SEPTIC TO SEWER PLANNING STUDY

CITY OF BELLEVIEW

Prepared for:

The City of Belleview

Prepared by:

Kimley-Horn and Associates, Inc.

Project 042223011
November 2018

101 E Silver Springs Boulevard, Suite 400
Ocala, FL 34470
352.438.3000

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Kimley»Horn

THIS IS TO CERTIFY THAT THE ENCLOSED ENGINEERING CALCULATIONS WERE PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION.

____
ALAN J. GARRI, P.E.

DATE: ______________________

Florida Registration Number #70674
CA No. 00000696

EXECUTIVE SUMMARY

Purpose

The purpose of the Belleview Septic to Sewer Planning Study is to identify projects that will eliminate on-site sewage treatment and disposal systems (OSTDS), commonly known as septic tanks. This effort will meet legislative and regulatory requirements and provide a significant environmental benefit to our local waterways, most notably Silver Springs, by eliminating total nitrogen from the aquifer. Finally, the expansion of the City's sewer system is consistent with responsible utility growth and will provide necessary infrastructure.

Legislative and Regulatory Back Ground

The State of Florida has taken significant steps to document water bodies that are impaired by pollutants. This process has culminated in the creation of Basin Management Action Plans (BMAPs) and the passage of the Florida Springs Protection Act. Both measures require significant improvements to address the impaired water ways and eliminate pollutants.

Silver Springs and the Silver River (Silver Springs Group) have a designated BMAP and are included in the Florida Springs Protection Act. The BMAP established a Priority Focus Area (PFA) for the Silver Springs Group which is impaired by total nitrogen (TN). Septic tanks have been identified as a significant contributor of TN to the Silver Springs Group, and the Department of Health will no longer permit them within the PFA.

The removal of existing septic tanks is in compliance with the current update of the Silver Springs Group BMAP. The installation of central sewer to prevent the future construction of septic tanks will comply with the Florida Springs Protection Act.

Due to the urgency placed on the health of the Silver Springs Group by the State, the grants offered by the St Johns Water Management District (SJRWMD) and the Florida Department of Environmental Protection (FDEP) have updated their requirements to allow for favorable/preferred rankings for projects that meet the BMAP objectives for septic tank removal.

Septic to Sewer Project Region Descriptions

There are six regions identified within the Belleview Utility Service Area (USA) where sewer service could be extended and septic tanks eliminated. These regions are defined as follows:

1. Region 1 includes 199 parcels and 156 known septic tanks, within 462 acres bound by SE 121st Place, SE 129th Place, US HWY 441 and SE 84th Terrace.
2. Region 2 includes 207 parcels and 45 known septic tanks, within 66 acres on the west side of US HWY 441.
3. Region 3 includes 607 parcels and 499 known septic tanks, within 270 acres bound by HWY 25 and US HWY 441.
4. Region 4 includes 217 parcels and 155 known septic tanks, within 143 acres. This region includes two neighborhoods; one north of SE 110th Street Road and the second off of SE 58th Avenue.
5. Region 5 includes 341 parcels and 248 known septic tanks, within 190 acres bound by SE Babb Road, SE 122nd Lane, SE 57th Avenue, and US HWY 301.
6. Region 6 includes 253 parcels and 212 known septic tanks, within 102 acres bound by SE 122nd Lane, SE 127th Lane, SE 155th Street, and US HWY 301.

There are 1,315 total known septic tanks within the six regions outlined as part of this project. All septic to sewer regions (1-6) are located within a "high recharge" area, as designated by the SJRWMD, and within the PFA as designated by the BMAP. This means that the septic tank effluent is reaching the groundwater and Silver Springs at a higher concentration and faster rate resulting in a high concentration of TN flowing into the springs. In accordance with the FDEP methodology for nutrient calculations, the 1,315 septic tanks associated with this study area produce 263,000 gallons per day of effluent resulting in 14,025 lbs/yr of TN flowing into Silver Springs.

Once the recommended collection systems are constructed, the effluent will be transmitted to the Belleview Wastewater Treatment Facility (WWTF) which produces effluent with a TN concentration of 2.8 mg/L. Once the flows are transmitted to the WWTF, the TN load to groundwater will be reduced to 57 lbs/yr. This is due to the high level of treatment at the WWTF and the conveyance of the effluent out of the high recharge area to golf courses and spray fields as reclaimed water.

This results in the removal of 13,968 lbs/yr of TN from the Silver Springs Group. This level of reduction is very significant and will result in substantial grant funding to construct the proposed collection systems.

Alternative Sewer Analysis

Conventional gravity sewer, low-pressure grinder sewer, and vacuum sewer were considered as alternatives for wastewater conveyance when determining the feasibility of transferring wastewater flows from on-site septic and disposal systems to Belleview's WWTF. All three of these alternatives rely on the downstream treatment facility for treatment of all wastewater collected (i.e. no treatment takes place on site). A fourth, "do nothing" alternative was also evaluated. This alternative considered the cost to the resident if a sewer collection system is not extended into these areas. The residents will be required by the state to install enhanced septic systems.

The alternative analysis consisted of five processes to review, rank, and select the most effective sewer collection system for each region. Cost, operation and maintenance feasibility, and construction feasibility were considered when selecting the sewer collection system.

The first step was to evaluate the existing condition of each region. The number of existing septic tanks, type of land uses, condition of roads, and distance of the residences from the road were considered in this step.

The second step was to determine the available existing sewer connections. This required the compilation and evaluation of as-builts, GIS data, and staff knowledge to identify the existing sewer throughout the City. Once this was accomplished, optimal points of connection for the proposed sewer collection systems were identified.

The third step was to lay out a proposed sewer for each alternative within each region. This was a conceptual plan but was completed to sufficient detail to allow for preliminary opinions of probable cost to be performed. Additionally, these concepts were incorporated into the Belleview Wastewater Master Plan.

The fourth step was to develop preliminary opinions of probable cost for each alternative within each region. The costs are based on best available data for construction costs. This data was obtained from prior construction bids, vendors, and professional engineering judgment. In addition to construction costs, the opinions of probable cost also include design and permitting.

The fifth step was to select the recommended sewer collection system alternative. As mentioned above, this selection was based on cost, operations and maintenance, and construction feasibility. The recommended systems and the associated opinion of probable cost are discussed below.

Recommended Sewer Collection Systems

A conventional gravity sewer system is recommended for Region 1. While the cost comparison provides that vacuum sewer may have a lower, initial capital and construction cost, gravity sewer is recommended for reduced future maintenance and costs. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately **$15 million**.

A conventional gravity sewer system is recommended for Region 2. This alternative is the most cost-effective and will allow for the continued growth of this development without the requirement for future up-sizing. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately **$4.9 million**.

A vacuum sewer system is recommended for Region 3. This alternative is the most cost-effective as it will eliminate the need for several lift stations (as would be required to accommodate the topography in this region). A single vacuum station also provides operation and maintenance advantages. The total preliminary opinion of probable cost for installing vacuum sewer and water service in this region is approximately **$22.2 million**.

A conventional gravity sewer system is recommended for Region 4. This alternative is the most cost-effective as it will take advantage of the adjacent infrastructure in the most efficient manner. It is possible to connect gravity sewer to both lift stations and gravity sewer already installed and maintained by the City, reducing the infrastructure and maintenance to take the septic tanks offline in this region. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately **$7.8 million**.

A conventional gravity sewer system is recommended for Region 5. This alternative is the most cost-effective as it does not require the construction of any additional pump stations in the region. It is possible to connect gravity sewer to both the single lift station and the gravity sewer already installed and maintained by the City, reducing the infrastructure and maintenance to take the septic tanks offline in this region. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately **$9.2 million**.

A conventional gravity sewer system is recommended for Region 6. This alternative is the most cost-effective and feasible as the topography of the region facilitates the use of a single lift station. It is possible to connect gravity sewer to both the single lift station and the gravity sewer already installed and maintained by the City, reducing the infrastructure and maintenance to take the septic tanks offline in this region. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately **$11.9 million**.

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1. PROJECT PLANNING

The City of Belleview is currently in the process of identifying projects to eliminate on-site sewage treatment and disposal systems (OSTDS), commonly known as septic tanks. These two terms are used interchangeably throughout this document. This effort is in compliance with and in support of the current update of the Silver Springs basin management action plan (BMAP).

The Belleview Septic to Sewer Planning Study has six regions within the Belleview Utility Service Area (USA) where sewer service could be extended and OSTDSs eliminated. These regions encompass approximately 1,213 acres and 1,315 existing septic tanks. Additionally, the six identified regions are within the priority focus area (PFA) for the Silver Springs BMAP. These regions and the existing collection system are depicted in **Appendix A**. The six expansion regions were selected due to their density of OSTDSs and proximity to existing infrastructure. The City has requested Kimley-Horn to prepare a planning study to facilitate the removal of the septic tanks. This Septic to Sewer Planning Study accomplished the following objectives for the identified regions:

1. Identified the number of OSTDSs within each region.
2. Identified multi-year phasing/sequencing to support the following:
    a. Grant Applications
    b. Design and Permitting
    c. Construction
3. Identified Existing Infrastructure surrounding the regions.
4. Provided an Alternative Analysis within each region to determine which type of collection system is most economical.
5. Estimate the costs to design, permit, and construct the selected sewage collection system needed to eliminate the OSTDSs within each region.
6. Facilitates future grant applications (FDEP Clean Water State Revolving Fund (CWSRF), etc.)

The number of OSTDSs within each region was identified using the FDOH records for permitted septic tanks, which were also field verified utilizing aerial imagery and site visits. The associated septic tanks are discussed in more detail in **Section 4** of this study. The multi-year phasing was necessary to ascertain a viable timeline for funding, designing, and constructing the sewer expansions associated with each region. The phasing is intended to be sequential with design and permitting (year 1) followed by construction for each Region (year 2). It is currently projected that all six regions will be designed, permitted and constructed by 2025, pending grant funding availability and city budget priorities. The phasing timeline is detailed in **Table 1**.

Table 1: Funding and Project Schedule

Project Name	Total Project Cost	Funding	Year								
			2017	2018	2019	2020	2021	2022	2023	2024	2025
SS OSTDS Planning Study	$152,000	State	$ 152,000								
		Match									
SS OSTDS Region 1	$14,922,052	State			$ 994,803	$ 6,466,223					
		Match			$ 994,803	$ 6,466,223					
SS OSTDS Region 2	$7,170,172	State				$ 1,483,615	$2,101,471				
		Match				$ 1,483,615	$2,101,471				
SS OSTDS Region 3	$22,254,230	State					$1,483,615	$9,643,500			
		Match					$1,483,615	$9,643,500			
SS OSTDS Region 4	$5,500,979	State						$366,732	$2,383,758		
		Match						$366,732	$2,383,758		
SS OSTDS Region 5	$5,489,064	State							$365,938	$ 2,378,594	
		Match							$365,938	$ 2,378,594	
SS OSTDS Region 6	$8,649,565	State								$ 576,638	$ 3,748,145
		Match								$ 576,638	$ 3,748,145
SUB_TOTAL	$31,993,031	STATE	$152,000.00	-	$994,803.48	$7,949,837.93	$3,585,086.05	$10,010,231.44	$2,749,695.12	$2,955,232.02	$3,748,144.88
	$31,993,031	LOCAL	-	-	$994,803.48	$7,949,837.93	$3,585,086.05	$10,010,231.44	$2,749,695.12	$2,955,232.02	$3,748,144.88
GRAND TOTAL	**$63,986,062**		**$152,000.00**	**-**	**$1,989,606.96**	**$15,899,675.87**	**$7,170,172.10**	**$20,020,462.89**	**$5,499,390.23**	**$5,910,464.03**	**$7,496,289.77**

LEGEND
FUNDED
STATE FUNDING SOFT COSTS
LOCAL MATCH SOFT COSTS
STATE FUNDING CONSTRUCTION
LOCAL MATCH CONSTRUCTION

The existing infrastructure, operated and maintained by the City, was identified utilizing as-built information, geographic information system (GIS) data, and available permit information. This data and information was verified by a subconsultant and City staff with extensive knowledge of the City's sewer system. The City's existing utility system currently serves approximately 1,700 sewer customers totaling an annual average daily flow (AADF) of 0.42 million gallons per day (mgd) of wastewater collected at the Belleview WWTF. The Belleview WWTF is an existing 0.76 mgd AADF permitted capacity domestic wastewater treatment facility consisting of influent screening, sequence batch reactors (SBRs) providing aeration and settling, filtration, chlorination, a 662,000-gallon concrete holding pond, dewatering sludge, and aerobic digestion of biosolids. Additionally, the City currently operates and maintains a collection system that consists of 41 lift stations, approximately 110,000 linear feet of force main, and approximately 280,000 linear feet of gravity sewer. The existing collection system is depicted in **Appendix A**.

The collection system alternatives considered in this study are a traditional gravity sewer/regional lift station system, vacuum sewer system, and low-pressure grinder system. These systems are detailed in **Section 4** of this study. During the analysis of the proposed sewer collection system needed within each region, the point of connection for the proposed system to the existing collection system was also identified. These points of connection are depicted in **Appendix B** for each region.

An opinion of probable cost was prepared during the alternative analysis to aid in determining the most efficient and economical sewer system for each region. The opinions of probable cost were prepared utilizing cost information from previous utility construction projects, professional judgment, and vendor supplied costs for parts, equipment, and materials. However, these costs are preliminary and should only be used for comparative purposes within this study. Formal opinions of probable costs should be developed at the time of project design and permitting.

To facilitate future grant applications, the information provided in this study was structured to comply with the information requirements for the SJRWMD cost share grant, the FDEP Springs Initiative grant, and the state revolving funds (SRF) loan application. The most comprehensive of these requirements is the SRF loan.

2. REGULATIONS AND LEGISLATIVE REQUIREMENTS

The FDEP submitted a Draft Silver Springs and Upper Silver River and Rainbow Spring Group and Rainbow River Basin Management Action Plan (BMAP) in May 2018 for legislative review. This Draft was adopted in July of 2018 and forms the basis of the regulatory requirements driving the need for this project. This latest BMAP serves to replace the existing BMAPs for Silver and Rainbow Springs areas, published in 2015, and addresses the requirements of the 2017 Florida Springs and Aquifer Protection Act (Chapter 373, Part VII, Section 1.1, Florida Statutes[F.S.]).

The Florida Springs and Aquifer Protection Act provides for the protection and restoration of Outstanding Florida Springs (OFS), which comprise 24 first magnitude springs, 6 additional named springs, and their associated spring runs. The FDEP has assessed water quality in each OFS and determined that 24 of the 30 OFS are impaired for the nitrate form of nitrogen. Silver Springs and the Rainbow Spring Group are among the impaired first magnitude OFS.

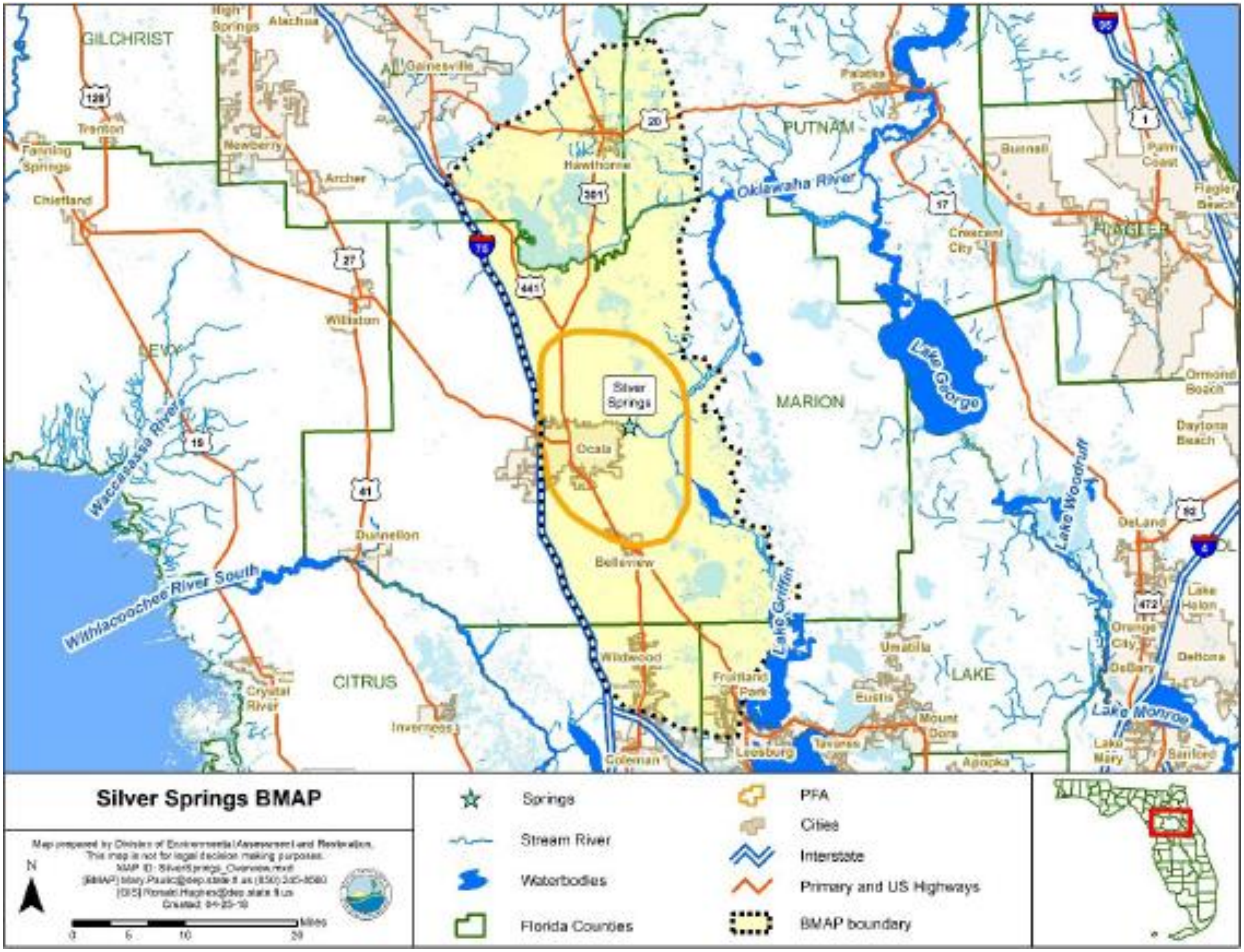
Each BMAP area has a delineated Priority Focus Area (PFA). These PFAs represent the areas in the basin where the aquifer is most vulnerable to inputs and where there are the most connections between groundwater and Silver Springs and Rainbow Spring Group. The PFAs for Silver Springs are based on Marion County's identified Primary Protection Zones and are supported by local ordinance. As identified in **Figure 1**, the City of Belleview and the 6 regions associated with this study lie within the PFA for the Silver Springs Group. In accordance with the Florida Springs and Aquifer Protection Act and the BMAP, lots within the PFA and are less than 1 acre in size will be required to install an enhanced septic system capable of meeting the reduced nutrient requirements identified in the BMAP.

OSTDSs contribute approximately 29% of total nitrogen loading to groundwater in the Silver Springs and Upper Silver River (Silver Springs Group) BMAP area, the largest contributing source off all those cataloged by the FDEP. There are approximately 26,550 OSTDSs in the PFA for the Silver Springs Group and approximately 66,311 OSTDSs in the entire Silver Springs and Upper Silver River BMAP area, based on Florida Department of Health (FDOH) estimates.

To reduce nitrogen loading, local ordinances provide support for the remediation of pollutant loading from OSTDSs. New development in unincorporated Marion County is required to connect to central sewer if the treatment facility has available capacity and if a connection line is available within 400 feet (Marion County Land Development Code, Section 6.14.2). Activities in Marion County that require a Repair or Modification Permit from FDOH in Marion County for new, modified, or repaired OSTDSs, regardless of the installation date, must achieve a minimum 24-inch separation between the bottom of the drain field and the estimated wettest season water table (Marion County Land Development Code, Section 6.14.3, Onsite Waste Treatment and Disposal Systems). In Belleview, if an existing OSTDS fails and central sewer is available, FDOH in Marion County will not issue a repair permit.

Figure 1: Silver Springs and Upper Silver River BMAP Area and PFA Boundaries

(Draft Silver Springs and Upper Silver River and Rainbow Springs Group and Rainbow River Basin Management Action Plan, July 2018)



3. EXPANSION REGION DESCRIPTIONS AND CONDITIONS

Region 1

Region 1 of the Belleview OSTDS to sewer expansion includes 199 parcels and 156 known septic tanks, within 462 acres bound by SE 121st Place, SE 129th Place, US HWY 441 and SE 84th Terrace. **Appendix B-1** provides an outline of the region as well as the proposed tie-in location to the existing wastewater collection system for the expansion recommended in Section 7.

The known land use acreage and the associated number of septic tanks per land use are provided in **Table 2**. The soil within this area consists of Candler Sand (0-5% slopes) and Arredondo Sand (0-5% slopes). Region 1 includes approximately 2.98 miles of dirt road and 1.83 miles of 20 foot-wide, paved road with a rural cross section in good to fair condition.

Table 2: Region 1 Land Use

Type	Acres	No. of Septic Tanks
Agricultural	45.91	5
Commercial	50.52	10
Residential	338.03	139
Misc	4.84	2

Region 2

Region 2 of the Belleview OSTDS to sewer expansion includes 207 parcels and 45 known septic tanks, within 66 acres on the west side of US HWY 441. **Appendix B-2** provides an outline of the region as well as the proposed tie-in location to the existing wastewater collection system for the expansion recommended in Section 7.

The known land use acreage and the associated number of septic tanks per land use is provided in **Table 3**. The soil within this area consists of Candler Sand (0-5% slopes), Adamsville Sand (0-5% slopes), Udalfic Arents (15-60% slopes), Gainesville Loamy Sand (0-5% slopes) and Arredondo Sand (0-5% slopes). Region 2 includes approximately 2.05 miles of 20-foot wide, paved road with a rural cross section in good to excellent condition.

Table 3: Region 2 Land Use

Type	Acres	No. of Septic Tanks
Commercial	2.3	0
Industrial	0.58	1
Residential	62.48	44

Region 3

Region 3 of the Belleview OSTDS to sewer expansion includes 607 parcels and 499 known septic tanks, within 270 acres bound by HWY 25 and US HWY 441. **Appendix B-3** provides an outline of the region as well as the proposed tie-in location to the existing wastewater collection system for the expansion recommended in Section 7.

The known land use acreage and the associated number of septic tanks per land use is provided in **Table 4**. The soil within this area consists of Candler Sand (0-5% slopes) and Arredondo Sand (0-5% slopes). Region 3 includes approximately 7.69 miles of 20-foot wide, paved road with a rural cross section in fair to poor condition.

Table 4: Region 3 Land Use		
Type	Acres	No. of Septic Tanks
Agricultural	9.46	1
Commercial	35.22	12
Government	0.8	0
Industrial	6.38	3
Institutional	3.92	2
Residential	204.52	474
Misc	6.96	7

The parcels within region 3 are not currently served by the City's water distribution system. Extending that water main within this region will require approximately 43,822 linear feet of water main, should the service be extended in the recommended horizontal location (**Appendix C-3**).

Region 4

Region 4 of the Belleview OSTDS to sewer expansion includes 217 parcels and 155 known septic tanks, within 143 acres. This region includes two neighborhoods; one north of SE 110th St Rd and the second off of SE 58th Ave. **Appendix B-4** provides an outline of the region as well as the proposed tie-in location, to the existing wastewater collection system, for the expansion recommended in Section 7.

The known land use acreage and the associated number of septic tanks per land use is provided in **Table 5**. The soil within this area consists of Candler Sand (0-5% slopes) and Arredondo Sand (0-5% slopes and 5-8% slopes). Region 4 includes approximately 3.39 miles of 20-foot wide, paved road with a rural cross section in good to excellent condition

Table 5: Region 4 Land Use		
Type	Acres	No. of Septic Tanks
Government	0.34	0
Residential	134.32	154
Misc	8.41	1

Region 5

Region 5 of the Belleview OSTDS to sewer expansion includes 341 parcels and 248 known septic tanks, within 190 acres bound by SE Babb Road, SE 122nd Lane, SE 57th Avenue, and US HWY 301. **Appendix B-5** provides an outline of the region as well as the proposed tie-in location to the existing wastewater collection system for the expansion recommended in Section 7.

The known land use acreage and the associated number of septic tanks per land use is provided in **Table 6**. The soil within this area consists of Candler Sand (0-5% slopes), Arredondo Sand (0-5% slopes), Kendrick Loamy Sand (0-5% slopes), Kanapaha Fine Sand (0-5% slopes), Hague-urban Land Complex (0-5% slopes), Arredondo-urban Land Complex (0-5% slopes) and Sparr Fine Sand (0-5% slopes. Region 5 includes approximately 3.58 miles of 20-foot wide, lime rock road with a rural cross section in fair to poor condition.

Table 6: Region 5 Land Use		
Type	Acres	No. of Septic Tanks
Commercial	25.23	6
Government	19.2	0
Institutional	3.27	2
Residential	136.56	238
Misc	2.7	2

Region 6

Region 6 of the Belleview OSTDS to sewer expansion includes 253 parcels and 212 known septic tanks, within 102 acres bound by SE 122nd Lane, SE 127th Lane, SE 155th Street, and US HWY 301. **Appendix B-6** provides an outline of the region as well as the proposed tie-in location to the existing wastewater collection system for the expansion recommended in Section 7.

The known land use acreage and the associated number of septic tanks per land use is provided in **Table 7**. The soil within this area consists of Arredondo Sand (0-5% slopes), Kendrick Loamy Sand (0-5% slopes), Hague Sand (0-5% slopes), and Sparr Fine Sand (0-5% slopes. Region 6 includes approximately 3.94 miles of 20-foot wide, paved road with a rural cross section in good to excellent condition.

Table 7: Region 6 Land Use		
Type	Acres	No. of Septic Tanks
Commercial	7.07	3
Institutional	9.31	2
Residential	81.34	204
Misc	3.64	3

The parcels within region 6 are not currently served by the City's water distribution system. Extending that water main within this region will require approximately 24,099 linear feet of water main, should the service be extended in the recommended horizontal location (**Appendix C-6**).

4. ENVIRONMENTAL REVIEW AND PROJECT JUSTIFICATION

Environmental Effects

There are currently 1,315 total OSTDSs within the six regions outlined as part of this project. All OSTDS to sewer regions (1-6) are located within a "high recharge" area, as designated by the SJRWMD, and the PFA, as designated by the BMAP.

The methodology used in this study for determining nutrient load reductions associated with the septic tank removal is recommended by the FDEP Springs Funding Guidance Document (**Appendix D**). This methodology was used to estimate nitrogen reductions associated with the removal of septic tanks and subsequent replacement with the recommended sewer collection system for each region. Additionally, this methodology involves first determining the septic tank nutrient load to groundwater, then determining the WWTF nutrient load to groundwater, and finally determining the net nutrient reduction associated with removing the septic tanks and sending the wastewater flows to the WWTF.

Septic Tank Nutrient Load to Groundwater

According to the FDEP methodology "a nutrient load to groundwater includes the nitrogen input to the land surface, an attenuation factor that accounts for removal that occurs in the soil, and a recharge factor that takes into account the annual rate of recharge to the aquifer."

Inputs of nitrogen are specific to the pollution sources being addressed. For the scope of this study, the pollution source is limited to septic tanks. Additionally, attenuation factors vary based on the nitrogen source. The recharge factors are based on available GIS coverages for the project area. The recharge factor is applied to the attenuated input.

Assumed input parameters used to calculate the TN load to groundwater from the septic tanks within each region include:

1. Septic system attenuation (drainfield + soil) leaching 50%. Multiplier = 0.5
2. Recharge factor equal to 0.9
3. Typical septic system TN input to the environment = 23.7 lbs/yr. This is based on 2.63 persons per household and 9.012 lbs / year per capita input of TN

The septic system nutrient load to groundwater is determined by multiplying the number of septic systems, the per-system input, the attenuation factor, and the recharge factor together. This resolves to the equation below.

$$Septic\ System\ TN\ Load\ (\frac{lbs}{yr}) = 1{,}315\ OSTDS\ X\ 23.7\frac{lbs}{yr}X\ 0.50\ X\ 0.9$$

Based on these assumptions and the methodology outlined above, it is estimated that **14,025 lb/yr** of TN is contributed to the groundwater from all 6 septic to sewer regions analyzed in this study. **Table 8** provides a breakdown of the nitrogen loading associated with each region while the complete calculations are provided in **Appendix E**.

WWTF Nutrient Load to Groundwater

In 2017 Belleview's WWTF effluent had an average concentration of 2.8 mg/L of TN according to the discharge monitoring reports (DMRs) that the City provides to FDEP in compliance with permit conditions. Assumed input parameters used to calculate the load to groundwater from the WWTF include the following:

1. Each OSTDS will contribute an average of 200 gallons per day of wastewater flow.
2. The WWTF will continue to produce effluent with a TN concentration of 2.8 mg/L
3. WWTF attenuation (reclaimed irrigation in low recharge area) leaching 25%. Multiplier = 0.25
4. Recharge factor equal to 0.1

The WWTF nutrient load to groundwater is determined by multiplying the wastewater flow input from septic systems to be connected, average effluent TN concentration, the attenuation factor, and the recharge factor together. This resolves to the equation below.

$$WWTP\ TN\ Load\ (\frac{lbs}{yr}) = 1{,}315\ OSTDS\ X\ 200\ gpd\ X\ 2.8\frac{mg}{l}\ X\ 0.25\ X\ 0.1$$

Please note the required conversion factors are not included in this formula. Based on these assumptions and the methodology discussed above, it is estimated that the WWTF would contribute an additional **57 lbs/yr** of TN to groundwater. This additional contribution is a result of conveying the wastewater flows from the residences within the six septic to sewer regions to the WWTF. These calculations are summarized in **Table 8** while the complete calculations are provided as **Appendix E**.

Net Nutrient Reduction Associated with the Septic to Sewer Projects

The net nutrient reduction of TN flowing to the groundwater is defined as the difference between the septic tank nutrient load to groundwater and the WWTF nutrient load to groundwater. The septic to sewer projects associated with the six regions analyzed in this study will result in a **net nutrient reduction of 13,968 lbs/yr** of TN. The septic to sewer projects associated with this study will meet 7 percent of the TN reduction goal for the Silver Springs and Upper Silver River BMAP.

Table 8: Total Nitrogen Reduction Summary

	Number of OSTDS	OSTDS TN Load to Groundwater (lbs/yr)	WWTF TN Load to Groundwater (lbs/yr)	TN Reduction from OSTDS to Sewer Project (lb/yr)
Region 1	156	1664	7	1,604
Region 2	45	480	2	463
Region 3	499	5322	21	5,130
Region 4	155	1653	7	1,593
Region 5	248	2645	11	2,550
Region 6	212	2261	9	2180
Total	1,315	14,025	57	13,520

Potential Nutrient Loading without Septic to Sewer Projects

Without the extension of the Belleview sewer system to all six regions of the proposed projects septic tanks will be installed as the area is built out. Assuming all lots within these regions will contain a septic tank at build out the nitrogen loading to groundwater within this high recharge area has the potential to increase from 14,025 lbs/yr to 19,453 lb/yr.

Table 9: Total Nitrogen Reduction Summary without Septic to Sewer				
	Number of OSTDS	OSTDS TN Load to Groundwater (lbs/yr)	WWTF TN Load to Groundwater (lbs/yr)	TN Reduction from OSTDS to Sewer Project (lb/yr)
Region 1	199	2122	76	2,046
Region 2	207	2208	79	2,129
Region 3	607	6474	233	6,241
Region 4	217	2314	83	2,231
Region 5	341	3637	131	3,506
Region 6	253	2698	97	2601
Total	1,824	19,453	699	18,754

Environmental Assessment

A list of species potentially occurring within the project vicinity was reviewed using Florida Natural Areas Inventory (FNAI), Florida Fish and Wildlife Conservation Commission (FWC), and US Fish and Wildlife Service (USFWS) databases. Based on the findings, a listing of the state and federally listed species potentially occurring within the immediate vicinity of the project site has been compiled.

There are no bald eagle nests or wading bird rookeries within two miles of the project site. Additionally, the project site is not within the core foraging areas for any wood stork colonies. The project site does have the potential for having Sherman's fox squirrels, Florida burrowing owls, eastern indigo snakes, and the gopher tortoise, in addition, the project site is located within the USFWS consultation areas for the Florida scrub-jay, sand skink, and Lake Wales Ridge plant species. Surveys or coordination with FWC and/or USFWS are recommended for those species.

Additional data was reviewed through the National Wetland Inventory (NWI) and the Natural Resources Conservation Service (NRCS) for potential on-site wetlands, hydrologic conditions, and hydric soil. Most of the land use types within the project boundary are considered upland habitat. However, scattered wetlands and surface waters have been documented by the NWI, adjacent to portions of the project site (**Appendix F**). A formal wetland delineation is recommended as the project moves forward to determine what actions may be required to limit project impacts to wetlands.

5. ALTERNATIVE ANALYSIS

Alternatives Considered – Background

When determining the feasibility of transferring wastewater flows from on-site septic and disposal systems to Belleview's WWTF, conventional gravity sewer, low-pressure grinder sewer, and vacuum sewer were considered as alternatives for wastewater conveyance. All three of these alternatives rely on the downstream treatment facility for treatment of all wastewater collected (i.e. no treatment takes place on site).

Gravity Sewer

Conventional gravity sewer has often been the standard for wastewater collection systems due to their low operation and maintenance cost and proven reliability. These systems require no moving parts to collect and convey wastewater from residential and commercial properties. Gravity sewer systems are governed by a series of design standards, listed below, that determine pipe size, slope, depth of bury, number of manholes, and service lateral connections. For gravity sewer to function properly, the collection system must be designed to maintain minimum slopes to ensure that minimum flow velocities are achieved when flowing full or partially full. This requirement, paired with the topography of the land surface governs the feasibility of gravity sewer. Minimum pipe slope and cover limit the horizontal distance that gravity sewer can be installed as construction no longer becomes safe or cost-effective as certain depths are required. Gravity sewer systems can routinely require installation depths from 6 feet to 15 feet, and in extreme cases depths of 30 feet or more may be necessary. Additionally, gravity sewer requires the installation of manholes at regular specified intervals, changes in grade, and pipe intersections. This allows for sufficient access for maintenance and prevents clogging during use but adds considerable cost to the project. Gravity sewers are typically located within the middle of the roadway or as close to the middle as the design parameters allow.

Lift Stations are required at low points in the design when minimum slopes can no longer be maintained, depth of bury is not feasible, or where existing infrastructure must be avoided. When lift stations are required, subsequent force mains will also be needed to convey the collected wastewater to the point of connection to the existing system or to the WWTF.

Low-Pressure Grinder Sewer

Low-pressure grinder sewer utilizes small volume sump and pump vaults at each residential or commercial connection. Each vault is equipped with grinder pumps that mince solids entering the sump into small particles. This mincing causes the solids to mix with the liquid waste, creating a slurry. This slurry is then pumped through a small diameter pressure line to a master lift station (if further conveyance is required) or directly to the WWTF. Force mains for low pressure grinder systems typically are 2 inches to 3 inches but can be as large as 4 inches to 6 inches. Grinder pumps for residential applications typically range in size from 0.5-2 hp, with flow rates between 9-14 gallons per minute (gpm), as reported by William T. Hensley, International Territory Manager, Orenco Systems, Inc. Grinder sewer can accommodate hilly or mostly flat terrain as the slurry is conveyed under pressure. Additionally, the depth of bury of the force main is a standard 30 inches to 36 inches. This depth coupled with the small diameter makes installing these mains more economical than most systems. The grinder pump vaults are typically located on private property due to limited right-of-way area. This requires easements for the pump vaults. The grinder pumps are also typically owned by the City while the electricity is paid for by the property owner.

