Comprehensive Wastewater Treatment Facilities Plan

Task 5: Implementation Scenarios for Alternative Wastewater Treatment Systems

Prepared by

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Acronyms and Abbreviations

ATU	Aerobic Treatment Unit
AWTS	Alternative Wastewater Treatment Systems
BMAP	Basin Management Action Plan
CWTFP	Comprehensive Wastewater Treatment Facilities Plan
DEP	Department of Environmental Protection
GIS	Geographic Information System
INRB	In-Ground Nitrogen-Reducing Biofilter
JSA	Jim Stidham & Associates
OSTDS	Onsite Sewage Treatment and Disposal System
PBTS	Performance Based Treatment System
PFA	Priority Focus Area
PSPZ	Primary Springs Protection Zone
TMDL	Total Maximum Daily Load
WWTF	Wastewater Treatment Facility

EXECUTIVE SUMMARY

Leon County is developing a plan to reduce nitrogen loads from existing onsite sewage treatment and disposal systems (OSTDSs), as well as future development, to groundwater and surface waters. OSTDSs are also known as septic systems. The Florida Department of Environmental Protection found that nutrient loads from several sources—including OSTDSs in Leon County—impaired Upper Wakulla River and Wakulla Spring. Leon County's plan has two parts: (1) a comprehensive wastewater treatment facilities plan for the entire county, and (2) a more focused facilities plan for part of the county that loads nitrogen to the Wakulla River and Wakulla Spring. Objectives of the plan are to: (1) identify OSTDSs to transition to alternative wastewater treatment systems (AWTSs) where the transition will most reduce nitrogen loads to surface waters and groundwater; and (2) identify future development that will require AWTSs to reduce nitrogen loads to surface waters and groundwater.

Leon County is developing the plan by progressing through eight major tasks. This report describes the results of the task 5: evaluation of implementation scenarios for AWTS. This task used the geologic criteria, cost-effectiveness data, mitigation criteria, and public input from the previous tasks to develop scenarios to retrofit existing OSTDS and recommendations for AWTS to reduce nitrogen loading from future development.

1.0 Introduction

The Florida Department of Environmental Protection (DEP, 2018) found that nutrient loads from several sources impaired Upper Wakulla River and Wakulla Spring. To develop a plan to restore the river and spring, DEP calculated the maximum amount of nitrate that the river and spring can receive each day, while still satisfying water quality standards. This maximum amount is called a total maximum daily load (TMDL). DEP prepared the Upper Wakulla River and Wakulla Spring Basin Management Action Plan (BMAP) to restore the river and spring by identifying actions that will reduce pollutant loads to the river and spring. The BMAP was adopted by DEP in June 2018 and requires that stakeholders, including Leon County, reduce nitrogen loads to the river and spring from onsite sewage treatment and disposal systems (OSTDSs). OSTDSs are also known as septic systems. Leon County contracted Jim Stidham & Associates (JSA) to develop the plan to reduce nitrogen loads from OSTDSs. JSA partnered with Advanced Geospatial, Applied Technology & Management, The Balmoral Group, Magnolia Engineering, and Tetra Tech to develop the plan. JSA and these partners are referenced throughout this plan as the JSA team.

The Leon County plan has two parts: (1) a comprehensive wastewater treatment facilities plan (CWTFP), and (2) a more focused facilities plan for the part of the county governed by the BMAP. The CWTFP is funded through a grant from the Blueprint Intergovernmental Agency. DEP funded the BMAP plan with a grant to the county. About 40% of Leon County is served by OSTDSs, about 20% is served by five centralized wastewater treatment facilities (WWTFs), and about 40% is government land that will not likely be developed during the next few decades and will not likely require wastewater treatment (Figure 1).

The objective of Leon County's plan is to identify existing OSTDSs to transition to alternative wastewater treatment systems (AWTS), where the transition will most reduce nitrogen loads to the river and spring. The plan will produce guidance for retrofit of existing development as well as direct technology selection for future development. The JSA team is creating the Leon County plan by performing the following tasks:

Task 1. Develop a nitrogen reduction score to identify likely contribution of nitrogen from OSTDSs to groundwater and surface waters; use the score to quantify, rank, and identify OSTDSs to transition to AWTS; and establish nitrogen reduction criteria for AWTSs for each of the separate delineated areas (Completed)

Task 2. Quantify cost-effectiveness of AWTS (Completed)

Task 3. Identify other factors that influence selection of an AWTS (Completed)

Task 4. Provide education to the community regarding information compiled in tasks 1, 2, and 3 and survey opinions of the citizens of Leon County, with respect to this plan (Completed)

Task 5. Analyze implementation scenarios for AWTS (Draft Completed)

Task 6. Calculate the anticipated decrease in nitrogen load to the Upper Wakulla River and Wakulla Spring, between 2020 and 2040, due to OSTDS transition to AWTS

Task 7. Provide additional education to the community regarding the information compiled in tasks 1 through 6 and conduct additional survey of opinions of the citizens of Leon County, with respect to this plan

Task 8. Present the plan to the Leon County Board of County Commissioners

This report describes task 5 of the Leon County plan: scenarios for AWTS implementation. The objective of task 5 was to use the geologic criteria, cost-effectiveness data, mitigation criteria, and public input from the previous tasks to develop scenarios for retrofit of existing OSTDS and recommendations for AWTS to reduce nitrogen loading from future development.

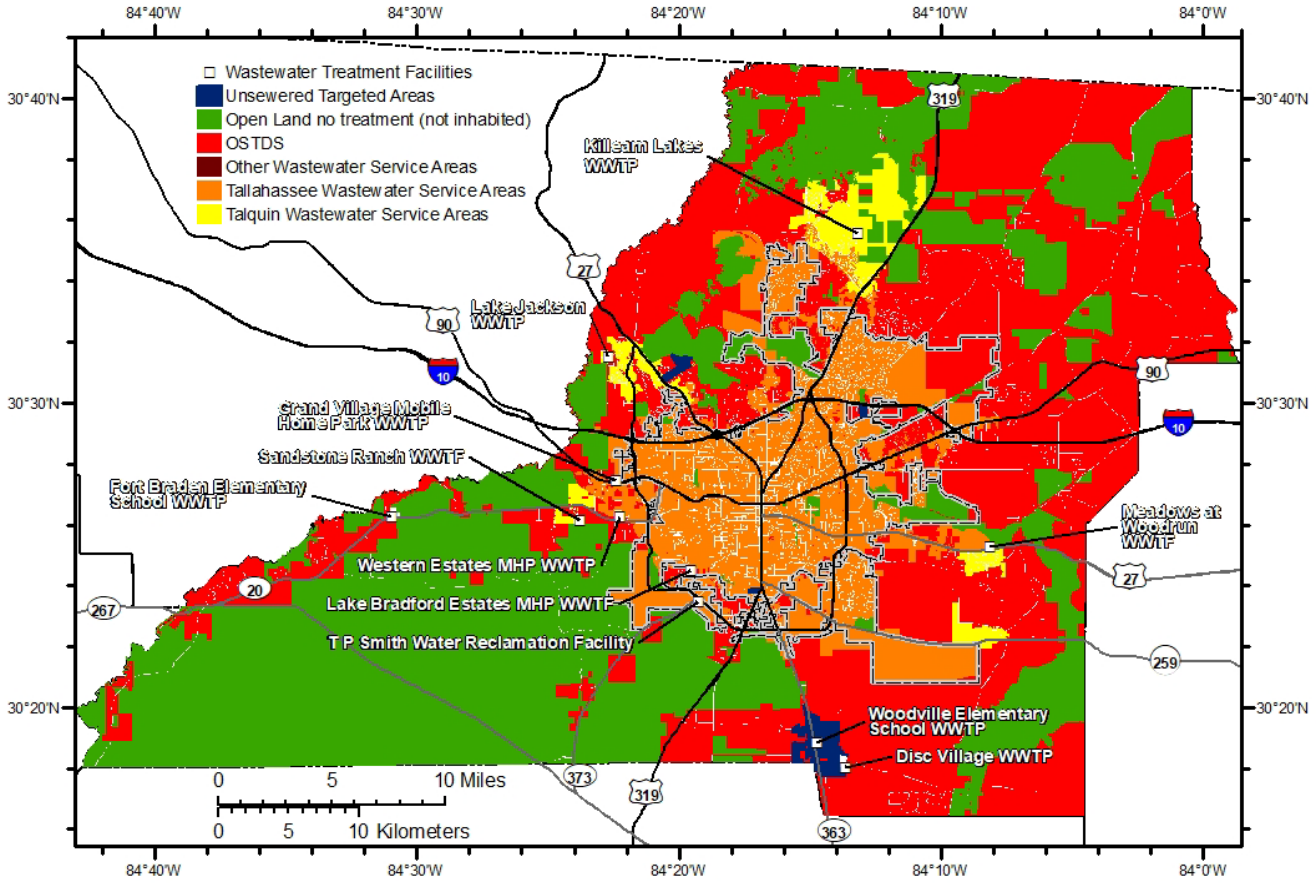

Figure 1. *Parcels with an OSTDS, five centralized WWTFs, parcels in the Tallahassee wastewater service area, and parcels in the Talquin service area.*

In this report, the JSA team summarizes the process used to evaluate potential OSTDS retrofit options (section 2.0), presents the OSTDS retrofit recommendations and target areas (section 3.0), and provides recommendations for new development standards (section 0).

2.0 Evaluation of Potential OSTDS Retrofit Options

The JSA team used the geographic information system (GIS) database that was developed in task 1 and augmented during task 3 to identify conditions throughout the county that were best suited to each AWTS technology. The nitrogen reduction score developed in task 1 was used to focus retrofits in the most vulnerable areas of the county. The mitigation criteria from task 3 were used to help determine which AWTS option would be most feasible in each location of the county. The GIS queries to identify potential AWTS technology options, based on the criteria from tasks 1 and 3, are summarized in Figure 2.

Once the potential AWTS options were identified, the costs developed in task 2, and updated based on feedback during task 4, were used to estimate the costs of retrofitting each area of the county based on the most feasible technology. The GIS queries used to add the cost-effectiveness factor to the decision process are summarized in Figure 3.

The GIS queries to identify locations where existing OSTDS are required to be upgraded to AWTS or connected to the central sewer systems are summarized in Figure 4.

Additional details about the process to assign recommended AWTS technologies to target areas throughout Leon County are provided in the subsections below.

