

**Lower St. Johns River Main Stem (LSJR)
and Lower St. Johns Tributary (LSJT)
Draft BMAP Plan for
City of Neptune Beach**

Duval County, Florida

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Introduction

This Draft Plan covers City of Neptune Beach proposed projects related to domestic wastewater facilities, infrastructure, and OSTDS (septic systems) which are tracked for the purpose of estimating nutrient load reductions for the Florida Department of Environmental Protection (DEP).

City of Neptune Beach is following the EPA's Capacity, Management, Operations and Maintenance (CMOM) assessment process and will prepare the DEP CS Pipe Assessment Plan under 62-604 FAC that includes two main areas:

1. Emergency Preparedness/Response Plan
2. Collection Systems Action Plan

The CS Pipe Assessment Plan will include asset management and GIS mapping for the entire wastewater system.

Florida Legislature recognized potential future potable water shortfalls and mandates communities to reuse effluent for irrigation and as a source of potable water. The Florida Statutes require disposal of treated effluent to surface waters be essentially eliminated by January 2032, mandating beneficial reuse of 90% of the facility's annual average flow. The remaining limited wastewater surface water discharge must meet Advanced Wastewater Treatment (AWT) limits of 5 mg/L CBOD5, 5 mg/L TSS, 3mg/L TN and 1 mg/L TP.

Senate Bill 64, SB 712, and HB 1379 mandate compliance with the new requirements by January 1, 2033. Florida Statute 403.064, Reuse of Reclaimed Water is commonly known as Senate Bill 64 and will impact the City of Neptune Beach with an estimated cost of \$8M to \$10M for a single deep injection well. A second well or an upgrade of treatment level to AWT will be required for redundancy. Concerning WWTF nutrient removal and treatment improvements, Total Nitrogen treatment improvements will involve WWTF Plant 2 construction upgrades. Bids opened in December 2023 and options are currently being evaluated, because bids were much higher than anticipated in the range of \$7.5 M to \$8.2 M. Various other equipment improvement projects are in process or completed including directing the flow equalization basin to Plant 1. WWTF Plant 1 improvement study is underway to evaluate Total Nitrogen and hydraulic issues.

The City of Neptune Beach is providing this Draft BMAP Plan to propose an evaluation and to prepare for improvements to address SB 64, SB 712, and HB 1379 for WWTF Nutrient Removal by considering Advanced Wastewater Treatment, the potential reuse of reclaimed water, providing further treatment for Underground Injection of treated wastewater (UIC) and to give consideration of other options. The Wishlist for the City of Neptune Beach will identify and consider Onsite Septic Treatment and Disposal Systems (OSTDS) phase-out and/or septic tank upgrades to nutrient removal if required by the BMAP.

HB 1379 requires nitrogen-reducing systems (for OSTDS) in places where waterbodies do not meet water quality standards and there is a plan in place to make water quality better. **LSJR Basin is in the affected area.** Effective July 1, 2023, HB 1379 requires that in all impacted areas, applicants for new septic systems (or for repair of existing systems) serving lots of one acre or less, must install a nitrogen-reducing system (ENR-OSTDS) instead of a conventional septic system.

Response to DEP BMAP Plan WWTF Questions

1. The facility's permitted capacity in average annual gallons per day;

Permitted design capacity to surface water is 1.50 MGD AADF, permitted capacity to surface water is 0.90 MGD AADF. The permitted capacity to reuse is 0.099 MGD AADF.

2. The facility's permitted TN and TP effluent limits for the facility;

TMDL TN is 13,559 lbs/yr, TMDL TP is 4,015 lb/yr

3. The annual TN and TP loads (showing both flow and concentrations) discharged from the facility over the past five years, estimated if necessary;

From DEP WL23-215, dated November 6, 2023, TN annual total is 37,302.1 lb/year as of August 2023 which exceeds the consent order limit of 36,584 lb/year. From the August 2023 DMR submitted to DEP, the monthly average flow was 0.9 MGD, the TN monthly average was 19.16 mg/L and the TP monthly average was 2.16 mg/L.

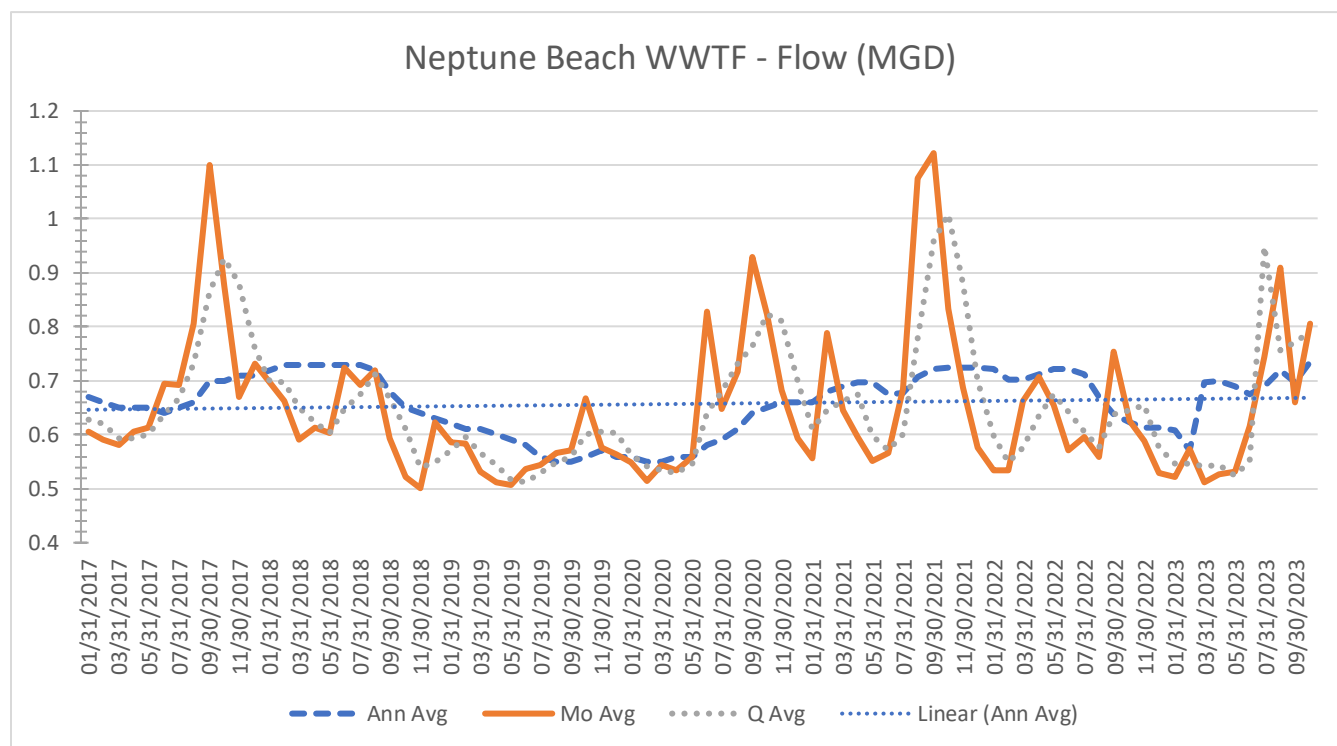


Figure 1 – Neptune Beach WWTF Flow (Discharge to Surface Waters)