Lastly, when considering low-pressure grinder sewer for areas undergoing development or where the number of connections will slowly increase over time, maintaining sufficient or consistent pressure in the small force mains may be problematic. This is due to the limitations of the low-pressure pumps coupled with the size of the force mains required to maintain cleansing velocity. These systems rely on the combined pumping capacity of the built-out system to function properly and convey wastewater the distances needed to connect to an existing system.

Vacuum Sewer

In a vacuum sewer system, the wastewater from each residential or commercial property flows into a sump and valve pit. When the liquid level in the sump reaches a specific level, a vacuum valve in the pit automatically opens, allowing the discharge of a predefined volume of both wastewater and air into the mainline. The mainline in a vacuum sewer is laid in a saw tooth pattern which is designed to maintain a downward slope toward the vacuum station. Essentially vacuum systems are vacuum assisted gravity systems. The sawtooth profile ensures that an open passage of air between the vac uum station and the interface valves is maintained throughout the piping network. This provides the maximum differential pressure at the interface valves to ensure self-cleansing of the valves as well as maximum energy input to the vacuum mains. The vacuum sewer mainline terminates at a central vacuum lift station, which maintains the vacuum in the system. The wastewater enters the pump station and is collected in a holding tank until it is transferred by a pump through a force main to the WWTF.

To better understand how these sewer alternatives operate and what should be considered when selecting an alternative, **Table 10** provides an overview comparison of these wastewater conveyance methods.

Table 10: Alternative Comparisons

	Gravity Sewer	Vacuum Sewer	Low-Pressure Grinder Sewer
Power Requirements	Electricity required only at the Pump Station, and several pump stations may be required to service a single area.	Power is required only at the Pump Station. A single pump station is usually all that is required to cover a large area. Pumps only run on average 3 hours per day so power use is lower than alternative systems.	Grinder Pumps require power at each unit. This requires each home or business owner pay for the power. Existing houses may need to upgrade electrical mains and power board. Some pumps require constant power. Systems that require transfer pump stations will require high total power use.
Connections	No restrictions on connections.	Usually 2-4 homes are connected to a single collection valve pit, though larger flows from a gravity area can be accommodated into a multiple collection pit. Hotels, schools and high flow areas can be serviced by a buffer tank.	One pump is required per house. If the house is large or commercial flows are anticipated, then a larger capacity pump may be required. Camping grounds and high flow situations are not recommended.
Leak Detection/Exfiltration	A broken pipe will go unnoticed for many months and the depth of the gravity lines will make detection difficult and expensive to repair.	Since vacuum is maintained within the mains at all times there is no chance of exfiltration of sewage.	As all pipework is under pressure then a break in the pipe may lead to large spills. Not suitable in environmentally sensitive areas.

Infiltration	Broken pipe can go unrepaired for long periods allowing stormwater to enter the system. This increases Treatment costs and power use.	Any leak in a vacuum main or valve pit will result in a vacuum drop which will register at the station immediately. Infiltration will occur until the leak is located but that is typically within 30-60 minutes of the vacuum drop being detected.	Infiltration is not common within a pressurized system.
Maintenance and Serviceability	High initial costs but low long-term O&M costs. Gravity sewer may require occasional jetting. Additional Maintenance would also include repair and coating of manholes. Access is typically not an issue as all infrastructure is located under roadways or within city property/utility easements.	Maintenance primarily involves replacement of the vacuum valves, and maintenance of the vacuum pumps. High scouring velocities in the system reduce risk of blockage. Most of the maintenance occurs at the vacuum station	Most maintenance requires the pump to be lifted out. An electrician is needed to be part of the service team. Access is difficult as all equipment is on the homeowner's property (utility easements are recommended).

Design Criteria

Gravity Sewer

Gravity sewer systems are designed and administrated utilizing the FDEP guidelines and permit application requirements for constructing a domestic wastewater collection / Transmission System. These administration and design guidelines are found in chapter 62-400.400 of the Florida Administrative Code and are further detailed in form 62-604.300 (8)(a). Additionally, the City of Belleview has additional guidelines found in the City Code of Ordinances. The basic design process involves the following steps.

1. Collect and compile existing data within the project area. This includes as-built information of existing utilities within the ROW, GIS data, topographic data, soils data, location of dwellings, water use (if available), and septic tank data.
2. Determine the permitting requirements and design regulations (see below).
3. Begin coordination with other existing utilities within the ROW.
4. Conduct field survey for supplemental topography, soft digs of existing utilities (if needed), existing dwelling finish floors, septic tank locations, and sewer cleanout locations.
5. Prepare a preliminary layout of the gravity sewer system including minimum slopes and depths of cover, controlling pipe runs, and manhole locations.
6. Prepare a preliminary layout of the lift station and force main layout including lift station location and force main route to connect to existing wastewater system.
7. Import preliminary sewer layout into a modeling software capable of gravity and pressure flow simulations. Model the project area at full buildout and size gravity mains, force mains, and lift stations accordingly. Comply with local regulations for system function.

8. Prepare final design plans based on the modeled results and engineering evaluations.
9. Submit for permits.

Typical design guidelines for gravity sewer layout include the following:

1. Gravity sewer shall be located under pavement (Marion County Land Development Code (MCLDC) Sec. 6.16.4.A).
2. All new gravity sewer to be installed is 8-inch in diameter.
3. Minimum flow velocity of 2 feet per second (fps) when flowing full (MCLDC Sec. 6.16.4.B).
4. Minimum slope to maintain minimum flow velocity for 8-inch gravity equal to 0.40 feet per 100 feet (MCLDC Sec. 6.16.4.B).
5. Minimum cover over gravity sewers shall be no less than 3 feet calculated from the finished grade (MCLDC Sec. 6.16.4.B).
6. Manholes shall be installed as follows (MCLDC Sec. 6.16.4.C):
    a. the end of each gravity sewer,
    b. all changes in grade, size or alignment,
    c. all sewer intersections,
    d. at distances not greater than 400 feet (350 feet used as typical minimum design),
    e. minimum diameter of 4 feet.

Typical design guidelines for force main and lift station layout include the following:

Lift station guidelines

1. Design capacities are based on peak hourly flow
2. Pumps maintain a minimum velocity of 2 fps in the force mains
3. Wet well volume is based on design average flows and a filling time not to exceed 30 minutes
4. Wet well floors have a minimum slope of 1 to 1 to the hopper bottom
5. Adequate ventilation and odor control is provided
6. Designed with a fenced enclosure around the pump station
7. Pumps alternate lead and lag rolls on cycling
8. Designed with high water alarms allowing for sufficient response time of maintenance personnel to reach the station before a spill

Force main guidelines

1. Designed to maintain, at design pumping rates, a cleansing velocity of at least 2 fps
2. Isolation valves every 750 to 1000 linear feet and where needed to appropriately isolate the branches and system
3. Air relief valves placed at all high points and at the ends of all directional drills
4. A C-value that does not exceed 120

Low-Pressure Grinder Sewer

Pressure systems are typically administrated in the same manner as gravity sewers or treatment facilities. The city will maintain ownership and responsibility for all components of the pressure sewer system. As referenced in the 1981 Design and Specification Guidelines for Low Pressure Sewer Systems, prepared by a Technical Advisory Committee for the State of Florida Department of Environmental Regulations, the design sequence for this system will be as follows:

1. Determine required data where possible for the planning area including the location of dwellings, population (present and design), water use, soils profiles, groundwater and surface water characteristics, present wastewater disposal facilities and problem locations, climate, and topography.

2. Determine location and condition of existing septic tank systems, where applicable.

3. Prepare a preliminary layout of pressure sewer mains based on minimized pipe lengths to sewer design population, the cost-effectiveness of serving fringe units (where applicable) which require long piping reaches vs. continued or modified on-site system service, potential for phasing construction of feeder mains and the potential for multiple service pressurization units (PU's).

4. Locate and determine minimum quantity of air-release and pressure-sustaining valves, in-line and terminal cleanouts and mainline shut-off valves.

5. Analyze alternative on-lot systems with respect to PU, control and alarm equipment, contingency systems, residuals disposal plan, and capital and operating costs. Determine most cost-effective generic type system and potential for phasing.

6. Where available determine design flows, theoretical flow patterns, and type of equipment chosen based on present local data.

7. Perform hydraulic analysis to determine final pipe sizes, transition points, valve and cleanout locations and anticipated needs.

The following design guidance and standards are recommended to ensure a properly functioning system:

1. Size wet wells for sufficient reserve capacity and hydraulic characteristics. Residential installations generally have a reserve capacity of approximately 50 gallons.

2. An ideal layout would include a consistently upward grade from its farthest point to its terminus. This would eliminate the need for air release valves, pressure sustaining valves, etc.

3. Pressure mains shall be sized to accommodate areas undergoing development.

4. Residential units, accommodating a single dwelling, should have a designed peak flow of 15 gpm.

5. Minimum required peak design velocity for grinder systems shall be 2.5 fps to provide sufficient scouring of the system.

Vacuum Sewer

Vacuum sewer systems are designed and administered in accordance with the 10 State Standards. FDEP has adopted a design check list for vacuum sewer design which is found in the **Appendix I**. Vacuum sewers are mechanized systems for wastewater transport that utilize differential air pressure and gravity to move sewage. Vacuum sewer mains are designed to maintain a generally downward slope toward the vacuum station and are vacuum-assisted gravity pipe networks. The major vacuum system components are sized according to peak flow. To facilitate this process, a catalog of land uses and resultant sewage flows should be compiled. The following are typical design criteria necessary for vacuum sewers:

1. Vacuum sewer systems are sized based on the number of connections and the type of connections (residential, commercial, etc.).

2. Vacuum pumps are ideally positioned above the vacuum tank to prevent the introduction of any fluid to the vacuum pumps.

3. The vacuum tank is for full buildout plus any perceived development.

4. The force main pumps are sized to meet traditional flow and total dynamic head characteristics and to meet the net positive suction head requirements to pull wastewater out of the vacuum tank.

5. Vacuum mains are first sized for adequate sewage flow and then sized to maintain proper vacuum levels throughout the system.

6. Vacuum mains are laid out in runs; no looping of runs is permitted.

7. Each vacuum main run is hydraulically analyzed to ensure proper flow in the pipe.

8. Minimum vacuum main slope is 0.20%.

9. The minimum slope must be held entering and exiting each lift.

10. Lifts are placed as needed to maintain minimum pipe depth and to facilitate proper function of the vacuum hydraulics.

11. Flows on a natural downhill grade do not require lifts on slopes less than 2000 linear feet.

12. Hydraulic evaluations consider the diameter of pipe, length of pipe run, number of lifts, number of valve pit connections, and elevation differences.

13. Valve pits are sized to allow for the service lateral to tie in as needed.

Net Present Worth Analysis

Section 602(b)(13) of the Federal Water Pollution Control Act was amended by the Water Resources Reform and Development Act in 2014 to require the study and evaluation of the cost and effectiveness of the process, materials, techniques, and technologies for carrying out the proposed project to be funded with Clean Water SRF (CWSRF) assistance. The result of this analysis is used to determine the cost effectiveness of a project during SRF funding review. To support this requirement, the net present worth (NPW) of each technically feasible alternative has been calculated. The NPW is the sum of the capital costs plus the uniform series present worth factor (USPWF) multiplied by the annual operation and maintenance (O&M) costs minus the single payment present worth factor (SPPWF) multiplied by the salvage value. As this planning document considers a project planning period longer than 20 years, it is also necessary to incorporate replacement costs (R) into the NPW calculation as follows:

$$NPW = Captial\ Cost + (USPWF \times\ Annual\ O\&M) + (SPPWF \times R) - (SPPWF \times\ Salvage)$$

The annual O&M costs were determined using comparable budgets and costs incurred by local utilities. These were further supported by vendor literature. The USPWF, used to covert annual O&M costs to present day dollars is a function of the discount rate and number of years in the planning period, is calculated as provided below. This master planning document will consider a planning period (n) of 30 years. The discount rate (i) used for this analysis is 0.7%, the “real” discount rate taken from the 2018 Appendix C of the OMB circular A-94. This Appendix is updated annually by the federal government.

$$USPWF = \frac{(1+i)^n - 1}{i \times (1+i)^n}$$

The salvage value of the constructed project is estimated using the anticipated life expectancy of the constructed items using straight line depreciation calculated at the end of the planning period and converted to present day dollars using the SPPWF. The SPPWF is a function of the discount rate (i), described above, and the year (n) at the end of which salvage value is estimated or a replacement cost is incurred.

$$SPPWF = (1+i)^{-n}$$

The life expectancy, or useful life, of each constructed component is provided in 62-503.200(36), F.A.C. as follows:

- Land = 100 years
- Conveyance pipes = 50 years
- Structures (buildings and tankage) = 30 to 50 years
- Process equipment = 15 to 20 years
- Auxiliary equipment such as generators and controls = 10 to 15 years

A cost effectiveness table will be provided for each alternative in Section 6 of this report, summarizing the capital costs, annual O&M cost, salvage value, present worth of each of these values, and the NPW.

6. ALTERNATIVE DESCRIPTION BY REGION

Region 1

Converting septic to sewer flow in region 1 using conventional gravity sewer will require the installation of 22,535 linear feet of gravity sewer and 76 manholes. These collected flows would be routed to 2 lift stations, as required by the size and topography of the region. The lift stations would then pump the regional flows through 6,382 linear feet of 6" force main (estimated size) to an existing gravity sewer manhole on US Highway 441. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 9 valves. The city would need to purchase two utility easements for the installation of the lift stations, equaling a total of approximately 0.12 acres in land acquisition. The construction of the gravity sewer system will require the repair and/or addition of approximately 4.27 miles of paved road. A summary of the proposed gravity sewer inventory in provided in **Table 11**.

Table 11: Region 1 - Gravity Sewer Inventory		
DESCRIPTION	QTY	UNIT
8" Gravity	22,535	LF
Manhole	76	Each
Lift Station	2	Each
Force Main	6,382	LF
Valve (FM)	9	EA
Road Repair	4.27	Mile
Land Acquisition	0.12	Acre

A low-pressure grinder system in Region 1 will require 198 grinders (one for each lot) and 22,535 linear feet of 2-inch force main. A 2-inch isolation valve will be required at the connection of every grinder and the intersections of 2-inch force main, for a total of 208 isolation valves. These flows will be routed to a single lift station that will pump into 2,752 linear feet of 6-inch force main (estimated size) to an existing gravity sewer manhole on US Highway 441. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 4 valves. As it is recommended that the City own and maintain each grinder, while the homeowner provides the electricity, the City will need to acquire individual utility easements for each lot. Easements will also need to be obtained for the master lift station, resulting in a required land acquisition of 0.456 acres. The construction of the low-pressure grinder sewer system will require the repair and/or addition of approximately 4.79 miles of paved road. A summary of the proposed low-pressure grinder sewer inventory in provided in **Table 12**.

Table 12: Region 1 - Low-Pressure Sewer Inventory		
DESCRIPTION	QTY	UNIT
2" Force Main	22,535	LF
Grinders	198	Each
Lift Station	1	Each
Force Main	2,752	LF
Valve (FM)	4	Each
2" Isolation Valve	208	Each
Road Repair	4.79	Mile
Land Acquisition	0.46	Acre

The installation of vacuum sewer in Region 1 will require 82 valve pits (to be shared amongst all of the lots). These pits will be placed along vacuum mains of various diameter to provide maximum differential pressure within the network. The required length of vacuum main for Region 1 is summarized in **Table 13**, with a complete inventory of all infrastructure required for this alternative. The vacuum mains will flow to a single vacuum station that will pump to 2,752 linear feet of 6-inch force main (estimated size). This force main will discharge) to an existing gravity sewer manhole on US Highway 441. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 4 valves. The purchase of a utility easement will be required at the vacuum station location, having a total land acquisition requirement of 0.06 acres. The construction of the vacuum sewer system will require the repair and/or addition of approximately 5.12 miles of paved road.

Table 13: Region 1 - Vacuum Sewer Inventory		
DESCRIPTION	QTY	UNIT
4" Vacuum Main	17,944	LF
6" Vacuum Main	3,606	LF
8" Vacuum Main	2,652	LF
10" Vacuum Main	82	LF
Vacuum Station	1	Each
Valve Pit	89	Each
6" Force Main	2,752	LF
Valve (FM)	4	Each
Road Repair	5.12	Mile
Land Acquisition	0.06	Acre

If the City of Belleview decided not to extend their sewer service to this region the residents in this region would be required to install enhanced septic tanks (for nitrogen removal) as additional lots were developed and as existing septic tanks required replacement. The Florida Springs Protection Act and the BMAP mandate the requirement for enhanced septic tanks within the PFA on lots smaller than 1 acre. Assuming all septic tanks will require replacement in the next 30 years and all areas of this region will be developed, the residents in this region will be responsible for funding the installation of 199 enhanced septic systems. The FDOH completed an Evaluation of Prototype Passive Nitrogen Reduction Systems (PNRS) and Recommendations for Future Implementations Vol. I in 2015. This report found that PNRS, or enhanced septic tanks, will cost an average of $17,726 per system, ranging in price from $10,399 to $32,116. As the Belleview residents will incur this cost, it is important to consider this alternative to the cost incurred to the residents over a 30-year period for central sewer installation.

The parcels within the region are not currently served by the City’s water distribution system. Extending water service within this region will require approximately 47,753 linear feet of water main, assuming the service will be installed in the recommended horizontal location (**Appendix C-1**).

An opinion of probable cost (OPC) and subsequent net present worth was calculated for each alternative. The total capital costs are provided to assist the City with planning and funding, a detailed OPC can be found in **Appendix G-1**. The net present worth is provided as it will be used to compare alternatives during the SRF review process (detailed in **Appendix H-1**). A summary of this information is provided in **Table 14**.

Table 14: Region 1 – Opinion of Probable Cost and Net Present Worth Summary

GRAVITY SEWER PROJECT COST		LOW-PRESSURE GRINDER SEWER PROJECT COST		VACUUM SEWER PROJECT COST		DO NOTHING PROJECT COST	
Sewer Capital Cost Subtotal	$5,173,616	Sewer Capital Cost Subtotal	$5,375,502	Sewer Capital Cost Subtotal	$4,922,144	Total Cost to Install Enhanced Septic (199 Tanks)	$3,527,474
30% Contingency	$1,552,085	30% Contingency	$1,612,651	30% Contingency	$1,476,643		
Design, Permitting and Const. Phase	$1,034,723	Design, Permitting and Const. Phase	$1,075,100	Design, Permitting and Const. Phase	$984,429		
SEWER CAPITAL COST TOTAL	$7,760,424	SEWER CAPITAL COST TOTAL	$8,063,253	SEWER CAPITAL COST TOTAL	$7,383,215		
ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$4,775,300	Water Capital Cost Subtotal	$4,775,300	Water Capital Cost Subtotal	$4,775,300	Water Service Not Provided w/o Sewer	NA
30% Contingency	$1,432,590	30% Contingency	$1,432,590	30% Contingency	$1,432,590		
Design, Permitting and Const. Phase	$955,060	Design, Permitting and Const. Phase	$955,060	Design, Permitting and Const. Phase	$955,060		
WATER CAPITAL COST TOTAL	$7,162,950	WATER CAPITAL COST TOTAL	$7,162,950	WATER CAPITAL COST TOTAL	$7,162,950		
GRAND TOTAL	**$14,923,374**	**GRAND TOTAL**	**$15,226,203**	**GRAND TOTAL**	**$14,546,165**	**GRAND TOTAL TO CITIZENS**	**$3,527,474**
NET PRESENT WORTH	**$6,983,996**	**NET PRESENT WORTH**	**$8,614,868**	**NET PRESENT WORTH**	**$8,289,502**	**NET PRESENT WORTH**	**NA**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Region 2

Installing conventional gravity sewer to replace the use of septic tanks in Region 2 will require 10,061 linear feet of gravity sewer and 36 manholes. These collected flows would be routed to a single lift station. The lift stations would then pump the regional flows through 1,713 linear feet of 6-inch force main (estimated size) to existing gravity sewer on US Highway 441. Alternatively, the force main may be manifolded into the existing 6-inch force main along US Highway 441. Valves would be installed along the force main at 750-foot intervals, requiring a total of 2 valves. The city would need to purchase a utility easement for the installation of the lift station as well as 30-foot utility easements between 4 lots. The total land acquisition required is equal to approximately 0.29 acres. The construction of the gravity sewer system will require the repair of approximately 1.91 miles of paved road. A summary of the proposed gravity sewer inventory in provided in **Table 15**.

Table 15: Region 2 - Gravity Sewer Inventory		
DESCRIPTION	QTY	UNIT
8" Gravity	10,061	LF
Manhole	36	Each
Lift Station	1	Each
Force Main	1,713	LF
Valve (FM)	2	Each
Road Repair	1.91	Mile
Land Acquisition	0.29	Acre

A low-pressure grinder system in Region 2 will require 207 grinders (one for each lot) and 10,061 linear feet of 2-inch force main. A 2-inch isolation valve will be required at the connection of every grinder and the intersections of 2-inch force main, for a total of 217 isolation valves. These flows will be routed to a single lift station that will pump into 1,713 linear feet of 6-inch force main (estimated size) to existing gravity sewer on US Highway 441. Alternatively, the force main may be manifolded into the existing 6-inch force main along US Highway 441. Valves would be installed along the force main at 750-foot intervals, requiring a total of 2 valves. As it is recommended that the City own and maintain each grinder, while the homeowner provides the electricity, the City will need to acquire individual utility easements for each lot. Easements will also need to be obtained for the master lift station, resulting in a required land acquisition of 0.47 acres. The construction of the low-pressure grinder sewer system will require the repair of approximately 2.23 miles of paved road. A summary of the proposed low-pressure grinder sewer inventory in provided in **Table 16**. Additional consideration should be paid to the final design of this system, should the low-pressure sewer system be selected. This is residential area that is not fully developed so the design will need to allow for significant growth in the future.

Table 16: Region 2 - Low-Pressure Sewer Inventory		
DESCRIPTION	QTY	UNIT
2" Force Main	10,061	LF
Grinders	207	Each
Lift Station	1	Each
Force Main	1,713	LF
Valve (FM)	2	Each
2" Isolation Valve	217	Each
Road Repair	2.23	Mile
Land Acquisition	0.47	Acre

The installation of Vacuum sewer in Region 2 will require 93 valve pits (to be shared amongst all of the lots). These pits will be placed along vacuum mains of various diameter to provide maximum differential pressure within the network. The required length of vacuum main for Region 2 is summarized in **Table 17**, with a complete inventory of all infrastructure required for this alternative. The vacuum mains will flow to a single vacuum station that will pump to 1,713 linear feet of 6-inch force main (estimated size). This force main will discharge to an existing gravity sewer manhole on US Highway 441. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 4 valves. The purchase of a utility easement will be required at the vacuum station location, having a total land acquisition requirement of 0.06 acres. The construction of the vacuum sewer system will require the repair and/or addition of approximately 2.21 miles of paved road.

Table 17: Region 2 - Vacuum Sewer Inventory

DESCRIPTION	QTY	UNIT
4" Vacuum Main	4,730	LF
6" Vacuum Main	2,564	LF
8" Vacuum Main	2,595	LF
10" Vacuum Main	80	LF
Vacuum Station	1	Each
Valve Pit	93	Each
6" Force Main	1,713	LF
Valve (FM)	2	Each
Road Repair	2.21	Mile
Land Acquisition	0.06	Acre

If the City of Belleview decided not to extend their sewer service to this region the residents in this region would be required to install enhanced septic tanks (for nitrogen removal) as additional lots were developed and as existing septic tanks required replacement. The Florida Springs Protection Act and the BMAP mandate the requirement for enhanced septic tanks within the PFA on lots smaller than 1 acre. Assuming all septic tanks will require replacement in the next 30 years and all areas of this region will be developed, the residents in this region will be responsible for funding the installation of 207 enhanced septic systems. The Florida Health Department completed an Evaluation of Prototype Passive Nitrogen Reduction Systems (PNRS) and Recommendations for Future Implementations Vol. I in 2015. This report found that PNRS, or enhanced septic tanks, will cost an average of $17,726 per system, ranging in price from $10,399 to $32,116. As the Belleview residents will incur this cost, it is important to consider this alternative to the cost incurred to the residents over a 30-year period for central sewer installation.

The parcels within Region 2 are not currently served by the City's water distribution system. Extending that water main within this region will require approximately 11,128 linear feet of water main, assuming the service will be installed in the recommended horizontal location (**Appendix C-2**).

An opinion of probable cost (OPC) for each alternative and subsequent net present worth was calculated. The total capital costs are provided to assist the City with planning and funding, a detailed OPC can be found in **Appendix G-2**. The net present worth is provided as it will be used to compare alternatives during the SRF review process (detailed in **Appendix H-2**). A summary of this information is provided on the following page in **Table 18**.

Table 18: Region 2 – Opinion of Probable Cost and Net Present Worth Summary

GRAVITY SEWER PROJECT COST		LOW-PRESSURE GRINDER SEWER PROJECT COST		VACUUM SEWER PROJECT COST		DO NOTHING PROJECT COST	
Sewer Capital Cost Subtotal	$2,119,714	Sewer Capital Cost Subtotal	$3,115,920	Sewer Capital Cost Subtotal	$2,797,193	Total Cost to Install Enhanced Septic (207 Tanks)	$3,669,282
30% Contingency	$635,914	30% Contingency	$934,776	30% Contingency	$839,158		
Design, Permitting and Const. Phase	$423,943	Design, Permitting and Const. Phase	$623,184	Design, Permitting and Const. Phase	$559,439		
SEWER CAPITAL COST TOTAL	$3,179,571	SEWER CAPITAL COST TOTAL	$4,673,880	SEWER CAPITAL COST TOTAL	$4,195,790		
ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$1,112,800	Water Capital Cost Subtotal	$1,112,800	Water Capital Cost Subtotal	$1,112,800	Water Service Not Provided w/o Sewer	NA
30% Contingency	$333,840	30% Contingency	$333,840	30% Contingency	$333,840		
Design, Permitting and Const. Phase	$222,560	Design, Permitting and Const. Phase	$222,560	Design, Permitting and Const. Phase	$222,560		
WATER CAPITAL COST TOTAL	$1,669,200	WATER CAPITAL COST TOTAL	$1,669,200	WATER CAPITAL COST TOTAL	$1,669,200		
GRAND TOTAL	**$4,848,771**	**GRAND TOTAL**	**$6,343,080**	**GRAND TOTAL**	**$5,864,990**	**GRAND TOTAL TO CITIZENS**	**$3,669,282**
NET PRESENT WORTH	**$2,825,957**	**NET PRESENT WORTH**	**$5,094,785**	**NET PRESENT WORTH**	**$3,438,810**	**NET PRESENT WORTH**	**NA**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Region 3

Replacing septic tanks in Region 3 with conventional gravity sewer will require the installation of 38,042 linear feet of gravity sewer and 146 manholes. These collected flows would be routed to 5 various lift stations, as required by the topography of the region and limited length of gravity sewer (due to constructability depth). The lift stations would then pump the regional flows through a total of 9,033 linear feet of 6-inch force main (estimated size) to existing gravity sewer on US Highway 441. Valves would be installed along the force main at 750-foot intervals, requiring a total of 12 valves. The City would need to purchase a utility easement for the installation of each of the lift stations, requiring a total land acquisition of approximately 0.30 acres. The construction of the gravity sewer system will require the repair of approximately 8.92 miles of paved road. A summary of the proposed gravity sewer inventory in provided in **Table 19**.

Table 19: Region 3 - Gravity Sewer Inventory		
DESCRIPTION	QTY	UNIT
8" Gravity	38,042	LF
Manhole	146	Each
Lift Station	5	Each
Force Main	9,033	LF
Valve (FM)	12	Each
Road Repair	8.92	Mile
Land Acquisition	0.30	Acre

A low-pressure grinder system in Region 3 will require 607 grinders (one for each lot) and 38,042 linear feet of 2-inch force main. A 2-inch isolation valve will be required at the connection of every grinder and the intersections of 2-inch force main, for a total of 637 isolation valves. These flows will be routed to 3 lift stations, due to the size of the region, that will pump into 5,450 linear feet of 6-inch force main (estimated size) to existing gravity sewer on US Highway 441. Valves would be installed along the force main at 750-foot intervals, requiring a total of 7 valves. As it is recommended that the City own and maintain each grinder, while the homeowner provides the electricity, the City will need to acquire individual utility easements for each lot. Easements will also need to be obtained for the master lift station, resulting in a required land acquisition of 1.39 acres. The construction of the low-pressure grinder sewer system will require the repair of approximately 8.24 miles of paved road. A summary of the proposed low-pressure grinder sewer inventory in provided in **Table 20**.

Table 20: Region 3 - Low-Pressure Sewer Inventory		
DESCRIPTION	QTY	UNIT
2" Force Main	38,042	LF
Grinders	607	Each
Lift Station	3	Each
Force Main	5,450	LF
Valve (FM)	7	Each
2" Isolation Valve	637	Each
Road Repair	8.24	Mile
Land Acquisition	1.39	Acre

The installation of vacuum sewer in Region 3 will require 253 valve pits (to be shared amongst all of the lots). These pits will be placed along vacuum mains of various diameter to provide maximum differential pressure within the network. The required length of vacuum main for Region 3 is summarized in **Table 21**, with a complete inventory of all infrastructure required for this alternative. The vacuum mains will flow to a single vacuum station that will pump to 2,988 linear feet of 6-inch force main (estimated size). This force main will discharge to an existing gravity sewer manhole on US Highway 441. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 4 valves. The purchase of a utility easement will be required at the vacuum station location, having a total land acquisition requirement of 0.06 acres. The construction of the vacuum sewer system will require the repair and/or addition of approximately 8.44 miles of paved road.

Table 21: Region 3 - Vacuum Sewer Inventory		
DESCRIPTION	QTY	UNIT
4" Vacuum Main	22,322	LF
6" Vacuum Main	11,729	LF
8" Vacuum Main	7,467	LF
10" Vacuum Main	62	LF
Vacuum Station	1	Each
Valve Pit	253	Each
6" Force Main	2,988	LF
Valve (FM)	4	Each
Road Repair	8.44	Mile
Land Acquisition	0.06	Acre

If the City of Belleview decided not to extend their sewer service to this region the residents in this region would be required to install enhanced septic tanks (for nitrogen removal) as additional lots were developed and as existing septic tanks required replacement. The Florida Springs Protection Act and the BMAP mandate the requirement for enhanced septic tanks within the PFA on lots smaller than 1 acre. Assuming all septic tanks will require replacement in the next 30 years and all areas of this region will be developed, the residents in this region will be developed, the residents will be responsible for funding the installation of 607 enhanced septic systems. The Florida Health Department completed an Evaluation of Prototype Passive Nitrogen Reduction Systems (PNRS) and Recommendations for Future Implementations Vol. I in 2015. This report found that PNRS, or enhanced septic tanks, will cost an average of $17,726 per system, ranging in price from $10,399 to $32,116. As the Belleview residents will incur this cost, it is important to consider this alternative to the cost incurred to the residents over a 30-year period for central sewer installation.

The parcels within Region 3 are not currently served by the City's water distribution system. Extending that water main within this region will require approximately 43,822 linear feet of water main, assuming the service will be installed in the recommended horizontal location (**Appendix C-3**).

An opinion of probable cost (OPC) for each alternative and subsequent net present worth was calculated. The total capital costs are provided to assist the City with planning and funding, a detailed OPC can be found in **Appendix G-3**. The net present worth is provided as it will be used to compare alternatives during the SRF review process (detailed in **Appendix H-3**). A summary of this information is provided on the following page in **Table 22**.

Table 22: Region 3 – Opinion of Probable Cost and Net Present Worth Summary

GRAVITY SEWER PROJECT COST		LOW-PRESSURE GRINDER SEWER PROJECT COST		VACUUM SEWER PROJECT COST		DO NOTHING PROJECT COST	
Sewer Capital Cost Subtotal	$12,306,487	Sewer Capital Cost Subtotal	$13,585,641	Sewer Capital Cost Subtotal	$10,453,982	Total Cost to Install Enhanced Septic (607 Tanks)	$10,759,682
30% Contingency	$3,691,946	30% Contingency	$4,075,692	30% Contingency	$3,136,195		
Design, Permitting and Const. Phase	$2,461,297	Design, Permitting and Const. Phase	$2,717,128	Design, Permitting and Const. Phase	$2,090,796		
SEWER CAPITAL COST TOTAL	$18,459,731	SEWER CAPITAL COST TOTAL	$20,378,462	SEWER CAPITAL COST TOTAL	$15,680,973		
ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$4,382,200	Water Capital Cost Subtotal	$4,382,200	Water Capital Cost Subtotal	$4,382,200	Water Service Not Provided w/o Sewer	NA
30% Contingency	$1,314,660	30% Contingency	$1,314,660	30% Contingency	$1,314,660		
Design, Permitting and Const. Phase	$876,440	Design, Permitting and Const. Phase	$876,440	Design, Permitting and Const. Phase	$876,440		
WATER CAPITAL COST TOTAL	$6,573,300	WATER CAPITAL COST TOTAL	$6,573,300	WATER CAPITAL COST TOTAL	$6,573,300		
GRAND TOTAL	**$25,033,031**	**GRAND TOTAL**	**$26,951,762**	**GRAND TOTAL**	**$22,254,273**	**GRAND TOTAL TO CITIZENS**	**$3,527,474**
NET PRESENT WORTH	**$15,090,236**	**NET PRESENT WORTH**	**$20,204,145**	**NET PRESENT WORTH**	**$13,286,852**	**NET PRESENT WORTH**	**NA**

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Region 4

The installation of conventional gravity sewer in region 4 will require 16,014 linear feet of gravity sewer and 72 manholes. These collected flows would be routed to 2 proposed lift stations and two existing various, as required by the topography of the region. A portion of the gravity flow would be directed to the City's existing Lift Station 35 and Lift Station 34. The proposed lift stations would pump the remaining regional flows through a total of 8,276 linear feet of 6-inch force main (estimated size) to existing force mains. Valves would be installed along the force main at 750-foot intervals, requiring a total of 11 valves. The City would need to purchase a utility easement for the installation of each of the two lift stations and one 330-foot stretch of gravity sewer, requiring a total land acquisition of approximately 0.35 acres. The construction of the gravity sewer system will require the repair of approximately 4.60 miles of paved road. A summary of the proposed gravity sewer inventory in provided in **Table 23**.

Table 23: Region 4 - Gravity Sewer Inventory

DESCRIPTION	QTY	UNIT
8" Gravity	16,014	LF
Manhole	72	Each
Lift Station	2	Each
Force Main	8,276	LF
Valve (FM)	11	Each
Road Repair	4.60	Mile
Land Acquisition	0.35	Acre

A low-pressure grinder system in Region 4 will require 217 grinders (one for each lot) and 15,505 linear feet of 2-inch force main. A 2-inch isolation valve will be required at the connection of every grinder and the intersections of 2-inch force main, for a total of 232 isolation valves. These flows will be routed to one proposed lift station and the City's existing Lift Station 35. The proposed lift station will require 6,532 linear feet of 6-inch force main (estimated size) to deliver region 4 flows to an existing force main. Valves would be installed along the force main at 750-foot intervals, requiring a total of 9 valves. As it is recommended that the City own and maintain each grinder, while the homeowner provides the electricity, the City will need to acquire individual utility easements for each lot. Easements will also need to be obtained for the master lift station, resulting in a required land acquisition of 0.49 acres. The construction of the low-pressure grinder sewer system will require the repair of approximately 4.17 miles of paved road. A summary of the proposed low-pressure grinder sewer inventory in provided in **Table 24**.

