

Phase 1: Regional AWS Feasibility – Cedar Key, Bronson, Otter Creek, and Unincorporated Areas in Levy County

Task 3 – Evaluation of Current and Projected Wastewater Treatment and Disposal Needs for Cedar Key, Otter Creek, Bronson, and Unincorporated Levy County (Draft)

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Section 1 Wastewater Infrastructure

1.1 Introduction

The Suwannee River Water Management District (SRWMD) is one of five water management districts tasked with four core mission areas: water supply, water quality, flood control/floodplain management, and natural systems. The SRWMD comprises all or portions of 15 counties and encompasses approximately 7,640 square miles. The SRWMD is responsible for managing the needs of both natural systems and water users. To accomplish this, the SRWMD issues water supply permits for water users and develops minimum flows and minimum levels (MFLs) for natural systems within the SRWMD. These efforts are carried out in conjunction with water supply planning to determine where additional water is needed, identify alternative water supplies (AWSs), and implement cost-effective projects to address identified water challenges or shortages.

Within the Waccasassa Basin the City of Cedar Key, unincorporated Levy County, and the Towns of Otter Creek and Bronson have a variety of water and wastewater challenges that they are attempting to address with assistance from the SRWMD. For both Cedar Key and Otter Creek, these include water quality concerns related to their supply wells and treatment requirements. Additionally, Cedar Key is faced with challenging wastewater treatment issues and loss of treated water to a marine ecosystem where it cannot be beneficially recharged or reused. Bronson and Levy County are concerned with water supply and managing increasing demand in a responsible manner. These disparate challenges present potential opportunities for these entities to collaborate to develop regional projects that can help address these concerns, while also providing a reliable and resilient water supply and employing wastewater treatment and reuse strategies that can benefit the region.

The SRWMD is working with the Florida Department of Environmental Protection (FDEP) and the communities to evaluate this study area and the identified water and wastewater issues by developing an alternatives analysis for the specific challenges and needs faced by each community. This effort is evaluating not only current needs, but also anticipated growth in the region and potential medium to long-term water supply challenges. The tasks to complete this project include:

- Task 1: Evaluation of current and future water supply challenges, needs, and limitations for Cedar Key, Otter Creek, Bronson, and Unincorporated Levy County.
- Task 2: Alternatives development to address current and future water supply needs.
- Task 3: Evaluation of current and projected wastewater treatment and disposal needs for Cedar Key, Otter Creek, Bronson, and Unincorporated Levy County.
- Task 4: Alternatives development for wastewater reuse and recharge.
- Task 5: Cost estimation and cost-effectiveness calculation for the identified alternatives.

This report is focused on Task 3 of the project including evaluation of current and projected wastewater treatment and disposal needs for Cedar Key, Otter Creek, Bronson, and Unincorporated Levy County.

1.1.1 Study Area

The study area for this project is the portion of the SRWMD that lies within the Waccasassa River Basin and Levy County. The primary focus of this project is the area between the Town of Bronson and the City of Cedar Key along and within the vicinity of State Road 24 (SR24). This includes the Town of Otter Creek and portions of Unincorporated Levy County along and near SR24 including the communities of Rosewood and Sumner. The relevant boundaries and study area are shown in Figure 1.

