WASTEWATER TREATMENT PLANT INSPECTION PROGRAM

2018– 2019 DATA REPORT

Prepared By:
Alachua County Environmental Protection Department

January 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

Alachua County Environmental Protection Department provided funding for wastewater inspections and report preparation. Additional data for facility self-compliance monitoring were provided by the Florida Department of Environmental Protection. Gregory Owen, Efrain Tavarez, and Arielle Hernandez prepared the report.

LIST OF ABBREVIATIONS

ACEPD – Alachua County Environmental Protection Department

BMAP = Basin Management Action Plan

BNR – Biological Nutrient Removal

CBOD – Carbonaceous Biochemical Oxygen Demand

DHR – Deerhaven Renewable Generating Station

DMR – Discharge Monitoring Report

DO – Dissolved Oxygen

FDEP – Florida Department of Environmental Protection

FDH – Florida Department of Health

GREC – Gainesville Renewable Energy Center

GRU – Gainesville Regional Utilities

MGD – Million Gallons per Day

MHP – Mobile Home Park

MW – Groundwater Monitoring Well

NOx – Nitrate plus Nitrite

OFW – Outstanding Florida Water

RAS – Return Activated Sludge

RPZ – Reduced Pressure Zone device

SSO – Sanitary Sewer Overflow

TKN – Total Kjeldahl Nitrogen

TMDL – Total Maximum Daily Load

TN – Total Nitrogen

TP – Total Phosphorus

TRC – Total Residual Chlorine

TSS- Total Suspended Solids

UF – University of Florida

WAS – Waste Activated Sludge

WWTF – Wastewater Treatment Facility

1.0 REPORT SCOPE

This data report focuses on the results from Alachua County Environmental Protection Department's (ACEPD) inspections of wastewater treatment facilities (WWTFs) within Alachua County. This report concentrates on the data collected in 2018 and 2019 but includes data extending as far back as 2008 for the purpose of demonstrating data trends. Facility-reported nutrient parameters vary by permit and the data were obtained from the Florida Department of Environmental Protection Department (FDEP). Effluent data collected during inspections conducted by ACEPD were also utilized. Nutrient loading rates were estimated by multiplying self-reported flow data and average effluent nutrient concentrations for each facility. Groundwater monitoring data were provided by FDEP for those treatment facilities that are required to submit this information, generally the larger municipal facilities. FDEP also provided data on biosolids/sludge disposal.

2.0 BACKGROUND AND INTRODUCTION

There were seventeen wastewater treatment facilities (WWTFs) located in Alachua County, permitted by the Florida Department of Environmental Protection Department (FDEP) during 2018 and 2019 (Table 1, Table 2 and Figure 1). The operators or owners of the WWTFs are required by their FDEP permit to self-monitor the quality of the effluent and to report the results to FDEP monthly. ACEPD has a wastewater program partially funded by annual fees paid to the County by the owners of the WWTFs. Facility requirements and the County's inspection program are outlined in the Alachua County Unified Land Development Code Chapter 406 Article 12, Wastewater Treatment Facilities. ACEPD does not inspect the University of Florida (UF) WWTF because they are considered a state entity. ACEPD does not permit wastewater facilities but does conduct inspections and collect effluent samples at most facilities on a quarterly basis. After each inspection ACEPD staff writes a letter communicating inspection results, noted concerns, and any compliance issues. The inspection form, the effluent data, and the summary letter are sent to the plant owner, plant operator, and FDEP's Northeast District Office Domestic Wastewater staff.

The wastewater facilities are inspected by ACEPD to ensure that they are operating properly, with an emphasis on nutrient removal. The FDEP permit does not require all facilities to sample the various nutrient species in their monthly sampling. ACEPD effluent grab samples are usually analyzed for nitrate + nitrite, Total Kjeldahl Nitrogen (TKN), ammonia, total nitrogen (TN), and total phosphorus (TP). This report will focus on nitrate (as it is the most mobile and environmentally sensitive form of nitrogen), total nitrogen, and total phosphorus. Nitrate + nitrite data is used as a surrogate for nitrate in situations where data is not available. The nitrite portion in wastewater effluent is normally low, with nitrate and ammonia typically composing the dominant forms of nitrogen.

Treated wastewater effluent is disposed of in various permitted ways including public access re-use, treatment wetlands, spray fields, injection wells, surface water discharges, absorption fields, and percolation ponds (also called rapid infiltration basins). The permitted effluent disposal methods for each facility are listed in Tables 1 and 2 and are included in the following summary sections. FDEP considers all effluent disposal methods that recharge groundwater (including spray fields) as re-use. However, for this report re-use refers to effluent that is treated to public access re-use standards and used in place of potable water, such as landscape irrigation. Regardless of

disposal method, treated wastewater eventually becomes groundwater or surface water and can contribute to environmental degradation if it has high concentrations of nitrogen and/or phosphorus. Excessive nutrients can cause algal blooms, prolific plant growth, and fish kills in springs and surface waters. However, this water also serves the important function of recharging the aquifer. Facilities recharging effluent directly to groundwater are required to submit groundwater reports to FDEP, and this data is included in the following sections.

Nutrient data used for this report include ACEPD's effluent sampling results and the facility's Discharge Monitoring Reports (DMR) obtained from FDEP. Effluent samples are collected by ACEPD as grab samples and are analyzed by a Florida Department of Health (FDH) certified laboratory. Some of the FDEP nutrient permit limitations for the larger treatment facilities are based on flow proportioned composite samples to compensate for variability of flow throughout the day. Since samples collected during ACEPD inspections are grab samples, the data collected by ACEPD for these parameters cannot be used to verify that the effluent at the larger facilities meets their permit requirements. However, the data does indicate the nutrient concentrations being released to the environment at the time of inspection.

The concentration of nutrients alone can be deceiving because the flow rates vary significantly between the facilities. The maximum permitted capacities of the facilities range from 4,200 gallons per day to 14.9 million gallons per day (MGD). To gain perspective on possible environmental impacts from treated effluent, nutrient loading rates from WWTFs were estimated. The monthly average flow rate reported by each facility in their DMRs was used to calculate an average flow value for 2018 and 2019. The average effluent nutrient concentrations incorporated data collected by the facilities and ACEPD inspectors. The estimated nutrient loading rates are summarized in Table 3 and discussed for each facility in the following sections.

Wastewater sludge is a semi-solid byproduct material that is created as a residual during the wastewater treatment process. Wastewater sludge can be further processed and treated to create biosolids. Biosolids that have been treated to the applicable standards can be land applied to dispose of the material while adding nutrients to the soil. The small package plants in Alachua County do not have the technology to process sewage sludge into biosolids, so they pay to have the sludge hauled to larger facilities for treatment and disposal. These smaller facilities generate less sludge, since they treat lower volumes of waste. The following sections will include the mass of wastewater sludge, or biosolids, generated from the municipal facilities (Table 4).

Table 1. Permitted Municipal Wastewater Treatment Facilities in Alachua County (2018 – 2019)

Owner Name	Facility ID	Permit Expiration	Max Permitted Capacity (gallons/day)	Effluent Disposal Method	Nutrient Effluent Limitations* (mg/L)
City of Gainesville GRU - Kanapaha	FL0112895	6/2/2026	14,900,000	Underground Injection and Public Re-use (also have a permitted surface water discharge for emergencies)	Total Nitrogen 29,619 lbs./yr, Total Phosphorus 1,461.2 lbs./yr Nitrite + Nitrate < 10 mg/L, Unionized ammonia <0.02 mg/L, Total Organic Nitrogen, Ammonia, TKN, Total Phosphorus, and Orthophosphate must be reported.
City of Gainesville GRU - Main Street	FL0027251	4/15/2025	7,500,000	Surface Water Discharge to Sweetwater Branch and Public Re-use	Total Nitrogen 40,380 lbs./year and 1.87 mg/L Annual Geometric Mean, Total Phosphorus 37,671 lb./yr and 0.3 mg/L Annual Geometric Mean, Total Organic Nitrogen < 3.5 mg/L, Ammonia < 4.87 or 3.64 mg/L (depending on season), Unionized Ammonia <0.02, Total Nitrogen, TKN, Total Phosphorus, Orthophosphate must be reported.
University of Florida	FLA011322	6/8/2026	3,000,000	Underground Injection and Public Re-use	Nitrate + Nitrite <10 mg/L, Total Nitrogen, TKN, and Total Phosphorus must be reported
City of Alachua	FLA011290	7/19/2026	1,500,000	Spray, Irrigation and Public Re-use	Nitrate + Nitrite, Total Nitrogen, TKN, and Total Phosphorus must be reported
City of Newberry	FLA011292	8/3/2026	560,000	Spray Irrigation	Total Nitrogen Annual Average < 3.0 mg/L Total Nitrogen and Total Phosphorus must be reported
City of High Springs	FLA286095	1/22/2023	240,000	Spray Irrigation	Total Nitrogen, TKN, Nitrate and Total Phosphorus must be reported
City of Hawthorne	FLA011291	11/17/2025	200,000	Rapid Infiltration Basin	Total Nitrogen, Nitrate + Nitrite, TKN, Total Organic N and Total Phosphorus must be reported

*** Facilities with groundwater effluent disposal do not have phosphorus permit limitations.**

Table 2. Permitted Package Wastewater Treatment Facilities in Alachua County (2018 – 2019)

Owner Name	Facility ID	Permit Expiration	Max Permitted Capacity (gallons/day)	Effluent Disposal Method	Nutrient Effluent Limitations* (mg/L)
Arredondo Farms MHP (The Palms)	FLA011315	9/15/2024	65,000	Rapid Infiltration Basin	Nitrate < 12 mg/L Total Nitrogen and Total Phosphorus must be reported
Brittany Estates MHP	FL0040215	9/8/2021 Draft Permit Executed with Intent to Issue 8/30/2021	60,000	Surface Water Discharge to Little Hatchet Creek	Total Nitrogen 3,104 lb./yr., Total Phosphorus 386 lb./yr., Nitrate < 12 mg/L, Ammonia <4.8, Total Organic Nitrogen <6.4, and Total Nitrogen and Phosphorus must be reported
Camp Kulaqua	FLA011302	decommissioned: 6/29/2021	20,100	Rapid Infiltration Basin	Nitrate + Nitrite < 12 mg/L, Total Nitrogen and Total Phosphorus must be reported
Micanopy Inn (formerly Knight's Inn and now Welcome Inn)	FLA011317	4/25/ 2022 FDEP Request for Additional Information 5/26/2022	15,000	Spray Irrigation	Nitrate + Nitrite must be reported
Florida Welcome Station	FLA011313	3/ 9/2025	9,000	Rapid Infiltration Basin	Nitrate < 12 mg/L Total Nitrogen Annual Average < 6.0 mg/L, monthly average must be reported
Archer Homes	FLA011298	10/13/ 2025	8,300	Absorption Field	Nitrate < 12 mg/L and Total Nitrogen Annual Average < 6.0 mg/L, monthly average must be reported
Gainesville Raceway	FLA011312	5/9/2022	8,250	Spray Irrigation	Nitrate must be reported
Cuscowilla (formally Camp McConnell YMCA)	FLA011293	10/14/2025	7,500	Absorption Field	Nitrate < 12 mg/L
Archer Community School	FLA011281	8/18/2024	5,000	Rapid Infiltration Basin	Nitrate + Nitrite must be reported
Prairie View Apartments	FLA011307	9/9/2020 Permit Applications sent 5/27/2022	4,200	Rapid Infiltration Basin	Nitrate <12 mg/L

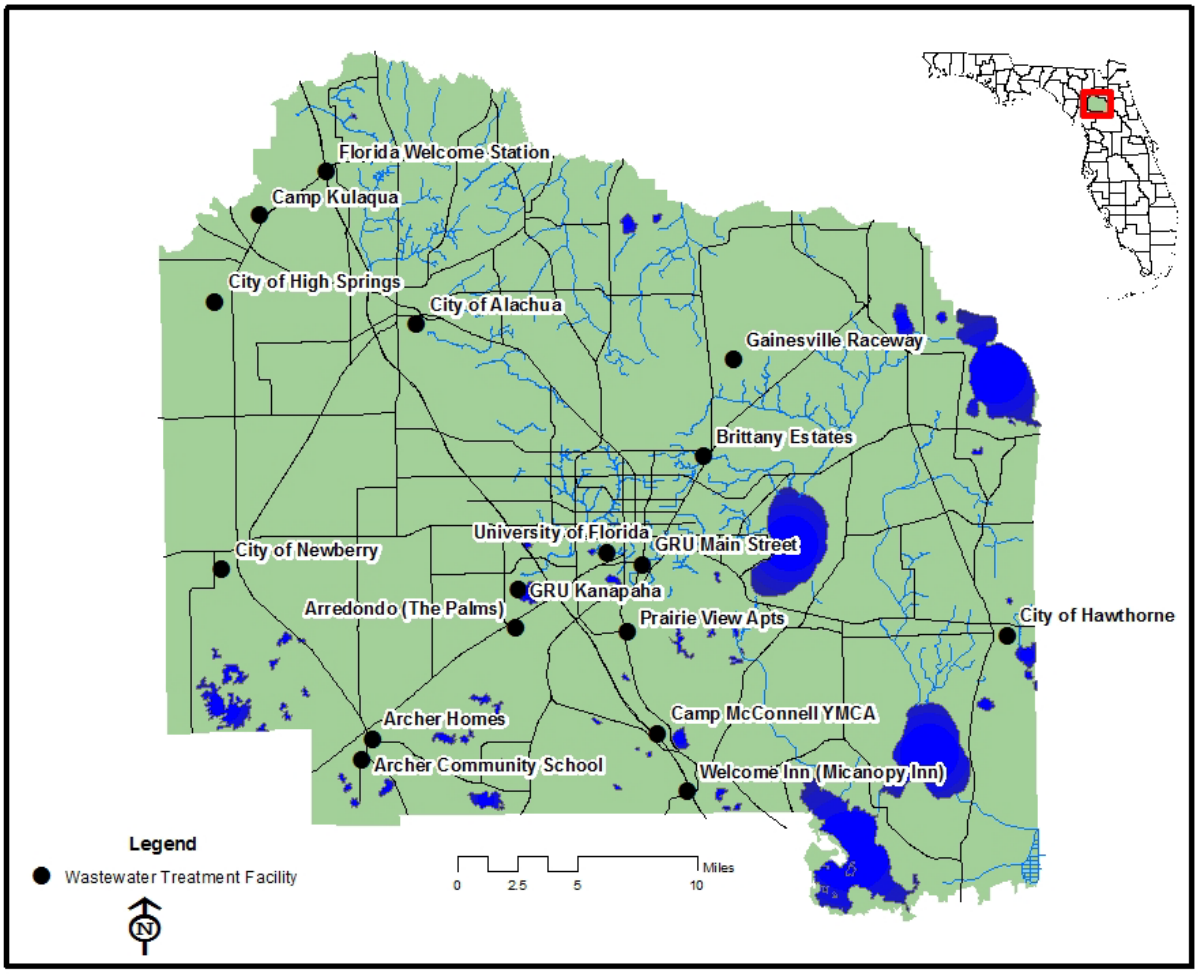


Figure 1. Location of Permitted Wastewater Treatment Facilities in Alachua County (2018-2019)

Table 3. Estimated Average Nutrient Loading from Wastewater Treatment Facilities (2018 – 2019)

Facility Name	Total Nitrogen (lb./year)	Total Phosphorus (lb./year)
GRU - Main Street	102,969	8,015
GRU - Kanapaha	144,741	38,358
City of Newberry	16,094	2,678
City of Alachua	9,650	7,222
City of High Springs	2,477	1,114
Palms of Arredondo	534	5,383
City of Hawthorne	5,711	1,521
Brittany Estates MHP	689	131
Archer Community School*	244	27
Florida Welcome Station	285	30
Archer Homes	336	44
Micanopy Inn (formerly Knight's Inn now Welcome Inn)	171	20
Camp Kulaqua	48	15
Cuscowilla (formerly Camp McConnell YMCA)**	1	0
Prairie View Apartments	391	24

*Flow rates from previous years used as an estimate

**Camp McConnell was not receiving effluent during this period

3.0 MUNICIPAL FACILITIES

There are six municipal WWTFs in Alachua County and one large, centralized facility at UF. Municipal and centralized facilities treat a larger volume of wastewater compared to package plants and include a treatment facility built on-site. The plant operators are required to spend more time at the municipal facilities (due to their larger treatment volume), and the facilities tend to utilize more advanced technologies which tend to reduce nutrient concentrations. The municipal facilities treat and discharge large volumes of effluent, which increases their potential to degrade water quality. The maximum permitted capacity for municipal facilities in Alachua County ranges from 0.2 million gallons per day (MGD) for the City of Hawthorne to 14.9 MGD for the Gainesville Regional Utilities (GRU) - Kanapaha WWTF.

The average total nitrogen and total phosphorus concentrations include reported nutrient data from each facility's Discharge Monitoring Report (DMR) and effluent sampling data from the ACEPD inspections (Figure 2). Effluent quality varied among the sampling events and among the various facilities. Some facilities were sampled more frequently than others and some have different reporting requirements for their DMRs. Each municipal facility is discussed in the following sections.

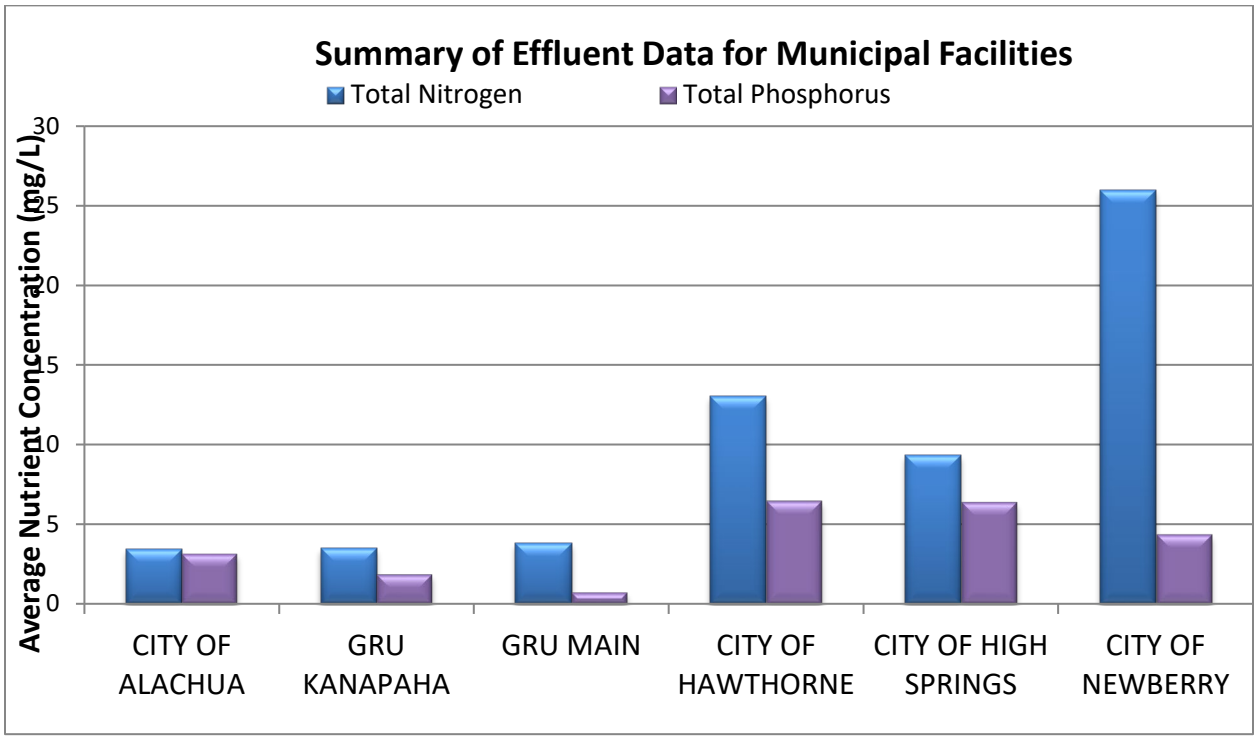


Figure 2. Average Effluent Nutrient Data for Municipal Facilities (2018 – 2019)

The environmental nutrient loading rates were estimated for each facility (Figure 3). The nutrient loading rates were estimated based on average flow rates and average nutrient concentrations for 2018 and 2019. Nutrient loading is largely driven by flow rates and the largest loading values are produced by the Gainesville Regional Utilities (GRU) Main Street and Kanapaha WWTFs (greater than 100,000 lb.) of Total Nitrogen per year at each facility since they have the largest flows (average of 6.55 MGD and 7.95 MGD, respectively).