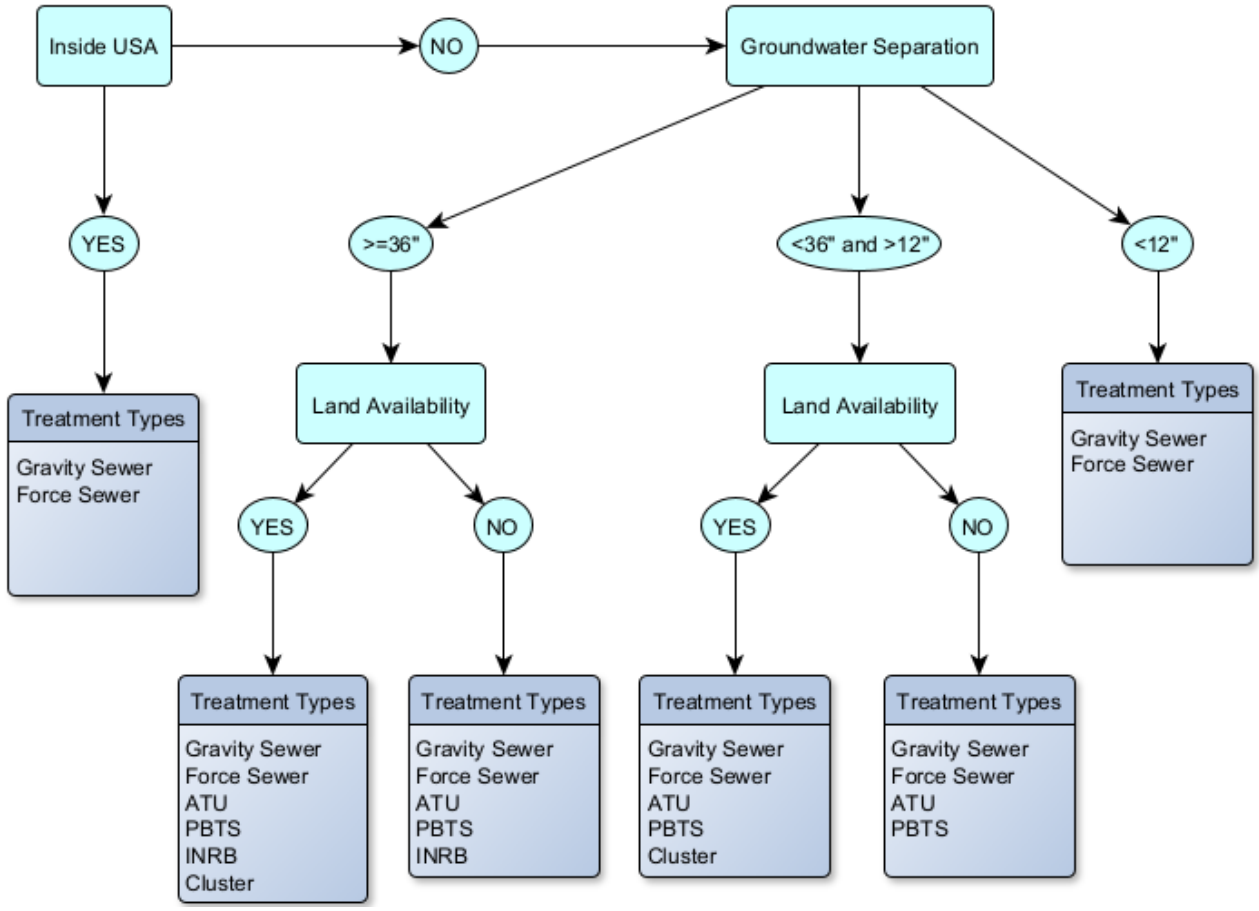

Figure 2. *Flow chart with queries to identify potential AWTS options for each parcel.*

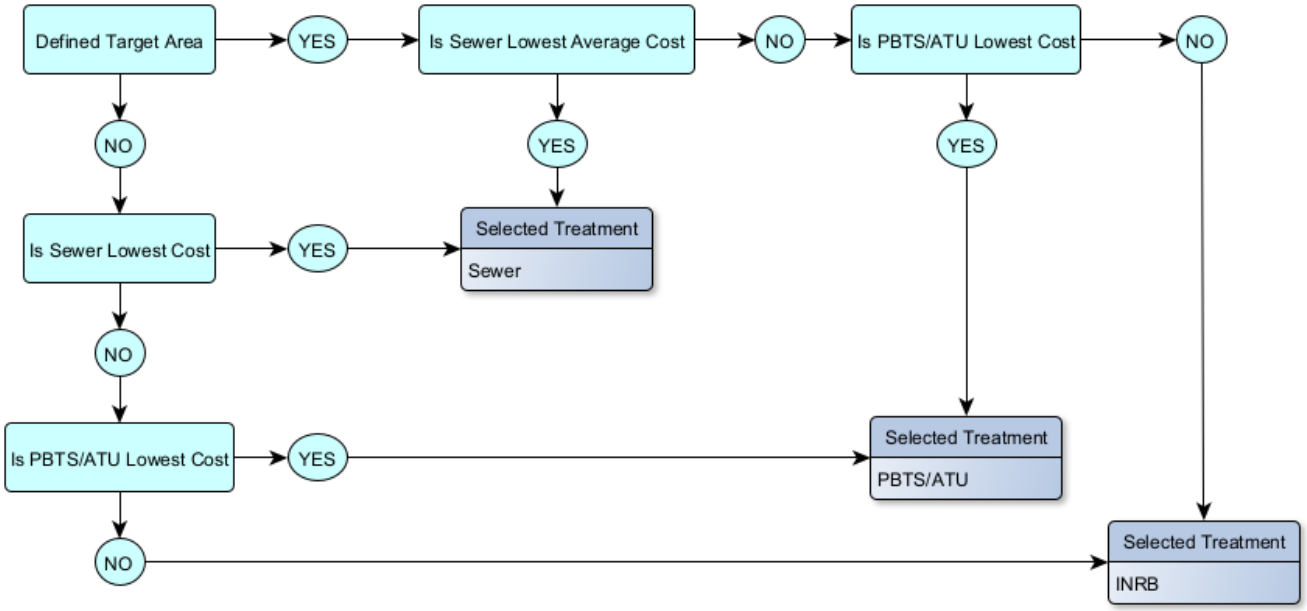

Figure 3. *Flow chart with queries to identify recommended AWTS based on cost-effectiveness.*

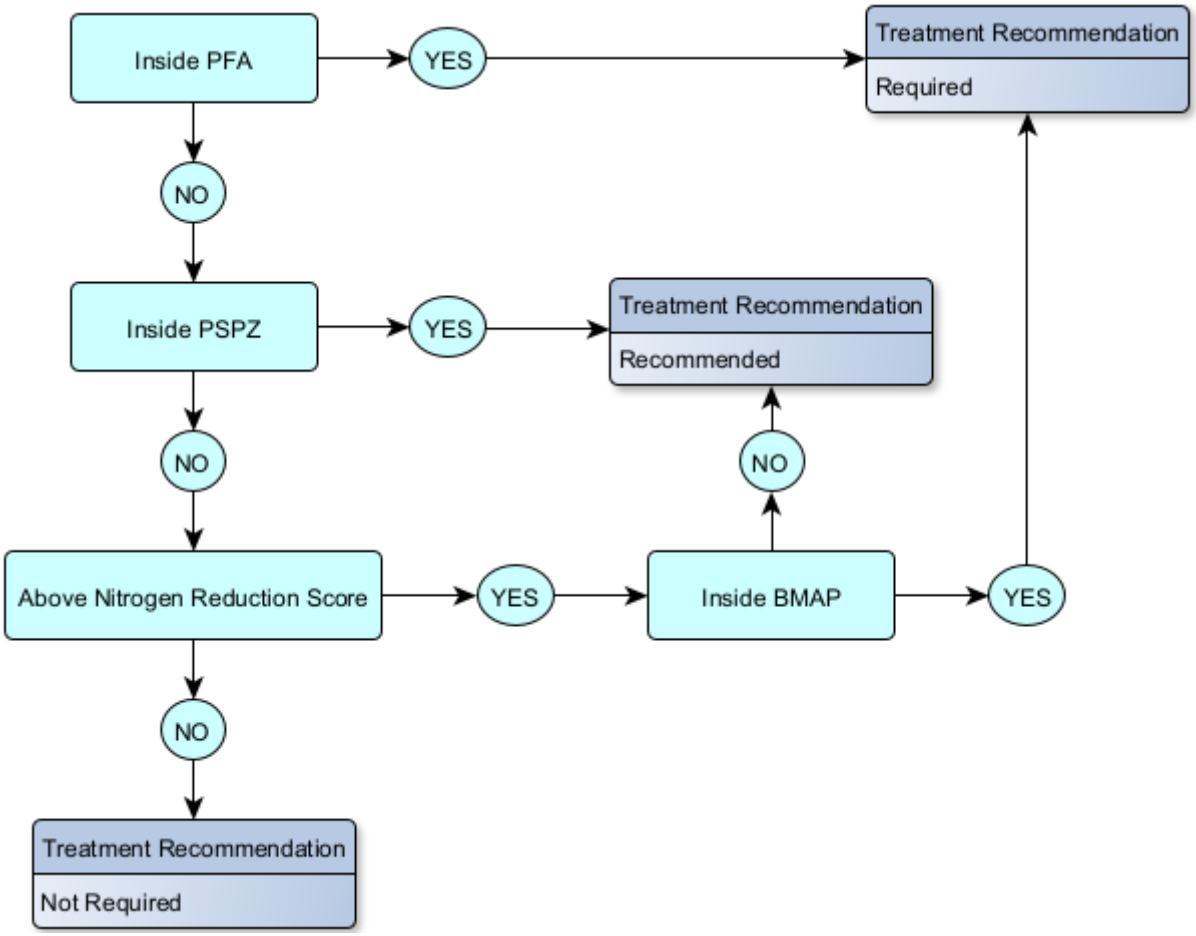

Figure 4. *Flow chart with queries to identify where OSTDS upgrades to AWTS or connection to central sewer are required.*

2.1 Site Location Relative to the Urban Service Area

The first step in the process was to identify whether parcels are within the urban service area (Figure 5). A parcel's location relative to the urban service area determines whether connection to a centralized wastewater collection system is feasible, both for retrofits and future development. The purpose of the urban service area, as defined in the Comprehensive Plan, is to direct development toward the capital infrastructure needed to serve it, including sanitary sewer. In the GIS database, if a portion of a parcel touches the urban service area, it was assigned a value of "Yes." All other parcels were assigned a value of "No." The result of this step found 14,458 parcels intersected with the urban service area, which should be connected to the central sewer system.

In addition, some areas of the county outside the urban service area have already been identified for sewer (Figure 5). These areas were also considered in this evaluation to determine target areas that could be connected to central sewer (see Section 3.1 for more details).

