CAPACITY ANALYSIS REPORT

Prepared For

MATANZAS SHORES WASTEWATER

TREATMENT FACILITY

FLAGLER COUNTY, FLORIDA

January 2025

FDEP FACILITY NUMBER: FLA011599
Permit Expiration: July 26,2025
FIELD EVALUATION DATE: October 18, 2024

PREPARED BY:

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CERTIFICATIONS FOR CAPACITY ANALYSIS REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

John Scott

Date 1/21/2025

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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jeffrey S Martin

Digitally signed by Jeffrey S Martin
Date: 2025.01.22 14:37:54 -05'00'

Signature, Date, and Seal

Jeff Martin, P.E. FL 43345
Name and License Number

This item has been digitally signed and sealed by Jeff Martin, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies.

1.0 INTRODUCTION

1.1 Overview

This report is being submitted in accordance with permit FLA011599 as part of the permit renewal process.

The Matanzas Shores Wastewater Treatment Facility is in Flagler County, at 110 E. Collector Road, Plam Coast, Florida. The WWTF has a permitted design capacity of 0.322 million gallons per day (MGD) and serves an estimated 1,000 residents of Matanzas Shores, Sea Colony, Surf Club, Lakeside and treats wastewater water from the Beach Haven subdivision, plus potentially additional housing as part of future development. Currently developed units utilizing the wastewater treatment plant are approximately 994, 3-bedroom units (on average) and 50 commercial recreational units. The most recent development is the Solitude subdivision Phase 1, with 14 single family homes. Units to be developed are 189 lots with 4.5-bedroom units (on average).

The facility was originally constructed in 1989. A permit revision was issued June 14, 2018, allowing for use of permitted Pond #3 and/or expansion of Ponds #1 and #2. The ponds were expanded, and the project cleared resulting in the capacity increase to 0.322 MGD AADF

There is ongoing construction activity for WWTF improvements as described under DEP permit FLA011599.

2.0 EXISTING CONDITIONS

2.1 Permitted Capacity

Matanzas Shores WWTP currently is operated under the Florida Department of Environmental Protection (FDEP) Domestic Wastewater Facility Permit, #FLA011599, issued July 27,2020, and is expiring July 26, 2025. The plant has a permitted capacity of 0.322 MGD annual average daily flow (AADF).

2.2 Monthly, 3-Month, and Annual Average Daily Flows

The monthly, three month, and annual average daily flows and the percent of permitted capacity based on the three-month average daily flow were calculated for this permitting period beginning **August 2019** through **August 2024**. The flow data obtained from FDEP are summarized in Figures 1,2 and 3 for historical annual average daily, monthly average and 3-month average daily flows.

As illustrated in Figures 1, 2 and 3 there has been a downward trend in flow, the WWTP operated at the end of year 2023 at 0.095 MGD AADF, 0.108 MGD Mo AVG and 0.103 MGD 3 Mo ADF or at about **30%** of the permitted capacity. As shown in Figure 2, except for a few

spikes, the wastewater flows over the past five years were stable with an increasing trend. The spikes, some of them with significant magnitudes, were associated with rainfall events from heavy thunderstorms, tropical storms and hurricane related events.

The Parshall Flume measured the flows with an ultrasonic flow sensor located in the chlorine contact basin and a continuous chart recorder. The flow meter was last calibrated by Florida Rural Water Association (FRWA).