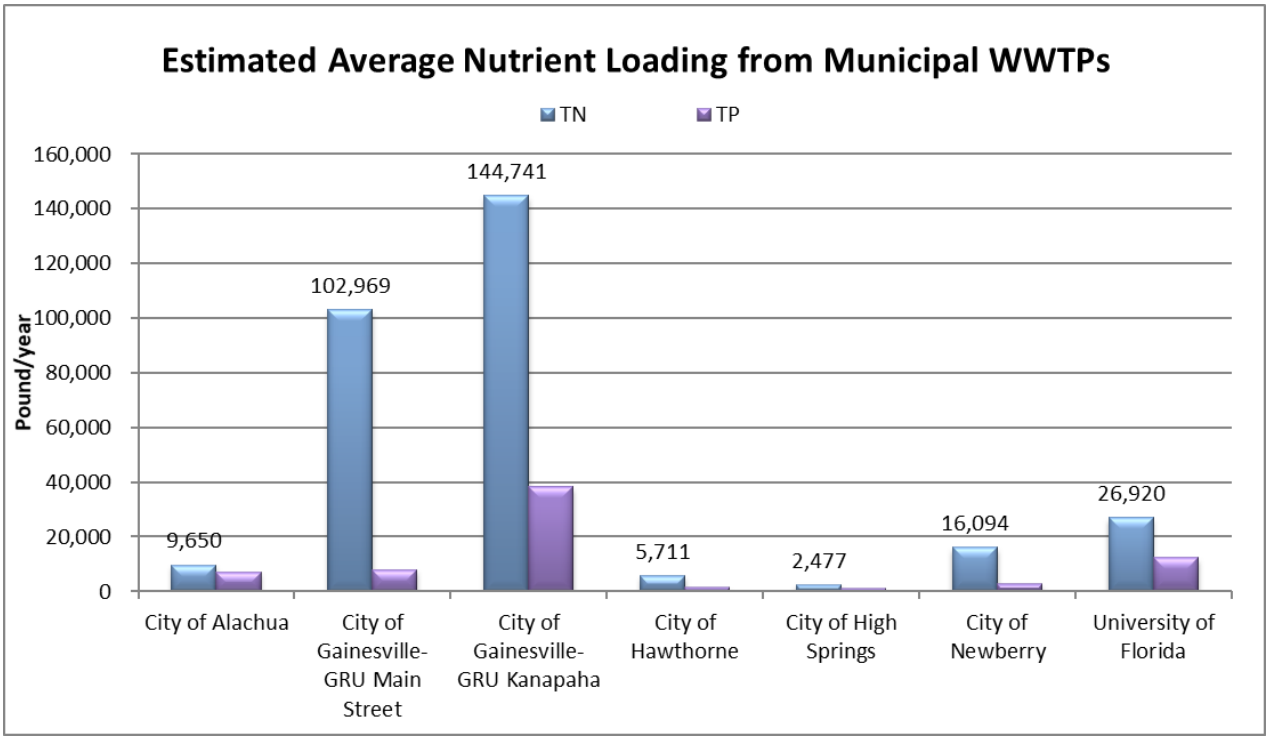


Figure 3. Estimated Nutrient Loading from Municipal Facilities (2018– 2019)

The quantity of biosolids, or treated wastewater sludge, produced at the five largest municipal facilities during 2018 and 2019 was obtained from the DMRs and is summarized in Table 4. The disposal methods for each facility are discussed in the following sections. Biosolids from GRU are processed at the Kanapaha Dewatering Facility before being sent to Green Edge where the biosolids are used as fertilizer products. Many of the municipal WWTFs and package treatment plants transport their wastewater sludge to GRU for treatment.

Table 4. Self-Reported Biosolids/Sludge Disposal Data for Municipal Wastewater Treatment Facilities (2018 – 2019)

Facility Name*	2018 Annual Quantity (Dry-ton)	2019 Annual Quantity (Dry-ton)	Disposal Method	Final Disposal Location
GRU - Main Street	1,123	1,114	Transferred/Land Application	Green Edge Technology

GRU - Kanapaha	5,446	8,761	Land Application	Green Edge Technology
City of Newberry	50	33	Land Application	City of Newberry Treatment Facility Spray Field Site
City of Alachua	208	191	Land Application	Farms in Columbia and Suwannee Counties
University of Florida	269	236	Land Application	To GRU – Green Edge Technology
City of High Springs	25	30	Land Application	To GRU – Green Edge Technology
City of Hawthorne	1	1	Land Application	To GRU – Green Edge Technology

3-1 The City of Alachua

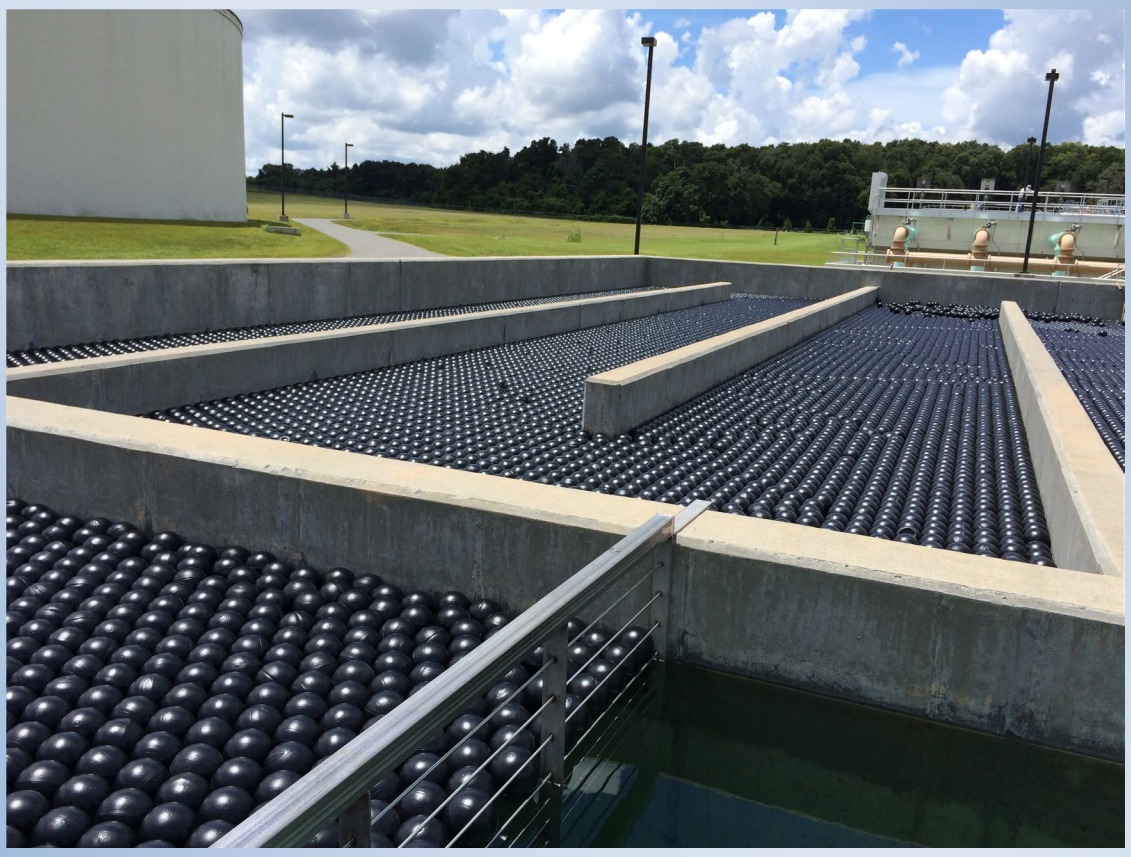
Facility size: 1.50 MGD **Permit expiration date**: 7/19/2026

Permitted effluent disposal:

105 acre spray field, 244 acre area for re-use irrigation, and 197 acre golf course (public access re-use); course is currently inactive. Effluent is additionally permitted for reuse at the Deerhaven Renewable Generating Station (DHR) as cooling water when in operation.

Residuals disposal:

Hauled to Class I landfill or treated and land applied in Columbia and Suwannee Counties.



The chlorine contact chamber at the City of Alachua facility; plastic balls are used to reduce evaporation and cut down on disinfection costs.

The City of Alachua's domestic wastewater treatment facility was upgraded in March 2011. The plant consists of two 0.75-MGD oxidation ditches for biological nutrient removal (BNR) using a Modified-Ludzack-Ettinger process configuration, two secondary clarifier basins, return/waste activated sludge (RAS/WAS) pumping stations, sand filter, and two chlorine contact chambers. Effluent sampling results indicate the upgraded plant is providing consistent nutrient removal (Figure 4). The current plant has two oxidation ditches which create zones of aerobic and anaerobic activity allowing microbes to breakdown nitrogen species into nitrogen gas which is released into the atmosphere. This facility was found to be in compliance during the seven ACEPD inspections conducted in 2018 and 2019.

The facility had a sanitary sewer overflow (SSO) for 209,000 gallons of untreated wastewater that was reported to ACEPD on June 14, 2018. The cause of the release was due to a sewer line from a newly developed area that was never connected to the city sewer system. The area of construction included a Holiday Inn Express, which was under construction during March of 2018. Most of the wastewater release is suspected to be within a month or two of the SSO notification.

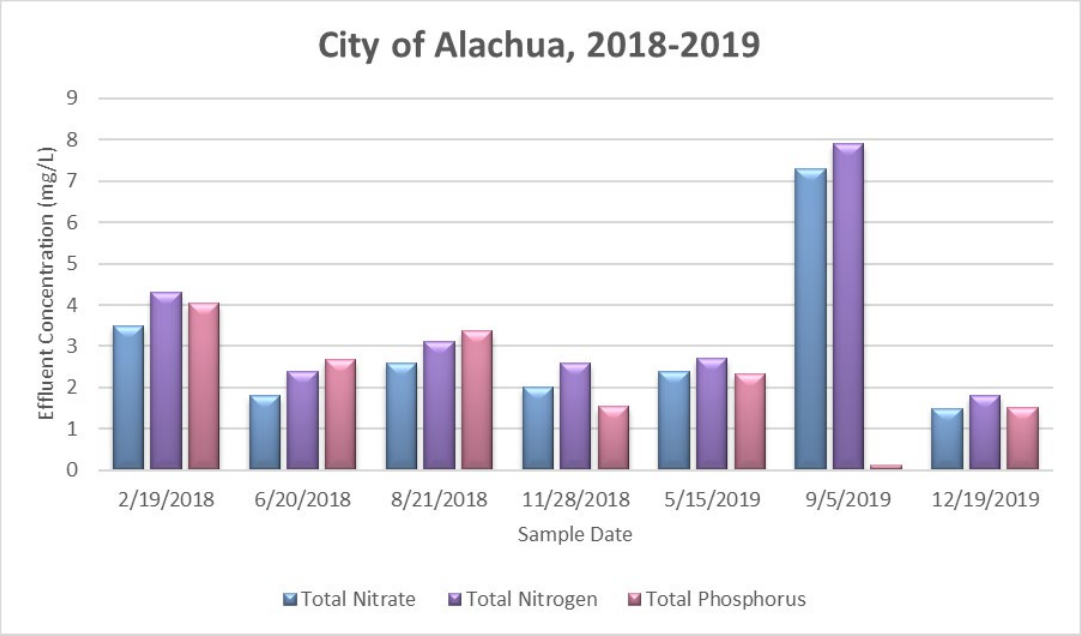


Figure 4. Effluent data from samples collected during ACEPD inspections at the City of Alachua WWTF.

The monthly average flows in 2018 and 2019 (monitoring location EFB-1, monitoring group R-001) were used to calculate an average flow of 0.707 MGD. Nutrient concentrations collected by ACEPD and reported by facility operators in the discharge monitoring reports (DMR) were then averaged and used to estimate the nutrient loading rate from this facility. Nitrate data, reported as nitrate plus nitrite by the facility, and total nitrate data collected by ACEPD were used to estimate a NOx loading of 8,552 lb./year. The City of Alachua is required to monitor for total nitrogen and total phosphorus; ACEPD inspection data were used in combination with monitoring data provided by the City of Alachua to estimate loadings of 9,650 lb./year and 7,222 lb./year, respectively. Total nitrogen concentrations increased for the 2018 -2019 period (Figure 5). Table 3 compares these values to those of the other wastewater treatment facilities located in Alachua County.

Large nitrate loads, regardless of the source, are a concern in such proximity to the Santa Fe River and springs system. A dye trace study conducted by Karst Environmental Services for ACEPD found a connection from nearby Lee Sink and the Mill Creek Sink to Hornsby Springs, a first magnitude spring on the Santa Fe River (Butt et al., 2006). When the City of Alachua upgraded their plant, it was designed to maximize de-nitrification with a new oxidation ditch treatment facility. If effluent concentrations remain constant, the new facility may be able to double its treatment volume and have the same total nitrogen loading rate as the previous WWTF. Loading rates for total phosphorus indicate that the new plant and its larger volumes are discharging more phosphorus than the previous facility. Typically, wastewater treatment does not focus on phosphorus removal; however, it may be important for the City of Alachua to keep watch on their total phosphorus loading. Even small amounts of phosphorus in a waterbody can be harmful.

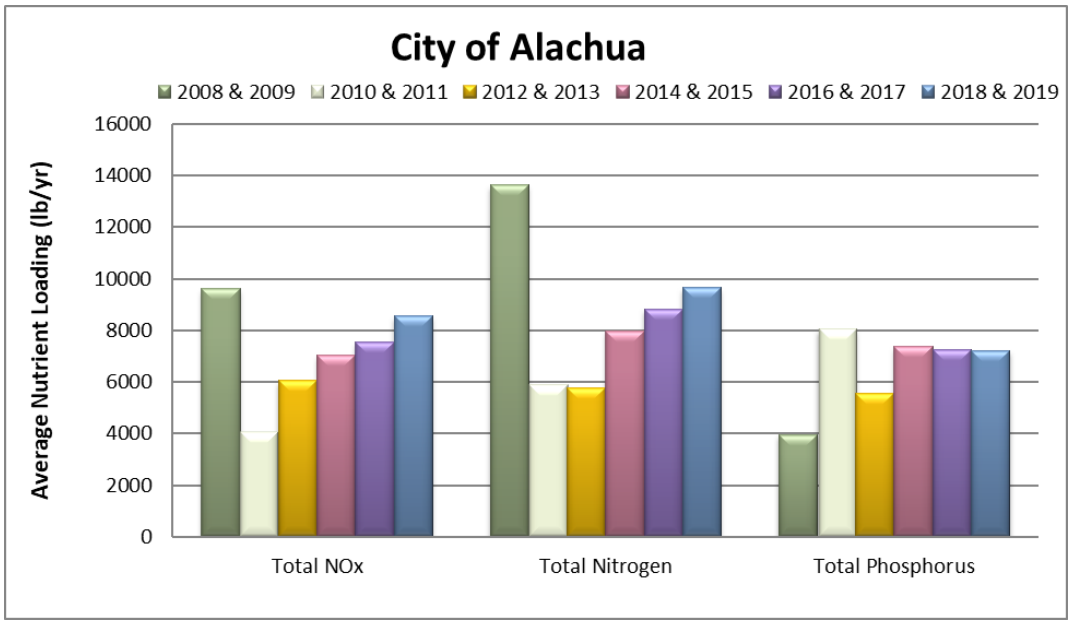


Figure 5. Estimated Nutrient Loading Values for the City of Alachua WWTF (2008 – 2019)

The City of Alachua is required by FDEP to sample their groundwater monitoring wells on a quarterly basis. The background wells are labeled with a "B", compliance wells are labeled with a "C", and intermediate wells are labeled with an "I". High nitrate values were consistently measured at Well MWB-1 (Figure 6) and the City of Alachua argued in 2006 that this well is up-gradient of their effluent disposal. The high nitrate values detected at this well are thought to be influenced by the groundwater contamination at the adjacent site, the former Copeland Sausage Plant (JEA, 1998 and Universal Engineering Sciences, 2010). The concentration of nitrates in the groundwater of this area often exceeds the drinking water standard of 10 mg/L. Results from MWC-6 show nitrate concentrations above the drinking water standard between the years of 2018 to 2019. Results from MWC-6 may be influenced by the former Copeland Sausage Plant as it is located adjacent to the former meat processing plant. With the expansion of the facility, new compliance wells were installed in 2011 (MWC-7 and MWC-8) which were below the drinking water standard for the years between 2018 and 2019. MWC-4 had an exceedance for total dissolved solids on 6/30/2018 with a result of 610 mg/L, above the permitted value of 500 mg/L.

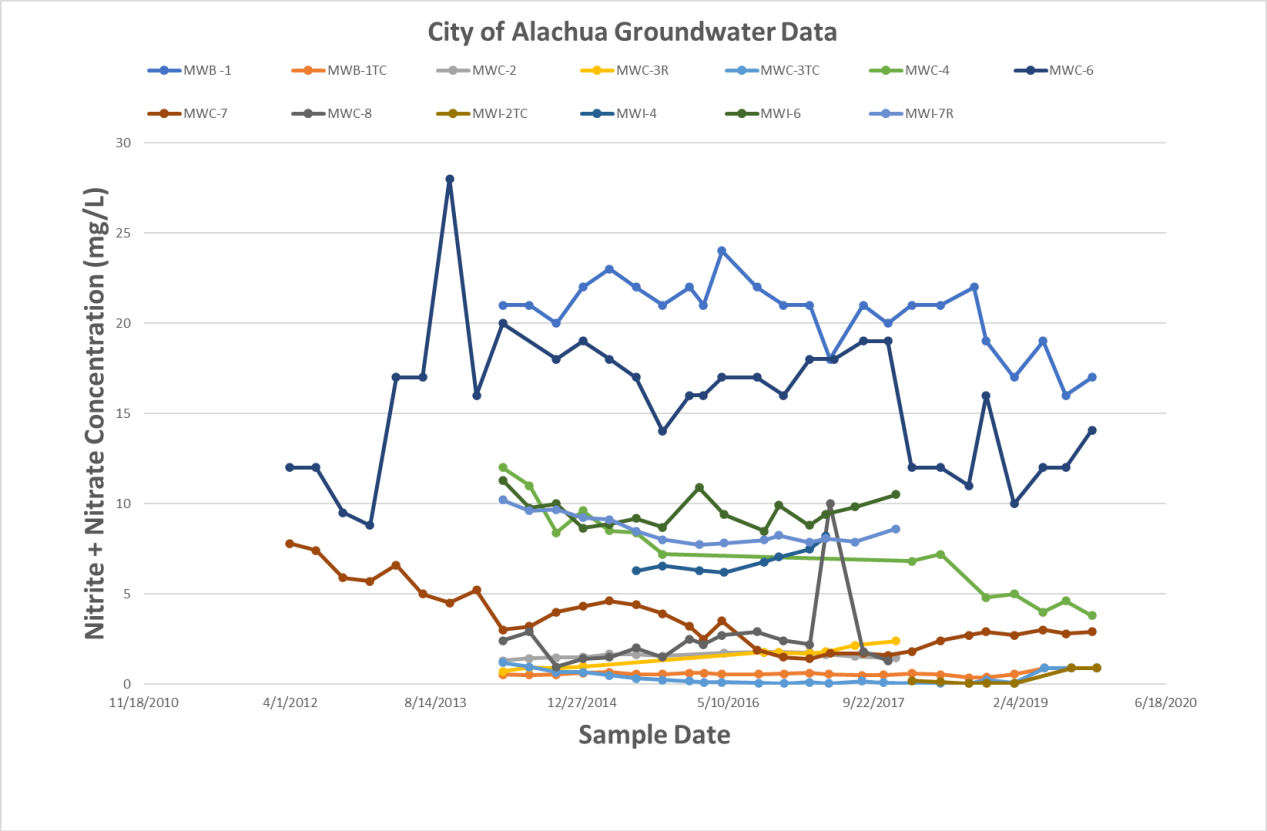


Figure 6. Groundwater Data from the City of Alachua WWTF for Nitrite + Nitrate

The domestic wastewater biosolids for this facility are classified as Class B and are hauled to Glenn Farms (FLA485578) for disposal. The treatment facility is permitted to land apply biosolids that have achieved class B pathogen reduction. According to data provided by FDEP, the facility produced 207 dry tons of biosolids in 2018 and 191 dry tons in 2019 (Table 4).

3-2 The City of Gainesville, GRU – Kanapaha Facility

Facility Size: 14.9 MGD **Permit expiration date**: 3/18/2026

Permitted effluent disposal:

Underground injection well and 6.89 MGD public access re-use.

Residuals disposal:

As of 2016 biosolids are now treated further and hauled by GreenEdge Technology.

The clarifiers at the GRU Kanapaha facility

The Gainesville Regional Utilities Kanapaha WWTF includes a 10 MGD Modified Ludzak-Ettinger extended aeration activated sludge system and a 4.9 MGD oxidation ditch system with pre-denitrification biological nutrient removal. The GRU facilities (Main and Kanapaha) were not inspected once during the 2018 -2019 period due to concerns associated with exposure to Covid-19. The effluent sample results were within the FDEP permit limitations and the nutrient concentrations were relatively low (Figure 7).