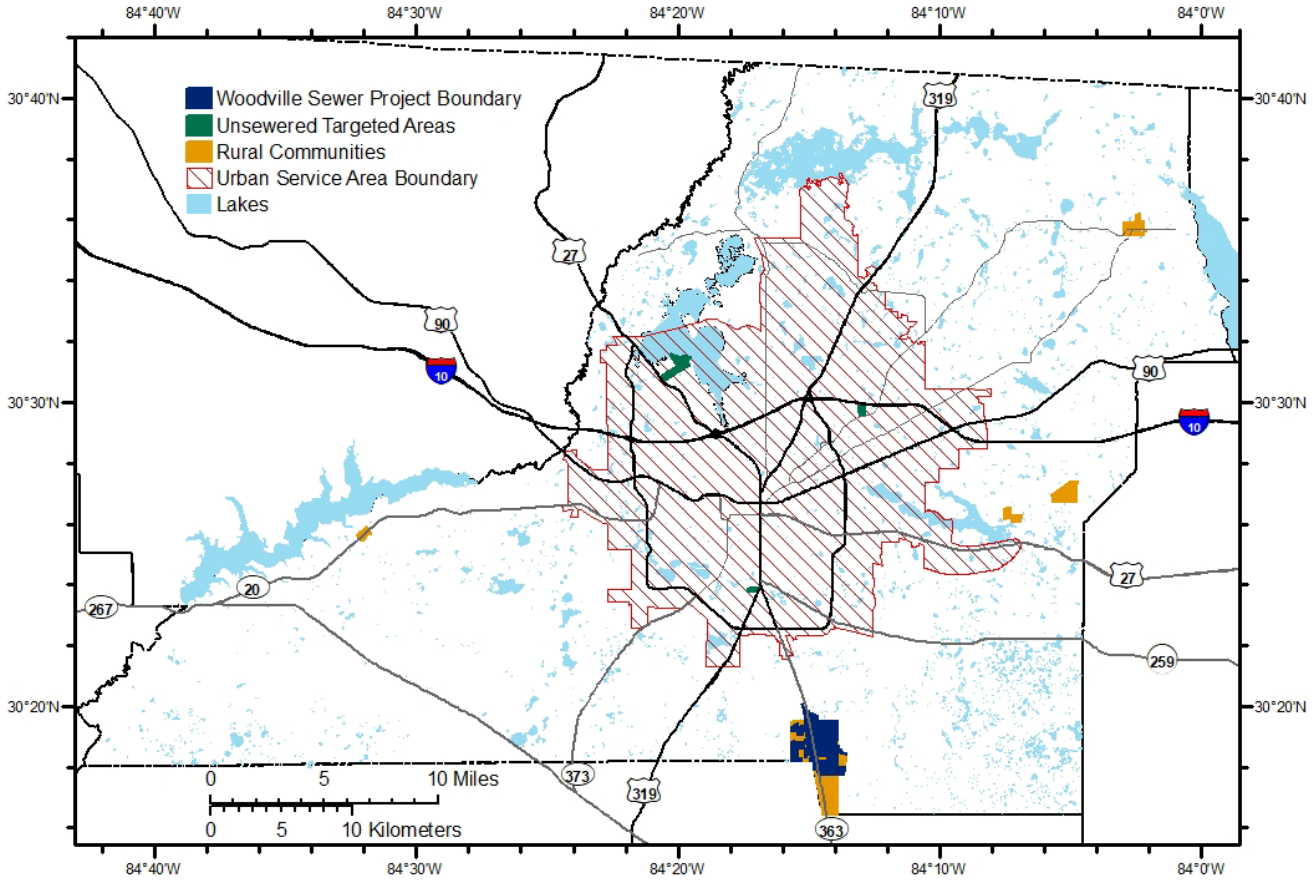

Figure 5. Location of the urban service area and unsewered target areas.

2.2 Site Location Relative to the Priority Focus Area (PFA) and Primary Springs Protection Zone (PSPZ)

The next step was to identify whether parcels are within the PFA and PSPZ (Figure 6). As part of the Upper Wakulla River and Wakulla Spring BMAP, DEP delineated two PFAs, one of which is within Leon County. The PFAs represent the areas where the Floridan aquifer is most vulnerable to adverse impacts from activities on the land surface. In 2007, the Leon County Board of Commissioners adopted the PSPZ into its Land Development Code. The PSPZ overlaps the PFA and also includes lands west and east of the PFA. In the GIS database, if a parcel touches the PFA and PSPZ polygons, it was assigned a value of "Yes." All other parcels were assigned a value of "No."

The location of a parcel within the PFA and PSPZ is one of the most important factors in targeting the parcel for conversion to an AWTS or connection to the central sewer system. DEP prepared the Upper Wakulla River and Wakulla Spring BMAP to comply with the requirements of the Florida Springs and Aquifer Protection Act. The Act prohibits conventional OSTDS on parcels less than one-acre within the PFA, unless the OSTDS includes enhanced nitrogen treatment or a connection to the central sewer system will be available within five years. When an existing traditional OSTDS must be repaired or replaced, the OSTDS must include nitrogen-reducing enhancements, unless connection to the central sewer system will be available within five years. In addition, the Leon County Comprehensive Plan requirements (Policy 1.2.6 [SS] and Policy 4.2.5 [C]) for the PSPZ include connection to sewer with advanced WWTFs where feasible, and PBTSs where connection is not feasible. Therefore, parcels on traditional OSTDS within the PFA and PSPZ should be upgraded to AWTS or connected to the central sewer system.

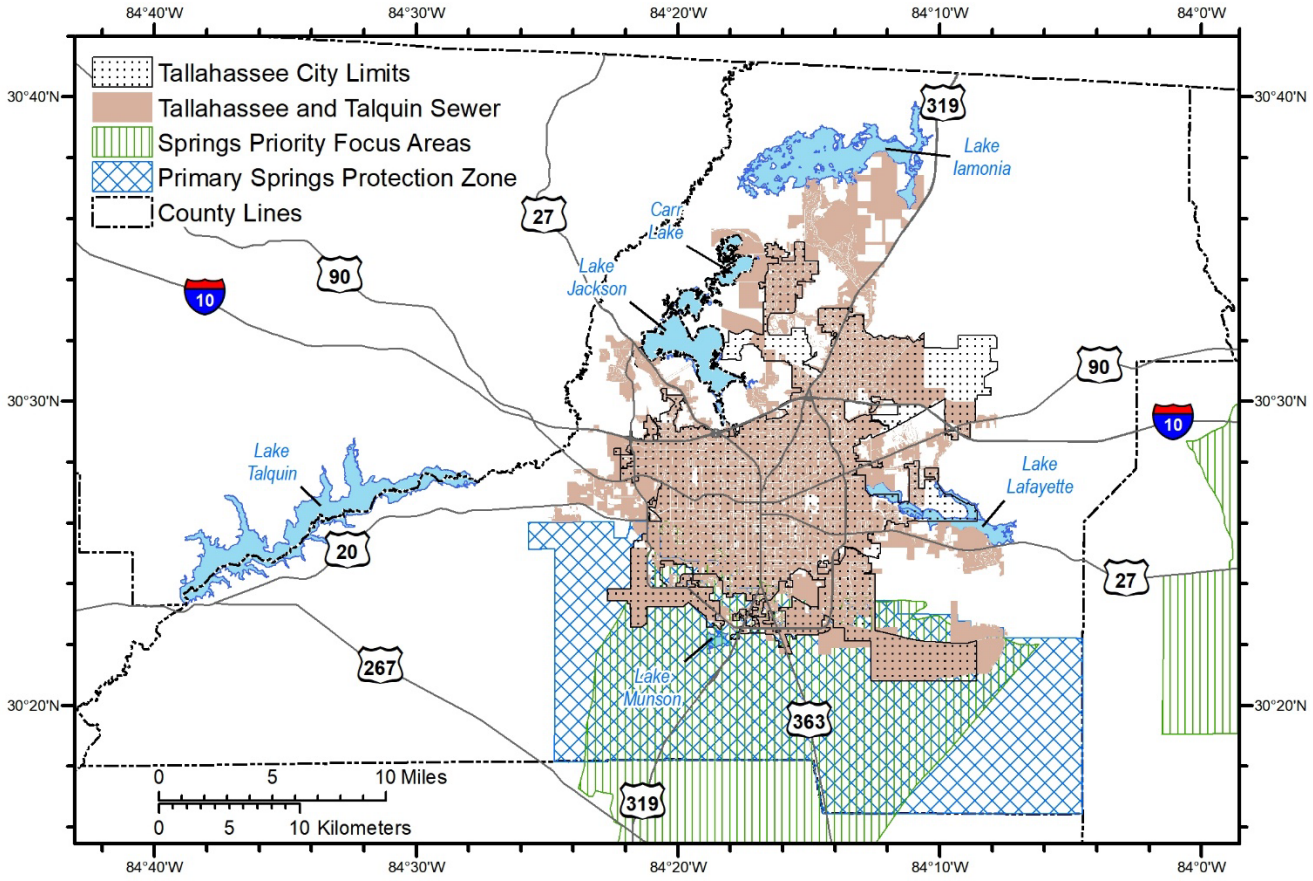

Figure 6. PFA, PSPZ, and wastewater service areas.

2.3 Adjacent Land Availability for Cluster Systems

Cluster systems are used to treat wastewater from multiple homes. Therefore, these systems are not limited to one parcel, and land must be acquired or dedicated to install the cluster system. For a cluster system to be cost-effective, it should be placed near the parcels it will be treating. For this study, vacant parcels within 1,000 feet of multiple residential units on OSTDS were evaluated (Figure 7). In addition, the number of parcels (vacant or developed) within 1,000 feet of a vacant parcel were identified. A total of 4,166 parcels were identified as having one or more parcels within 1,000 feet that could be potential locations for constructing a cluster system.

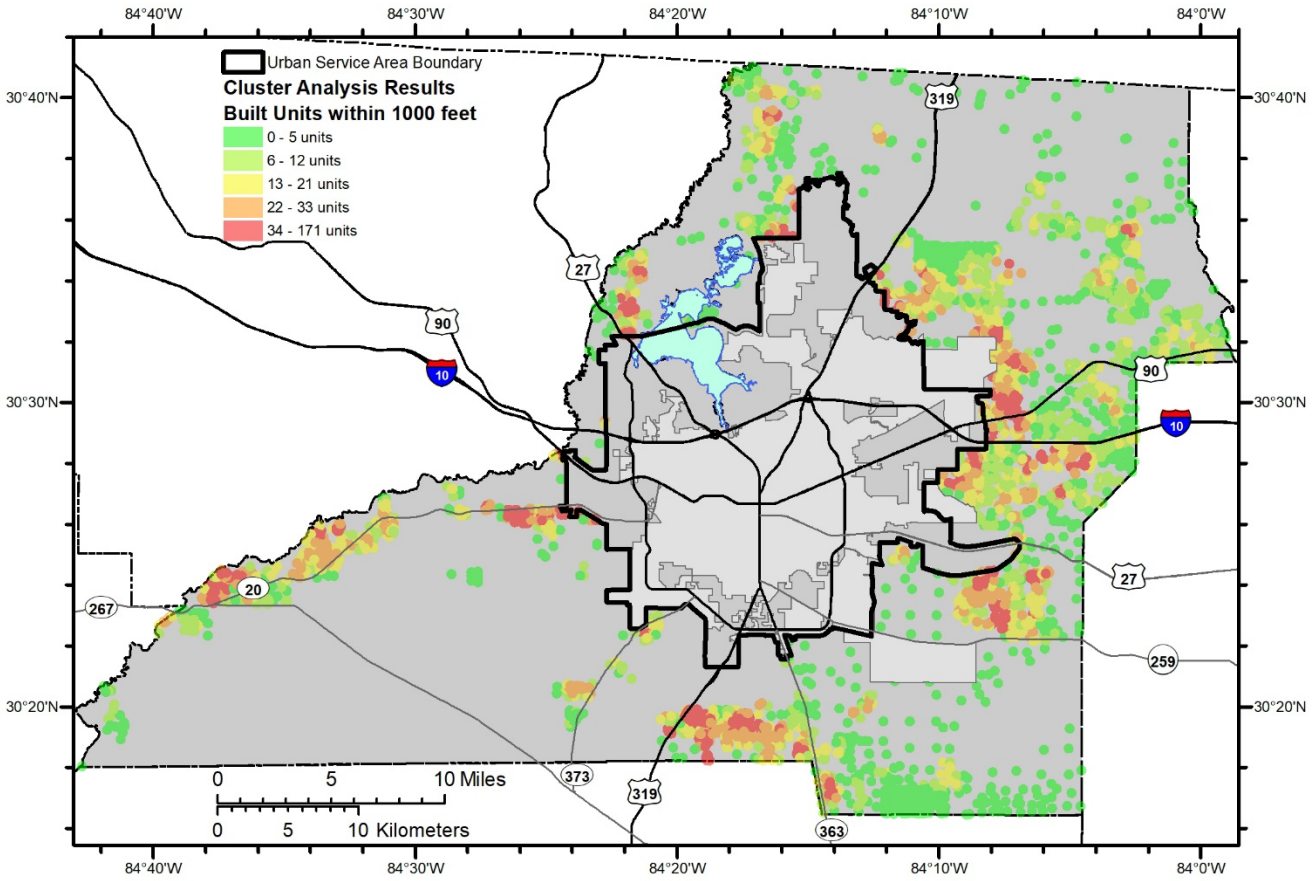

Figure 7. Vacant parcels within 1,000 feet of parcels with existing septic systems.