Table 24: Region 4 - Low-Pressure Sewer Inventory

DESCRIPTION	QTY	UNIT
2" Force Main	15,505	LF
Grinders	217	Each
Lift Station	1	Each
Force Main	6,532	LF
Valve (FM)	9	Each
2" Isolation Valve	232	Each
Road Repair	4.17	Mile
Land Acquisition	0.49	Acre

The installation of vacuum sewer in Region 4 will require 97 valve pits (to be shared amongst all of the lots). These pits will be placed along vacuum mains of various diameter to provide maximum differential pressure within the network. The required length of vacuum main for region 4 is summarized in **Table 25**, with a complete inventory of all infrastructure required for this alternative. The vacuum mains will flow to two vacuum stations, as required by the separation between the two collection systems within this region. The two stations will pump to 6,893 linear feet of 6-inch force main (estimated size). This force main will discharge to existing city force mains. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 9 valves. The purchase of a utility easement will be required at the vacuum station location, having a total land acquisition requirement of 0.12 acres. The construction of the vacuum sewer system will require the repair and/or addition of approximately 4.49 miles of paved road.

Table 25: Region 4 - Vacuum Sewer Inventory		
DESCRIPTION	QTY	UNIT
4" Vacuum Main	9,043	LF
6" Vacuum Main	5,353	LF
8" Vacuum Main	2,212	LF
10" Vacuum Main	192	LF
Vacuum Station	2	Each
Valve Pit	97	Each
6" Force Main	6,893	LF
Valve (FM)	9	Each
Road Repair	4.49	Mile
Land Acquisition	0.12	Acre

If the City of Belleview decided not to extend their sewer service to this region the residents in this region would be required to install enhanced septic tanks (for nitrogen removal) as additional lots were developed and as existing septic tanks required replacement. The Florida Springs Protection Act and the BMAP mandate the requirement for enhanced septic tanks within the PFA on lots smaller than 1 acre. Assuming all septic tanks will require replacement in the next 30 years and all areas of this region will be developed, the residents in this region will be responsible for funding the installation of 217 enhanced septic systems. The Florida Health Department completed an Evaluation of Prototype Passive Nitrogen Reduction Systems (PNRS) and Recommendations for Future Implementations Vol. I in 2015. This report found that PNRS, or enhanced septic tanks, will cost an average of $17,726 per system, ranging in price from $10,399 to $32,116. As the Belleview residents will incur this cost, it is important to consider this alternative to the cost incurred to the residents over a 30-year period for central sewer installation.

Both neighborhoods within this region are served off of the City of Belleview's water distribution system, as identified in **Appendix C-4**.

An opinion of probable cost (OPC) for each alternative and subsequent net present worth was calculated. The total capital costs are provided to assist the City with planning and funding, a detailed OPC can be found in **Appendix G-4**. The net present worth is provided as it will be used to compare alternatives during the SRF review process (detailed in **Appendix H-4**). A summary of this information is provided on the following page in **Table 26**.

Table 26: Region 4 – Opinion of Probable Cost and Net Present Worth Summary

GRAVITY SEWER PROJECT COST		LOW-PRESSURE GRINDER SEWER PROJECT COST		VACUUM SEWER PROJECT COST		DO NOTHING PROJECT COST	
Sewer Capital Cost Subtotal	$5,217,258	Sewer Capital Cost Subtotal	$5,223,333	Sewer Capital Cost Subtotal	$5,761,398	Total Cost to Install Enhanced Septic (217 Tanks)	$3,846,542
30% Contingency	$1,565,177	30% Contingency	$1,567,000	30% Contingency	$1,728,419		
Design, Permitting and Const. Phase	$1,043,452	Design, Permitting and Const. Phase	$1,044,667	Design, Permitting and Const. Phase	$1,152,280		
SEWER CAPITAL COST TOTAL	$7,825,887	SEWER CAPITAL COST TOTAL	$7,835,000	SEWER CAPITAL COST TOTAL	$8,642,097		
ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$0	Water Capital Cost Subtotal	$0	Water Capital Cost Subtotal	$0	Water Service Not Provided w/o Sewer	NA
30% Contingency	$0	30% Contingency	$0	30% Contingency	$0		
Design, Permitting and Const. Phase	$0	Design, Permitting and Const. Phase	$0	Design, Permitting and Const. Phase	$0		
WATER CAPITAL COST TOTAL	$0	WATER CAPITAL COST TOTAL	$0	WATER CAPITAL COST TOTAL	$0		
GRAND TOTAL	**$7,825,887**	**GRAND TOTAL**	**$7,835,000**	**GRAND TOTAL**	**$8,642,097**	**GRAND TOTAL TO CITIZENS**	**$3,846,542**
NET PRESENT WORTH	**$4,934,886**	**NET PRESENT WORTH**	**$6,466,379**	**NET PRESENT WORTH**	**$5,315,938**	**NET PRESENT WORTH**	**NA**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Region 5

Replacing septic tanks in Region 5 with conventional gravity sewer will require the installation of 18,345 linear feet of gravity sewer and 64 manholes. These collected flows would be routed to the City's existing Lift Station 42. The lift stations would then utilize an existing force main to pump Region 5 flows to the WWTF. By utilizing this existing infrastructure, this alternative does not require the installation of additional valves or land acquisition. The construction of the gravity sewer system will require the repair of approximately 3.47 miles of paved road. A summary of the proposed gravity sewer inventory in provided in **Table 27**.

Table 27: Region 5 - Gravity Sewer Inventory		
DESCRIPTION	QTY	UNIT
8" Gravity	18,345	LF
Manhole	64	Each
Lift Station	-	Each
Force Main	-	LF
Valve (FM)	-	Each
Road Repair	3.47	Mile
Land Acquisition	-	Acre

A low-pressure grinder system in Region 5 will require 342 grinders (one for each lot) and 18,345 linear feet of 2-inch force main. A 2-inch isolation valve will be required at the connection of every grinder and the intersections of 2-inch force main, for a total of 357 isolation valves. These flows will be routed to the City's existing Lift Station 42. The lift stations would then utilize an existing force main to pump region 5 flows to the WWTF. By utilizing this existing infrastructure, this alternative does not require the installation of additional force main valves. As it is recommended that the City own and maintain each grinder, while the homeowner provides the electricity, the City will need to acquire individual utility easements for each lot. Easements will also need to be obtained for the master lift station, resulting in a required land acquisition of 0.68 acres. The construction of the low-pressure grinder sewer system will require the repair of approximately 3.47 miles of paved road. A summary of the proposed low-pressure grinder sewer inventory in provided in **Table 28**.

Table 28: Region 5 - Low-Pressure Sewer Inventory		
DESCRIPTION	QTY	UNIT
2" Force Main	18,345	LF
Grinders	342	Each
Lift Station	-	Each
Force Main	-	LF
Valve (FM)	-	Each
2" Isolation Valve	357	Each
Road Repair	3.47	Mile
Land Acquisition	0.68	Acre

The installation of vacuum sewer in Region 5 will require 147 valve pits (to be shared amongst all of the lots). These pits will be placed along vacuum mains of various diameter to provide maximum differential pressure within the network. The required length of vacuum main for Region 5 is summarized in **Table 29**, with a complete inventory of all infrastructure required for this alternative. The vacuum mains will flow to a single vacuum station that will pump to 169 linear feet of 6-inch force main (estimated size). This force main will discharge to an existing City force main. The purchase of a utility easement will be required at the vacuum station location, having a total land acquisition requirement of 0.06 acres. The construction of the vacuum sewer system will require the repair and/or addition of approximately 3.38 miles of paved road.

Table 29: Region 5 - Vacuum Sewer Inventory		
DESCRIPTION	QTY	UNIT
4" Vacuum Main	16,138	LF
6" Vacuum Main	895	LF
8" Vacuum Main	560	LF
10" Vacuum Main	62	LF
Vacuum Station	1	Each
Valve Pit	147	Each
6" Force Main	169	LF
Valve (FM)	0	Each
Road Repair	3.38	Mile
Land Acquisition	0.06	Acre

If the City of Belleview decided not to extend their sewer service to this region the residents in this region would be required to install enhanced septic tanks (for nitrogen removal) as additional lots were developed and as existing septic tanks required replacement. The Florida Springs Protection Act and the BMAP mandate the requirement for enhanced septic tanks within the PFA on lots smaller than 1 acre. Assuming all septic tanks will require replacement in the next 30 years and all areas of this region will be developed, the residents in this region will be responsible for funding the installation of 341 enhanced septic systems. The Florida Health Department completed an Evaluation of Prototype Passive Nitrogen Reduction Systems (PNRS) and Recommendations for Future Implementations Vol. I in 2015. This report found that PNRS, or enhanced septic tanks, will cost an average of $17,726 per system, ranging in price from $10,399 to $32,116. As the Belleview residents will incur this cost, it is important to consider this alternative to the cost incurred to the residents over a 30-year period for central sewer installation.

Region 5 is partially served by the City's water distribution system. To serve the entire region would require approximately 11,837 linear feet of water main, assuming the service will be installed in the recommended horizontal location (**Appendix C-5**).

An opinion of probable cost (OPC) for each alternative and subsequent net present worth was calculated. The total capital costs are provided to assist the City with planning and funding, a detailed OPC can be found in **Appendix G-5**. The net present worth is provided as it will be used to compare alternatives during the SRF review process (detailed in **Appendix H-5**). A summary of this information is provided on the following page on **Table 30**.

Table 30: Region 5 – Opinion of Probable Cost and Net Present Worth Summary

GRAVITY SEWER PROJECT COST		LOW-PRESSURE GRINDER SEWER PROJECT COST		VACUUM SEWER PROJECT COST		DO NOTHING PROJECT COST	
Sewer Capital Cost Subtotal	$4,955,676	Sewer Capital Cost Subtotal	$6,394,642	Sewer Capital Cost Subtotal	$5,450,254	Total Cost to Install Enhanced Septic (341 Tanks)	$6,044,566
30% Contingency	$1,486,703	30% Contingency	$1,918,393	30% Contingency	$1,635,076		
Design, Permitting and Const. Phase	$991,135	Design, Permitting and Const. Phase	$1,278,928	Design, Permitting and Const. Phase	$1,090,051		
SEWER CAPITAL COST TOTAL	$7,433,514	SEWER CAPITAL COST TOTAL	$9,591,963	SEWER CAPITAL COST TOTAL	$8,175,381		
ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$1,183,700	Water Capital Cost Subtotal	$1,183,700	Water Capital Cost Subtotal	$1,183,700	Water Service Not Provided w/o Sewer	NA
30% Contingency	$355,110	30% Contingency	$355,110	30% Contingency	$355,110		
Design, Permitting and Const. Phase	$236,740	Design, Permitting and Const. Phase	$236,740	Design, Permitting and Const. Phase	$236,740		
WATER CAPITAL COST TOTAL	$1,775,550	WATER CAPITAL COST TOTAL	$1,775,550	WATER CAPITAL COST TOTAL	$1,775,550		
GRAND TOTAL	**$9,209,064**	**GRAND TOTAL**	**$11,367,513**	**GRAND TOTAL**	**$9,950,931**	**GRAND TOTAL TO CITIZENS**	**$6,044,566**
NET PRESENT WORTH	**$5,667,019**	**NET PRESENT WORTH**	**$9,399,701**	**NET PRESENT WORTH**	**$6,180,900**	**NET PRESENT WORTH**	**NA**

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Region 6

Installing conventional gravity sewer to replace the use of septic tanks in Region 6 will require 18,714 linear feet of gravity sewer and 62 manholes. These collected flows would be routed to a single lift station. The lift stations would then pump the regional flows through 5,304 linear feet of 6-inch force main (estimated size) to existing force main. Valves would be installed along the force main at 750-foot intervals, requiring a total of 7 valves. The total land acquisition required is equal to approximately 0.06 acres, for the single lift station. The construction of the gravity sewer system will require the repair of approximately 4.55 miles of paved road. A summary of the proposed gravity sewer inventory in provided in **Table 31**.

Table 31: Region 6 - Gravity Sewer Inventory		
DESCRIPTION	QTY	UNIT
8" Gravity	18,714	LF
Manhole	62	Each
Lift Station	1	Each
Force Main	5,304	LF
Valve (FM)	7	Each
Road Repair	4.55	Mile
Land Acquisition	0.06	Acre

A low-pressure grinder system in Region 6 will require 253 grinders (one for each lot) and 18,714 linear feet of 2-inch force main. A 2-inch isolation valve will be required at the connection of every grinder and the intersections of 2-inch force main, for a total of 268 isolation valves. These flows will be routed to a single lift station that will pump into 5,304 linear feet of 6-inch force main (estimated size) to an existing force main. Valves would be installed along the force main at 750-foot intervals, requiring a total of 7 valves. As it is recommended that the City own and maintain each grinder, while the homeowner provides the electricity, the city will need to acquire individual utility easements for each lot. Easements will also need to be obtained for the master lift station, resulting in a required land acquisition of 0.57 acres. The construction of the low-pressure grinder sewer system will require the repair of approximately 4.55 miles of paved road. A summary of the proposed low-pressure grinder sewer inventory in provided in **Table 32**.

Table 32: Region 6 - Low-Pressure Sewer Inventory		
DESCRIPTION	QTY	UNIT
2" Force Main	18,714	LF
Grinders	253	Each
Lift Station	1	Each
Force Main	5,304	LF
Valve (FM)	7	Each
2" Isolation Valve	268	Each
Road Repair	4.55	Mile
Land Acquisition	0.57	Acre

The installation of vacuum sewer in Region 6 will require 111 valve pits (to be shared amongst all of the lots). These pits will be placed along vacuum mains of various diameter to provide maximum differential pressure within the network. The required length of vacuum main for Region 6 is summarized in **Table 33**, with a complete inventory of all infrastructure required for this alternative. The vacuum mains will flow to a single vacuum station that will pump to 5,304 linear feet of 6-inch force main (estimated size). This force main will discharge to an existing force main. Valves would be installed along the force main at 750-foot intervals, resulting in a total of 7 valves. The purchase of a utility easement will be required at the vacuum station location, having a total land acquisition requirement of 0.06 acres. The construction of the vacuum sewer system will require the repair and/or addition of approximately 4.56 miles of paved road.

Table 33: Region 6 - Vacuum Sewer Inventory		
DESCRIPTION	QTY	UNIT
4" Vacuum Main	16,043	LF
6" Vacuum Main	1,010	LF
8" Vacuum Main	1,651	LF
10" Vacuum Main	47	LF
Vacuum Station	1	Each
Valve Pit	111	Each
6" Force Main	5,304	LF
Valve (FM)	7	Each
Road Repair	4.56	Mile
Land Acquisition	0.06	Acre

If the City of Belleview decided not to extend their sewer service to this region the residents in this region would be required to install enhanced septic tanks (for nitrogen removal) as additional lots were developed and as existing septic tanks required replacement. The Florida Springs Protection Act and the BMAP mandate the requirement for enhanced septic tanks within the PFA on lots smaller than 1 acre. Assuming all septic tanks will require replacement in the next 30 years and all areas of this region will be developed, the residents in this region will be responsible for funding the installation of 253 enhanced septic systems. The FDOH completed an Evaluation of Prototype Passive Nitrogen Reduction Systems (PNRS) and Recommendations for Future Implementations Vol. I in 2015. This report found that PNRS, or enhanced septic tanks, will cost an average of $17,726 per system, ranging in price from $10,399 to $32,116. As the Belleview residents will incur this cost, it is important to consider this alternative to the cost incurred to the residents over a 30-year period for central sewer installation.

The parcels within Region 6 are not currently served by the City's water distribution system. Extending that water main within this region will require approximately 24,099 linear feet of water main, assuming the service will be installed in the recommended horizontal location (**Appendix C-6**).

An opinion of probable cost (OPC) for each alternative and subsequent net present worth was calculated. The total capital costs are provided to assist the City with planning and funding, a detailed OPC can be found in **Appendix G-6**. The net present worth is provided as it will be used to compare alternatives during the SRF review process (detailed in **Appendix H-6**). A summary of this information is provided on the following page in **Table 34**.

Table 34: Region 6 – Opinion of Probable Cost and Net Present Worth Summary

GRAVITY SEWER PROJECT COST		LOW-PRESSURE GRINDER SEWER PROJECT COST		VACUUM SEWER PROJECT COST		DO NOTHING PROJECT COST	
Sewer Capital Cost Subtotal	$5,476,346	Sewer Capital Cost Subtotal	$6,199,870	Sewer Capital Cost Subtotal	$5,363,548	Total Cost to Install Enhanced Septic (199 Tanks)	$4,484,678
30% Contingency	$1,642,904	30% Contingency	$1,859,961	30% Contingency	$1,609,064		
Design, Permitting and Const. Phase	$1,095,269	Design, Permitting and Const. Phase	$1,239,974	Design, Permitting and Const. Phase	$1,072,710		
SEWER CAPITAL COST TOTAL	$8,214,519	SEWER CAPITAL COST TOTAL	$9,299,804	SEWER CAPITAL COST TOTAL	$8,045,322		
ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS		ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$2,409,900	Water Capital Cost Subtotal	$2,409,900	Water Capital Cost Subtotal	$2,409,900	Water Service Not Provided w/o Sewer	NA
30% Contingency	$722,970	30% Contingency	$722,970	30% Contingency	$722,970		
Design, Permitting and Const. Phase	$481,980	Design, Permitting and Const. Phase	$481,980	Design, Permitting and Const. Phase	$481,980		
WATER CAPITAL COST TOTAL	$3,614,850	WATER CAPITAL COST TOTAL	$3,614,850	WATER CAPITAL COST TOTAL	$3,614,850		
GRAND TOTAL	**$11,829,369**	**GRAND TOTAL**	**$12,914,654**	**GRAND TOTAL**	**$11,660,172**	**GRAND TOTAL TO CITIZENS**	**$4,484,678**
NET PRESENT WORTH	**$7,084,876**	**NET PRESENT WORTH**	**$9,526,028**	**NET PRESENT WORTH**	**$6,914,435**	**NET PRESENT WORTH**	**NA**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

7. RECOMMENDED ALTERNATIVE BY REGION

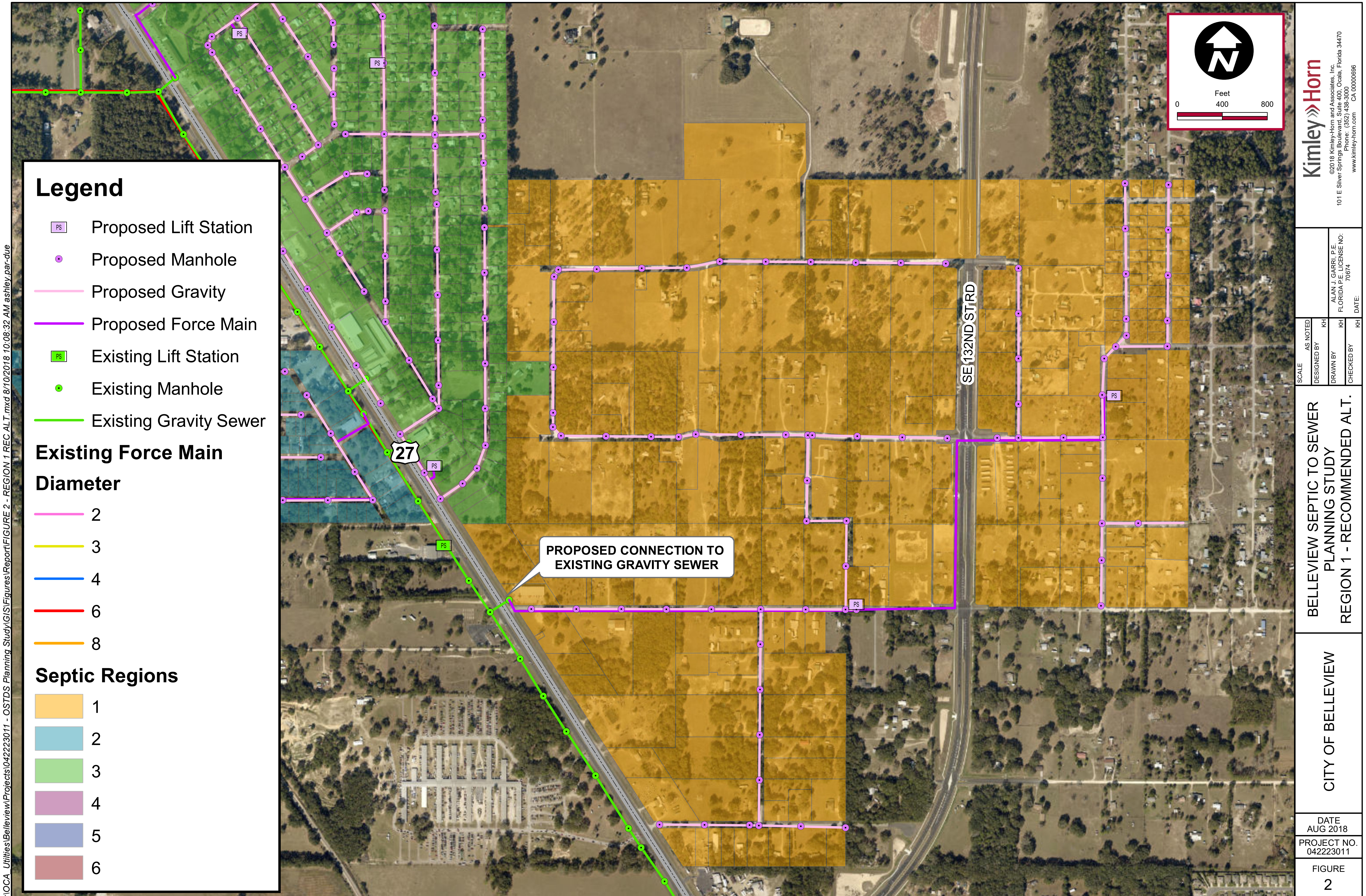
Region 1

It is recommended that the City of Belleview install a conventional gravity sewer system in Region 1. While the cost comparison provides that vacuum sewer may have a lower, initial capital and construction cost, gravity sewer is recommended for reduced future maintenance and costs. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately $14.9 million, as provided in **Table 35**.

Table 35: Region 1 - Gravity Sewer Project Cost	
Sewer Capital Cost Subtotal	$5,173,616
30% Contingency	$1,552,085
Design, Permitting and Const. Phase	$1,034,723
SEWER CAPITAL COST TOTAL	$7,760,424
ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$4,775,300
30% Contingency	$1,432,590
Design, Permitting and Const. Phase	$955,060
WATER CAPITAL COST TOTAL	$7,162,950
GRAND TOTAL	**$14,923,374**
NET PRESENT WORTH	**$6,983,996**

A recommended schematic of the approximate horizontal locations of the gravity sewer, manholes, lift stations and force main is provided as **Figure 2**. The proposed initial sizing of this system includes 8" gravity sewer and 6" force main. Additional design and modeling will be required to accurately size the force mains and lift stations within this region.

This alternative will require permitting and coordination with FDEP, SJRWMD, Marion County and FDOT. Permitting with FDOT will also be required to directionally drill the small section of force main under SE 132nd Street Road. The City will be required to submit a domestic wastewater collection/transmission system through the FDEP. Specific department requirements, including permitting requirements, for domestic wastewater collection systems and transmission facilities are contained in Chapter 62-604, Florida Administrative Code (F.A.C.). The city will also be required to submit an NPDES permit, as required by the Clean Water Act. The permit will contain limits on what the city can discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. It will also be necessary for the City to obtain an environmental resource permit (ERP) application from the SJRWMD. An ERP authorizes new development or construction activities to occur in a manner that will prevent adverse flooding, manage surface water, and protect water quality, wetlands and other surface waters. A permit from Marion County will be required for all installation of sewer or water mains in Marion County rights-of-way.



Legend
Proposed Lift Station
Proposed Manhole
Proposed Gravity
Proposed Force Main
Existing Lift Station
Existing Manhole
Existing Gravity Sewer
Existing Force Main Diameter
2
3
4
6
8
Septic Regions
1
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3
4
5
6
PS
27
SE 132ND ST RD
PROPOSED CONNECTION TO EXISTING GRAVITY SEWER
Feet
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FIGURE 2
K:\OCA_Utilities\Belleview\Projects\042223011 - OSTDS Planning Study\GIS\Figures\Report\FIGURE 2 - REGION 1 REC ALT.mxd 8/10/2018 10:08:32 AM ashley.par-due

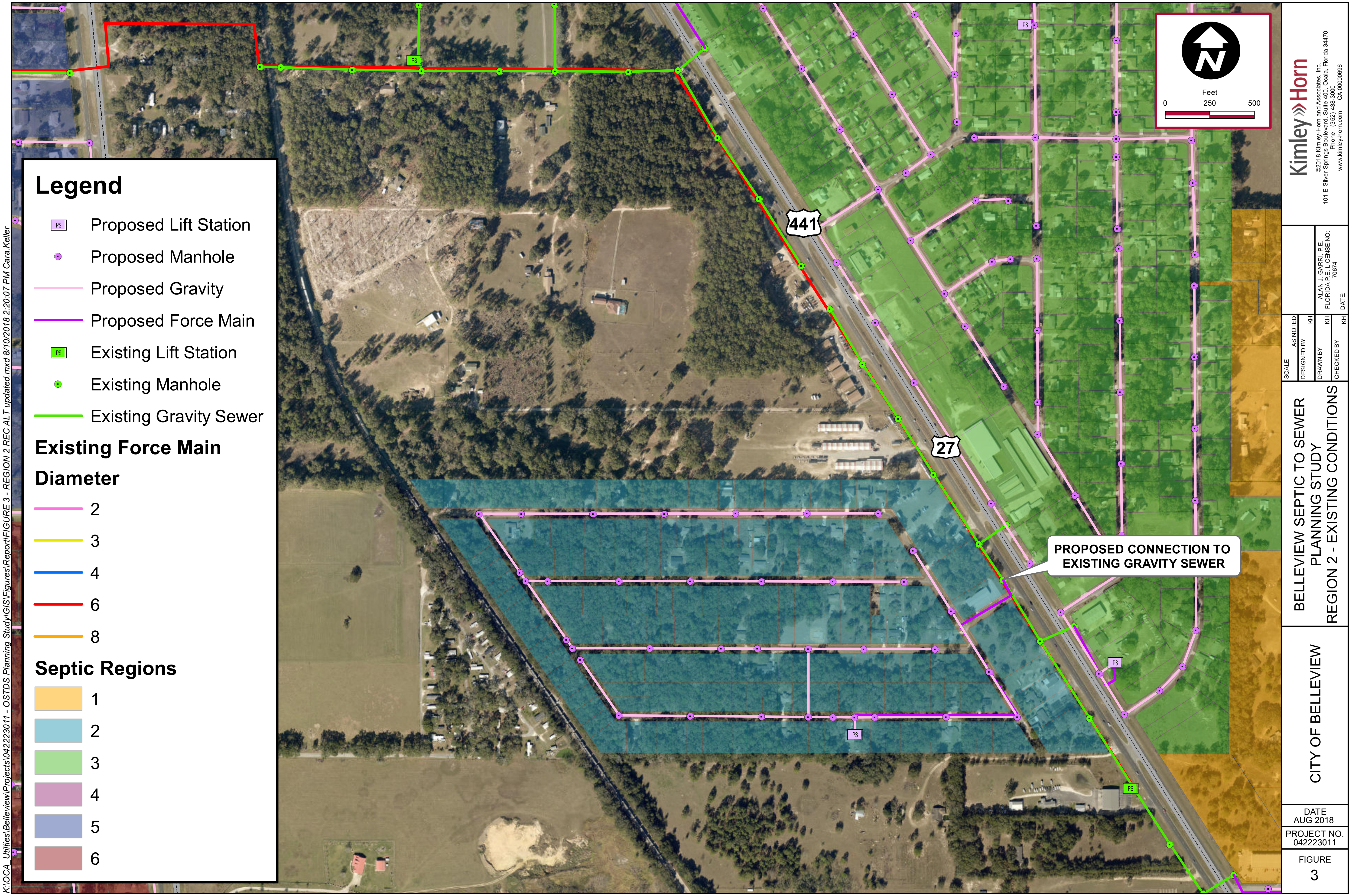
Region 2

It is recommended that the City of Belleview install a conventional gravity sewer system in region 2. This alternative is the most cost-effective and will allow for the continued growth of this development, without the requirement for future up-sizing. The total preliminary opinion of probable cost for installing gravity sewer and water service in this region is approximately $4.8 million, as provided in **Table 36.**

Table 36: Region 2 - Gravity Sewer Project Cost	
Sewer Capital Cost Subtotal	$2,119,714
30% Contingency	$635,914
Design, Permitting and Const. Phase	$423,943
SEWER CAPITAL COST TOTAL	$3,179,571
ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$1,112,800
30% Contingency	$333,840
Design, Permitting and Const. Phase	$222,560
WATER CAPITAL COST TOTAL	$1,669,200
GRAND TOTAL	**$4,848,771**
NET PRESENT WORTH	**$2,825,957**

A recommended schematic of the approximate horizontal locations of the gravity sewer, manholes, lift stations and force main is provided as **Figure 3**. The proposed initial sizing of this system includes 8-inch gravity sewer and 6-inch force main. Additional design and modeling will be required to accurately size the force main and lift station within this region.

This alternative will require permitting and coordination with FDEP, SJRWMD, Marion County and FDOT. Permitting with FDOT will also be required to directionally drill the small section of force main under SE 132nd Street Road. The City will be required to submit a domestic wastewater collection/transmission system through the FDEP. Specific department requirements, including permitting requirements, for domestic wastewater collection systems and transmission facilities are contained in Chapter 62-604, Florida Administrative Code (F.A.C.). The City will also be required to submit an NPDES permit, as required by the Clean Water Act. The permit will contain limits on what the City can discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. It will also be necessary for the City to obtain an environmental resource permit (ERP) application from the SJRWMD. An ERP authorizes new development or construction activities to occur in a manner that will prevent adverse flooding, manage surface water, and protect water quality, wetlands and other surface waters. A permit from Marion County will be required for all installation of sewer or water mains in Marion County rights-of-way.



Legend
Proposed Lift Station
Proposed Manhole
Proposed Gravity
Proposed Force Main
Existing Lift Station
Existing Manhole
Existing Gravity Sewer
Existing Force Main Diameter
2
3
4
6
8
Septic Regions
1
2
3
4
5
6
PS
441
27
PROPOSED CONNECTION TO EXISTING GRAVITY SEWER
N
Feet
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FIGURE 3
K:\OCA_Utilities\Belleview\Projects\042223011 - OSTDS Planning Study\GIS\Figures\Report\FIGURE 3 - REGION 2 REC ALT updated.mxd 8/10/2018 2:20:07 PM Cara.Keller

Region 3

It is recommended that the City of Belleview install a vacuum sewer system in Region 3. This alternative is the most cost-effective as it will eliminate the need for several lift stations (as would be required to accommodate the topography in this region). A single vacuum station (with three vacuum pumps and two sewage pumps) also provides operation and maintenance advantages. The total preliminary opinion of probable cost for installing vacuum sewer and water in this region is approximately $22.2 million, as provided in **Table 37**.

Table 37: Region 3 - Vacuum Sewer Project Cost	
Sewer Capital Cost Subtotal	$10,453,982
30% Contingency	$3,136,195
Design, Permitting and Const. Phase	$2,090,796
SEWER CAPITAL COST TOTAL	$15,680,973
ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$4,382,200
30% Contingency	$1,314,660
Design, Permitting and Const. Phase	$876,440
WATER CAPITAL COST TOTAL	$6,573,300
GRAND TOTAL	**$22,254,273**
NET PRESENT WORTH	**$13,286,852**

A recommended schematic of the approximate horizontal locations of the gravity sewer, manholes, lift stations and force main is provided as **Figure 4**. The proposed initial sizing of this system includes 8-inch gravity sewer and 6-inch force main. Additional design and modeling will be required to accurately size the force main and lift station within this region.

This alternative will require permitting and coordination with FDEP, SJRWMD, Marion County and FDOT. The City will be required to submit a domestic wastewater collection/transmission system through the FDEP. Specific department requirements, including permitting requirements, for domestic wastewater collection systems and transmission facilities are contained in Chapter 62-604, Florida Administrative Code (F.A.C.). The city will also be required to submit an NPDES permit, as required by the Clean Water Act. The permit will contain limits on what the city can discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. It will also be necessary for the City to obtain an environmental resource permit (ERP) application from the SJRWMD. An ERP authorizes new development or construction activities to occur in a manner that will prevent adverse flooding, manage surface water, and protect water quality, wetlands and other surface waters. A permit from Marion County will be required for all installation of sewer or water mains in Marion County rights-of-way. As will a FDOT permit be required for any activity in state rights-of way.

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FIGURE
4

Region 4

It is recommended that the City of Belleview install a conventional gravity sewer system in Region 4. This alternative is the most cost-effective as it will take advantage of the adjacent infrastructure in the most efficient manner. It is possible to connect gravity sewer to both lift stations and gravity sewer already installed and maintained by the City, reducing the infrastructure and maintenance to take the septic tanks offline in this region. The total preliminary opinion of probable cost for installing gravity sewer in this region is approximately $7.8 million, as provided in **Table 38**.

Table 38: Region 4 - Gravity Sewer Project Cost	
Sewer Capital Cost Subtotal	$5,217,258
30% Contingency	$1,565,177
Design, Permitting and Const. Phase	$1,043,452
SEWER CAPITAL COST TOTAL	$7,825,887
ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$0
30% Contingency	$0
Design, Permitting and Const. Phase	$0
WATER CAPITAL COST TOTAL	$0
GRAND TOTAL	**$7,825,887**
NET PRESENT WORTH	**$4,934,886**

A recommended schematic of the approximate horizontal locations of the gravity sewer, manholes, lift stations and force main is provided as **Figure 5**. The proposed initial sizing of this system includes 8-inch gravity sewer and 6-inch force main. Additional design and modeling will be required to accurately size the force main and lift station within this region.

This alternative will require permitting and coordination with FDEP, SJRWMD, Marion County and FDOT. The City will be required to submit a domestic wastewater collection/transmission system through the FDEP. Specific department requirements, including permitting requirements, for domestic wastewater collection systems and transmission facilities are contained in Chapter 62-604, Florida Administrative Code (F.A.C.). The city will also be required to submit an NPDES permit, as required by the Clean Water Act. The permit will contain limits on what the city can discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. It will also be necessary for the City to obtain an environmental resource permit (ERP) application from the SJRWMD. An ERP authorizes new development or construction activities to occur in a manner that will prevent adverse flooding, manage surface water, and protect water quality, wetlands and other surface waters. A permit from Marion County will be required for all installation of sewer or water mains in Marion County rights-of-way. As will a FDOT permit be required for any activity in state rights-of way.