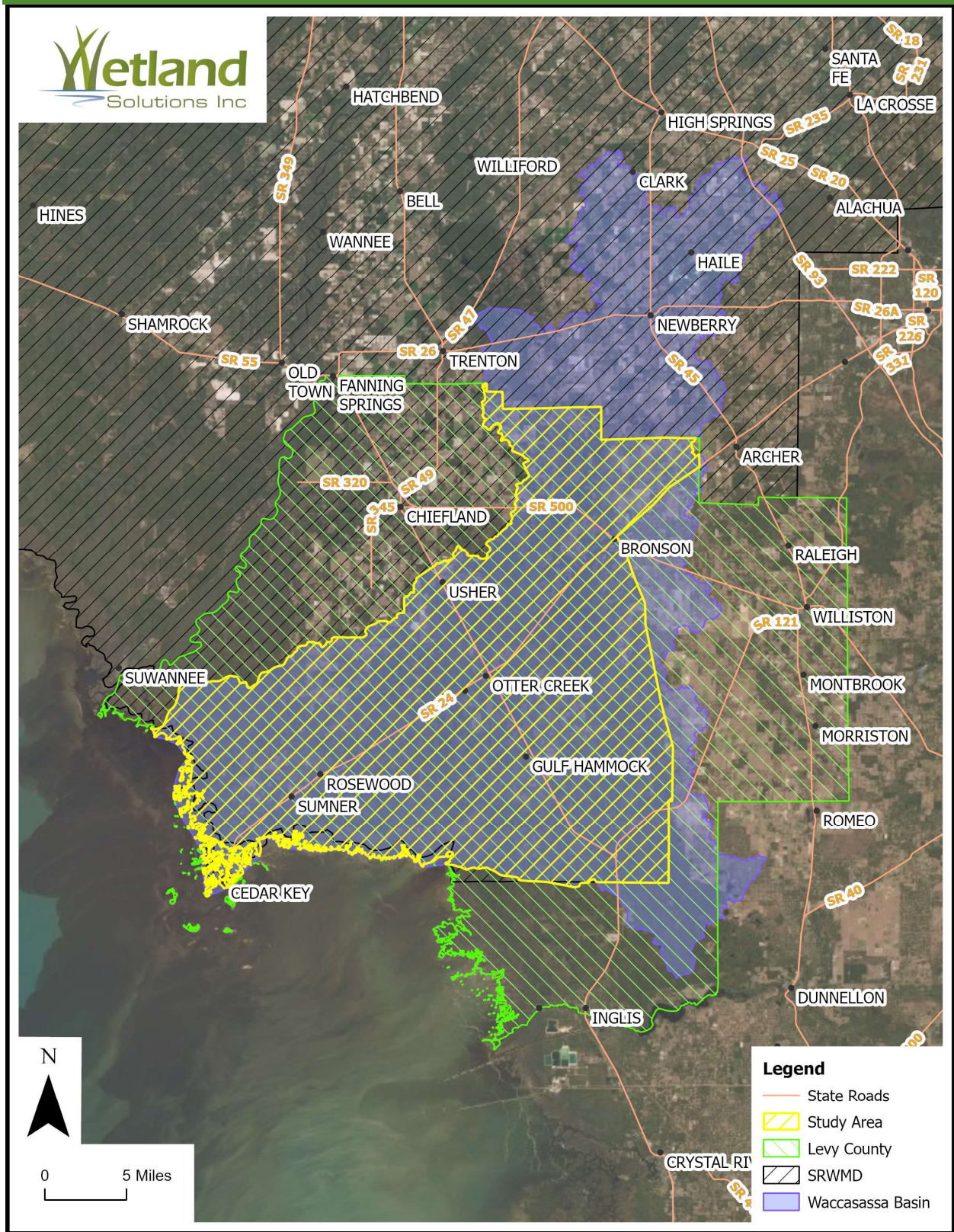


Figure 1. Regional Alternative Water Supply Feasibility Study Area Extents

Section 2 Data and Methods

This section describes the data that were collected as part of this project. Primary data types included geographic data, wastewater facility data, and population data. The following sections discuss each of these sources and the data evaluated as a part of this study.

2.1 Geographic Data

Geographic data were collected to evaluate the spatial attributes of features of interest. These data were generally in geographic information system (GIS) formats.

2.1.1 Data Sources

Data were collected from a variety of sources including the SRWMD, FDEP, Florida Department of Transportation (FDOT), Florida Department of Health (FDOH), United States Geological Survey (USGS), and the Florida Geographic Data Library (FGDL). Table 1 shows the data collected, source, and year.

Table 1. Data, Source, and Year

Data	Source	Year
Waccasassa River Basin (HUC8)	USGS	2016
Parcels	FGDL	2019
County Boundaries (Detailed Shoreline)	FGDL	2015
State Roads	FDOT	2022
Onsite Sewage Treatment & Disposal System	FDOH	2021
Wastewater Facility Regulation (WAFR) - Wastewater Sites	FDEP	2018
SRWMD Boundary	SRWMD	2022
Public Service Area Boundaries	SRWMD	2021
Statewide Land Use Land Cover	FDEP	2022

2.2 Wastewater Data

Wastewater in the study area is either treated centrally at wastewater treatment facilities (WWTFs) or in on-site sewage treatment and disposal systems (OSTDSs). WWTFs within the study area were identified based on FDEP data that are a part of the Wastewater Facility Regulation (WAFR) database. These facilities include all permitted domestic, power plant, or industrial WWTFs, as well as residuals application sites and collection systems. OSTDSs were identified based on FDOH parcel data.

Section 3 Wastewater Considerations

This project is evaluating wastewater considerations for Bronson, Cedar Key, Otter Creek, and Unincorporated Levy County. These entities have various degrees of existing wastewater service and treatment with most homes on septic systems.

3.1 Inventory of Existing Wastewater Treatment Facilities

Based on the WAFR database a total of five wastewater facilities are located within the study area as shown in Figure 2. Additionally based on searches of the FDEP Oculus database there were an additional 53 facilities that had permits and had their location marked as either Cedar Key, Bronson, or Unincorporated. A majority of these facilities appear, based on facility name and a spot-check of available permit files, to be aquaculture processing facilities. Upon reviewing a selection of these facilities, the process appears to be a once-through operation model with water pumped from the Gulf through the process and discharged back to the Gulf. Additionally, there are other wastewater permits that appear to be related to small stores or condominiums. These 53 facilities are not of interest to this project because none of these systems are centralized, municipal systems. However, any of these facilities discharging to OSTDSs could be considered for connection to an existing or expanded WWTF.