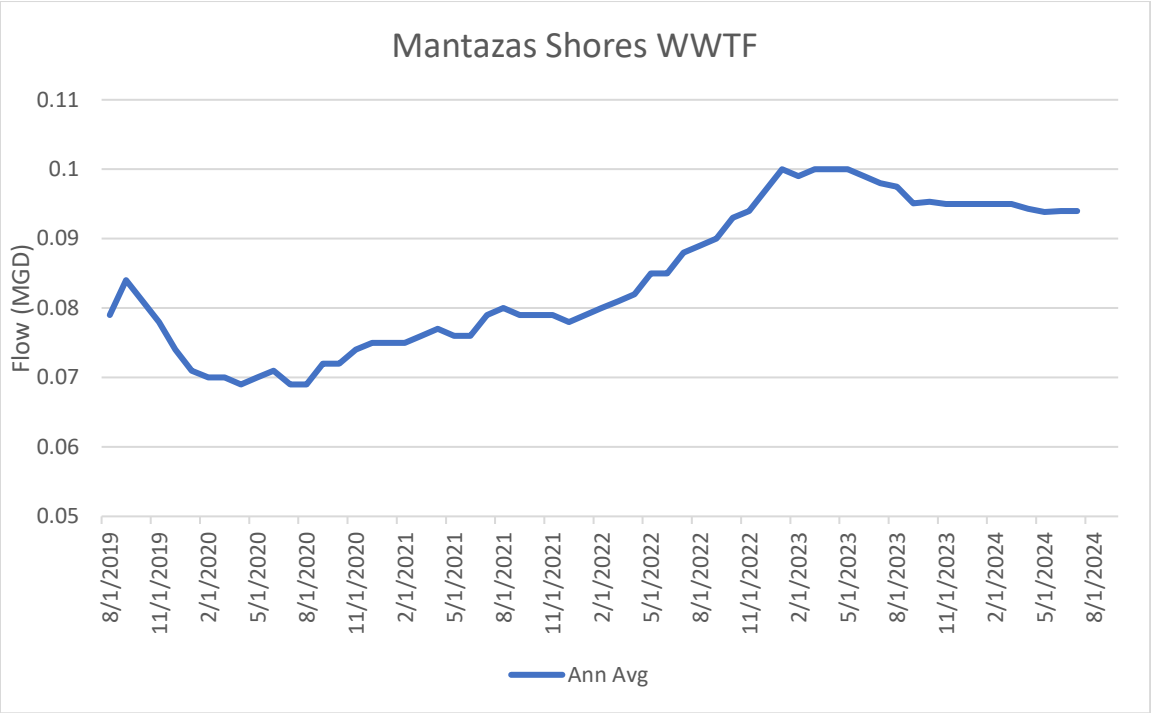

Figure 1 – Matanzas Shores WWTF Average Annual Daily Flow (AADF)

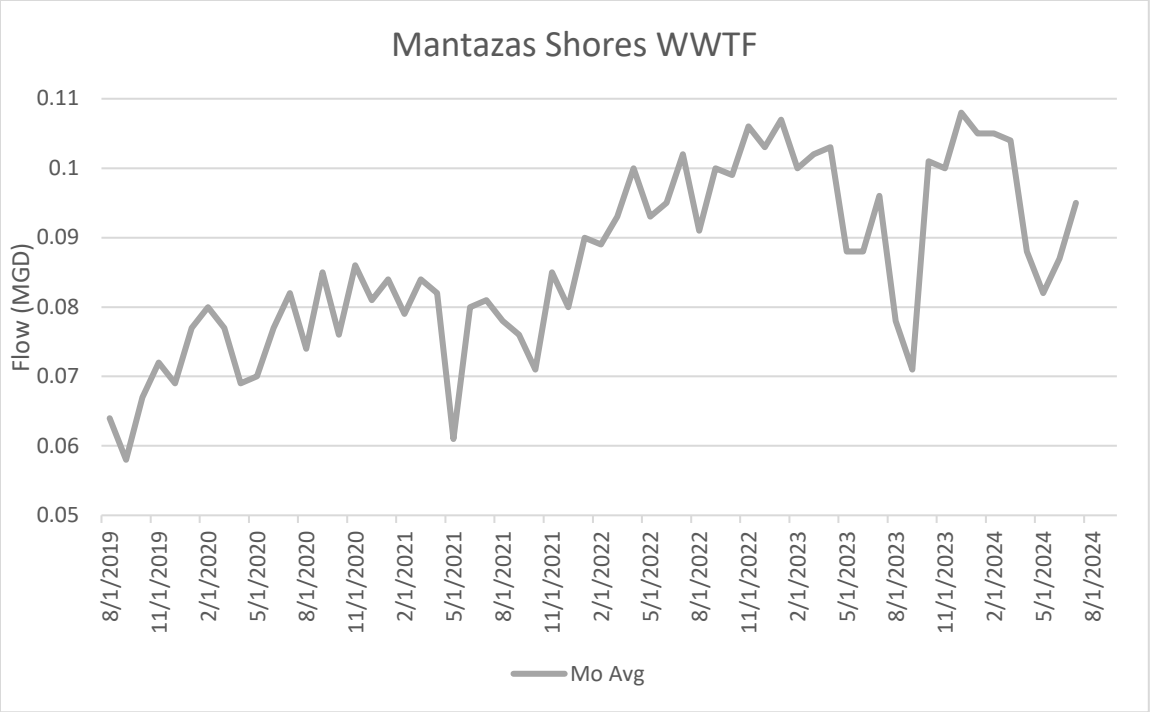

Figure 2 – Matanzas Shores WWTF Monthly Average Flow (Mo Avg)

