joint county water model, as provided by Carollo Engineers.

The overall demands at the POCs described above, and the minimum pressures required at each, limited the pipe diameters explored in the hydraulic investigation as follows:

- Phase 3C – evaluated as both 42-inch and 48-inch
- Phase 3C Extension –
 - 42-inch from Fruitville Pump Station to intersection of Fruitville Road and Lorraine Road, where a 24-inch pipe branches off to connect with Sarasota County's distribution system;
 - 36-inch from the Lorraine Rd POC with Sarasota County to the POC with Manatee County at Lakewood Ranch Blvd at University Parkway;
 - 36-inch from Lakewood Ranch Boulevard to Sarasota County's University Pump Station No. 1. Note that, as described above, this section of the Phase 3C Extension is deemed not favorable in the route evaluation but is included for comparison in the hydraulic investigation.

Scenarios evaluated include the following:

- 2025 Max Day – In this scenario, Manatee County is no longer providing water to Sarasota County at the University Pump Station. The Authority's Phase 3C transmission main and Fruitville pump station are in service, delivering water to the new Sarasota County POC near Fruitville Road and Lorraine Road.
- 2040 Max Day, normal conditions – In this scenario, the Authority's Phase 3C transmission main, the Pump Station and the 3C extension to the new Manatee County POC at Lakewood Ranch Boulevard and University Parkway are in service. As explained later in this analysis, in order to promote water movement through the Phase 3C extension during normal conditions for optimal water age, additional water is provided to Manatee County at the Lakewood Ranch POC and traded back to Sarasota County at the University Pump Station No. 1.
- 2040 Max Day, emergency conditions – Lake Manatee Water Treatment Plant is completely offline requiring supply from the Authority. The Phase 3C transmission main and new Fruitville pump station are both in service, and the Phase 3C extension is in service providing flow to both

the University Pump Station and Lakewood Ranch Boulevard POCs. Normal Sarasota County Max Day demands are still active during this scenario. An additional sub-scenario was evaluated in which emergency flows are provided solely through the Lakewood Ranch Blvd POC.

Note that minor adjustment of output pressure of the new Fruitville Pump Station could have significant impacts on the available capacity of the system to deliver flows to the further delivery points but was maintained at a constant 75 psi in all scenarios for comparison purposes.

4.1.2 Demands

In addition to the demand information included in the original regional model, Sarasota County also provided the following flow and pressure information for the Authority delivery points within the County. A max day peaking factor of 1.3 was also provided by the County.

Table 4-1: Peace River Delivery Out of Carlton WTP

Delivery Point	2025 Max Day (MGD)	2040 Max Day (MGD)	Minimum Static Delivery Pressure (psi)
Carlton High Service Pump Station	2.569	3.0	N/A (from onsite GST)
Preymore Meter Station (aka 681)	11.315	3.0	60.0
Clark Road	7.2	14.6	75.0
Fruitville Road	0.0 (6.0 ²)	6.0	75.0
Total (to be delivered to Carlton GST's)	21.084 (27.084 ²)	26.6	

¹ Note that the delivery pressures listed for Clarke Rd and Fruitville Rd in the table above are understood to be the delivery pressures into the distribution system *after* being repumped by Sarasota County's existing Pump Station No. 5 and the Authority's new Fruitville Regional Pump Station, respectively. Minimum delivery pressures into the storage tanks at both pump stations is maintained above 20 psi in the model.

² Sarasota County indicated a "zero" flow requirement for the 2025 condition, but it is understood that the County and Authority's intent would be to provide their 2040 flow upon completion of the Phase 3C project (as simulated by the 2025 Max Day Scenario), at which time flows to other delivery points could be reduced accordingly. However, for the purposes of the model, the 6.0 MGD flow was included in both the 2025 and 2040 scenarios at Fruitville Road, with all other demands input into the model as originally provided by Sarasota County.

4.1.3 Hydraulic Model Results

The Sarasota County portion of the regional model was simplified to only include the Authority's transmission mains and facilities, with demands placed at the delivery points according to the flows listed in Table 4-1 and Table 4-2.

For the 2025 Max Day Scenario, it was assumed that Phase 3C will be in place up to the Fruitville Road POC, but the Phase 3C Extension from Fruitville Road to Manatee County would not yet be active. Scenarios were run with the Phase 3C transmission main as a 42-inch pipe and a 48-inch pipe.

Table 4-2: 2025 Max Day Scenario Results, Phase 3C as 42-inch Pipe

Delivery Point	2025 Max Day Flow (MGD)	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	11.32	49
Clark Road	7.2	45 at meter assembly 33 at PS 5
Fruitville Road	6.0	39 into tank

Table 4-3: 2025 Max Day Scenario Results, Phase 3C as 48-inch Pipe

Delivery Point	2025 Max Day Flow (MGD)	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	11.32	49
Clark Road	7.2	45 at meter assembly 33 at PS 5
Fruitville Road	6.0	40 into tank

As shown in the results above, during the 2025 scenarios, increasing the pipe size does not make a significant difference in the system pressures at the Fruitville Pump Station delivery point. Note that the pressures listed in the table above at Fruitville Road are immediately upstream of the Fruitville Pump Station ground storage tank, and that flows will be re-pressurized to 75 psi minimum before being delivered to Sarasota County's distribution system.

For the 2040 scenarios, simulations were run considering both normal and emergency delivery conditions. Emergency conditions assumed that Manatee County's Lake Manatee WTP was

completely out of service. The normal and emergency conditions were each evaluated using both 42 and 48-inch pipe for Phase 3C.

Under normal delivery conditions, it was found that Manatee County's demands do not draw a significant amount of flow from the regional system. As shown in the tables below, due to the low velocities within the system under 2040 max day normal delivery conditions, increasing the size of the Phase 3C pipeline does not provide a significant difference in delivery pressures over that of a 42-inch pipe. Water received by Manatee County at Lakewood Ranch Boulevard is returned to Sarasota County at PS 1 so the Counties can maintain a "net-zero" metering.

Table 4-4: 2040 Max Day Normal Delivery Scenario Results, Phase 3C as 42-inch Pipe

Delivery Point	2040 Max Day Flow (MGD) Normal Conditions	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	3.00	66
Clark Road	14.6	54 at meter assembly 22 at PS 5
Fruitville Road (into tank)	11.0	47
Fruitville Road (into Sarasota County distribution)	6	72
Lakewood Ranch Blvd	1.67	71

Table 4-5: 2040 Max Day Normal Delivery Scenario Results, Phase 3C as 48-inch Pipe

Delivery Point	2040 Max Day Flow (MGD) Normal Conditions	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	3.00	66
Clark Road	14.6	54 at meter assembly 24 at PS 5
Fruitville Road (into tank)	11.0	49
Fruitville Road (into Sarasota County distribution)	6	72
Lakewood Ranch Blvd	1.67	71

During the emergency scenarios, in order to determine the maximum amount of flow that could potentially be delivered (based on the assumed 75-psi output pressure at the new Fruitville Pump Station used in the model), the delivery points at Manatee County were modeled as reservoirs, with pressure sustaining valves immediately upstream. The delivery pressure at University Pump Station was set to 20 psi, and set to 40 psi at Lakewood Ranch Blvd. The flows and pressures achieved in these scenarios are reflected in Tables 4-6 and 4-7 below, based on a 42-inch and 48-inch transmission main for Phase 3C, respectively. Results of the sub-scenario in which the section of the Phase 3C Extension between Lakeshore Ranch Blvd and University Pump Station No. 1 is eliminated, with all flow to Manatee County being provided at the Lakewood Ranch Blvd POC, is reflected in Table 4-8.

Table 4-6: 2040 Max Day Emergency Delivery Scenario Results, Phase 3C as 42-inch Pipe

Delivery Point	2040 Max Day Flow (MGD) Emergency Conditions	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	3.00	56
Clark Road	11.42	41 at meter assembly 20 at PS 5
Fruitville Road (into tank)	21.76	20
Fruitville Road (into Sarasota County distribution)	6	72
Lakewood Ranch Boulevard (PSV = 40 psi)	2.33	40
University Pump Station (into tank)	17.63	20

Table 4-7: 2040 Max Day Emergency Delivery Scenario Results, Phase 3C as 48-inch Pipe

Delivery Point	2040 Max Day Flow (MGD) Emergency Conditions	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	3	53
Clark Road	9.63	36 at meter assembly 20 at PS 5
Fruitville Road (into tank)	25.89	20
Fruitville Road (into Sarasota County distribution)	6	72
Lakewood Ranch Boulevard (PSV = 50 psi)	2.94	40
University Pump Station (into tank)	17.72	20

Table 4-8: 2040 Max Day Emergency Delivery (Sub)Scenario Results, Phase 3C as 42-inch Pipe, Delivery to Manatee County only at Lakewood Ranch Boulevard

Delivery Point	2040 Max Day Flow (MGD) Emergency Conditions	Minimum Delivery Pressure (psi)
Preymore Meter Station (aka 681)	3	53
Clark Road	11.42	41 at meter assembly 20 at PS 5
Fruitville Road (into tank)	21.76	20
Fruitville Road (into Sarasota County distribution)	6	73
Lakewood Ranch Boulevard (PSV = 50 psi)	24.17	40

It was found that during emergency scenarios, when providing water to Manatee County is prioritized along with maintaining a minimum pressure of 20 psi at the re-pump storage tanks, Sarasota County's 14.6 MGD maximum day demand at the Clark Road delivery cannot be fully satisfied. The model predicts that 11.42 MGD can be delivered to PS 5 at 20 psi if the Phase 3C transmission main is constructed as a 42-inch, which does still fulfill the average day demand of 11.23 MGD. Increasing the Phase 3C main to 48-inch allows approximately 4 MGD of additional flow to be delivered to the tank at 20 psi at the Fruitville Road Regional Pump Station. This increase in flow results in a lower delivery pressure at the Clark Road meter station; therefore, in order to maintain the minimum system delivery pressure of 20 psi, flow to PS 5 reduces to 9.63 MGD.