2.4 Separation from Groundwater

For each parcel, the depth to groundwater was evaluated to determine which technologies were applicable. Some technologies, such as in-ground nitrogen-reducing biofilters (INRBs), require greater separation from groundwater than other technologies to achieve optimal nitrogen removal. A countywide coverage to determine the separation from groundwater was not readily available, so the JSA team used the "depth to water" layer developed by the Florida Geological Survey as part of the Florida Aquifer Vulnerability Assessment. The raster grid in this file was converted to contour lines in one foot intervals. The contour lines were then joined to the parcels, and the average, minimum, and maximum values for the depth-to-groundwater lines on the parcels were calculated, as shown on the example in Figure 8. The average value for the parcel was used in the technology option evaluations. There were 1,223 parcels that did not intersect any polylines for the depth to water elevation. For these parcels, the JSA team assigned the nearest elevation contour.

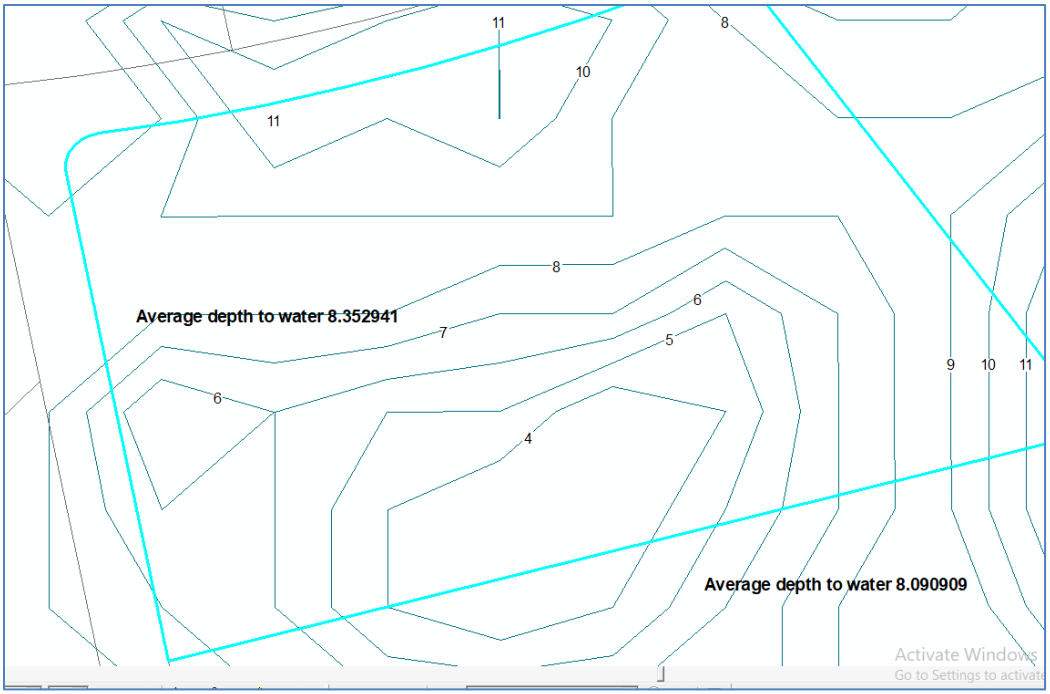

Figure 8. Example depth to groundwater elevation contours for a parcel.

2.5 Parcels with Wetlands or Conservation Easements

An evaluation was also made to determine which parcels had wetlands and/or easements and, therefore, may not have sufficient space to install an AWTS. A 75 foot buffer was drawn around the wetlands from the National Wetlands Inventory coverage. This buffer was applied based on the required separation from standing water per the Florida Department of Health Chapter 64E-6, Table V. The JSA team obtained a polygon coverage from Leon County that contained all county easements. The easements classified as conservation, conservation drainage, and drainage were used to create a layer that was merged with the 75 foot wetland buffer. The wetlands/easements layer was then intersected with the parcels to calculate the acres of wetlands/easements on the property and the remaining acres available for AWTS.

2.6 Assignment of Treatment Options

Based on the GIS data evaluations, the following treatment technologies were assigned to each parcel:

- Aerobic treatment unit (ATU)
- Performance based treatment system (PBTS)
- INRB
- Cluster system
- Central sewer system

The technologies were selected based on the best available information gathered in tasks 1 through 4 and the considerations noted in Table 1. Before moving forward with retrofits on these parcels, the site conditions will need to be verified in the field.

All potential technologies that would be feasible on each parcel are shown in Figure 9.

Table 1. Considerations used to determine which AWTS technologies could be used for OSTDS retrofits.

Technology	Potential Parcel Considerations
ATU	At least a 12-inch separation from groundwater At least 0.5-acre of the parcel is available with no wetlands and/or easements
PBTS	At least a 12-inch separation from groundwater At least 0.5-acre of the parcel is available with no wetlands and/or easements
INRB	At least a 36-inch separation from groundwater At least 0.5-acre of the parcel is available with no wetlands and/or easements
Cluster system	Available open parcel within 1,000 feet of multiple existing OSTDS Passive systems used where conditions allow for INRBs Active systems used where conditions do not allow for INRBs
Central sewer	Within the urban service area Within a 2,000 foot buffer of the urban service area or existing sewer lines Gravity sewer used within 2,000 feet of a sewer main Force main used for distances greater than 2,000 feet from a sewer main

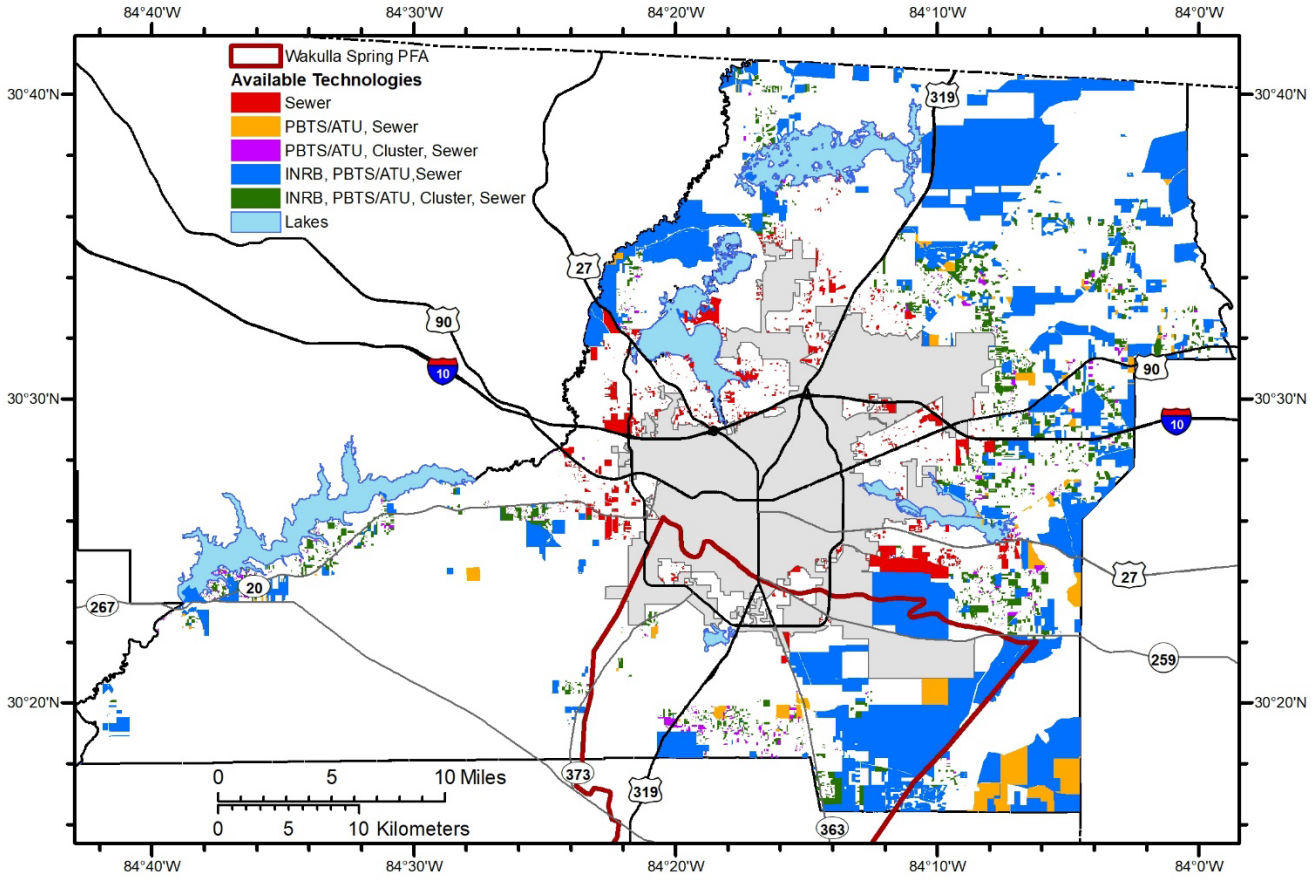

Figure 9. Potential applicable AWTS technologies by parcel.

The technologies in Figure 9 were further evaluated to determine the recommended alternative on a parcel-by-parcel basis. The costs to implement each technology were determined using the lifecycle costs estimated in task 2 and updated in task 4 based on stakeholder feedback (Table 2). In evaluating the costs to implement feasible technologies on each parcel, the primary type of AWTS for each parcel was determined (Figure 10).

Table 2. Estimated lifecycle cost per unit for each AWTS technology option.

Technology	Estimated Lifecycle Cost per Unit
ATU	$29,750
PBTS	$31,100
INRB	$19,256
Cluster (active)*	$19,595
Cluster (passive)*	$17,280
Central sewer (gravity)	$57,987
Central sewer (force main)**	$59,067

* The expected costs for cluster systems assume service for 8 units, as a midpoint in system size.
** The average distance for force main to the existing main was calculated and the cost was estimated.