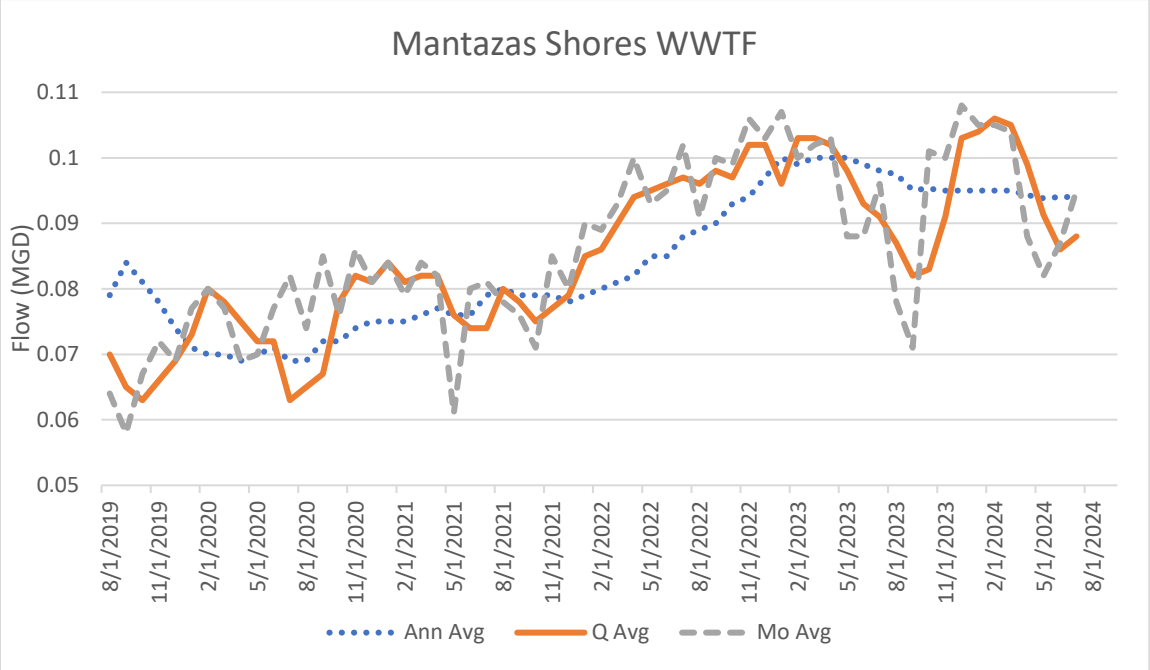

Figure 3 – Matanzas Shores WWTF AADF, Mo Avg and 3Mo Average Flow

2.3 Seasonal Variation in Flow

Seasonal variation in flow was evident by calculating the annual maximum "3-Month Peak Factor," a ratio of the maximum 3-month ADF to Annual ADF. These values for the last years are presented below. The maximum 3-month ADF typically occurs for the winter period of December to March due to a greater resident population. Recent years there is a gradual flow increase due to the overall continued increase in population.

FLOW	**Max**
AADF	**0.1**
Mo Avg	**0.11**
3 Mo Avg	**0.11**

FLOW Ratio	**Max Ratio**
Mo Avg: AADF	**1.1**
Mo Avg: 3 Mo Avg	**1.0**
3 Mo Avg: AADF	**1.1**

Table 1 – Matanzas Shores WWTF Flow Ratios

Summary of Seasonal Flow Variations

Peak flow months were January 2023 and December 2023. These seasonal peaks generally coincide with the increased winter population trend for this area.