Additionally, because the model results showed that delivery to both University Pump Station and Lakewood Ranch the regional system could provide approximately 27 MGD to Manatee County, an additional scenario was run to determine how much flow could be provided through the Lakewood Ranch POC alone. As shown in the tables above, it was possible to transmit over 24 MGD with a delivery pressure of 40 psi.

Based on the results of the various scenarios discussed above, it is recommended that the Phase 3C transmission main be constructed as a 42-inch main. Increasing the pipe size to 48-inches provides insignificant benefit for flows and pressures under normal conditions. Under emergency conditions, increasing the size of the main to 48-inch allows approximately 4 MGD of additional flow to be delivered into the Fruitville Pump Station. However, without also increasing the diameter of the Phase 3C Extension, it only allows an additional 0.7 MGD to be delivered to Manatee County, while

also decreasing the amount of flow that can be delivered to Sarasota County's PS 5 due to the increased head losses upstream of the Clark Road meter assembly.

4.2 Pipeline Bedding and Backfill Requirements

Proper pipe bedding and backfill requirements shall be presented to the contractor in accordance with industry standards and Authority specifications. Special crossings shall be created to provide the contractor with the proper installation techniques to protect the pipeline and restore the impacted vicinity to preconstruction conditions. The preconstruction conditions will need to be well documented prior to construction.

4.3 Thrust Restraint

The pressure required to move the water creates forces along the pipeline. To prevent movement at bends, fittings, and valves, thrust restraints shall be incorporated in the design of the pipe.

Several conditions impact the thrust restraint design, some of which include:

- Depth of pipe from ground surface
- Soil classifications and conditions
- Total pipeline pressure
- Pipe diameter
- Pipe wall thickness
- Pipe weight
- Elevation of the groundwater table
- Angles and types of fittings

These conditions will dictate the restrained length of pipe required to counteract the generated resultant forces.

4.4 Pipeline Appurtenances

4.4.1 Line Valves

Installation of isolation valves can be beneficial in the event that the transmission water main needs to be shut down for bypass, repair, maintenance, or relocation. Recommended line valves are butterfly valves which are large, heavy, and can be expensive. Valve installations should be limited, however transmission line valve spacing is suggested to be no greater than 5,000 feet. Ideally, the chosen locations will be in open and accessible areas where operation of the valve will not impede traffic.

4.4.2 Air Release Valves

As water is agitated, gas and air can be mixed into the water. The air bubbles in water rise and can become trapped at the crown, or top, of the pipe. If there are high points in the pipe, the air will remain there and grow in volume over time. These high points typically occur when the pipeline must be designed to go underneath other utilities or conflicts. Air release valves are installed to

automatically release entrapped air and to protect the pipe. These systems require a routine maintenance program to ensure that they are working properly.

A design should limit the number of air release valves that will be installed on the proposed transmission water main. This will help reduce the cost and time required for maintenance.

4.5 Permit Requirements

Several permit applications will be required prior to construction. The following permitting agencies should be contacted during design.

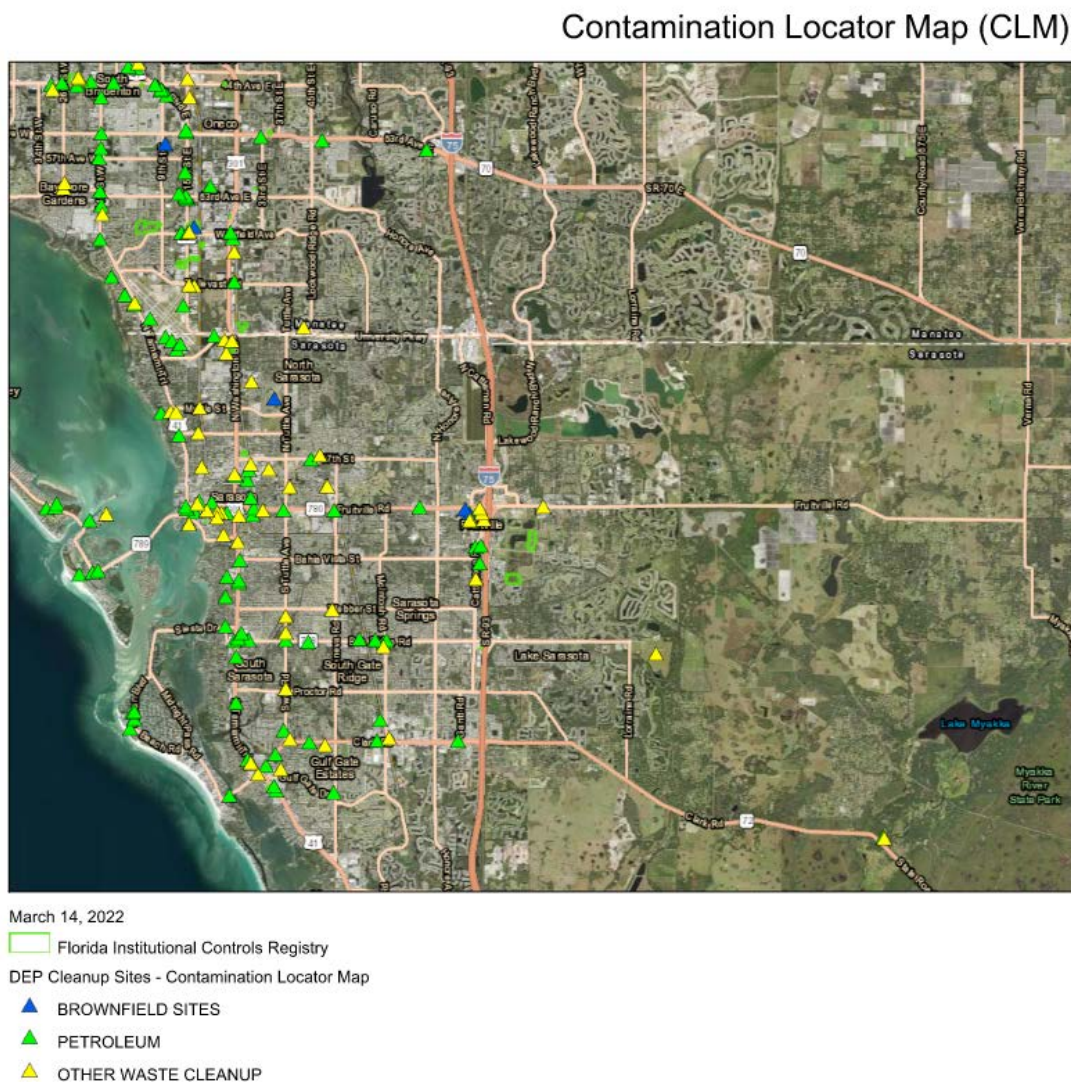
- Florida Department of Transportation
- Florida Department of Environmental Protection
- Sarasota County Right of Way
- United States Army Corps of Engineers
- Sarasota County DOH
- Florida Fish and Wildlife (FWC)

Once the project is in construction, the contractor will be required to obtain an NPDES permit, develop a surface water pollution prevention plan (SWPPP), and obtain maintenance of traffic approval.

4.6 Hazardous Waste Sites

The location of hazardous waste sites was determined using the Florida Department of Environmental Protection Contamination database. The FDEP database classifies cleanup sites by brownfield, superfund, petroleum, and other waste cleanup (i.e. dry cleaners). FDEP tracks contaminated site cleanup through Environmental Restoration Integrated Cleanup (ERIC). There are two cleanup sites that fall within 1,000 feet of the route alternatives and are identified Figure 4-1.

Figure 4-1 – Contamination Locator Map (CLM)



1. Sarasota County Bee Ridge Class LF1 (ERIC_8572)

The Sarasota County Bee Ridge Class LF1 site is located at 8350 Bee Ridge Road. This cleanup site is deemed an Other Waste Cleanup site and was an operational landfill from 1971 to 1998. In 1984 the EPA performed assessments and found that the Bee Ridge landfill was deemed to have ground and surface water contamination due to offsite leaching. The property is now used as a community park and squadron. Phase 1 routes A1, B1, and C1 run adjacent to the cleanup site.