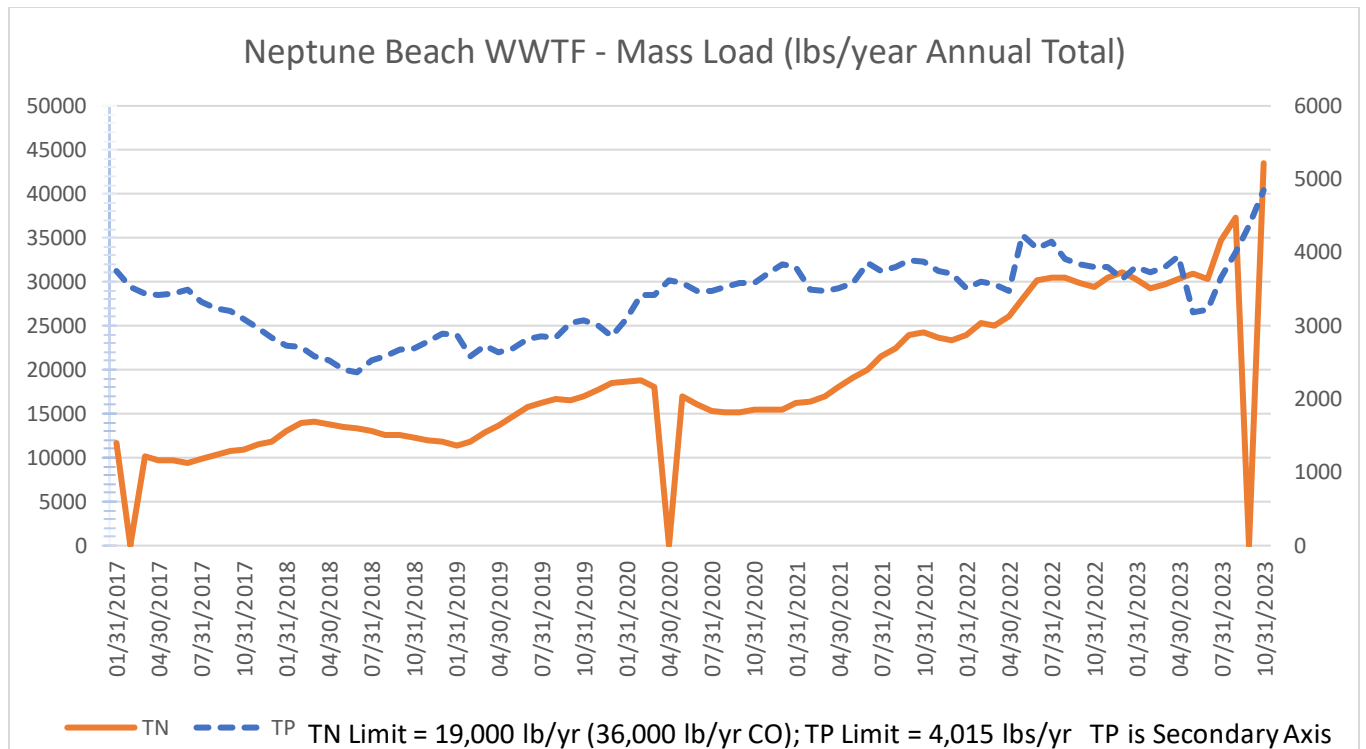


Figure 2 – Neptune Beach WWTF TN and TP Mass Load

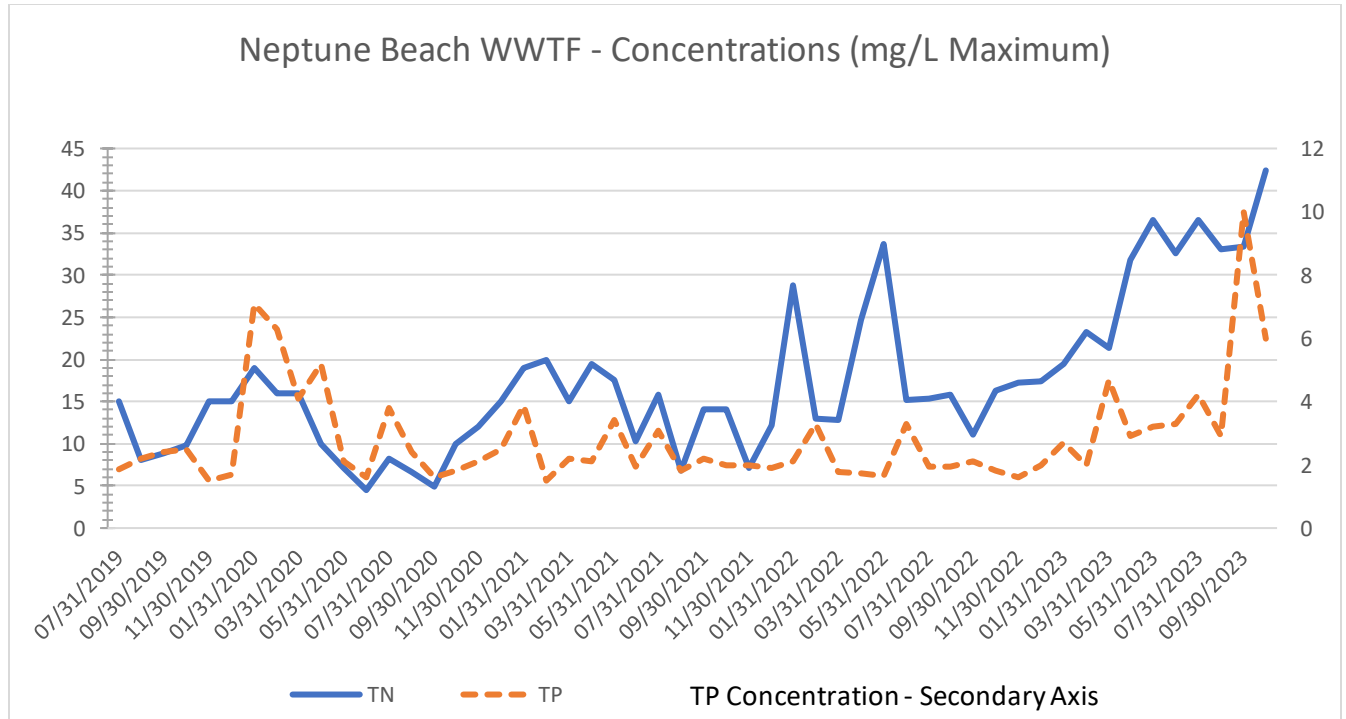


Figure 3 – Neptune Beach WWTF – TN and TP Concentrations

4. A capacity analysis for the facility, considering future growth over the next 20 years;

Based on a review of DEP DMR data, the WWTF will not reach permitted AADF capacity of 0.9 MGD within 20 years. The permit renewal document will include a full and updated Capacity Analysis Report (CAR).

