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Janicki Environmental, Inc.



Mosquito Lagoon Reasonable Assurance Plan (RAP)

Volusia County and Mosquito Lagoon RAP Stakeholder Group
August 2019

MOSQUITO LAGOON REASONABLE ASSURANCE PLAN (RAP)

Prepared for

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and

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ACRONYMS AND ABBREVIATIONS

AGM	Annual Geometric Mean
AMO	Atlantic Multidecadal Oscillation
BMAP	Basin Management Action Plan
BOD ₅	5-Day Biochemical Oxygen Demand
CI	Confidence Interval
CIP	Capital Improvement Project
CWA	Clean Water Act
DO	Dissolved Oxygen
ENR	Estuary Nutrient Region
EPA	US Environmental Protection Agency
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FWC	Florida Fish and Wildlife Conservation Commission
HUC8	Hydrologic Unit Level 8
IFAS	Institute of Food and Agricultural Sciences
IRL	Indian River Lagoon
lb/yr	Pounds per Year
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter
MTAC	Marine Technical Advisory Committee
NAVD88	North American Vertical Datum of 1988
NNC	Numeric Nutrient Criteria
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
OSTD	On-Site Sewage Treatment and Disposal System
SJRWMD	St. Johns River Water Management District
RAP	Reasonable Assurance Plan
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
USGS	US Geological Survey
WBID	Waterbody Identification
WWTP	Wastewater Treatment Plant

1 BACKGROUND

Mosquito Lagoon is one of the distinct sections of the larger Indian River Lagoon (IRL) system. The Mosquito Lagoon watershed is approximately 36 miles long and stretches across north Brevard County and south Volusia County. Except for a very small piece of the Kennedy Space Center at the south tip of the watershed, nearly all the urban land uses in the watershed are in Volusia County. The Canaveral National Seashore encompasses nearly all the watershed in Brevard County and a portion in Volusia County and is encompassed by the larger Merritt Island National Wildlife Refuge Complex. Immediately north of the Canaveral National Seashore is the 4,740-acre Mosquito Lagoon Aquatic Preserve.

The sponsors for this Reasonable Assurance Plan (RAP) are the City of Edgewater, City of New Smyrna Beach, City of Oak Hill, Florida Department of Transportation (FDOT), and Volusia County. Collectively, the sponsors have made significant investments over the past few decades to reduce pollutant loading to Mosquito Lagoon with projects such as converting wastewater treatment surface water discharges to reuse and stormwater retrofit projects. The origin for this RAP began at the June 26, 2014 Water Quality Workshop hosted by the Volusia County Council. By early 2016, the sponsors had developed Joint Project Agreements that covered topics such as authority, governance and management, funding, and responsibilities of parties and Board members for developing the RAP.

In addition to the RAP sponsors, collaborative partners and interested parties have included:

- Applied Technology and Management (representing FDOT).
- Bethune-Cookman University.
- Brevard County.
- Canaveral National Seashore.
- Citizens.
- Florida Department of Environmental Protection (FDEP).
- Daytona News Journal.
- E Sciences (representing FDOT).
- East Central Florida Regional Planning Council.
- ECT Inc.
- Florida Department of Agriculture and Consumer Services (FDACS).
- Florida Department of Health-Volusia County.
- Florida Farm Bureau Association.
- Florida Fish and Wildlife Conservation Commission (FWC).
- Indian River Lagoon Council & National Estuary Program.
- Kennedy Space Center-NASA.
- Marine Discovery Center.
- Merritt Island National Wildlife Refuge.
- Save the Manatee Club.
- St. Johns River Water Management District (SJRWMD).
- Stetson University.
- Wildwood Consulting (as Project Facilitator).

This document describes the local stakeholders' efforts to develop a robust plan to restore water quality in the Mosquito Lagoon within 15 years. Implementation of the restoration activities and projects included in this plan provides a more cost-effective and locally driven path toward attaining water quality standards. The plan includes a description of the concentration- and load-based targets to be achieved by planned restoration, adaptive management, and corrective actions if goals are not being met.

2 DESCRIPTION OF MOSQUITO LAGOON

This Section describes Mosquito Lagoon and its associated watershed, the current water quality conditions, and the sources of pollutants.

2.1 DESCRIPTION OF THE WATER BODY AND WATERSHED

Figure 2-1 shows the Mosquito Lagoon watershed, which is 116.5 square miles. Approximately two-thirds of the watershed area is in Volusia County, with the remainder in Brevard County. Three cities have a significant area in the watershed: Edgewater, New Smyrna Beach, and Oak Hill. A small portion of the Town of Ponce Inlet also lies in the north edge of the watershed. The watershed area used in this RAP does not include some closed basin areas that are along the west-central, southwest, and south portions of the watershed border, since these areas do not likely contribute significant load to the watershed. FDEP subdivided Mosquito Lagoon into three Estuary Nutrient Regions (ENRs) for developing numeric nutrient criteria (NNC). Figure 2-1 shows these ENRs.

Slope in the watershed is very flat. The highest elevations, at approximately 30 feet referenced to the North American Vertical Datum of 1988 (NAVD88), are along the west boundary where the watershed extends west of I-95. As Figure 2-1 shows, the size of Mosquito Lagoon and its connected salt marshes is very large compared to the remainder of the watershed. Soils are predominantly well-drained in the north and central portions of the watershed. Soils are predominantly poorly drained in the south portion of the watershed. Table 2-1 summarizes the hydrologic soil groups within the Mosquito Lagoon watershed by ENR beyond the Mosquito Lagoon waterbody and its connected salt marshes by ENR. Additional watershed characteristics are described in the *Watershed Model Development Report* (Jones Edmunds and Janicki Environmental, June 2017).

The Mosquito Lagoon watershed also comprises the Canaveral National Seashore and Mosquito Lagoon Aquatic Preserve, which are Outstanding Florida Waters provided special protection under Chapter 62-302.700 of the Florida Administrative Code (FAC). In fact, nearly all the watershed contributing to the South ENR is federal lands that will remain undeveloped. Mosquito Lagoon is also protected under the Indian River Lagoon System and Basin Act, Chapter 90-262 Laws of Florida.

Table 2-1 Hydrologic Soil Group Percentages

ENR	Hydrologic Soil Group				
	A	B	B/D	C/D	D
North	50%	4%	21%	0%	24%
Central	62%	2%	13%	1%	23%
South	20%	0%	10%	5%	65%

A – Low runoff potential when thoroughly wet.

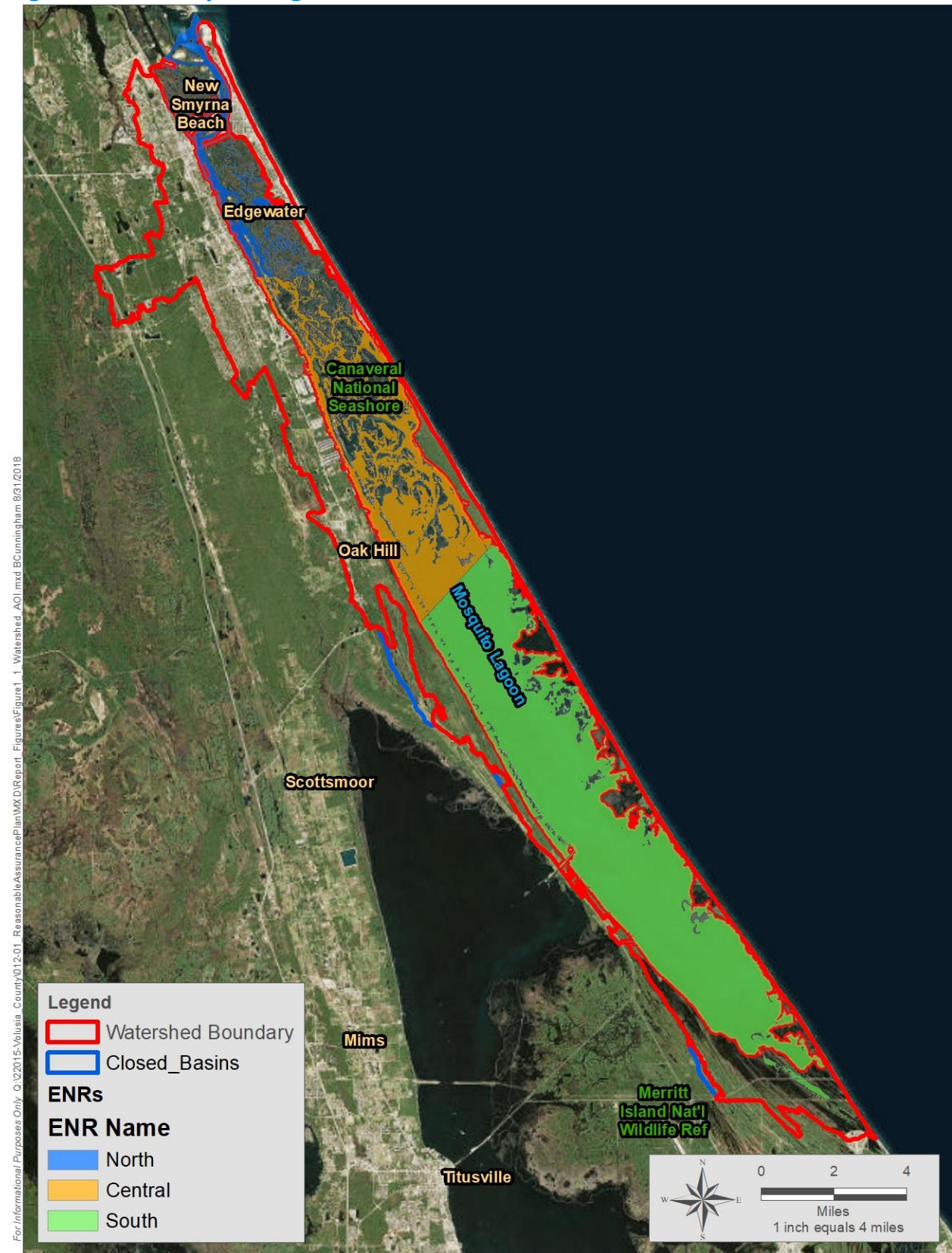
B – Moderately low runoff potential when thoroughly wet.