GRU Kanapha WWTF

Date	NO_x (mg/L)	TN (mg/L)	TP (mg/L)
12/18/2017	2.2	3.5	1.87

Figure 7. Effluent data from samples collected during ACEPD inspections at the GRU - Kanapaha WWTF

The majority of the Kanapaha effluent is injected into the Floridan aquifer via deep well injection at a depth interval of 450 – 1,200 feet via four wells. Up to 11.94 MGD of Kanapaha effluent is permitted for public access re-use for applications such as landscape irrigation, fire protection, aesthetic uses, and industrial use (tanker trucks for pesticide application, dust control, and other activities). Effluent data collected by the facility and ACEPD during inspections and information from Discharge Monitoring Reports (DMR) were used to determine the average nutrient concentration and estimated nutrient loading values for this facility in 2018-2019 (Table 5). Monthly averages from the DMR at the deep-well injection location were used for yearly flow and nutrient averages to calculate the annual loading to the groundwater.

Table 5. Calculated average effluent loading rates at the GRU Kanapaha facility

GRU Kanapaha WWTF	Flow Rate (MGD)	Nitrate (lb./year)	Total Nitrogen (lb./year)	Total Phosphorus (lb./year)
Average Inflow	7.95	90,236	144,741	38,358
Deep Well Injection	8.54	96,882	143,168	41,249
Public Re-Use	2.14	24,277	35,876	10,336

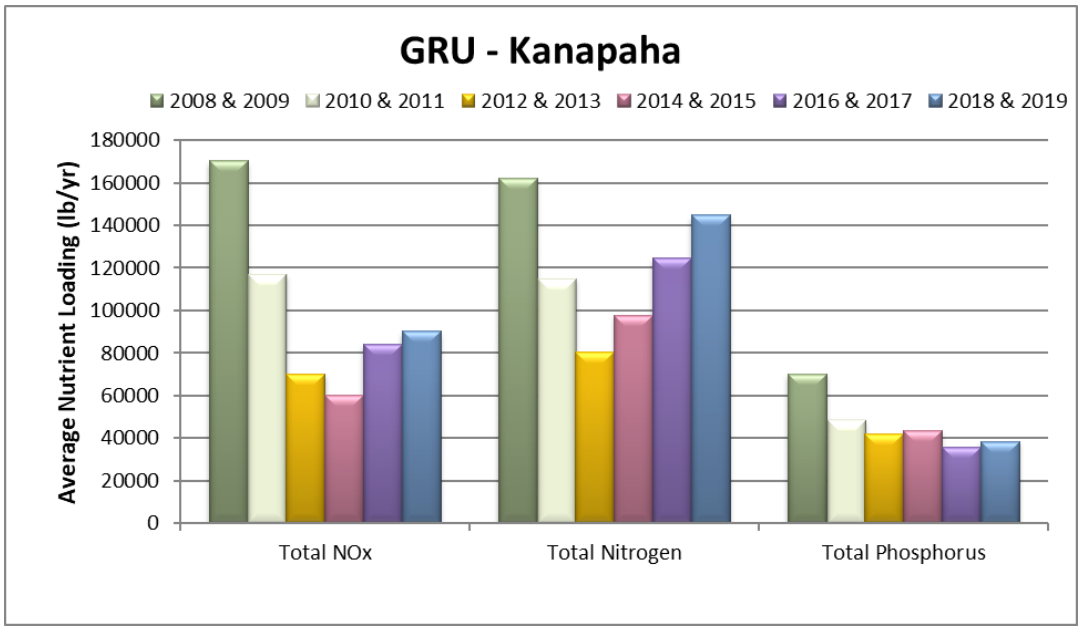


Figure 8. Estimated Nutrient Loading Values for the GRU – Kanapaha WWTF (2008 – 2019)

GRU is required to sample their groundwater monitoring wells at the Kanapaha facility and submit the results to FDEP. The background wells are labeled with a "B" and the compliance wells are labeled with a "C." Two specific conductive zones are monitored by the wells, a shallow zone above 250 feet below the land surface (labeled with a "S") and a deeper zone 450 feet below land surface (labeled with a "D"). The MWC-2 wells are located less than one-tenth of a mile west of the facility. The nitrate concentrations at monitoring MWC-2D well are not steady but do appear to be increasing (Figure 9).

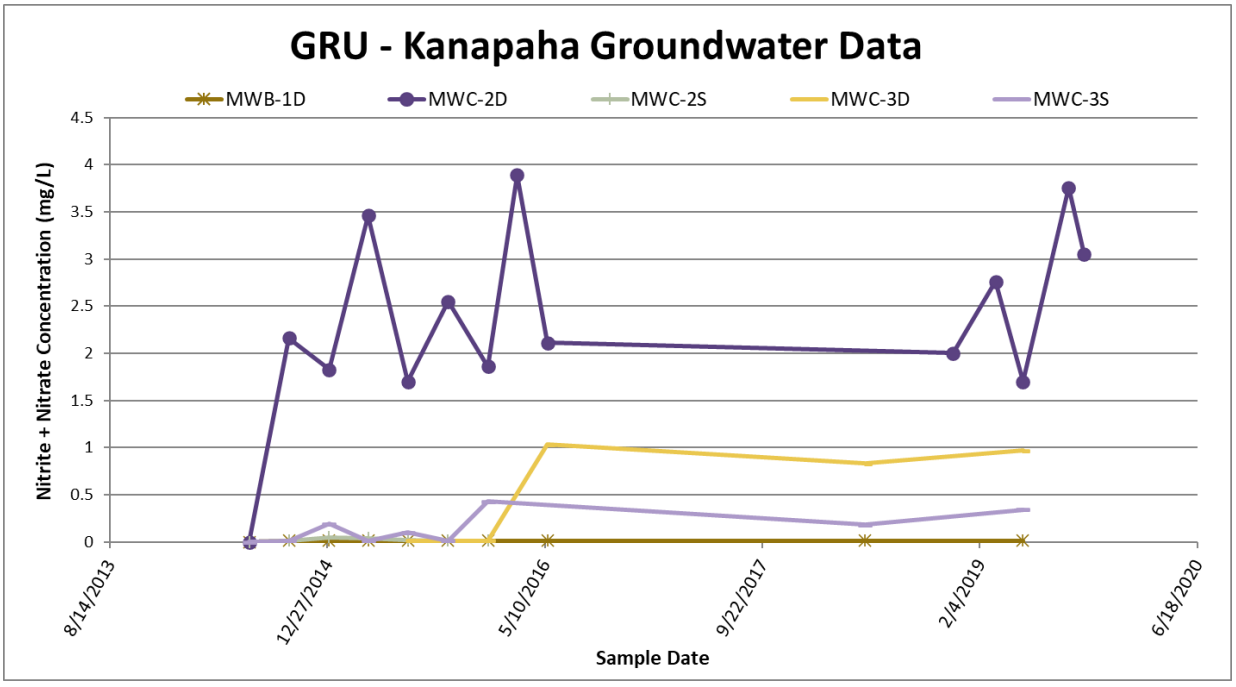


Figure 9. Groundwater Data from the GRU – Kanapaha WWTF for Nitrite + Nitrate

The wastewater residuals (sludge) are treated to Class B standards and then sent to Green Edge and turned into fertilizer. According to calculations using compiled DMR reports GRU has generated 3,665 tons in 2018 and 3,959 tons in 2019. These numbers are slightly different from the annual biosolids report to the EPA which reported 3,379 tons in 2018 and 3,348 tons in 2019.

3-2 The City of Gainesville, GRU – Main Street Facility

Facility Size: 7.5 MGD **Permit expiration date**: 4/15/2025

Permitted effluent disposal:

7.5 MGD discharge to Sweetwater Branch and 3.309 MGD public re-use.

Residuals disposal:

Land applied at Whistling Pines Ranch. As of 2016, biosolids are now treated further and hauled to Green Edge in Jacksonville

The aeration basin at the GRU Main St. Facility

The Gainesville Regional Utilities Main Street facility is an advanced secondary activated sludge plant and is typically inspected annually by ACEPD. The plant was not inspected by ACEPD between 2018 and 2019 in part due to Covid 19. The plant was found in compliance during a 2017 inspection and the effluent was within the FDEP permit limitations (Figure 10). The effluent from the Main Street facility is discharged to Sweetwater Branch that was historically channelized through Paynes Prairie State Preserve before discharging directly to the Floridan aquifer via Alachua Sink. There are no groundwater monitoring wells associated with the Main Street facility since this plant discharges to surface waters.

Alachua Sink has a Total Maximum Daily Load (TMDL) requiring a 45% reduction in nitrogen inputs (FDEP 2014). Construction started on the Paynes Prairie Sheet flow Restoration Project in 2012 to reduce nutrient loading to Alachua Sink by restoring sheet flow and eliminating the direct discharge of water from Sweetwater Branch to Alachua Sink. This project, completed in 2015, includes constructed treatment wetlands to reduce nutrients and to recharge Paynes Prairie. In 2014 the Main Street WWTF began adding aluminum sulfate to meet phosphorus loading reduction requirements for the newly constructed wetland.

GRU Main Street WWTF			
Date	NO_x (mg/L)	TN (mg/L)	TP (mg/L)
12/18/2017	2.9	3.8	0.73

Figure 10. Effluent data from samples collected during ACEPD inspections at the GRU – Main Street WWTF

Monthly average effluent flow data from 2018 and 2019 were used to calculate an average flow of 6.55 MGD. Average nutrient concentrations were then multiplied by this flow rate to estimate the nutrient loading rate from the facility (Figure 10). Monthly average data reported by the facility and ACEPD inspection data were averaged to estimate loading of 116,443 lb./year of nitrate, 102,969 lb./year of total nitrogen, and 8,015 lb./year of total phosphorus.

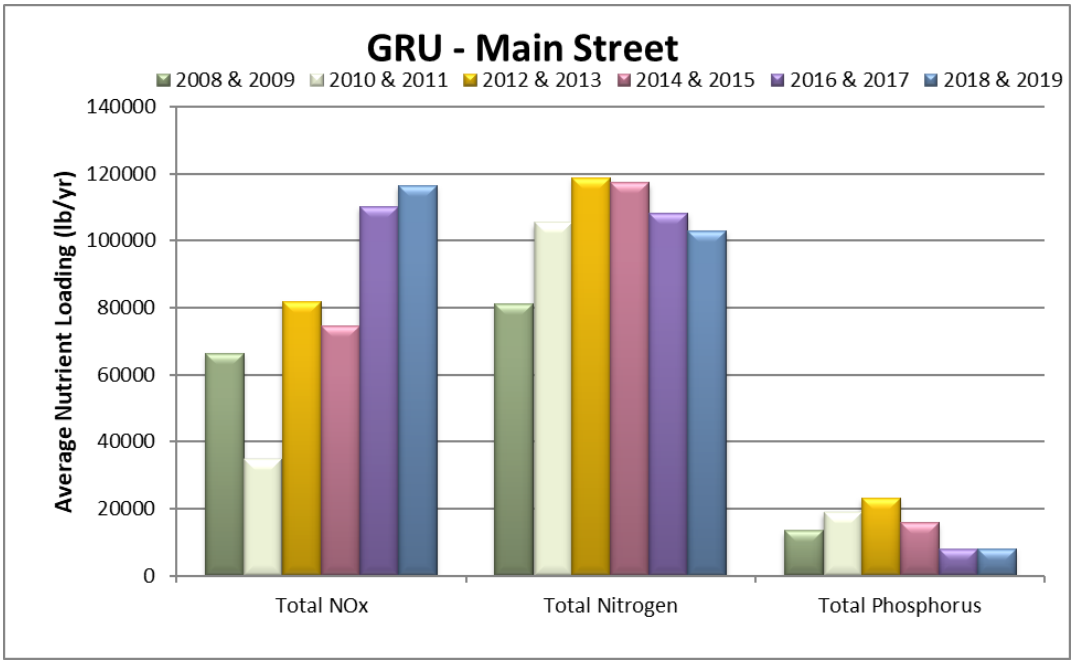


Figure 11. Estimated Nutrient Loading Values for the GRU – Main Street WWTF (2008 – 2019)

The wastewater residuals (sludge) are treated to Class B standards and then sent to Green Edge and turned into fertilizer. According to FDEP's records 1,123 dry tons of biosolids were produced in 2018 and 1,114 dry tons of biosolids were produced in 2019 at the Main Street Facility.

3-4 The City of Hawthorne

Facility size: existing 0.2 MGD **Permit expiration date**: 10/3/2020

Facility to be expanded to 0.50 MGD

Permitted effluent disposal:

1.79 acres of rapid infiltration basins to be expanded to 4.77 acres.

Residuals disposal:

Transported to GRU.

The City of Hawthorne Wastewater Treatment Facility

The City of Hawthorne municipal wastewater treatment plant is an extended aeration secondary treatment plant. ACEPD conducted seven inspections during 2018 and 2019. One inspection noted minor deficiencies including improperly stored screenings and tripping hazards. Both were fixed by the time of the next inspection. Total residual chlorine was low during an inspection in December of 2018. The violation was corrected in the following inspection. The samples collected during the May 2018 inspection resulted in the highest nitrate result recorded (29 mg/L), and the February 2018 inspection sample result for total nitrogen (36 mg/L) was the highest concentration since February of 2017 (52 mg/L). Samples of total phosphorus also peaked with a new maximum concentration of 10.5 mg/L (Figure 12). Elevated nutrient concentrations levels are a concern with the proximity of Little Orange Lake. However, the effluent was in compliance with the FDEP permit, as this permit does not have numeric limitations for nutrients. The city of Hawthorne's plant was found to be out of compliance for permit limits of fecal coliform in self-reported monitoring for three samples between 2018 and 2019. The plant was also in exceedance of the permitted total suspended solids twice in 2018.

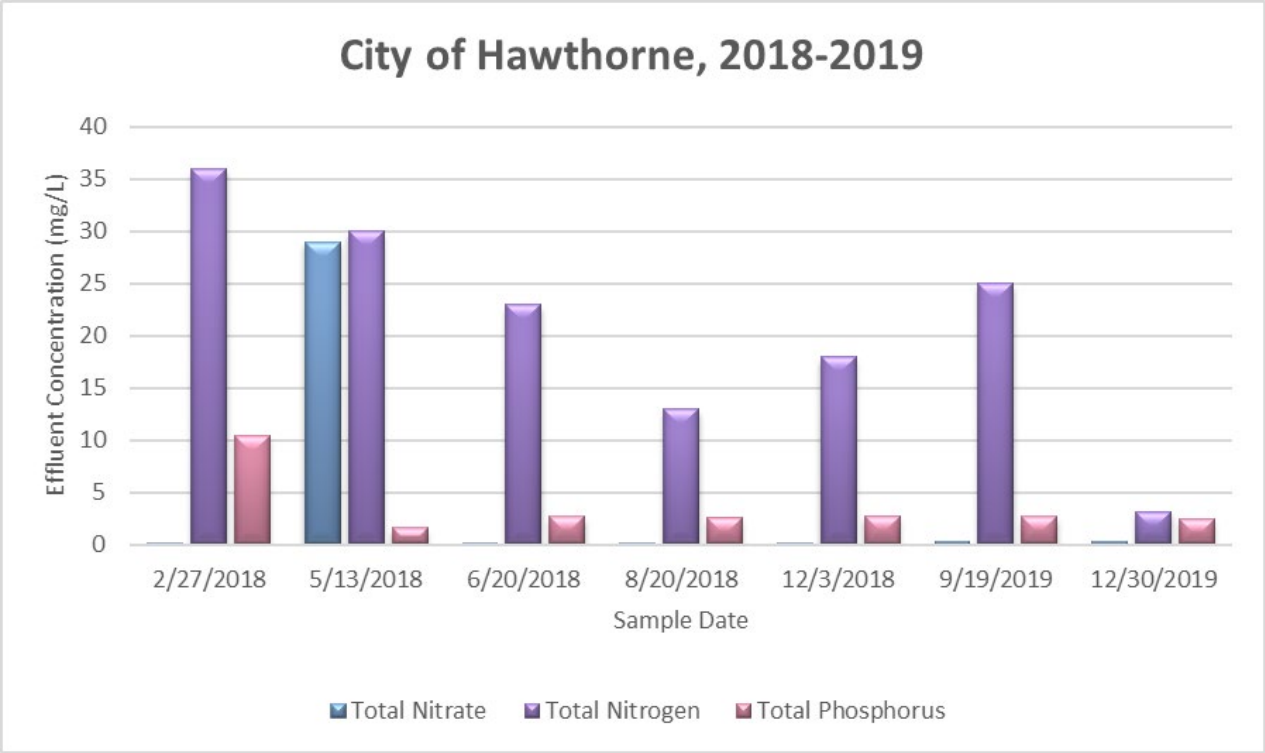


Figure 12. Effluent data from samples collected during ACEPD inspections at the City of Hawthorne WWTF

The monthly average flows of effluent from 2018 and 2019 were used to calculate an average flow of 0.10 MGD. Average nutrient concentrations were then multiplied by this flow rate to estimate a nutrient loading rate from the facility. Monthly maximum nutrient concentrations as reported by DMRs and data collected by ACEPD during 2018 and 2019 were used to calculate a loading of 580 lb./year of nitrate (Figure 13). Although the facility does not have a numeric limitation for total nitrogen and total phosphorus, they are required to report the concentrations in their effluent. The estimated loading rates for total nitrogen and total phosphorus are 5,711 lb./year and 1,521 lb./year, respectively. Total nitrogen

loading rates are much higher than previous years (Figure 13). Table 3 compares these values to those of the other wastewater treatment facilities located in Alachua County.

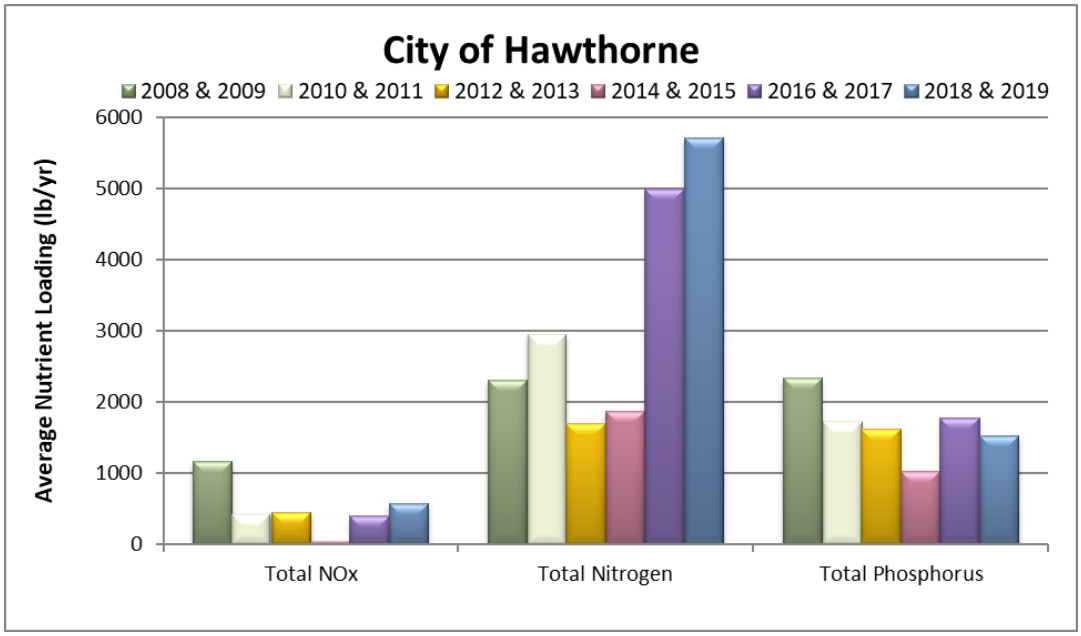


Figure 13. Estimated Nutrient Loading Values for City of Hawthorne WWTF (2008 – 2019)

The City of Hawthorne is required to sample their groundwater monitoring wells and submit the results to FDEP on a quarterly basis. The background well is labeled with a "B" and the compliance wells are labeled with a "C". (Figure 14). There were five nitrate exceedances from 2018 to 2019. Two of the exceedances were at the background well MWB-1, one exceedance in well MWC-5, and two at well MWC-6 (Figure 14).