All the facilities in the WAFR database are domestic facilities with one domestic wastewater residuals application site and four domestic WWTFs, with the characteristics shown in Table 2. Capacities of the wastewater facilities range from 0.024 to 0.18 MGD. Of the four WWTFs, two facilities are associated with municipalities (Bronson and Cedar Key), one with the Levy County Jail, and one with the Levy Forestry Work Camp. The remainder of this study focused specifically on the municipal wastewater facilities located in Bronson and Cedar Key.

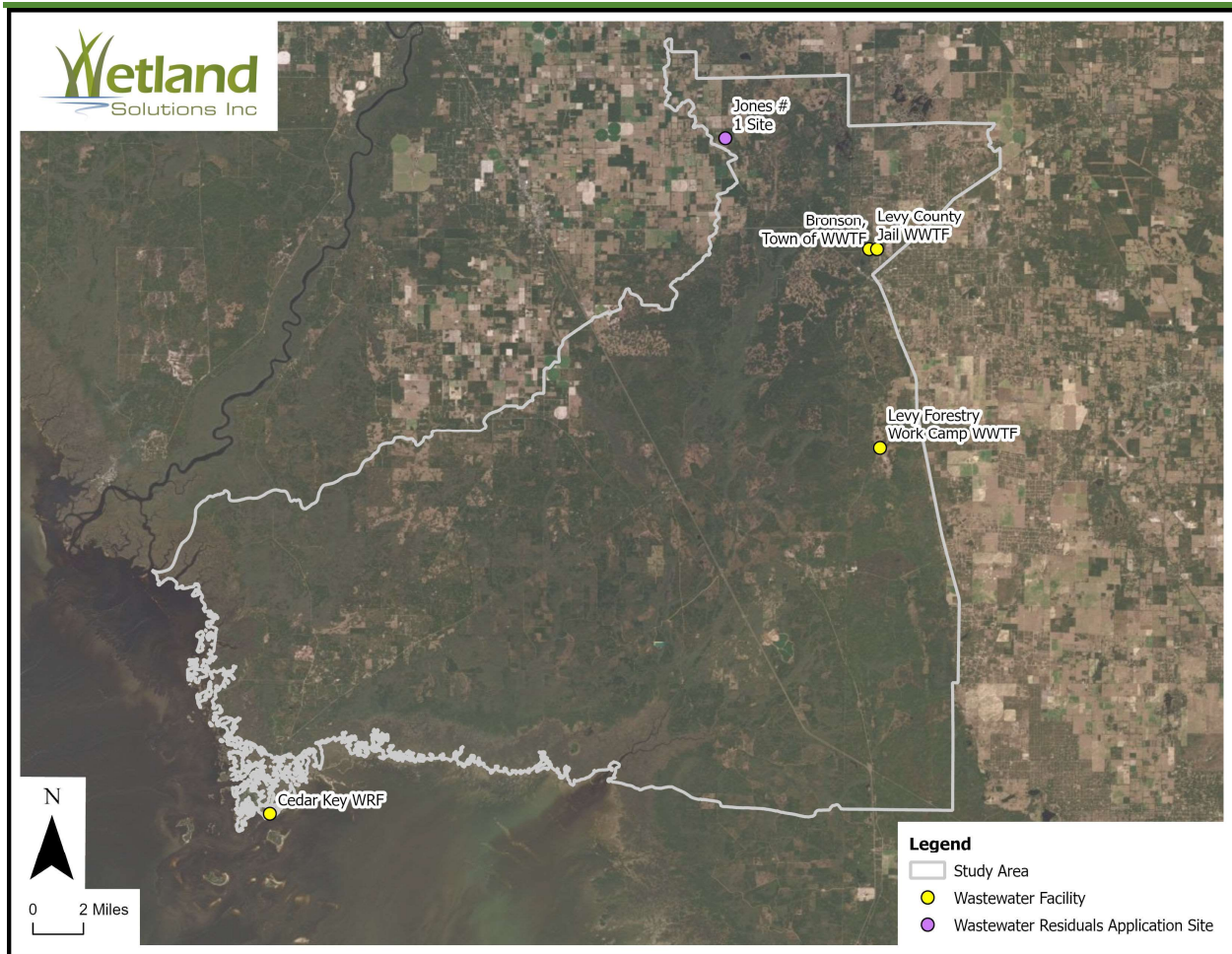


Figure 2. Permitted Wastewater Treatment Facilities in the Waccasassa Feasibility Study Area

Table 2. Permitted Wastewater Treatment Facilities

Facility ID	Name	Capacity (MGD)	Facility Type
FLA956945	Jones #1 Site	--	Domestic WW Residuals Application Site
FLA011656	Levy Forestry Work Camp WWTF	0.035	Domestic WW Facility
FLA011647	Levy County Jail WWTF	0.024	Domestic WW Facility
FLA317659	Bronson, Town of WWTF	0.083	Domestic WW Facility
FL0031216	Cedar Key WRF	0.18	Domestic WW Facility

3.1.1 Current Disposal

Both municipal WWTFs rely on land application for disposal. Cedar Key maintains and operates an absorption field system for disposal, with a surface water discharge to Back Bayou as a backup/emergency disposal system. The absorption field is comprised of 1.148 acres of underground, high-rate drip irrigation system located on the parcel that also houses the City’s water tower. The surface water discharge location is to Back Bayou, Class III Marine Waters (WBID# 8037C), which includes approximately 80 feet of pipe, discharging approximately 20 feet from shore at a depth of 3 feet.