3.0 FUTURE CONDITIONS

3.1 Population Projections

The population in the Matanzas Shores WWTP service area has been staying at the same level or in a slight declining trend through 2023. However, the population in this area in the next 20 years is projected to maintain a 1% low growth to 2.7% high growth (based the Bureau of Economic and Business Research (estimates_2023.pdf (ufl.edu) B.E.B.R. through the website of ufl.edu)).

Population Estimate 4/1/2023	Location
101,737	Palm Coast
130,756	Flagler County
19,269	Unincorporated

Table 2 – B.E.B.R. Current Population Estimate

There are 994 total developed units in the complex with remaining to be developed are 189 units with average of 4.5 bedrooms. Vacancies are sometimes high however and some units are

rented monthly during winter and/or summer. There is historically some seasonality to the flows. There are no anticipated major changes to the residential population.

3.2 Flow Projections

The table below summarizes the average per capita wastewater generation rate over the past five years (2020 - 2024). The average per capita rate includes all contributions including residential, commercial, industrial, and infiltration and inflow (I and I). By utilizing a five-year average per capita flow, both dry and wet periods are included. Estimated Service Population for the year of 2024 is 2050 people.

Population Estimate 2030	2040	2045	2050	Location
152,900	178,100	187,900	196,600	Flagler County – Medium -16%
172,700	217,800	237,700	256,500	Flagler County – High – 26%

Table 3 – B.E.B.R. Future Population Estimate

Future wastewater flow was projected from 2017 through 2026 by multiplying a 1% low growth and a 2.7% high growth projected population growth by the per capita flow established above.

For a linear growth projection, the facility will reach 0.16 MGD AADF, about 33% of permitted capacity as shown in **Figure 4**, in the year 2034 and beyond. **Figure 5** uses a very conservative exponential projection where the flow would reach 0.21 MGD AADF in 2044, about 65% of permitted capacity, however that growth rate is not expected.

By using a 1% growth rate and a 2.7% growth rate, the WWTF capacity will reach 0.11 MGD to 0.16 MGD AADF, still at about 33% of permitted flow capacity as shown in **Table 4**, in the year 2034 and beyond.

Based on the linear growth projection, the exponential growth projection or the 1% to 2.7% population growth estimate of B.E.B.R., the WWTF is expected to remain within the facility permitted capacity for the next permit cycle.