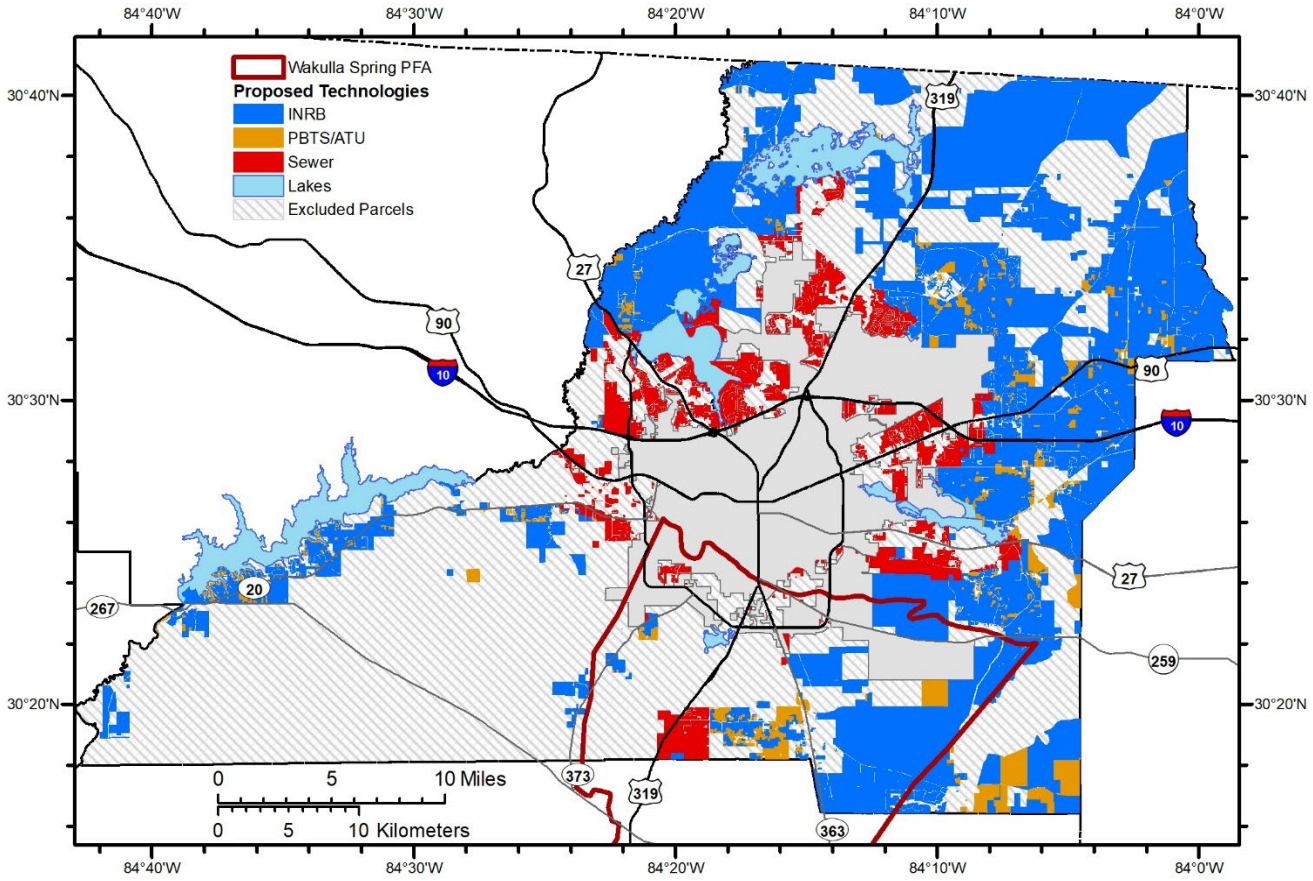

Figure 10. Proposed primary AWTS technology by parcel.

3.0 OSTDS Retrofit Scenarios

3.1 Target Areas

Once applicable technologies were assigned to each parcel, the JSA team identified large contiguous areas that had the same or similar best AWTS options. These areas were grouped by technology type and identified as "target areas" for the initial focus on retrofits. An overview of all the target areas is shown in Figure 11, and detailed maps for different areas of the county are shown in Figure 12 through Figure 15. Target areas were assigned identification numbers, which do not indicate priority. The identification numbers appear on the maps below.

All areas within 2,000 feet of existing central sewer are included in a target area. Many of these sewer target areas are included in the City of Tallahassee 2035 Master Sewer Plan Update (Hatch Mott MacDonald, 2016). Where sewer is the primary recommended technology to retrofit a target area, all parcels are recommended for connection to the central sewer system to make that option as cost-effective as possible, since the cost per household is lower with more connections to the same sewer line. In other target areas, the recommended technology may vary from parcel-to-parcel based on the conditions in that area, including soil type, depth to groundwater, presence of wetlands, and other factors.

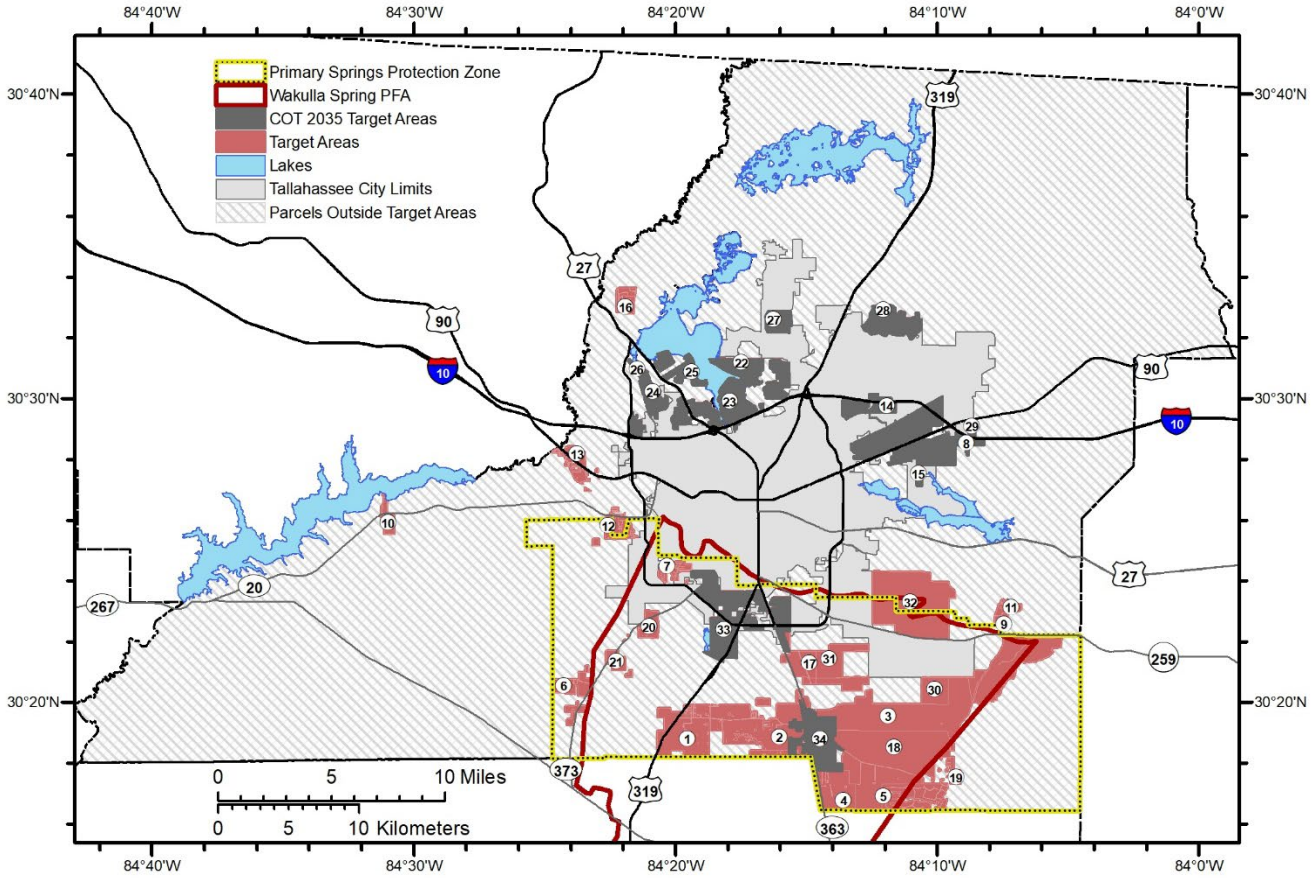

Figure 11. Overview of proposed target areas for AWTS.

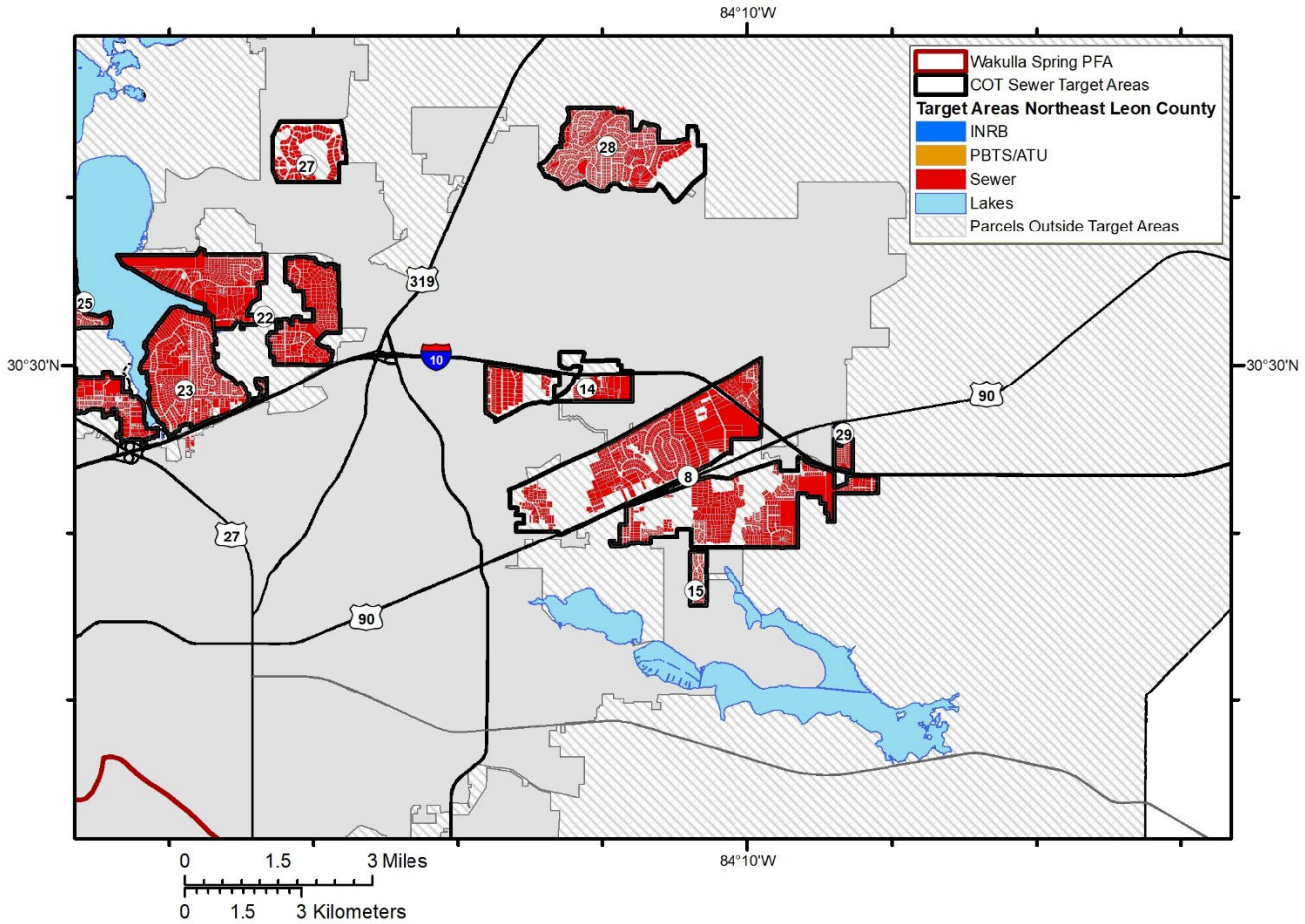

Figure 12. Proposed target areas for AWTS in northeast Leon County.