The city is pursuing Inflow and Infiltration (I&I) reduction, estimated at 0.28 MGD. During the period of a Sanitary Sewer Overflow (SSO), the I&I reached 660,000 gpd. At a WWTF Average Day Flow of 585,000 gpd for July 2019 through June 2020, the corresponding flow per equivalent ERC was $585,000 \text{ gpd} / 4008 \text{ ERCs} = 146 \text{ gpd/ERC}$. For the high rainfall month of June 2020, the WWTF flow was 827,000 gpd, resulting in a flow per equivalent ERC of 206 gpd/ERC. These flows peaked at approximately 0.28 MGD during the high flows received in June and July 2020.

The City is generally at build-out conditions.

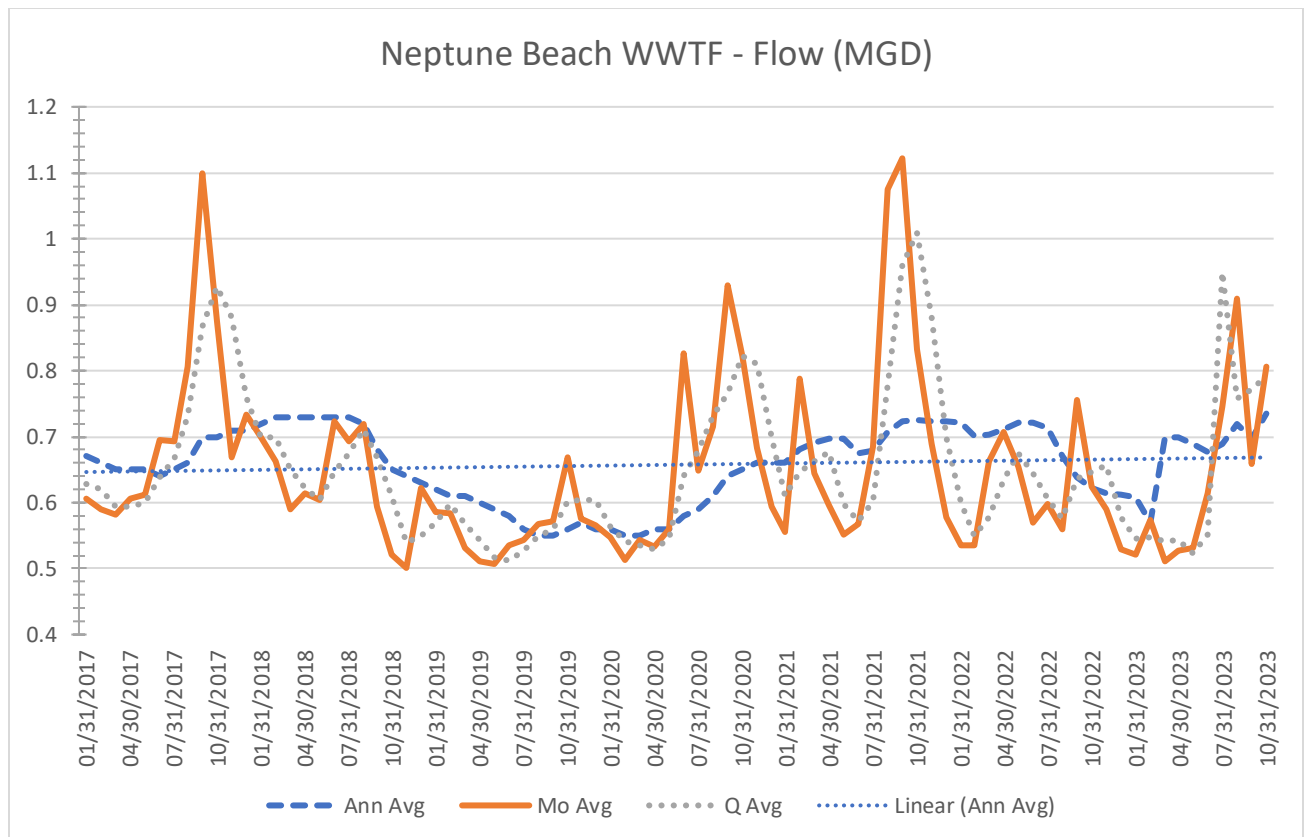


Figure 4 – Neptune Beach WWTF – Flow Projection

5. A list and ranking of facility construction, expansion, or upgrades necessary to meet applicable nutrient water quality requirements (for example, to meet nutrient effluent limits in BMAPs and TMDLs, section 403.064(17), Florida Statutes, requirements, or other statutory or regulatory requirements), and the estimated costs of these facility improvements;

The City of Neptune Beach impact is estimated at \$8-\$10 million for a single, deep injection well. A second well or upgrade of treatment levels to AWT will be required for redundancy.

Option:	Rapid Infiltration Basin (RIB)	Public Access Reuse (PAR)	Deep Well Injection
Benefits:	- Low cost - Proven - Recharge surficial aquifer	- Highest and best use of effluent - Reduce demand on the Floridan aquifer	- Can design an injection well to handle effluent flow needs - Smallest land requirements of the options
Risks and Downsides:	- Requires large area of vacant land - Surface fouling/crusting - Potential to build up CECs or other contaminants that pass through the treatment process in ground water - Finding 30-acres of available land outside the City limits with good perk rates - Transmission distance to the RIB site	- Wide range of seasonal demand fluctuations (e.g. wet vs. dry season) - Daily usage fluctuations - Established R-O-Ws that have decades of infrastructure installed, retired in place, and replacement infrastructure installed by all the various utilities - Would require additional land for storage	- Little information is available on the aquifer under the Floridan in this region. - The long FDEP permitting process
Considerations:	The City is built-out and does not have large parcels of land available	- PAR is not viable single option with the seasonal and daily variation in usage - SB64 requires a minimum of 90 percent of a facility's annual average flow	- Would the FDEP issue a permit for deep well injection - What is the life span of a deep injection well
Budget Costs:	\$4.5 million + Land Acquisition + Transmission	\$22 million	\$18 million
Annual payment to a 20-year bond or loan at 3%:	\$300,000	\$1,465,000	\$1,200,000
Appraisal:	- Is within the utility's means based on current revenues - The City does not have sufficient vacant land needed to site a RIB large enough to handle the WWTF effluent flows; <u>therefore</u> this estimate does not include an unknown land acquisition cost. - Based on the land acquired a transmission system will be required which is estimated to cost up to an additional \$10 million.	- Raise utility rates approximately \$5.60/1000 gal (customer bills increase by \$38/<u>mo</u>) - Cannot handle the seasonal or daily variation in <u>flows</u> - The 90% of facilities annual average flow requirement is not achievable - Not likely to meet daily discharge demands	- Raise utility rates approximately \$4.60/1000 gal (customer bills increase by \$31/<u>mo</u>) - Will require additional study and discussions with FDEP