2. Touch of Class Cleaners (ERIC_4897)

The Touch of Class Cleaners is located at 8420 Lockwood Ridge Road. This cleanup site is deemed an Other Waste Cleanup site and was a dry cleaner. FDEP conducted an assessment in 1996 and found high levels tetrachloroethene. In 1997 the site became part of the Dry cleaning

Solvent Cleanup Program. Ongoing site assessments lead to a 2021 recommendation for long term monitoring. The property has been Heinrich's German Grill since 2008. Connection to the University Pump Station, part of Phase 2 route C2, falls within 1,000 feet of the contaminated site.

4.7 Pipe Installation Methodology

The pipeline will be constructed via open cut trench installation except at crossings that do not facilitate road closures or pavement destruction, and areas that may be environmentally sensitive. Within the shortlisted routes there are sections that will require installation by trenchless methods. It is proposed that trenchless installation will be done by horizontal directional drill or microtunnel.

4.7.1 Open-Cut Trench Installation

Open-cut trench installation is destructive to the existing ground surface over the pipe. When installing through existing pavement, the contractor will use a saw or an excavator to demolish existing pavement and prepare a trench for installation of the pipe. The depth of the trench will be determined by the pipe's designed depth and the contract plans. The limit of trench width is determined by trench depth, type of soil, and the contractor's decision to either slope the trench walls, use trench safety boxes, or to provide sheeting and shoring. In order to maintain open trench safety requirements, the contractor must protect the pipe crew working in the trench from hazards. The width of the trench can be narrowed if use of a safety trench box or sheeting and shoring is implemented during construction.

During construction, the contractor will be required to install the pipe in a dry trench with proper soil, backfill, and compaction techniques. These construction requirements will be dictated by the contract plans and specifications in order to protect the pipe and to ensure the soil does not settle over time. During backfill of the newly installed pipe, compaction will be required in 6-inch to 1-foot lifts from the trench bottom to the surface.

Following compaction, the contractor will be required to restore the pavement to preconstruction conditions and the plans will call for the contractor to mill and resurface the entire lane of impacted roadway from edge of lane to edge of lane.

4.7.2 Trenchless Installation

There are several methods of trenchless installation, horizontal directional drill (HDD), jack and bore, and micro tunneling,

Horizontal direction drilling involves an entry and exit pit. Drilling starts with a smaller diameter pilot hole where drilling fluid is pumped through the pipe to a drill bit. The pilot hole is tracked, and a steering tool is used to maintain the bore path. Once the exit point is reached a reamer is attached

to enlarge the pilot hole. Lastly, the pipe is pulled back into the drill hole, using drilling fluid as a lubrication. A flexible pipe, commonly HDPE or fusible PVC is used for this construction method.

The jack and augering method of construction, also known as jack and bore is accomplished by jacking/pushing and augering a casing underneath a crossing that cannot be impacted by construction activities on the surface, i.e. railroad crossings and major roadway corridors. This method of construction includes a jacking pit and a receiving pit. The jacking pit is the location where the casing is lowered, set on a rail, welded, and jacked underneath the proposed crossing. The receiving pit is where the casing will terminate, on the other side of the crossing. The jacking pit construction area is larger than that of the receiving pit. Depth of casing installation varies depending on what utility or landowner is being crossed.

Like jack and boring, micro tunneling is a subsurface installation without disturbing the ground surface. However, this technology is much more advanced using a remote-controlled pipe jacking process to strategically guide the tunneling face. Unlike jack and bore and horizontal directional drilling, this method also has the potential to install pipes underground in a single pass (eg. No casing pipe). This method is proven effective for applications such as installation beneath railroads, harbors, rivers, and many environmentally sensitive areas. Pipe and casing materials such as steel or fiberglass-lined concrete jacking/carrier pipe are among those suitable for microtunnel construction.

4.8 Environmental Considerations

EarthBalance® ecologists conducted a desktop assessment to evaluate the environmental features along the alternative routes. The purpose of the assessment was to characterize any sensitive environmental features along a 50-foot-wide corridor within the alternate routes. Sensitive environmental features, including wetlands and habitat potentially occupied by threatened and endangered species, were the primary focus of the analysis. The following methods were employed to assess the proposed pipeline routes:

- Desktop analysis of protected habitats using natural resource data available in the public domain;
- Review of recent aerial photography of the routes;
- Review of the Soil Survey of Sarasota County, Florida (<http://websoilsurvey.nrcs.usda.gov>);
- Research of the Florida Natural Areas Inventory (FNAI) for documented occurrence and potential occurrence of protected wildlife species on or near the site;
- Review of the Florida Fish and Wildlife Conservation Commission's Eagle Nest Locator Site; and
- Review of available Sarasota County scrub jay mapping data.

4.8.1 Wetland Impact

The following table denotes the potential impacts to wetlands and Other Surface Waters (OSW) from the proposed pipeline routes. For the purpose of this analysis, it is assumed that all wetlands and surface waters within the pipeline corridor will be impacted.

Table 4-9 Wetland and Other Surface Water (OSW) Impacts

Phase	Route	OSW Impacts (Acres)	Herbaceous Wetland Impacts (Acres)	Forested Wetland Impacts (Acres)
Phase 1	A	4.34	6.29	3.61
	B	10.76	0.06	0.96
	C	0.65	0.06	0.79
	D	0.24	0.64	0.52
Phase 2	A	<0.01	0.00	0.14
	B	0.02	0.97	0.00
	C	0.11	0.98	0.13

Impacts to ponds, ditches, freshwater marshes, and wet prairie habitat are typically considered temporary by the regulatory agencies because these impacted areas will be restored to preconstruction grades. Since the impacts are classified as temporary, no wetland mitigation is required. Several forested systems (streams and lake swamps, inland ponds and sloughs, and hydric pine flatwoods) occur within the proposed routes. Typically, forested systems are converted to herbaceous systems post construction. The reason for this is that trees are not allowed to grow on top of the water line to preserve the integrity of the pipe. The conversion of a forested wetland system to an herbaceous wetland system will require mitigation. As shown in Table 4-9 above, Phase 1 Route A would have the greatest potential impacts to forested wetlands.

In addition to potential impacts to protected wetland habitat, the project may impact mesic hammock habitat, a natural resource given protection by Sarasota County. Mesic hammock habitat is sensitive upland habitat that is protected by Sarasota County. These are forested communities typically comprised of cabbage palm and a mixture of oak species within the canopy. The trees generally form a dense closed canopy. The closed canopy creates the conditions for a microclimate that is cooler than the surrounding habitat. The reduced light limits the shrub and groundcover species creating a generally open understory. These habitats are found at the fringe wetlands and water courses. In determining impacts related to mesic hammocks, Sarasota County staff will assist in the evaluation of potential impacts resulting from this project.

The County guidelines state that up to 25% of hammocks may be cleared in accordance with the “Principles for Evaluating Development within Native Habitats” and no mitigation is required. A field review is required to determine the extent of these habitats within the potential pipeline corridors.

4.8.2 Wildlife Habitat Impact

County, State, and federal wildlife databases were reviewed for the potential of protected wildlife species to occur along the proposed routes. These species included bald eagle, Florida scrub jay, eastern indigo snake, wood stork, and wading bird rookeries. The presence or absence of critical habitat for these species was also evaluated. The results indicate that protected wildlife species and habitat occur along the proposed routes or nearby. Additional wildlife surveys may be required by the County, Florida Fish and Wildlife Conservation Commission (FWC), and United States Fish and Wildlife Service (USFWS) upon review of the permit application for the selected pipeline route. Table 4-10 provides a list of wildlife species that have the potential to occur along the proposed routes.

Table 4-10 Protected Species Potentially Occurring Along the Pipeline Routes

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
Florida Scrub Jay	<i>Aphelocoma coerulescens</i>	FT	ST
Little Blue Heron	<i>Egretta caerulea</i>	N	ST
Tri-colored Heron	<i>Egretta tricolor</i>	N	ST
Florida sandhill crane	<i>Grus canadensis pratensis</i>	N	ST
Bald Eagle	<i>Haliaeetus leucocephalus</i>	N	N
Wood Stork	<i>Mycteria americana</i>	FT	ST
Mammals			
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	N	ST
Reptiles			
Eastern indigo snake	<i>Drymarchon couperi</i>	FT	ST
Gopher tortoise	<i>Gopherus polyphemus</i>	N	ST
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	N	ST

FT = federal threatened, N = not listed, ST = state threatened, N = not listed

Although Table 4-10 provides a listing of species that may occur within the study area, only a few species would likely be impacted by the construction of the selected pipeline. The species that could be affected by construction of any of the proposed pipeline routes are discussed below.