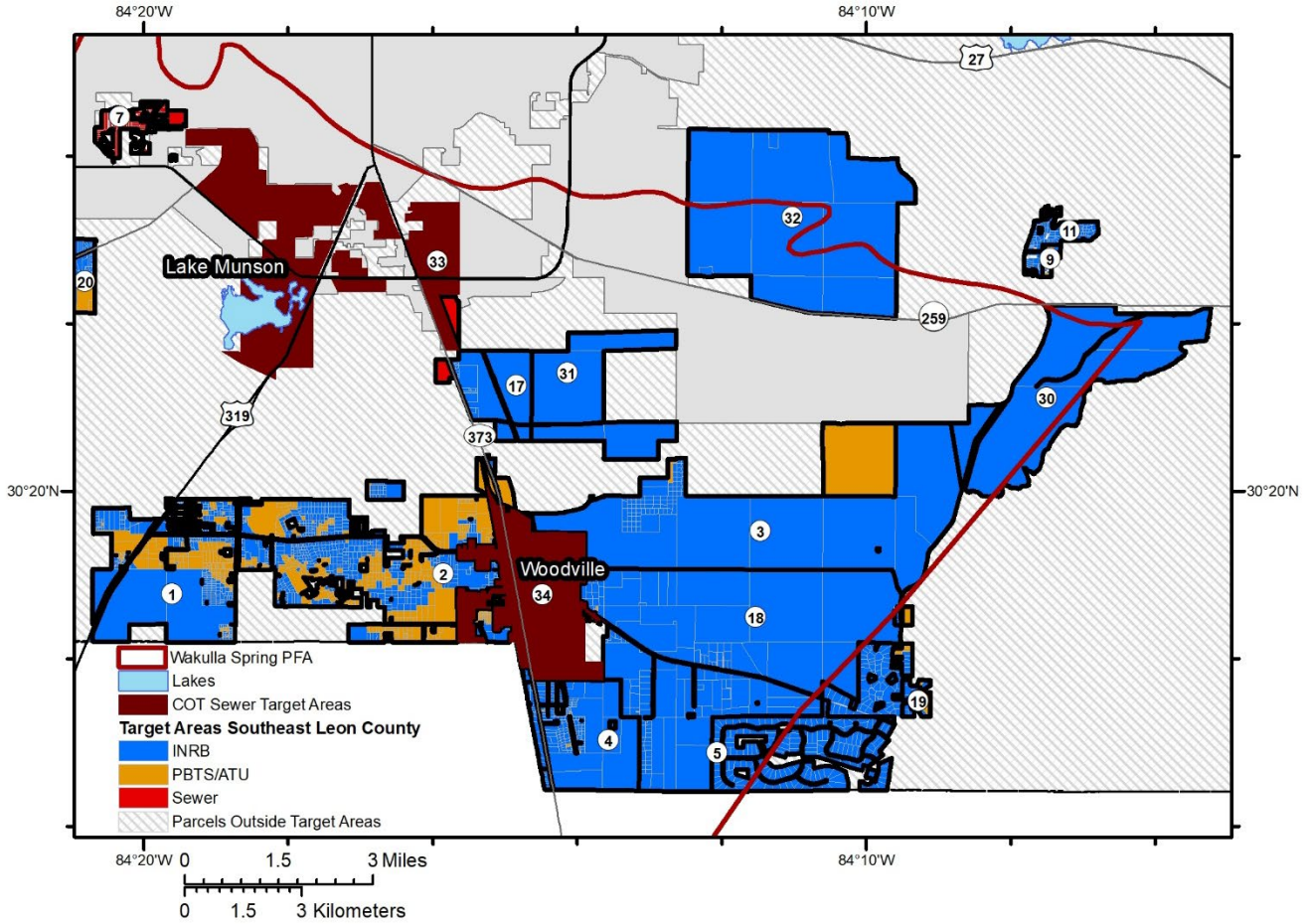

Figure 13. Proposed target areas for AWTS in southeast Leon County.

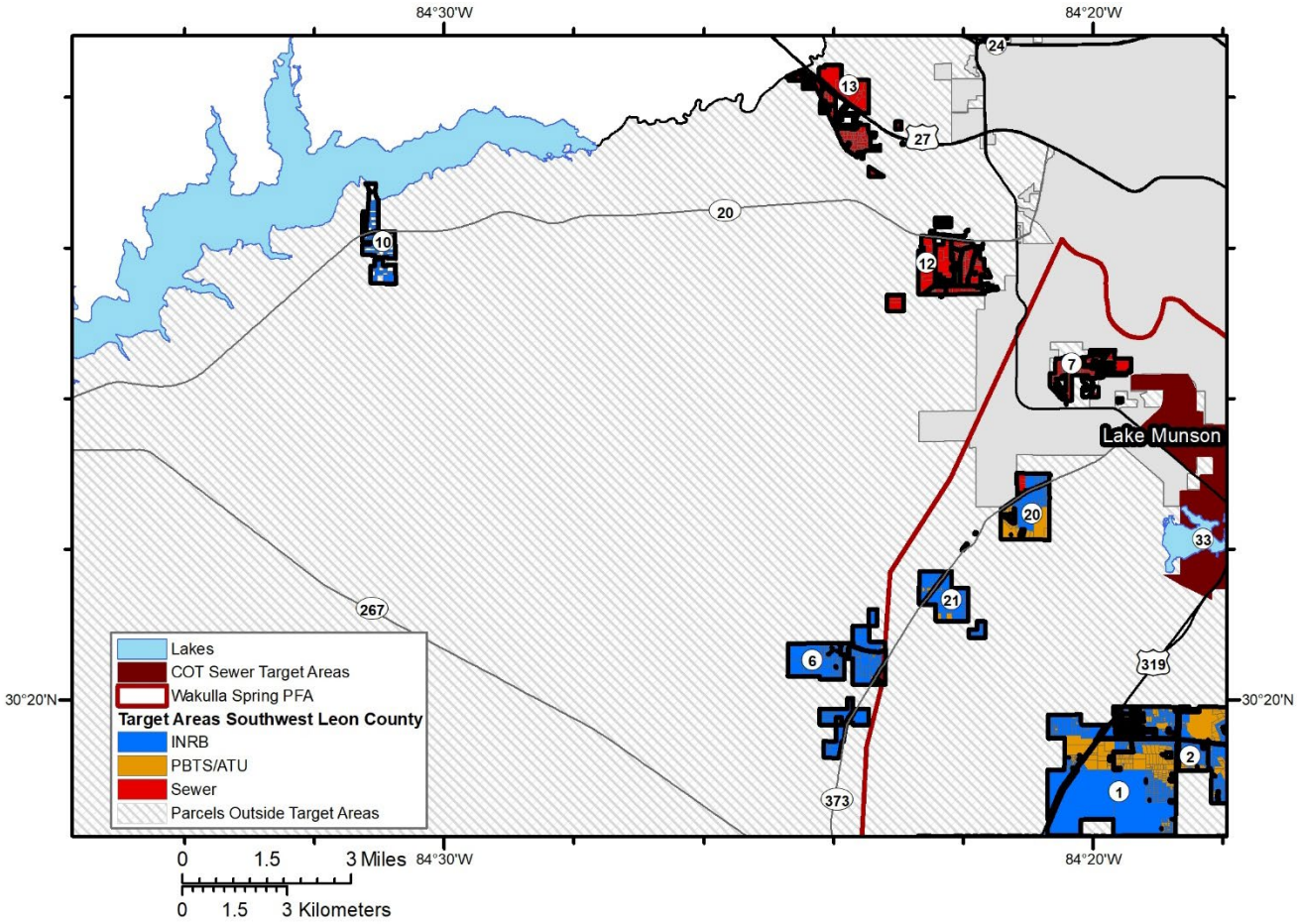

Figure 14. Proposed target areas for AWTS in southwest Leon County.

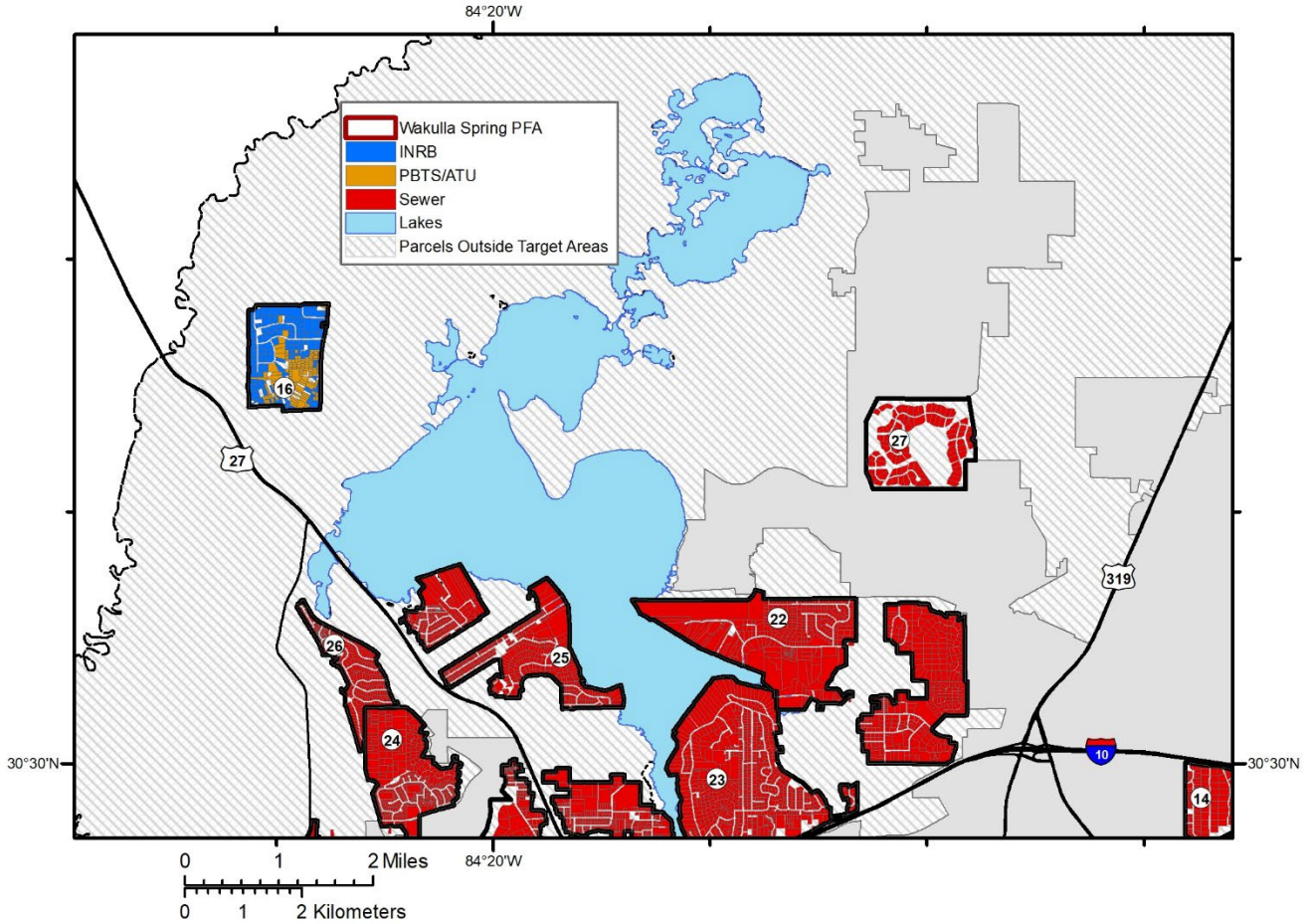

Figure 15. Proposed target areas for AWTS in northwest Leon County.