Table 1 – Neptune Beach WWTF Cost Estimates

6. A projected timeline of the dates by which the construction of any facility improvements, including new/extended sewer lines, will begin and be completed and the date by which operations of the improved facility will begin.

Potential Reuse Project

Reuse of reclaimed water for Part III public access irrigation has potential at Neptune Beach Elementary School. Based on the soils information from Natural Resources Conservation Services (NRCS), the primary soil type #71 is Leon-Boulogne complex, 0 to 20 percent slope, affine sand to depths of 80 inches, with depth to water table ranging from 6 to 18 inches and is not hydric soil. Site specific soil borings and geotechnical evaluation would be recommended.

The site would have about 3.5 acres of available irrigation area. From FEMA maps, the flood

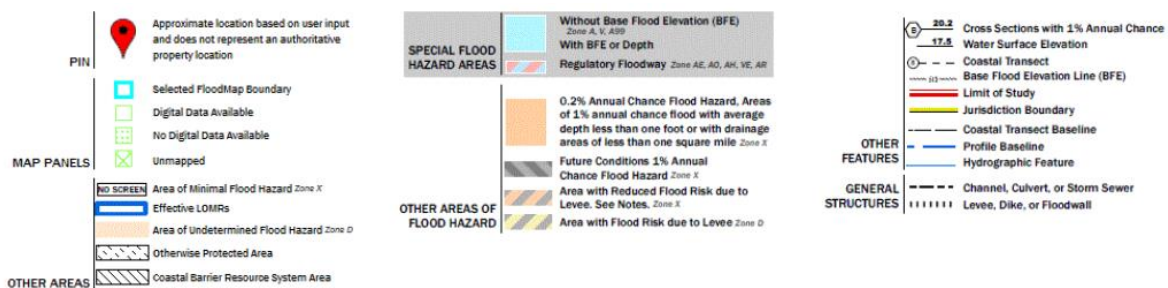
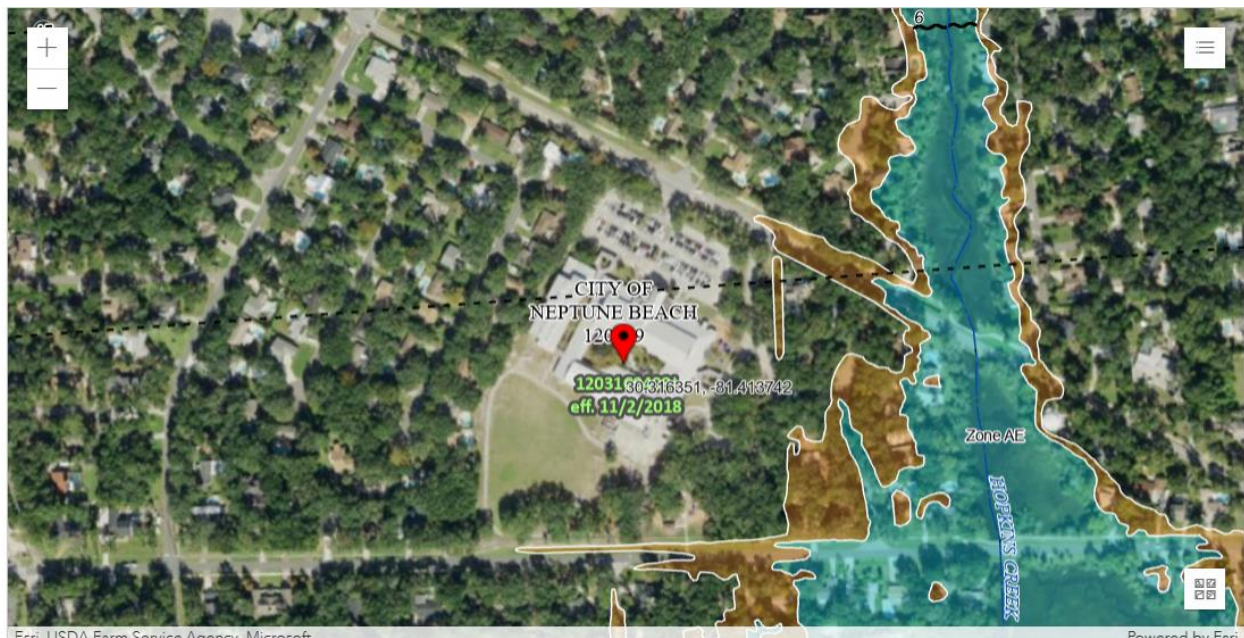


Figure 5 – FEMA FIRM Map for Neptune Beach Elementary School

map for the selected area is number **12031C0408J**, effective **11/2/2018**.
([FEMA Flood Map Service Center | Search By Address](#))

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

For 3.5 acres, irrigated at 2 inches per week, there is potential for 190,000 gallons per day of public access reuse of reclaimed water based on an annual average daily flow. A site-specific geotechnical evaluation would need to be conducted to confirm the soil and water table conditions, plus determine the actual available application area considering regulatory setbacks.