C – Moderately high runoff potential when thoroughly wet.

D – High runoff potential when thoroughly wet.

B/D and C/D – Runoff potential is based partly on presence of water table.

Figure 2-1 Mosquito Lagoon Watershed



2.2 DESCRIPTION OF THE IMPAIRMENT

This RAP was undertaken by the stakeholder group in anticipation of impairments because of the Cycle 3 assessment of the Group 5 Indian River Lagoon Basin. There were significant concerns with regards to a series of algal blooms that have been observed since 2011. A report by a consortium of experts concluded that attempts to explain the initiation and persistence of the 2011 superbloom using available data highlighted some key gaps in its understanding (IRL 2011 Consortium, 2015). Questions still remain about the nature and causes of blooms in the Indian River Lagoon. This RAP refers to the period prior to 2011 as the pre-bloom period and the period after it as the bloom period.

For assessment purposes, FDEP has divided Mosquito Lagoon into three water assessment polygons with unique WaterBody IDentification (WBID) numbers. All three WBIDs are contained within the US Geological Survey (USGS) Hydrologic Unit (HUC8) 03080202. Table 2-2 summarizes the WBIDs (listed from north to south) and the parameters of concern covered by this RAP.

Table 2-2 WBIDs and Parameters Addressed by this RAP

WBID	Waterbody Name	Waterbody Type	Waterbody Class*	Parameter of Concern
2924B2	Mosquito Lagoon	Estuary	3M	Nutrients
2924B1	Mosquito Lagoon (Shellfish Portion)	Estuary	2	Nutrients
2924	Mosquito Lagoon	Estuary	2	Nutrients

Notes: * 2 - Shellfish propagation and/or harvesting.

3M - Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water.

The three Mosquito Lagoon WBIDs had the following parameters placed on the verified impaired list adopted by Secretarial Order on June 27, 2018:

- WBID 2924B2 – Nutrients (Chlorophyll *a*) and Fecal Coliform (SEAS Classification).
- WBID 2924B1 – Nutrients (Chlorophyll *a*), and Nutrients (Total Nitrogen [TN]).
- WBID 2924 – Nutrients (Chlorophyll *a*), Nutrients (Total Phosphorus [TP]), and Nutrients (TN).

This RAP was prepared to address only the nutrient impairments and not the fecal coliform impairment.

2.3 DESCRIPTION OF LOADING SOURCES

The primary pollutants of concern for Mosquito Lagoon are TN and TP. The five primary loading sources of these constituents are direct runoff, base flow, point sources, on-site sewage treatment and disposal systems (OSTDs [i.e., septic systems]), and atmospheric deposition. The relative amount of loading of each constituent varies significantly by ENR and over time. Monthly pollutant loading from 2004 through 2015 was quantified by ENR in the *Watershed Model Development Report* using measured data and predictive methods. Section 9 of the *Watershed Model Development Report* presents the results, Output Reporting and Results, by annual totals and percentages over the simulation period and are also provided below.

Figures 2-2 through 2-5, respectively, show the totals for flow volume, the 5-day biochemical oxygen demand (BOD₅), TN, and TP for the three ENRs.