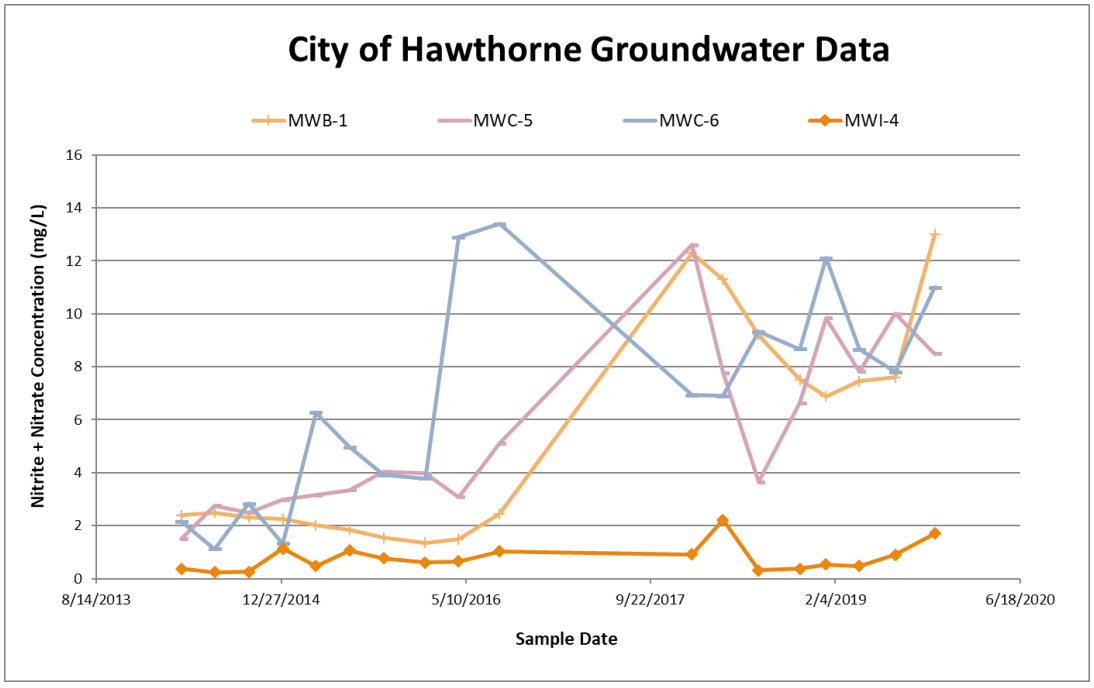


Figure 14. Groundwater Data from the City of Hawthorne WWTF for Nitrite + Nitrate

The City of Hawthorne hires GRU to pump their biosolids and to haul it for further treatment at one of GRU treatment facilities. In 2018 and 2019 0.5 tons of biosolids were reported as being hauled from Hawthorne WWTP annually.

3-5 The City of High Springs

Facility size: 0.24 MGD **Permit expiration date**: 1/23/2023

Permitted effluent disposal: 16.25 acres of spray field.

Residuals disposal: Applied to DEP permitted land application sites or transferred to Watson Composting Facility.

The City of High Springs aeration basin

The City of High Springs municipal wastewater treatment plant is a Ludzak-Ettinger activated sludge plant. The City of High Springs has approved plans and permits to expand the existing facility with a parallel setup and the addition of infiltrating wetlands. The occasional elevated nitrogen and phosphorus concentrations in the treated effluent (Figure 15) are of concern in the karst setting of the plant's spray field and with its proximity to the Santa Fe River and its springs. ACEPD conducted seven inspections between 2018 and 2019 with no plant deficiencies noted during the plant inspections. FDEP has required The City of High Springs to demonstrate an established cover crop on the existing spray field before the spray field can be expanded as planned in the most recent permit.

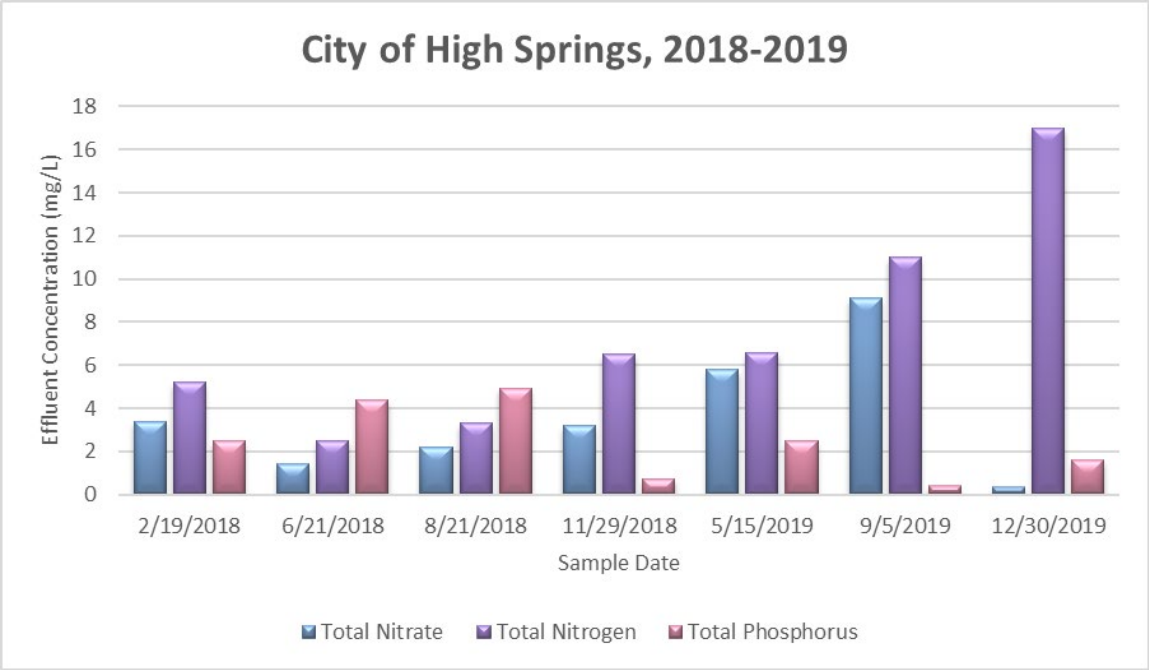


Figure 15. Effluent data from samples collected during ACEPD inspections at the City of High Springs WWTF

The monthly average flow of effluent from 2018 and 2019 was used to calculate an average flow of 0.14 MGD. Average nutrient concentrations were then multiplied by this flow rate to calculate an average loading rate from the facility. Monthly nutrient data for total nitrogen and total phosphorus reported by the facility and data collected by ACEPD during inspections were combined to estimate loading of 1,608 lb./year of nitrate, 2,477 lb./year of total nitrogen, and 1,114 lb./year of total phosphorus (Figure 16). Total nitrate, total nitrogen, and total phosphorus were lower than all previous years except in 2008 and 2009. The treatment volume to the High Springs WWTF increased after the 2008 – 2009 reporting period, causing increased nutrient loading. Table 3 compares these values to those of the other wastewater treatment facilities located in Alachua County.

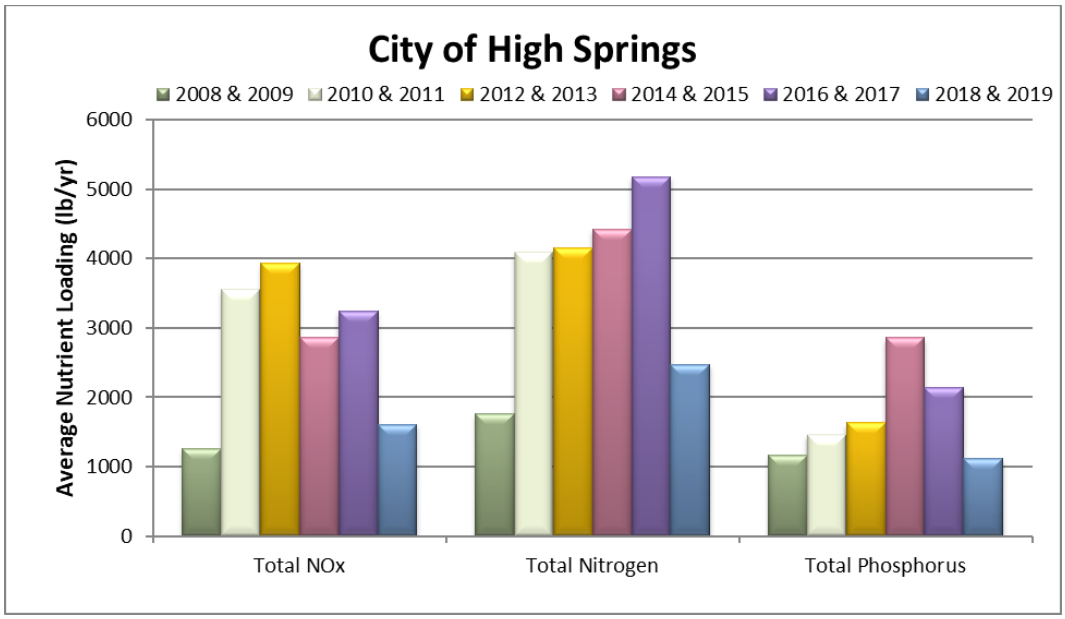


Figure 16. Estimated Nutrient Loading Values for the City of High Springs WWTF (2008 – 2019)

The City of High Springs is required to sample the groundwater monitoring wells and submit the results to FDEP on a quarterly basis (Figure 17). The background well is labeled with a "B", intermediate wells are labeled with an "I", and the compliance wells are labeled with a "C". These monitoring wells are open to the Floridan aquifer, which is unconfined in this portion of Alachua County. Nitrate and Nitrite concentrations from these monitoring wells from 2012 to 2019 are shown in Figure 17. There were no exceedances in nitrate concentrations of any monitoring wells between 2018 and 2019, however on 12/31/2018 there were exceedances for fecal coliform in MWC-3 and MWC-4 with results of 17 and 20 colony county per milliliter.

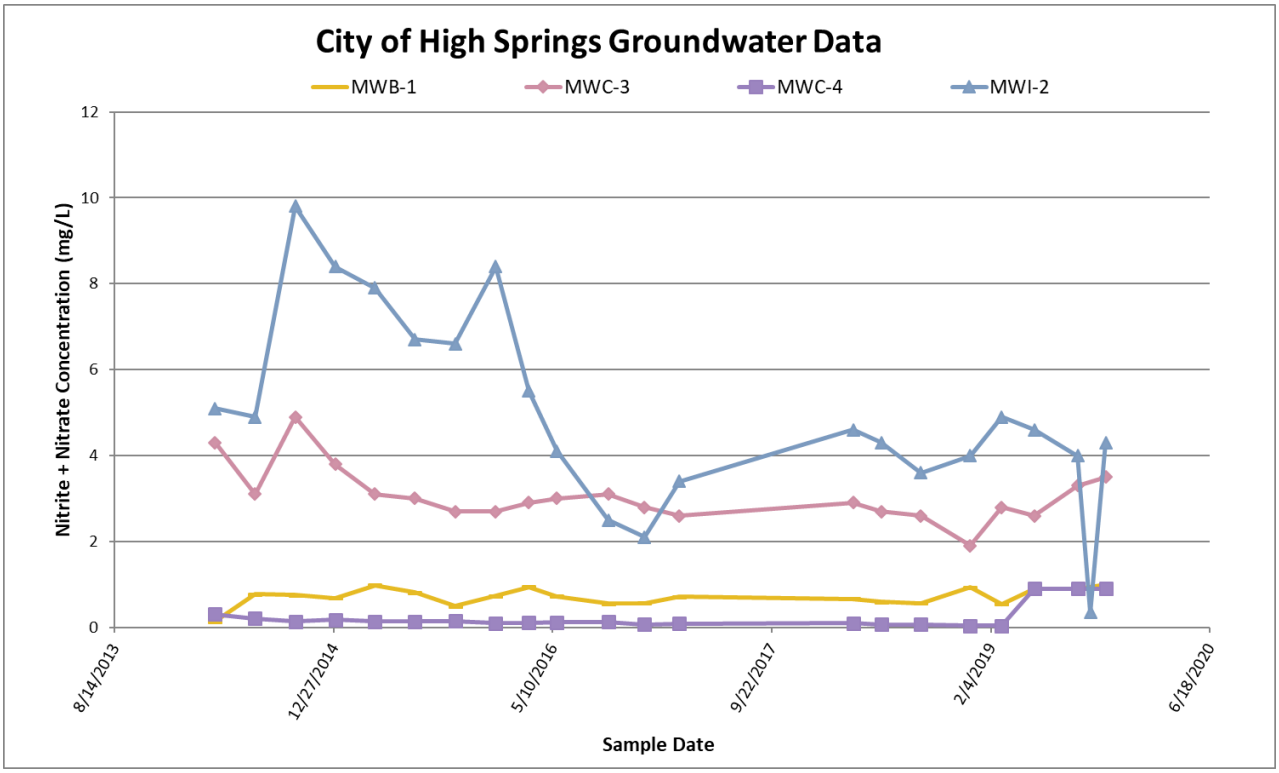


Figure 17. Groundwater Data from the City of High Springs WWTF for Nitrite + Nitrate

The City of High Springs hauls their sewage sludge to GRU for further treatment. According to FDEP's records, 25 dry tons of biosolids were produced in 2018, while 30 dry tons were produced in 2019 at the City of High Springs Facility. Documentation for biosolids was incomplete in the state database, actual tons of biosolids may exceed those presented here.

3-6 The City of Newberry

Facility size: up to 1.059 MGD **Permit expiration date**: 8/3/2026

Permitted effluent disposal: 40 acres of spray field.

Residuals disposal: Land applied to spray field on site.

The City of Newberry Plant 1

City of Newberry is an activated sludge secondary treatment plant The facility was expanded in 2013 to accommodate an additional 0.21 MGD in treatment capacity. ACEPD completed seven inspections of the City of Newberry between 2018 and 2019. No plant deficiencies were noted during the plant inspections. Samples of the effluent were collected for nutrient analysis and are summarized in Figure 18. Nitrate concentrations ranged from 0.35 mg/L to 17 mg/L, total phosphorus ranged from 0.312 mg/L to 6.59 mg/L and total nitrogen concentrations ranged from 10 mg/L to 31 mg/L (Figure 18).

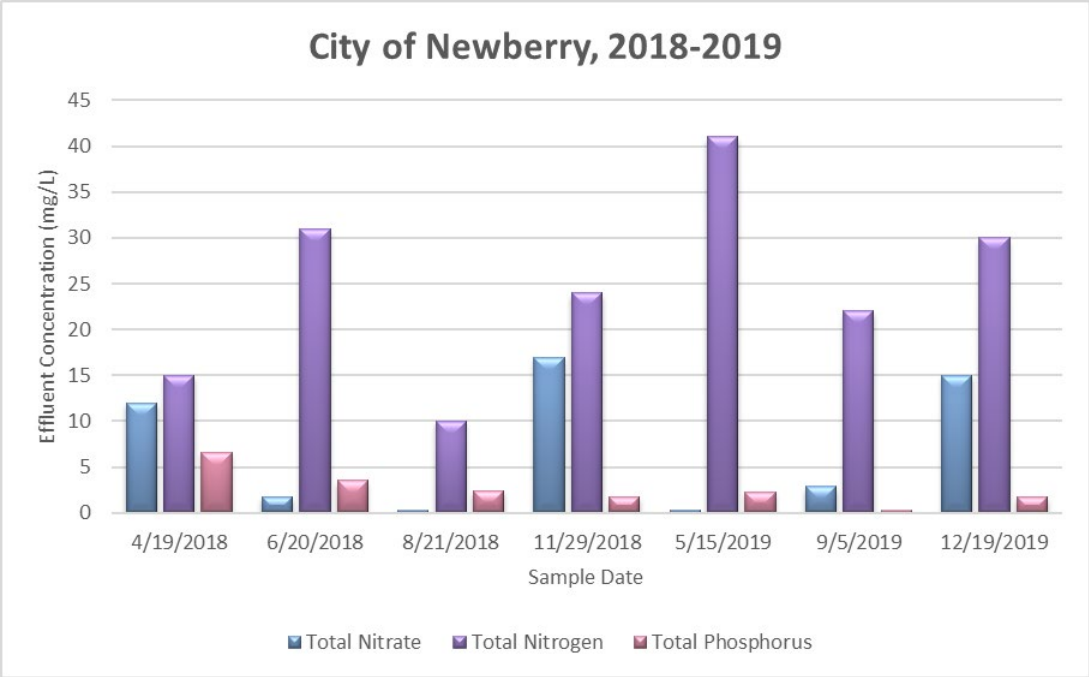


Figure 18. Effluent data from samples collected during ACEPD inspections at the City of Newberry WWTF

The monthly average flows of effluent from 2018 and 2019 were used to calculate an average flow of 0.24 MGD. Average nutrient concentrations were then multiplied by this flow rate to estimate nutrient loading rates from the facility. Monthly maximum nutrient concentrations as reported by the facility and data collected by ACEPD were combined to estimate the annual loading rates at 5,201 lb./year of nitrate, 16,094 lb./year of total nitrogen, and 2,678 lb./year of total phosphorus (Figure 19). The Newberry Plant does not report nitrate results, so nitrate loading was calculated using only ACEPD sample results (n=7). Table 3 compares these values to those of the other wastewater treatment facilities located in Alachua County.

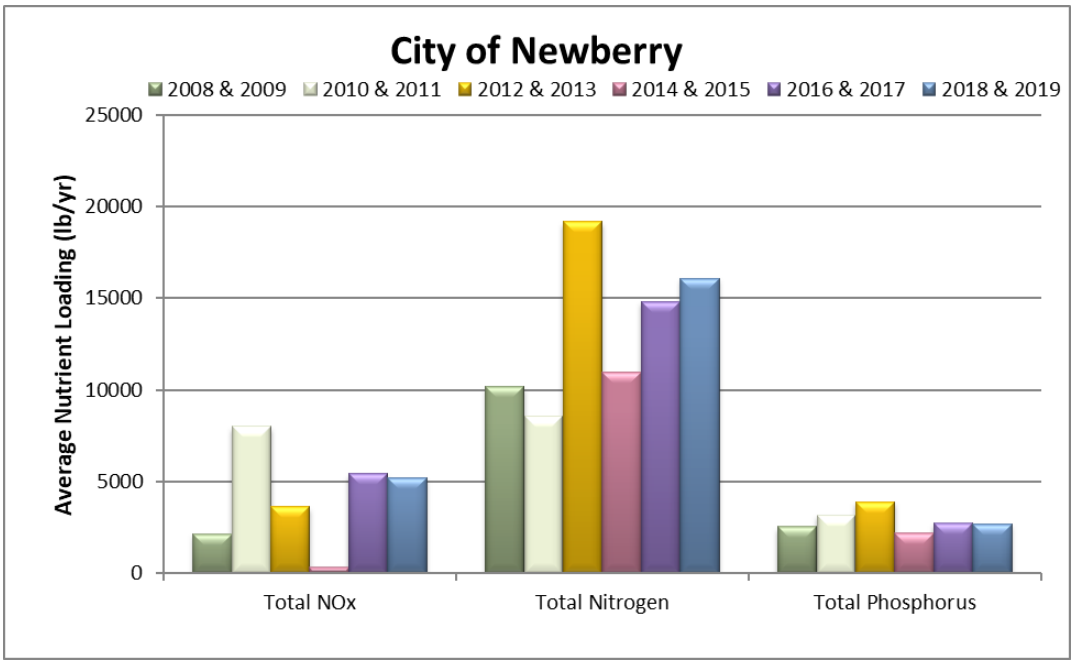


Figure 19. Estimated Nutrient Loading Values for the City of Newberry WWTF (2008 – 2019)

The city is required to sample their groundwater monitoring wells and submit the results to FDEP on a quarterly basis. The background wells are labeled with a "B", compliance wells are labeled with a "C", and intermediate wells are labeled with an "I". These wells are open to the Florida aquifer, which is unconfined in this portion of Alachua County. Nitrate levels are higher at all the monitoring wells in comparison to the background well (Figure 20). Elevated nutrient concentrations in the effluent and the groundwater monitoring wells are of concern in the karst setting of the plant's spray field for the Santa Fe River and Springs system.