The Town of Bronson’s WWTF has two sites for disposal that are located on adjoining parcels. The first is slow-rate land application at an 8.2-acre sprayfield and the second is two rapid infiltration basins (RIBs) with a total area of 0.849 acres.

3.1.2 Current Flows

The WWTFs within the study area have permitted capacities ranging from 0.024 to 0.18 MGD (Table 2). Discharge monitoring report (DMR) data were obtained from the FDEP for the Bronson and Cedar Key facilities. Monthly average flows are presented in Figure 3 with average flows at these facilities ranging from 0.048 to 0.097 MGD (Table 3). Another important metric when considering wastewater facilities is the ratio of current flow to permitted capacity. This information is used to determine when a wastewater facility needs to expand capacity to meet population growth. This ratio was calculated for each facility and was 39% for Bronson and 52% for Cedar Key.

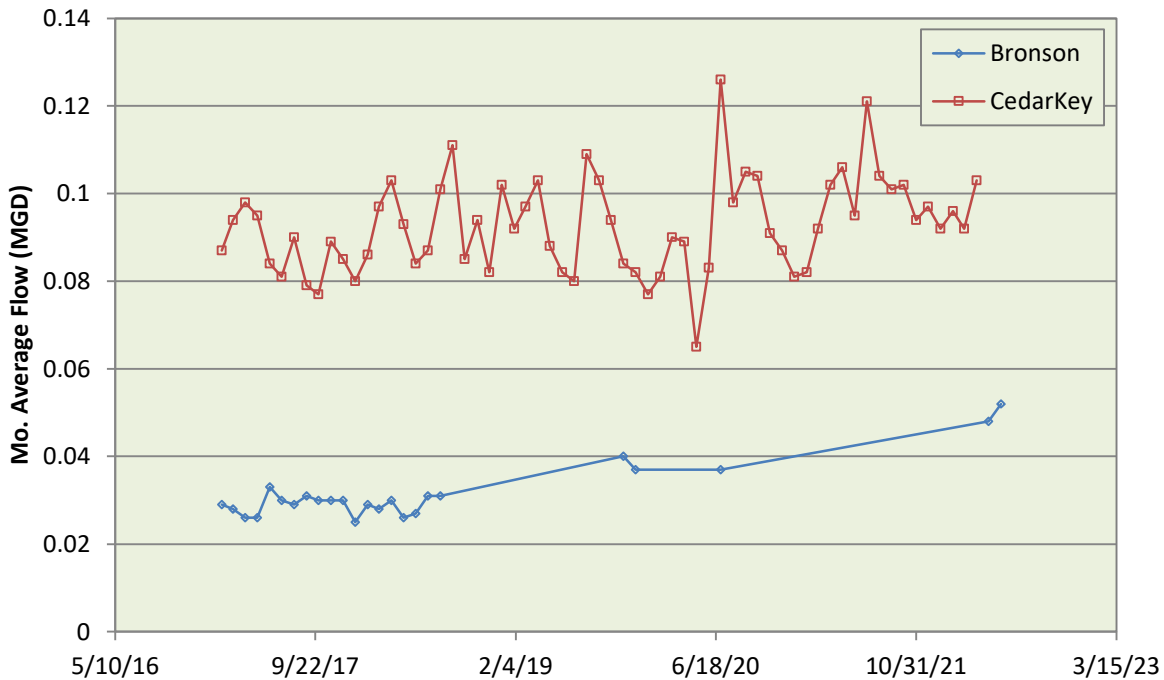


Figure 3. Bronson and Cedar Key Discharge Monitoring Data (2017 - 2022)

Table 3. Permitted Wastewater Treatment Facilities

Facility ID	Name	Capacity (MGD)	Average Flow (MGD)	Flow to Capacity Ratio	Period of Record
FLA317659	Bronson, Town of WWTF	0.083	0.032 ¹	39%	Jan 2017 – May 2022
FL0031216	Cedar Key WRF	0.18	0.093	52%	Jan 2017 – Mar 2022

¹ No DMRs available between July 2018 - October 2019 and June 2020 - April 2022

3.1.3 Current Wastewater Quality

Water quality for the WWTFs are reported as part of the monthly DMRs submitted to FDEP. The parameters of primary interest to this study include nutrients and fecal coliform. Fecal coliform concentrations are of particular interest for the Cedar Key facility because of the local aquaculture industry. Regulated parameters in the permits for each WWTF of interest to this study included total Kjeldahl nitrogen (TKN), nitrate+nitrite as nitrogen (NO_x-N), and fecal coliform (FC), with the limits shown in Table 4. Despite being included in the permit for Cedar Key, TKN is not directly sampled at the facility but can be calculated based on the sampled parameters (TN and NO_x-N, as TKN = TN - NO_x-N). Average monthly maximum NO_x-N values shown in Table 4 are concentrations leaving the facility, not at the monitoring wells where concentrations are regulated. Finally, Bronson recently had an operator change for their contracted wastewater operations and had limited DMRs available over the past two years. Time series data for Bronson (NO_x-N) and Cedar Key (TN and NO_x-N) are shown in Figure 4 and Figure 5, respectively.