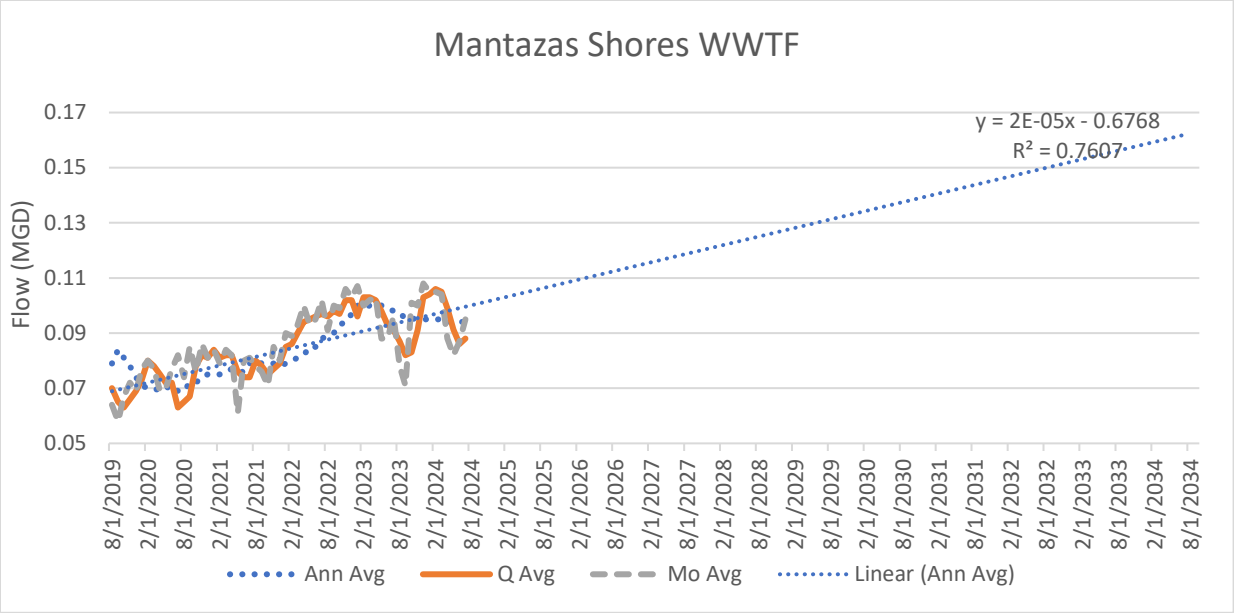

Figure 4 – Matanzas Shores WWTF Current Flow Projection at Linear Growth

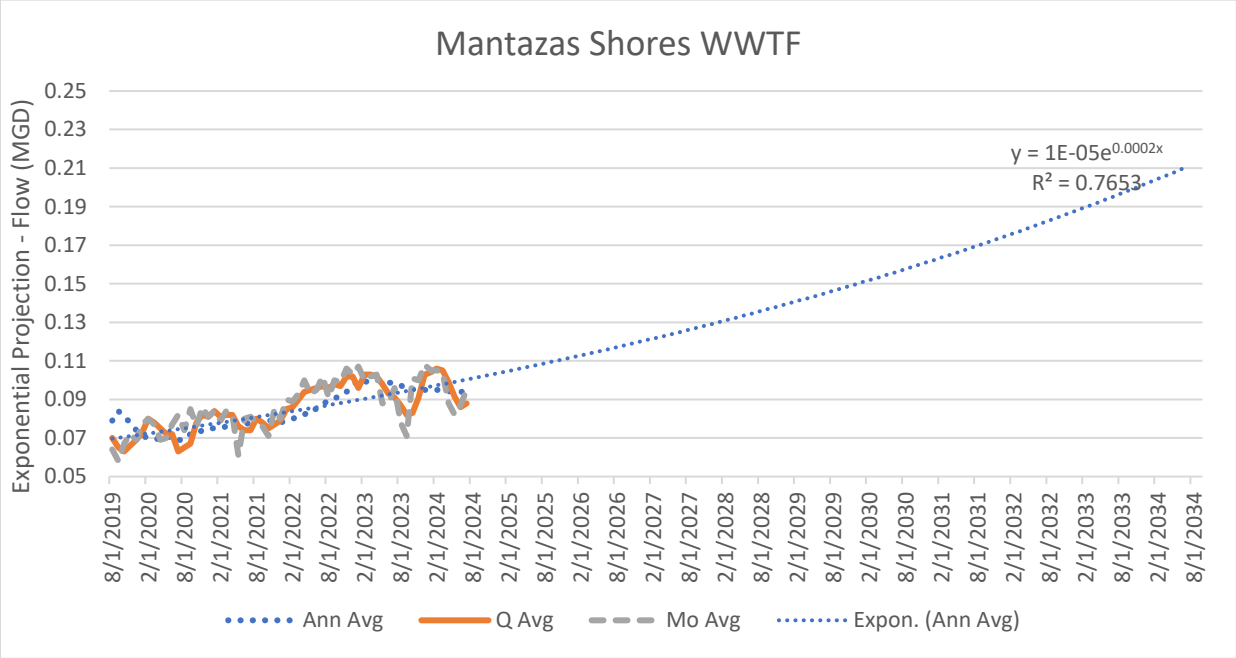

Figure 5 – Matanzas Shores WWTF Projection with Exponential Growth

Year	1% Growth	2.7% Growth
2023	0.09	0.09
2024	0.09	0.09
2025	0.09	0.09
2026	0.09	0.10
2027	0.09	0.10
2028	0.09	0.10
2029	0.10	0.11
2030	0.10	0.11
2031	0.10	0.11
2032	0.10	0.11
2033	0.10	0.12
2034	0.10	0.12
2035	0.10	0.12
2036	0.10	0.13
2037	0.10	0.13
2038	0.10	0.13
2039	0.11	0.14
2040	0.11	0.14
2041	0.11	0.15
2042	0.11	0.15
2043	0.11	0.15
2044	0.11	0.16

Table 4 – Matanzas Shores WWTF Projection at 1% and 2.7% Yearly Growth

4.0 COLLECTION SYSTEM EVALUATION

The main components of the current sewer system are estimated as follows:

- 100 manholes,
- 900 service connections,
- approximately 135,000 feet of gravity piping,
- 4 lift stations,
- 5 miles of force main piping,

• 0.322 MGD wastewater treatment facility (WWTF),

The Matanzas Shores WWTF is required to monitor the carbonaceous biochemical oxygen demand ($CBOD_5$) and total suspended solids (TSS) concentrations in the influent samples. Table 3 summarizes the historic influent $CBOD_5$ and TSS concentrations extracted from the FDEP electronic database.