Bald Eagle

The bald eagle was removed from the federal list of threatened and endangered species on June 28, 2007 but will still be protected under the Bald and Golden Eagle Protection Act (Eagle Act), the Migratory Bird Treaty Act, and on the State level by the bald eagle management plan. Depending on the type of construction, the FWC designates a 660-foot and a 330-foot no activity buffer zone surrounding active eagle nests. Construction may be permissible within the 330-foot buffer if monitoring of the nest is conducted during the eagle nesting season (October 1 to May 31). A review of the State's eagle nest locator database indicates that there are eagle nests (SA008, SA035, SA042,

SA056) within the vicinity of the proposed routes, however none of the nests are within 660 feet of any of the proposed routes. Field review assessments are recommended to confirm that the selected route will not have any impacts on this species.

Wood Stork

The wood stork is a State and federal listed endangered species with a defined core foraging area (CFA) of an 18.6-mile radius for each breeding colony. The northern limit of its breeding range is the southeastern U.S., where it breeds in colonies with great egrets, snowy egrets, white ibises, and many other wading bird species. The unique feeding method of the wood stork gives it specialized habitat requirements. Normally an inhabitant of swamplands, wood storks often forage in rural ditches and ponds. Wood storks can be found feeding in shallow water in both freshwater and coastal wetlands, including tidal creeks and flats, marshes, cypress swamps, ponds, ditches, and flooded fields. Colonies are typically located on coastal islands and on willow islands in swamps, cypress swamps, impoundments, and other inundated areas. The proposed routes are within wood stork's core foraging habitat.

Eastern Indigo Snake

Both the FWC and the USFWS list the eastern indigo snake as threatened. The eastern indigo snake is the largest North American snake and occurs within habitats throughout most of Florida. It can be found in a range of habitats from dry sandy areas to mangrove swamps and wet prairies. It is frequently encountered in pine flatwoods as well as in the moist tropical hammocks of South Florida. In drier environments, indigo snakes often seek shelter in gopher tortoise burrows.

The USFWS has developed the "Standard Protection Measures for the Indigo Snake" to ensure that no indigo snakes are harmed by construction activities. The plan consists of the methods used to educate construction personnel about the species, with particular attention to correct identification and procedures to follow in the event indigo snakes are encountered. Because the indigo snake has potential to occur along the proposed routes, the "Standard Protection Measures for the Indigo Snake" (Attachment 2) is required to be implemented during construction of the selected pipeline route.

Gopher Tortoise

The gopher tortoise is listed as threatened by the FWC. This species prefers dry, well drained soils that are typical within the project area. The FWC currently allows mitigation options to offset impacts to a gopher tortoise population including complete avoidance, establishing a 25-foot buffer surrounding the burrow, and on-site and/or off-site relocation. Gopher tortoise burrows are typically observed in the open sandy and grassy areas. Gopher tortoise burrows are considered suitable habitat and are often used by commensal species, such as the eastern indigo snake and gopher frog. Because gopher tortoises are mobile, surveys are only valid for 90 days. The uplands of any selected route should be surveyed for Gopher Tortoises at least 90 days prior to construction. Multiple surveys may be required during the permitting phase of the project to determine species occurrence within the selected pipeline

route. A permit to relocate gopher tortoises from the project area will be required from the FWC should avoidance of burrows not be possible.

5.0 FINAL RECOMMENDATIONS

It is recommended the Authority proceed with construction of the Phase 1 facilities including Route B1 (41,306 LF of 42-inch water transmission main), the pumping station, at least 5 MG of ground storage (10 MG ultimate) and associated site facilities including electrical equipment, generator, chemical injection, administrative building, stormwater system, driveway and parking, site utilities, etc. Phase 1 includes the transmission main from the pump station to the point of connection to Sarasota County's distribution system. If the POC is moved to near intersection of Lorraine Road and Blue Lake Road add an additional 6,850 LF of 42-inch water transmission main at an estimated cost of \$3,253,750.

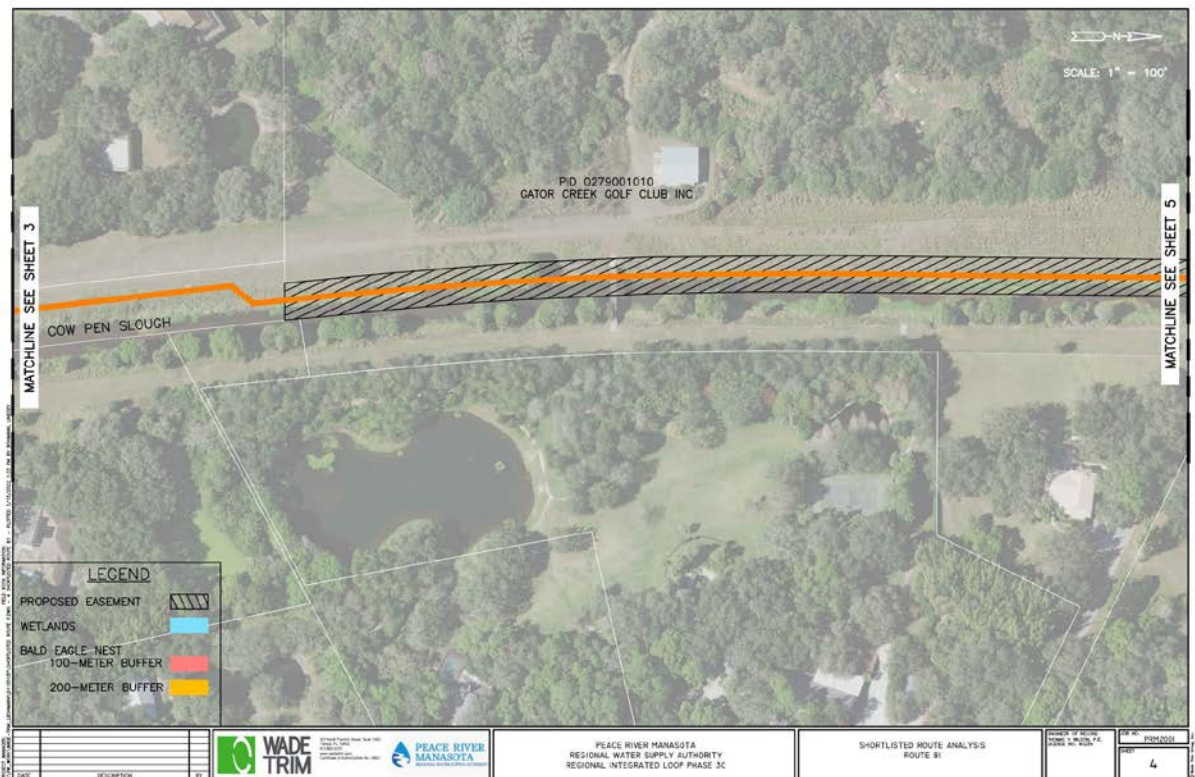
Five split-case pumps with a capacity of 6.5 MGD each are recommended for the pumping station with a total firm capacity of 26 MGD. Additional details on the pump station will be included in a separate technical memorandum addressing hydraulics and water quality.

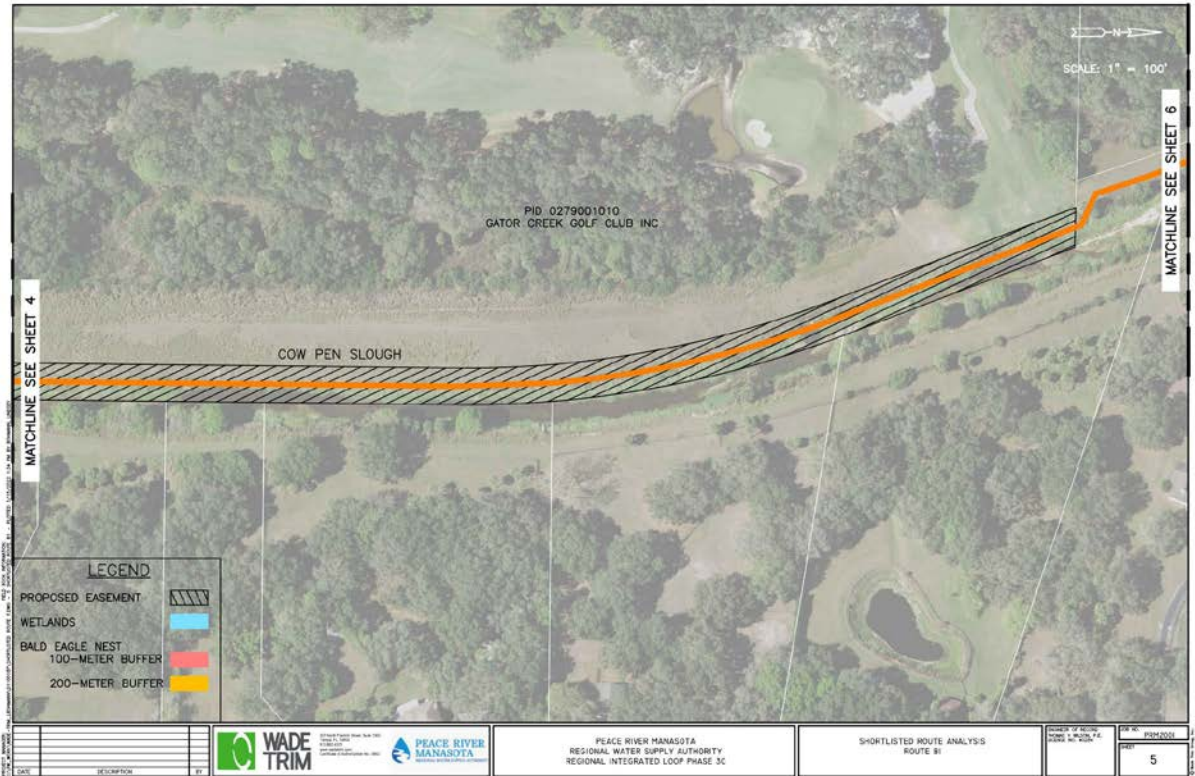
Phase 2 recommended facilities include either Route A2 or Route B2 of 42-inch and 36-inch water transmission main to the Point of Connection to Manatee County at University Parkway and Lakewood Ranch Boulevard. In order to maintain satisfactory water quality in this main, it is recommended to provide at least 3 MGD to Manatee County continuously. This same amount of Water can be provided by Manatee County back to Sarasota County at the University Pump Station located on University Parkway and Lockwood Ridge Road. Manatee County projects a need for regional water supply from the Authority in 2037 at which time the water swap described may no longer be required to maintain satisfactory water quality. Arrangement for this water swap may require upgrades to pumping and storage facilities at the interconnections.