Table 4. Wastewater Facility Water Quality Limits and Average Values

Facility ID	Facility Name	Permitted TKN (mg/L) ^{1,2}	Permitted NO _x -N (mg/L) ^{3,4}	Permitted FC (#/100mL) ^{1,4}	Avg. Mo. Max TN (mg/L) ⁵	Avg. Mo. Max NO _x -N (mg/L) ¹	Avg. FC (#/100 mL)	Period of Record
FLA317659	Bronson, Town of WWTF ⁶	--	10.0	200	---	2.83	1,785	Jan 2017 – May 2022
FL0031216	Cedar Key WRF	12.0	10.0	14	9.48	2.32	2.2	Jan 2017 – Mar 2022

¹Effluent at R-001

²Single sample

³Groundwater at monitoring wells

⁴Annual average

⁵TN and NO_x-N sampled for rather than TKN

⁶Bronson facility had no DMRs available between July 2018 - October 2019 and June 2020 - April 2022

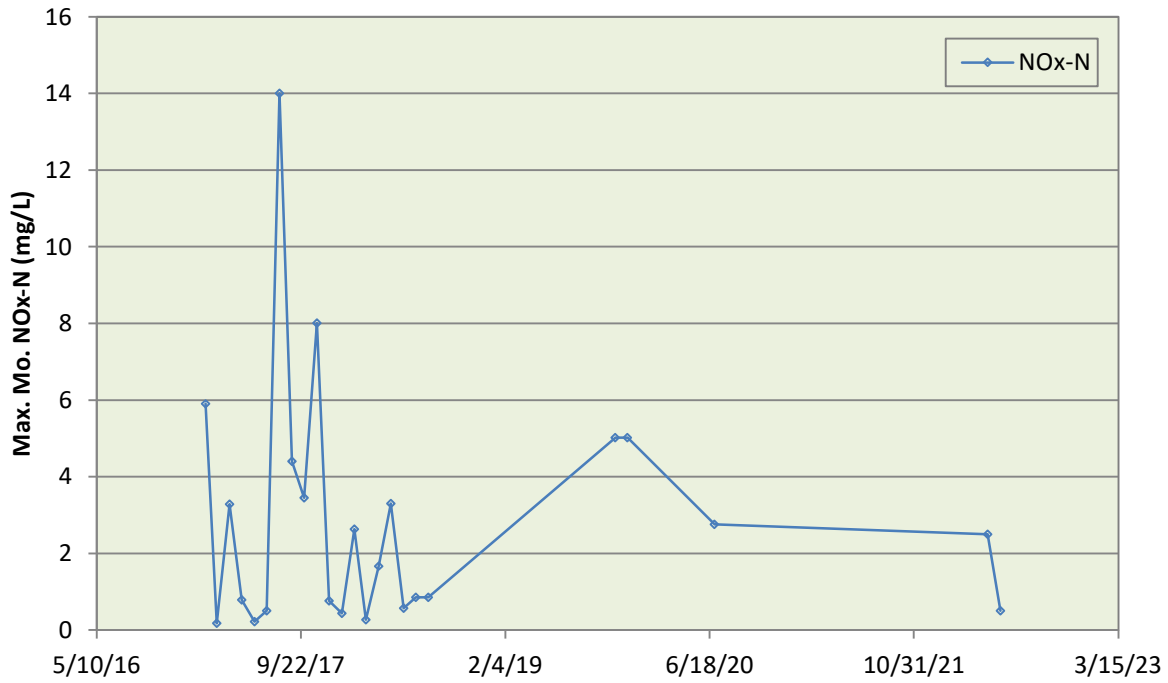


Figure 4. Bronson Discharge Monitoring Report Data (2017 - 2022)