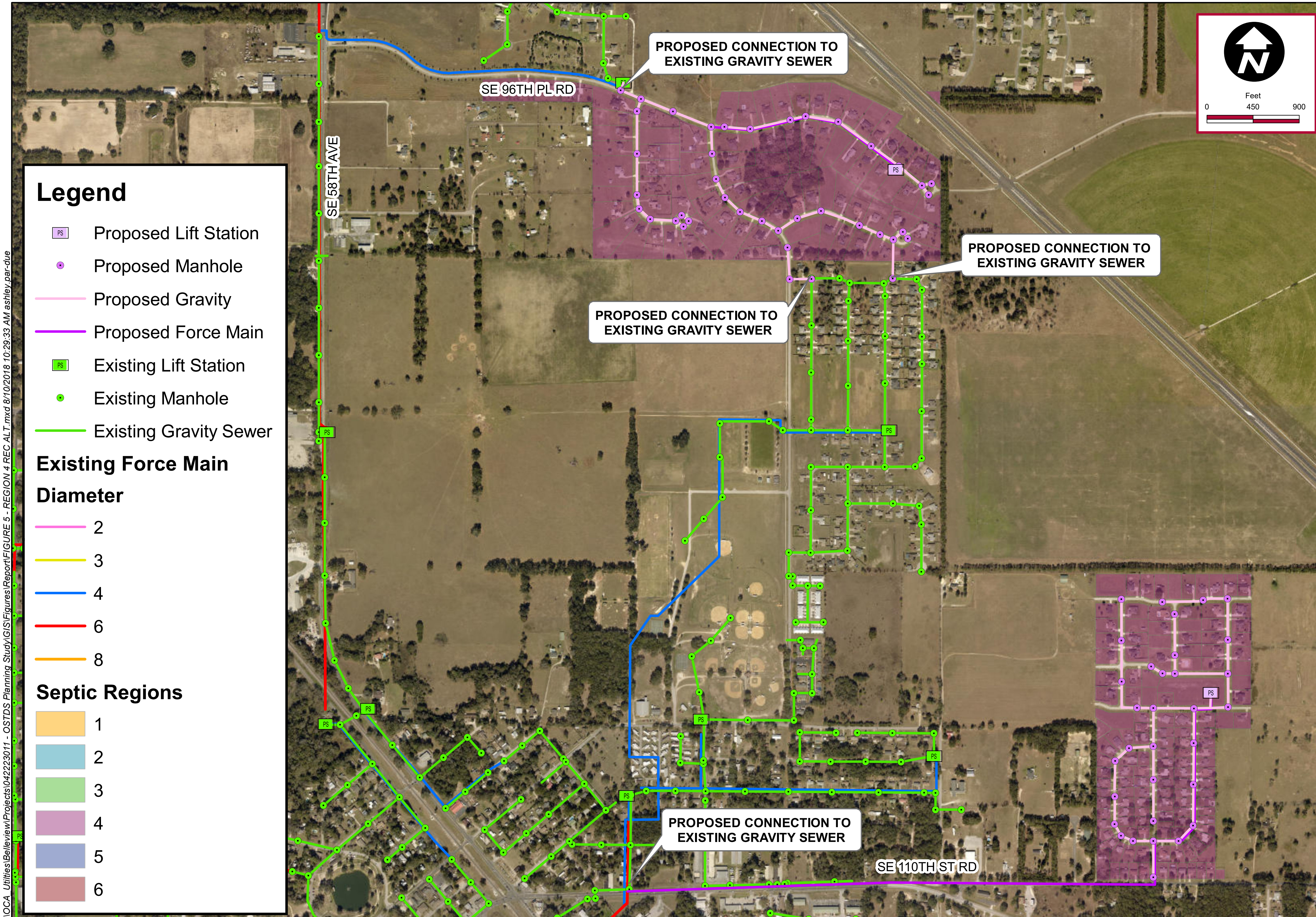

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FIGURE 5

Region 5

It is recommended that the City of Belleview install a conventional gravity sewer system in Region 5. This alternative is the most cost-effective as it does not require the construction of any additional pump stations in the region. It is possible to connect gravity sewer to both the single lift station and the gravity sewer already installed and maintained by the City, reducing the infrastructure and maintenance to take the septic tanks offline in this region. The total preliminary opinion of probable cost for installing gravity sewer and water in this region is approximately $9.2 million, as provided in **Table 39**.

Table 39: Region 5 - Gravity Sewer Project Cost	
Sewer Capital Cost Subtotal	$4,955,676
30% Contingency	$1,486,703
Design, Permitting and Const. Phase	$991,135
SEWER CAPITAL COST TOTAL	$7,433,514
ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$1,183,700
30% Contingency	$355,110
Design, Permitting and Const. Phase	$236,740
WATER CAPITAL COST TOTAL	$1,775,550
GRAND TOTAL	**$9,209,064**
NET PRESENT WORTH	**$5,667,019**

A recommended schematic of the approximate horizontal locations of the gravity sewer, manholes, lift stations and force main is provided as **Figure 6**. The proposed initial sizing of this system includes 8" gravity sewer and 6" force main. Additional design and modeling will be required to accurately size the force main and lift station within this region.

This alternative will require permitting and coordination with FDEP, SJRWMD, Marion County and FDOT. The City will be required to submit a domestic wastewater collection/transmission system through the FDEP. Specific department requirements, including permitting requirements, for domestic wastewater collection systems and transmission facilities are contained in Chapter 62-604, Florida Administrative Code (F.A.C.). The city will also be required to submit an NPDES permit, as required by the Clean Water Act. The permit will contain limits on what the city can discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. It will also be necessary for the City to obtain an environmental resource permit (ERP) application from the SJRWMD. An ERP authorizes new development or construction activities to occur in a manner that will prevent adverse flooding, manage surface water, and protect water quality, wetlands and other surface waters. A permit from Marion County will be required for all installation of sewer or water mains in Marion County rights-of-way. As will a FDOT permit be required for any activity in state rights-of way.

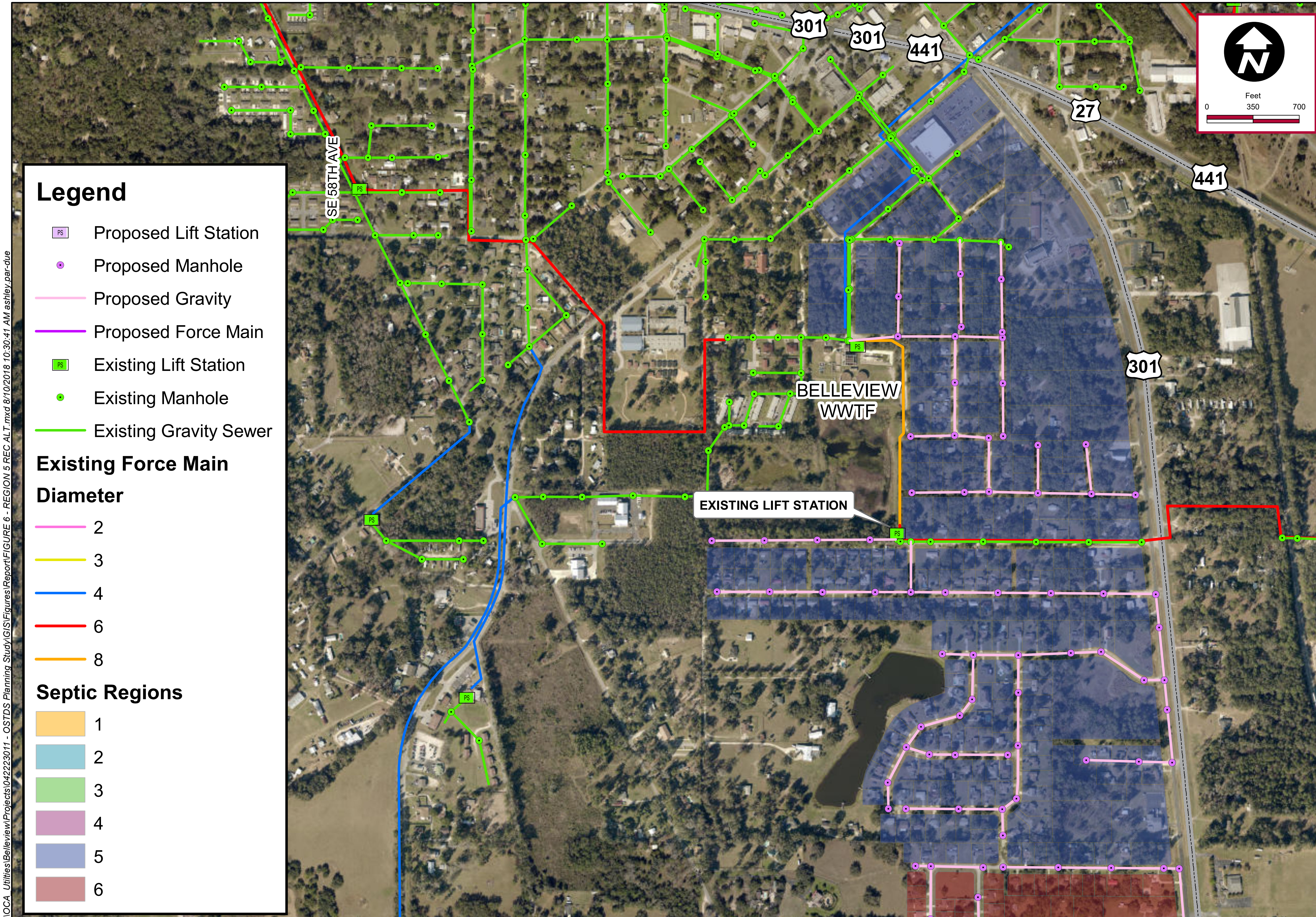

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FIGURE
6

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Region 6

It is recommended that the City of Belleview install a conventional gravity sewer system in Region 6. This alternative is the most cost-effective and feasible as the topography of the region facilitates the use of a single lift station. The total preliminary opinion of probable cost for installing gravity sewer and water in this region is approximately $11.8 million, as provided in **Table 40**.

Table 40: Region 6 - Gravity Sewer Project Cost	
Sewer Capital Cost Subtotal	$5,476,346
30% Contingency	$1,642,904
Design, Permitting and Const. Phase	$1,095,269
SEWER CAPITAL COST TOTAL	$8,214,519
ASSOCIATED WATER PROJECT COSTS	
Water Capital Cost Subtotal	$2,409,900
30% Contingency	$722,970
Design, Permitting and Const. Phase	$481,980
WATER CAPITAL COST TOTAL	$3,614,850
GRAND TOTAL	**$11,829,369**
NET PRESENT WORTH	**$7,084,876**

A recommended schematic of the approximate horizontal locations of the gravity sewer, manholes, lift stations and force main is provided as **Figure 7**. The proposed initial sizing of this system includes 8-inch gravity sewer and 6-inch force main. Additional design and modeling will be required to accurately size the force main and lift station within this region.

This alternative will require permitting and coordination with FDEP, SJRWMD, Marion County and FDOT. The City will be required to submit a domestic wastewater collection/transmission system through the FDEP. Specific department requirements, including permitting requirements, for domestic wastewater collection systems and transmission facilities are contained in Chapter 62-604, Florida Administrative Code (F.A.C.). The city will also be required to submit an NPDES permit, as required by the Clean Water Act. The permit will contain limits on what the city can discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. It will also be necessary for the City to obtain an environmental resource permit (ERP) application from the SJRWMD. An ERP authorizes new development or construction activities to occur in a manner that will prevent adverse flooding, manage surface water, and protect water quality, wetlands and other surface waters. A permit from Marion County will be required for all installation of sewer or water mains in Marion County rights-of-way. As will a FDOT permit be required for any activity in state rights-of way.

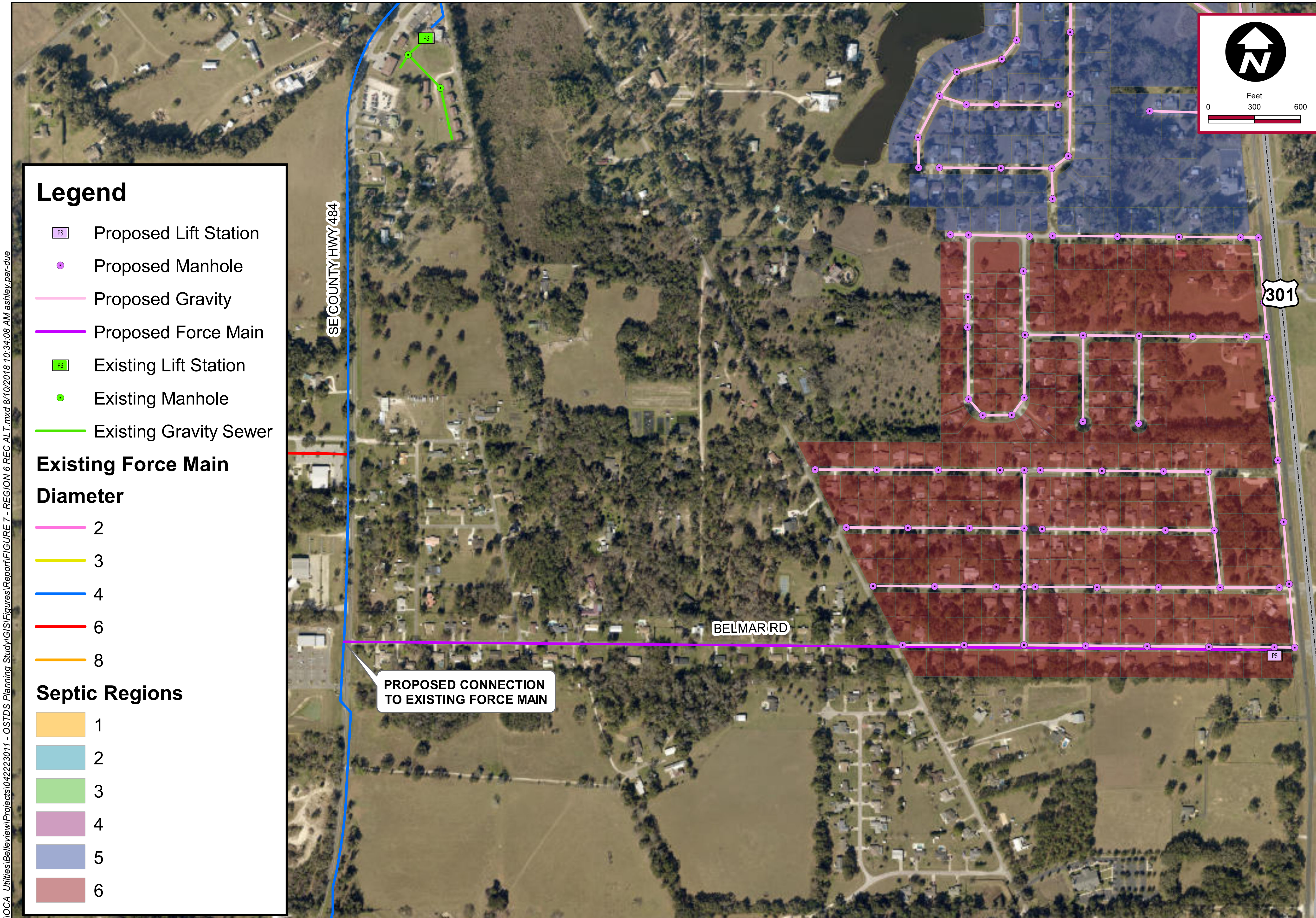

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FIGURE
7

APPENDICES

APPENDIX A: Belleview Existing Wastewater System Overview

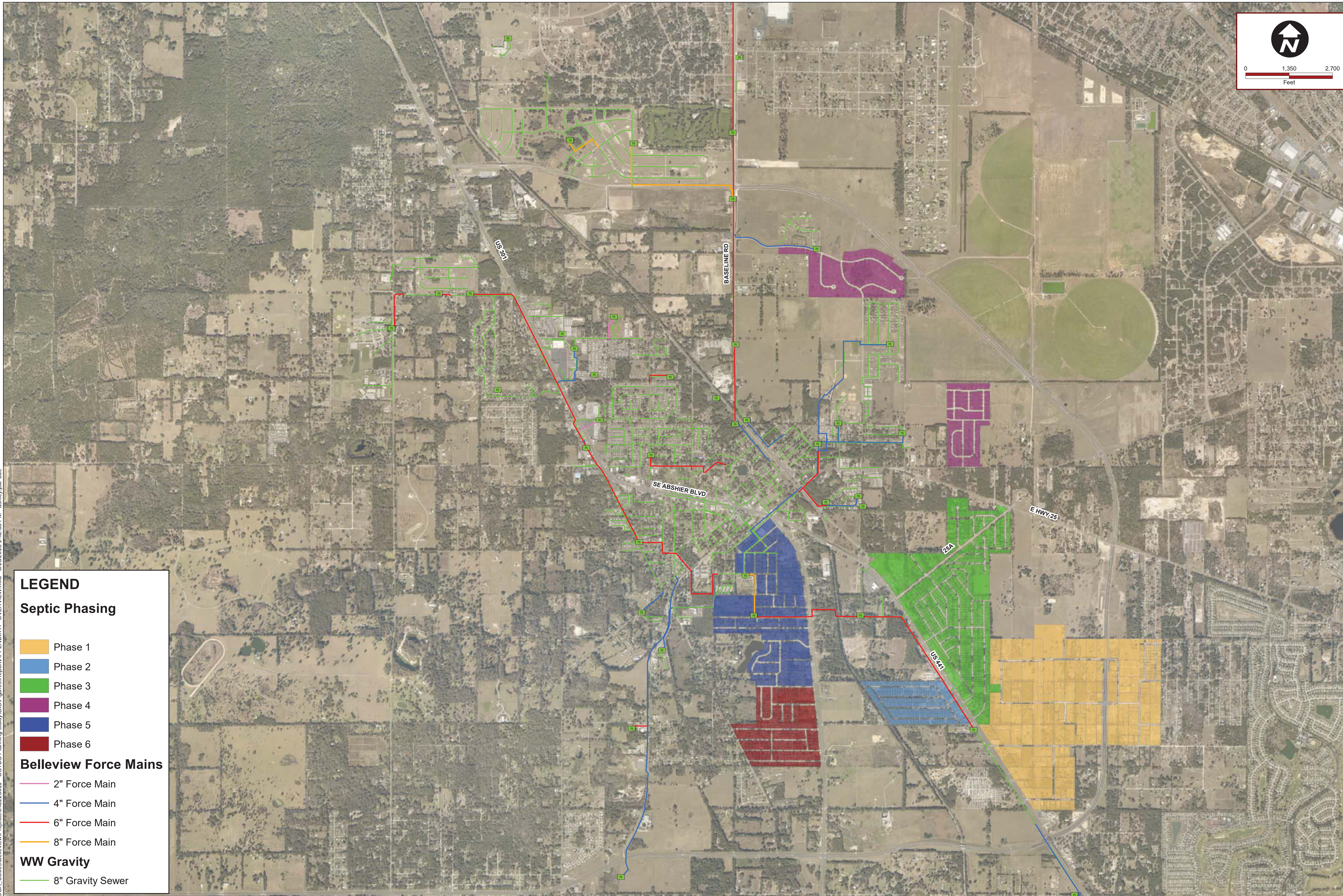

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FIGURE
A

APPENDIX B:
Septic to Sewer Regions and Existing Utilities

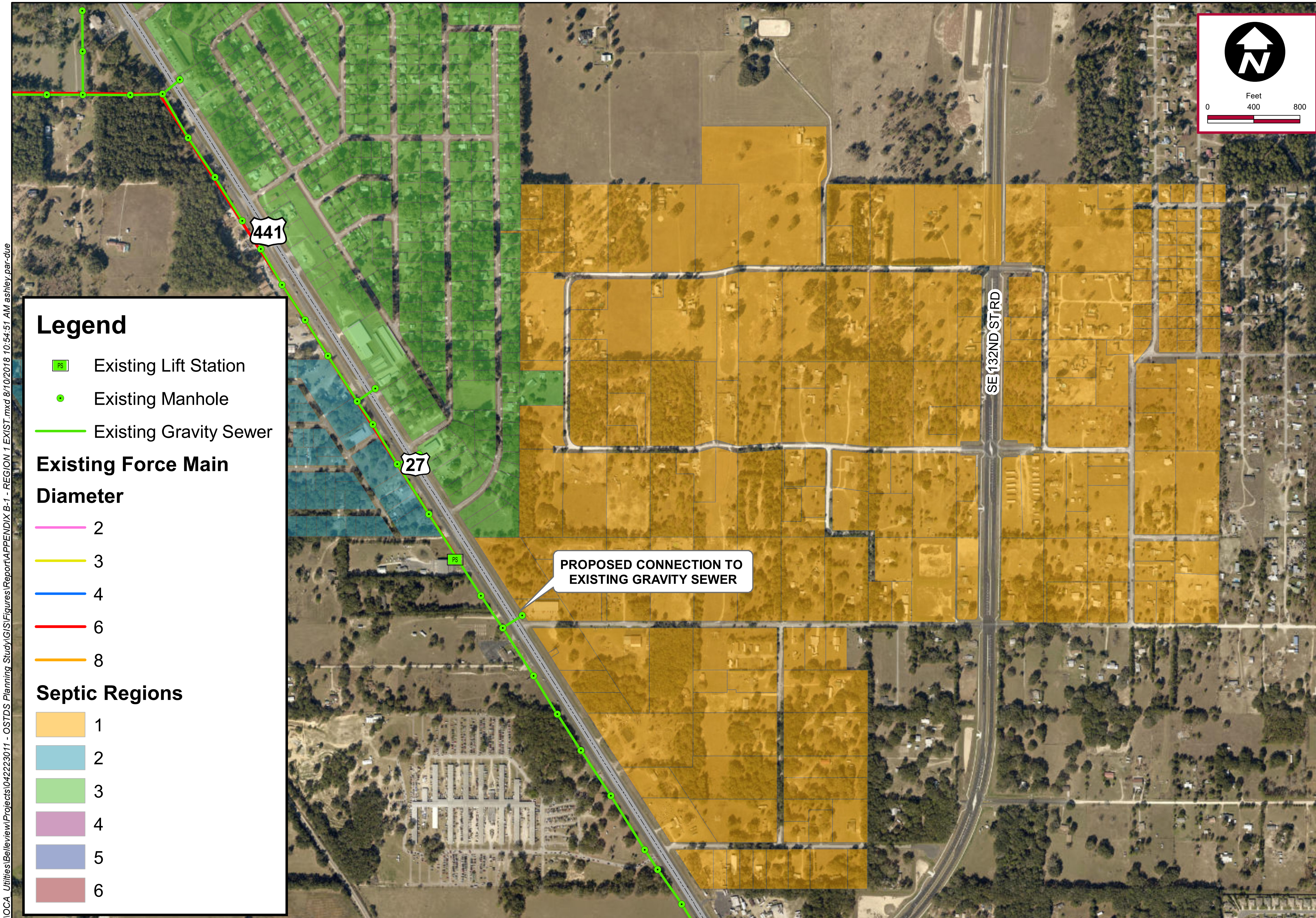

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FIGURE B-1

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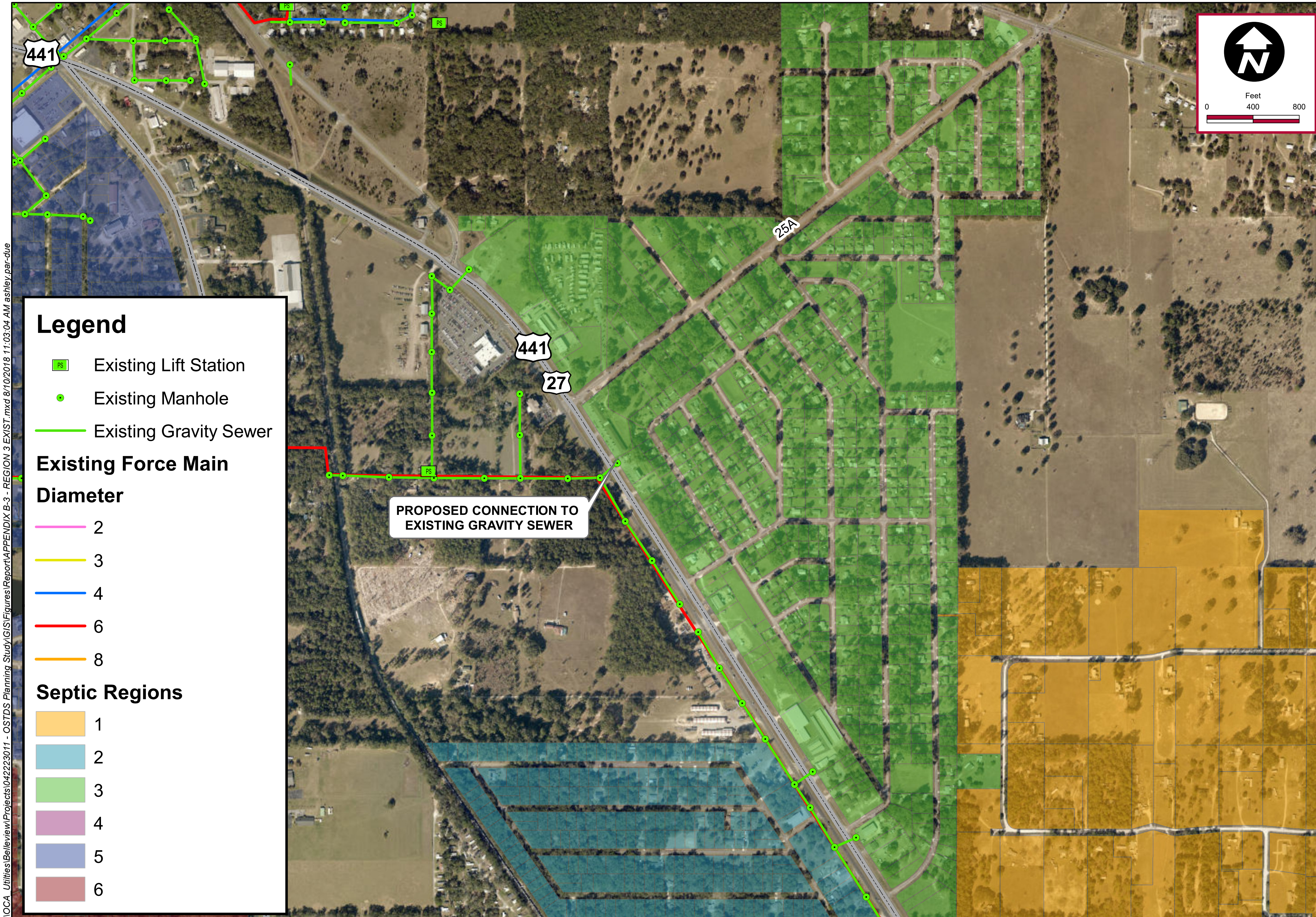
FIGURE
B-2



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BELLEVIEW SEPTIC TO SEWER PLANNING STUDY
REGION 3 - EXISTING CONDITIONS

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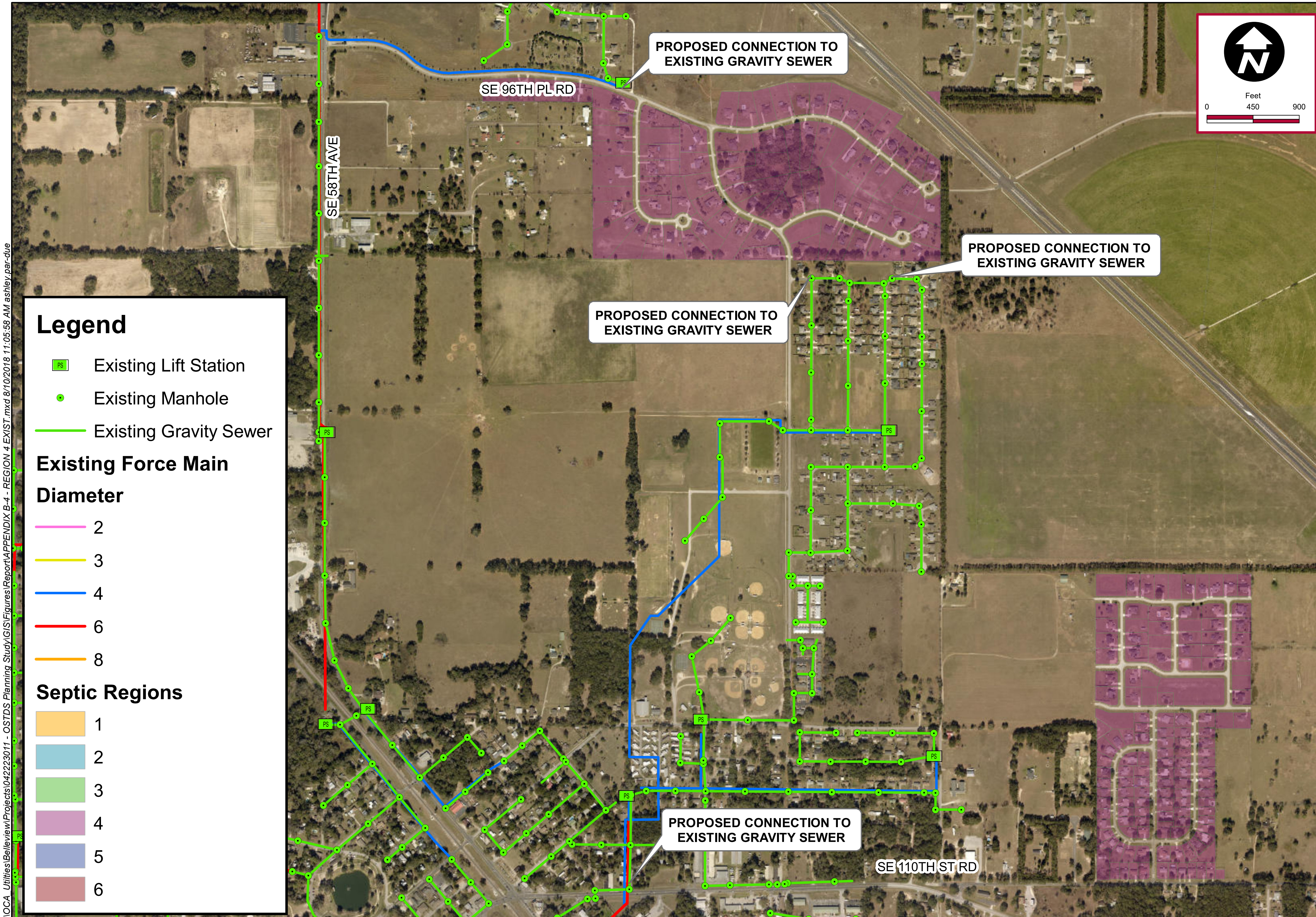
FIGURE
B-3



ALAN J. GARRI, P.E.
FLORIDA P.E. LICENSE NO: 70674
DATE:

SCALE AS NOTED
DESIGNED BY KH
DRAWN BY KH
CHECKED BY KH

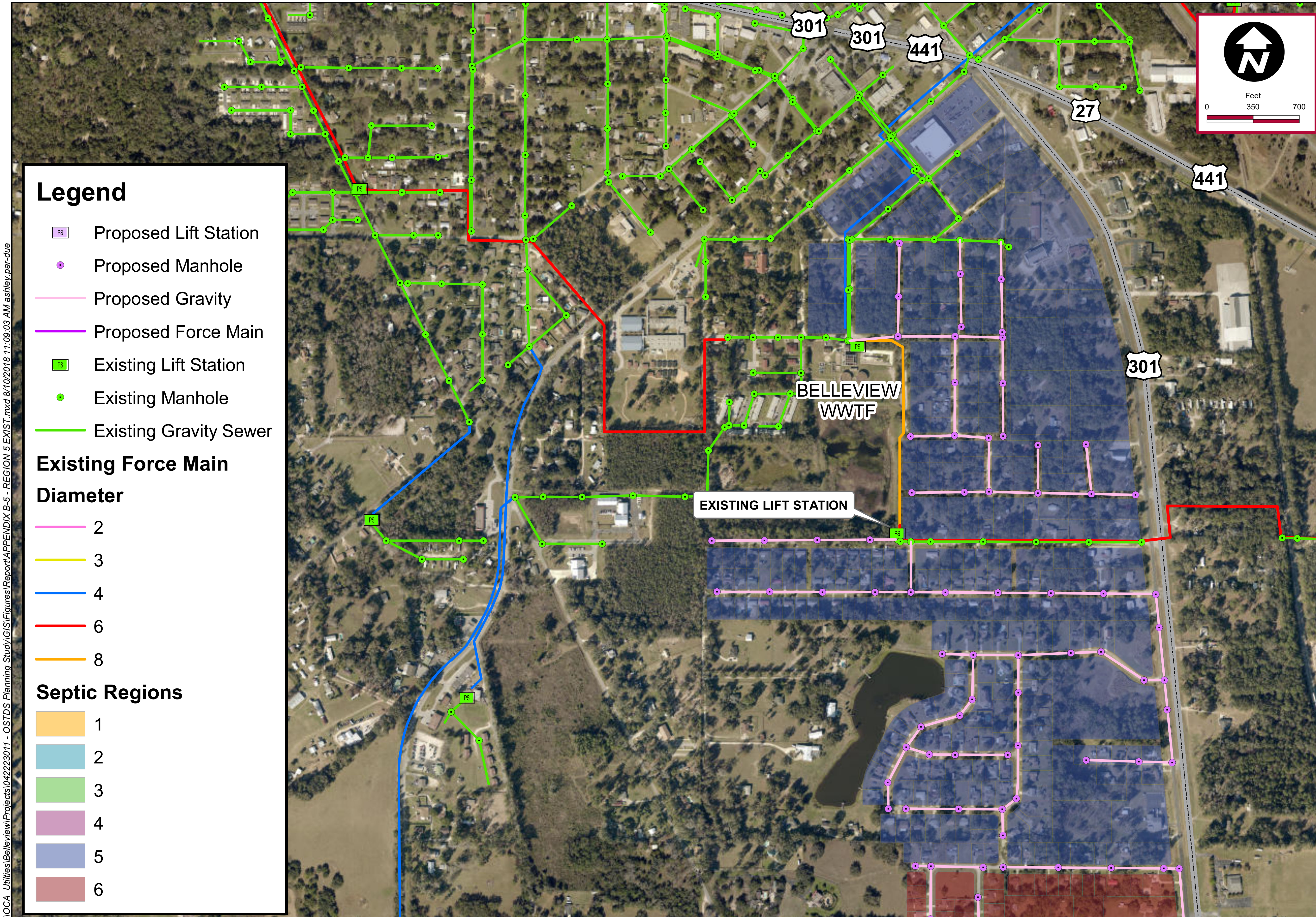
BELLEVIEW SEPTIC TO SEWER PLANNING STUDY
REGION 4 - EXISTING CONDITIONS

CITY OF BELLEVIEW

DATE AUG 2018

PROJECT NO. 042223011

FIGURE B-4



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www.kimley-horn.com CA 00000696

ALAN J. GARRI, P.E.
FLORIDA P.E. LICENSE NO: 70674
DATE:

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DRAWN BY KH
CHECKED BY KH

BELLEVIEW SEPTIC TO SEWER PLANNING STUDY
REGION 5 - EXISTING CONDITIONS

CITY OF BELLEVIEW

DATE AUG 2018
PROJECT NO. 042223011
FIGURE B-5

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BELLEVIEW SEPTIC TO SEWER PLANNING STUDY
REGION 6 - EXISTING CONDITIONS