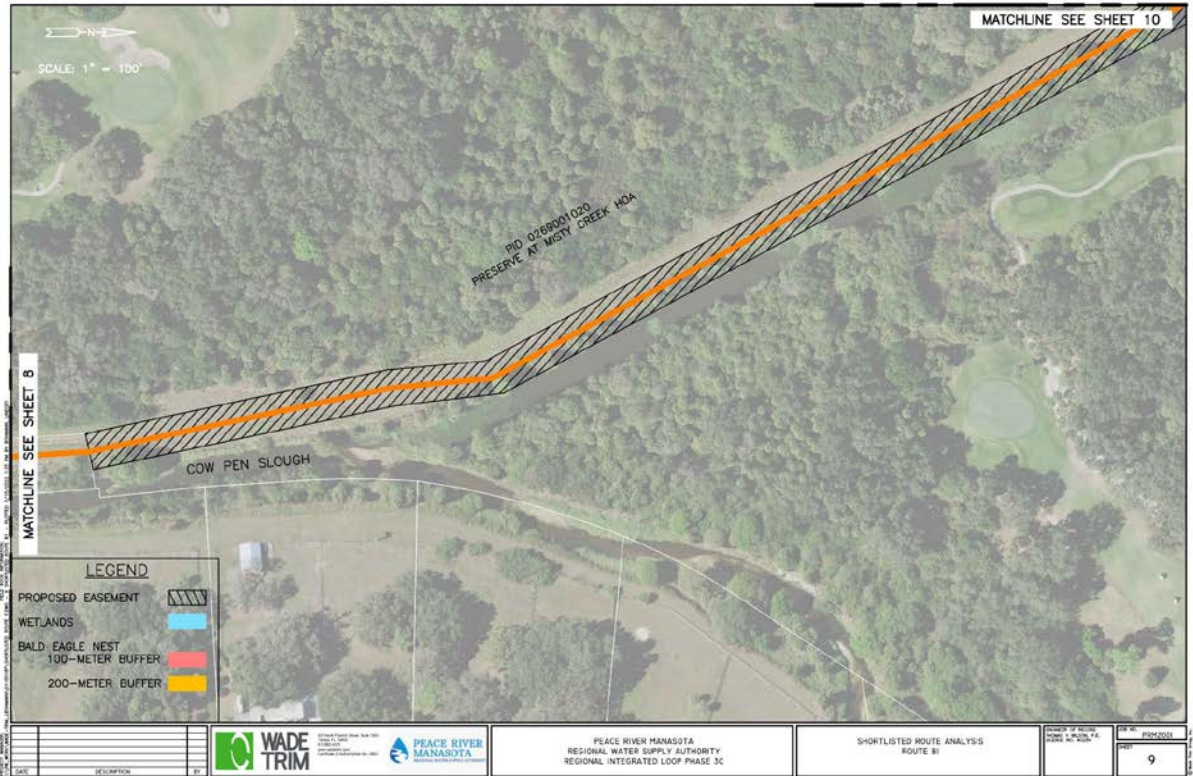
Appendix A. 1" =100' Scale Conceptual Plans