Figure 6 – Potential Public Access Reuse Site – Elementary School

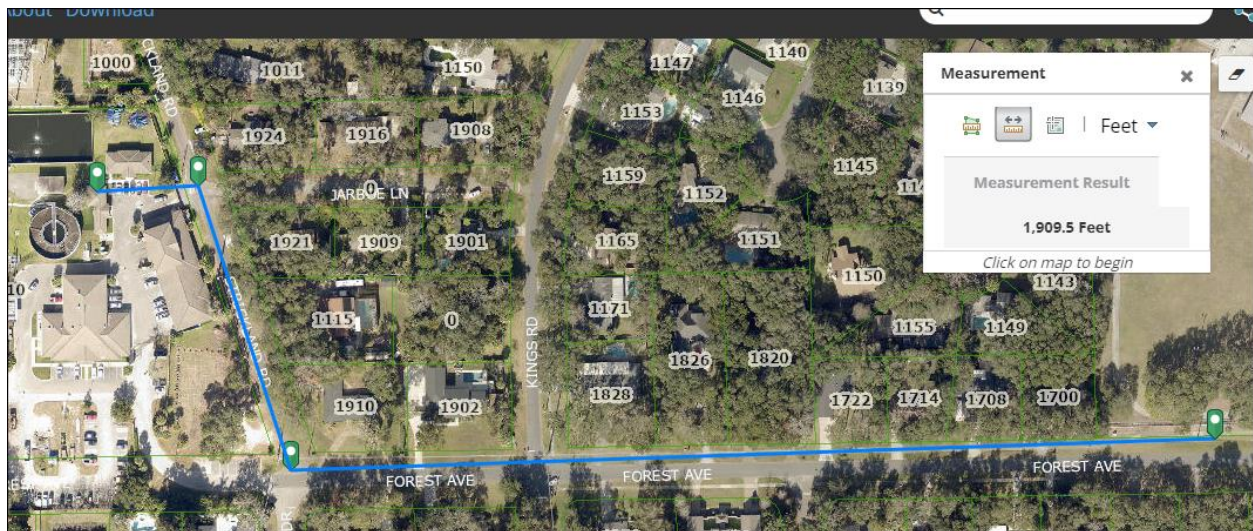


Figure 7 – Potential Reclaimed Water Main to Serve Public Access Reuse Site

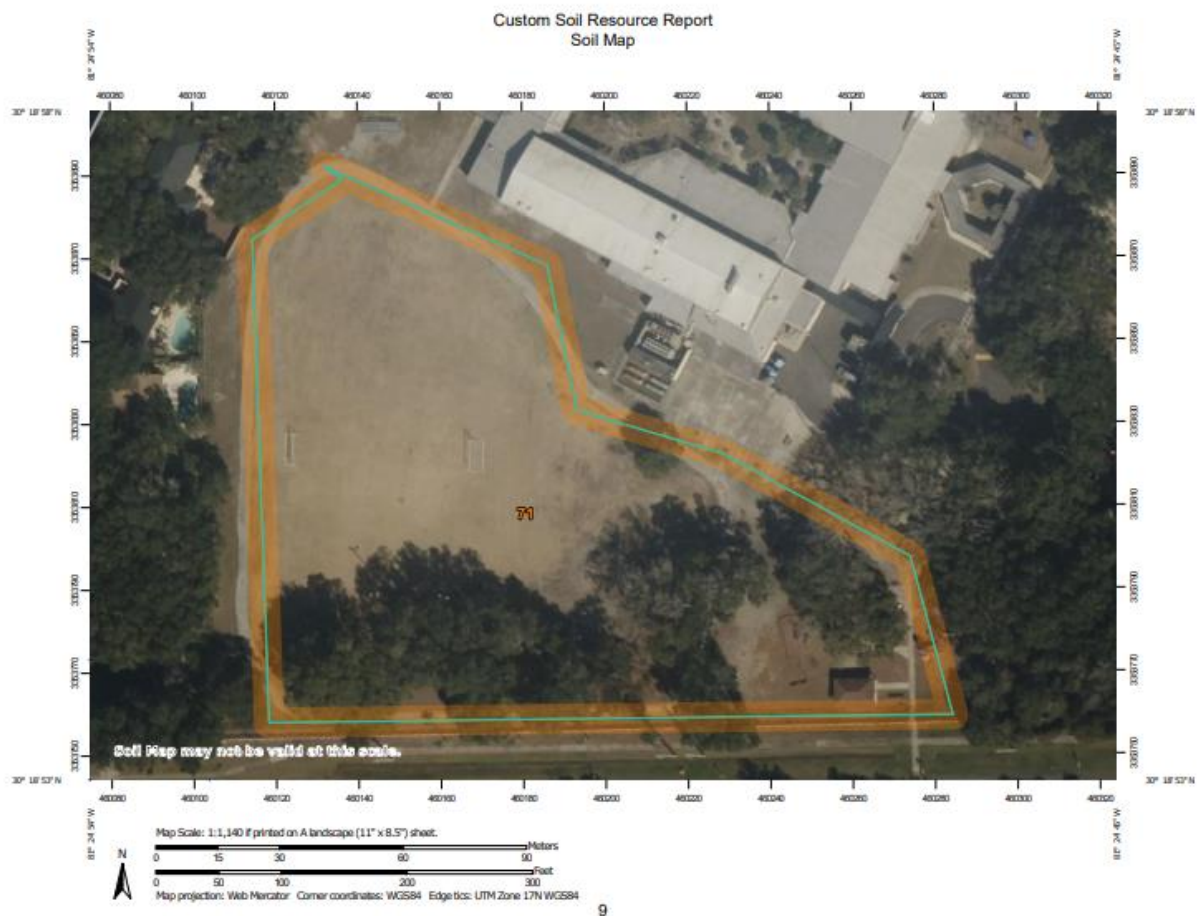


Figure 8 – Potential Public Access Reuse Site NRCS General Soils

In order to meet the requirements for SB 64 and for HB 1379, improvement actions shall be completed according to the following schedule:

Improvement Action	Completion Date
Complete Evaluation and Planning for Improvements to address SB 64 WWTF Nutrient Removal by providing reuse of reclaimed water, providing UIC and/or evaluation and consideration of other options. (Neptune Beach Final BMAP Remediation and Treatment Plan completion date)	8/1/2024
Complete Design for Improvements to meet requirements of SB 64	12/1/2027
Obtain and Secure Funding Sources and Necessary Permits to Address the Design and Improvements for meeting SB 64	12/1/2028
Once Permits and Funding Sources are secured, Commence Construction to Address Improvements to meet SB 64 requirements.	12/1/2029
Complete construction for WWTF Improvements, Complete Record Drawings, Develop Operation and Maintenance Manuals, Certify Completion of Construction and Commence Operation	7/1/2031
Evaluate WWTF system Operation and certify to DEP that the requirements of SB 64 are being achieved (meet the deadline of 1/1/2032)	12/31/2031

Table 2 – Neptune Beach WWTF Timeline for WWTF Actions

Response to DEP OSTDS Remediation Plan Questions

1. An inventory of the OSTDS (including locational information, such as GIS shape files, if available, or an excel spreadsheet with addresses and/or latitude and longitude) within the local government's jurisdiction or service area based on the best information available;

The wastewater master plan evaluation area is in Neptune Beach, lies within the Hopkins Creek Watershed and encompasses 45 residential lots (38 developed and 7 undeveloped) near the southern portion of Kings Road along Nightfall Drive and Seagate Avenue, as depicted in Figure 9.