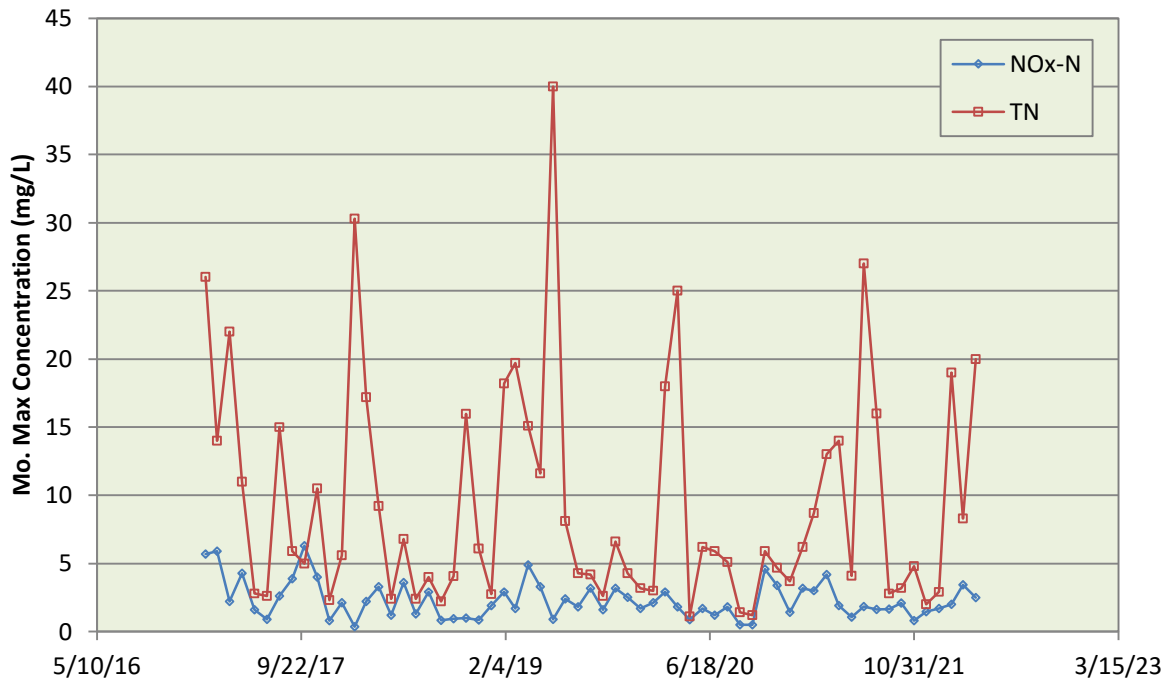


Figure 5. Cedar Key Discharge Monitoring Report Data (2017 - 2022)

3.1.4 Current Wastewater Facility Condition

Wastewater facility condition is evaluated as part of permit renewal. The purpose of this review is to identify current issues with the operation and maintenance of WWTFs and necessary repairs. Both facilities that are a part of this study, Cedar Key and Bronson, had reports prepared and available for their WWTFs from their last permit renewal cycle. These reports are summarized in the following sections.

3.1.4.1 Cedar Key Water Reclamation Facility

The Cedar Key WRF had an Operation and Maintenance Performance Report developed in July 2018 as part of the facility permit renewal. This report described the components of the wastewater system as well as condition of each component. Reported conditions are summarized in Table 5.

Table 5. Cedar Key Water Reclamation Facility Operation and Maintenance Summary

System	Component	Condition	Identified Issues
Influent	Static Screen	Satisfactory	None
Influent	Grit Chamber	Poor	Inoperable, relying on removal in aeration tanks, safety issue with exposed open channels, recommended to monitor sediment accumulation in aeration tanks
Aeration	Tanks	Poor	Walls have cracks that require rehabilitation
Aeration	Blowers	Poor	Leaking oil and require maintenance
Aeration	Diffusers	Good	None
Clarification	Clarifiers	Good	Safety issue with a lack of handrail around edge
RAS	Pumps	Good	None
Filtration	Filters	Good	None, but air scour system is not efficient
Chlorination	Pumps	Good	None
Chlorination	Chamber	Good	None
Dechlorination	Pumps	Good	None
Reclaimed	Pumps	Good	None
Polymer Feed	Pumps	Satisfactory	None
Aerobic Digester	Tank, Blower	Satisfactory	None, but changes could be made to reduce sludge volume
Collection	Collection	--	The system does experience some infiltration and inflow due to materials and condition and is being evaluated in a study

Facility performance was evaluated based on data from January 2016 through June 2017. Performance was well within permit requirements in treated effluent. The groundwater monitoring program indicated permit exceedances for total dissolved solids (TDS), chloride, and sodium, although water quality criteria exemptions have been issued for these parameters.

3.1.4.2 Bronson Wastewater Treatment Facility

The Bronson WWTF had an Operation and Maintenance Performance Report developed in September 2018 as part of the facility permit renewal. This report described the components of the wastewater system as well as condition of each component. Reported conditions and identified issues are summarized in Table 6.

Table 6. Bronson Wastewater Treatment Facility Operation and Maintenance Summary

Component	Condition	Identified Issues
Static Screen	Excellent	None
Surge Tank	Satisfactory	None
Flow Splitter Box	Excellent	Recommended to evaluate sizing to allow simultaneous operations of pumps and to monitor grit levels
Biological Treatment Unit	Satisfactory	Offline blower and clogged line should be repaired
Secondary Clarifiers	Satisfactory	Recommend cleaning to remove scum and algae
Chlorine	Good	None, but cleaning recommended quarterly
Spray fields	Satisfactory	Complete repair of control panel
RIBs	Satisfactory	None, recommend normal maintenance
Aerobic Digester	Satisfactory	None
Collection System	Good	No identified infiltration and inflow issues

Facility performance was evaluated based on data from July 2016 through March 2018. Evaluated constituents were generally within permit limits except during a single event for nitrate (October 2016, 60.09 mg/L) and a single event for fecal coliform (May 2017, 9,000/100 mL). Three-month average daily flows were below 50% for the facility, not requiring a Capacity Analysis Report. Groundwater sampling found pH to be out of compliance, although effluent pH values were within limits and this is believed to be the result of natural soil conditions.