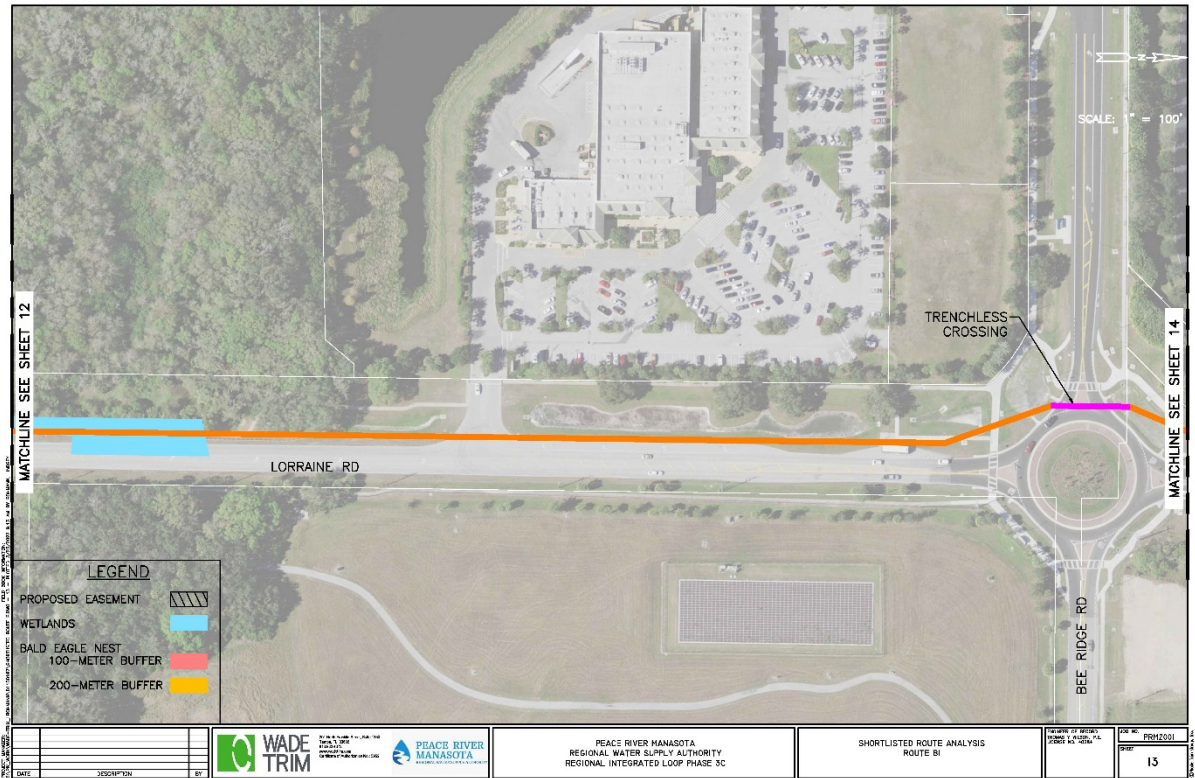




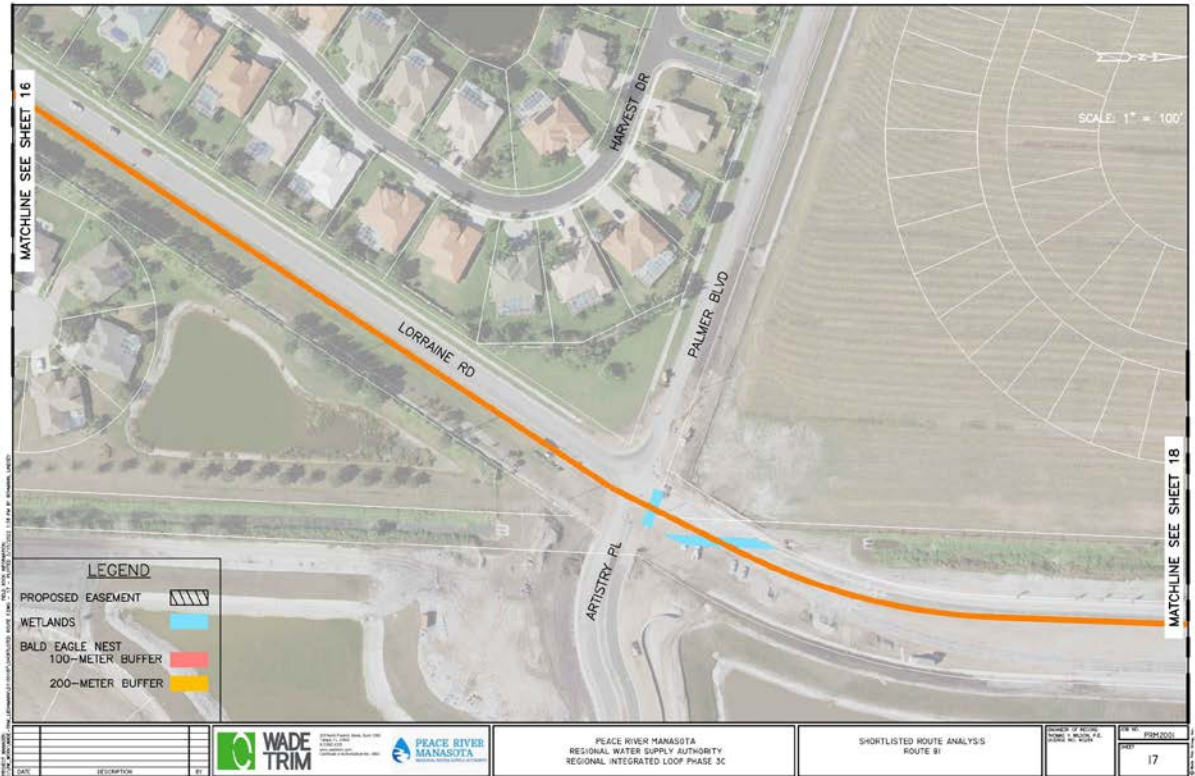


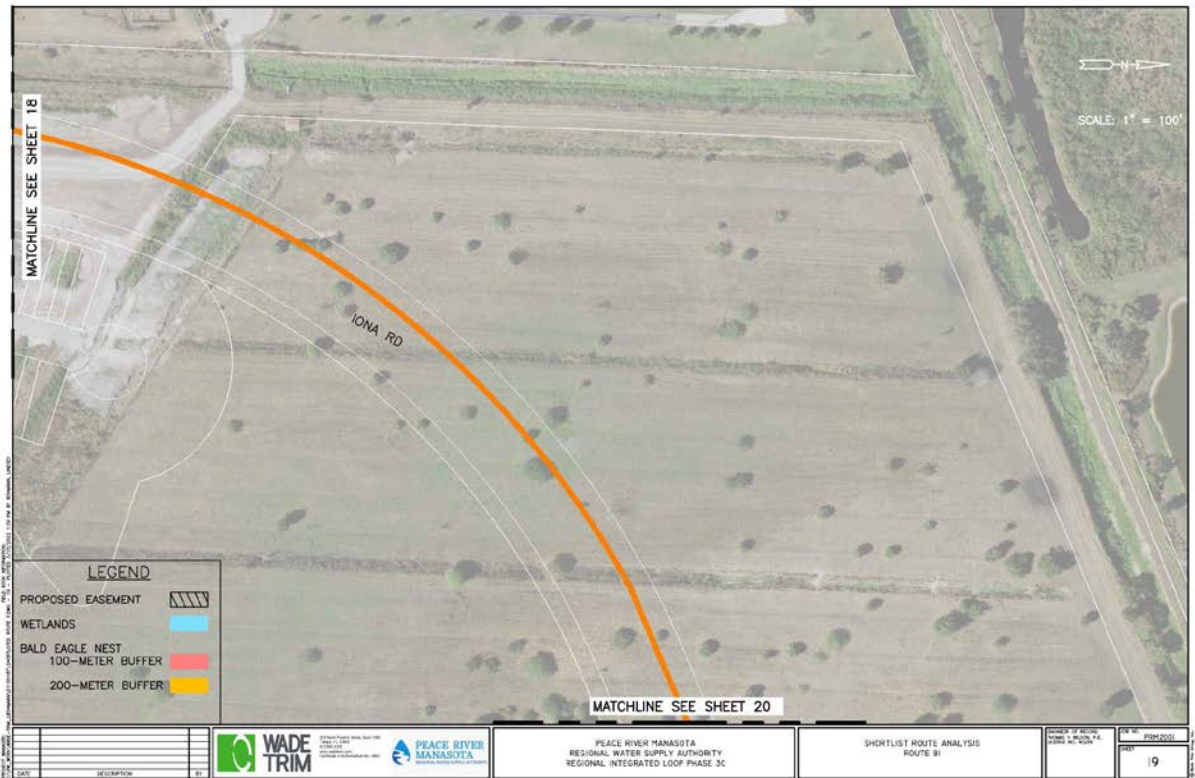


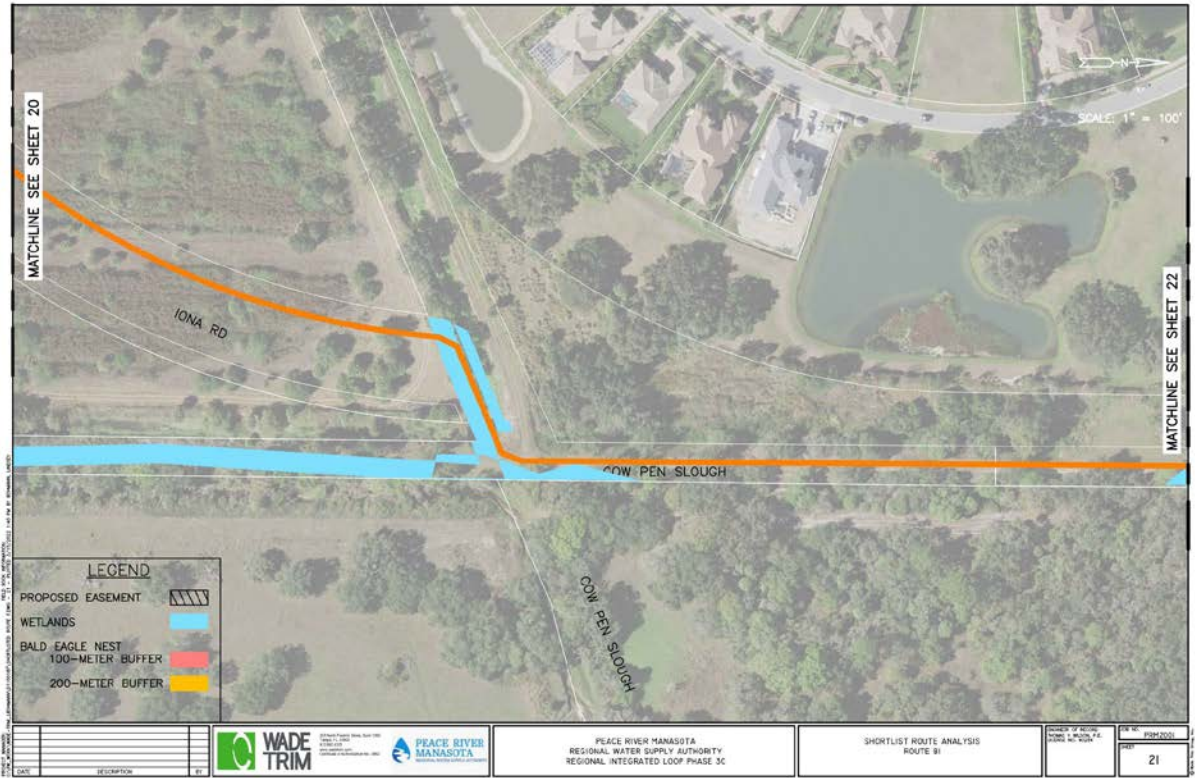




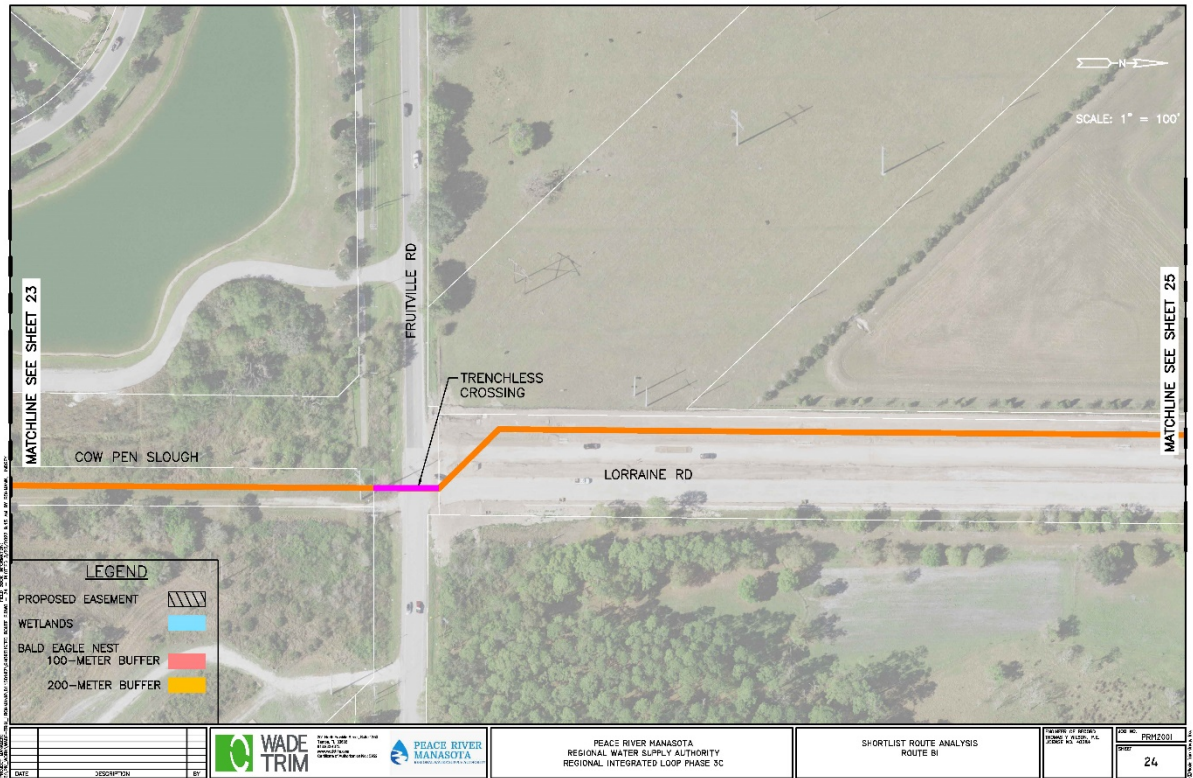


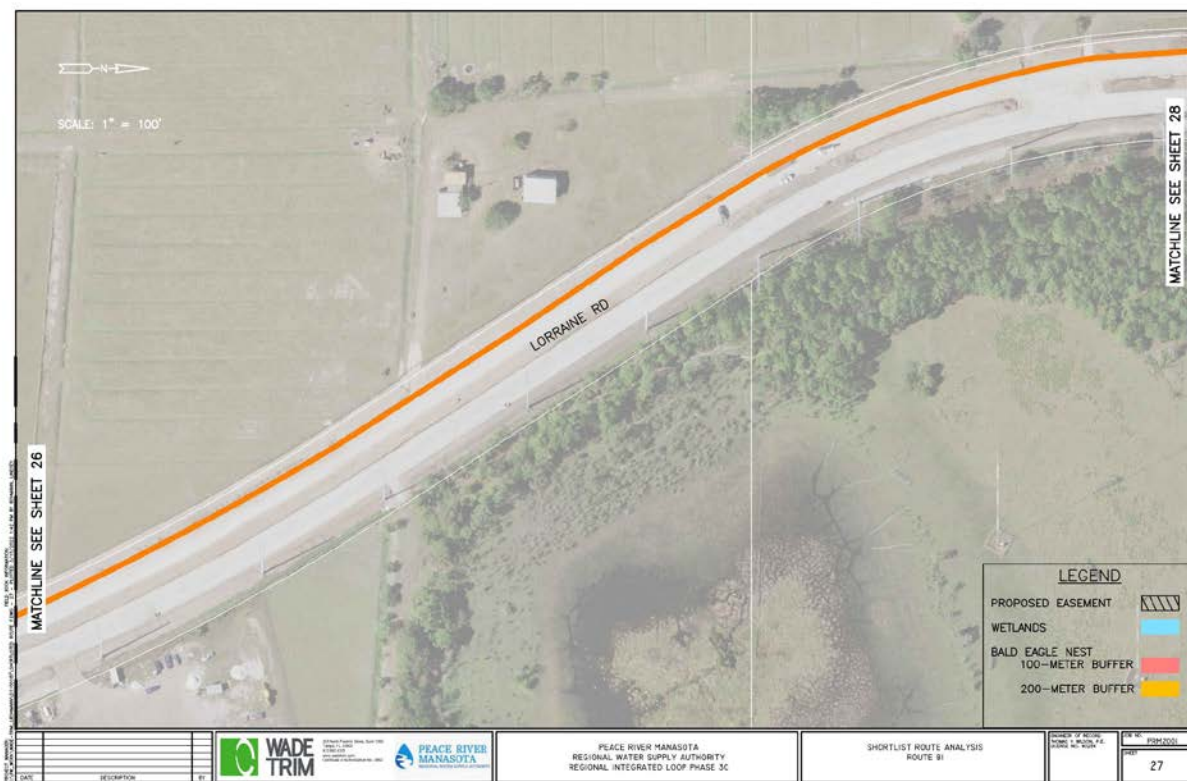














Appendix B. Comparable Cost Details for Alternative Routes and Cost Estimates

Route Study - Phase 1 Route A1

DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
Sitework				
Mobilization (5%)	1	LS	\$1,244,000	\$ 1,244,000
Easement Acquisition	16	*		\$ 6,355,266
F&I 42" WTM	49988	LF	\$475	\$ 23,745,000
F&I Jack and Bore Steel Casing, for 42-Inch Carrier Pipe	300	LF	\$2,250	\$ 675,000
42" MJ BV	10	EA	\$45,000	\$ 450,000
			SUBTOTAL	\$ 32,469,266
			ENGINEERING AND CONSTRUCTION SERVICES (20%)	\$ 6,493,853
			CONTINGENCY (25%)	\$ 8,118,000
			PUMP STATION	\$ 13,861,000
			TOTAL	\$ 60,942,119

* Easement cost equals estimated value per acre plus \$40,000/easement administrative cost

Route Study - Phase 1 Route B1

DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
Sitework				
Mobilization (5%)	1	LS	\$1,028,000	\$ 1,028,000
Easement Acquisition	5	*		\$ 825,918
F&I 42" WTM	22,906	LF	\$475	\$ 10,881,000
F&I 42" WTM open grassed area	18,400	LF	\$435	\$ 8,004,000
F&I Jack and Bore Steel Casing, for 42-Inch Carrier Pipe	320	LF	\$2,250	\$ 720,000
42" WTM by Microtunnel	150	LF	\$2,850	\$ 428,000
Microtunnel Shafts	2	EA	\$150,000	\$ 300,000
42" MJ BV	5	EA	\$45,000	\$ 225,000
			SUBTOTAL	\$ 22,411,918
			ENGINEERING AND CONSTRUCTION SERVICES (20%)	\$ 4,482,384
			CONTINGENCY (25%)	\$ 5,603,000
			PUMP STATION	\$ 13,861,000
			TOTAL	\$ 46,358,302