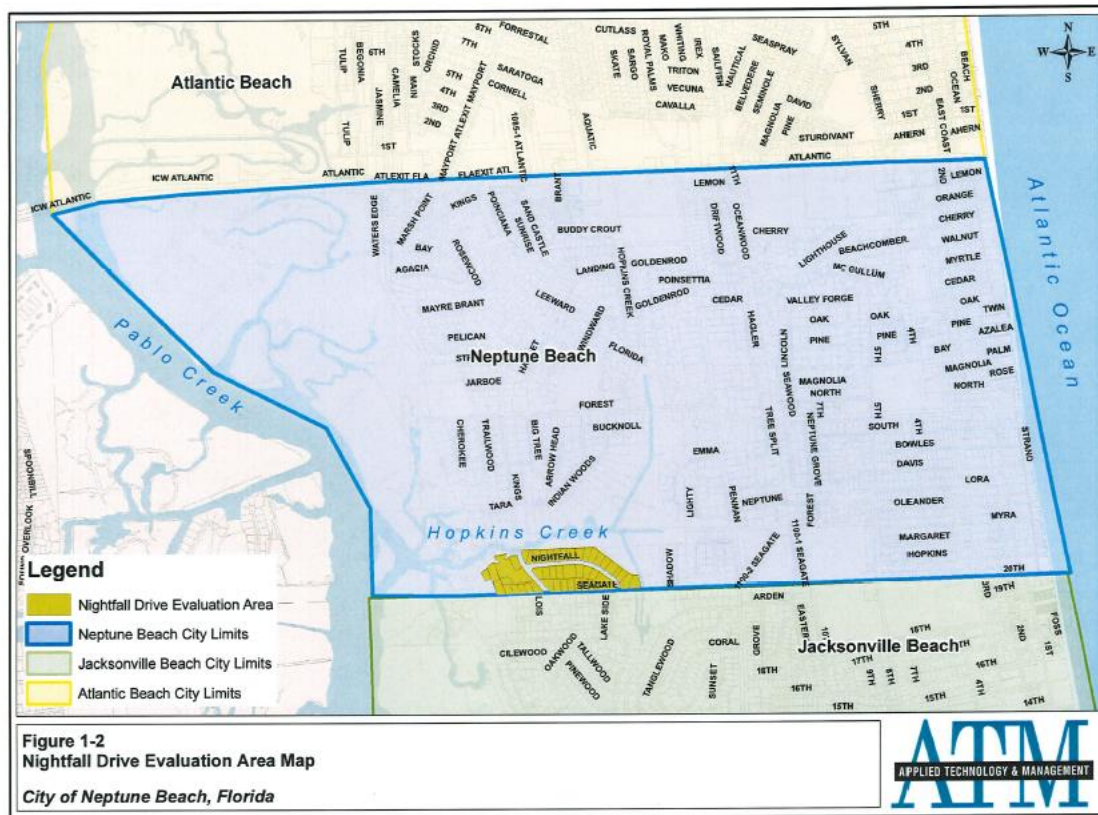


Figure 9 – Potential OSTDS Phase-Out - Nightfall Drive

Nightfall Drive Evaluation Area Wastewater Flow Generation Estimates	
Existing ADF (gpd)	10,688
Build-Out ADF (gpd)	12,656
Existing Peak Flow (gpm) ¹	32
Build-Out Peak Flow (gpm) ²	38

¹ Existing Peak Flow Peak Factor used 4.32

² Build-Out Peak Flow Peak Factor used 4.47

Figure 10 – Potential OSTDS Wastewater Flow Estimates

2. An inventory of OSTDS that are expected to be eliminated over the next 20 years through connection to central sewer lines of a domestic wastewater facility or other distributed wastewater system with additional nutrient reduction (including locational information, such as GIS shape files, if available, or an excel spreadsheet with address and/or latitude and longitude);

The wastewater master plan evaluation area is in Neptune Beach, lies within the Hopkins Creek Watershed and encompasses 45 residential lots (38 developed and 7 undeveloped) near the southern portion of Kings Road along Nightfall Drive and Seagate Avenue, as depicted in Figure 9. The area is well established, with few undeveloped lots and is characterized by its narrow roads and expansive tree canopy.

For the septic tank phase-out, the 2011 consultant study identified three options for the Nightfall Drive area (45 properties). The cost range in 2023 dollars is from \$566,000 to \$1,200,000, however, recent supply chain and inflationary pressures on construction probably will push the total cost higher. Shadow Lane has approximately ten properties and this area has not been studied.

Options Include:

1. No Action
2. Install Conventional Wastewater Collection System
3. Install Grinder Pump System
4. Install Septic Tank Effluent Pump (STEP) System

A spreadsheet tool has been developed to assist BMAP stakeholders with quantifying nutrient reductions associated with OSTDS Phase Out or Enhancement Projects. By using the FDEP NSILT calculator, SJRWMD/DEP Modified version for the elimination of 45 homes with septic tanks, the reduction of TN load to the basin would be estimated as 533 lbs/year ([Methods for Calculating Project Reductions | Florida Department of Environmental Protection](#)). [OSTDS Calc Methods for BMAPs_230811.xlsx \(live.com\)](#). This calculated value assumes the Neptune Beach WWTF will meet AWT treatment levels and this increased treatment level would be a requirement as part of SB 64 and HB 1379.

The intersection of Nightfall Drive and Kings Road is located at LAT 30° 18' 30.50" and LONG -81° 24' 59.48".