INFLUENT	Aug-22	Aug-23	Aug-24	Min	Max	50th P	95th P	Skew	Std Dev	Average
CBOD5 (mg/L)	178	104	142	65.80	413	189.00	325.8	0.60	72.78	205.41

INFLUENT	Aug-22	Aug-23	Aug-24	Min	Max	50th P	95th P	Skew	Std Dev	Average
TSS (mg/L)	121	924	96	68.00	14800	218.50	3990.5	4.11	2606.0	1111.4

Table 3– Matanzas Shores WWTF Influent Loading

The influent CBOD5 and TSS concentrations averaged **205 mg/L and 1111 mg/L**, respectively over the period from **August 2019 through August 2024**. As illustrated on Figures 6 and 7, the overall trends of the influent quality vary throughout the permit cycle and during high volumes of rain the TSS and $CBOD_5$ spike respectively. The $CBOD_5$ highest value was in May 2021 at 413 mg/L and TSS highest concentration was 14,800 mg/L in August 2021, greatly exceeding the upper limits of domestic wastes and strongly suggest that it was caused by unknown loading associated by the discharge from local sources. Perhaps the values also may be related to the composite sampling.

July 2021 through December 2021 had unusually high influent TSS loading. However, the higher level of TSS influent do not seem to be related to WWTF flow conditions.

A review of the TSS and CBOD5 influent statistics indicate that the 50th Percentie for TSS is 218 mg/L and is 189 mg/L for CBOD5. The influent wastewater values at the 50th Percentile are representative of a typical residential community.

Historically for domestic wastewater treatment plants, the organic loading concentrations are increasing because in recent years low flow plumbing and appliances conserve potable water supply and reduces the incoming flow, on average, to a domestic wastewater facility. The $CBOD_5$ and TSS concentrations are expected to be maintained at the current level and the $CBOD_5$ loading is likely to be within the plant's design capacity in the next permit period.