Figure 2-2 Total Flow Volume by ENR for the Simulation Period

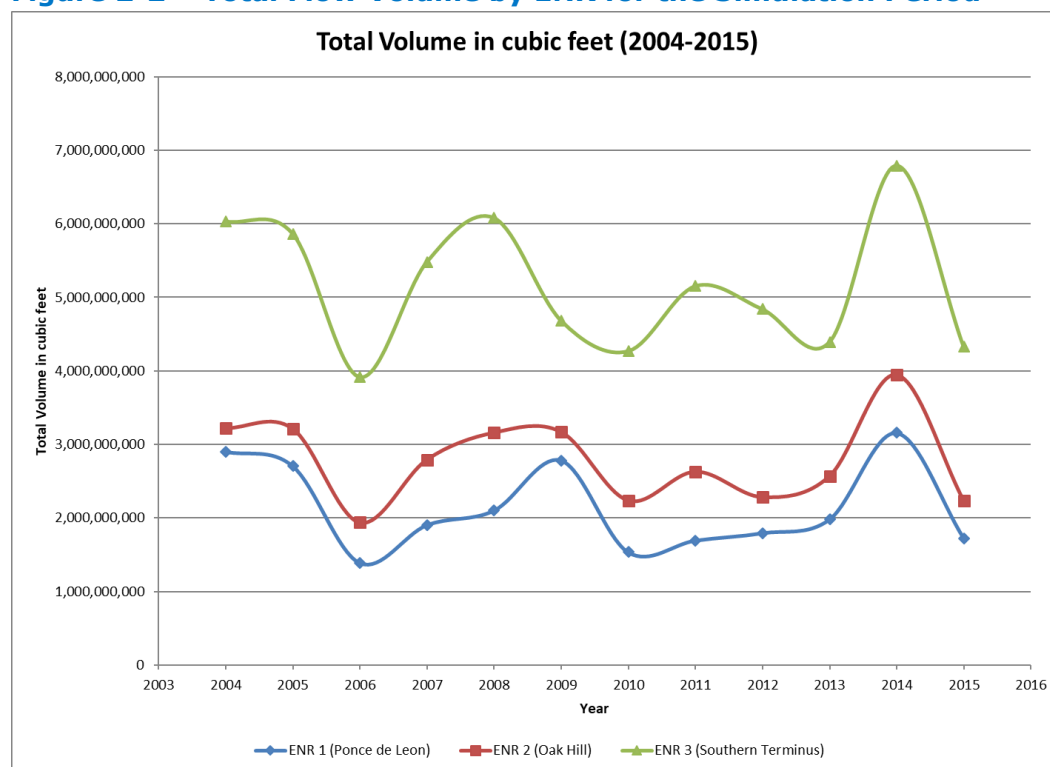


Figure 2-3 BOD Load by ENR for the Simulation Period

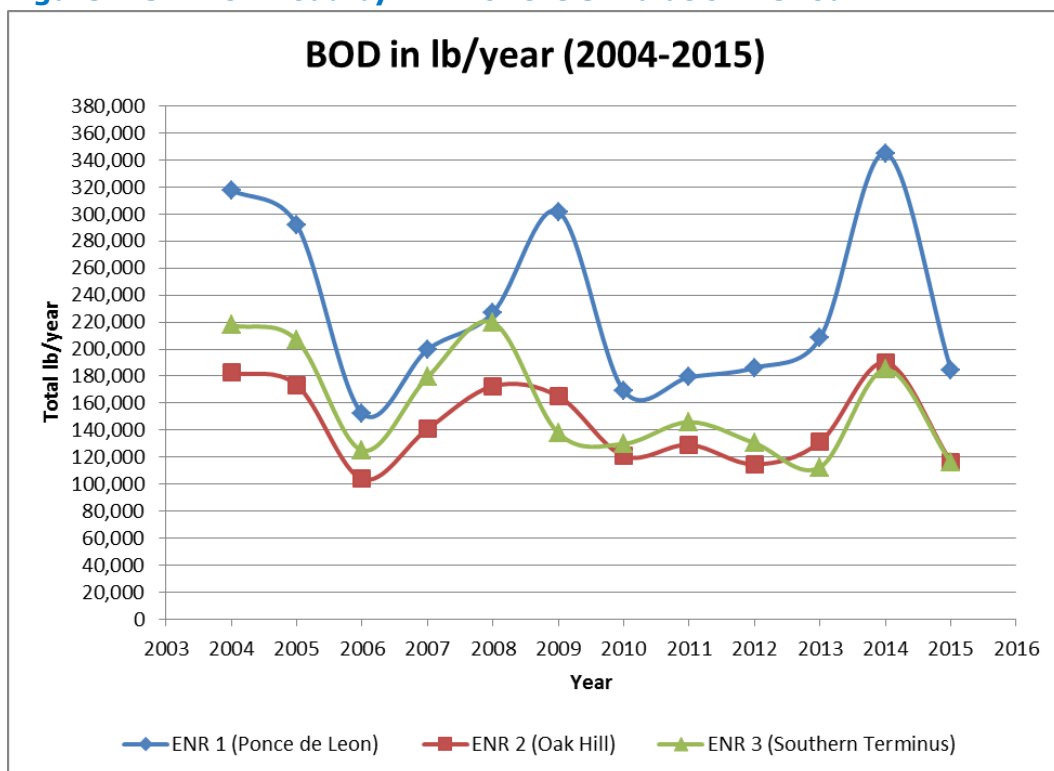


Figure 2-4 TN Load by ENR for the Simulation Period

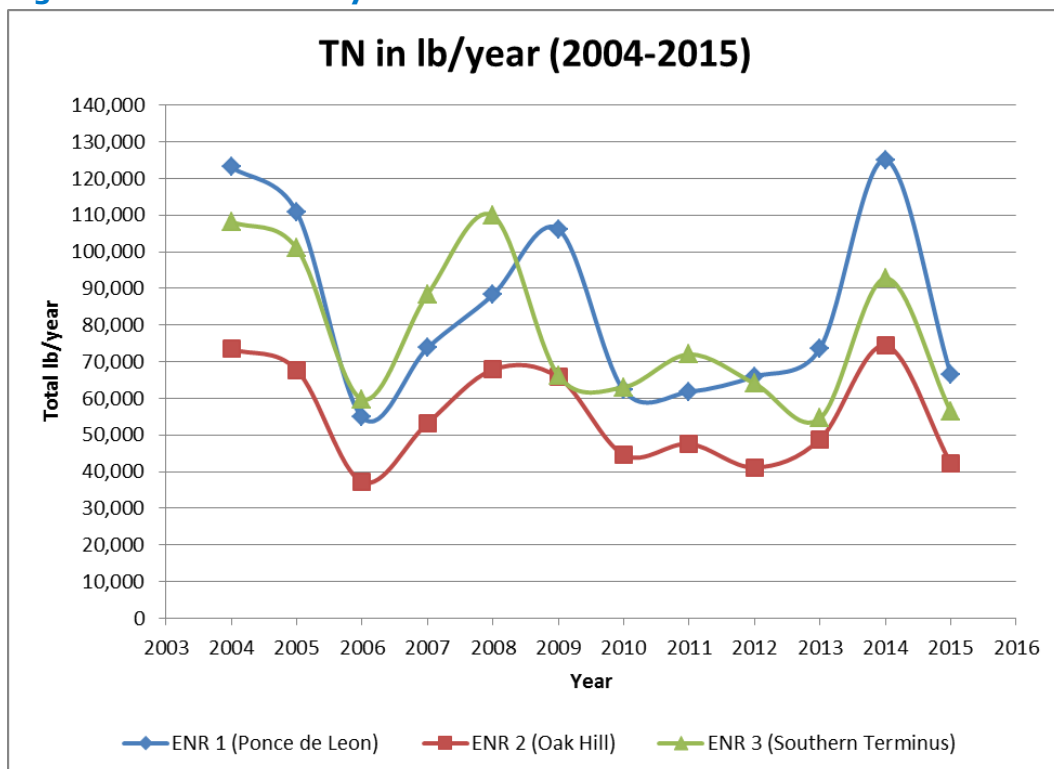
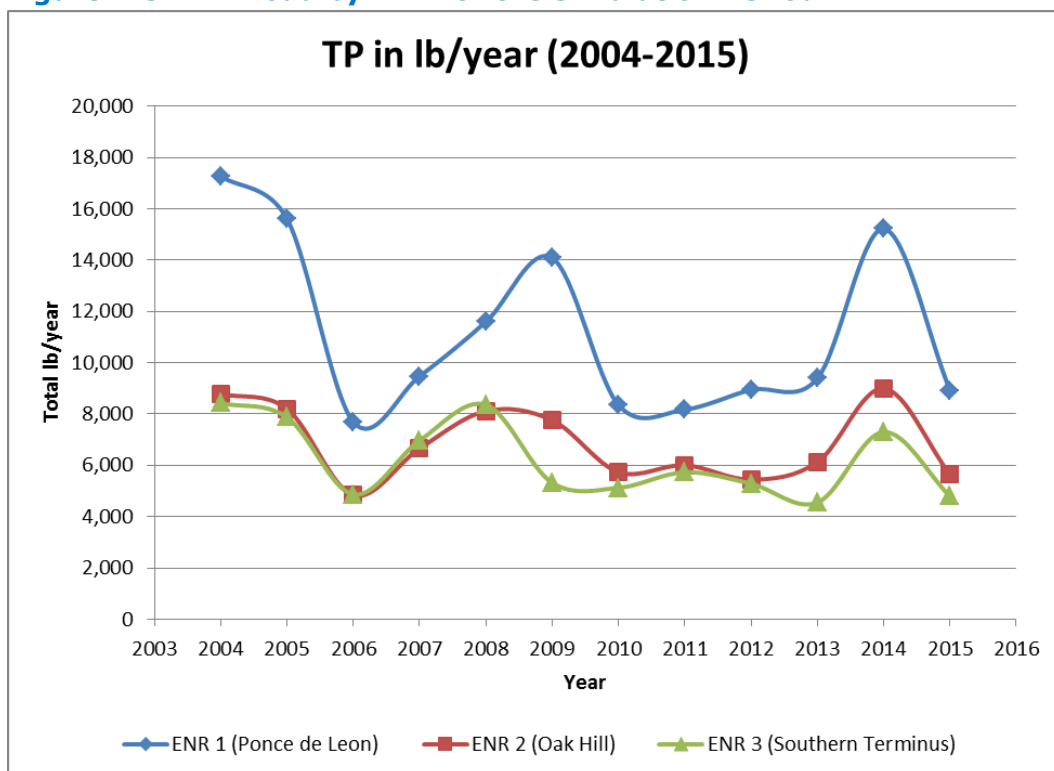


Figure 2-5 TP Load by ENR for the Simulation Period



Figures 2-6 through 2-9 respectively show percentages of the sources of flow volume, BOD₅, TN, and TP for ENR 1 (North ENR).