* Easement cost equals estimated value per acre plus \$40,000/easement administrative cost

Route Study - Phase 1 Route C1

DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
Sitework				
Mobilization (5%)	1	LS	\$1,083,000	\$ 1,083,000
F&I 42" WTM	41957	LF	\$475	\$ 19,930,000
F&I Jack and Bore Steel Casing, for 42-Inch Carrier Pipe	285	LF	\$2,250	\$ 642,000
42" WTM by Microtunnel	150	LF	\$2,850	\$ 428,000
Microtunnel Shafts	2	EA	\$150,000	\$ 300,000
42" MJ BV	8	EA	\$45,000	\$ 360,000
			SUBTOTAL	\$ 22,743,000
			ENGINEERING AND CONSTRUCTION SERVICES (20%)	\$ 4,548,600
			CONTINGENCY (25%)	\$ 5,686,000
			PUMP STATION	\$ 13,861,000
			TOTAL	\$ 46,838,600

Route Study - Phase 2 Route A2

DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
Sitework				
Mobilization (5%)	1	LS	\$666,000	\$ 666,000
F&I 36" WTM	21516	LF	\$418	\$ 8,994,000
F&I 42" WTM	6850	LF	\$475	\$ 3,254,000
42" WTM by Jack and Bore 60" Steel Casing	300	LF	\$2,850	\$ 855,000
36" MJ BV	4	EA	\$40,000	\$ 160,000
42" MJ BV	1	EA	\$45,000	\$ 45,000
			SUBTOTAL	\$ 13,974,000
			ENGINEERING AND CONSTRUCTION SERVICES (20%)	\$ 2,794,800
			CONTINGENCY (25%)	\$ 3,494,000
			TOTAL	\$ 20,262,800

Route Study - Phase 2 Route B2

DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
Sitework				
Mobilization (5%)	1	LS	\$710,000	\$ 710,000
Easement Acquisition	1	LS	\$3,325,950	\$ 3,326,000
F&I 36" WTM	25577	LF	\$418	\$ 10,692,000
F&I 42" WTM	6850	LF	\$475	\$ 3,254,000
36" MJ BV	5	EA	\$40,000	\$ 200,000
42" MJ BV	1	EA	\$45,000	\$ 45,000
			SUBTOTAL	\$ 18,227,000
			ENGINEERING AND CONSTRUCTION SERVICES (20%)	\$ 3,645,400
			CONTINGENCY (25%)	\$ 4,557,000
			TOTAL	\$ 26,429,400