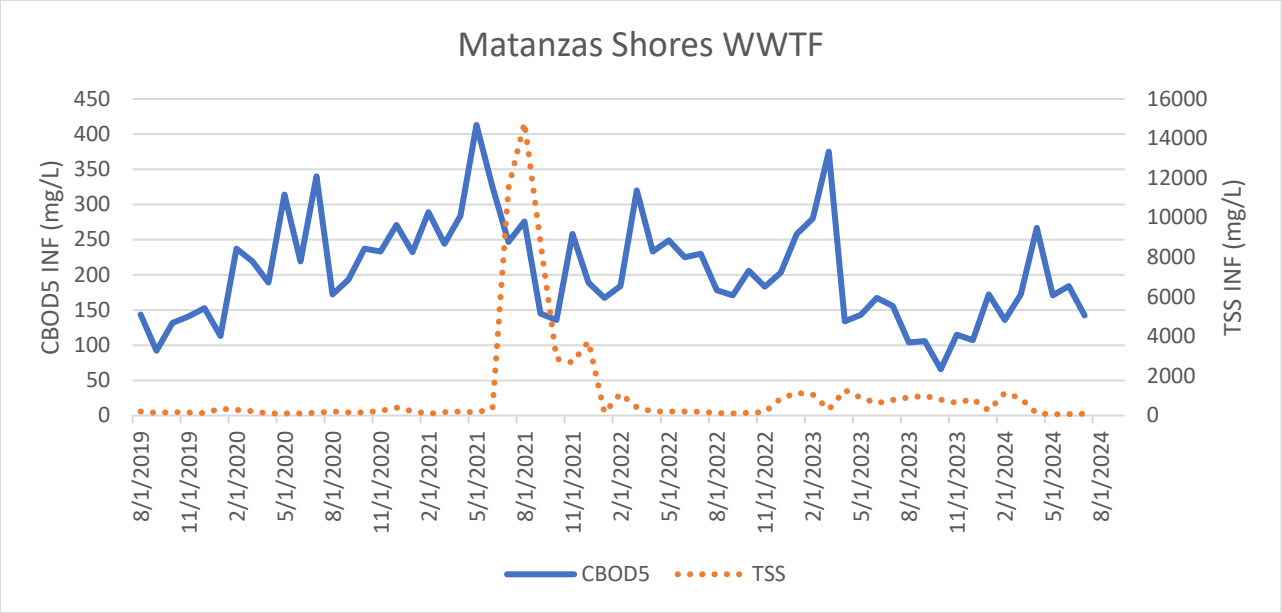

Figure 6 – Matanzas Shores WWTF Influent $CBOD_5$ and TSS

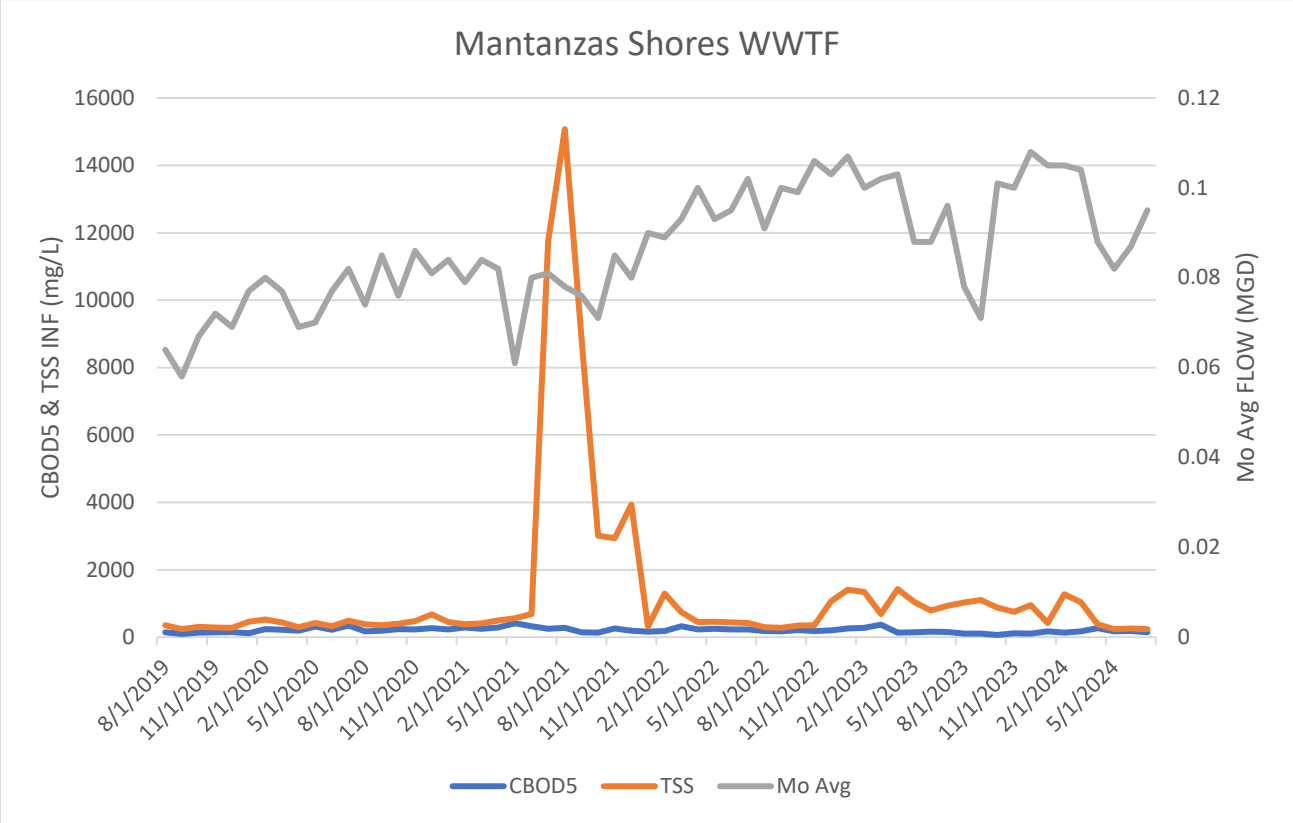

Figure 7 – Matanzas Shores WWTF Influent $CBOD_5$, TSS Versus Monthly Average Flow

4.1 Flow and Organic Loading Ratios

The Matanzas Shores Owner's Association, Inc. owns and has contract services to Biometrics to operate the wastewater collection and treatment system for its service area. The sewer system is generally new, some portions being 35 years old to more recent construction within the last year. Overall, the system is in good function and operates satisfactorily.