3.2 Inventory of Existing Septic Systems

Data on the location of OSTDSs were collected from the FDOH, which maintains a dataset of parcels and disposal types. These data were combined with parcel data for the state to yield a best estimate of parcels that had both buildings and/or residential units and septic tanks. The OSTDS data are classified based on disposal method with values of: known septic, likely septic, somewhat likely septic, known sewer, likely sewer, somewhat likely sewer, undetermined, unknown, or not applicable. Parcels identified as “unknown” or “undetermined” are due to conflicts between data sources used to derive the OSTDS status. Parcels identified as “NA”, are generally for parcels where structures have not yet been constructed (Ursin 2016). For this project, all parcels with one or more buildings and/or residential units and that were identified as known septic, likely septic, or somewhat likely septic were considered as having an OSTDS in use.

This process identified 2,437 parcels as having OSTDSs, with 581 classified as known septic, 1,844 classified as likely septic, and 12 identified as somewhat likely septic. Of the identified parcels that are categorized as having OSTDSs, 638 are located completely or partially within the Public Service Areas (PSAs) of Bronson (n=189), Otter Creek (n=79), Cedar Key (n=2), and the University Oaks Mobile Home Park (n=368). The Town of Otter Creek and University Oaks Mobile Home Park do not provide wastewater service and all homes are on OSTDSs. The City of Cedar Key has virtually all units on centralized wastewater. The Town of Bronson has 220 wastewater accounts that are on centralized wastewater with the remainder apparently served by OSTDSs.