CITY OF BELLEVIEW

DATE AUG 2018

PROJECT NO. 042223011

FIGURE B-6

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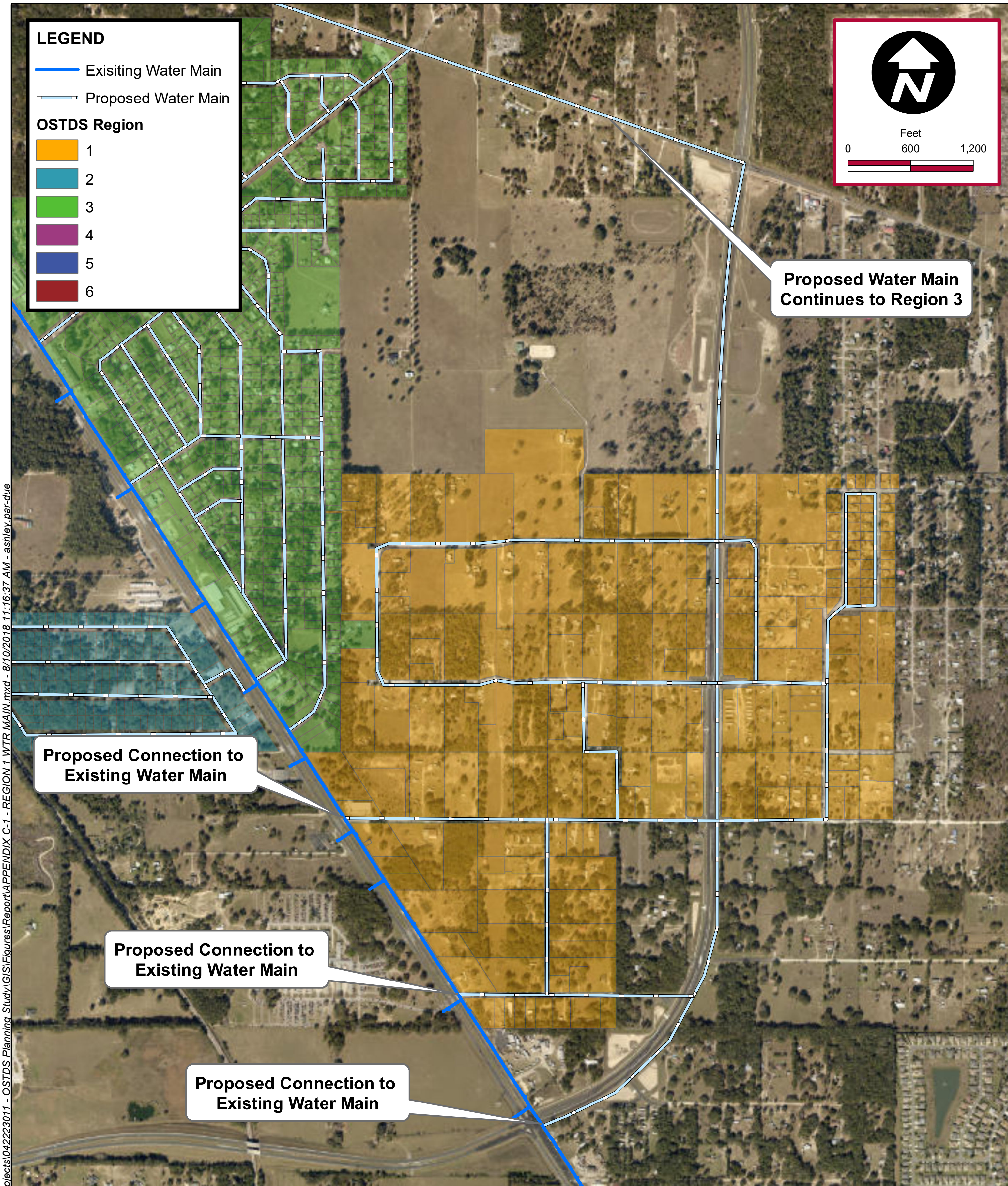
APPENDIX C:
Existing and Proposed Water Mains



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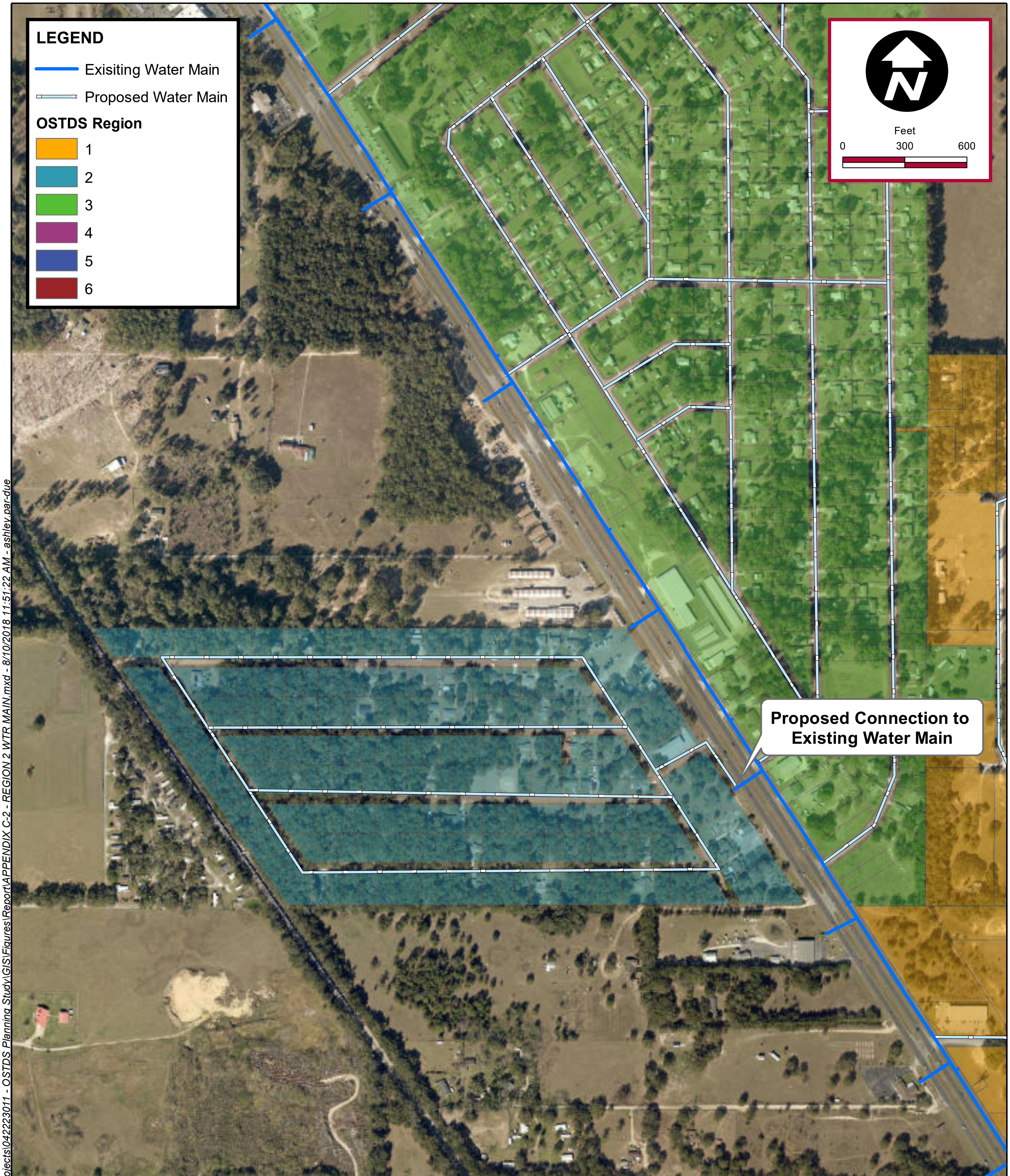
REGION 1 - PROPOSED WATER MAIN | **FIGURE C-1**

SEPTIC TO SEWER PLANNING STUDY
CITY OF BELLEVIEW

Scale: As Noted | Project No.: 042223011 | August 2018



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REGION 2 - PROPOSED WATER MAIN | **FIGURE C-2**

SEPTIC TO SEWER PLANNING STUDY
CITY OF BELLEVIEW

Scale: As Noted	Project No.: 042223011	August 2018

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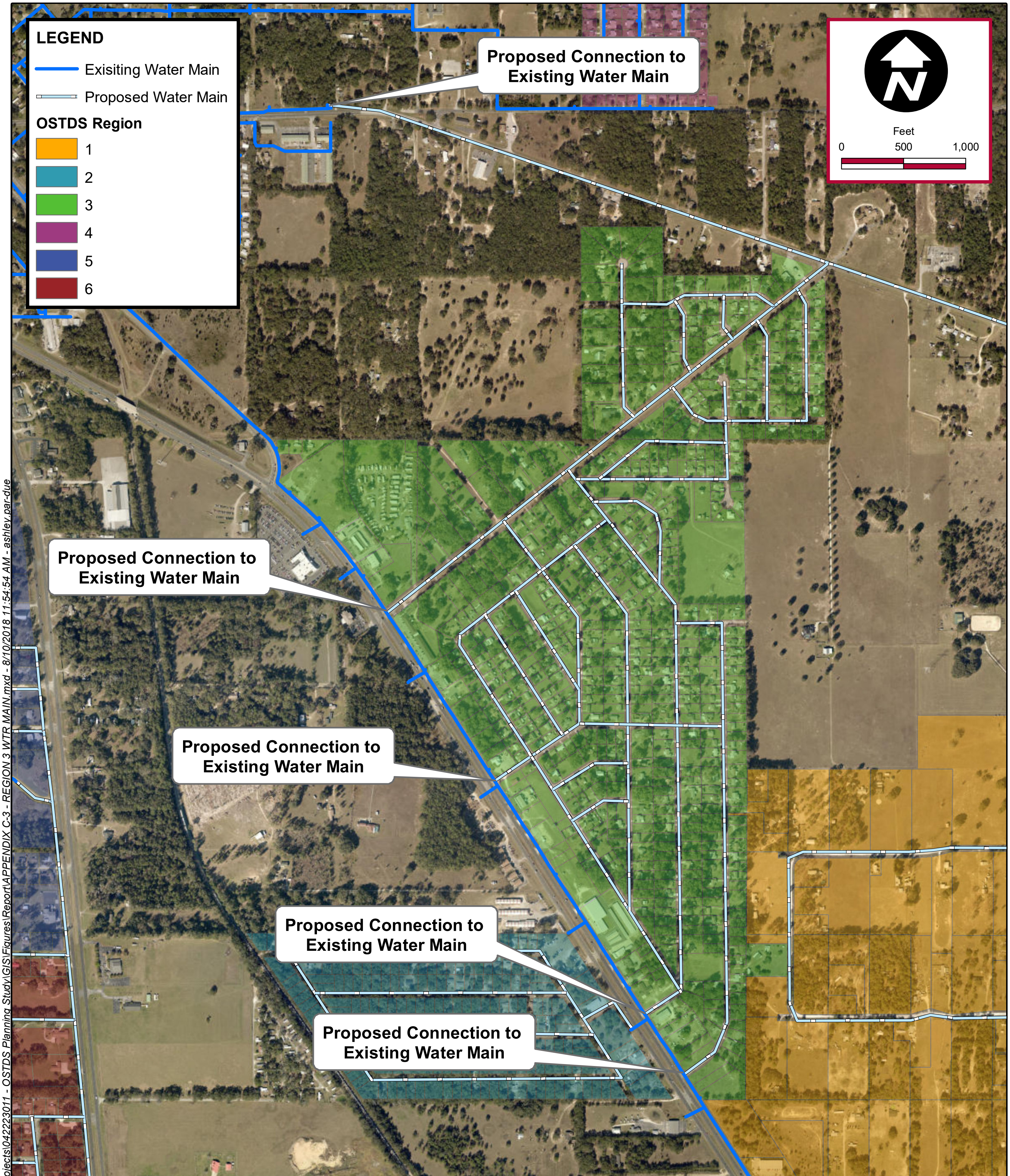

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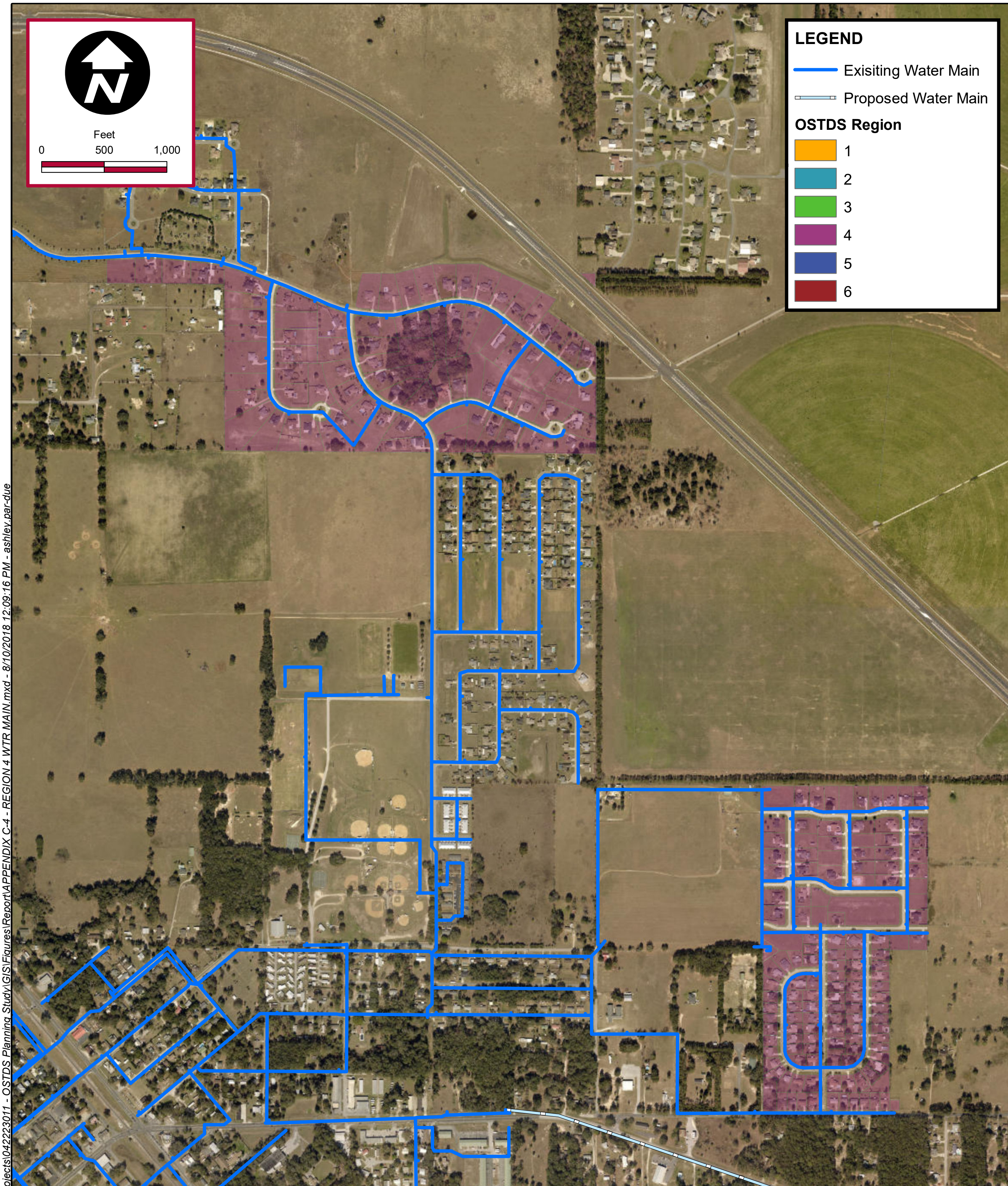
REGION 3 - PROPOSED WATER MAIN		FIGURE C-3
SEPTIC TO SEWER PLANNING STUDY CITY OF BELLEVIEW		
Scale: As Noted	Project No.: 042223011	August 2018



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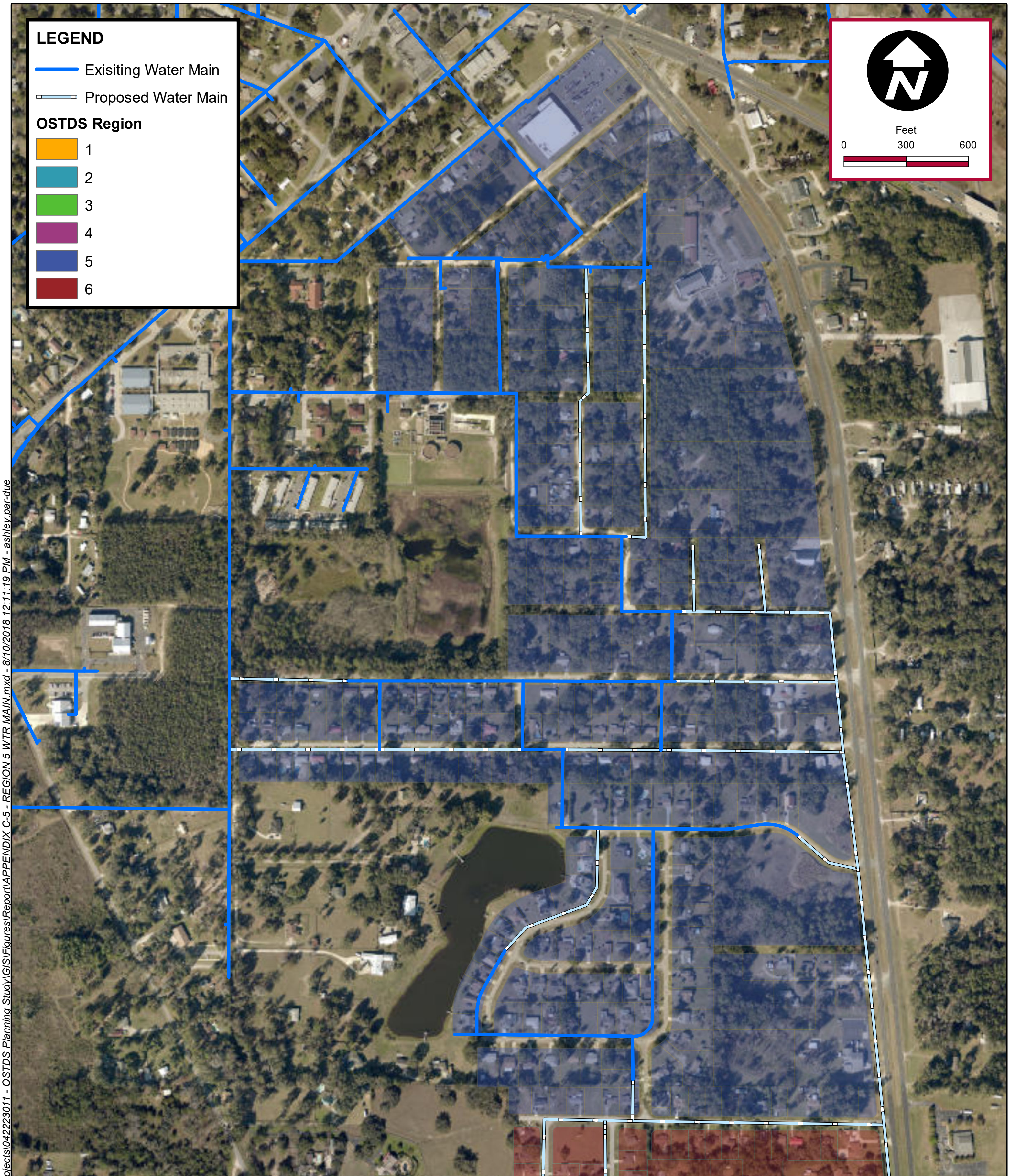
REGION 4 - PROPOSED WATER MAIN

FIGURE C-4

SEPTIC TO SEWER PLANNING STUDY
CITY OF BELLEVIEW

Scale: As Noted	Project No.: 042223011	August 2018



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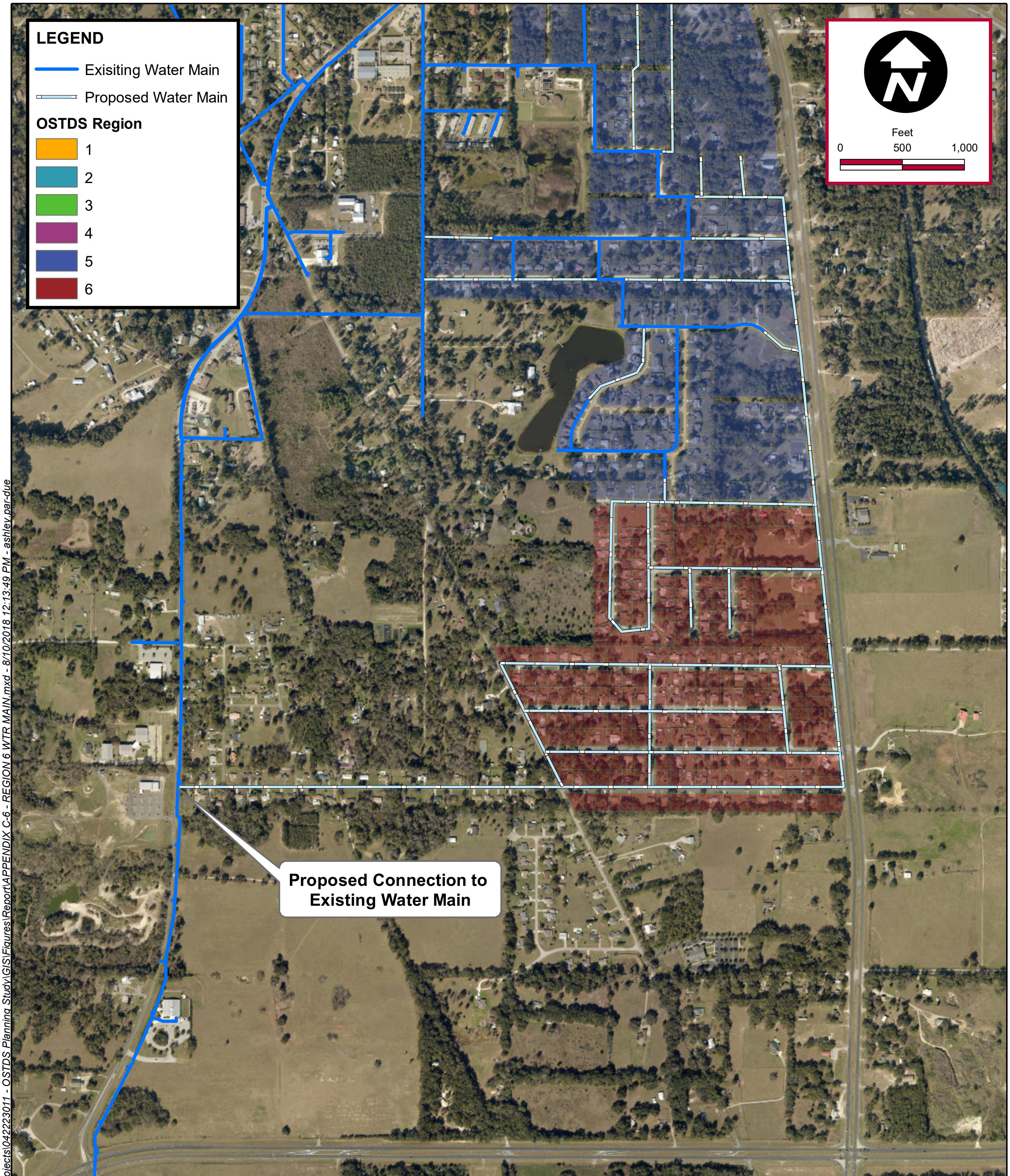
REGION 5 - PROPOSED WATER MAIN | **FIGURE C-5**

SEPTIC TO SEWER PLANNING STUDY
CITY OF BELLEVIEW

Scale: As Noted | Project No.: 042223011 | August 2018



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REGION 6 - PROPOSED WATER MAIN | **FIGURE C-6**

SEPTIC TO SEWER PLANNING STUDY
CITY OF BELLEVIEW

Scale: As Noted | Project No.: 042223011 | August 2018

APPENDIX D:
Springs Funding Guidance 2017

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

TO: George Roberts, Chair, NWFWMD
Brett Cyphers, Executive Director, NWFWMD
Donald J. Quincy, Chair, SRWMD
Hugh Thomas, Executive Director, SRWMD
John Miklos, Chair, SJRWMD
Ann Shortelle, Executive Director, SJRWMD
Randall Maggard, Chair, SWFWMD
Brian Armstrong, Executive Director, SWFWMD
Dan O'Keefe, Chair, SFWMD
Ernest Marks, Executive Director, SFWMD

FROM: Stephen M. James, Esq.
Director, Office of Water Policy

THROUGH: Drew Bartlett
Deputy Secretary, Water Policy and Ecosystem Restoration

SUBJECT: Guidance on Springs Project Funding

DATE: October 17, 2017

In 2016, the Florida Legislature recognized the critical importance of Florida's freshwater springs and identified a long-term funding source for the restoration, protection, and management of these unique natural resources. To that end, Florida's Department of Environmental Protection (Department) and the water management districts (Districts) share an important responsibility to identify springs projects that will help improve water quality, increase water flow and protect habitat in these extraordinary and iconic spring systems.

The selection of springs projects that will receive funding in any given year is based upon the consideration of a number of factors including nitrogen and sediment reduction, quantity of water saved or made available, readiness to proceed and cost-sharing and leveraging opportunities (including District, local government, and third-party matching funds). To ensure that all funding requests are publicly vetted and include the same information and criteria so to engender consistent and comparable consideration, we have prepared Springs Funding Guidance (Guidance) to facilitate the submittal process and bring clarity to the selection of projects that provide the greatest environmental benefits and the most favorable return on state investment.

Included in the Guidance is a project spreadsheet with specific criteria for data entries that must be completed for a project to be considered and eligible for funding. To assist with responses, the Guidance includes instructions and narrative descriptions that can be referenced to articulate and format each particular entry. In addition, each submittal must be accompanied by Geographic Information System (GIS) data, as further described in the Guidance.

Eligibility

Eligible projects include land acquisition intended to protect springs, and capital projects that protect the quality and quantity of water that flows from springs. This would include any viable springs protection, restoration or management projects, such as:

- Agricultural Best Management Practices (BMPs)
- Water Conservation
- Hydrologic Restoration
- Land Acquisition
- Reuse
- Wastewater Collection and Treatment; and
- Stormwater

This list is not intended to be exhaustive, and the Department will certainly consider innovative approaches and efficiencies that further the intended goal. Feasibility studies or other types of analysis, data collection, or environmental review are not eligible pursuant to budget proviso.

Procedural Requirements

Springs funding requests must be submitted through the appropriate water management district, irrespective of whether the District is contributing funds, and only after approval by the Governing Board during a publicly-noticed meeting. This will ensure that there is public support for the project, and confirm that it has been reviewed through a District process. Governing Board action is also important in recognizing the value of multi-year plans, including budget allocations, land acquisition, and any additional construction phases contemplated. Although this process does not presuppose that all beneficial projects within the District will be afforded a cost-share allocation, the Department is relying on the Governing Boards to submit essential restoration projects regardless of District contribution.

Districts should begin the solicitation process in late fall to early winter, leaving ample time for responses, review, public notice, and Governing Board approvals prior to submittal to the Department in early May. This schedule will allow for Department review and project selection by June or July, with award announcements expected between late July and early August.

Spreadsheet submittals must be fully completed as missing or incomplete information may eliminate the project from funding consideration. As these documents are public records, please pay special attention to the project's description and benefits so that the intent is precisely articulated.

Special Consideration

To demonstrate the commitment to long-term springs restoration efforts, the Department will continue to encourage and fund subsequent years of any local government's multi-year plan, particularly when it relates to wastewater treatment, septic systems, and reuse of reclaimed water. This policy should help to build predictability at the local level, and present opportunities for rural and financially disadvantaged communities.

SPRINGS FUNDING GUIDANCE

This document provides guidance for the Water Management Districts in their submittal of Springs Funding Requests to the Department of Environmental Protection.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

October, 2017

Springs Funding Template Purpose and General Guidance

The Florida Department of Environmental Protection (DEP or Department) coordinates the development of springs project funding with the Water Management Districts (WMDs or Districts). While details on the submittal expectations are set forth in detail in this document, below are key elements to keep in mind throughout this process.

- The proviso language associated with the springs appropriation provides that funds may be used for land acquisition to protect springs and for capital projects that protect the quality and quantity of water that flow from springs.
- Project benefits include: nitrogen reduction, sediment reduction, quantity of water made available, and acres acquired. Each project submitted must have at least one project benefit.
- All data elements in the spreadsheet must be addressed, even if the answer is not applicable or "N/A." Incomplete submittals may be eliminated from consideration.
- Match is an important aspect of springs funding and Districts and local project sponsors are expected to meet this match commitment. This will be documented in a final report at the end of a grant period.
- Completion of springs projects is important. Local project sponsors and the Districts will provide a quarterly update on the status of projects selected for funding.
- The project submittal spreadsheet must be written in clear, concise and publicly-understood language and should be double-checked for accuracy.

Contents

I. Foreword

The Florida Legislature has recognized the critical importance of Florida's freshwater springs and identified a long-term funding source for the restoration, recovery, protection, and management of these unique natural resources. To that end, the Department and the Districts share an important responsibility to identify springs projects that will help improve water quality, recharge water flow and protect habitat in these extraordinary and iconic spring systems.

This guidance document has been developed to assist with the selection of projects for springs funding provided by the Legislature. It has been designed to provide the Districts with the key data elements and clear policy direction that is intended to result in consistency when collecting and submitting springs projects for funding consideration.

II. Introduction

A. Project Eligibility

The legislative appropriation for springs projects contains the following proviso language:

> "Funds... may be used for land acquisition to protect springs and for capital projects that protect the quality and quantity of water that flow from springs."[1]

Eligible projects are categorized in the following high-level project types:

- Agricultural Best Management Practices (BMPs)
- Water Conservation
- Hydrologic Restoration
- Land Acquisition
- Reuse
- Wastewater collection and treatment
- Stormwater
- Other Water Quality
- Other Water Quantity

This list is not intended to be exhaustive but provides a high-level roll up of category types. Within each type listed above there may be multiple project sub-types. Eligible projects, however, do not include feasibility studies or other types of analysis, data collection, or environmental review.

B. Project Selection By the Department

The selection of springs projects that will receive state funding in any given year is based upon the Department's consideration of factors including:

---

[1] *See* Ch. 2017-70, Laws of Florida, Specific Appropriation 1606.

- Nutrient reductions or measurable improvements in water quality
- Water savings or measurable water quantity improvements
- Cost sharing and leveraging opportunities referred to as "match"
- Readiness to proceed in a timely manner
- Proximity to primary focus areas (PFAs) or springs
- Cost effectiveness.

Factors to be considered for land acquisition include:

- Proximity to primary focus areas (PFAs) or springs
- Location within a BMAP area
- Recharge potential
- Current land use
- Manageability

To the extent applicable, each of these factors should be explained in the project description for any land acquisition project.

In addition, it is important that springs funding is used to support the Department's and Districts' efforts to achieve water quality standards and minimum flows and minimum water levels (MFLs). Therefore, special consideration is given to those project commitments contained in a restoration, prevention or recovery plan such as Basin Management Action Plans (BMAP), a BMAP annual update (or intended to be included in the next BMAP annual update), Reasonable Assurance Plans, and MFL Recovery or Prevention Strategies. Additional consideration will be given to those projects that are included in an MFL Recovery or Prevention Strategy for Outstanding Florida Springs. While projects benefitting either BMAPs or MFLs will be afforded special consideration, one type of project will not be prioritized over the other. This special focus will not only further restoration efforts in areas of established priority, but will also encourage communities to submit these much-needed projects due to the availability of enhanced funding consideration.

The Department supports those projects that are part of a local project sponsors' long-term strategy to address water quality or water supply issues. The Department may identify multiple phases of such long-term strategies for funding in multiple years subject to future legislative appropriations. See Section III.D. of this guidance and Appendix B. This policy should help build predictability at the local level, and present opportunities for rural and financially disadvantaged communities.

Finally, it is important that springs projects stay on schedule and on budget. The Department will provide guidance on the manner in which the Districts provide quarterly status updates of prior year springs projects. The Department may consider prior performance (e.g., meeting timelines and match commitments) of local project sponsors and Districts in its evaluation process.

III. Development of the District Funding Request

A. District Procedure Overview

All springs funding requests must be submitted through the appropriate water management district, regardless of whether the District is contributing funds. These projects are predominately those with a local sponsor for which the project has been evaluated by the District's Governing Board. Projects submitted directly to the Department that did not go through the District solicitation and the District's Governing Board approval process will not be considered for funding. The District may additionally propose projects for which there is no local sponsor, but for which the District is the entity responsible for implementing the project, so long as the District's Governing Board considered the project alongside the other springs projects.

The Districts may use their cost share program solicitations to solicit springs projects. The Districts should begin the solicitation process in late fall to early winter, leaving ample time for responses, review, public notice, and Governing Board approvals prior to submittal to the Department in early May. This schedule will allow for the Department's review and project selection by June or July, with award announcements in late July to early August.

The District should consider the project selection factors identified in Sections II and III in their review. The project submittal spreadsheet (not just general discussion of the projects) must be approved by the Governing Board during a publicly-noticed meeting prior to submittal to the Department. This will ensure that the project has been solicited and reviewed through a public process. Governing Board consideration is also important in recognizing the value of multi-year plans, including budget allocations, land acquisition, and any additional construction phases contemplated. Again, this process does not presuppose that all beneficial springs restoration projects within the District will be afforded a cost-share allocation. The Department is, however, relying on Governing Boards to submit much needed restoration projects regardless of District contribution.

Spreadsheets must be fully completed, and if information is missing or incomplete, the project may be eliminated from funding consideration. In addition, the Department requests that the Districts submit Geographic Information System data (vector) for each project as further described in section C.1. The project location in the GIS file should be consistent with the latitude/longitude information submitted in the spreadsheet.

Once springs projects are selected, the Districts will provide routine updates to the Department for all projects for which the District is providing any funding or for which the District is the contracting entity. (The Department will seek routine updates from local project sponsors for all projects in which there is no District funding and for which the contract is directly between the Department and the local sponsor.)

Note that if a project falls through or the state funding for a project is reduced, the funds will be returned to the Department to reallocate to other projects. Neither the Districts nor local sponsors should assume the funds will be redirected to another project in the District, county, or municipality.

Because the Department intends to fully commit the springs funding each year, the Department cannot commit to providing additional funding for increased project costs. The District or its cooperator should assume that cost overruns will be the responsibility of the local project sponsor or the District.

B. Match

Match is intended to reflect how the Department's springs funding has been leveraged with other resources. Dollar amounts reported for match must be accurate; avoid double-counting and ensure ability to confirm the dollar amounts identified in the matching funds. Match will be tracked and reported by the Department for springs projects and, as such, the District must be committed to, and able to confirm these numbers at the time of project submittal and at project completion.

The Department recognizes that certain communities, such as Rural Economic Development Initiative (REDI) communities, have less ability to provide match funding and that grant funding remains an important part of ensuring these communities are able to contribute to springs restoration and recovery. Identifying projects that can take place over multi-year periods may benefit these communities. The Department asks that Districts identify economically disadvantaged communities in the "Local Government" field (and state the designation type in parenthetical) and the Department will take the information into consideration during project selection.

There are four types of match: cash, in-kind efforts, companion projects, and other. Each of those types is defined below for both the Districts and for the local sponsor.

- Primary District Match:
  1. Cash (District funding – e.g., District cost-share program funding)
  2. In Kind Efforts (District staff time directly related to the planning, implementation, supervision and completion of the project – subject to review by the Department)
  3. Companion Projects (Costs of a companion project - e.g., costs associated with a wastewater treatment plant upgrade that was required to accommodate a septic to sewer project)
  4. Other (Other District match not listed above, if any; e.g., prior land acquisition by the District related to the project)

- Primary Local Match:
  1. Cash (Local government cash funding - e.g. local government appropriation or line item funding)
  2. In Kind Efforts (Local staff time directly related to the planning, implementation, supervision and completion of the project – subject to review by the Department)
  3. Companion Projects (Costs of a companion project - e.g. costs associated with a wastewater treatment plant upgrade that was required to accommodate a septic to sewer project)
  4. Other (Other Primary Local Match not listed above, if any; e.g., prior land acquisition by local government related to the project)

Guidance on what match may and may not include is provided in the below chart.