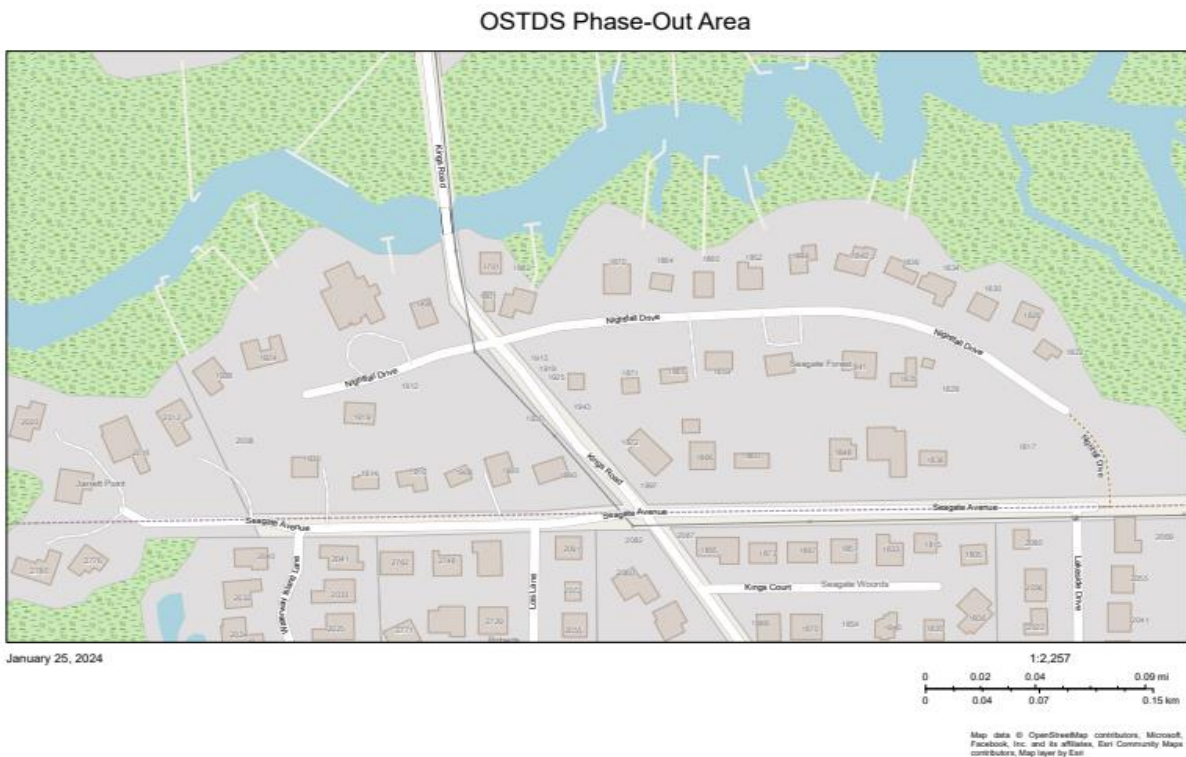


Figure 11 – Potential OSTDS Phase-Out – Homes and Lots on Nightfall Drive

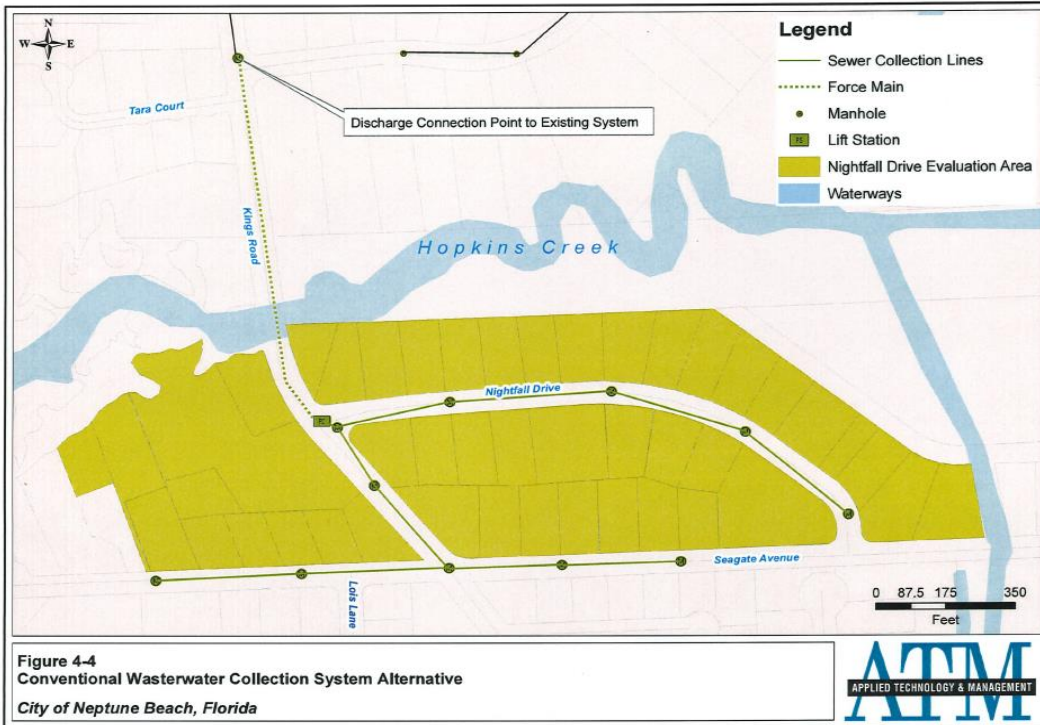


Figure 12 – Septic Tank Phase-Out – Conventional CS System Layout

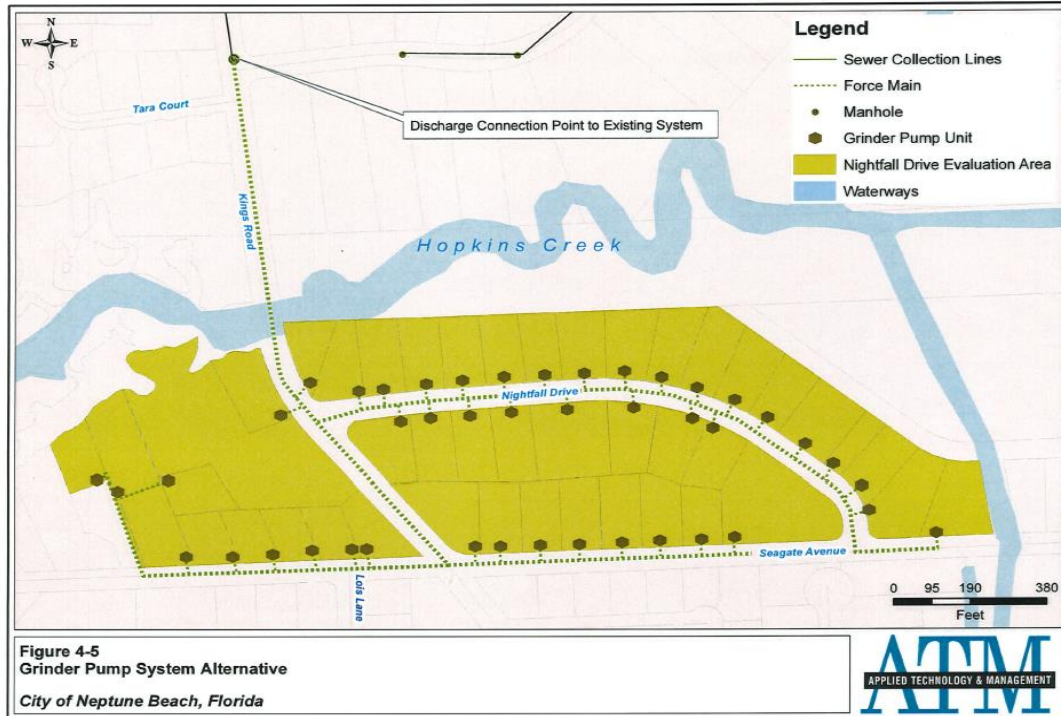


Figure 13 – Septic Tank Phase-Out – Grinder Pump CS System Layout

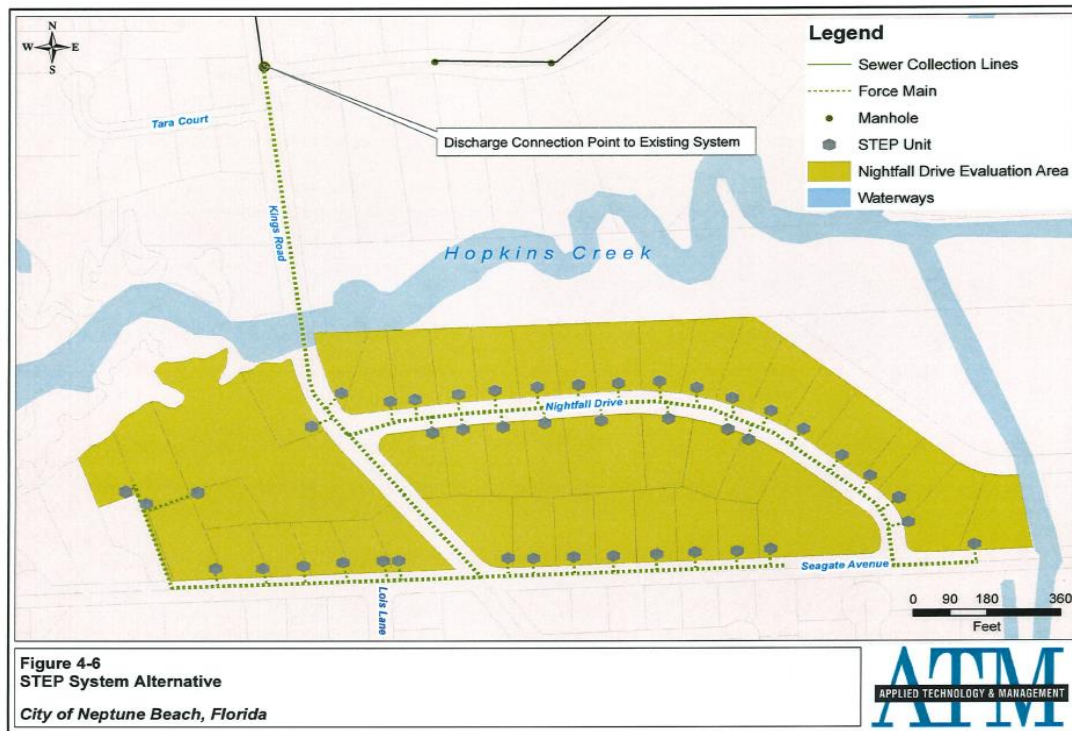


Figure 14 – Septic Tank Phase-Out – STEP CS System Layout

3. An estimate of future growth in new OSTDS over the next 20 years in the local government's jurisdiction or service area (including locational information, such as GIS shape files, if available, or an excel spreadsheet with addresses and/or latitude and longitude);

There is potential for new OSTDS systems in the Nightfall Drive area because there are 7 vacant lots. The intersection of Nightfall Drive and Kings Road is located at LAT 30° 18' 30.50" and LONG -81° 24' 59.48".

4. Identification of deadlines and interim milestones for the planning, design, and construction of new/extended central sewer lines and replacement of OSTDS by connection to the new/extended lines (including locational information, such as GIS shape files, if available, or an excel spreadsheet with address and/or latitude and longitude)

The Wishlist for the City of Neptune Beach OSTDS projects will identify and consider septic tank phase-out and/or septic tank upgrades to nutrient removal if required by the BMAP. If required, locational information, such as GIS shape files, if available, or an excel spreadsheet with address and/or latitude and longitude would be provided. If required, the City of Neptune Beach would need to develop this phase-out plan and include it in the Five-Year budget.

If required to meet new BMAP requirements, the OSTDS improvement actions could be completed according to the following schedule:

Improvement Action	Completion Date
Complete Evaluation and Planning for Improvements to Address OSTDS systems (Neptune Beach Final BMAP Remediation and Treatment Plan completion date)	8/1/2024
Complete Design for Improvements to Address OSTDS systems	12/1/2027
Obtain and Secure Funding Sources and Necessary Permits to Address OSTDS Systems	12/1/2028
Once Permits and Funding Sources are secured, Commence Construction to Address OSTDS Systems.	12/1/2029