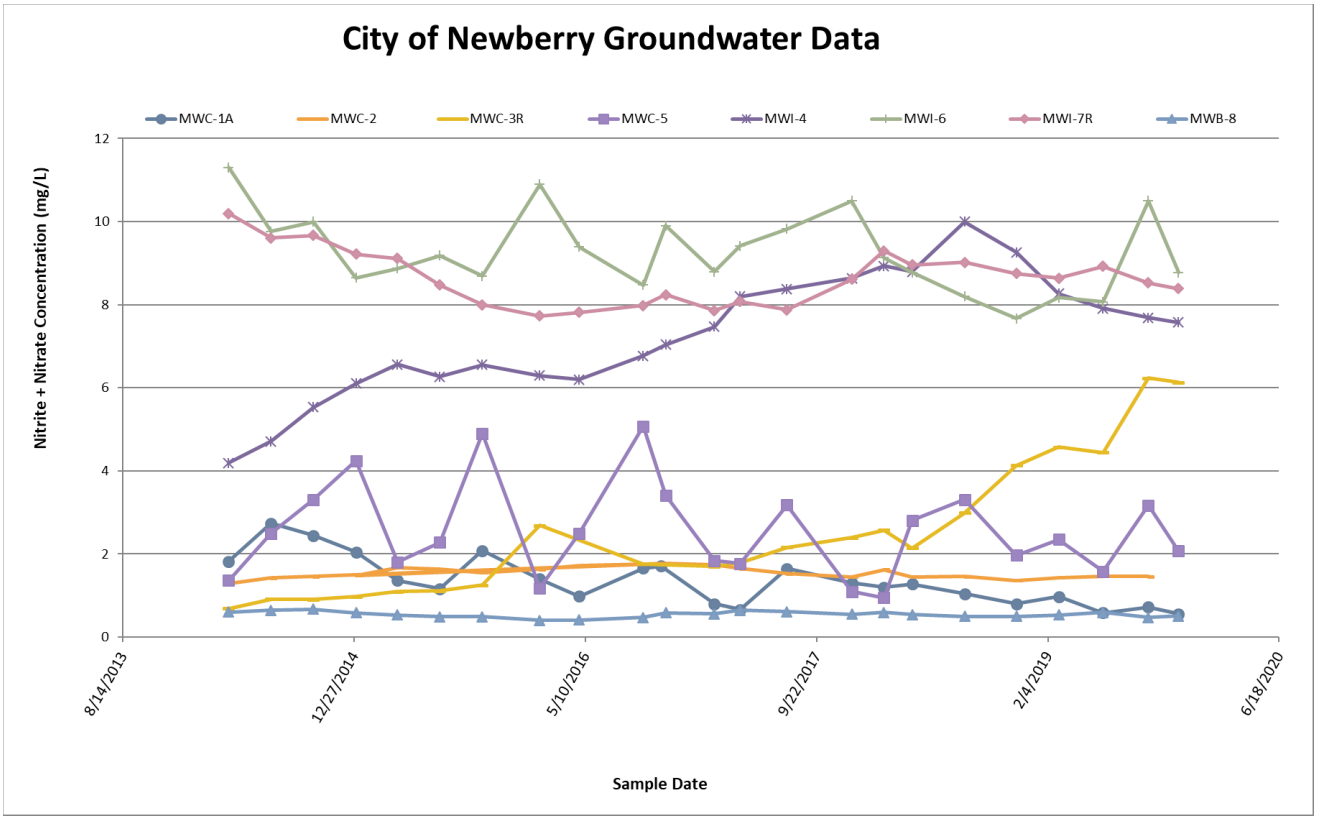


Figure 20. Groundwater Data from the City of Newberry WWTF for Nitrite + Nitrate

The Newberry treatment facility is permitted to land apply biosolids that have achieved class B pathogen reduction. According to FDEP's records, the facility produced 50 dry tons of biosolids in 2018 and 33 dry tons in 2019. These biosolids are land applied at the City of Newberry wastewater treatment facility spray field site.

3-7 The University of Florida

Facility size: 3.0 MGD **Permit expiration date**: 6/8/2026

Permitted effluent disposal:

3.0 MGD underground injection and 0.96 MGD public access re-use.

Residuals disposal: Hauled to GRU.

University of Florida WWTF

The University of Florida wastewater treatment plant is an advanced treatment Kruger Process (phased isolation oxidation ditch) treatment plant. This facility was inspected for the final time by ACEPD in 2010 and was found to be in compliance during the inspection. The effluent samples showed relatively low nitrogen concentrations that fluctuate with the seasons. Loads of total nitrogen and total phosphorus have risen slightly since the 2014 – 2015 reporting period (Figure 21) however 2018 and 2019 effluent results have been slightly lower than 2016 and 2017. Since ACEPD no longer samples or inspects the UF facility, these numbers are calculated solely from DMRs submitted to FDEP as part of permit compliance.

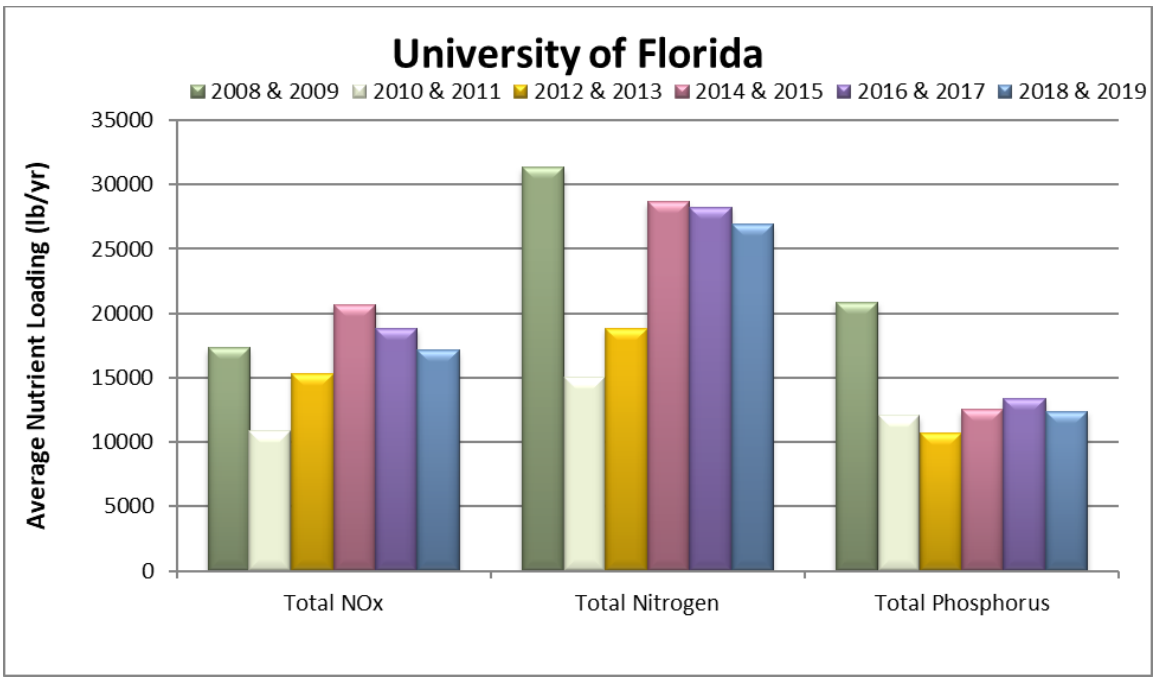


Figure 21. Estimated Nutrient Loading Values for the University of Florida WWTF (2008 – 2019)

The monthly average flow of influent from 2018 and 2019 was used to calculate an average flow of 1.72 MGD. Monthly average nutrient concentrations reported by the facility were averaged and then multiplied by this flow rate to estimate nutrient loading rates. Using the calculated flow and nutrients measured, total nitrate plus nitrate was 17,143 lb./year, total nitrogen was 26,920 lb./year, and total phosphorus was 12,401 lb./year. Table 3 compares these values to those of the other wastewater treatment facilities located in Alachua County.

UF is required to sample groundwater monitoring wells and submit the results to FDEP. However, monitoring well data is only required when the treated water is discharged into the injection well system; groundwater data is not reported when the effluent is utilized for public access re-use. The background wells are labeled with a "B" and compliance wells are labeled with a "C". The monitoring wells are open to the Florida aquifer, which is semi-confined in this area and are located within two different zones of the aquifer. Wells designated with a "D" (for deep) are between 250 and 300 feet in total depth. Shallow monitoring wells, designated with an "S", are 60 to 65 feet in total depth. Nitrate levels appear to be elevated in background well MWB-3S (Figure 22). However, a larger period of record would be needed to verify any trends and none of the results exceeded drinking water standards for nitrate.

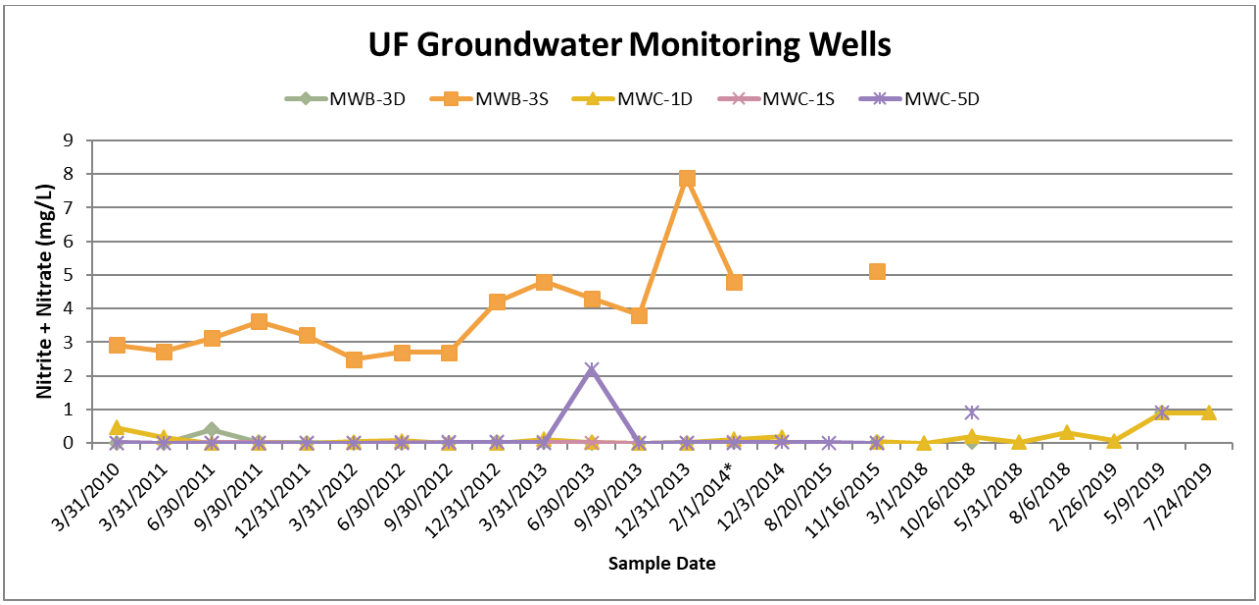


Figure 22. Groundwater Data from the University of Florida WWTF for Nitrite + Nitrate

UF hires GRU to pump their sewage sludge and haul it for further treatment at one of GRU's treatment facilities. According to FDEP's records, 269 dry tons were produced in 2016 and 236 dry tons were produced in 2019.

4.0 PACKAGE PLANTS

Package plants are smaller prefabricated wastewater treatment facilities designed to treat domestic wastewater for a localized area, such as a mobile home park (MHP) or camp. There were ten package plants located in Alachua County in 2018 and 2019. Previously there were more package plants in Alachua County, but the recent trend has been to abandon package plants as they are able to connect to the centralized municipal wastewater collection systems.

The average total nitrogen and total phosphorus concentrations include reported nutrient data from each facility's Discharge Monitoring Report (DMR) and effluent sampling data from the ACEPD inspections. Effluent quality varied among the package plants (Figure 26). The level of treatment and nutrient removal tends to be less at package plants compared to municipal facilities; however, the volume of effluent is also considerably lower at package plants. The high total nitrogen concentrations observed at many of the package plants are concerning. Most of the nitrogen was not in the mobile nitrate form but instead was in ammonia form, which is likely converted to nitrate once released to the environment. The nutrient loading rates to the environment were calculated for each plant by multiplying the average flow by the average nutrient concentrations (Figure 27). The individual package plants are discussed in the following sections of this report. These facilities contract to transport and process their sludge. Facilities which are operating below capacity do not generate enough sludge to haul annually.

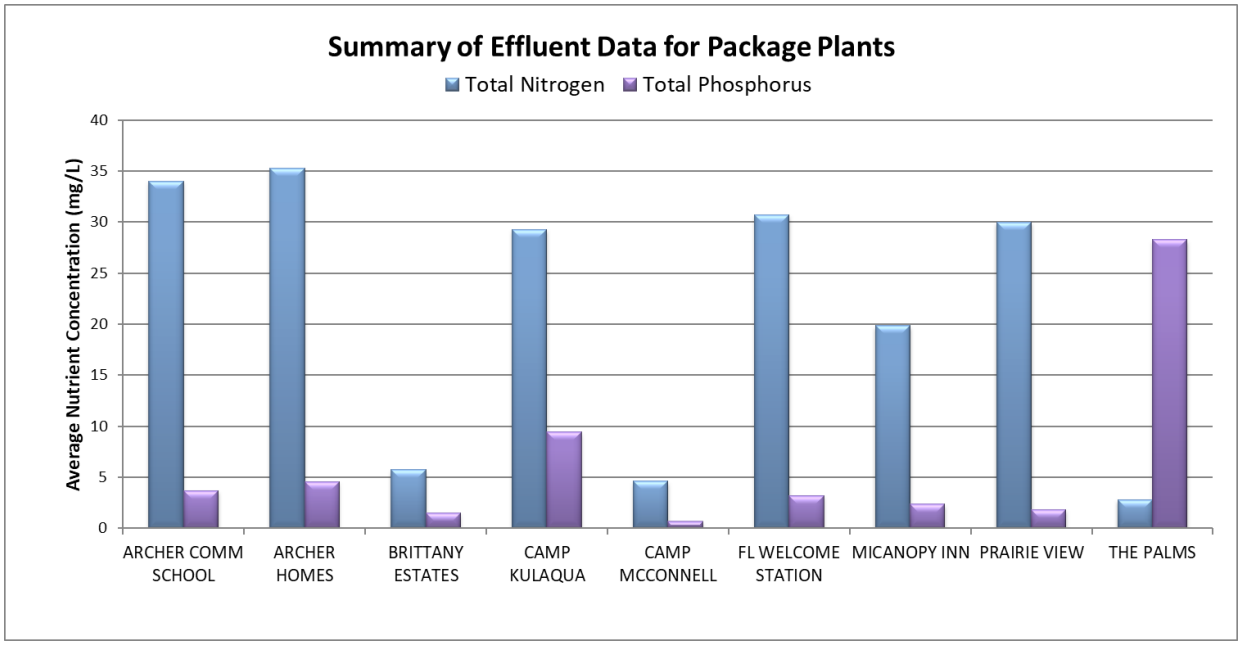


Figure 23. Average Effluent Nutrient Data for Package Plants (2018 – 2019)

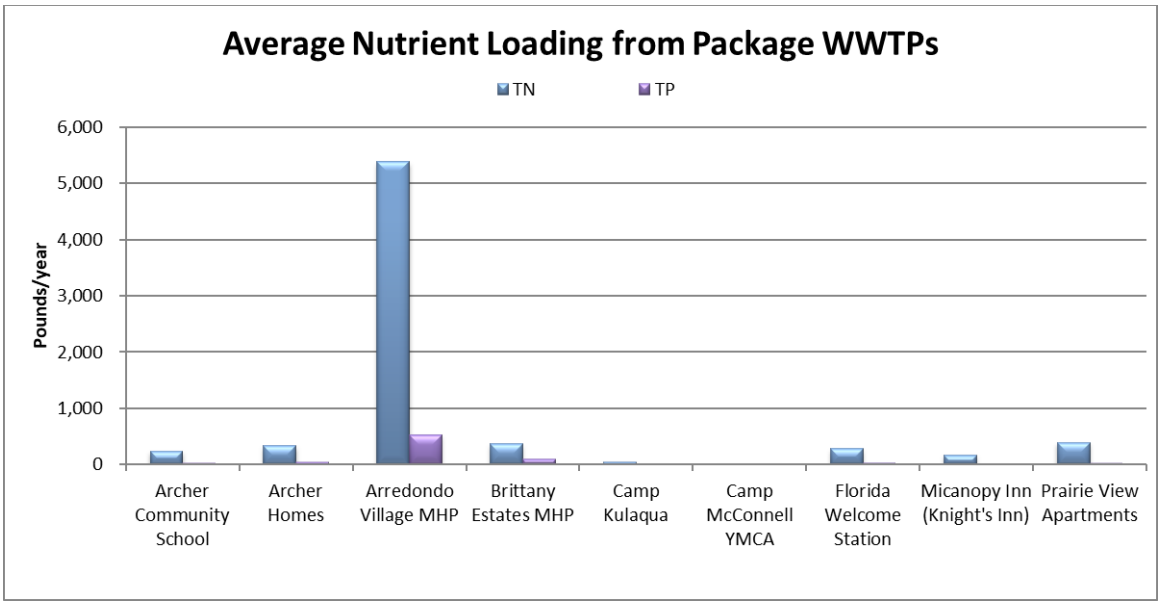


Figure 24. Estimated Nutrient Loading from Package Plants (2018 – 2019)

4-1 Archer Community School

Facility size: 0.005 MGD **Permit expiration date**: 8/18/2024

Permitted effluent disposal: three rapid infiltration basins (0.124 acres).

Residuals disposal: Hauled off-site.

The Archer Community School WWTF

The package plant at the Archer Community School is an extended aeration activated sludge plant. This facility was inspected seven times between 2018 and 2019. The total residual chlorine was below the 0.5 mg/L FDEP permit minimum during the February 2018 and January 2019 inspections. Total nitrogen values at this plant were elevated during the ACEPD sampling events, ranging from 22mg/L to 44mg/L, nitrate ranged from 1.1 mg/L to 32 mg/L and total phosphorus ranged from 1.08 mg/L to 8.91 mg/L (Figure 25). In the state permit, the plant has a report-only NO_x requirement, but no reporting requirement for nitrate, total nitrogen, or total phosphorus. High concentrations of total nitrogen with low concentrations of nitrate indicate that ammonia is the dominant form of nitrogen present in the effluent, which can be converted back to nitrate in the environment. High nitrogen concentrations are of concern in this part of the county where the Floridan aquifer is unconfined and vulnerable to pollution.

The monthly average flow of influent from 2018 and 2019 was used to calculate an average flow of 0.002 MGD. Average nutrient concentrations from ACEPD inspection samples were then multiplied by this flow rate to estimate nutrient loading rates. The estimated nitrate loading was 62 lb./year, total nitrogen was 244 lb./year, and total phosphorus was 27 lb./year. The total nitrogen load from 2018 - 2019 remains less than the 2012 – 2013 and less than 2016-2017 concentrations (Figure 26). Table 3 compares loading among wastewater treatment facilities located in Alachua County.