Match **MAY** include:	Match **MAY NOT** include:
Any of these items *that have not been previously counted towards match*: ✓ Legislative appropriations ✓ Costs of a companion project (e.g. costs associated with a wastewater treatment plant upgrade that was required to accommodate a septic to sewer project) ✓ WMD and local staff time directly related to the planning, implementation, supervision and completion of the project (subject to review by DEP) ✓ Costs associated with prior phases of a project that were ***not*** funded by DEP springs funding ✓ WMD or local government cash funding (e.g. WMD cost share program funding; local government appropriation or line item funding) ✓ Third party cash contributions (e.g. not-for-profit providing cash funding towards land acquisition) ✓ Federal funding (e.g. State Revolving Fund loans; 319 nonpoint source grants) ✓ Non-DEP state funding ✓ Costs of design, permitting and engineering the project incurred by the local government or WMD ✓ Cost of land acquisition if the purchase of land is necessary for project completion (e.g. purchasing land for a new lift station) ✓ Connection fees applied to the project	× Prior DEP springs funding × Any cost identified to the left that was previously counted towards match to any DEP springs funded project × Future funding that may be requested from DEP × Future funding that may be added by the WMD or local project sponsor, without a definitive commitment for the funding

C. District Submission – Springs Project Submittal

As part of the District's Springs Project Submittal, the Department has identified key data elements required for each project that must be collected by the Districts and approved by the Governing Boards prior to submittal to the Department. This information is set forth in the springs submittal spreadsheet, a screenshot of which appears in Appendix A.

1. General Guidance

The use of the word "project" in the Springs Project Submittal refers to those activities associated only with this funding request. If this funding request is part of a larger, multi-year project, additional information will be requested for what is termed the "complete project."

The district must follow the definitions and instructions included in this guidance and must present a complete submittal for the Department's review. Information needs to be written for public understanding and attention should be paid to accuracy, spelling, grammar, acronyms, consistency, and the messaging to the public. Each project submitted must have at least one project benefit. Project benefits include: nitrogen reduction, sediment reduction, quantity of water made available, and acres acquired. All data elements in the spreadsheet must be addressed, even if the answer is "not applicable" or "N/A." Incomplete submittals may be eliminated from consideration.

Finally, the Department requests that the Districts submit Geographic Information System data (vector) for each project. For a single project that include multiple points, consider whether a polygon may be appropriate. One file may be submitted containing all projects. The project location in the GIS file should be consistent with the latitude/longitude information submitted in the spreadsheet.

2. Specific Guidance

Specific directions for each of the columns in the submittal are provided below.

I. Contact Information		
Lead Water Management District Name	**Local Government**	**WMD Project Manager Name, Phone and Email**
Please provide the lead WMD only, (i.e. the WMD contracting with DEP)	*Please identify the local project sponsor (local government) completing the project. If a REDI or other designated economically disadvantaged community, please include designation in parentheses after name (e.g.,* County Name (REDI Community)*)*	*Please provide the first and last name, phone number, and email of the WMD project manager*

II. Spring Information		
Spring Name	**Does the Spring have an Impairment? If so, does it have a BMAP?**	**Does the Spring have an MFL, and, if so, is it in recovery or prevention?**
Please provide the name of the Spring that will receive the primary benefit of the project.	***Drop Down:*** *1) No Impairment;* *2) Impairment, No BMAP or RAP;* *3) BMAP or RAP*	***Drop Down:*** *1) No MFL;* *2) MFL – Meeting,* *3) MFL – Prevention;* *4) MFL - Recovery*

III. Project Information			
Project Name	**County**	**Project Location - Latitude of project**	**Project Location - Longitude of project**
Provide the project name. If project is included in a BMAP, BMAP Annual Report, RAP or MFL Recovery/Prevention (R/P) Strategy, the name should match so it can be easily cross-referenced	*List the county or counties in which the project actually lies. Do not include all counties the project benefits.*	*Provide the latitude coordinate using the two-decimal point format*	*Provide the longitude coordinate using the two-decimal point format*

III. Project Information (continued)			
Project Type	**Project description**	**Is the Project Listed in a BMAP (or Annual Update)?**	**Is the Project Listed in a Recovery/Prevention Strategy or Identified in a Regional Water Supply Plan as Benefitting an MFL?**
Drop Down: *1) Agricultural Best Management Practices (BMPs)* *2) Water Conservation* *3) Hydrologic Restoration* *4) Land Acquisition* *5) Reuse* *6) Wastewater collection and treatment* *7) Stormwater* *8) Other Water Quality* *9) Other Water Quantity*	*A brief narrative describing the size, purpose and benefits of the project. What does the project do and why is it being done? For land acquisition, ensure the project description includes information on all applicable factors listed in Section II.*	***Drop Down:*** *1) Yes;* *2) No;* *3) No, but intended to be incorporated in next BMAP Annual Update*	***Drop Down:*** *Yes or No*

IV. Water Quality			V. Water Quantity		VI. Land Acquisition
Does this Project Have Water Quality Benefits?	**N Reduced (lbs/yr)**	**Sediment reduced (in lbs/yr)**	**Does this Project Have Water Quantity Benefits?**	**Quantity of Water Made Available (MGD)**	**Acres to be Acquired**
Drop Down: *Yes or No*	*Please provide the anticipated reduction of nitrogen using pounds per year (lbs/yr). See "Estimating Nitrogen Load Reductions from Springs Restoration Projects" guidance in Appendix C.*	*Please use the U.S. EPA's free, downloadable and customizable "Spreadsheet Tool for the Estimation of Pollution Load" (STEPL).*	***Drop Down:*** *Yes or No*	*Please provide the anticipated quantity of water made available using million gallons per day (MGD). See "Guidance to Develop the Quantity of Water Made Available" in Appendix D.*	*Please provide the number of acres the district intends to acquire via fee acquisition or conservation easement. See Guidance to Identify Estimated Acreage for Land Acquisition Projects.*

VI. Project Time and Cost		
State Funding Requested	**Local Match**	**WMD Match**
How much DEP springs funding is required? This is the amount of DEP springs funding requested for this project submittal for this fiscal year. It does NOT include other funding needed to complete the project (e.g. WMD or local match) and does NOT include prior years of springs funding or funding for other future phases of the same project.	*How much local match is committed to this project? This represents the local project sponsor's contribution towards this project for this fiscal year including Cash, In Kind Efforts, Companion Projects, and Other. See also section III.B. of this guidance.*	*How much WMD match is committed to this project? This represents the water management district's contribution towards this project for this fiscal year including Cash, In Kind Efforts, Companion Projects, and Other. See also section III.B. of this guidance.*

VI. Project Time and Cost (continued)				VII. Other
Third Party Match	**Anticipated Start Date**	**Anticipated End Date**	**Is this a multi-year project?**	**Additional Information**
Third party match: This reflects a third party's contribution towards this project for this fiscal year. See also section III.B. of this guidance.	*Please provide the anticipated project start date associated with this funding request.*	*Please provide the anticipated project end date associated with this funding request.*	***Drop Down:*** *Yes or No.* *If yes, complete Multi-Year Project Fiscal Spreadsheet. See also section III.D. and Appendix B.*	*Any additional information that would be beneficial in evaluating the project.*

D. District Submission – Multi-Year Project Fiscal

Districts must complete the Multi-Year Project Fiscal spreadsheet to identify funding for multi-year projects over the next five years. Each project the District identified as multi-year in section VI., *Project Time and Cost*, in the Springs Project Submittal spreadsheet must be included. The multi-year project fiscal spreadsheet includes three sections: **Section I**, an auto-populated totals section; **Section II**, a detailed breakout for Years 1 and 2; and **Section III**, a general breakout for Years 3, 4, and 5.

While each year is required to be broken out individually in the spreadsheet, instructions below break them out by section since the instruction for each section is the same. See Appendix B for a screen shot of the spreadsheet.

I. Total Project Cost				
DEP/State Funding Amount	**Local Match Amount**	**WMD Match Amount**	**Third Party Match**	**TOTAL Project Cost**
These columns will auto populate based on information in the Years 1 – 5 breakout. There is no need for the district to enter information into these columns.				

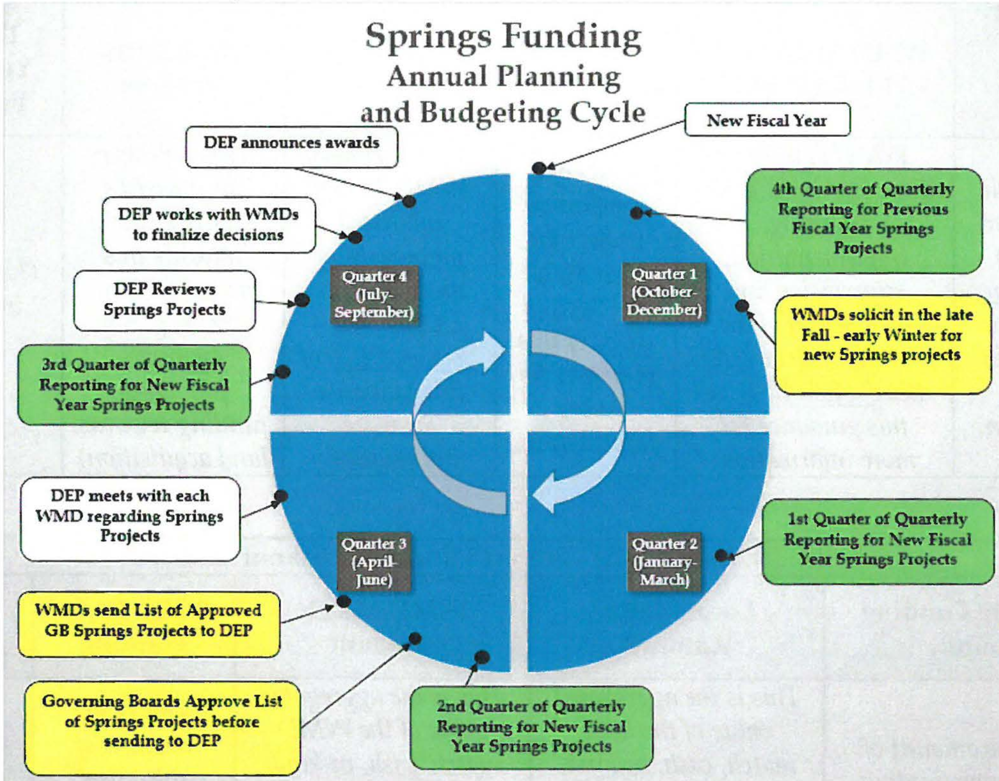
II. Year (1/2) – Project Funding Breakout				
DEP/State Funding Amount	**Local Match - Cash**	**Local Match - In-kind Efforts**	**Local Match - Companion Projects**	**Local Match - Other**
This is the amount of DEP springs funding requested for Year (1/2)	*Local government cash funding for Year (1/2). See Section III.B. of this guidance for more information.*	*Local staff time directly related to the planning, implementation, supervision and completion of the project for Year (1/2). See Section III.B. of this guidance for more information.*	*Costs of a companion project for Year (1/2). See Section III.B. of this guidance for more information.*	*Other Primary Local Match not listed previously, if any, for Year (1/2). See Section III.B. of this guidance for more information.*

II. Year (1/2) – Project Funding Breakout (Continued)					
WMD Match - Cash	**WMD Match - In-kind Efforts**	**WMD Match - Companion Projects**	**WMD Match - Other**	**Third Party Funding**	**TOTAL Year (1/2) Funding**
WMD cash funding for Year (1/2). See Section III.B. of this guidance for more information.	*WMD staff time directly related to the planning, implementation, supervision and completion of the project for Year (1/2). See Section III.B. of this guidance for more information.*	*Costs of a companion project for Year (1/2). See Section III.B. of this guidance for more information.*	*Other Primary WMD Match not listed previously, if any, for Year (1/2). See Section III.B. of this guidance for more information.*	*This reflects a third party's contribution towards this project for Year (1/2) (e.g. not-for-profit providing funding towards land acquisition)*	*This column will auto total*

III. Year (3/4/5) - Project Funding Breakout				
DEP/State Funding Amount	**Local Match Amount**	**WMD Match Amount**	**Third Party Funding**	**TOTAL Year 3 Funding**
This is the amount of DEP springs funding requested for Year (3/4/5)	*This is the aggregated value of the local match, cash, in-kind, companion projects, and other, for Year (3/4/5)*	*This is the aggregated value of the WMD match, cash, in-kind, companion projects, and other, for Year (3/4/5)*	*This is the amount of third part funding for Year (3/4/5)*	*This cell will auto total*

E. Process Cycle and Milestones

1. Process Cycle



2. Milestones

DATE	MILESTONE
October 1st	New WMD Fiscal Year Begins
Late Fall or Early Winter	WMDs solicit projects for cooperative funding
April - Early-May	Governing Boards approve springs submittal spreadsheet before sending to DEP
Early May	WMDs submit list of Governing Board-approved projects to DEP for consideration
June-July	DEP meets with each WMD regarding projects
Mid-July	DEP reviews Springs projects
July-August	DEP works with WMDs to finalize decisions
August	DEP announces Springs projects
Post-August	*Evaluation of process*
January 15th	1st Quarter of Springs Quarterly Reporting
April 15th	2nd Quarter of Springs Quarterly Reporting
July 15th	3rd Quarter of Springs Quarterly Reporting
October 15th	4th Quarter of Springs Quarterly Reporting

F. Project Selection and Announcement

The District project submittal spreadsheet will be reviewed by the Department, who may contact the Districts with questions about the information submitted. Once the Department's internal selection process is completed, the Deputy Secretary will notify the Districts' Executive Directors of the final project selections and the Department staff will work with District staff on the public announcement.

1. Overall Springs Funding Amount Announcement

The Department will develop and coordinate the overall statewide announcement of the total springs funding amount from the Governor's budget. This announcement will include descriptions of select example springs projects from the Districts' and the Department's approved list for that fiscal year. The announcement will be distributed through the GovDelivery/Granicus media distribution lists.

2. Individual Springs/District Funding Amount Announcements

Four announcements are developed by the Department to announce the specific funding amount for springs projects regionally. These include descriptions of select springs projects from the Districts' and the Department's approved list for that fiscal year. The Department will consult with the District about which projects to highlight in its jurisdiction. The District should select 3 or 4 projects to highlight that focus on the priorities of that fiscal year (e.g., septic-to-sewer conversion, BMPs, aquifer recharge, etc.). The District must ensure that the project description and specific dollar amounts included in the draft press release's description match the approved spreadsheet.

G. Risk Mitigation - Commitment of Match Funds

The Department relies on the project benefits and match commitment in its selection of the projects and its external communication regarding the projects. Subsequent reductions in match or project benefits affect project merits. The Department requests the Districts make every effort to accurately estimate and represent the details of each project in its proposal to the Department, and to continue every effort practicable to ensure those details do not change significantly as the selected projects proceed. As such, the Department must consider the following options in the event of significant changes subsequent to project selection:

1. The Department may consider reliability of District match and those of its local project sponsors when considering project proposals in subsequent years.
2. Similarly, failure to meet timeline goals (including project completion) may be a consideration for the Department in future years.
3. If a project is cancelled or the state funding for a project is reduced, the funds will be returned to the Department to reallocate to other projects. Neither the Districts

nor local sponsors should assume the funds will be redirected to another project in the District, county, or municipality.

4. Because the Department intends to fully commit the springs funding each year, the Department cannot commit to providing additional funding for increased project costs. The District or its local project sponsor should assume that cost overruns will be the responsibility of the local project sponsors or the District.

IV. Appendices

A. Springs Project Submittal Template

SPRINGS PROJECT SUBMITTAL TEMPLATE - 2017

	I. Contact Information			II. Spring Information			III. Project Information							
COUNT	Lead Water Management District Name	Local Government	WMD Project Manager Name, Phone and Email	Spring Name	Does the Spring have an Impairment? If so, does it have a BMAP?	Does the Spring have an MFL, and, if so, is it in recovery or prevention?	Project Name	County	Project Location - Latitude of project	Project Location - Longitude of project	Project Type	Project description	Is the Project Listed in a BMAP or Annual Update)?	Is the Project Listed in a Recovery/Prevention Strategy or Identified in a Regional Water Supply Plan as Benefitting an MFL?
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

SPRINGS PROJECT SUBMITTAL TEMPLATE - 2017

	IV. Water Quality			V. Water Quantity		VI. Land Acquisition	VII. Project Time and Cost							VIII. Other
COUNT	Does this Project Have Water Quantity Benefits?	N Reduced (lbs/yr)	Sediment Reduced (lbs/yr)	Does this Project Have Water Quality Benefits?	Quantity of Water Made Available (MGD)	Acres to be Acquired	State Funding Requested	Local Match	WMD Match	Third Party Match	Anticipated Start Date	Anticipated End Date	Is this a multi-year Project? If so, complete the Multi-Year Project Fscal Spreadsheet	Additional Information
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

B. Multi Year Project Fiscal Tab

Florida Springs Funding

Count	I. TOTAL PROJECT COST					II. Years 1-2 - Project Funding Breakout										
	DEP/State Funding Amount	Local Match Amount	WMD Match Amount	Third Party Match	TOTAL Project Cost	DEP/State Funding Amount	Local Match - Cash	Local Match - In-kind Efforts	Local Match - Companion Projects	Local Match - Other	WMD Match - Cash	WMD Match - In-kind Efforts	WMD Match - Companion Projects	WMD Match - Other	Third Party Funding	TOTAL Years 1-2 Funding
1	$ -	$ -	$ -	$ -	$ -											$ -
2	$ -	$ -	$ -	$ -	$ -											$ -
3	$ -	$ -	$ -	$ -	$ -											$ -
4	$ -	$ -	$ -	$ -	$ -											$ -
5	$ -	$ -	$ -	$ -	$ -											$ -
6	$ -	$ -	$ -	$ -	$ -											$ -
7	$ -	$ -	$ -	$ -	$ -											$ -
8	$ -	$ -	$ -	$ -	$ -											$ -
9	$ -	$ -	$ -	$ -	$ -											$ -
10	$ -	$ -	$ -	$ -	$ -											$ -

Florida Springs Funding

Count	III. Years 3 -5 - Project Funding Breakout														
	DEP/State Funding Amount	Local Match Amount	WMD Match Amount	Third Party Funding	TOTAL Year 3 Funding	DEP/State Funding Amount	Local Match Amount	WMD Match Amount	Third Party Funding	TOTAL Year 4 Funding	DEP/State Funding Amount	Local Match Amount	WMD Match Amount	Third Party Funding	TOTAL Year 5 Funding
1					$ -					$ -					$ -
2					$ -					$ -					$ -
3					$ -					$ -					$ -
4					$ -					$ -					$ -
5					$ -					$ -					$ -
6					$ -					$ -					$ -
7					$ -					$ -					$ -
8					$ -					$ -					$ -
9					$ -					$ -					$ -
10					$ -					$ -					$ -

C. Estimating Nitrogen Load Reductions from Springs Restoration Projects

How to Apply Attenuation and Recharge Factors

In the Department's nitrogen inventories, a load to groundwater includes the nitrogen **input** to land surface, an **attenuation factor** that accounts for removal that occurs in the soil (nitrification-denitrification, plant uptake, volatilization, etc.) and a **recharge factor** that takes into account the annual rate of recharge to the Upper Floridan aquifer (based on overburden material thickness and head differences between the surficial aquifer system and the Upper Floridan aquifer).

Inputs of nitrogen are specific to the sources being addressed and should be reported in **lbs/year (yr.)**.

Attenuation factors vary based on the nitrogen source category (e.g., septic tank, wastewater sprayfield, agricultural field with row crops, etc.). Attenuation factors for most of the sources being addressed in projects and multipliers to use in calculations are shown below.

Source type	% Attenuated	% Leached	Multiplier to use
Wastewater sprayfield	60	40	**0.40**
Wastewater reuse	75	25	**0.25**
Wastewater Rapid Infiltration Basin (RIB)	25	75	**0.75**
Conventional septic system	50	50	**0.50**
Farm fertilizer	80	20	**0.20**
Lawn fertilizer	80	20	**0.20**
Livestock on pasture	90	10	**0.10**

Note: Septic system values include treatment in both the drainfield (30%) and soil (20%).

Recharge factors are based on available Geographic Information System (GIS) coverages for most of the state. The recharge factor is applied to the attenuated input. For the area of interest, use the appropriate recharge coverage in GIS to determine the recharge rate (or rates, if area of interest is within more than one recharge regime) and assign the corresponding weighted factor. The recharge factors are applied as shown below.

Recharge Rate	Designation	% Recharged	Multiplier to use
>= 10 in/yr	High	90	**0.90**
3 to 10 in/yr	Medium	50	**0.50**
0 to 3 in/yr	Low	10	**0.10**
Discharge	Discharge	0	**0**

How to Calculate Nitrogen (N) Reduction from Wastewater Projects

These may include wastewater treatment plant (WWTP) upgrades to reduce nitrogen, re-distributing applied wastewater to other methods or areas.

LOAD REDUCTION BY UPGRADING WASTEWATER PLANT TREATMENT. For domestic WWTP upgrades from secondary treatment to advanced wastewater treatment to reduce nitrogen (assuming wastewater application volume and method does not change):

- **REDUCTION IN LOAD DUE TO IMPROVED TREATMENT (lbs/yr Total Nitrogen (TN)** = (Original annual TN input – Anticipated annual TN input after upgrade) X effluent treatment application method attenuation factor X effluent application area recharge factor

LOAD REDUCTION BY CHANGING APPLICATION METHODS. For domestic WWTP projects that involve changing application methods and/or areas applied. An example would be if additional reclaimed water lines are extended within the service area so that some of the wastewater being treated in RIBs (in a high recharge area) would be used for reclaimed water irrigation instead (in a low recharge area). Using this example, the change in N loading would be calculated as follows:

Assuming:

- RIB percent leached 75%. Multiplier = **0.75**
- Reuse percent leached 25%. Multiple = **0.25**
- High recharge weighted factor 90%. Multiplier = **0.90**
- Low recharge weighted factor 10%. Multiplier = **0.10**

- **REDUCTION IN LOAD DUE TO CHANGE IN LAND APPLICATION METHOD (lbs/yr TN)** = ([Current input of N from RIBs X 0.75 X 0.90] + [current input of N to reclaimed X 0.25 X 0.10]) - ([Anticipated input of N to RIBs X 0.75 X 0.90] + [anticipated input of N to reclaimed X 0.25 X 0.10])
  ([Current input of N to LAM1 X LAM1 Percent leached X Weighted recharge for LAM1 application area] + [current input of N to LAM2 X LAM2 Percent leached X Weighted recharge for LAM2 application area])- ([Anticipated input of N to LAM1 X LAM1 Percent leached X Weighted recharge for LAM1 application area] + [Anticipated input of N to LAM2 X LAM2 Percent leached X Weighted recharge for LAM2 application area])
  Where LAM= Land Application Method (RIBs, sprayfield, or reclaimed)

How to Calculate Septic Tank Load Reductions to Groundwater

SEPTIC SYSTEM LOAD TO GROUNDWATER. If a project involves reducing septic tank loads by sewering or replacing septic tanks with nitrogen reducing systems, it is first necessary to calculate the initial load that will be reduced.

Assume the following:

- Typical septic system TN input to the environment = **23.7 lbs/yr**
- Based on 2.63 persons per household[2] and 9.012 lbs/year per capita input of TN[3]

[2] Florida statewide census (2011-2015) https://www.census.gov/quickfacts/FL
[3] EPA estimate based on average value from several references.

- Septic system attenuation (drainfield + soil) leaching 50%. Multiplier **= 0.50**

- **SEPTIC SYSTEM LOAD TO GROUNDWATER (lbs/yr TN)** = Number of septic systems X per-system input X 0.50 X Recharge Factor

LOAD REDUCTIONS FROM SEPTIC TO SEWER. To estimate N load reductions by sewering, it is necessary to consider the load being reduced by removing the septic systems as well as the load increase from additional wastewater that would be treated at the plant and applied.

- **LOAD REDUCTION FROM SEPTIC-TO-SEWER PROJECT (lbs/yr-TN)** = (Input from septic systems to be connected X 0.50 X Recharge Factor for septic tank area) - (Input from septic systems to be connected X %N remaining after treatment at the wastewater plant X Attenuation Factor of wastewater application method X Recharge Factor for wastewater treatment area)

Note: If the wastewater application area is outside of the spring contributing area, the load reduction = total of septic systems' load to groundwater.

LOAD REDUCTIONS FROM UPGRADING TO NITROGEN-REDUCING SYSTEMS. Estimating N load reductions by converting septic systems to nitrogen reducing systems requires some assumptions about the types of nitrogen reducing systems anticipated to be installed. These are the types of systems that are available, or are being studied, and their associated nitrogen removal benefits.[4]

Type system	Overall treatment effectiveness (% N removed)
Conventional septic system	30%
Aerobic treatment unit + drainfield	51%
Current nitrogen reducing performance based treatment system	65%
Recirculating media filter	65%
Lined media treatment	65%
Passive nitrogen removal system in tank	93%

Converting to a system that reduces nitrogen by 65% may be a conservative estimate. This will provide a 35% reduction over conventional systems and is easily calculated. There may be a better estimate of the increase in treatment.

Assumptions:

- Attenuation by drainfield and soil (conventional systems), leaching 50% = Multiplier= **0.50**

[4] From Department of Health, Cost Comparisons of Various Onsite Sewage Treatment System Nitrogen Reducing Technologies (July 21, 2016 draft).

  - Net N removed by nitrogen reducing system, assumed = 65%, 35% leached. Multiplier= **0.35**
  - N removed by soil treatment below the drainfield = 20%, 80% leached. Multiplier = **0.80**

- **DIFFERENCE IN LOAD TO GROUNDWATER BY UPGRADING CONVENTIONAL SEPTIC SYSTEMS TO ONES ACHIEVING 65% N REDUCTION (lbs/yr TN)** = ([Input from septic systems to be converted X 0.50] – [Input from septic systems to be converted X 0.35 X 0.80]) X Recharge Factor for septic tank area

How to calculate TN load reductions from agricultural activities that reduce nitrogen loads

Agricultural activities (such as fertilizer applications on cropland, pastures, sod; animal farming operations; nurseries) are complex and variable and the actions to reduce nitrogen loads are often innovative and typically related to research projects. For that reason, justifications for the anticipated TN load reductions should be provided on a case by case basis. However, they must still be expressed as lbs/yr reductions in load to groundwater and use existing attenuation and recharge factors that are consistent with the Department's Nitrogen Source Inventory and Loading Tool (NSILT) methodology. Contact the Department's Division of Environmental Assessment and Restoration if there are questions.

D. Guidance to Develop the Quantity of Water Made Available

A uniform method to identify the "Quantity of Water Made Available" will allow the Department, districts, and the public to fully understand the water quantity value of the project and allow for direct, district-to-district comparisons. This guidance identifies uniform methods for calculating the Quantity of Water Made Available for use by districts in requests for springs funding from the Department. The types of projects listed below include those most commonly included in requests for springs funding. For any project types not included below, the district is to use the best available method to calculate the Quantity of Water Made Available. It is recognized that the numbers generated through this methodology may not match numbers identified by the district using alternative regional methods. This guidance may be amended over time to add additional project types.

Quantity of Water Made Available should be reported in million gallons per day and should be rounded to the tenths place (e.g., 1.1 mgd or 0.5 mgd), if known. The district should not present a range of numbers.

I. For recharge projects not involving reclaimed water, districts shall utilize the best available tool to determine the Quantity of Water Made Available as a result of the overall benefit to the aquifer. The best available tool may include a groundwater model, a surface water model, a statistical tool, or other tool that demonstrates the Quantity of Water Made Available.

II. For agricultural projects associated with irrigation system efficiency improvements for a specific agricultural operation, the Quantity of Water Made Available shall be calculated as follows:

Δ Efficiency × Average 5-Year Water Use

Where:

a. **Δ Efficiency** = Proposed Irrigation System Efficiency – Prior Irrigation System Efficiency

b. **Average 5-Year Water Use** = Average metered water use (in mgd) for the past five years. If average metered water use is not known, the district may use an estimated water use based on average crop irrigation needs or AFSIRS (using average condition). If a grower has more than one crop over the past five years, the district may use the average of fewer than five years using data from the crop with the most intensive water use.

III. For implementation of technologies that optimize water management other than new irrigation systems (e.g., soil moisture probe), the district shall use the best available information, including independent publications relating to the technology, and apply that information to the last five years of water use of the agricultural operation, if available.

IV. For agricultural irrigation system projects *not* associated with a known agricultural operation, such as requests for future funding for a district Ag BMP cost share program, the Quantity of Water Made Available shall be calculated as follows:

Total Project Cost × Historic Program Gallons Per Dollar, where:

a. **Total Project Cost** = State Funding Request + All Match for Current Request as Calculated Pursuant to the Department's Guidance

b. **Historic Program's Gallons Per Dollar = ∑ Historic Program's (Δ Efficiency × Average 5-Year Water Use) ÷ ∑ (Historic Program's Project Funding)**, where:

1. **Δ Efficiency** and **Average 5-Year Water Use** are defined in II. a. and b., above.
2. **Historic Program's Project Funding** is the sum of program's funding, including district cost share and any match from all previous projects of similar types to the funding requested.

If the district does not have historic program data, the district should use the best available regional data to determine Historic Program's Gallons Per Dollar.

V. For reclaimed water projects, the Quantity of Water Made Available shall be calculated as follows:

The greater of:

Projected Reuse Flow × Percent Offset

OR

Projected Reuse Flow × Percent Recharge, where:

a. **Projected Reuse Flow**:
- Projected Reuse Flow shall mean the annual average actual volume of water per day treated by a wastewater treatment plant and distributed through a reuse system within five years of funding request minus any permitted supplementation from traditional sources. The projected reuse flow does not equal the designed reuse capacity.
- Projected Reuse Flow should be based on:
  - Projected wastewater inflows
  - Known and planned customers for reclaimed water

- Ability to meet demands using only reclaimed water (e.g., during peak demands)
- The ability to realize the flows in the next five years
- For phased projects, include only the flows anticipated over the next five years in the phase for which funding is requested. Do not include flows for completed phases. The project description can describe past and future phases, if needed.

In no case shall the Projected Reuse Flow be greater than system's capacity.

b. **Percent Offset**:

- If Percent Offset is known for all or a portion of the reclaimed water being generated (e.g., reclaimed water is going to be used to replace the groundwater use of an industrial user), the known Percent Offset for that portion of the water should be listed.
- If Percent Offset is not known for all or a portion of the reclaimed water being generated (e.g., residential irrigation or unspecified commercial customers), use the Percent Offset based on reuse activity provided in Table 1.
- If water sources other than groundwater are being offset, a district may only include a Percent Offset for non-groundwater if the district provides an explanation in the project description of how the non-groundwater offset will benefit springs. If no explanation is provided, the Percent Offset is zero.

c. **Percent Recharge**:

- A district shall not calculate a recharge benefit for reuse disposal that does not benefit a water system. This includes the district's consideration of whether the geographic and hydrologic location of the recharge is appropriate and providing a benefit to the aquifer system.
- For all other activities, use the Percent Recharge based on reuse activity provided in Table 1.

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Table 1. Percent Offset and Recharge based on Reuse Activities[5]

Reuse Activity	Percent offset based on reuse flow	Percent recharge based on reuse flow
Indirect potable reuse	--	100
Industrial uses	100	0
Toilet flushing	100	0
Rapid Infiltration Basins (where groundwater is used)	0	90
Efficient agricultural irrigation where irrigation is needed	75	25
Efficient landscape irrigation (golf courses, parks, etc.)	75	10
Efficient residential irrigation[6]	60	40
Cooling towers	100	0
Vehicle washing	100	0
Commercial laundries	100	0
Cleaning of roads, sidewalks, & work areas	100	10
Fire protection	100	10
Construction dust control	100	0
Mixing of pesticides	100	0
Inefficient landscape irrigation (parks and other landscaped areas)	50	50
Inefficient agricultural irrigation	50	50
Surface water with direct connection to groundwater (canals of SE Florida)	0	75
Wetlands restoration (when additional water is needed)	75	10
Inefficient residential irrigation[6]	25	50
Flushing & testing of sewers and reclaimed water lines	50	0
Rapid Infiltration Basins where groundwater is currently not used	0	25
Aesthetic features (ponds, fountains, etc.)	75	10
Sprayfields (wastewater disposal on grass or other cover crop at irrigation rates higher than agronomically necessary; intended to provide some groundwater recharge)	0	50
Wetlands (when additional water is not needed)	0	10

[5] Adapted from the Department's SB 536 Report, December 1, 2015, which had been adapted from Table 5, Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water, DEP, 2003. Adaptations in this version include: removing requirement that the augmentation be only to potable groundwater and Class I surface waters in order to recognize benefits to the aquifer system and changing table headers; adding footnotes.

[6] Efficient residential irrigation ratios are used when the reuse facility's service agreement, local ordinance, or similar include provisions that require residence to have a functioning irrigation shut-off device; Pressure-regulated heads or pressure-regulation at the valve; Matched precipitation (rotors have correctly sized nozzles); an irrigation controller schedule set to follow local/district irrigation restrictions (or facility pressure reductions timed to meet those requirements), or volumetric rate for use (metering). Otherwise, inefficient residential irrigation ratios should be used.

E. Guidance to Identify Estimated Acreage for Land Acquisition Projects

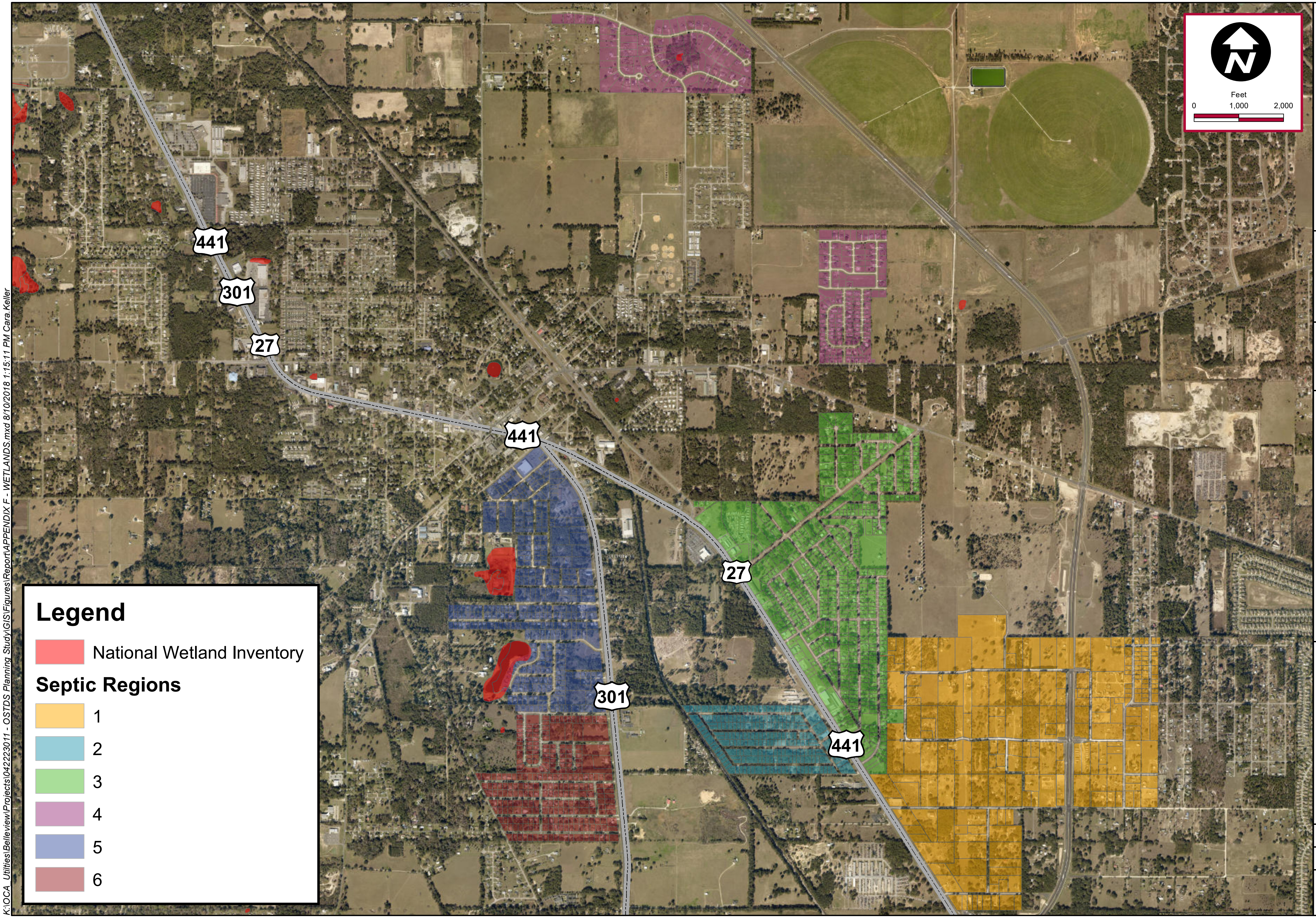
Restoring spring shorelines and habitats, improving the water quality of stormwater flowing to a spring and spring run, or preserving lands within a groundwater contribution area are all important tools for spring protection. To quantify this benefit, the number of acres of land preserved via the proposed project should be listed. If an acquisition project lies on the border of a groundwater contribution area or BMAP, only that portion within the BMAP or contribution area should be included.