In addition, due to BMAP requirements, all parcels within the PFA are included in a target area with proposed AWTS options to achieve requirements. To meet Leon County Comprehensive Plan requirements for the PSPZ, AWTS recommendations are also provided for the parcels within the PSPZ. Figure 16 shows the proposed AWTS for the currently developed parcels that are on OSTDS within the PFA and PSPZ. Figure 17 shows the proposed AWTS for future development within the PFA and PSPZ.

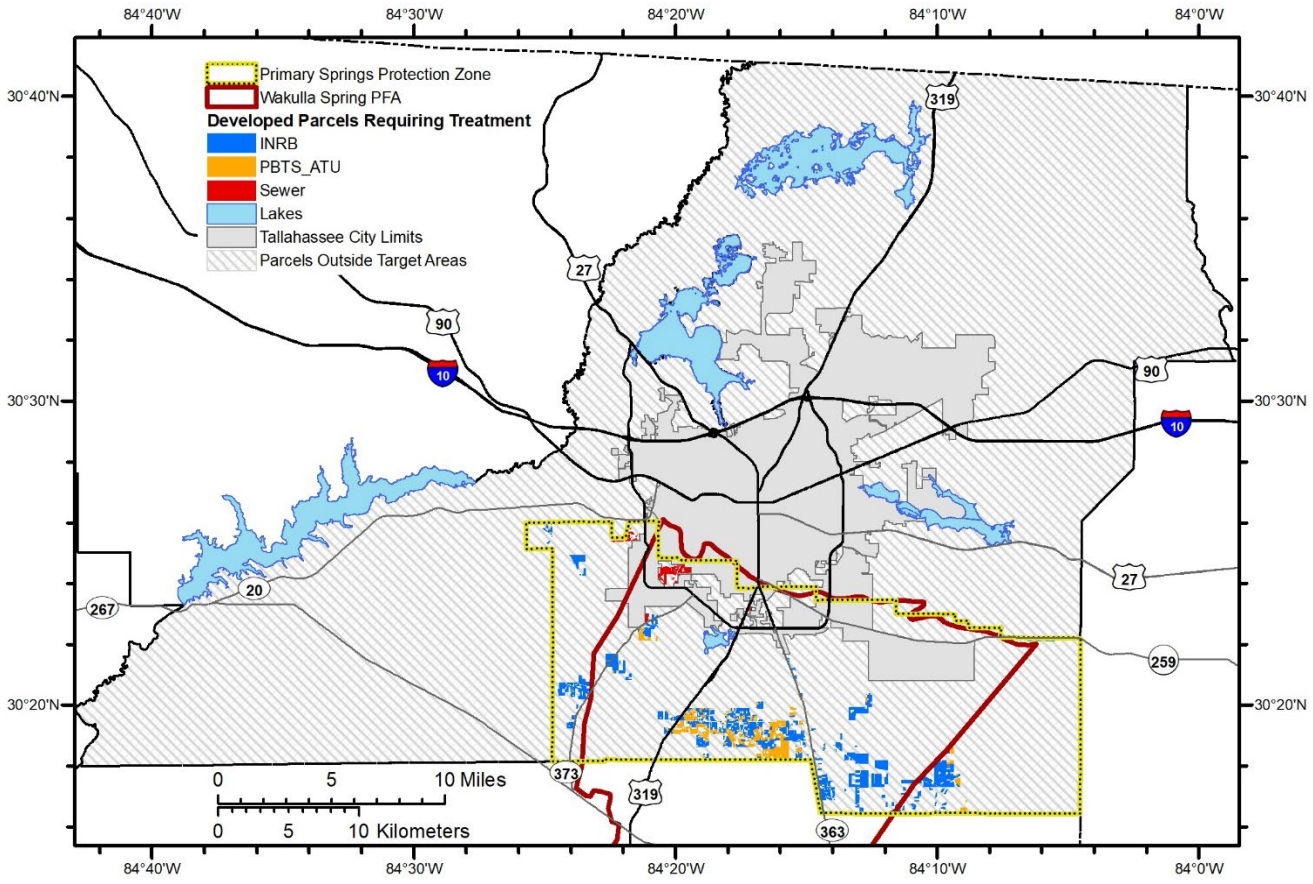

Figure 16. Recommended treatment type for currently developed parcels within the PFA and PSPZ.

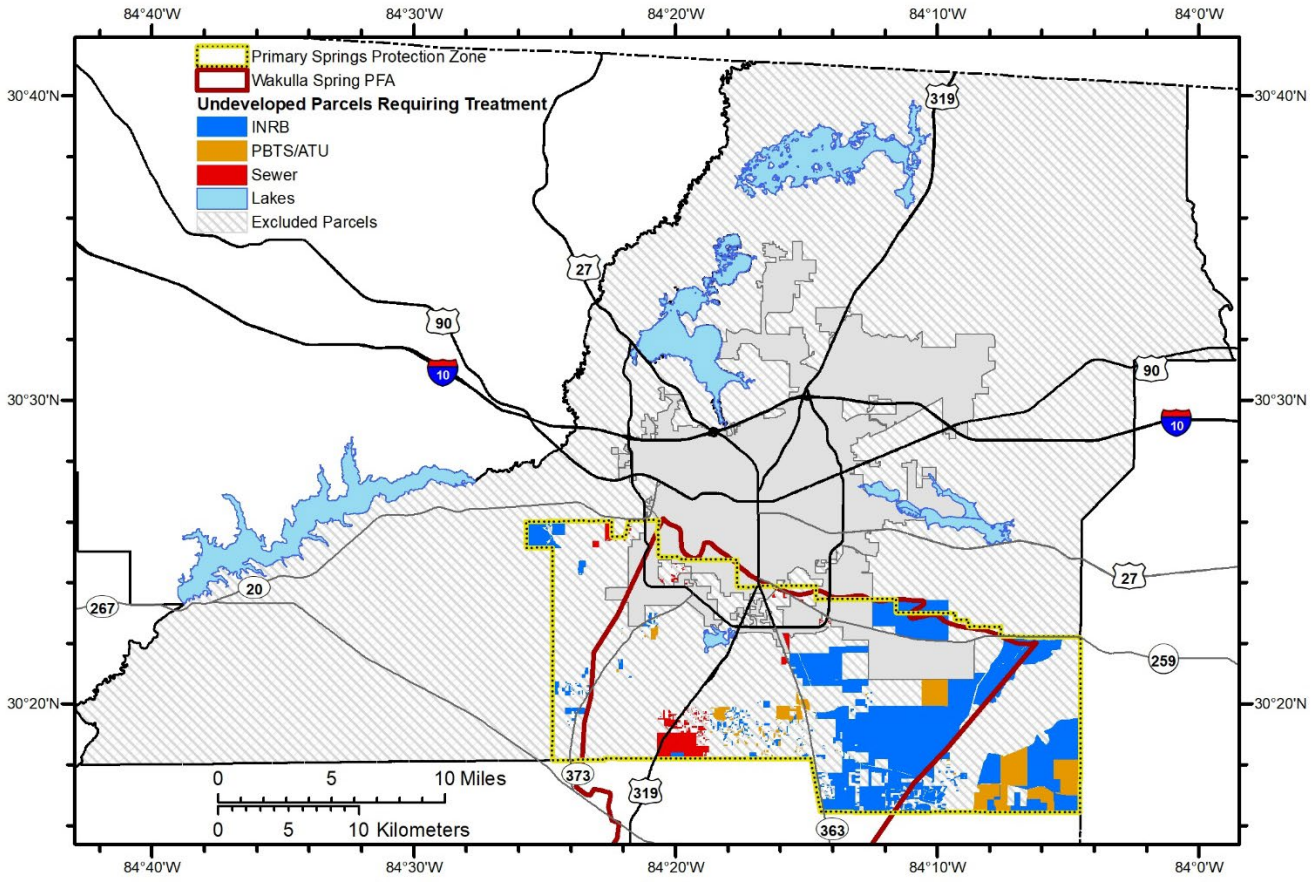

Figure 17. Recommended treatment type for undeveloped parcels within the PFA and PSPZ.

3.2 Estimated Costs for OSTDS Retrofit

The estimated costs to retrofit existing OSTDS to the recommended AWTS technology for each target area are summarized in Table 3. The zoning breakdown for each target area is presented in Table 4. The number of OSTDS retrofits in each target area represent the number of developed parcels currently on septic systems.

Table 3. Estimated costs for OSTDS retrofit by target area.

Target Area Number	Target Area Name	Recommended Technology	Number of OSTDS Retrofits	Total Target Area Cost	Average Cost Per OSTDS Retrofit
1	Oak Ridge Road West	Sewer	812	$26,822,000	$33,032
2	Oak Ridge Road East	INRB or Sewer	1,138	$27,977,000	$24,584
3	Rhodes Cemetery Road	INRB or PBTS/ATU	97	$1,951,000	$20,113
4	Pine Acres	PBTS/ATU, INRB, or Sewer	253	$5,144,000	$20,332
5	Tallahassee Ranch Club	INRB or PBTS/ ATU	236	$4,544,000	$19,254
6	Spring Hill Trace/Cox Road	PBTS/ATU, INRB, or Sewer	174	$3,457,000	$19,868
7	Lake Bradford	Sewer	159	$5,001,000	$31,453
8	Buck Lake Woods	Sewer	1,501	$46,058,000	$30,685
9	Kelly Court/Louvenia Woods	PBTS/ATU, INRB, or Sewer	75	$2,060,000	$27,467
10	Nottingham Castle Estates/Tully Estates	INRB or PBTS/ATU	90	$1,733,000	$19,256
11	Kellywood Farms/Powder Horn Woods	INRB or PBTS/ATU	106	$2,041,000	$19,255
12	Pineridge Estates	Sewer	318	$9,822,000	$30,887
13	Geddie Road/Barineau Road	Sewer	246	$7,609,000	$30,931
14	Pemberton Road	Sewer	172	$5,366,000	$31,198
15	Benjamin's Run	Sewer	140	$4,341,000	$31,007
16	Farmview Estates/Box Wood Estates/North Lake Meadows	PBTS/ATU, INRB, or Sewer	284	$7,210,000	$25,387
17	Rhodes Subdivision	PBTS/ATU, INRB, or Sewer	45	$1,139,000	$25,311
18	Natural Bridge Road	PBTS/ATU, INRB, or Sewer	165	$3,319,000	$20,115
19	Natural Bridge Acres	PBTS/ATU, INRB, or Sewer	31	$727,000	$23,452
20	Lonnie Gray Road	PBTS/ATU, or Sewer	106	$2,596,000	$24,491
21	Robert Golden Road	PBTS/ATU, INRB, or Sewer	51	$1,112,000	$21,804
22	Rhoden Cove	Sewer	677	$20,417,000	$30,158
23	Lakeshore	Sewer	1,309	$40,197,000	$30,708
24	Huntington Estates	Sewer	603	$18,572,000	$30,799
25	Lake Breeze	Sewer	764	$23,096,000	$30,230
26	Duck Lake Point	Sewer	330	$10,430,000	$31,606
27	Rosehill	Sewer	92	$3,038,000	$33,022
28	Killearn Acres	Sewer	1,479	$44,295,000	$29,949
29	Plantation Forest Drive/Hill North Dale Drive North	Sewer	154	$4,845,000	$31,461
30	Plank Road/Tram Road	PBTS/ATU, INRB, or Sewer	7	$158,000	$22,571
31	Lutterloh Pond	INRB or PBTS/ATU	3	$58,000	$19,333
32	Verdura Plantation	INRB or PBTS/ATU	10	$193,000	$19,300
Total	-	-	***11,627***	***$335,328,000***	***$28,840***

Note: The total cost for each target area is rounded to the nearest $1,000.