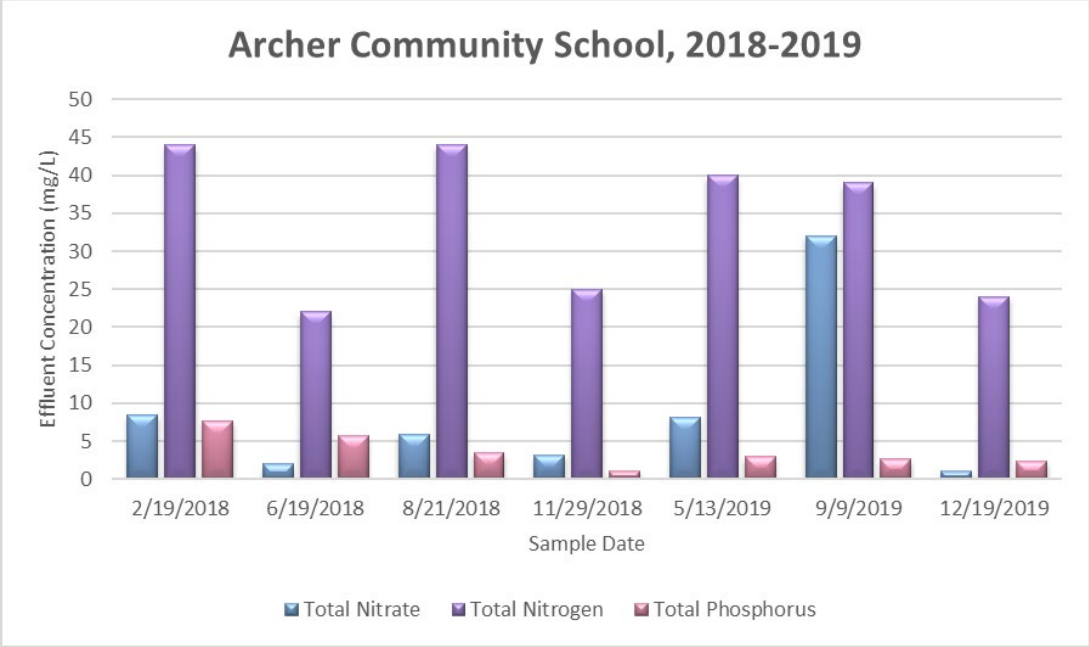


Figure 25. Effluent data from samples collected during ACEPD inspections at the Archer Community School Package Plant

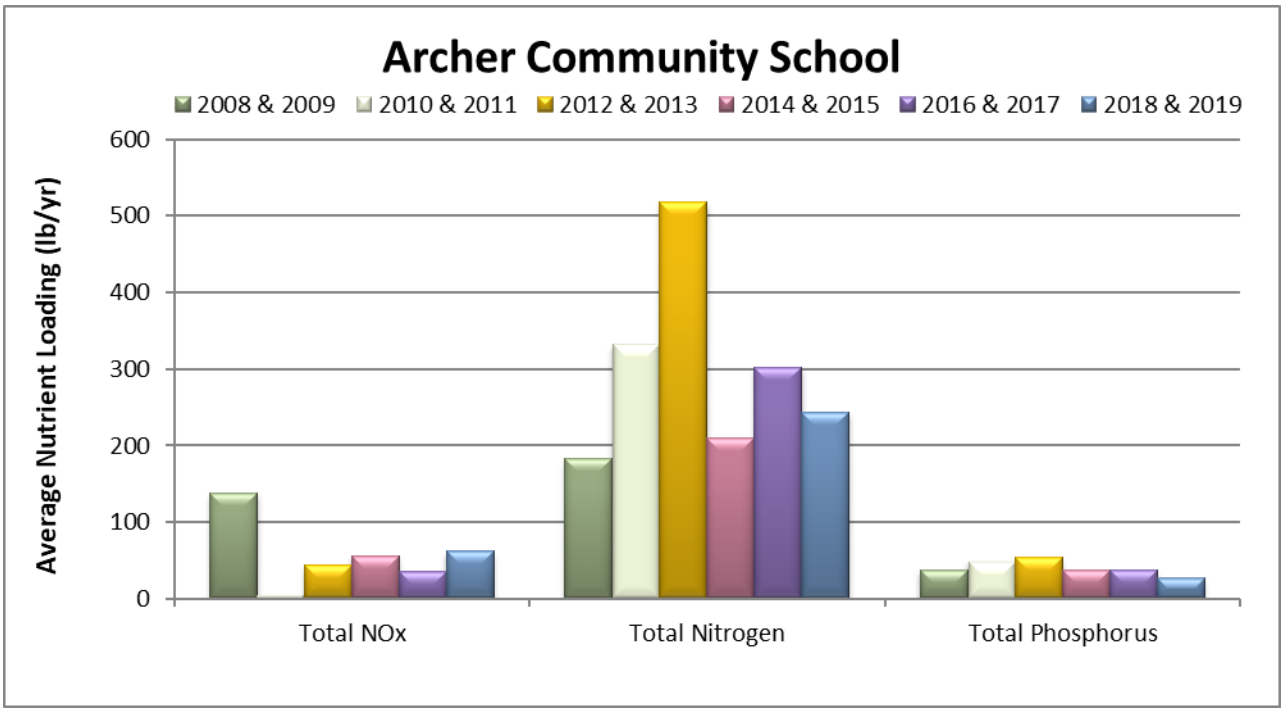


Figure 26. Estimated Nutrient Loading Values for the Archer Community School Package Plant (2008 – 2019)

4-2 Archer Homes

Facility size: 0.0083 MGD **Permit expiration date**: 10/13/2020

Permitted effluent disposal: 0.22 acre absorption field.

Residuals disposal: Hauled off-site.

The Archer Homes WWTF

The package plant at Archer Homes is an extended aeration treatment plant. This facility was inspected six times in 2018 and 2019. The total residual chlorine was below the 0.5 mg/L FDEP permit minimum during the February 2018 inspection but was resolved during the next inspection date. Total nitrogen values at this plant were elevated during the sampling events, and the nitrate concentration has ranged from 0.48 mg/L and 58 mg/L through the sampling period, nitrate ranged from 0.35 mg/L to 3.8 mg/L, and total phosphorus ranged from 0.72 mg/L to 14.2 (Figure 25). In the state permit, the plant has a report-only NO_x requirement but no reporting requirement for nitrate, total nitrogen, or total phosphorus. High concentrations of total nitrogen with low concentrations of nitrate indicate that ammonia is the dominant form of nitrogen present in the effluent, which can be converted back to nitrate in the environment. High nitrogen concentrations are of concern in this part of the county where the Floridan aquifer is unconfined and vulnerable to pollution.

The monthly average flow of influent from 2018 and 2019 was used to calculate an average flow of 0.0031 MGD. Average nutrient concentrations from ACEPD inspection samples were then multiplied by this flow rate to estimate nutrient loading rates. The estimated nitrate loading was 33 lb./year, total nitrogen was 336 lb./year, and total phosphorus was 44 lb./year. The total nitrogen load from 2018 - 2019 has risen from the 2016 - 2018 results but is less than the 2012 – 2013 results (Figure 28). Table 3 compares loading values among wastewater treatment facilities located in Alachua County.

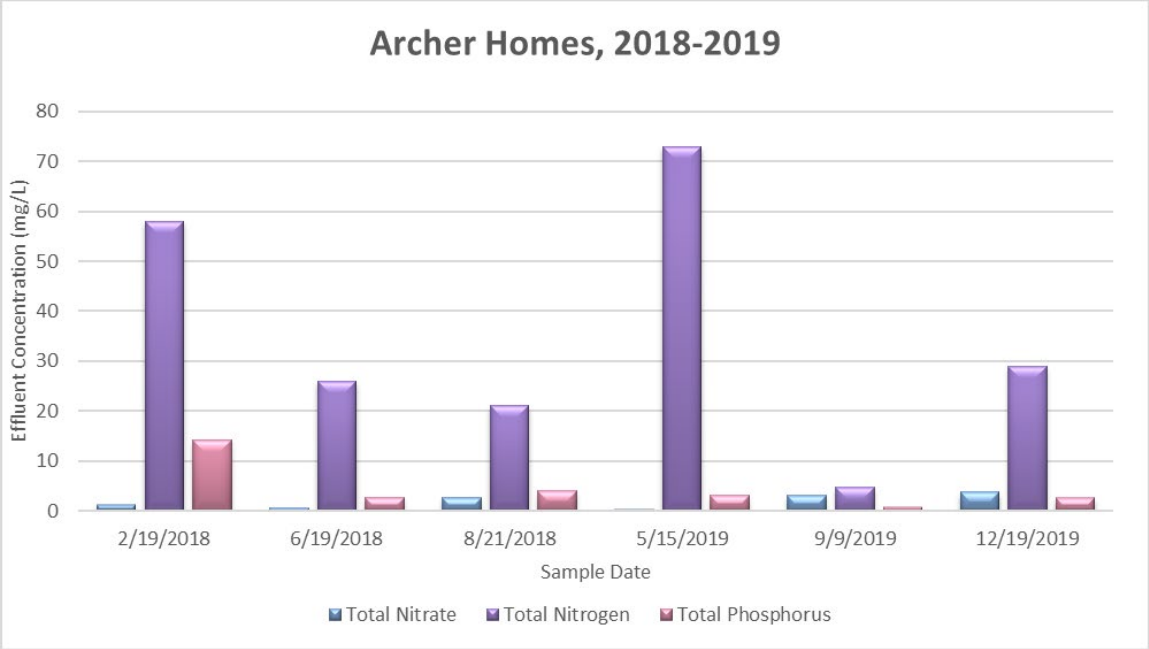


Figure 27. Effluent data from samples collected during ACEPD inspections at the Archer Homes Package Plant

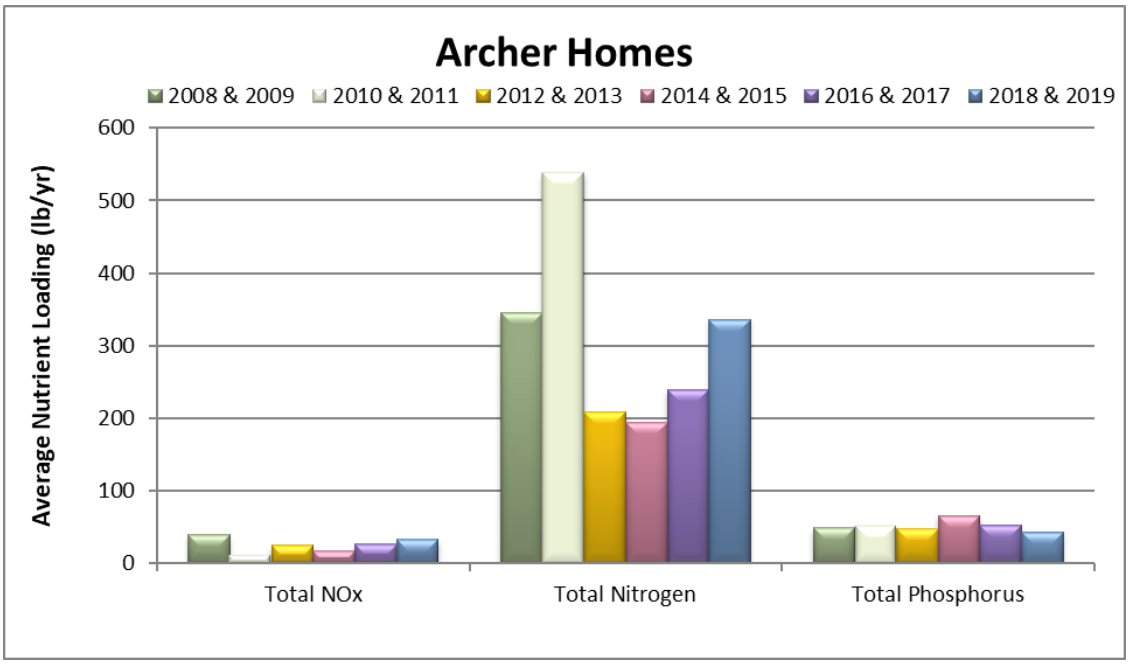


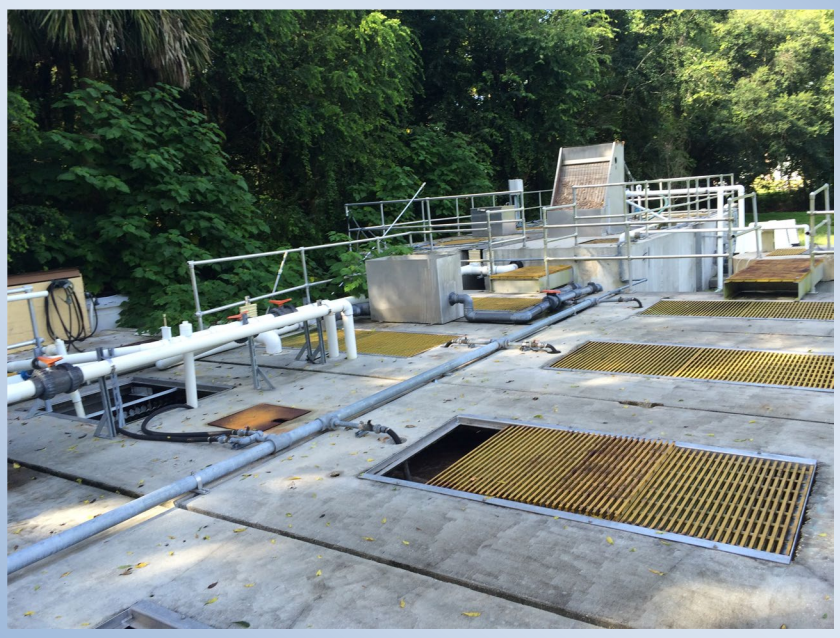
Figure 28. Estimated Nutrient Loading Values for the Archer Homes Package Plant (2008 – 2019)

4-3 The Palms Mobile Home Park (formerly Arredondo Farms)

Facility size: 0.06 MGD **Permit expiration date**: 4/28/2019

Permitted effluent disposal: Two rapid infiltration basins.

Residuals disposal: Hauled off-site.



The Palms WWTF

The package plant at The Palms MHP (formerly Arredondo Farms) is an extended aeration treatment plant. This facility was inspected seven times during 2018 and 2019. During the February 2018 visit total residual chlorine was below the FDEP required minimum of 0.5 mg/L. The chlorine values were within compliance during the next inspection. Total nitrogen concentrations were elevated during all seven visits with concentrations ranging from 14 mg/L to 54 mg/L, nitrate ranged from 0.011 mg/L to 0.66 mg/L and total phosphorus ranged from 0.881 mg/L to 8.2 mg/L (Figure 29). Sample results from 2018 - 2019 show some improvement in total nitrogen concentrations, but total phosphorus concentrations increased by more than double of any previous two-year period.

The monthly average effluent flow from 2018 and 2019 were used to calculate an average flow of 0.062 MGD. Average nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly maximum values for nitrate samples collected by the facility were combined with ACEPD inspection data to calculate a loading rate of 119 lb./year (Figure 30). Since the facility is not required to monitor for total nitrogen or total phosphorus, ACEPD data was used to calculate these loadings of 534 lb./year and 5,383 lb./year, respectively. The total phosphorus loading has been the highest ever reported. Table 3 compares loading among wastewater treatment facilities located in Alachua County.

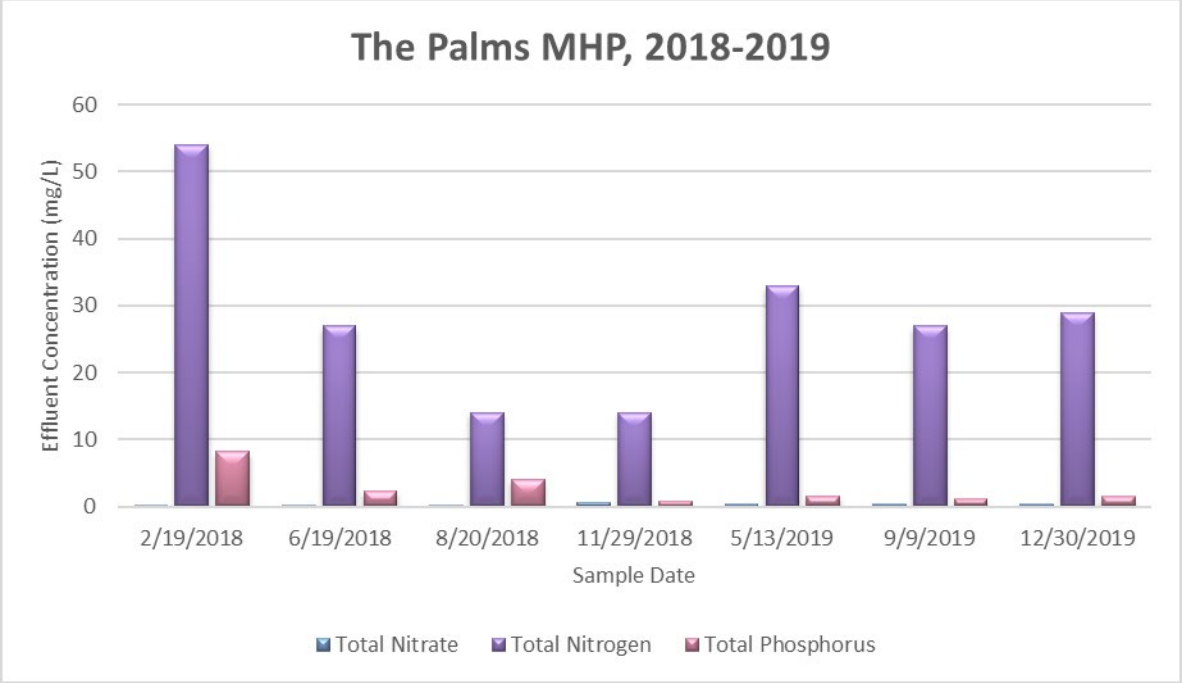


Figure 29. Effluent data from samples collected during ACEPD inspections at the Arredondo Farms Mobile Home Park Package Plant

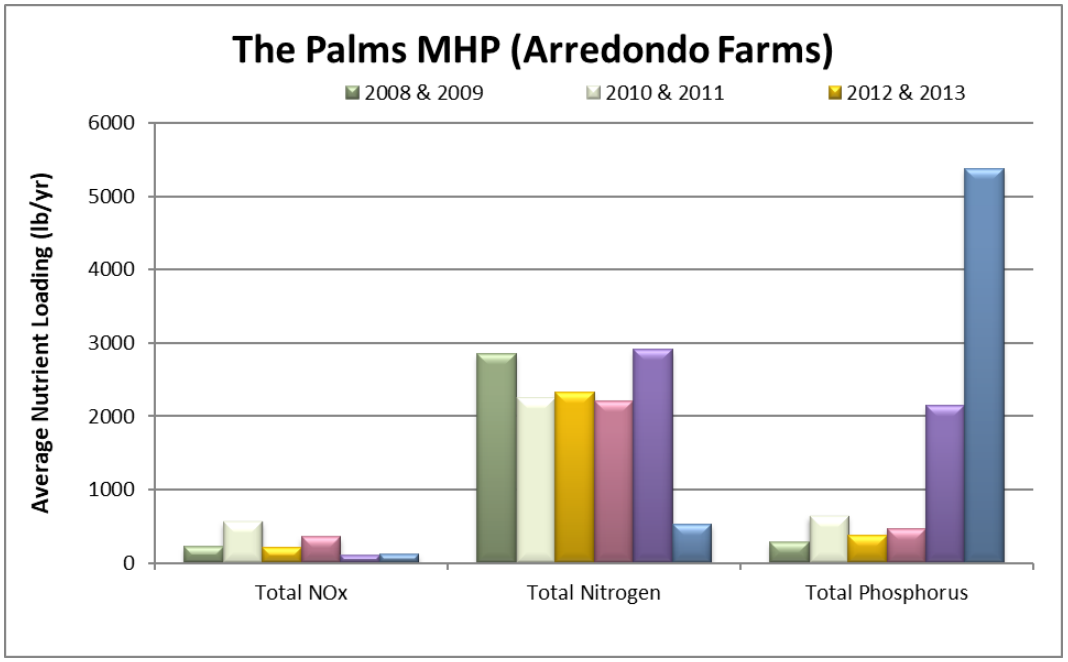


Figure 30. Estimated Nutrient Loading Values for the Arredondo Farms Mobile Home Park Package Plant (2008 – 2019)

4-4 Brittany Estates Mobile Home Park

Facility size: 0.06 MGD **Permit expiration date**: 8/28/2016

Permitted effluent disposal: Little Hatchet Creek.

Residuals disposal: Hauled off-site.

Brittany Estates WWTF

The package plant at Brittany Estates MHP can be operated as an activated sludge extended aeration or contact stabilization plant. This facility was inspected seven times by ACEPD between 2018 and 2019.Total residual chlorine was below the permitted concentration of 0.5 mg/L during the February 2018 visit. The chlorine concentrations were corrected during the next inspection. Grab samples for nutrient analysis collected by ACEPD are summarized in Figure 31. Total nitrogen ranged from 0.77 mg/L to 11 mg/L, nitrate ranged between 0.32 mg/L and 10 mg/L, and total phosphorus concentrations ranged from 0.609 mg /L to 6.9 mg/L (Figure 31).

The monthly average effluent flow from 2018 and 2019 was used to calculate an average flow of 0.0262 MGD. Average nutrient concentrations were then multiplied by this flow rate to estimate nutrient loading rates. Monthly average values reported by the facility were combined with ACEPD inspection data to calculate a loading of 116 lb./year of nitrate, 238 lb./year of total nitrogen, and 70 lb./year of total phosphorus. Estimated loading of nitrate, and total phosphorous have continued to drop since 2014 – 2015 samplings, however total nitrogen for 2018 – 2019 increased from the 2016 and 2017 sampling period (Figure 32). Nutrients in effluent from this plant are a concern because they are discharged to a tributary of Little Hatchet Creek. TMDLs for total nitrogen and total phosphorus were developed for Newnans Lake, the downstream receiving water body, to address water quality issues in the watershed (FDEP 2014). Table 3 compares loading rates among wastewater treatment facilities in Alachua County.