Route Study - Phase 2 Route C2

DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
Sitework				
Mobilization (5%)	1	LS	\$1,296,000	\$ 1,296,000
Easement Acquisition	1	LS	\$1,888,786	\$ 1,888,800
F&I 36" WTM	49738	LF	\$418	\$ 20,791,000
F&I 42" WTM	6850	LF	\$475	\$ 3,254,000
F&I 36" WTM by Jack and Bore, 54" Steel Casing	695	LF	\$2,050	\$ 1,425,000
36" MJ BV	10	EA	\$40,000	\$ 400,000
42" MJ BV	1	EA	\$45,000	\$ 45,000
			SUBTOTAL	\$ 29,099,800
			ENGINEERING AND CONSTRUCTION SERVICES (20%)	\$ 5,819,960
			CONTINGENCY (25%)	\$ 7,275,000
			TOTAL	\$ 42,194,760



ENGINEER'S OPINION OF CONSTRUCTION COST

PROJECT:	Peace River Pump Station and Storage
LOCATION:	Sarasota County, FL
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> Conceptual <input type="checkbox"/> 30% <input type="checkbox"/> 60% <input type="checkbox"/> 100%
WORK:	Date: 01/04/22
	Project No.: PRM2021

ITEM NO.	DESCRIPTION	AMOUNT
1	Civil	\$ 735,000
2	Structural	\$ 6,832,000
3	Process-Mechanical	\$ 1,624,000
4	Electrical	\$ 1,029,000
	SUBTOTAL	\$ 10,220,000
	Property Acquisition	\$ 1,500,000
	Mobilization & Demobilization (Max 7.5%)	\$ 767,000
	Contractor Insurance & Bonding (5%)	\$ 550,000
	Contractor Overhead & Profit (20%)	\$ 2,077,000
	Engineer's Estimate Contingency (25%)	\$ 3,641,000
	Total Construction Cost	\$ 13,861,000

This Engineer's Opinion of Construction Costs is provided based on available information and the engineer's experience and qualifications and represents his best judgement as a design professional familiar with the construction industry. The engineer has no control over the costs of labor, materials, equipment, or over the contractor's methods of determining prices or over competitive bidding or market conditions. The engineer cannot and does not guarantee that proposals, bids or construction cost will not vary from this estimate.

ENR Construction Cost Index = 12481 (December 2021)

AI Mitrovic	January 4, 2022
Engineer's Name	Date
Prepared by:	
Wade Trim, Inc.	
3790 Dixie Highway NE	
Suite D	
Palm Bay, FL 32905	

**ENGINEER'S OPINION OF CONSTRUCTION COST****PROJECT** Peace River Pump Station and Storage**DATE:**


01/04/22

LOCATION Sarasota County, FL**PROJECT NO.**

PRM2021

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST**BASIS FOR ESTIMATE:** ☒ Conceptual ☐ 30% ☐ 60% ☐ 100%**WORK:** Civil

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Site Work				\$ -
1.1	Pond (88,000 SF)	1	LS	200,000	\$ 200,000
1.2	Site Improvements (clearing & grubbing, dewatering, grading)	1	LS	450,000	\$ 450,000
1.3	Valve & Meter Boxes	3	EA	9,000	\$ 27,000
1.4	Driveway & Sidewalks	1	LS	58,000	\$ 58,000
					\$ -
	Total				\$ 735,000

					
ENGINEER'S OPINION OF CONSTRUCTION COST					
PROJECT:	Peace River Pump Station and Storage			DATE:	01/04/22
LOCATION:	Sarasota County, FL			PROJECT NO.	PRM2021
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST					
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> Conceptual <input type="checkbox"/> 30% <input type="checkbox"/> 60% <input type="checkbox"/> 100%				
WORK:	Structural				
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Admin Building				\$ -
1.1	Structural/Architectural (1,500 SF)	1	LS	\$ 225,000	\$ 225,000
					\$ -
2	Pump Room				\$ -
2.1	Building (3,500 SF)	1	LS	\$ 400,000	\$ 400,000
2.2	Structural Slabs	1	LS	\$ 50,000	\$ 50,000
					\$ -
3	5 MG Storage Tanks				\$ -
3.1	5 MG Tank	2	EA	\$ 2,714,000	\$ 5,428,000
					\$ -
4	Electrical Room				\$ -
4.1	Building (1,200 SF)	1	LS	\$ 225,000	\$ 225,000
4.2	Structural Slabs	1	LS	\$ 10,000	\$ 10,000
					\$ -
5	Generator				\$ -
5.1	6,000 gal Fuel Tank Structural Slab	1	LS	\$ 8,700	\$ 8,700
5.2	Transformer Structural Slab	1	LS	\$ 5,000	\$ 5,000
5.3	Generator Structural Slab	1	LS	\$ 9,800	\$ 9,800
5.4	Building (1,000 SF)	1	LS	\$ 225,000	\$ 225,000
					\$ -
6	Chemical Room				\$ -
6.1	Building (1,200 SF)	1	LS	\$ 225,000	\$ 225,000
6.2	Fill Station	1	LS	\$ 10,000	\$ 10,000
6.3	Structural Slabs	1	LS	\$ 10,000	\$ 10,000
					\$ -
					\$ -
					\$ 6,832,000



ENGINEER'S OPINION OF CONSTRUCTION COST


PROJECT: Peace River Pump Station and Storage DATE: 01/04/22
 LOCATION: Sarasota County, FL PROJECT NO. PRM2021

ENGINEER'S OPINION OF CONSTRUCTION COST

BASIS FOR ESTIMATE: ☒ Conceptual ☐ 30% ☐ 60% ☐ 100%

WORK: Process-Mechanical

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Admin Building				\$ -
1.1	Plumbing	1	LS	\$ 50,000	\$ 50,000
					\$ -
2	Site Work				\$ -
2.1	Process Yard Piping	1	LS	\$ 750,000	\$ 750,000
					\$ -
3	Pump Room				\$ -
3.1	Interior Piping & Valves	1	LS	\$ 130,000	\$ 130,000
3.2	5 MGD Pumps	5	EA	\$ 90,000	\$ 450,000
					\$ -
4	5 MG Storage Tanks				\$ -
4.1	Process Mechanical	1	LS	\$ 50,000	\$ 50,000
					\$ -
5	Generator				\$ -
5.1	6,000 gal Fuel Tank	1	LS	\$ 110,000	\$ 110,000
5.2	Piping	1	LS	\$ 3,500	\$ 3,500
					\$ -
6	Chemical Room				\$ -
6.1	2+1 Metering Pump Skid	1	LS	\$ 33,500	\$ 33,500
6.2	Fill Station	1	LS	\$ 8,000	\$ 8,000
6.3	3,250 gal Storage Tank	1	LS	\$ 24,500	\$ 24,500
6.4	Sample Pumps	1	LS	\$ 14,000	\$ 14,000
					\$ -
					\$ -
					\$ -
	Total				\$ 1,624,000

					
ENGINEER'S OPINION OF CONSTRUCTION COST					
PROJECT:	Peace River Pump Station and Storage		DATE:	01/04/22	
LOCATION:	Sarasota County, FL		PROJECT NO.	PRM2021	
ENGINEER'S OPINION OF CONSTRUCTION COST					
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> Conceptual		<input type="checkbox"/> 30%	<input type="checkbox"/> 60%	<input type="checkbox"/> 100%
WORK:	Electrical				
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Admin Building				\$ -
1.1	Electrical	1	LS	\$ 50,000	\$ 50,000
					\$ -
2	Site Work				\$ -
2.1	Site Electrical	1	LS	\$ 200,000	\$ 200,000
					\$ -
3	5 MG Storage Tanks				\$ -
3.1	Electrical	1	LS	\$ 15,000	\$ 15,000
					\$ -
4	Generator				\$ -
4.1	Generator	1	LS	\$ 182,000	\$ 182,000
4.2	15 KVA Transformer	1	LS	\$ 7,000.00	\$ 7,000
					\$ -
5	Electrical Room				\$ -
5.1	120 HP VFDs	5	EA	\$ 60,000	\$ 300,000
5.2	MCCs	2	EA	\$ 67,000.00	\$ 134,000
5.3	Switchgear	1	LS	\$ 70,000.00	\$ 70,000
5.4	25 KVA Transformer	1	LS	\$ 8,000.00	\$ 8,000
					\$ -
6	Chemical Room				\$ -
6.1	Analyzers	1	LS	\$ 50,000	\$ 50,000
6.2	Electrical	1	LS	\$ 13,000.00	\$ 13,000
					\$ -
					\$ -
	Total				\$ 1,029,000



Appendix C. Environmental Features Map