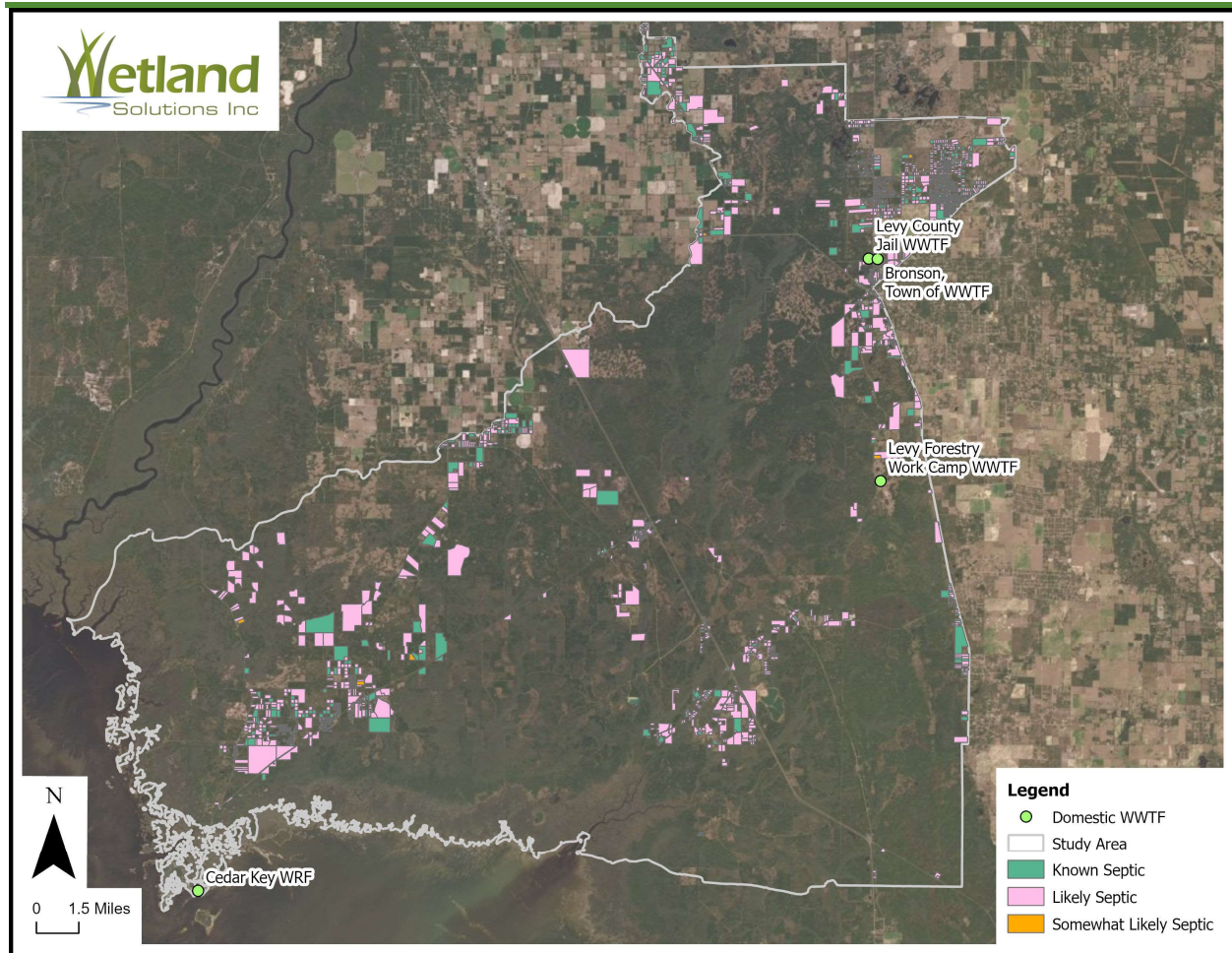


Figure 6. Septic Systems in the Waccasassa Feasibility Study Area

3.3 Population Growth Projections

Population growth projections were presented as part of Task 1. None of the utilities of interest (Cedar Key, Otter Creek, or Bronson) were projected to grow based on estimates from the SRWMD (Suwannee River Water Management District 2021). The current populations as of 2020 were estimated to be 2,304, 173, and 1,133 for Cedar Key, Otter Creek, and Bronson, respectively. Complexities associated with these population estimates are discussed below.

Cedar Key has a substantial transient, tourist population and flows for both the water and wastewater systems increase substantially on weekends, and particularly holiday and festival weekends. This results in wastewater flows doubling to tripling during these periods.

In a meeting with Bronson, the Town discussed current and planned development that could significantly change population during the planning period. To better estimate this potential scenario, the medium and high population growth estimates for Levy County developed by BEBR were used to estimate potential population growth through 2045. This approach resulted in 2045 population estimates of 1,310 and 1,539 for the medium and high growth scenarios, respectively.

3.4 Projected Wastewater Flows

Current combined wastewater flows for both Bronson and Cedar Key average approximately 0.13 MGD. If a centralized wastewater option were available to new and existing parcels for the area, this flow would be expected to increase. This increase would occur due to septic-to-sewer conversion and new development (residential, commercial, institutional, and industrial). These two potential sources of additional flow are discussed in the following sections.

3.4.1 Septic-to-Sewer Conversion

Wastewater flows would be expected to increase if septic-to-sewer conversion occurred for parcels currently served by OSTDSs. These conversions can be split into two primary groups: parcels currently within a PSA and parcels not currently within a PSA. For parcels within a PSA, if septic-to-sewer conversion occurred for the University Oaks Mobile Home Park, Otter Creek, and the remainder of unserved homes in the Town of Bronson, an additional 636 OSTDSs could be sewered. Flow for this number of additional accounts was calculated based on an assumption of 50 gallons per person per day (Tchobanoglous et al. 2003) and an estimate of 2.5 people per OSTDS. This equates to 125 gallons per OSTDS per day. Expected flow increases associated with conversion of the OSTDSs within PSAs would be expected to generate an additional approximately 0.08 MGD of flow.

In addition to existing OSTDSs within the PSAs, there are also parcels currently relying on OSTDSs outside the PSAs. The greatest concentration of these parcels within the study area are in the Rosewood and Sumner areas and north of the Town of Bronson. Along the alignment between Cedar Key and Otter Creek there are approximately 350 additional accounts within one mile of SR24, primarily within the Rosewood and Sumner areas. This number increases to approximately 460 additional accounts within 1.5 miles of the same segment of SR24. This equates to additional wastewater flows of 0.04 to 0.06 MGD. Additionally, north of Bronson there are approximately 350 additional OSTDSs associated with parcels outside of the Bronson PSA. This would equate to additional wastewater flows of approximately 0.04 MGD.

Total wastewater flows, including existing flows and conversion of all the described septic systems to sewer, results in estimated flows of approximately 0.31 MGD.

3.4.2 Wastewater from New Development

A second source of new wastewater flows is new construction of residential, commercial, institutional, or commercial properties. It would be expected that if water and wastewater services were expanded from/to regional or municipal sources, that development would also expand due to avoided complications associated with construction and operation of small water and wastewater systems with challenging hydrologic (shallow water tables) and water quality issues (elevated color, total organic carbon, and iron). Projecting future development based on the availability of water and wastewater services is beyond the scope of this project but should receive consideration during design phases for any potential regional project.

Section 4 References

- Suwannee River Water Management District. 2021. "SRWMD Regional Water Supply Projections 2020-2045."
<https://www.northfloridawater.com/watersupplyplan/documents/Projections-20211029.xlsx>.
- Tchobanoglous, George, Franklin L. Burton, H. David Stensel, and Metcalf & Eddy, eds. 2003. *Wastewater Engineering: Treatment and Reuse*. 4th ed. McGraw-Hill Series in Civil and Environmental Engineering. Boston: McGraw-Hill.
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