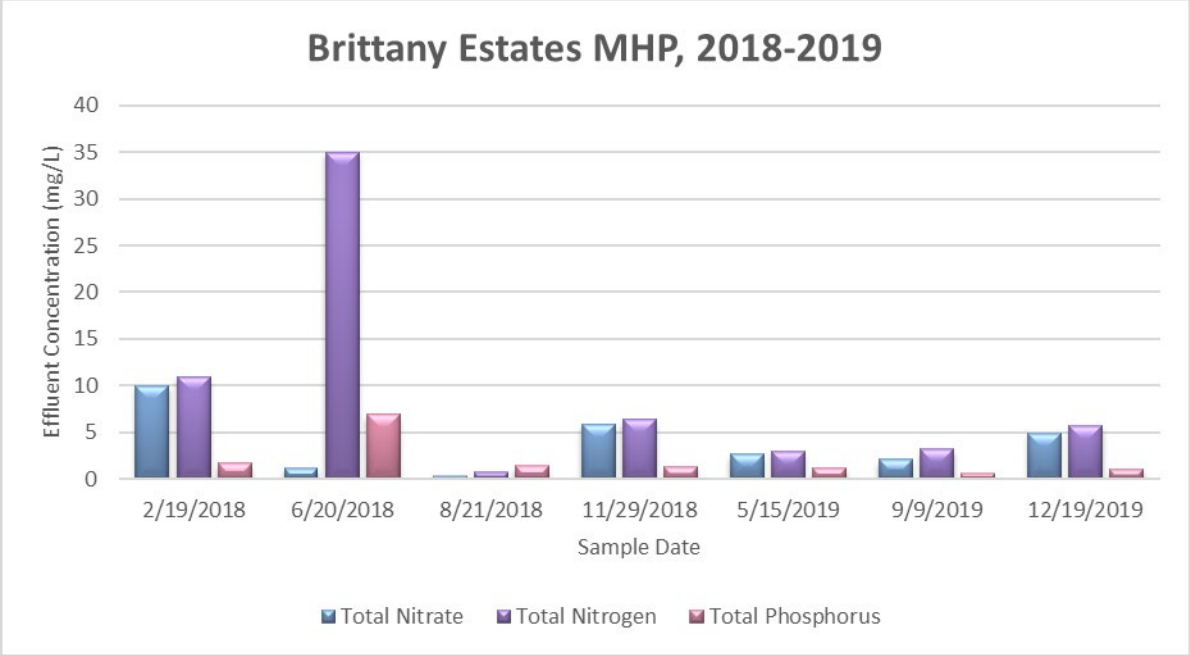


Figure 31. Effluent data from samples collected during ACEPD inspections at the Brittany Estates Mobile Home Park Package Plant

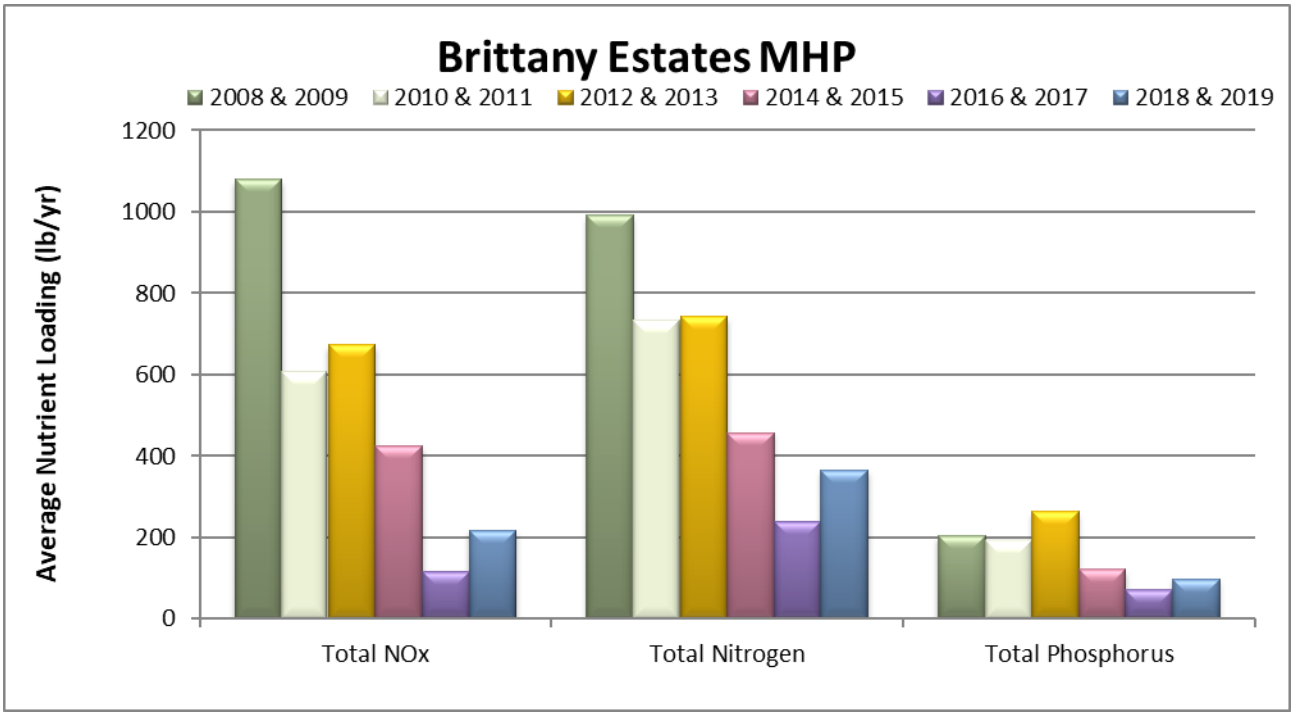


Figure 32. Estimated Nutrient Loading Values for the Brittany Estates Mobile Home Park Package Plant (2008 – 2019)

4-5 Camp Kulaqua

Facility size: 0.0201 MGD **Permit expiration date**: 6/30/2019

Permitted effluent disposal: Two rapid infiltration basins (0.372 acres).

Residuals disposal: Hauled off-site.

Camp Kulaqua clarifier and chlorine contact chamber

The package plant at Camp Kulaqua in High Springs is an extended aeration activated sludge treatment plant. This facility was inspected two times in 2018 before the plant was abandoned in August of 2018. Total Residual Chlorine (TRC) was low during the last inspection in June of 2018. ACEPD sample analysis from grab samples collected during site inspections are summarized in Figure 33. Total nitrogen ranged from 15 mg/L to 74 mg/L, nitrate ranged from 0.11 mg/L to 1 mg/L, and total phosphorus ranged from 6.16 mg/L to 12.7 mg/L (Figure 33). In August of 2018 the Camp Kulaqua plant was decommissioned and wastewater services were connected to the City of High Springs Wastewater Treatment Plant. Nutrients are a concern within this area due to the proximity of Hornsby Springs and the Santa Fe River, especially since Hornsby Spring is impaired for nitrate concentrations.

The monthly average effluent flows for 2018 were used to calculate an average flow of 0.0005 MGD. Average nutrient concentrations were multiplied by this flow rate to estimate nutrient loading rates. Monthly maximum nitrate data reported by the facility were combined with ACEPD inspection results to estimate a nitrate loading rate of 2 lb./year (Figure 34). Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 48 lb./year and 15 lb./year, respectively. than 2014 – 2015 inspections. The total nitrogen and total phosphorus loads have also decreased. Table 3 compares loading among wastewater facilities in Alachua County.

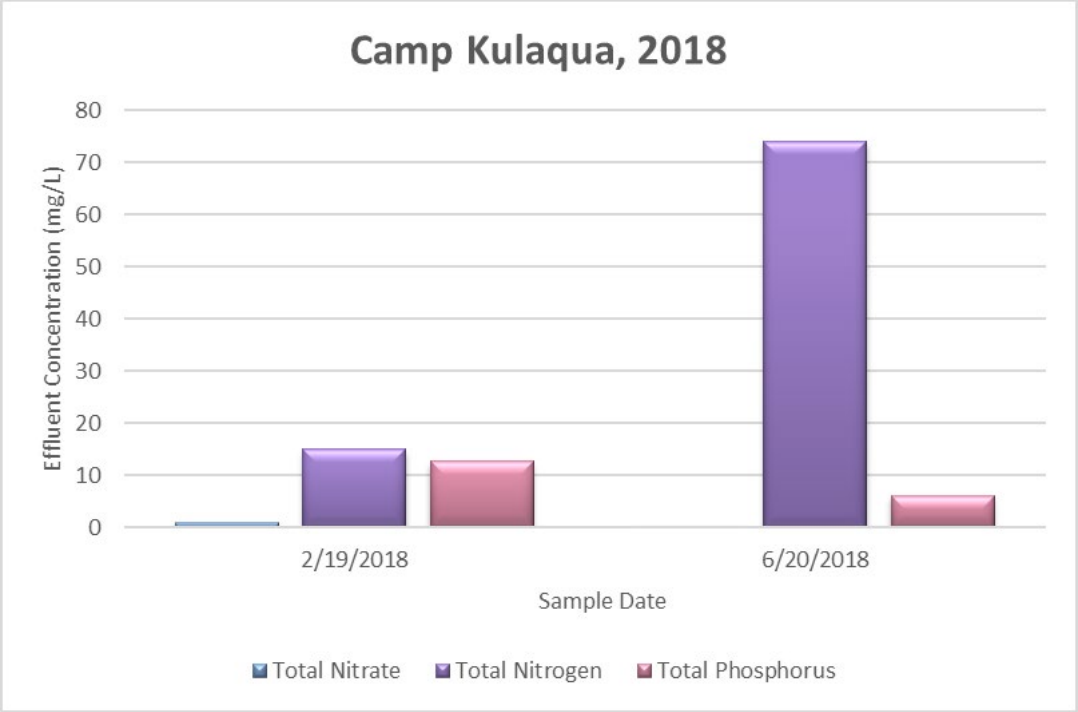


Figure 33. Effluent data from samples collected during ACEPD inspections at the Camp Kulaqua Package Plant

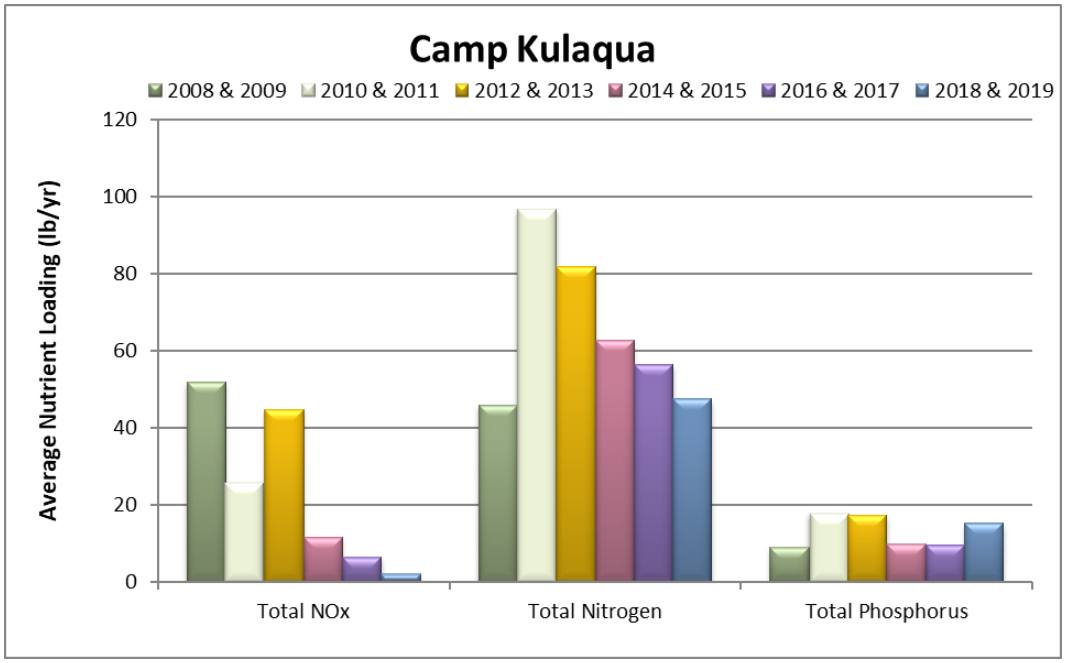


Figure 34. Estimated Nutrient Loading Values for the Camp Kulaqua Package Plant (2008 – 2019)

4-6 Camp McConnell /Cuscowilla

Facility Size: 0.0075 MGD **Permit expiration date**: 3/11/2020

Permitted effluent disposal: Two absorption fields (0.0388 acres).

Residuals disposal: Hauled off-site.

Camp McConnell/Cuscowilla aeration basin and clarifier

The package plant at Camp McConnell is an extended aeration plant. This facility was inspected seven times by ACEPD between 2018 and 2019. The Total Residual Chlorine (TRC) was low in June of 2018 and May of 2019. Camp McConnell changed ownership in 2017 when Alachua County purchased the property. The flow rate at this facility is intermittent and is dependent on the programming at the camp. During low flows to the plant, operators must maintain the microbial communities by adding dog food.

The monthly average effluent flows from 2018 to 2019 were used to calculate an average flow of 0.0001 MGD. Average nutrient concentrations (Figure 35) were then multiplied by this flow rate to estimate nutrient loading rates. Monthly maximum nitrate plus nitrite data reported by the facility were combined with ACEPD inspection data to calculate a nitrate loading rate of 0.2 lb./year (Figure 36). Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 1 lb./year and 0.1 lb./year respectively. The estimated nutrient load has decreased since the last reporting period most likely due to the low usage and flows. Table 3 compares loading rates among wastewater treatment facilities in Alachua County.

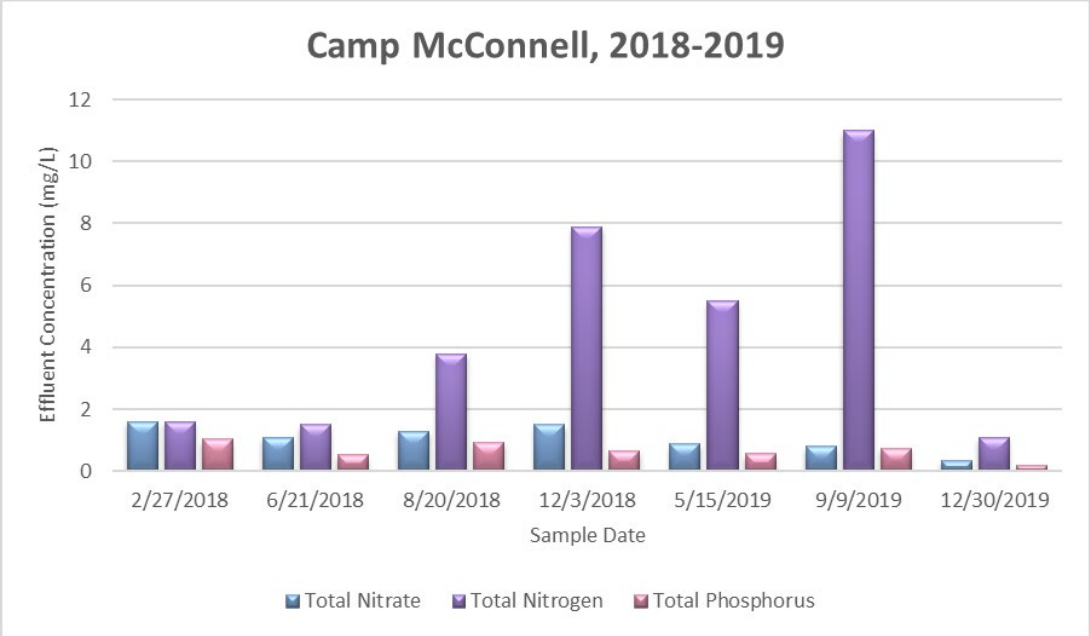


Figure 35. Effluent data from samples collected during ACEPD inspections at the Camp McConnell YMCA Package Plant

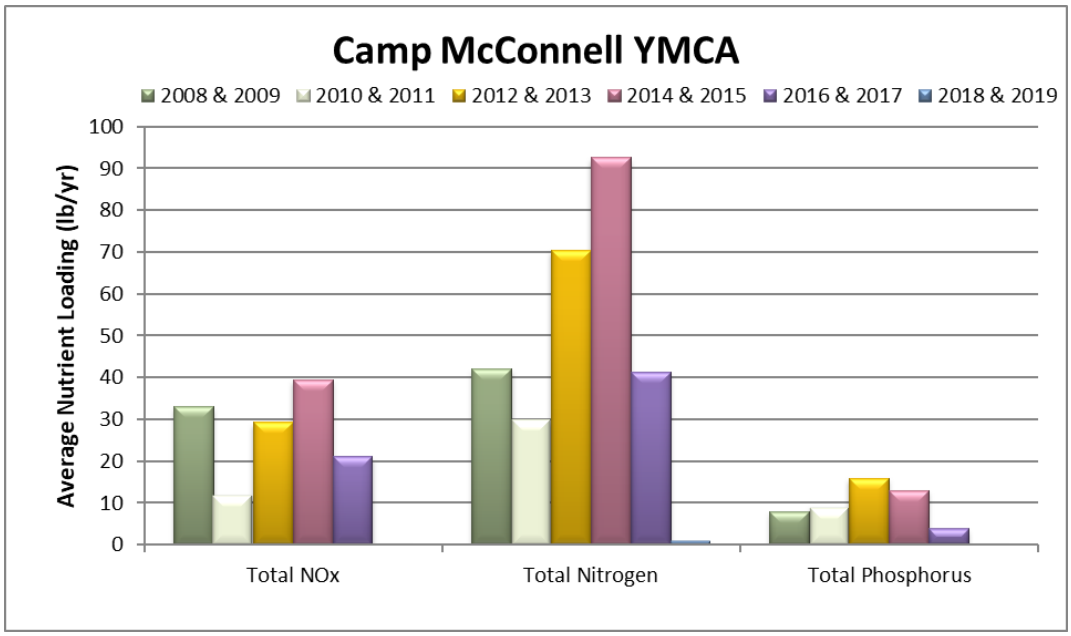


Figure 36. Estimated Nutrient Loading Values for the Camp McConnell YMCA Package Plant (2008 – 2019)

4-7 The Florida Welcome Station

Facility size: 0.009 MGD **Permit expiration date**: 3/10/2020

Permitted effluent disposal: Rapid infiltration basin (0.25 acres).

Residuals disposal: Hauled off-site.

The Florida Welcome Station WWTF

The package plant at the Florida Welcome Station is an extended aeration plant. ACEPD conducted seven inspections at this facility between 2018 and 2019. No plant deficiencies were noted during the inspections. Results from grab samples collected during ACEPD inspections are summarized below in Figure 37. Total nitrogen concentrations ranged from 1.5 mg/L to 83 mg/L, nitrate ranged from 0.35 mg/L to 3.7 mg/L and total phosphorus ranged from 0.155 mg/L to 7.56 mg/L (Figure 37). High nitrogen concentrations are of concern in proximity to the Santa Fe River and its springs. The Floridan aquifer is semi-confined in this area which is on the edge of the Cody Scarp. Although the nitrogen in the effluent is not always dominated by the mobile nitrate form, ammonia may be easily converted to nitrate once in the environment.

The monthly average influent flow from 2018 and 2019 was used to calculate an average flow of 0.0030 MGD. Average nutrient concentrations were then multiplied by this flow rate to estimate nutrient loading rates from this facility. Monthly maximum nitrate data reported by the facility were combined with ACEPD inspection results to calculate a nitrate loading rate of 57 lb./year. Since the facility is not required to monitor for total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 285 lb./year and 30 lb./year, respectively. Estimated loads of total nitrogen and total phosphorus have decreased since 2014 – 2015, based on concentrations observed by ACEPD in effluent samples (Figure 38). Table 3 compares loading rates among wastewater treatment facilities located in Alachua County.