A project may have more than one benefit metric that is measurable. For example, a project involving acquisition of a conservation easement may limit the allowable activities on a parcel to retain natural systems and aquifer recharge, while also protecting against future potential water quality impacts. Pollutant load prevention can be calculated based on the difference between the development potential for the property (or highest and best use) versus the current and/or planned use. By preventing or limiting development of the project site, an environmental benefit is realized in pounds per nitrogen per year or pounds of total suspended solids per year.

APPENDIX E:
Nutrient Calculations

Region	1	2	3	4	5	6	
Septic Tank TN Load to Ground Water	156	45	499	155	248	212	Septic Tanks
	23.7						lbs of TN/year/septic tank
	0.5						Attenuation Multiplier
	0.9						Recharge Factor
Total	**1664**	**480**	**5322**	**1653**	**2645**	**2261**	**lbs of TN/year to ground water**
City's WWTP Plant Efficiency	2.8						mg/l of nitrogen - discharge concentration
	31200	9000	99800	31000	49600	42400	gpd flow from septic tanks
	0.25						Attenuation Multiplier
	0.1						Recharge Factor
Total	**7**	**2**	**21**	**7**	**11**	**9**	**lbs of TN/year to ground water**
Load Reduction from Septic to Sewer Project	**1657**	**478**	**5301**	**1646**	**2634**	**2252**	**lbs of TN / YR**

APPENDIX F:
Wetland Inventory



BELLEVIEW SEPTIC TO SEWER PLANNING STUDY

WETLAND INVENTORY

CITY OF BELLEVIEW

DATE AUG 2018

PROJECT NO. 042223011

FIGURE F

SCALE	AS NOTED
DESIGNED BY	KH
DRAWN BY	KH
CHECKED BY	KH

ALAN J. GARRI, P.E.
FLORIDA P.E. LICENSE NO: 70674
DATE:

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APPENDIX G: Detailed Opinions of Probable Cost

Kimley»Horn

APPENDIX G-1: Region 1 Detailed Opinion of Probable Cost

Region 1

Gravity Sewer Project Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
8" Gravity	22,535	LF	$28.00	$630,980
Manhole	76	Each	$3,200	$243,200
Lift Station	2	Each	$210,000	$420,000
6" Force Main	6,382	LF	$20.00	$127,640
Valve (FM)	9	Each	$1,800	$16,200
Road Repair	4.27	Mile	$500,000	$2,133,996
Land Acquisition	0.12	Acre	$180,000	$21,600
Septic Tank Abandonment	156	Each	$10,000	$1,560,000
Sewer Capital Cost Subtotal				$5,173,616
30% Contingency				$1,552,085
Design, Permitting and Const. Phase				$1,034,723
SEWER CAPITAL COST TOTAL				$7,760,424
Water Project Costs				
Installed Water Main*	47,753	LF	$100	$4,775,300
Water Capital Cost Subtotal				$4,775,300
30% Contingency				$1,432,590
Design, Permitting and Const. Phase				$955,060
WATER CAPITAL COST TOTAL				$7,162,950
Grand Total				**$14,923,374**

Low-Pressure Grinder Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
2" Force Main	22,535	LF	$18.00	$405,630
Grinders	198	Each	$5,000	$990,000
Lift Station	1	Each	$210,000	$210,000
6" Force Main	2,752	LF	$20.00	$55,040
Valve (FM)	4	Each	$1,800	$7,200
2" Isolation Valve	208	Each	$1,200	$249,600
Road Repair	4.79	Mile	$375,000	$1,795,952
Land Acquisition	0.46	Acre	$180,000	$82,080
Septic Tank Abandonment	156	Each	$10,000	$1,560,000
Sewer Subtotal				$5,375,502
30% Contingency				$1,612,651
Design, Permitting and Const. Phase				$1,075,100
SEWER CAPITAL COST TOTAL				$8,063,253
Water Capital Costs				
Installed Water Main*	47,753	LF	$100	$4,775,300
Water Subtotal				$4,775,300
30% Contingency				$1,432,590
Design, Permitting and Const. Phase				$955,060
WATER CAPITAL COST TOTAL				$7,162,950
Grand Total				**$15,226,203**

Vacuum Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$40,000	$40,000
4" Vac Main	17,944	LF	$19.00	$340,936
6" Vac Main	3,606	LF	$27.00	$97,362
8" Vac Main	2,652	LF	$34.00	$90,168
10" Vac Main	82	LF	$42.00	$3,444
Vac Station	1	Each	$1,000,000	$1,000,000
Valve Pit	89	Each	$4,900	$437,080
6" Force Main	2,752	LF	$20.00	$55,040
Valve (FM)	4	Each	$1,800	$7,200
Road Repair	5.12	Mile	$250,000	$1,280,114
Land Acquisition	0.06	Acre	$180,000	$10,800
Septic Tank Abandonment	156	EA	$10,000	$1,560,000
Sewer Subtotal				$4,922,144
30% Contingency				$1,476,643
Design, Permitting and Const. Phase				$984,429
SEWER CAPITAL COST TOTAL				$7,383,215
Water Capital Costs				
Installed Water Main*	47,753	LF	$100	$4,775,300
Water Subtotal				$4,775,300
30% Contingency				$1,432,590
Design, Permitting and Const. Phase				$955,060
WATER CAPITAL COST TOTAL				$7,162,950
Grand Total				**$14,546,165**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX G-2: Region 2 Detailed Opinion of Probable Cost

Region 2

Gravity Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
8" Gravity	10,061	LF	$28.00	$281,708
Manhole	36	Each	$3,200	$115,200
Lift Station	1	EA	$210,000	$210,000
6" Force Main	1,713	LF	$20.00	$34,260
Valve (FM)	2	Each	$1,800	$3,600
Road Repair	1.91	Mile	$500,000	$952,746
Land Acquisition	0.29	Acre	$180,000	$52,200
Septic Tank Abandonment	45	Each	$10,000	$450,000
			Subtotal	$2,119,714
			30% Contingency	$635,914
			Design, Permitting and Const. Phase	$423,943
			SEWER CAPITAL COST TOTAL	$3,179,571
Water Capital Costs				
Installed Water Main*	11,128	LF	$100	$1,112,800
			Water Subtotal	$1,112,800
			30% Contingency	$333,840
			Design, Permitting and Const. Phase	$222,560
			WATER CAPITAL COST TOTAL	$1,669,200
			Grand Total	**$4,848,771**

Low-Pressure Grinder Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
2" Force Main	10,061	LF	$18.00	$181,098
Grinders	207	Each	$5,000	$1,035,000
Lift Station	1	Each	$210,000	$210,000
6" Force Main	1,713	LF	$20.00	$34,260
Valve (FM)	2	Each	$1,800	$3,600
2" Isolation Valve	217	Each	$1,200	$260,400
Road Repair	2.23	Mile	$375,000	$836,242
Land Acquisition	0.47	Acre	$180,000	$85,320
Septic Tank Abandonment	45	Each	$10,000	$450,000
			Subtotal	$3,115,920
			30% Contingency	$934,776
			Design, Permitting and Const. Phase	$623,184
			SEWER CAPITAL COST TOTAL	$4,673,880
Water Capital Costs				
Installed Water Main*	11,128	LF	$100	$1,112,800
			Water Subtotal	$1,112,800
			30% Contingency	$333,840
			Design, Permitting and Const. Phase	$222,560
			WATER CAPITAL COST TOTAL	$1,669,200
			Grand Total	**$6,343,080**

Vacuum Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$40,000	$40,000
4" Vac Main	4,730	LF	$19.00	$89,870
6" Vac Main	2,564	LF	$27.00	$69,228
8" Vac Main	2,595	LF	$34.00	$88,230
10" Vac Main	80	LF	$42.00	$3,360
Vac Station	1	Each	$1,000,000	$1,000,000
Valve Pit	93	Each	$4,900	$454,720
6" Force Main	1,713	LF	$20.00	$34,260
Valve (FM)	2	Each	$1,800	$3,600
Road Repair	2.21	Mile	$250,000	$553,125
Land Acquisition	0.06	Acre	$180,000	$10,800
Septic Tank Abandonment	45	EA	$10,000	$450,000
			Subtotal	$2,797,193
			30% Contingency	$839,158
			Design, Permitting and Const. Phase	$559,439
			SEWER CAPITAL COST TOTAL	$4,195,790
Water Capital Costs				
Installed Water Main*	11,128	LF	$100	$1,112,800
			Water Subtotal	$1,112,800
			30% Contingency	$333,840
			Design, Permitting and Const. Phase	$222,560
			WATER CAPITAL COST TOTAL	$1,669,200
			Grand Total	**$5,864,990**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX G-3: Region 3 Detailed Opinion of Probable Cost

Region 3

Gravity Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
8" Gravity	38,042	LF	$28.00	$1,065,176
Manhole	146	Each	$3,200	$467,200
Lift Station	5	Each	$210,000	$1,050,000
6" Force Main	9,033	LF	$20.00	$180,659
Valve (FM)	12	Each	$1,800	$21,600
Road Repair	8.92	Mile	$500,000	$4,457,853
Land Acquisition	0.30	Acre	$180,000	$54,000
Septic Tank Abandonment	499	Each	$10,000	$4,990,000
			Subtotal	$12,306,487
			30% Contingency	$3,691,946
			Design, Permitting and Const. Phase	$2,461,297
			SEWER CAPITAL COST TOTAL	$18,459,731
Water Capital Costs				
Installed Water Main*	43,822	LF	$100	$4,382,200
			Water Subtotal	$4,382,200
			30% Contingency	$1,314,660
			Design, Permitting and Const. Phase	$876,440
			WATER CAPITAL COST TOTAL	$6,573,300
			Grand Total	**$25,033,031**

Low-Pressure Grinder Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
2" Force Main	38,042	LF	$18.00	$684,756
Grinders	607	Each	$5,000	$3,035,000
Lift Station	3	Each	$210,000	$630,000
6" Force Main	5,450	LF	$20.00	$109,010
Valve (FM)	7	Each	$1,800	$12,600
2" Isolation Valve	637	Each	$1,200	$764,400
Road Repair	8.24	Mile	$375,000	$3,088,955
Land Acquisition	1.39	Acre	$180,000	$250,920
Septic Tank Abandonment	499	Each	$10,000	$4,990,000
			Subtotal	$13,585,641
			30% Contingency	$4,075,692
			Design, Permitting and Const. Phase	$2,717,128
			SEWER CAPITAL COST TOTAL	$20,378,462
Water Capital Costs				
Installed Water Main*	43,822	LF	$100	$4,382,200
			Water Subtotal	$4,382,200
			30% Contingency	$1,314,660
			Design, Permitting and Const. Phase	$876,440
			WATER CAPITAL COST TOTAL	$6,573,300
			Grand Total	**$26,951,762**

Vacuum Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$40,000	$40,000
4" Vac Main	22,322	LF	$19.00	$424,118
6" Vac Main	11,729	LF	$27.00	$316,683
8" Vac Main	7,467	LF	$34.00	$253,878
10" Vac Main	62	LF	$42.00	$2,604
Vac Station	1	Each	$1,000,000	$1,000,000
Valve Pit	253	Each	$4,900	$1,238,720
6" Force Main	2,988	LF	$20.00	$59,758
Valve (FM)	4	Each	$1,800	$7,200
Road Repair	8.44	Mile	$250,000	$2,110,222
Land Acquisition	0.06	Acre	$180,000	$10,800
Septic Tank Abandonment	499	EA	$10,000	$4,990,000
			Subtotal	$10,453,982
			30% Contingency	$3,136,195
			Design, Permitting and Const. Phase	$2,090,796
			SEWER CAPITAL COST TOTAL	$15,680,973
Water Capital Costs				
Installed Water Main*	43,822	LF	$100	$4,382,200
			Water Subtotal	$4,382,200
			30% Contingency	$1,314,660
			Design, Permitting and Const. Phase	$876,440
			WATER CAPITAL COST TOTAL	$6,573,300
			Grand Total	**$22,254,273**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX G-4: Region 4 Detailed Opinion of Probable Cost

Region 4

Gravity Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
8" Gravity	16,014	LF	$28.00	$448,392
Manhole	72	Each	$3,200	$230,400
Lift Station	2	Each	$210,000	$420,000
6" Force Main	8,276	LF	$20.00	$165,512
Valve (FM)	11	Each	$1,800	$19,800
Road Repair	4.60	Mile	$500,000	$2,300,153
Land Acquisition	0.35	Acre	$180,000	$63,000
Septic Tank Abandonment	155	Each	$10,000	$1,550,000
			Subtotal	$5,217,258
			30% Contingency	$1,565,177
			Design, Permitting and Const. Phase	$1,043,452
			SEWER CAPITAL COST TOTAL	$7,825,887
Water Capital Costs				
Installed Water Main*	-	LF	$100	$0
			Water Subtotal	$0
			30% Contingency	$0
			Design, Permitting and Const. Phase	$0
			WATER CAPITAL COST TOTAL	$0
			Grand Total	**$7,825,887**

Low-Pressure Grinder Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
2" Force Main	15,505	LF	$18.00	$279,090
Grinders	217	Each	$5,000	$1,085,000
Lift Station	1	Each	$210,000	$210,000
6" Force Main	6,532	LF	$20.00	$130,630
Valve (FM)	9	Each	$1,800	$16,200
2" Isolation Valve	232	Each	$1,200	$278,400
Road Repair	4.17	Mile	$375,000	$1,565,093
Land Acquisition	0.49	Acre	$180,000	$88,920
Septic Tank Abandonment	155	Each	$10,000	$1,550,000
			Subtotal	$5,223,333
			30% Contingency	$1,567,000
			Design, Permitting and Const. Phase	$1,044,667
			SEWER CAPITAL COST TOTAL	$7,835,000
Water Capital Costs				
Installed Water Main*	-	LF	$100	$0
			Water Subtotal	$0
			30% Contingency	$0
			Design, Permitting and Const. Phase	$0
			WATER CAPITAL COST TOTAL	$0
			Grand Total	**$7,835,000**

Vacuum Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$40,000	$40,000
4" Vac Main	9,043	LF	$19.00	$171,817
6" Vac Main	5,353	LF	$27.00	$144,531
8" Vac Main	2,212	LF	$34.00	$75,208
10" Vac Main	192	LF	$42.00	$8,064
Vac Station	2	Each	$1,000,000	$2,000,000
Valve Pit	97	Each	$4,900	$474,320
6" Force Main	6,893	LF	$20.00	$137,851
Valve (FM)	9	Each	$1,800	$16,200
Road Repair	4.49	Mile	$250,000	$1,121,807
Land Acquisition	0.12	Acre	$180,000	$21,600
Septic Tank Abandonment	155	Each	$10,000	$1,550,000
			Subtotal	$5,761,398
			30% Contingency	$1,728,419
			Design, Permitting and Const. Phase	$1,152,280
			SEWER CAPITAL COST TOTAL	$8,642,097
Water Capital Costs				
Installed Water Main*	-	LF	$100	$0
			Water Subtotal	$0
			30% Contingency	$0
			Design, Permitting and Const. Phase	$0
			WATER CAPITAL COST TOTAL	$0
			Grand Total	**$8,642,097**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX G-5: Region 5 Detailed Opinion of Probable Cost

Region 5

Gravity Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
8" Gravity	18,345	LF	$28.00	$513,660
Manhole	64	Each	$3,200	$204,800
Lift Station	-	Each	$210,000	$0
6" Force Main	-	LF	$20.00	$0
Valve (FM)	-	Each	$1,800	$0
Road Repair	3.47	Mile	$500,000	$1,737,216
Land Acquisition	-	Acre	$180,000	$0
Septic Tank Abandonment	248	Each	$10,000	$2,480,000
			Subtotal	$4,955,676
			30% Contingency	$1,486,703
			Design, Permitting and Const. Phase	$991,135
			SEWER CAPITAL COST TOTAL	$7,433,514
Water Capital Costs				
Installed Water Main*	11,837	LF	$100	$1,183,700
			Water Subtotal	$1,183,700
			30% Contingency	$355,110
			Design, Permitting and Const. Phase	$236,740
			WATER CAPITAL COST TOTAL	$1,775,550
			Grand Total	**$9,209,064**

Low-Pressure Grinder Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
2" Force Main	18,345	LF	$18.00	$330,210
Grinders	342	Each	$5,000	$1,710,000
Lift Station	-	Each	$210,000	$0
6" Force Main	-	LF	$20.00	$0
Valve (FM)	-	Each	$1,800	$0
2" Isolation Valve	357	Each	$1,200	$428,400
Road Repair	3.47	Mile	$375,000	$1,302,912
Land Acquisition	0.68	Acre	$180,000	$123,120
Septic Tank Abandonment	248	Each	$10,000	$2,480,000
			Subtotal	$6,394,642
			30% Contingency	$1,918,393
			Design, Permitting and Const. Phase	$1,278,928
			SEWER CAPITAL COST TOTAL	$9,591,963
Water Capital Costs				
Installed Water Main*	11,837	LF	$100	$1,183,700
			Water Subtotal	$1,183,700
			30% Contingency	$355,110
			Design, Permitting and Const. Phase	$236,740
			WATER CAPITAL COST TOTAL	$1,775,550
			Grand Total	**$11,367,513**

Vacuum Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$40,000	$40,000
4" Vac Main	16,138	LF	$19.00	$306,622
6" Vac Main	895	LF	$27.00	$24,165
8" Vac Main	560	LF	$34.00	$19,040
10" Vac Main	62	LF	$42.00	$2,604
Vac Station	1	Each	$1,000,000	$1,000,000
Valve Pit	147	Each	$4,900	$719,320
6" Force Main	169	LF	$20.00	$3,374
Valve (FM)	0	Each	$1,800	$405
Road Repair	3.38	Mile	$250,000	$843,924
Land Acquisition	0.06	Acre	$180,000	$10,800
Septic Tank Abandonment	248	Each	$10,000	$2,480,000
			Subtotal	$5,450,254
			30% Contingency	$1,635,076
			Design, Permitting and Const. Phase	$1,090,051
			SEWER CAPITAL COST TOTAL	$8,175,381
Water Capital Costs				
Installed Water Main*	11,837	LF	$100	$1,183,700
			Water Subtotal	$1,183,700
			30% Contingency	$355,110
			Design, Permitting and Const. Phase	$236,740
			WATER CAPITAL COST TOTAL	$1,775,550
			Grand Total	**$9,950,931**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX G-6: Region 6 Detailed Opinion of Probable Cost

Region 6

Gravity Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
8" Gravity	18,714	LF	$28.00	$523,992
Manhole	62	Each	$3,200	$198,400
Lift Station	1	Each	$210,000	$210,000
6" Force Main	5,304	LF	$20.00	$106,087
Valve (FM)	7	Each	$1,800	$12,600
Road Repair	4.55	Mile	$500,000	$2,274,467
Land Acquisition	0.06	Acre	$180,000	$10,800
Septic Tank Abandonment	212	Each	$10,000	$2,120,000
			Subtotal	$5,476,346
			30% Contingency	$1,642,904
			Design, Permitting and Const. Phase	$1,095,269
			SEWER CAPITAL COST TOTAL	$8,214,519
Water Capital Costs				
Installed Water Main*	24,099	LF	$100	$2,409,900
			Water Subtotal	$2,409,900
			30% Contingency	$722,970
			Design, Permitting and Const. Phase	$481,980
			WATER CAPITAL COST TOTAL	$3,614,850
			Grand Total	**$11,829,369**

Low-Pressure Grinder Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$20,000	$20,000
2" Force Main	18,714	LF	$18.00	$336,852
Grinders	253	Each	$5,000	$1,265,000
Lift Station	1	Each	$210,000	$210,000
6" Force Main	5,304	LF	$20.00	$106,087
Valve (FM)	7	Each	$1,800	$12,600
2" Isolation Valve	268	Each	$1,200	$321,600
Road Repair	4.55	Mile	$375,000	$1,705,850
Land Acquisition	0.57	Acre	$180,000	$101,880
Septic Tank Abandonment	212	Each	$10,000	$2,120,000
			Subtotal	$6,199,870
			30% Contingency	$1,859,961
			Design, Permitting and Const. Phase	$1,239,974
			SEWER CAPITAL COST TOTAL	$9,299,804
Water Capital Costs				
Installed Water Main*	24,099	LF	$100	$2,409,900
			Water Subtotal	$2,409,900
			30% Contingency	$722,970
			Design, Permitting and Const. Phase	$481,980
			WATER CAPITAL COST TOTAL	$3,614,850
			Grand Total	**$12,914,654**

Vacuum Sewer Capital Costs				
DESCRIPTION	QTY	UNIT	UNIT COST	COST
Mobilization	1	Each	$40,000	$40,000
4" Vac Main	16,043	LF	$19.00	$304,817
6" Vac Main	1,010	LF	$27.00	$27,270
8" Vac Main	1,651	LF	$34.00	$56,134
10" Vac Main	47	LF	$42.00	$1,974
Vac Station	1	Each	$1,000,000	$1,000,000
Valve Pit	111	Each	$4,900	$544,880
6" Force Main	5,304	LF	$20.00	$106,087
Valve (FM)	7	Each	$1,800	$12,600
Road Repair	4.56	Mile	$250,000	$1,138,985
Land Acquisition	0.06	Acre	$180,000	$10,800
Septic Tank Abandonment	212	Each	$10,000	$2,120,000
			Subtotal	$5,363,548
			30% Contingency	$1,609,064
			Design, Permitting and Const. Phase	$1,072,710
			SEWER CAPITAL COST TOTAL	$8,045,322
Water Capital Costs				
Installed Water Main*	24,099	LF	$100	$2,409,900
			Water Subtotal	$2,409,900
			30% Contingency	$722,970
			Design, Permitting and Const. Phase	$481,980
			WATER CAPITAL COST TOTAL	$3,614,850
			Grand Total	**$11,660,172**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX H: Detailed Net Present Worth Calculations

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APPENDIX H-1: Region 1 Present Worth Analysis Calculation

Gravity Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
8" Gravity	22,535	LF	$28.00	$630,980	26.97	0.71		$252,392.00		$452,905
Manhole	76	Each	$3,200	$243,200	26.97	0.71		$97,280.00		$174,564
Lift Station	2	Each	$210,000	$420,000	26.97	0.87	$108,000.00	$210,000.00	$1,805.00	$379,971
6" Force Main	6,400	LF	$20.00	$128,000	26.97	0.71		$51,200.00		$91,876
Valve (FM)	9	Each	$1,800	$16,200	26.97	0.71		$6,480.00		$11,628
Road Repair	4.27	Mile	$500,000	$2,133,996	26.97					$2,133,996
Land Acquisition	0.12	Acre	$180,000	$21,600	26.97	0.50		$8,640.00		$17,299
Septic Tank Abandonment	156	Each	$10,000	$1,560,000	26.97	0.71				$1,560,000
									Sewer Net Present Worth	$4,842,240
Water Net Present Worth										
Installed Water Main*	47,753	LF	$100	$4,775,300.00	26.97	0.71		$1,910,120.00	$9,641.23	$3,687,688
									Water Net Present Worth	$3,687,688
									Total Net Present Worth	**$8,529,928**

Low-Pressure Grinder Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
2" Force Main	22,535	LF	$18.00	$405,630	26.97	0.71		$162,252.00		$291,153
Grinders	198	Each	$5,000	$990,000	26.97	0.90	$1,089,000.00	$0.00	$10,021.97	$2,241,151
Lift Station	1	Each	$210,000	$210,000	26.97	0.87	$50,000.00	$105,000.00	$902.50	$186,507
6" Force Main	2,780	LF	$20.00	$55,600	26.97	0.71		$22,240.00		$39,909
Valve (FM)	4	Each	$1,800	$7,200	26.97	0.71		$2,880.00		$5,168
2" Isolation Valve	208	Each	$1,200	$249,600	26.97	0.71		$99,840.00		$179,158
Road Repair	4.79	Mile	$375,000	$1,795,951.70	26.97					$1,795,952
Land Acquisition	0.46	Acre	$180,000	$82,080.00	26.97	0.50		$57,456.00		$53,479
Septic Tank Abandonment	156	Each	$10,000	$1,560,000	26.97					$1,560,000
									Sewer Net Present Worth	$6,372,476
Water Net Present Worth										
Installed Water Main*	47,753	LF	$100	$4,775,300.00	26.97	0.71		$1,910,120.00	$9,641.23	$3,687,688
									Water Net Present Worth	$3,687,688
									Total Net Present Worth	**$10,060,164**

Vacuum Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$40,000	$40,000.00	26.97					$40,000
4" Vac Main	17,944	LF	$19.00	$340,936.00	26.97	0.71		$136,374.40		$244,717
6" Vac Main	3,606	LF	$27.00	$97,362.00	26.97	0.71		$68,153.40		$49,277
8" Vac Main	2,652	LF	$34.00	$90,168.00	26.97	0.71		$72,134.40		$39,274
10" Vac Main	82	LF	$42.00	$3,444.00	26.97	0.71		$1,377.60		$2,472
Vac Station	1	Each	$1,000,000	$1,000,000.00	26.97	0.87	$19,266.67	$500,000.00	$12,950.00	$931,188
Valve Pit	89	Each	$4,900	$437,080.00	26.97	0.90	$966.33	$0.00		$437,950
6" Force Main	2,780	LF	$20.00	$55,600.00	26.97	0.71		$77,840.00		$680
Valve (FM)	4.00	Each	$1,800	$7,200.00	26.97	0.71		$2,880.00		$5,168
Road Repair	5.13	Mile	$250,000	$1,281,439.39	26.97					$1,281,439
Land Acquisition	0.06	Acre	$180,000	$10,800.00	26.97	0.50		$7,560.00		$7,037
Septic Tank Abandonment	156	EA	$10,000	$1,560,000	26.97					$1,560,000
									Sewer Net Present Worth	$4,599,202
Water Net Present Worth										
Installed Water Main*	47,753	LF	$100	$4,775,300.00	26.97	0.71		$1,910,120.00	$9,641.23	$3,687,688
									Water Net Present Worth	$3,687,688
									Total Net Present Worth	**$8,286,890**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX H-2: Region 2 Present Worth Analysis Calculation

Gravity Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
8" Gravity	10,061	LF	$28.00	$281,708	26.97	0.71		$112,683.20		$202,205
Manhole	36	Each	$3,200	$115,200	26.97	0.71		$46,080.00		$82,688
Lift Station	1	EA	$210,000	$210,000	26.97	0.87	$54,000.00	$105,000.00	$902.50	$189,986
6" Force Main	1,713	LF	$20.00	$34,260	26.97	0.71		$13,704.00		$24,591
Valve (FM)	2	Each	$1,800	$3,600	26.97	0.71		$1,440.00		$2,584
Road Repair	1.91	Mile	$500,000	$952,746	26.97					$952,746
Land Acquisition	0.29	Acre	$180,000	$52,200	26.97	0.50		$20,880.00		$41,806
Septic Tank Abandonment	45	Each	$10,000	$450,000	26.97	0.71				$450,000
									Sewer Net Present Worth	$1,966,606
Water Net Present Worth										
Installed Water Main*	11,128	LF	$100	$1,112,800.00	26.97	0.71		$445,120.00	$2,246.72	$859,351
									Water Net Present Worth	$859,351
									Total Net Present Worth	**$2,825,957**

Low-Pressure Grinder Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
2" Force Main	10,061	LF	$18.00	$181,098	26.97	0.71		$72,439.20		$129,989
Grinders	207	Each	$5,000	$1,035,000	26.97	0.90	$1,138,500.00	$0.00	$10,477.51	$2,343,022
Lift Station	1	Each	$210,000	$210,000	26.97	0.87	$50,000.00	$105,000.00	$902.50	$186,507
6" Force Main	1,713	LF	$20.00	$34,260	26.97	0.71		$13,704.00		$24,591
Valve (FM)	2	Each	$1,800	$3,600	26.97	0.71		$1,440.00		$2,584
2" Isolation Valve	217	Each	$1,200	$260,400	26.97	0.71		$104,160.00		$186,910
Road Repair	2.23	Mile	$375,000	$836,242.19	26.97					$836,242
Land Acquisition	0.47	Acre	$180,000	$85,320.00	26.97	0.50		$59,724.00		$55,590
Septic Tank Abandonment	45	Each	$10,000	$450,000	26.97					$450,000
									Sewer Net Present Worth	$4,235,434
Water Net Present Worth										
Installed Water Main*	11,128	LF	$100	$1,112,800.00	26.97	0.71		$445,120.00	$2,246.72	$859,351
									Water Net Present Worth	$859,351
									Total Net Present Worth	**$5,094,785**

Vacuum Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$40,000	$40,000.00	26.97					$40,000
4" Vac Main	4,730	LF	$19.00	$89,870.00	26.97	0.71		$35,948.00		$64,507
6" Vac Main	2,564	LF	$27.00	$69,228.00	26.97	0.71		$48,459.60		$35,037
8" Vac Main	2,595	LF	$34.00	$88,230.00	26.97	0.71		$70,584.00		$38,430
10" Vac Main	80	LF	$42.00	$3,360.00	26.97	0.71		$1,344.00		$2,412
Vac Station	1	Each	$1,000,000	$1,000,000.00	26.97	0.87	$19,266.67	$500,000.00	$12,950.00	$931,188
Valve Pit	93	Each	$4,900	$454,720.00	26.97	0.90	$0.00	$0.00		$454,720
6" Force Main	1,713	LF	$20.00	$34,260.00	26.97	0.71		$47,964.00		$419
Valve (FM)	2.00	Each	$1,800	$3,600.00	26.97	0.71		$1,440.00		$2,584
Road Repair	2.21	Mile	$250,000	$553,125.00	26.97					$553,125
Land Acquisition	0.06	Acre	$180,000	$10,800.00	26.97	0.50		$7,560.00		$7,037
Septic Tank Abandonment	45	EA	$10,000	$450,000	26.97					$450,000
									Sewer Net Present Worth	$2,579,459
Water Net Present Worth										
Installed Water Main*	11,128	LF	$100	$1,112,800.00	26.97	0.71		$445,120.00	$2,246.72	$859,351
									Water Net Present Worth	$859,351
									Total Net Present Worth	**$3,438,810**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

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APPENDIX H-3: Region 3 Present Worth Analysis Calculation

Gravity Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
8" Gravity	38,042	LF	$28.00	$1,065,176	26.97	0.71		$426,070.40		$764,563
Manhole	146	Each	$3,200	$467,200	26.97	0.71		$186,880.00		$335,347
Lift Station	5	Each	$210,000	$1,050,000	26.97	0.87	$270,000.00	$525,000.00	$4,512.50	$949,929
6" Force Main	9,033	LF	$20.00	$180,659	26.97	0.71		$72,263.41		$129,673
Valve (FM)	12	Each	$1,800	$21,600	26.97	0.71		$8,640.00		$15,504
Road Repair	8.92	Mile	$500,000	$4,457,853	26.97					$4,457,853
Land Acquisition	0.30	Acre	$180,000	$54,000	26.97	0.50		$21,600.00		$43,248
Septic Tank Abandonment	499	Each	$10,000	$4,990,000	26.97	0.71				$4,990,000
									Sewer Net Present Worth	$11,706,117
Water Net Present Worth										
Installed Water Main*	43,822	LF	$100	$4,382,200.00	26.97	0.71		$1,752,880.00	$8,847.57	$3,384,119
									Water Net Present Worth	$3,384,119
									Total Net Present Worth	**$15,090,236**

Low-Pressure Grinder Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
2" Force Main	38,042	LF	$18.00	$684,756	26.97	0.71		$273,902.40		$491,505
Grinders	607	Each	$5,000	$3,035,000	26.97	0.90	$3,338,500.00	$0.00	$30,723.91	$6,870,600
Lift Station	3	Each	$210,000	$630,000	26.97	0.87	$150,000.00	$315,000.00	$2,707.50	$559,520
6" Force Main	5,450	LF	$20.00	$109,010	26.97	0.71		$43,603.93		$78,245
Valve (FM)	7	Each	$1,800	$12,600	26.97	0.71		$5,040.00		$9,044
2" Isolation Valve	637	Each	$1,200	$764,400	26.97	0.71		$305,760.00		$548,672
Road Repair	8.24	Mile	$375,000	$3,088,955.35	26.97					$3,088,955
Land Acquisition	1.39	Acre	$180,000	$250,920.00	26.97	0.50		$175,644.00		$163,485
Septic Tank Abandonment	499	Each	$10,000	$4,990,000	26.97					$4,990,000
									Sewer Net Present Worth	$16,820,025
Water Net Present Worth										
Installed Water Main*	43,822	LF	$100	$4,382,200.00	26.97	0.71		$1,752,880.00	$8,847.57	$3,384,119
									Water Net Present Worth	$3,384,119
									Total Net Present Worth	**$20,204,145**

Vacuum Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$40,000	$40,000.00	26.97					$40,000
4" Vac Main	22,322	LF	$19.00	$424,118.00	26.97	0.71		$169,647.20		$304,424
6" Vac Main	11,729	LF	$27.00	$316,683.00	26.97	0.71		$221,678.10		$160,279
8" Vac Main	7,467	LF	$34.00	$253,878.00	26.97	0.71		$203,102.40		$110,580
10" Vac Main	62	LF	$42.00	$2,604.00	26.97	0.71		$1,041.60		$1,870
Vac Station	1	Each	$1,000,000	$1,000,000.00	26.97	0.87	$19,266.67	$500,000.00	$12,950.00	$933,698
Valve Pit	253	Each	$4,900	$1,238,720.00	26.97	0.90	$0.00	$0.00		$1,238,721
6" Force Main	2,988	LF	$20.00	$59,757.60	26.97	0.71		$83,660.64		$732
Valve (FM)	4.00	Each	$1,800	$7,200.00	26.97	0.71		$2,880.00		$5,169
Road Repair	8.44	Mile	$250,000	$2,110,221.59	26.97					$2,110,222
Land Acquisition	0.06	Acre	$180,000	$10,800.00	26.97	0.50		$7,560.00		$7,037
Septic Tank Abandonment	499	EA	$10,000	$4,990,000	26.97					$4,990,000
									Sewer Net Present Worth	$9,902,732
Water Net Present Worth										
Installed Water Main*	43,822	LF	$100	$4,382,200.00	26.97	0.71		$1,752,880.00	$8,847.57	$3,384,120
									Water Net Present Worth	$3,384,120
									Total Net Present Worth	**$13,286,852**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