Figure 2-6 Percentages of Total Flow Volume for ENR 1 for the Simulation Period

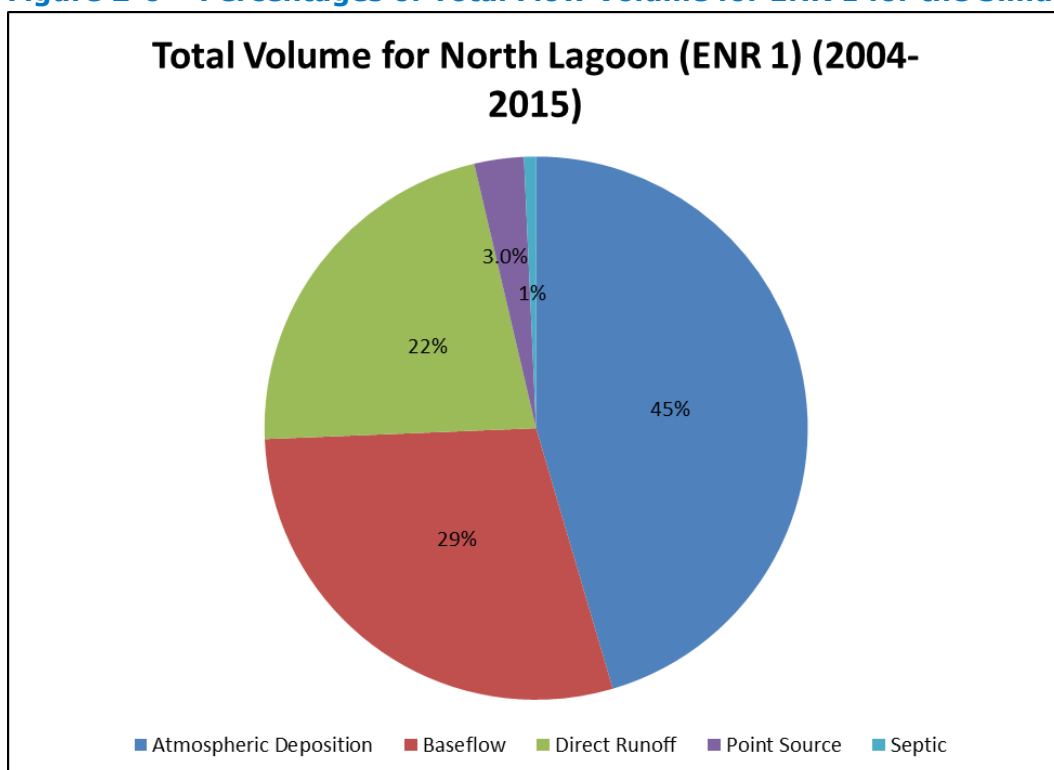


Figure 2-7 Percentages of BOD for ENR 1 for the Simulation Period

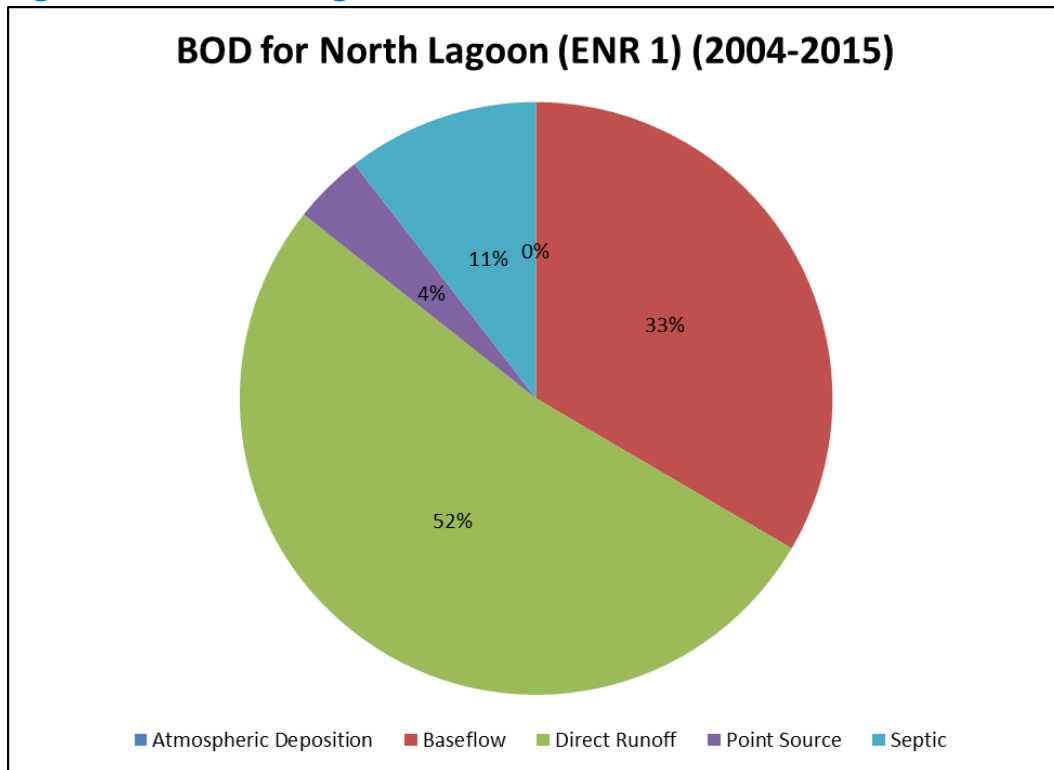


Figure 2-8 Percentages of TN for ENR 1 for the Simulation Period

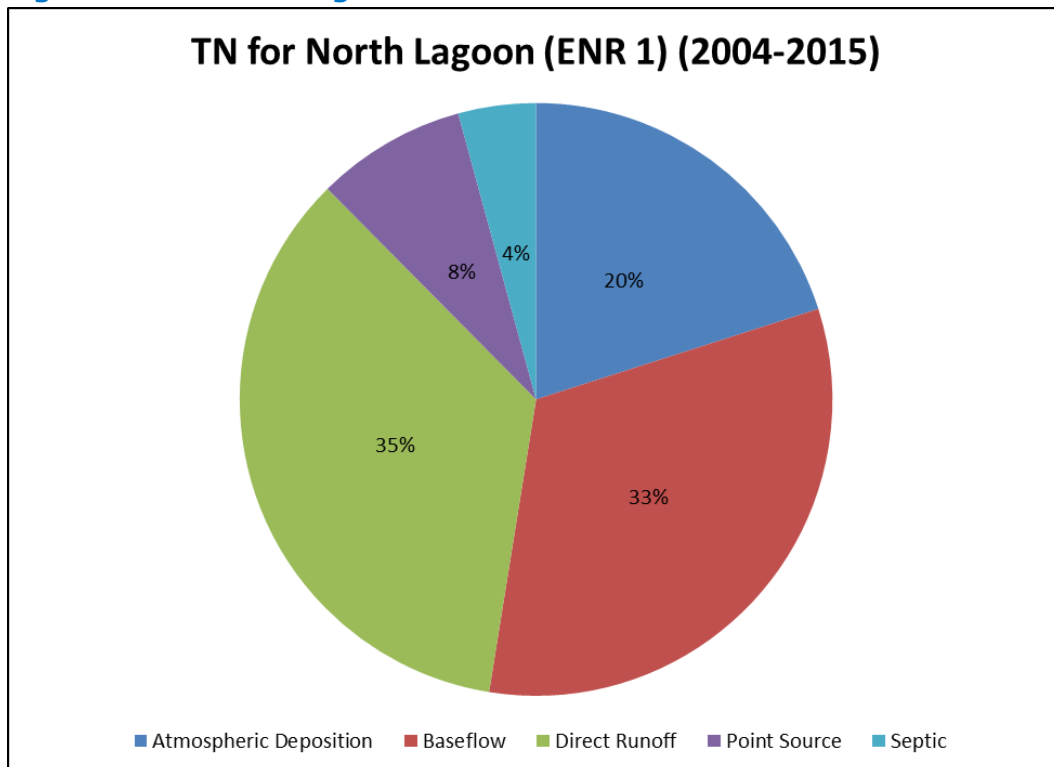
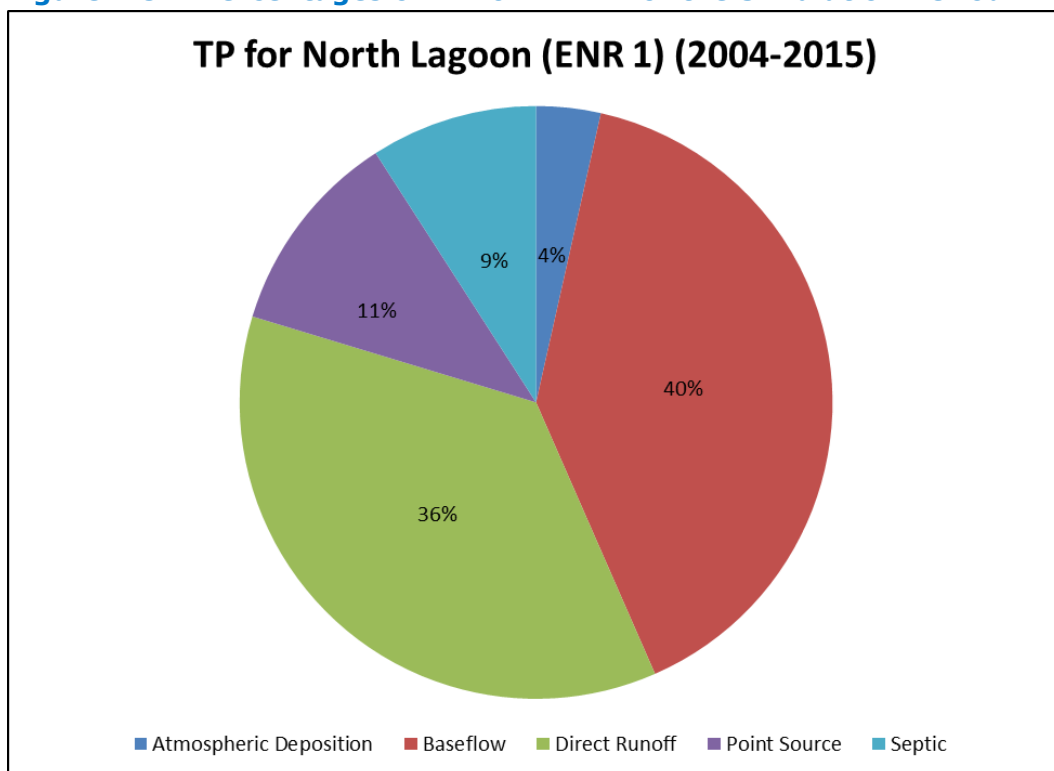


Figure 2-9 Percentages of TP for ENR 1 for the Simulation Period



Figures 2-10 through 2-13 respectively show percentages of the sources of flow volume, BOD₅, TN, and TP for ENR 2 (Central ENR).