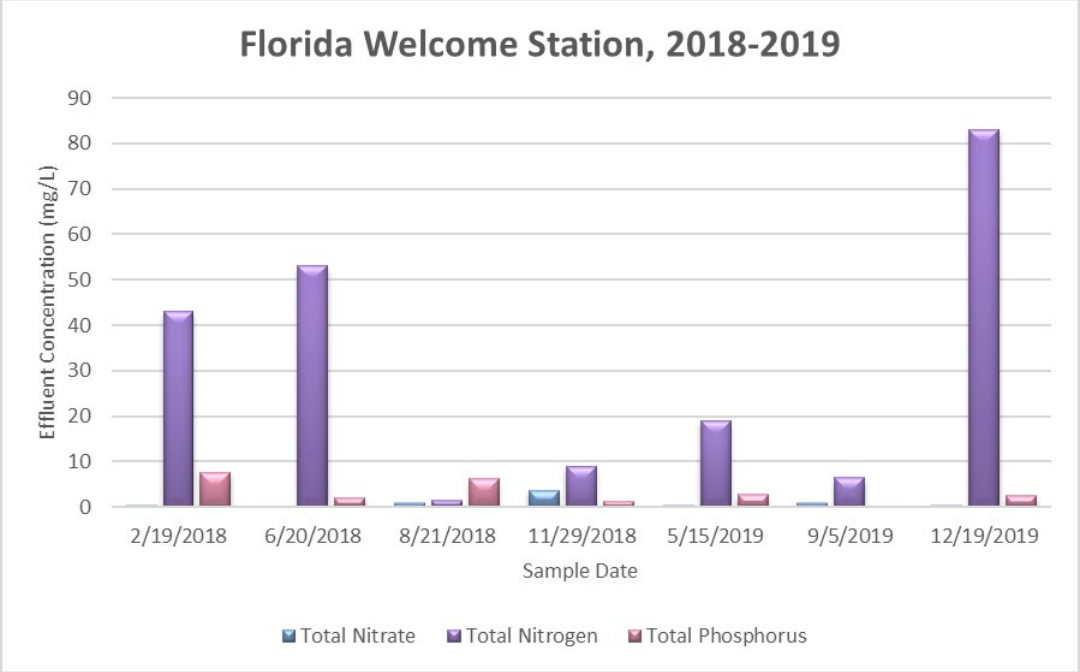


Figure 37. Effluent data from samples collected during ACEPD inspections at the Florida Welcome Station Package Plant

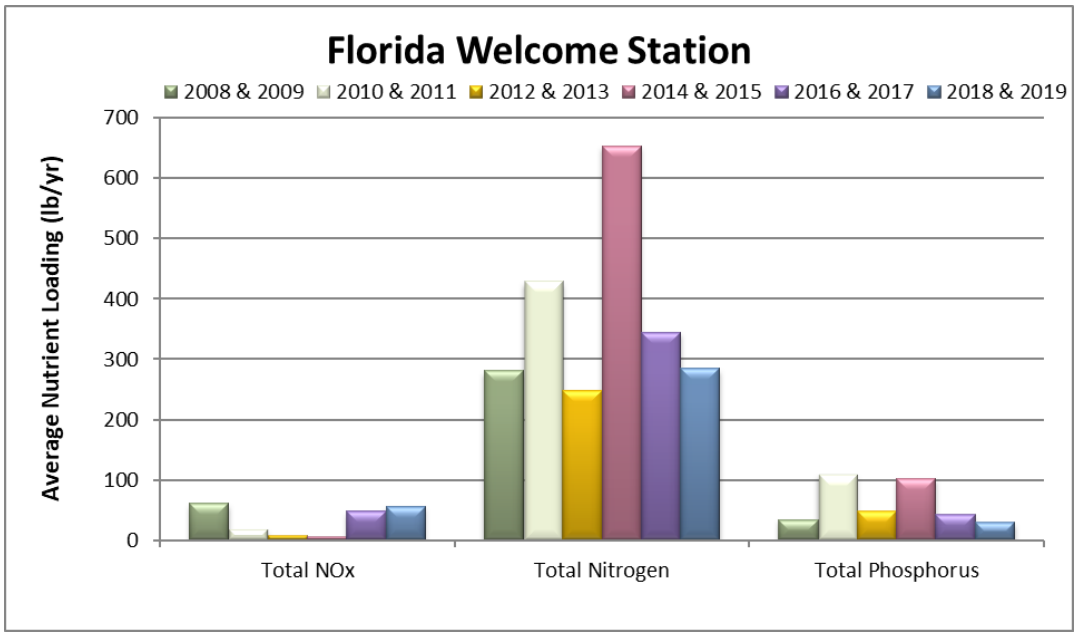


Figure 38. Estimated Nutrient Loading Values for the Florida Welcome Station Package Plant (2008 – 2019)

4-8 The Gainesville Raceway

Facility size: 0.00825 MGD **Permit expiration date**: 5/9/2022

Permitted effluent disposal: Spray irrigation (3.25 acres).

Residuals disposal: None produced.

The Gainesville Raceway aeration treatment system

The Gainesville Raceway plant is an extended aeration batch treatment system designed to treat the intermittent flows of the Gainesville Raceway including the extreme flows of Gator Nationals. This facility was last inspected in March 2019, and samples were found to be in compliance. No plant deficiencies were noted during the plant inspection. Usually, no effluent is discharged through the spray fields due to operator management of the aeration basins; therefore, no recurring effluent samples were taken. The plant was sampled March 14th, 2019. This plant operates during special events at the Gainesville Raceway and receives and treats wastewater pumped from portable toilets. This plant has historically been found to be in compliance. The facility was designed as an experimental project.

Table 6: Gainesville Raceway sample results

Date	NH_3 (mg/L)	TN (mg/L)	TP (mg/L)	NO_x (mg/L)
3/20/2017	16	27	12.2	2.7

4-9 Micanopy Inn (formerly Knight's Inn)

Facility size: 0.015 MGD **Permit expiration date**: 4/25/2020

Permitted effluent disposal: 1.26 acre spray field.

Residuals disposal: Hauled off-site.

The Micanopy Inn aeration basin

The package plant at the Micanopy Inn (formerly Knight's Inn) is an extended aeration plant. This facility was inspected seven times by ACEPD between 2018 and 2019. Multiple plant deficiencies were noted during plant inspections including low chlorine in June of 2018, elevated nitrate in August of 2018, and low chlorine in December of 2018. The Micanopy Inn plant appeared to be neglected during the 2018 sampling period, and may have lacked a lead operator. By May of 2019 Micanopy Inn had contracted ATP to operate the plant. Total Residual Chlorine was below permitted values and nitrate was elevated. There are no effluent nutrient limitations in the FDEP permit, but nitrate is report only. Results for samples collected by ACEPD show an increase in nitrate, and total nitrogen; total nitrogen ranged from 9.2 mg/L to 30 mg/L, nitrate ranged from 0.98 mg/L to 27 mg/L, and total phosphorus ranged from 2 mg/L to 4.47 mg/L (Figure 39). Elevated nitrogen levels are of concern in this area of the County where the Floridan aquifer is semi-confined to unconfined.

The monthly average flow were unavailable for the 2018 and 2019 period, so the of influent flow from 2016 and 2017 were used to calculate an average flow of 0.0028 MGD. Monthly maximum nitrate data provided by the facility were combined with ACEPD inspection results to calculate a nitrate loading rate of 47 lb./year (Figure 40). Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data was used to calculate these loadings of 171 lb./year and 20 lb./year, respectively. Nitrate and total nitrogen decreased since 2014 – 2015 sampling period. Table 3 compares loading values among wastewater treatment facilities located in Alachua County.

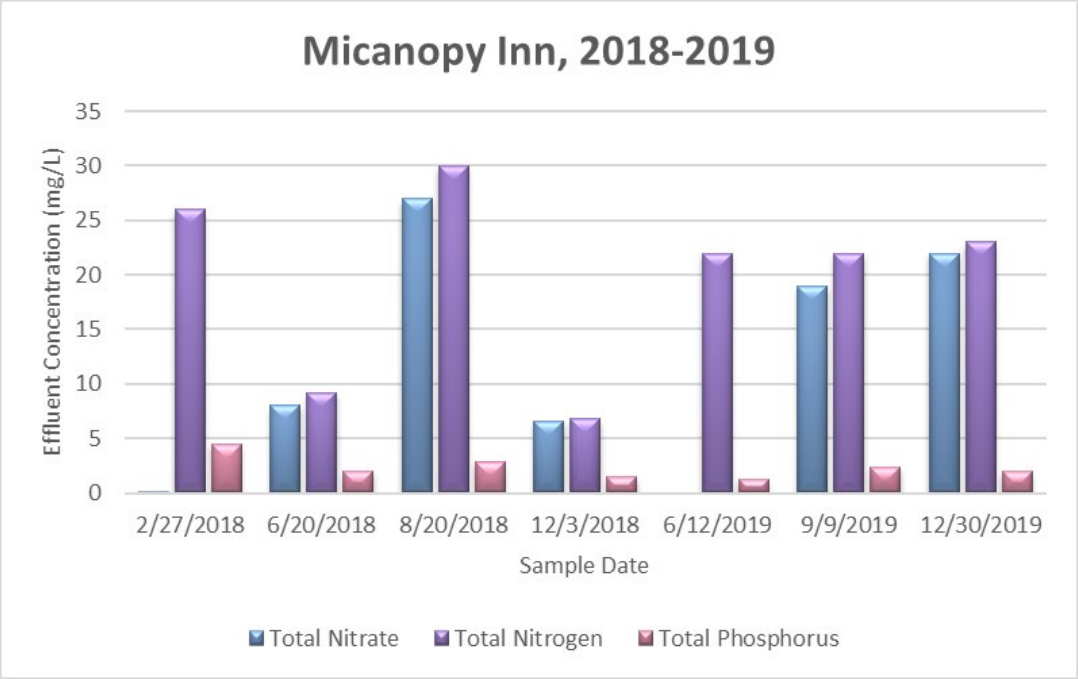


Figure 39. Effluent data from samples collected during ACEPD inspections at the Micanopy Inn Package Plant, formerly Knight's Inn

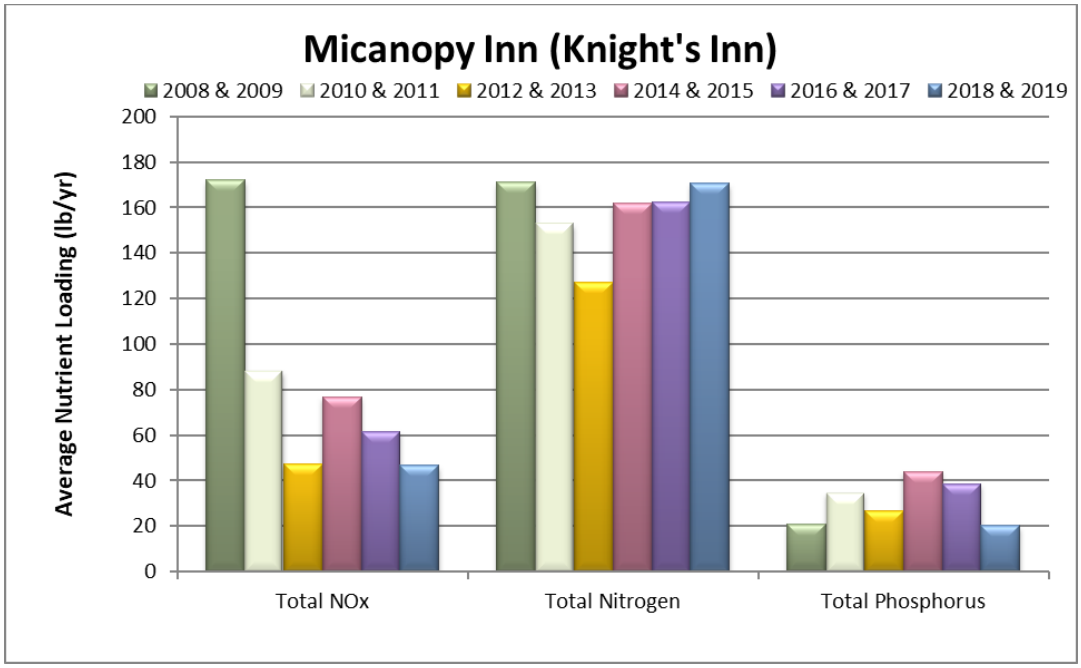


Figure 40. Estimated Nutrient Loading Values for the Micanopy Inn Package Plant, formerly Knight's Inn (2008 – 2019)

4-10 Prairie View Apartments

Facility size: 0.00424 MGD **Permit expiration date**: 9/9/2020

Permitted effluent disposal: Percolation pond (6,608 square feet).

Residuals disposal: Hauled off-site.

The Prairie View Apartments WWTF

The package plant at Prairie View Apartments is an activated sludge secondary treatment plant. This facility was inspected seven times between 2018 and 2019. The total residual chlorine was below the 0.5 mg/L FDEP permit minimum during the June and December 2018 inspections, as well as the May and September 2019 inspections. In September 2019 ACEPD noted that Prairie View did not have a plant operator. ACEPD shared inspection findings with FDEP who acted in the form of a consent order against Prairie View Apartments. ACEPD also issued a citation to Prairie View for failure to comply with the wastewater County Ordinance requirements. The rapid infiltration basin (RIB) where the final effluent is typically collected was under water for the majority of 2018, due to flooding of adjacent Paynes Prairie. Samples were not collected in 2018 during the June and August inspections. During the December 2018 inspection the RIB was still flooded, so samples were instead collected from the chlorine contact chamber. The sample results collected during –2018 to 2019 for total nitrogen ranged from 21 mg/L to 60 mg/L, nitrate ranged from 0.35 mg/L to 5.4 mg/L, and total phosphorus ranged from 1.34 mg/L to 2.75 mg/L (Figure 41). The poor effluent quality is of concern because of the plant's proximity to Paynes Prairie which is designated an Outstanding Florida Water (OFW).

Prairie View did not submit any DMR's between 2018 and 2019. Monthly average flows reported by the facility for –2016-2017 were used to calculate an average flow of 0.0043 MGD. Average nutrient concentrations were then multiplied by this flow rate to estimate the nutrient loading rates from this facility. Nitrate data collected during ACEPD inspections were used to estimate a nitrate loading rate of 21 lb./year, total nitrogen loading of 391 lb./year and total phosphorus loading of 24 lb./year (Figure 42).

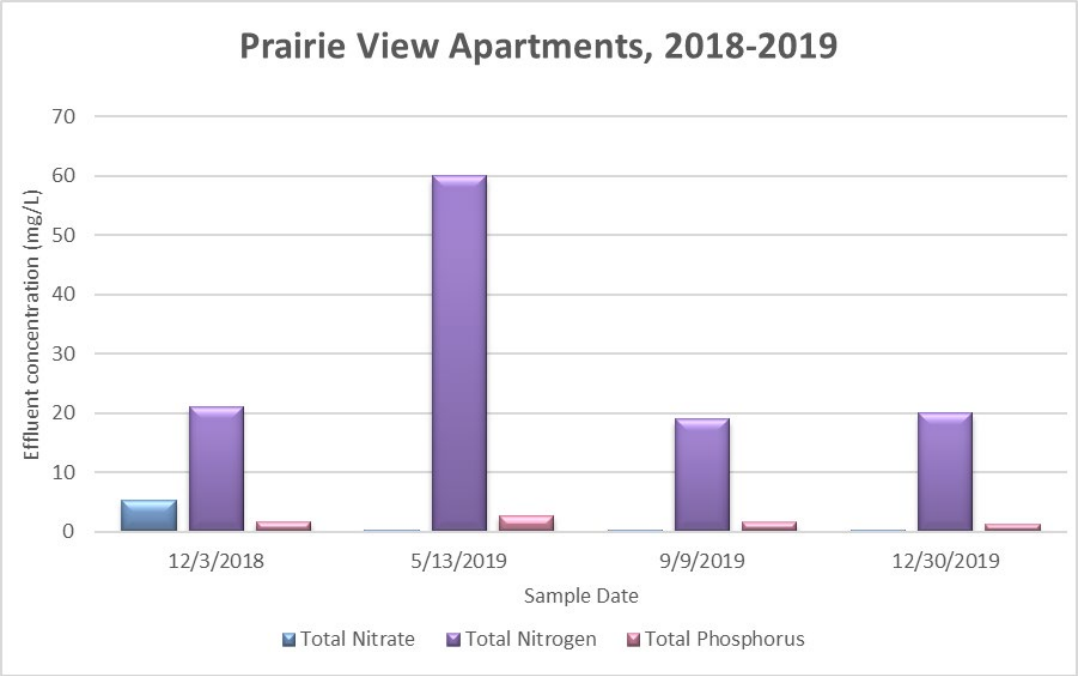


Figure 41. Effluent data from samples collected during ACEPD inspections at the Prairie View Apartments Package Plant

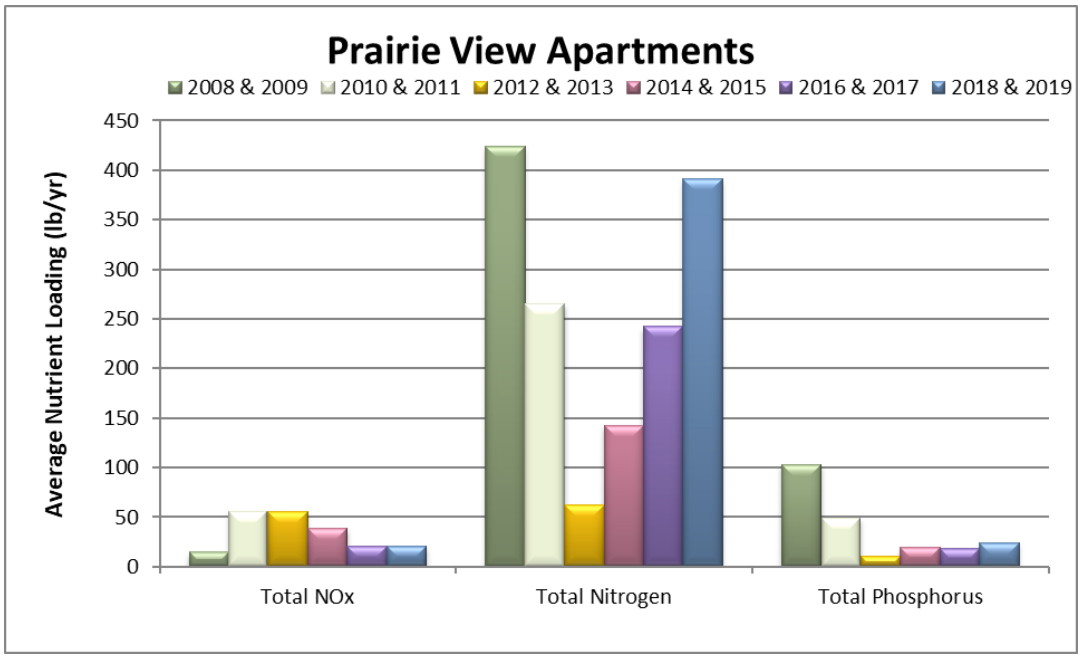


Figure 42. Estimated Nutrient Loading Values for the Prairie View Apartments Package Plant (2008 – 2019)

5.0 SUMMARY AND RECOMMENDATIONS

ACEPD will continue to monitor the Wastewater Treatment Facilities in Alachua County. Effluent will be analyzed for nutrient species (nitrate, nitrate + nitrite, ammonia, total nitrogen, and total phosphorus). If the effluent is discolored and appears to be out of compliance with its FDEP permit limitations, parameters such as Fecal Coliform, Carbonaceous Biochemical Oxygen Demand (CBOD), and Total Suspended Solids (TSS) may be monitored to assist FDEP in enforcing permit limitations. ACEPD intends to inspect all facilities at least three times a year, apart from the two GRU facilities and the Gainesville Raceway which are monitored on an annual basis. UF is no longer inspected by ACEPD.

ACEPD plans to increase communication concerning problematic facilities with the Florida Department of Environmental Protection Domestic Wastewater Compliance staff. ACEPD schedules semi-annual meetings with FDEP to review inspection results and concerns. ACEPD's inspection program assists in keeping the WWTFs in compliance with their FDEP permits. In 2013, ACEPD added enforcement capabilities to its wastewater program giving ACEPD the authority to issue civil citations for effluent and reporting violations. County Ordinance 13-11 adopted August 27, 2013, amended Chapter 24 of the Alachua County Code to provide citation authority for failure to comply with disposal standards, inspection requirements, record keeping standards, discharge requirements, temporary non-compliance requirements, and FDEP wastewater regulations.

ACEPD will continue to encourage all the wastewater treatment facilities to upgrade to more advanced treatment with the goal of reducing nutrient concentrations in treated effluent. An emphasis will be placed on treatment facilities within areas where the Floridan aquifer is unconfined, delineated springsheds of the springs of the lower Santa Fe River, and to those in the watersheds of Outstanding Florida Waters or Impaired Waters. Camp Kulaqua has abandoned their package plant and now pumps effluent to the City of High Springs Municipal Wastewater Plant. This is an important step in protecting and improving the water quality of Hornsby Spring which is a first magnitude spring on the Santa Fe River.

The Brittany Estates Mobile Home Park wastewater treatment plant discharge to Little Hatchet Creek is one source of external loading to Little Hatchet Creek and its downstream receiving waterbody Newnans Lake, which is being further evaluated.

ACEPD will promote additional nutrient monitoring (nitrogen species and total phosphorus) requirements for inclusion in FDEP permits. Some of the Alachua County waterbodies, including Lake Santa Fe (an Outstanding Florida Water) are phosphorus limited. Newnans Lake, Lochloosa Lake and Lake Wauberg have TMDLs set for TN and TP. Orange Lake has a TMDL for TP, Alachua Sink has a TMDL for TN, and the Santa Fe River has a TMDL for nitrate and DO. Basin management action plans (BMAPs) covering the lakes in the Orange Creek Basin and the Santa Fe River have been adopted by FDEP and are being implemented.

6.0 REFERENCES

Butt, P.L., Boyes, S. and Morris, T.L. 2006. *Mill Creek and Lee Sinks Dye Trace Alachua County, FL July – December 2005*. Karst Environmental Services, Inc.

Florida Department of Environmental Protection. 2014. *Basin Management Action Plan for the Implementation of Total Maximum Daily Loads adopted by the Florida Department of Environmental Protection in the Orange Creek Basin.* FDEP Division of Environmental Assessment and Restoration, Water Quality Restoration Program.

Jones, Edmonds, and Associates (JEA). 1998. Final Report, Copeland Site, Alachua, Florida for the University of Florida Foundation.

Universal Engineering Sciences, Inc. 2011. Copeland Park: Groundwater Laboratory Analytical Results.

Water Environment Federation. 1985. Operation of Extended Aeration Package Plants, Manual of Practice OM-7. Alexandria, VA.