Table 4. Zoning breakdown by target area.

Target Area	Zoned	Percentage
1	Urban Fringe	51.10%
1	Residential Preservation	48.90%
2	Urban Fringe	40.93%
2	Residential Preservation	51.01%
2	Residential Acre	4.57%
2	Single Family Detached R-1	1.86%
2	Manufactured Home and Single Family Residential	1.55%
2	Mobile Home Park	0.08%
3	Rural	98.98%
3	Single Family Detached R-1	1.02%
4	Woodville Commercial District	0.64%
4	General Commercial	1.61%
4	Single Family Detached R-1	6.75%
4	Residential Preservation	53.05%
4	Manufactured Home and Single Family Residential	18.33%
4	Residential Acre	15.76%
4	Mobile Home Park	0.96%
4	Rural	2.89%
5	Residential Preservation	8.47%
5	Rural	91.53%
6	Residential Preservation	27.04%
6	Rural	72.96%
7	Single Family Detached R-1	8.47%
7	Residential Preservation	78.84%
7	Open Space	4.76%
7	Light Industrial	1.59%
7	Single Family Detached R-2	5.29%
7	Mobile Home Park	1.06%
8	Single Family Detached R-1	4.05%
8	Residential Preservation	91.90%
8	Activity Center	0.19%
8	Mahan Corridor Node	0.19%
8	Residential Acre	1.54%
8	Westminster Oaks PUD	0.90%
8	Open Space	0.06%
8	Single Detached, Attached and Two Family Residential	0.90%
8	Office Residential, Medium Density	0.13%
8	Urban Fringe	0.13%
9	Residential Preservation	85.23%
9	Urban Fringe	14.77%
10	Residential Preservation	68.75%
10	Urban Fringe	6.25%
10	Lake Talquin Recreational/Urban Fringe	25.00%
11	Urban Fringe	64.41%
11	Residential Preservation	35.59%
12	Single Family Detached R-1	35.57%
12	Manufactured Home and Single Family Residential	2.99%
12	Mobile Home Park	1.00%
12	Light Industrial	4.98%
12	General Commercial	0.75%
12	Single Detached, Attached and Two Family Residential	16.67%
12	Open Space	2.24%

Target Area	Zoned	Percentage
12	Residential Acre	3.98%
12	Residential Preservation	29.35%
12	Airport Vicinity	0.25%
12	Urban Fringe	0.25%
12	Rural	1.99%
13	Urban Fringe	23.62%
13	Single Family Detached R-1	6.75%
13	Single Detached, Attached and Two Family Residential	34.97%
13	Commercial Parkway	3.37%
13	Light Industrial	0.92%
13	The Gardens at Westlake PUD	0.61%
13	General Commercial	0.31%
13	Manufactured Home and Single Family Residential	0.31%
13	Residential Preservation	28.83%
13	Mobile Home Park	0.31%
14	Residential Preservation	55.03%
14	Single Detached, Attached and Two Family Residential	38.62%
14	Manufactured Home and Single Family Residential	5.82%
14	Welaunee Toe-East PUD	0.53%
15	Single Family Detached R-1	3.40%
15	Residential Preservation	96.60%
16	Residential Preservation	88.54%
16	Rural	11.46%
17	Woodville Commercial District	2.04%
17	Single Detached, Attached and Two Family Residential	4.08%
17	Light Industrial	2.04%
17	Rural	91.84%
18	Residential Preservation	2.26%
18	Single Family Detached R-1	10.17%
18	Woodville Retirement Community PUD AKA DISC Village	3.95%
18	Residential Acre	3.39%
18	Single Family Detached R-1	80.23%
19	Residential Preservation	79.41%
19	Rural	20.59%
20	Residential Preservation	35.20%
20	Government Operation - 2	2.40%
20	Rural	62.40%
21	Rural	100.00%
22	Lake Protection	99.85%
22	The Villages of Maclay PUD	0.15%
23	Lake Protection	81.64%
23	Residential Preservation	12.39%
23	Urban Residential District	0.88%
23	Commercial Parkway	0.52%
23	Office Residential, Medium Density	0.59%
23	Lake Jackson Station Postal Facility PUD	0.22%
23	General Commercial	0.29%
23	Single Detached, Attached and Two Family Residential	0.66%
23	Office Residential	0.44%
23	Medium Density Residential	1.92%
23	Tallahassee School of Math and Science PUD	0.22%
23	Light Industrial	0.07%
23	Open Space	0.07%

Target Area	Zoned	Percentage
23	Wal-Mart PUD	0.07%
24	Residential Preservation	76.28%
24	Neighborhood Commercial	1.12%
24	Open Space	0.48%
24	Single Detached, Attached and Two Family Residential	19.07%
24	Park Place PUD	1.44%
24	Single Family Detached R-1	1.44%
24	Residential Preservation-1	0.16%
25	Lake Protection	98.58%
25	Open Space	1.42%
26	Residential Preservation	76.42%
26	Single Detached, Attached and Two Family Residential	19.24%
26	Lake Protection	4.34%
27	Residential Preservation	74.77%
27	Lake Protection	25.23%
28	Residential Preservation	100.00%
29	Residential Preservation	88.00%
29	Interchange Commercial	10.29%
29	Residential Acre	1.71%
30	Rural	100.00%
31	Rural	100.00%
32	Urban Fringe	35.71%
32	Rural	64.29%

4.0 Recommendations for New Development Standards

As new development occurs in Leon County, the following recommendations are provided for the PFA and PSPZ for use of AWTS in lieu of adding new traditional OSTDS:

- Parcels within and adjacent to the target areas should use the same AWTS technology as the target area or nearby target area.
- Parcels within 2,000 feet of an existing central sewer main should be connected to central sewer where possible.
- Areas of higher development density with available parcels should be considered for cluster systems.

The recommended alternatives for currently undeveloped parcels within the PFA and PSPZ that could be developed in the future are shown in Figure 18.

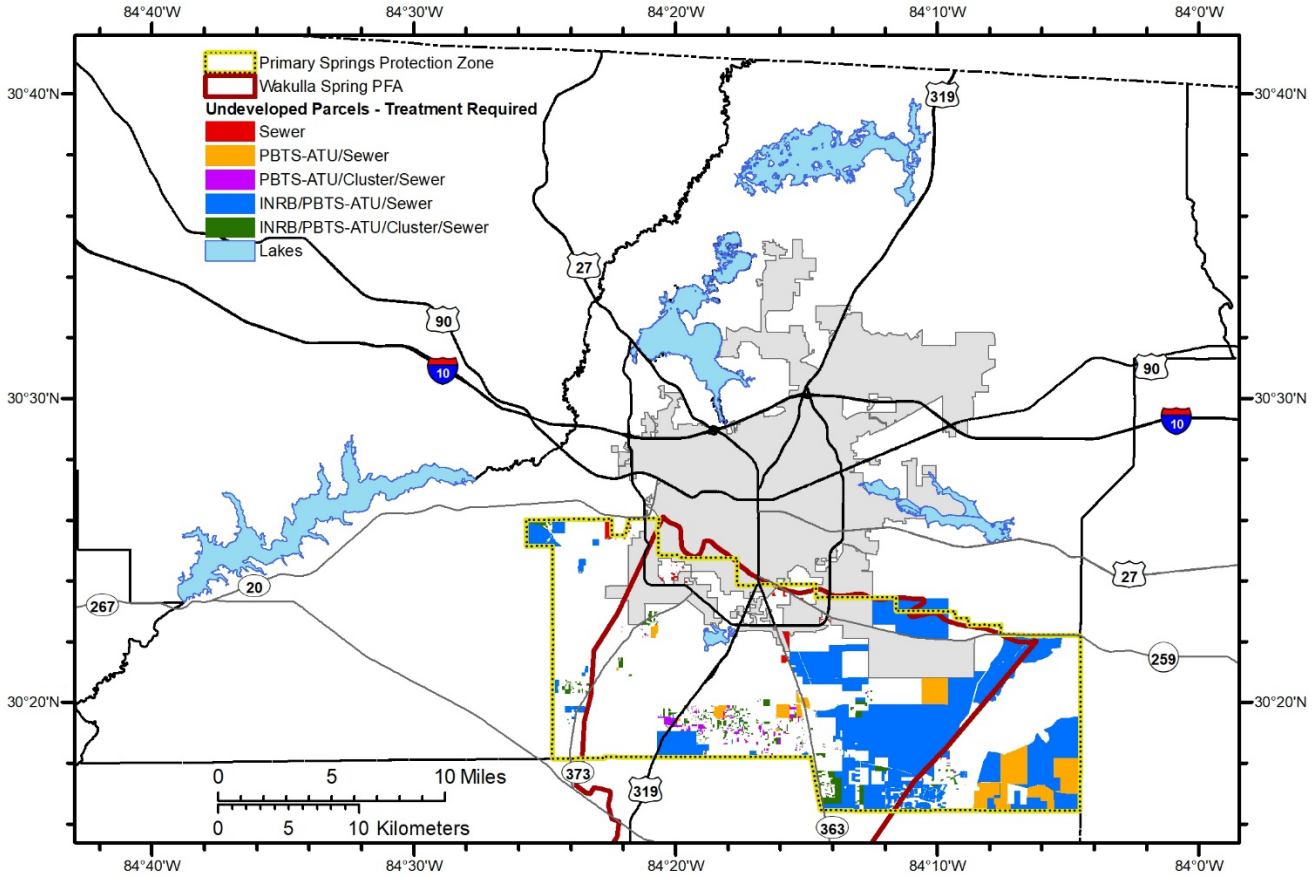

Figure 18. Recommended AWTS options for future development.

5.0 References

DEP, 2018 (June). Upper Wakulla River and Wakulla Spring Basin Management Action Plan: Division of Environmental Assessment and Restoration, Tallahassee, FL, 126 p., accessed March 8, 2020 at https://floridadep.gov/sites/default/files/Wakulla%20BMAP.pdf.

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