Figure 2-10 Percentages of Total Flow Volume for ENR 2 for the Simulation Period

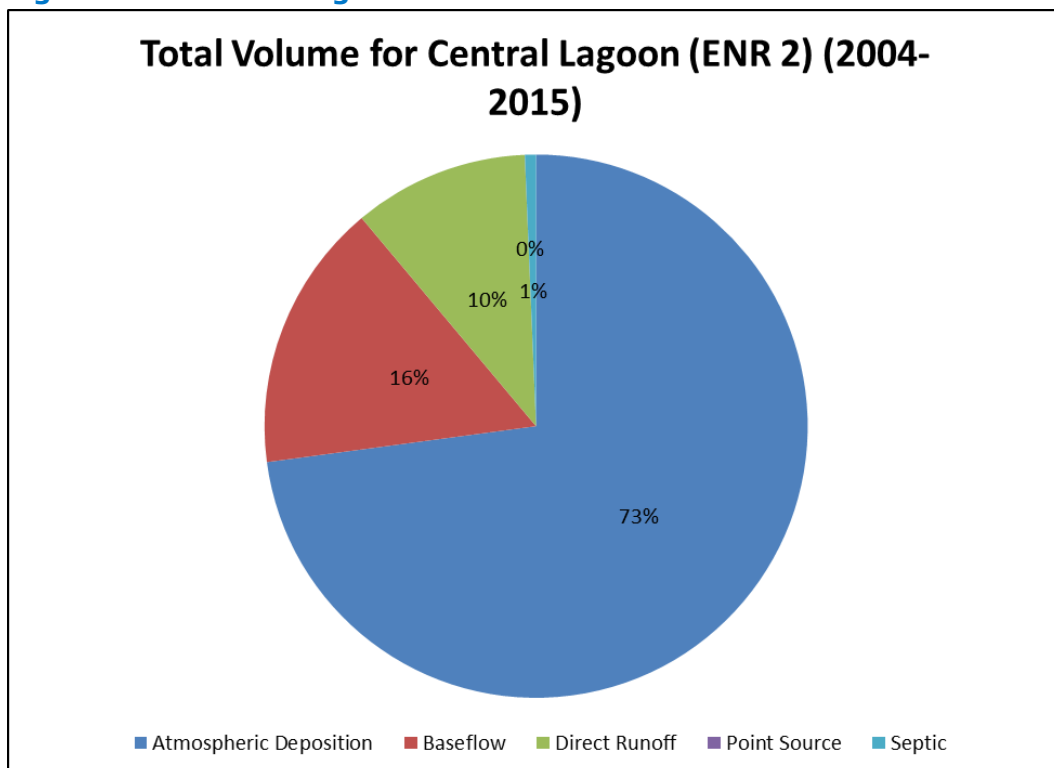


Figure 2-11 Percentages of BOD for ENR 2 for the Simulation Period

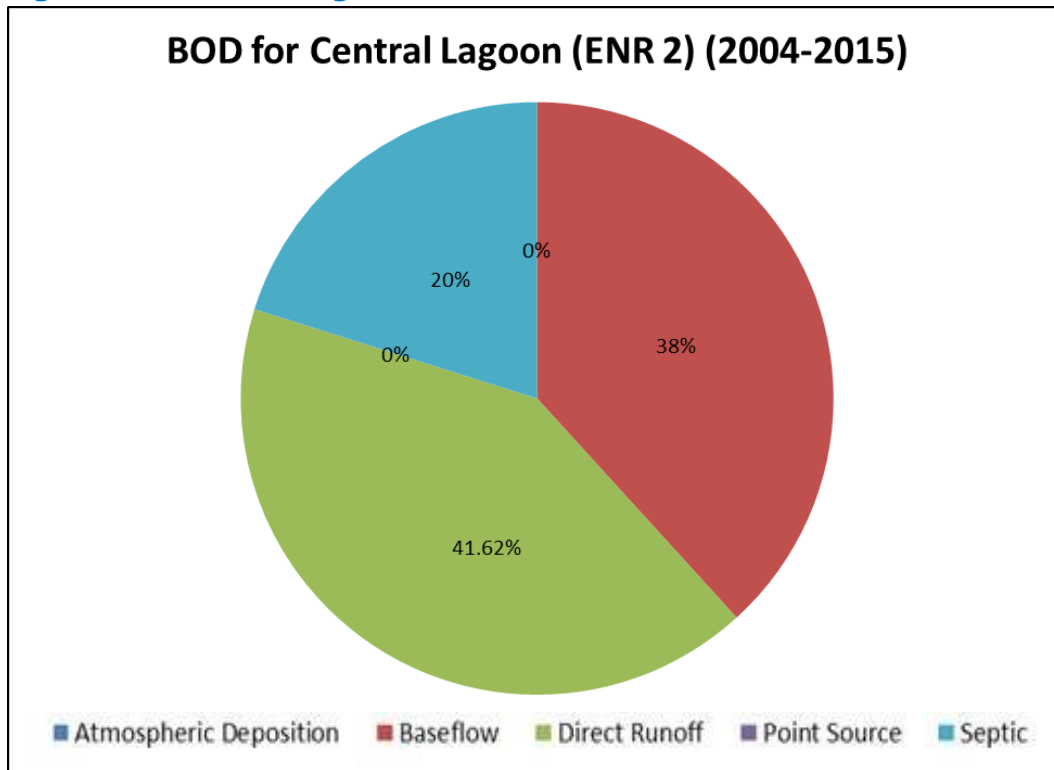


Figure 2-12 Percentages of TN for ENR 2 for the Simulation Period

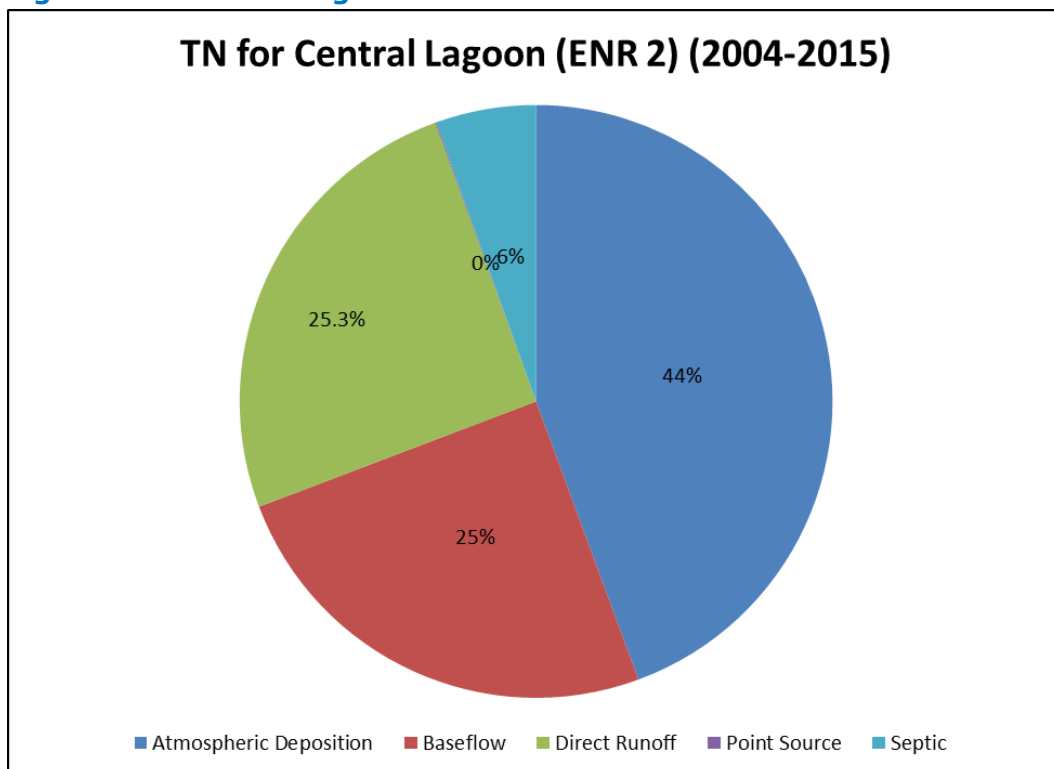
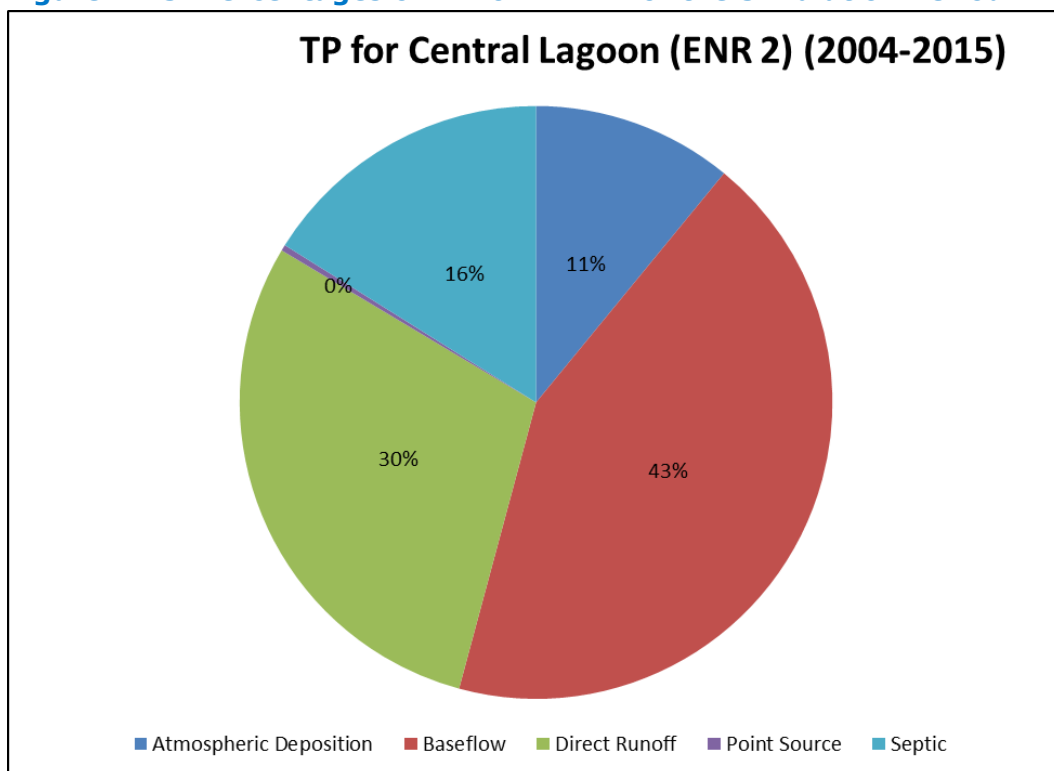


Figure 2-13 Percentages of TP for ENR 2 for the Simulation Period



Figures 2-14 through 2-17 respectively show percentages of the sources of flow volume, BOD₅, TN, and TP for ENR 3 (South ENR) are shown in Figures 2-14 through 2-17, respectively.