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APPENDIX H-4: Region 4 Present Worth Analysis Calculation

Gravity Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
8" Gravity	16,014	LF	$28.00	$448,392	26.97	0.71		$179,356.80		$321,848
Manhole	72	Each	$3,200	$230,400	26.97	0.71		$92,160.00		$165,377
Lift Station	2	Each	$210,000	$420,000	26.97	0.87	$108,000.00	$210,000.00	$1,805.00	$394,036
6" Force Main	8,276	LF	$20.00	$165,512	26.97	0.71		$66,204.96		$118,802
Valve (FM)	11	Each	$1,800	$19,800	26.97	0.71		$7,920.00		$14,213
Road Repair	4.60	Mile	$500,000	$2,300,153	26.97					$2,300,153
Land Acquisition	0.35	Acre	$180,000	$63,000	26.97	0.50		$25,200.00		$50,456
Septic Tank Abandonment	155	Each	$10,000	$1,550,000	26.97	0.71				$1,550,001
									Sewer Net Present Worth	$4,934,886
Water Net Present Worth										
Installed Water Main*	-	LF	$100	$0.00	26.97	0.71		$0.00	$0.00	$0
									Water Net Present Worth	$0
									Total Net Present Worth	**$4,934,886**

Low-Pressure Grinder Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
2" Force Main	15,505	LF	$18.00	$279,090	26.97	0.71		$111,636.00		$200,326
Grinders	217	Each	$5,000	$1,085,000	26.97	0.90	$1,193,500.00	$0.00	$10,983.67	$2,574,782
Lift Station	1	Each	$210,000	$210,000	26.97	0.87	$50,000.00	$105,000.00	$902.50	$193,018
6" Force Main	6,532	LF	$20.00	$130,630	26.97	0.71		$52,252.07		$93,765
Valve (FM)	9	Each	$1,800	$16,200	26.97	0.71		$6,480.00		$11,629
2" Isolation Valve	232	Each	$1,200	$278,400	26.97	0.71		$111,360.00		$199,831
Road Repair	4.17	Mile	$375,000	$1,565,092.97	26.97					$1,565,093
Land Acquisition	0.49	Acre	$180,000	$88,920.00	26.97	0.50		$62,244.00		$57,936
Septic Tank Abandonment	155	Each	$10,000	$1,550,000	26.97					$1,550,000
									Sewer Net Present Worth	$6,466,379
Water Net Present Worth										
Installed Water Main*	-	LF	$100	$0.00	26.97	0.71		$0.00	$0.00	$0
									Water Net Present Worth	$0
									Total Net Present Worth	**$6,466,379**

Vacuum Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$40,000	$40,000.00	26.97					$40,000
4" Vac Main	9,043	LF	$19.00	$171,817.00	26.97	0.71		$68,726.80		$123,328
6" Vac Main	5,353	LF	$27.00	$144,531.00	26.97	0.71		$101,171.70		$73,150
8" Vac Main	2,212	LF	$34.00	$75,208.00	26.97	0.71		$60,166.40		$32,758
10" Vac Main	192	LF	$42.00	$8,064.00	26.97	0.71		$3,225.60		$5,789
Vac Station	2	Each	$1,000,000	$2,000,000.00	26.97	0.87	$38,533.33	$1,000,000.00	$25,900.00	$1,867,395
Valve Pit	97	Each	$4,900	$474,320.00	26.97	0.90	$0.00	$0.00		$474,321
6" Force Main	6,893	LF	$20.00	$137,851.21	26.97	0.71		$192,991.69		$1,687
Valve (FM)	9.00	Each	$1,800	$16,200.00	26.97	0.71		$6,480.00		$11,629
Road Repair	4.49	Mile	$250,000	$1,121,806.84	26.97					$1,121,807
Land Acquisition	0.12	Acre	$180,000	$21,600.00	26.97	0.50		$15,120.00		$14,074
Septic Tank Abandonment	155	Each	$10,000	$1,550,000	26.97					$1,550,000
									Sewer Net Present Worth	$5,315,938
Water Net Present Worth										
Installed Water Main*	-	LF	$100	$0.00	26.97	0.71		$0.00	$0.00	$0
									Water Net Present Worth	$0
									Total Net Present Worth	**$5,315,938**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

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APPENDIX H-5: Region 5 Present Worth Analysis Calculation

Gravity Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
8" Gravity	18,345	LF	$28.00	$513,660	26.97	0.71		$205,464.00		$368,696
Manhole	64	Each	$3,200	$204,800	26.97	0.71		$81,920.00		$147,002
Lift Station	-	Each	$210,000	$0	26.97	0.87	$0.00	$0.00	$0.00	$0
6" Force Main	-	LF	$20.00	$0	26.97	0.71		$0.00		$0
Valve (FM)	-	Each	$1,800	$0	26.97	0.71		$0.00		$0
Road Repair	3.47	Mile	$500,000	$1,737,216	26.97					$1,737,216
Land Acquisition	-	Acre	$180,000	$0	26.97	0.50		$0.00		$0
Septic Tank Abandonment	248	Each	$10,000	$2,480,000	26.97	0.71				$2,480,001
									Sewer Net Present Worth	$4,752,915
Water Net Present Worth										
Installed Water Main*	11,837	LF	$100	$1,183,700.00	26.97	0.71		$473,480.00	$2,389.86	$914,104
									Water Net Present Worth	$914,104
									Total Net Present Worth	**$5,667,019**

Low-Pressure Grinder Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
2" Force Main	18,345	LF	$18.00	$330,210	26.97	0.71		$132,084.00		$237,019
Grinders	342	Each	$5,000	$1,710,000	26.97	0.90	$1,881,000.00	$0.00	$17,310.67	$4,057,950
Lift Station	-	Each	$210,000	$0	26.97	0.87	$0.00	$0.00	$0.00	$0
6" Force Main	-	LF	$20.00	$0	26.97	0.71		$0.00		$0
Valve (FM)	-	Each	$1,800	$0	26.97	0.71		$0.00		$0
2" Isolation Valve	357	Each	$1,200	$428,400	26.97	0.71		$171,360.00		$307,498
Road Repair	3.47	Mile	$375,000	$1,302,911.93	26.97					$1,302,912
Land Acquisition	0.68	Acre	$180,000	$123,120.00	26.97	0.50		$86,184.00		$80,218
Septic Tank Abandonment	248	Each	$10,000	$2,480,000	26.97					$2,480,000
									Sewer Net Present Worth	$8,485,598
Water Net Present Worth										
Installed Water Main*	11,837	LF	$100	$1,183,700.00	26.97	0.71		$473,480.00	$2,389.86	$914,104
									Water Net Present Worth	$914,104
									Total Net Present Worth	**$9,399,701**

Vacuum Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$40,000	$40,000.00	26.97					$40,000
4" Vac Main	16,138	LF	$19.00	$306,622.00	26.97	0.71		$122,648.80		$220,088
6" Vac Main	895	LF	$27.00	$24,165.00	26.97	0.71		$16,915.50		$12,231
8" Vac Main	560	LF	$34.00	$19,040.00	26.97	0.71		$15,232.00		$8,294
10" Vac Main	62	LF	$42.00	$2,604.00	26.97	0.71		$1,041.60		$1,870
Vac Station	1	Each	$1,000,000	$1,000,000.00	26.97	0.87	$19,266.67	$500,000.00	$12,950.00	$933,698
Valve Pit	147	Each	$4,900	$719,320.00	26.97	0.90	$0.00	$0.00		$719,321
6" Force Main	169	LF	$20.00	$3,373.68	26.97	0.71		$4,723.15		$42
Valve (FM)	0.22	Each	$1,800	$404.84	26.97	0.71		$161.94		$291
Road Repair	3.38	Mile	$250,000	$843,924.44	26.97					$843,924
Land Acquisition	0.06	Acre	$180,000	$10,800.00	26.97	0.50		$7,560.00		$7,037
Septic Tank Abandonment	248	Each	$10,000	$2,480,000	26.97					$2,480,000
									Sewer Net Present Worth	$5,266,797
Water Net Present Worth										
Installed Water Main*	11,837	LF	$100	$1,183,700.00	26.97	0.71		$473,480.00	$2,389.86	$914,104
									Water Net Present Worth	$914,104
									Total Net Present Worth	**$6,180,900**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

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APPENDIX H-6: Region 6 Present Worth Analysis Calculation

Gravity Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
8" Gravity	18,714	LF	$28.00	$523,992	26.97	0.71		$209,596.80		$376,112
Manhole	62	Each	$3,200	$198,400	26.97	0.71		$79,360.00		$142,408
Lift Station	1	Each	$210,000	$210,000	26.97	0.87	$54,000.00	$105,000.00	$902.50	$197,018
6" Force Main	5,304	LF	$20.00	$106,087	26.97	0.71		$42,434.96		$76,148
Valve (FM)	7	Each	$1,800	$12,600	26.97	0.71		$5,040.00		$9,045
Road Repair	4.55	Mile	$500,000	$2,274,467	26.97					$2,274,467
Land Acquisition	0.06	Acre	$180,000	$10,800	26.97	0.50		$4,320.00		$8,650
Septic Tank Abandonment	212	Each	$10,000	$2,120,000	26.97	0.71				$2,120,001
									Sewer Net Present Worth	$5,223,849
Water Net Present Worth										
Installed Water Main*	24,099	LF	$100	$2,409,900.00	26.97	0.71		$963,960.00	$4,865.54	$1,861,027
									Water Net Present Worth	$1,861,027
									Total Net Present Worth	**$7,084,876**

Low-Pressure Grinder Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$20,000	$20,000	26.97					$20,000
2" Force Main	18,714	LF	$18.00	$336,852	26.97	0.71		$134,740.80		$241,787
Grinders	253	Each	$5,000	$1,265,000	26.97	0.90	$1,391,500.00	$0.00	$12,805.85	$3,001,934
Lift Station	1	Each	$210,000	$210,000	26.97	0.87	$50,000.00	$105,000.00	$902.50	$193,018
6" Force Main	5,304	LF	$20.00	$106,087	26.97	0.71		$42,434.96		$76,148
Valve (FM)	7	Each	$1,800	$12,600	26.97	0.71		$5,040.00		$9,045
2" Isolation Valve	268	Each	$1,200	$321,600	26.97	0.71		$128,640.00		$230,839
Road Repair	4.55	Mile	$375,000	$1,705,850.14	26.97					$1,705,850
Land Acquisition	0.57	Acre	$180,000	$101,880.00	26.97	0.50		$71,316.00		$66,380
Septic Tank Abandonment	212	Each	$10,000	$2,120,000	26.97					$2,120,000
									Sewer Net Present Worth	$7,665,001
Water Net Present Worth										
Installed Water Main*	24,099	LF	$100	$2,409,900.00	26.97	0.71		$963,960.00	$4,865.54	$1,861,027
									Water Net Present Worth	$1,861,027
									Total Net Present Worth	**$9,526,028**

Vacuum Sewer Net Present Worth										
DESCRIPTION	QTY	UNIT	UNIT COST	COST	USPWF	SPPWF	R	S	O&M	NPW
Mobilization	1	Each	$40,000	$40,000.00	26.97					$40,000
4" Vac Main	16,043	LF	$19.00	$304,817.00	26.97	0.71		$121,926.80		$218,793
6" Vac Main	1,010	LF	$27.00	$27,270.00	26.97	0.71		$19,089.00		$13,803
8" Vac Main	1,651	LF	$34.00	$56,134.00	26.97	0.71		$44,907.20		$24,451
10" Vac Main	47	LF	$42.00	$1,974.00	26.97	0.71		$789.60		$1,418
Vac Station	1	Each	$1,000,000	$1,000,000.00	26.97	0.87	$19,266.67	$500,000.00	$12,950.00	$933,698
Valve Pit	111	Each	$4,900	$544,880.00	26.97	0.90	$0.00	$0.00		$544,881
6" Force Main	5,304	LF	$20.00	$106,087.40	26.97	0.71		$148,522.36		$1,298
Valve (FM)	7.00	Each	$1,800	$12,600.00	26.97	0.71		$5,040.00		$9,045
Road Repair	4.56	Mile	$250,000	$1,138,985.32	26.97					$1,138,985
Land Acquisition	0.06	Acre	$180,000	$10,800.00	26.97	0.50		$7,560.00		$7,037
Septic Tank Abandonment	212	Each	$10,000	$2,120,000	26.97					$2,120,000
									Sewer Net Present Worth	$5,053,408
Water Net Present Worth										
Installed Water Main*	24,099	LF	$100	$2,409,900.00	26.97	0.71		$963,960.00	$4,865.54	$1,861,027
									Water Net Present Worth	$1,861,027
									Total Net Present Worth	**$6,914,435**

**Includes appurtenances (valves, fittings, hydrants, etc.)*

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

APPENDIX I: Design Considerations – Vacuum Sewer Systems

	Design Considerations-Vacuum Sewer Systems
	If any of the following standards or criteria do not apply to a project or if the project has not been designed to comply with the following standards or criteria, please provide an explanation. An application for an individual permit is required for construction of a vacuum sewer system. [62-604.600(7)(a), Florida Administrative Code (F.A.C.)]
	General
___	1. The project is designed based on an average daily flow of 100 gallons per capita plus wastewater flow from industrial plants and major institutional and commercial facilities unless water use data or other justification is used to better estimate the flow. [RSWF 11.243]
___	2. The design includes an appropriate peaking factor (minimum ratio of 3 for peak hour/design average flow). [RSWF 11.243]
___	3. Procedures are specified for operation of the existing collection/transmission system during construction. [RSWF 20.15]
___	4. Except for on-lot facilities, the project is designed to be located on public right-of-ways, land owned by the permittee, or easements. [62-604.400(1)(b), F.A.C.]
___	5. A central management entity, be it public or private, is responsible for operation and maintenance of the on-lot facilities. [62-604.400(4), F.A.C.]
___	6. The project is designed to be located no closer than 100 feet from a public drinking water supply well and no closer than 75 feet from a private drinking water supply well; or documentation is provided showing that another alternative will result in an equivalent level of reliability and public health protection. [62-604.400(1)(c), F.A.C.]
___	7. The project is designed with no physical connections between a public or private potable water supply system. [RSWF 38.1 and 48.5]
___	8. The project is designed to preclude the deliberate introduction of storm water, surface water, groundwater, roof runoff, subsurface drainage, swimming pool drainage, air conditioning system condensate water, non-contact cooling water and sources of uncontaminated wastewater. [62-604.400(1)(d), F.A.C.]
___	9. At the completion of each days work, testing on vacuum mains and vacuum service pit connections laid that day is specified requiring; 1) the completed portion of the system be plugged and subjected to a vacuum of 22 inches Hg and then allowed to stabilize for 15 minutes prior to monitoring; and 2) a vacuum loss of less than l % per hour during the minimum testing period of 2 hours. [MOPFD-12 #1 Page 205]
___	10. Final testing on completed vacuum mains and vacuum service pit connections is specified requiring: 1) the completed portion of the system be plugged and subjected to a vacuum of 22 inches Hg and then allowed to stabilize for 15 minutes prior to monitoring; and 2) a vacuum loss of less than l % per hour during the minimum testing period of 4 hours. [MOPFD-12 #2 Page 205]
	Vacuum Collection System
___	11. The entire piping network is designed to keep the bore of the entire pipeline open; sections of pipeline are not purposely sealed. [MOPFD-12 #2 Page 200]

___	12. The vacuum sewer system is designed with a minimum air-to-liquid ratio of two parts air to one part liquid. [MOPFD-12 #5 Page 200]
___	13. The vacuum sewer system is designed with a maximum static loss of 13 feet and a maximum friction loss of 5 feet in any single flow path. [MOPFD-12 #6 and #7 Page 200]
___	14. The project is designed with no vacuum sewer mains less than 4 inches in diameter. [MOPFD-12 #2 Page 201]
	15. Pipe and fittings for vacuum sewer pipe is SDR 21 pressure rated PVC pipe with double-lipped, push-on gasketed joints. [MOPFD-12 #13 Page 202 and Page 129]
___	16. General design configuration for uphill transport is based on a saw tooth pipeline profile; or documentation is provided showing other vertical profiles are justified by appropriate engineering data. [MOPFD-12 #1 Page 201]
___	17. When vacuum sewer mains or branches must ascend a hill, multiple lifts are designed at a minimum distance of 20 feet apart. Between each lift, vacuum lines are installed with a uniform slope, so that minimum fall of 0.25 feet is achieved between these lifts. [MOPFD-12 #10 Pages 201 and 202]
___	18. The project is designed with no single lift of vacuum sewer main exceeding 3 feet in height. [MOPFD-12 #6 Page 201]
___	19. The project is designed with 5 maximum lifts in a series. A series of 5 lifts is designed to be separated by at least 100 feet of vacuum mains from the next lift or series of lifts, at least one energy input is designed in the zone of separation. [62-4.070(3), F.A.C.]
___	20. If not uphill transport, vacuum sewer mains are designed with a minimum slope of 0.20%. For profile changes less than 125 feet apart, the minimum fall between profile changes is 0.25 feet. [MOPFD-12 #3 Page 201]
___	21. If directional drilling, installation tolerances for vacuum sewer main slope are specified the same as those required for open trenching. [62-4.070(3), F.A.C.]
___	22. The maximum design flows (i.e., peak flows) for vacuum sewer main sizing is designed as follows: 4-inch pipe/38 gallons per minute (gallons per minute (gpm)); 6-inch pipe/105 gpm; 8-inch pipe/210 gpm; and 10-inch pipe/375 gpm. For vacuum mains larger than 10-inches, flow data supports the peak design flow capacity of that pipe size. [MOPFD-12 #4 Page 201]
___	23. The project is designed with 2000 feet maximum length for any one run of 4-inch diameter vacuum sewer main. [MOPFD-12 #5 Page 201]
___	24. For changes in horizontal alignment, two 45-degree bends connected by a short section of piping are designed, rather than one 90-degree bend. [MOPFD-12 #8 Page 201]
___	25. The project is designed with isolation valves at every branch connection and at intervals no greater than 1500 feet on vacuum sewer mains. Resilient coated wedge gate valves and a valve box or other approved apparatus, to facilitate proper use of the valve, are specified. [MOPFD-12 #9 Page 201]
___	26. The vacuum sewer system is designed to prevent damage from superimposed loads. [RSWF 33.7]
___	27. The vacuum sewer system is designed to meet the “Stream Crossings” portion (Items 27-33) of the Collection/Transmission System Design Information beginning on page 4 of DEP Form 62-604.300(8)(a), Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System. [62-604.300(8)(a), F.A.C.]
___	28. New or relocated vacuum sewers are located to provide horizontal distance of at least three feet, and preferably ten feet, between the outside of the vacuum sewer and any existing or proposed water main; or documentation is provided showing technical or economic justification for each exemption and providing alternative construction features that offer a similar level of reliability and public health protection. [62-604.400(3) and 62-555.314(1)(b) and (5), F.A.C.]

___	29. New or relocated vacuum sewers crossing any existing or proposed water main are located so the outside of the water main is at least six inches, and preferably 12 inches, above or at least 12 inches below the outside of the vacuum sewer; or documentation is provided showing technical or economic justification for each exemption and providing alternative construction features that offer a similar level of reliability and public health protection. [62-604.400(3) and 62-555.314(2)(a) and (5), F.A.C.]
___	30. At the vacuum sewer and water main crossings described in Item 29 above, one full length of vacuum sewer pipe is centered above or below the water main so that the vacuum sewer joints are as far as possible from the water main, or alternatively, the vacuum sewer and water pipes are arranged so that vacuum sewer joints are at least three feet from all water main joints; or documentation is provided showing technical or economic justification for each exemption and providing alternative construction features that offer a similar level of reliability and public health protection. [62-604.400(3) and 62-555.314(2)(c) and (5), F.A.C.]
___	31. New or relocated vacuum sewers are located to provide horizontal distance of at least three feet, and preferably ten feet, from the drains of any existing or proposed fire hydrants with underground drains. [62-604.400(3) and 62-555.314(4), F.A.C.]
___	32. New or relocated vacuum sewers are located to provide the same horizontal, vertical and joint distance for any existing or proposed reclaimed water main as specified in Items 28, 29 and 30 above for a water main; or documentation is provided showing technical or economic justification for each exemption and providing alternative construction features that offer a similar level of reliability and public health protection. [62-4.070(3), F.A.C.]
	Vacuum Valves
___	33. Vacuum valves with the ability to pass a 3-inch spherical solid are specified. [MOPFD-12 #1 Page 204]
___	34. Valves that are vacuum-operated on opening and spring-assisted on closing are specified. [MOPFD-12 #2 Page 204]
___	35. Valve configuration is designed so that the collection system vacuum ensures positive valve seating. Valve plunger and shaft is designed to be completely out of the flow path when valve is in the open position. [MOPFD-12 #3 Page 204]
___	36. The valve is designed to be equipped with a sensor-controller that relies on atmospheric air and vacuum pressure from the downstream side of the valve for its operation, thereby requiring no other power source. The controller is designed to be capable of maintaining the valve fully open for a fixed period of time and be field-adjustable over a range of 3 to 10 seconds. [MOPFD-12 #4 Page 204]
___	37. With the exception of the gravity lateral line air-intake, no other external sources of air are designed as a part of the valve assembly. [MOPFD-12 #5 Page 204]
___	38. An internal sump breather unit arrangement is designed to connect the valve controller to its air source and provide a means of ensuring that no liquid can enter the controller during system shutdowns and restarts. It shall also be designed to prevent sump pressure from forcing the valve open during low-vacuum conditions and provide positive sump venting, regardless of traps in the home gravity service line. [MOPFD-12 #6 Page 204]
	Valve Pits
___	39. Peak flow to any vacuum valve pit is designed to a maximum of 3 gallons per minute. [MOPFD-12 #3 Page 202]
___	40. When specific valve service lines having suction lifts in excess of 5.5 feet are designed, the static losses added to the losses for that main do not exceed 13 feet. [MOPFD-12 #6 Page 200]

___	41. Suction lifts from the bottom of the holding sump to the valve centerline do not exceed 8 feet. [MOPFD-12 #6 Page 200]
___	42. A single valve pit is designed to serve a maximum of four separate building sewers, but no more than 3 gallons per minute. [MOPFD-12 #1 Page 202]
	43. On a system-wide design basis, the overall separate building sewer to valve pit ratio does not exceed 2.5: l. [MOPFD-12 #1 Page 202]
___	44. No single property or parcel is designed to be served by more than one valve pit, unless justification is provided to support multiple valve pits. [MOPFD-12 #2 Page 202]
___	45. Valve pits installed within a road right-of-way or other area subject to vehicular traffic shall be designed and installed to withstand appropriate traffic loads. [MOPFD-12 #4 Page 202]
___	46. Valve pits are designed to have a receiving sump with a minimum of 50 gallons of storage. [MOPFD-12 #5 Page 202]
___	47. Valve pits are designed to prevent entrance of water in the sump and for the vacuum valve to remain fully operational if submerged. [MOPFD-12 #6 Page 203]
___	48. Valve pit locations are designed to be easily accessible, so that valves may be easily removed and replaced. [MOPFD-12 #7 Page 203]
___	49. Valve pits are designed to include a 3” flexible PVC connector connected directly to the valve pit between the valve pit and vacuum sewer main. [MOPFD-12 Page 162]
___	50. Valve pits are designed to include gravity service connection stub-outs piping to which the sewer customer will ultimately connect. Customer connections are designed via gravity flow to the vacuum pit location. [MOPFD-12 #9 Page 203 and #1 Page 209]
	Buffer Tanks
___	51. Buffer tanks are designed instead of single valve pits if there are nonresidential/commercial or high flow inputs greater than 3-gpm peak flow or if there is no other practical method of serving the property by additional vacuum mains and valve pits. [MOPFD-12 #1 Page 203]
___	52. Buffer tanks are designed to have an operating sump of no less than 10 gallons at a wastewater depth of 10 to 14 inches. [MOPFD-12 #3 Page 203]
___	53. No more than 25% of the total peak design flow on a system-wide basis is designed to enter through buffer tanks, unless justification is provided depending on static and friction loss and buffer tank location. [MOPFD-12 #4 Page 203]
___	54. No more than 50% of the total peak design flow is designed to enter a single vacuum main through buffer tanks, unless justification is provided depending on static and friction loss and buffer tank location. [MOPFD-12 #5 Page 203]
___	55. One 3-inch vacuum valve is designed to be used for every 15 gpm at peak wastewater flow. For higher flows, the wastewater is designed to be admitted to a splitter manhole which will evenly split and divert the flow to multiple valve buffer tank units. [MOPFD-12 #6 Page 203]
___	56. When specific buffer tank valve pits having suction lifts in excess of 5.5 feet are designed, the static losses added to the losses for that main do not exceed 13 feet. [MOPFD-12 #6 Page 200]
___	57. Suction lifts from the bottom of the holding sump to the valve centerline do not exceed 8 feet. [MOPFD-12 #6 Page 200]
___	58. Dual buffer tanks are designed to be connected to a 6-inch or larger vacuum main; where three or more valves are used, an 8-inch vacuum main or larger is specified. [MOPFD-12 #7 Page 204]

___	59. The design requires: 1) buffer tanks be constructed of minimum 4-feet internal diameter precast concrete manhole sections; and 2) all joints and connections on the buffer tank must be water-tight. Above ground venting of the vacuum valve must be installed, to ensure proper venting, in the event that the buffer tank becomes filled with wastewater. [MOPFD-12 #8 Page 204]
___	60. Provisions are included with the buffer tank design to allow for separation of the valve access area from the sanitary wastewater storage area. [MOPFD-12 #9 Page 204]
___	61. Provisions are included with the buffer tank design for maintenance personnel access. [MOPFD-12 #9 Page 204]
	Individual Gravity Laterals
___	62. Inspection and approval of individual gravity laterals are specified before final connection and vacuum valve installation requiring: 1) laterals be no less than 4 inches in diameter; and 2) laterals be schedule 40 PVC or pressure-rated PVC (SDR 21 or SDR 26) or similar. [MOPFD-12 #2 and #5 Page 210]
___	63. Air-intakes for each individual gravity lateral are specified requiring that: 1) air-intake piping and fittings be the same diameter as the lateral; 2) air-intakes extend a minimum of 2 feet above ground level with a gooseneck to protect against flooding; 3) air-intakes contain a stainless-steel screen to prevent the entry of rodents, insects, and debris; and 4) air-intakes be located to prevent damage to the piping. As an alternative to air-intakes, 6-inch Dedicated Air Terminals are specified. [MOPFD-12 #8 Page 203 and #4 Page 210]
	Vacuum/Pump Stations
___	64. In areas with high water tables, stations are designed to withstand flotation forces when empty. When siting the station, the design considers the potential for damage or interruption of operation because of flooding. Station structures and electrical and mechanical equipment are designed to be protected from physical damage by the 100-year flood. Stations are designed to remain fully operational and accessible during the 25-year flood unless lesser flood levels are appropriate based on local considerations, but not less than the 10-year flood. [62-604.400(2)(e), F.A.C.]
___	65. Stations are designed to be readily accessible by maintenance vehicles during all weather conditions. [RSWF 41.2]
___	66. The total volume of the vacuum collection tank is designed to be three times the collection tank operating volume, plus 400 gal, with a minimum size of 1000 gallons. [MOPFD-12 #3 Page 207]
___	67. Necessary pipe, fittings, and valves are specified to allow for emergency pumping out of the vacuum collection tank. [MOPFD-12 #9 Page 206]
___	68. A minimum of two pumping units are specified for both the vacuum pumps and the wastewater pumps, with each being capable of handling peak flow conditions with the other out of service. [MOPFD-12 #3 Page 206]
___	69. The design includes provisions to automatically alternate the pumps in use. [RSWF 42.4]
___	70. Vacuum pumps are designed for both peak flow from the vacuum valves adjusted to a 2:1 air-liquid inlet time ratio and for a system pump down time between 1 and 3 minutes with one pump not in service. [MOPFD-12 #2 Page 207 and 208]
___	71. Wastewater discharge pumps are designed using an appropriate peaking factor. [MOPFD-12 #2 Page 206 and 207]
___	72. Pumps handling raw wastewater are designed to pass spheres of at least 3 inches in diameter. Pump suction and discharge openings are designed to be at least 4 inches in diameter. [RSWF 42.33]
___	73. The design requires pumps be placed such that under normal operating conditions they will operate under a positive suction head. [RSWF 42.34]
___	74. Wastewater discharge pumps are adequate to maintain a minimum velocity of 2 feet per second in the force main. [RSWF 42.38]

___	75. Certification is specified from the pump manufacturer stating that wastewater discharge pumps are suitable for use in a vacuum sewer installation. [MOPFD-12 #5 Page 206]
___	76. The design requires: 1) suitable shutoff valves (plug valves or resilient coated wedge gate valves) be placed on the suction line of wastewater discharge pumps; 2) suitable shutoff and check valves be placed on the discharge line of each wastewater discharge pump; 3) a check valve be located between the shutoff valve and the wastewater discharge pump; 4) check valves be suitable for the material being handled; 5) check valves be placed on the horizontal portion of discharge piping (except for ball checks, which may be placed in the vertical run); 6) all valves be capable of withstanding normal pressure and water hammer; and 7) all shutoff and check valves be operable from the floor level and accessible for maintenance. [MOPFD-12 #6 and #8 Page 206 ands RSWF 42.5]
___	77. Isolation valves are specified between the vacuum collection tank, vacuum pump(s), influent line, and raw wastewater discharge pipe. [MOPFD-12 #7 Page 206]
___	78. Vacuum station piping and fittings 4 inches and larger are specified to be 150 #ANSI flanged ductile iron. Piping and fittings less than 4 inches are specified to be schedule 80 PVC with solvent-welded joints. [MOPFD-12 #10 Page 206]
___	79. Station testing requirements are specified in accordance with the vacuum system manufacturer's standard. [MOPFD-12 #12 Page 206]
___	80. Instrumentation and control systems to provide operational functionality are specified to manufacturer’s standard. Provisions for automatic pump alternation are included in the instrumentation and control system. The instrumentation and control system to bear the UL label, per the requirements of UL 508 and UL 508A. [MOPFD-12 #1 and #2 Page 208]
___	81. The design requires: 1) stations be protected from lightning and transient voltage surges; and 2) stations be equipped with lighting arrestors, surge capacitors, or other similar protection devices and phase protection. [62-604.400(2)(b), F.A.C.]
___	82. The design provides for adequate ventilation in accordance with RSWF 42.7. [MOPFD-12 Page 208 and RSWF 42.7]
___	83. Electrical equipment and installation are designed to meet the requirements of the National Electrical Code. [MOPFD-12 #2 Page 208]
___	84. Adequate temperature control is designed for the main electrical equipment and primary power distribution. [MOPFD-12 #5 Page 209]
___	85. Potable water, power, and telephone service is specified to be provided to the vacuum/pump station. [MOPFD-12 #6 Page 209]
___	86. Outdoor lighting for security is specified. [MOPFD-12 #9 Page 209]
___	87. Stations are designed and located on the site to minimize adverse effects from odors, noise, and lighting. [62-604.400(2)(c), F.A.C.]
___	88. The design requires stations be enclosed with a fence or otherwise designed with appropriate features to discourage the entry of animals and unauthorized persons. Posting of an unobstructed sign made of durable weather resistant material at a location visible to the public with a telephone number for a point of contact in case of emergency is specified. [62-604.400(2)(d), F.A.C.]
___	89. The design provides for suitable and safe means of access in accordance with RSWF 42.23. [RSWF 42.23]
___	90. Specified construction materials are appropriate under conditions of exposure to hydrogen sulfide and other corrosive gases, greases, oils, and other constituents frequently present in wastewater. The ferrous metal components of the vacuum pump station are specified to be protectively coated to prevent corrosion. [MOPFD-12 #11 Page 206 and RSWF 42.25]
___	91. The design includes provisions to facilitate removing pumps, motors, and other mechanical and electrical equipment. [RSWF 42.22]
___	92. The design requires suitable devices for measuring wastewater flow at all pump stations. Indicating, totalizing, and recording flow measurement are specified for stations with a 1200 gpm or greater design peak flow. [RSWF 42.8]

___	93. The station is designed with no physical connections with any potable water supplies. If a potable water supply is brought to a station, reduced-pressure principle backflow-prevention assemblies are specified. [RSWF 42.9 and 62-555.360(4), F.A.C.]
	Emergency Operations for Vacuum/Pump Stations
___	94. Stations are designed with an alarm system which activates in cases of power failure, pump failure, unauthorized entry, or any cause of pump station malfunction. Station alarms are designed to be telemetered to a facility that is manned 24 hours a day. If such a facility is not available, the alarm is designed to be telemetered to utility offices during normal working hours and to the home of the responsible person(s) in charge of the lift station during off-duty hours. Note, if an audio-visual alarm system with a self-contained power supply is provided in lieu of a telemetered system, documentation is provided showing an equivalent level of reliability and public health protection. [RSWF 45]
___	95. The design requires emergency pumping capability be provided for all stations. For stations discharging through pipes 12 inches or larger, the design requires uninterrupted pumping capability be provided, including an in-place emergency generator. Where portable pumping and/or generating equipment or manual transfer is used, the design includes sufficient storage capacity with an alarm system to allow time for detection of station failure and transportation and connection of emergency equipment. [62-604.400(2)(a)1. and 2., F.A.C., MOPFD-12 #4 Page 209 and RSWF 46.423 and 46.433]
___	96. The design requires: 1) emergency standby systems to have sufficient capacity to start up and maintain the total rated running capacity of the station, including lighting, ventilation, and other auxiliary equipment necessary for safety and proper operation; 2) special sequencing controls be provided to start pump motors unless the generating equipment has capacity to start all pumps simultaneously with auxiliary equipment operating; 3) a riser from the force main with rapid connection capabilities and appropriate valving be provided for all stations to hook up portable pumps; and 4) all station reliability design features be compatible with the available temporary service power generating and pumping equipment of the authority responsible for operation and maintenance of the collection/transmission system. [62-604.400(2)(a)3., F.A.C. and RSWF 46.431]
___	97. The design provides for emergency equipment to be protected from operation conditions that would result in damage to the equipment and from damage at the restoration of regular electrical power. [RSWF 46.411, 46.417, and 46.432]
___	98. For permanently-installed internal combustion engines, underground fuel storage and piping facilities are designed in accordance with applicable state and federal regulations; and the design requires engines to be located above grade with adequate ventilation of fuel vapors and exhaust gases. [RSWF 46.414 and 46.415]
___	99. For permanently-installed or portable engine-driven pumps are used, the design includes provisions for manual start-up. [RSWF 46.422]
___	100. Where independent substations are used for emergency power, each separate substation and its associated transmission lines is designed to be capable of starting and operating the pump station at its rated capacity. [RSWF 46.44]
	Conventional Force Mains, Pump Stations, Gravity Sewers and Manholes
___	101. For conventional force mains, pump stations, gravity sewers and manholes used after leaving the vacuum/pump station, the project design meets the "General Requirements" and applicable portions of the Collection/Transmission System Design Information beginning on page 2 of DEP Form 62-604.300(8)(a), Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System. [62-604.300(8)(a), F.A.C.]

(RSWF) "Recommended Standards for Wastewater Facilities"; Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers; 1997 (Adopted by Rule 62-604, 300(5)(g), F.A.C.).

(MOPFD-12) "Alternative Sewer Systems, Manual of Practice No. FD-12"; Water Environment Federation; 2008 (Note, since this is an updated version of manual adopted by Rule 62-604.300(5)(c), F.A.C., use for guidance only).