Complete construction for OSTDS System Improvements, Complete Record Drawings, Develop Operation and Maintenance Manuals, Certify Completion of Construction and Commence Operation (to meet HB 1379 deadline of 1/1/2032)	12/31/2031

Table 3 – Neptune Beach WWTF Timeline for OSTDS Actions (if required)

5. The estimated costs associated with the projects in 4) above;

The project probable cost of the proposed STEP system is estimated at \$566,000, while the conventional CS system ranges up to \$1,200,000. The details of the capital costs are provided in the Appendix of the ATM report.

Options Costs:

1. No Action - \$0.00
2. Install Conventional Wastewater Collection System - \$1,200,000
3. Install Grinder Pump System - \$784,600
4. Install Septic Tank Effluent Pump (STEP) System - \$566,000

The cost span in 2023 dollars ranges from \$566,000 to \$1,200,000, however, recent supply chain and inflationary pressures on construction probably will push this cost higher. Shadow Lane has approximately ten properties and has not been studied.

6. For OSTDS that are not expected to be eliminated over the next 20 years through connection to central sewer lines, an estimate of the number of these OSTDS that will require upgrading to enhanced nutrient-reducing OSTDS or participating in a distributed wastewater treatment system with additional nutrient reduction (including locational information, such as GIS shape files, if available, or an excel spreadsheet with addresses and/or latitude and longitude) within the local government's jurisdiction, in order to meet the water quality objectives of the BMAP;

The City of Neptune Beach will continue to work with DEP to make the final determination if OSTDS systems would be required to upgrade to a nutrient reducing system or if they can potentially have connection to the Neptune Beach WWTF.

7. The estimated costs associated with upgrading to enhanced nutrient-reducing OSTDS that are identified in 6);

For the OSTDS systems, there are no known systems that would be upgraded to enhanced nutrient reducing OSTDS.

8. Any other cost-effective and financially feasible projects necessary to achieve the nutrient load reductions for OSTDS in order to meet the water quality objectives of the BMAP with estimated costs, timelines, and locational information.

For the OSTDS systems, there are no other known feasible projects to achieve the nutrient load reductions for OSTDS, if required by the BMAP.