Figure 2-14 Percentages of Total Flow Volume for ENR 3 for the Simulation Period

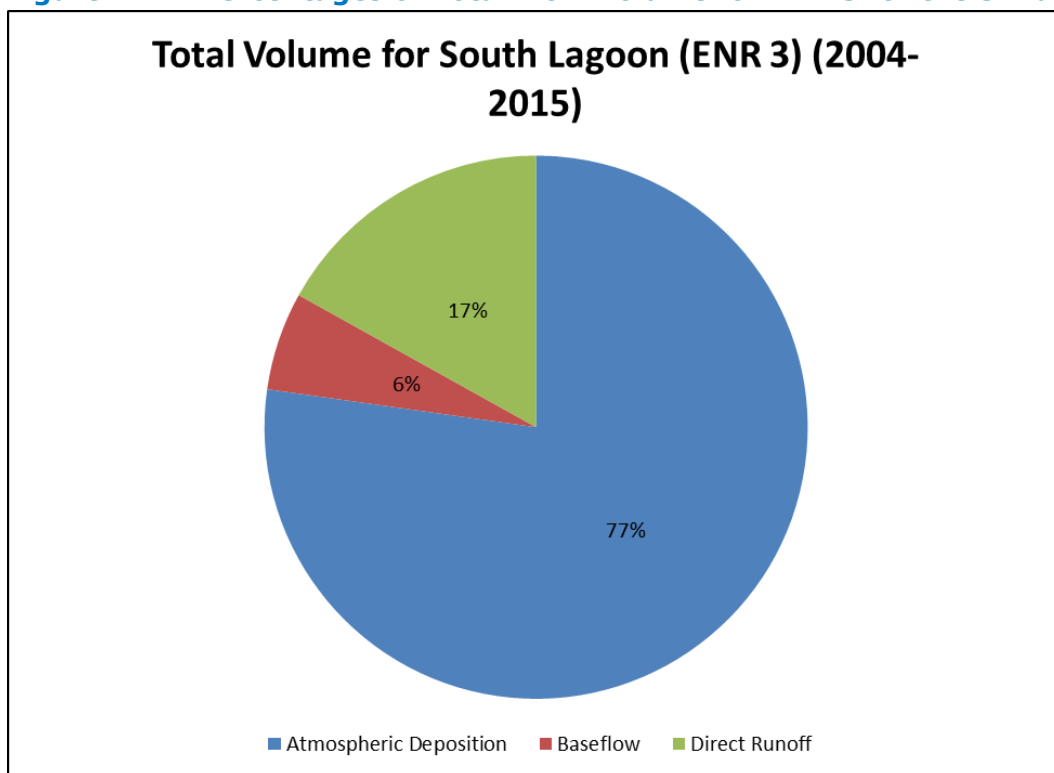


Figure 2-15 Percentages of BOD for ENR 3 for the Simulation Period

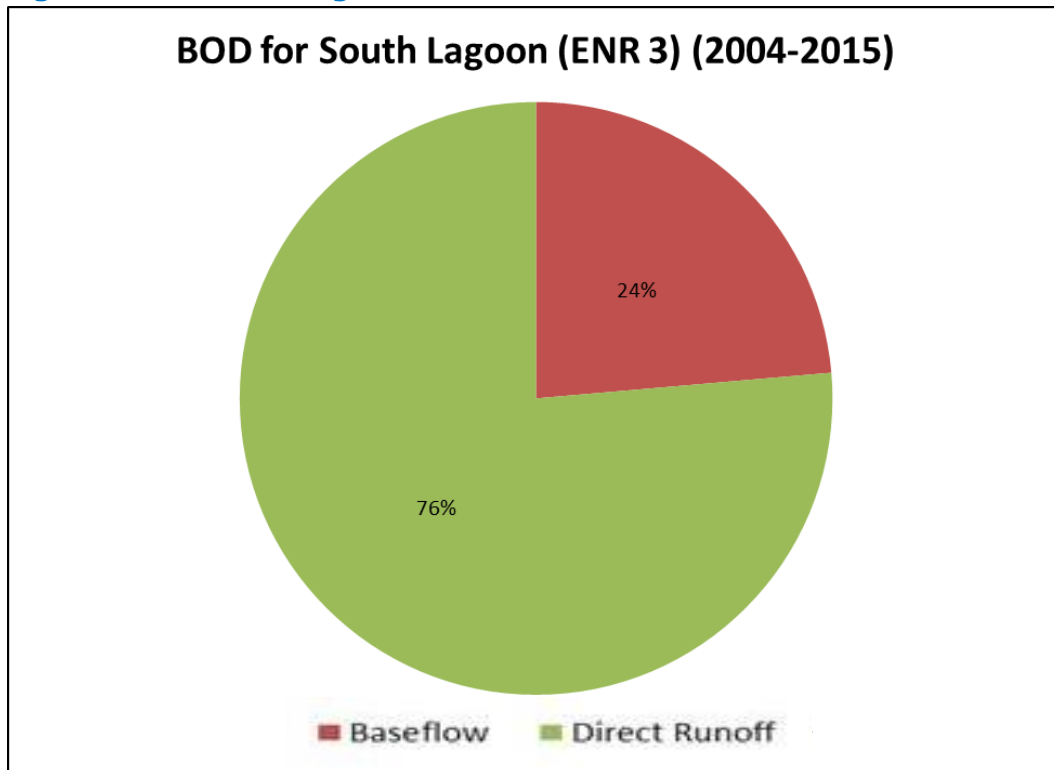


Figure 2-16 Percentages of TN for ENR 3 for the Simulation Period

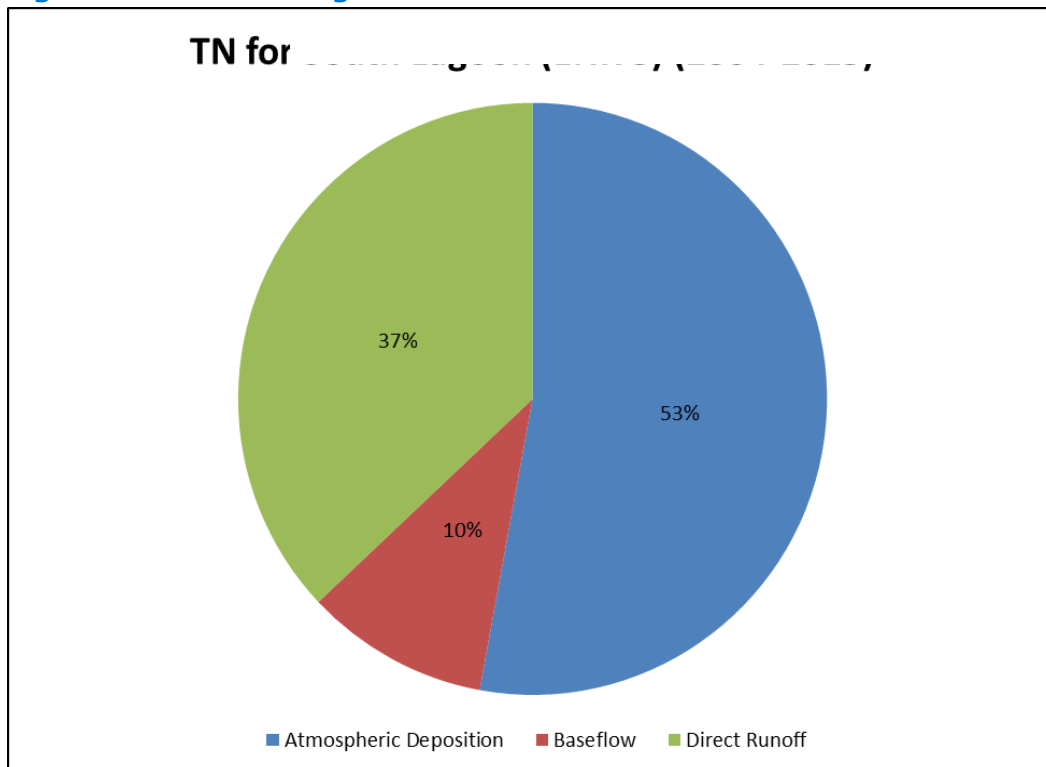
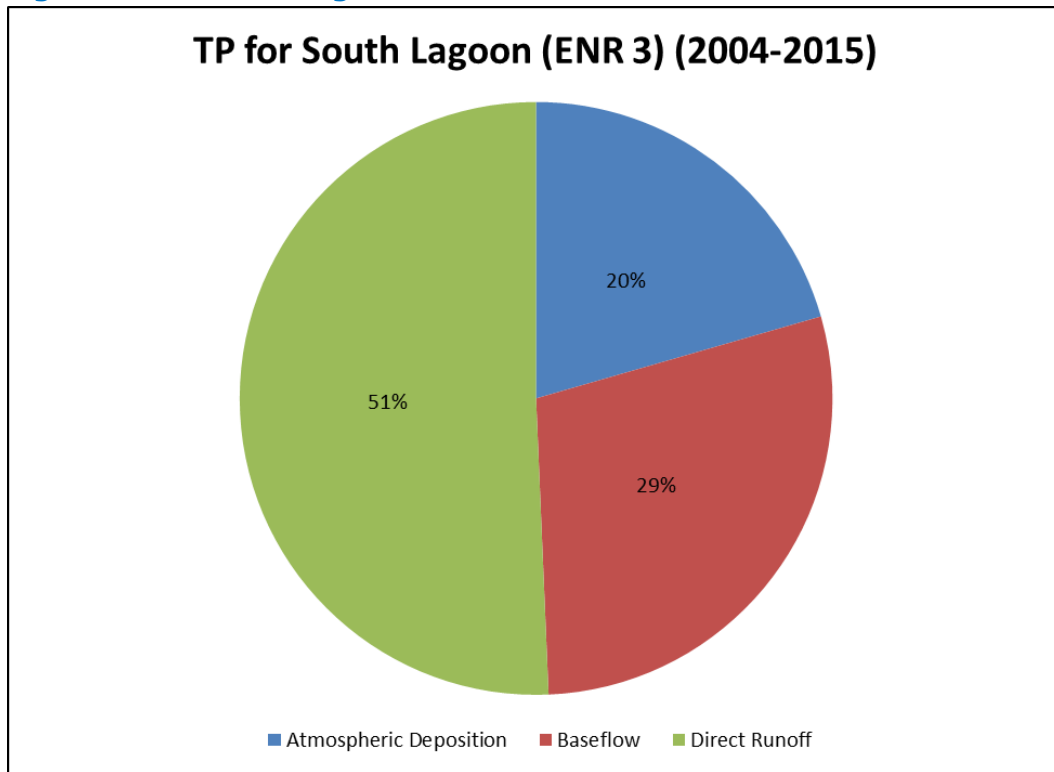


Figure 2-17 Percentages of TP for ENR 3 for the Simulation Period



3 DESCRIPTION OF WATER QUALITY GOALS

3.1 WATER QUALITY CONCENTRATION TARGETS

When developing a RAP, a first step is to evaluate existing water quality targets for the parameters and determine if they are appropriate for the waterbodies of concern. Establishing water quality targets for an estuary is typically achieved by following five steps:

1. Identify resource of concern.
2. Identify appropriate, measurable metrics.
3. Identify the appropriate data sources.
4. Define a reference period.
5. Determine water quality targets.

In this case, the starting points are the adopted NNC for TN, TP, and chlorophyll *a* (Rule 62-302.532(1)(aa)11-13.). The method for determining the current criteria is detailed in the *Report on Numeric Nutrient Criteria for Estuaries* (FDEP, 2014).

Our review of the FDEP approach, as described in *Determination of the Mosquito Lagoon Nutrient Loading Targets* (Janicki Environmental, 2017), concluded that:

- 1) Seagrasses are the appropriate resource of concern.
- 2) TN, TP, and chlorophyll *a* are the appropriate, measurable metrics to be used.
- 3) The primary data source is the FDEP impaired waters database updated for this process to include data collected through 2015.
- 4) FDEP used the 2004-2008 period recommended by the SJRWMD as the reference period to derive the criteria. This period was the 5-year period that had the lowest concentrations observed during the 1989–2008 period for which data were available, and as such, the resultant NNC are conservative (i.e., may be lower than needed to support seagrass).
- 5) Using annual geometric means (AGMs) as a metric accounts for extreme values within any given year and FDEP's approach of calculating the NNC using the 80-percent-prediction interval was appropriate, statistically sound, and defensible.

For these reasons, the water quality targets used for this RAP are the current NNC developed by FDEP (Table 3-1).

Table 3-1 Water Quality Targets

ENR	TN (mg/L)	TP (mg/L)	Chlorophyll <i>a</i> (µg/L)
North Mosquito Lagoon	0.51	0.05	4.0
Central Mosquito Lagoon	0.65	0.05	3.4
South Mosquito Lagoon	1.14	0.03	2.5

Note: mg/L = milligrams per liter.

3.2 LOADING TARGETS

Loading targets provide the basis for identifying projects that are needed to provide the reasonable assurance that the proposed management actions can achieve the designated uses of the waterbody. Loading targets are typically determined by calculating the nutrient loads that are expected to attain the selected water quality targets (in this case the NNC). While this restoration plan will use the NNC as water quality concentration targets to confirm that restoration actions are working, nutrient concentrations in the Mosquito Lagoon were not well correlated with nutrient loads as described in *Determination of the Mosquito Lagoon Nutrient Loading Targets*. Since the statistical relationships between parameters were not sufficient to use an empirical stressor-response model approach to determine loading targets and a mechanistic model that is useful for this purpose is still under development by the SJRWMD, the application of a Reference Period approach was chosen as the most defensible means to determine the loading targets.

For the first step in this approach, the average nutrient loads for the reference period used to establish the NNC (2004-2008) were calculated as the reference period load because the loads during the reference period clearly attain the NNC, and as such, can be presumed to be protective (Table 3-2). To be more protective and provide a further margin of safety, RAP sponsors decided to remove the first two years of nutrient loads from the NNC reference period (2004 and 2005) because they were higher than subsequent pre-bloom years and extend the period through 2010 when loads were lower. The reference period load (i.e., allowable load) was then calculated as the average load for the period (Table 3-2). The period of 2006–2010 was selected as the reference period load as it represented the most conservative 5-year period in terms of loadings for TN and TP (lower than the allowable loads for the reference period used to calculate the NNC) (Figure 3-1 and Figure 3-2, respectively), was without blooms, was not biased regarding rainfall, and was the most reflective of management actions that have already occurred.