		Aug-22	Aug-23	Aug-24	Min	Max	50th P	95th P	Skew	Std Dev	Average
Flow	Ann Avg	0.089	0.171	0.09	0.07	0.10	0.08	0.10	0.12	0.01	0.084
EFA-1	Q Avg	0.096	0.087	0.09	0.06	0.11	0.08	0.10	-0.02	0.01	0.085
	Mo Avg	0.091	0.078	0.095	0.06	0.11	0.09	0.11	-0.07	0.01	0.086

Table 4 – Matanzas Shores WWTF Flow Statistics

Saltus Engineering was contracted by the Matanzas Shores Owner's Association to review the collection system in the service area to provide sewer system evaluation as related to the DEP permit renewal. The goal of the investigation was to determine if inflow and infiltration is present in the gravity system of each lift station, to map the system and evaluate lift stations for functional operation.

EPA reference documents have indicated that I and I flow of 120 GPD per person as excessive, and once the evaluation can be conducted and completed the Matanzas Shores CS system status will be known.

DEP rule updates to Chapters 62-600 and 62-604 FAC concerning a Collection System Action Plan requires a five-year planning horizon to evaluate the entire CS. This rule is now in effect and the CS Action Plan is being developed and full documentation will be submitted by the date of the **First Annual** report to DEP that will be **due June 30, 2025**.

4.2 Recommendations for Collection System

As part of utility planning, a thorough review and analysis of the wastewater collection system will need to be conducted to meet the new DEP rule requirements.

The scope of the **CS Action Plan** is described below:

1. Inventory existing collection system, service area characteristics, and environmental conditions.

2. Establish design needs for the planning period.

3. Identify and evaluate collection lines, manholes, and lift stations.

4. Recommend the most cost-effective, environmentally sound facilities to meet the planning needs.

5. Provide a mapping system, such as Diamond Maps and a layout for the CS components.

6. Present a schedule of implementation of any recommended facilities.

7. Identify any adverse environmental impacts and propose mitigating measures.

If a Rehabilitation alternative is selected, the plan would have the following components:

- Sewer System Evaluation Survey to clean and televise gravity sewer pipe.
- Lining of aging pipe and point repairs.
- Repair any manholes with cementitious grout or fiberglass lining; and lid rehabilitation
- Repair any lift stations
- A list of capital improvements at the wastewater treatment facility.

The **Final CS Action Plan** will cover all the requirements for DEP from Rules 62-600 and 62-604 FAC as indicated in the Report outline below:

1. Introduction
2. Power Outage Contingency Plan
3. Inventory and Mapping
4. Inflow and Infiltration and Leakage Surveys
5. System Evaluation Plan
6. Maintenance and Repair Plan
7. Record Keeping
8. Fats, Oils, and Grease
9. Local Sewer Ordinances/Requirements
10. Satellite Systems
11. System Resiliency
12. Annual Report
13. Conclusion

There is additional Collection System and Lift Station information in the Operation and Maintenance and Performance Report.

5.0 SUMMARY AND CONCLUSIONS

The Matanzas Shores service area has seen a steady increase in service area population over the last 10 years, there is absence of commercial or industrial inputs since this WWTF serves residential communities. A review of the collection system for manholes, lift stations and other components will be conducted.

5.1 Time Required for the Three-Month Average Daily Flow to Reach Permitted Capacity

The rolling TMADF has not exceeded the permit limit in the last five years. The tables above show that the maximum TMADFs are **not** projected to exceed the permitted capacity of the treatment facility (based upon current rate of growth) within the next 10 years.

5.2 Recommendations for Expansion

As stated above, the TMADF has not exceeded the permit limit, nor are the projected maximum TMADFs projected to exceed the permit limit in the next 5+ years. Based on these factors, there are no recommendations for expansion at this time. However, Matanzas Shores will continue and proceed with needed WWTF modifications and improvements to maintain the existing operation and to meet the expected new customer connections from new developments.