The selection of this load reference period was validated by comparing ambient water quality and seagrass data from the three periods available before the bloom period. Table 3-2 compares the AGM TN, TP, and chlorophyll *a* concentrations and the seagrass coverages over the different potential reference periods.

Figure 3-1 Mean Annual TN loads for a Series of 5-Year Increments for Each ENR

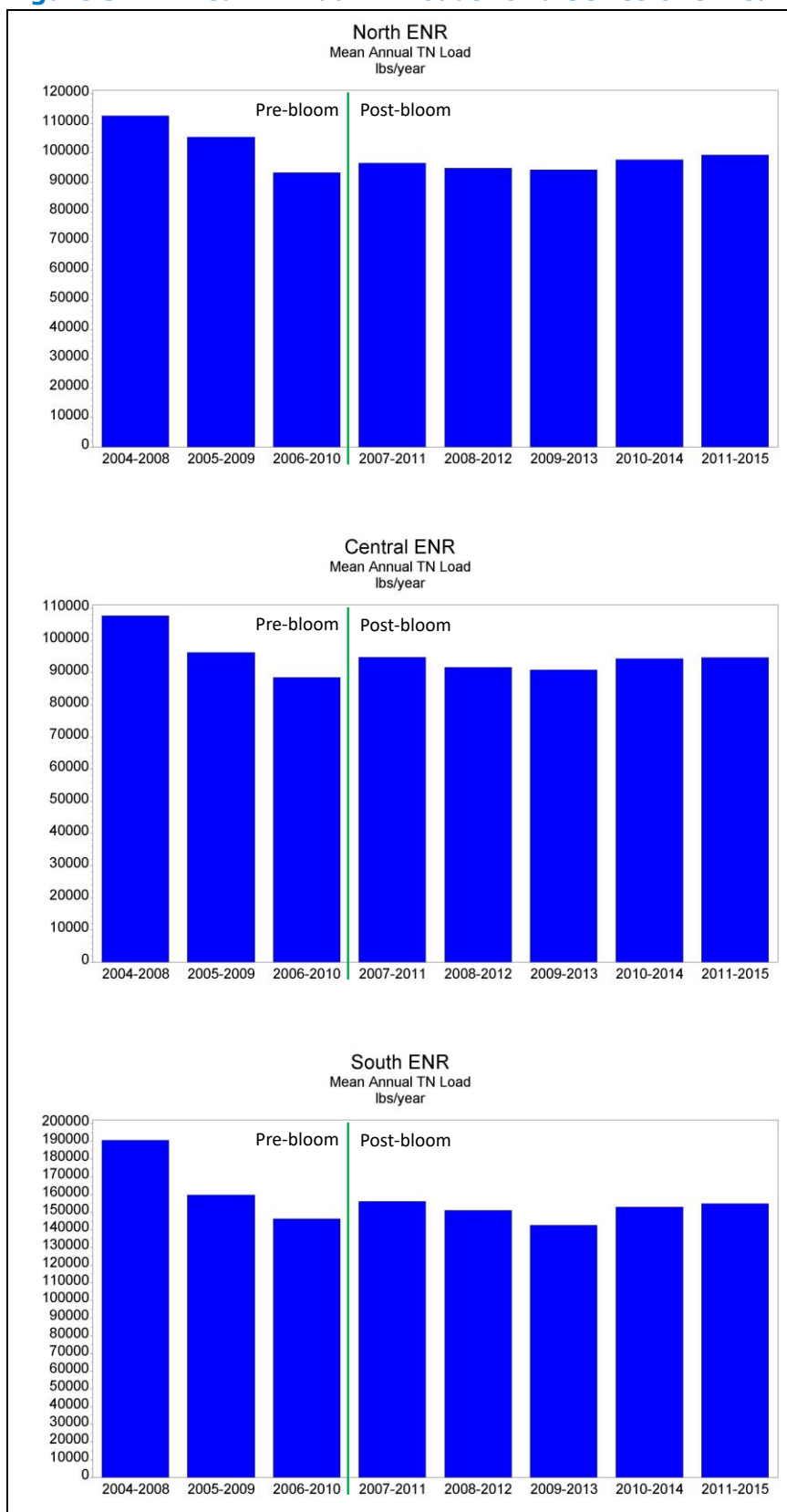


Figure 3-2 Mean Annual TP Loads for a Series of 5-Year Increments for Each ENR

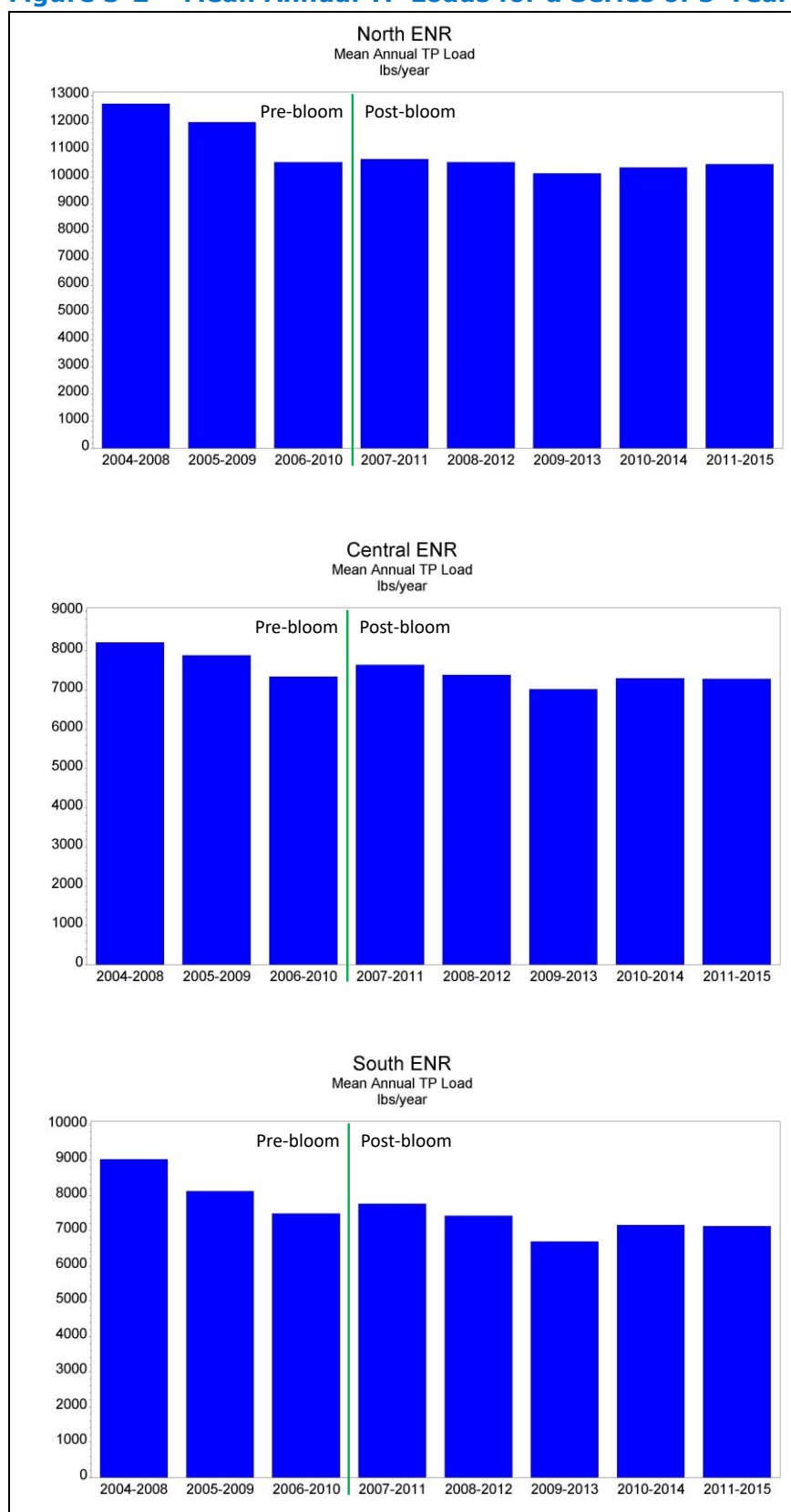


Table 3-2 Comparison of the AGM Concentrations of TN, TP, and Chlorophyll *a* and Seagrass Cover from Three Potential Reference Periods prior to the bloom period

Reference Period	TN (mg/L)	TP (mg/L)	Chlorophyll <i>a</i> (µg/L)	Seagrass Cover (acres)
<u>North ENR</u>				
2004–2008	0.39	0.04	3.3	83
2005–2009	0.39	0.04	4.0	
2006–2010	0.40	0.04	3.7	84
<u>Central ENR</u>				
2004–2008	0.54	0.04	2.5	2,764
2005–2009	0.51	0.04	3.1	
2006–2010	0.51	0.03	3.5	2,729
<u>South ENR</u>				
2004–2008	0.88	0.02	1.7	13,669
2005–2009	0.84	0.02	1.9	
2006–2010	0.82	0.03	2.4	13,859

Regarding the nutrient (i.e., TN and TP) concentrations, the differences between the 2006–2010 period and the other two periods are very small in all three ENRs. The chlorophyll *a* concentrations from the 2006–2010 period are all well within 1 µg/L of those from the other two periods in all three ENRs. The differences in seagrass cover between the 2004–2008 and 2006–2010 periods are also very small in all three ENRs, which is not surprising given the very stable seagrass coverage that had been seen before the bloom period. Therefore, it can be concluded that the loadings from the 2006–2010 period can be expected to protect estuarine health as measured by the nutrient and chlorophyll *a* concentrations and seagrass cover.

The DO standard for marine waters in Florida is currently expressed as percent saturation and has been defined as 42 percent. None of the samples collected in the three ENRs during 2004–2010 were below the 42-percent saturation standard. Therefore, since one of the important estuarine effects to nutrient loading are changes in ambient DO concentrations, it can be further concluded that the 2006–2010 loadings can be expected to protect estuarine health as measured by DO.

3.2.1 RECOMMENDATIONS OF NUTRIENT LOADING TARGETS

Based on the results presented above, the loading targets from the 2006–2010 reference period are:

- TN Loading (lb/yr)
 - North ENR – 93,328
 - Central ENR – 88,557
 - South ENR – 146,245
- TP Loading (lb/yr)
 - North ENR – 10,538
 - Central ENR – 7,343
 - South ENR – 7,492

3.3 PERCENT-LOAD REDUCTIONS

Developing percent-loading reductions is an essential element in the Mosquito Lagoon RAP. Given the recommended allowable nutrient loading targets, the next step is to identify a defensible baseline period to provide the basis for the calculation of percent-load reductions.

The period of record for which nutrient loadings have been estimated to Mosquito Lagoon is 2004–2015 (Jones Edmunds, 2017). This period includes years during which bloom conditions occurred in the IRL Basin, including Mosquito Lagoon. Therefore, using the entire period of record to define the baseline from which load reductions would be calculated is not appropriate. As a result, the recommended baseline loading period is 2004–2010, i.e., the pre-bloom period of record from which loading estimates are available. Extending the baseline to include the entire pre-bloom period reduces the effect of the abnormally high loadings experienced in 2004 resulting from three hurricanes (Charley, Frances, and Jeanne) affecting this portion of Florida.

Table 3-3 compares the nutrient loading targets to the baseline loadings and the estimated percent reduction from the baseline to achieve the loading targets. These loadings represent the total loadings delivered to the Mosquito Lagoon including direct runoff, baseflow, OSTDS, point sources, and atmospheric deposition.

Table 3-3 Baseline and Target Nutrient Loadings and Percent Load Reduction for Each ENR

ENR	Baseline Loading (lb/yr)	Target Loading (lb/yr)	Percent Reduction (%)
<u>TN Loading</u>			
North	110,059	93,328	15
Central	102,905	88,557	14
South	173,125	146,245	16
<u>TP Loading</u>			
North	12,370	10,538	15
Central	8,000	7,343	8
South	8,414	7,492	10

A comparison was also made to ensure the target loads did not exceed the loads exhibited during the NNC reference period (Table 3-4). In all cases, the target loads are less than the NNC reference period loads. This demonstrates that the NNC should be met when the RAP load targets are achieved through the implementation of this plan.

Table 3-4 Comparison of the NNC Reference Period (2004-2008) to the Allowable Target Nutrient Loadings for Each ENR (2006-2010)

ENR	NNC Reference Loading (lb/yr)	Target Loading (lb/yr)
<u>TN Loading</u>		
North	112,556	93,328
Central	107,728	88,557
South	190,574	146,245
<u>TP Loading</u>		
North	12,700	10,538
Central	8,207	7,343
South	9,025	7,492

4 DESCRIPTION OF PROPOSED MANAGEMENT ACTIONS

The proposed management actions for Mosquito Lagoon are a combination of capital improvement projects (CIPs), septic to sewer conversions, and public education and outreach and are described in more detail below.

4.1 SUMMARY OF POLLUTANT LOAD REDUCTIONS PROJECTS REPORT

As part of the *Pollutant Load-Reduction Projects Report* (Jones Edmunds and Janicki Environmental, February 2018), we evaluated 13 project options. Nine of the 13 projects are stormwater/base flow retrofit projects. The other four projects are a quantification of the load reductions from the septic-to-sewer projects in the *2015 Volusia County Water Quality Plan*, a quantification of load reductions from public education and outreach, an evaluation of potential load reductions from dragline ditch restoration, and a quantification of the load reduction expected from the North IRL meeting its Total Maximum Daily Load (TMDL). Five of the nine stormwater/base flow retrofit projects are intended as back-up projects in case issues arise with some of the other larger implementations (i.e., they treat some of the same areas as larger downstream projects).

4.2 PLANNED MANAGEMENT ACTIVITIES

There are seven large-scale projects summarized in Table 4-1 that the sponsors plan to implement. Descriptions and cost estimates for all the projects except Project 14 (Reclaimed Water Main Extension Phases 1, 2 and 3) were provided in Section 2 of the *Pollutant Load-Reduction Projects Report*. Project 14 was developed by the City of Edgewater outside of the *Pollutant Load-Reduction Projects Report*. Additional detail on project 14 is provided in Appendix A, and additional detail on all projects is provided in Appendix B at the end of this document.

There are several smaller-scale stormwater retrofit projects that will provide additional reductions above and beyond those listed in Table 4-1. Some of these planned for implementation are identified in the City of Edgewater's *Stormwater Master Plan CIP Update* (Quentin L. Hampton Associates, 2013). These projects generally treat less than 20 acres and remove less than 100 lb/yr TN and less than 10 lb/yr TP. As discussed further in Section 5, these projects and their associated load reductions will be tracked and will provide additional reductions beyond the large-scale planned projects.

Relatively recent public education and outreach would qualify three cities (Edgewater, New Smyrna Beach, and Oak Hill) and Volusia County for a 3-percent load reduction and FDOT for a 1-percent reduction by following the approach currently used in Basin Management Action Plans (BMAPs). Most notably a fertilizer ordinance that covers the Volusia County portion of Mosquito Lagoon was passed 2014. Effects from the ordinance were not likely realized in Mosquito Lagoon until sometime in 2015. The three cities and Volusia County are committed to identifying homeowner groups for the University of Florida's Institute of Food and Agricultural Sciences (IFAS) to contact and set up education efforts with them. This additional effort will allow them to be eligible for the additional 3-percent credit available through the Florida Yards and Neighborhoods Program. Table 4-2 shows the total load reduction from these credits applicable to the North and Central ENRs. The credits being estimated are derived from an EPA Office of Wetlands, Oceans and Watersheds-funded

Watershed Treatment Model by the Center for Watershed Protection. These types of credits are not being applied to the South ENR since the majority of the watershed is within the Cape Canaveral National Seashore and under the jurisdiction of the U.S. Park Service. This area is maintained to remain predominantly natural and undeveloped.

As discussed in Section 2.13 of the *Pollutant Load-Reduction Projects Report*, the estimated load reduction in the South ENR relies on the North IRL meeting its TMDL. That reduction is approximately an order of magnitude greater than the South ENR reduction goals of 12,400 lb/yr TN and 613 lb/yr TP. The ongoing dragline ditch restoration in Mosquito Lagoon is likely also providing pollutant-load reductions. However, site-specific research will need to be done before FDEP can allow load-reduction credits to be accounted for that activity.

Table 4-1 Large-Scale Stormwater/Base Flow Retrofit Projects

Project Number and Name	ENR	TN Reduction (lb/yr)	TP Reduction (lb/yr)	Schedule (Years After Plan Adoption)
Project 1: Diversion to Borrow Pit South of New Smyrna Beach Airport	North	1,300	320	5–10
Project 2: 10 th Street Treatment Facility	North	5,600	1,400	1–5
Project 8: Septic to Sewer ¹	North and Central	>2,200	>100	5–10
Project 9: Ariel Canal Water Quality Improvement Enhancement (aka River Breeze Stormwater Park)	Central	1,300	210	1–5
Project 10: Lighthouse Cove Treatment Facility	Central	760	180	5–10
Project 12: Public Education and Outreach	North and Central	4,100	570	1–5
Project 14: Reclaimed Water Main Extension Phases 1, 2 and 3	North and Central ²	4,900	1,600	1–5

Note: 1 – Specific septic-to-sewer projects are not identified as a part of the RAP. Instead, the sponsors have specified that they will implement septic-to-sewer projects to achieve the remainder of the pollutant load-reduction requirements. Discharge is near the north/central ENR border.

Table 4-2 Public Education and Outreach Pollutant Load Reductions

Stakeholder	Percent Reduction	Annual Load Reduction (lb/yr)	
		TP	TN
City of Edgewater	6	180	1,300
City of New Smyrna Beach	6	210	1,500
City of Oak Hill	6	43	310
FDOT	1	9	70
Volusia County	6	130	920

The large-scale stormwater projects shown in Table 4-1 and public education and outreach reductions shown in Table 4-2 provide approximately 18,000 lb/yr TN reduction of the 19,100 lb/yr needed for the North and Central ENRs combined and approximately 4,300 lb/yr TP reduction of the 2,100 lb/yr needed. Implementation of enough small stormwater retrofit projects is unlikely to meet the remaining TN load-reduction goal. Therefore, the remaining TN reduction will come from septic-to-sewer projects. The highest priority septic-to-sewer project identified in the *2015 Volusia County Water Quality Plan* (Indian Harbor Estates) is estimated to remove between 3,600 to 6,000 lb/yr TN, which is more than the balance of TN reduction needed. This project is conservatively scheduled for implementation between 5–10 years after adoption of this RAP. With adequate funding, the Indian Harbor Estates project, and possibly other septic-to-sewer projects, may be implemented sooner. Other septic-to-sewer projects identified in the *2015 Volusia County Water Quality Plan* include the following, with cost estimates being in 2015 dollars:

- Area 1 – Indian Harbor Estates (approximately 300 lots), \$6.08 million.
- Area 2 – Jackson Hole RV Park, Mosquito Lagoon RV Park, and Seminole Rest State Park (approximately 25 on-site septic systems), \$0.42 million.
- Area 3 – Waterway Estates (approximately 240 lots), \$6.03 million.
- Area 4 – Cory Estates (approximately 180 lots), \$4.70 million.
- Area 5 – Waterfront Park (approximately 40 lots), \$1.20 million.
- Area 6 – Lyon Subdivision (approximately 50 lots), \$1.47 million.
- Area 7 – Jones Fish Camp (approximately 65 lots), \$2.11 million.
- Area 8 – Oak Hill East (approximately 230 lots), \$6.19 million.
- Area 9 – Mobile Village (approximately 175 lots), \$4.73 million.
- Area 10 – Oak Hill West (approximately 170 lots), \$4.59 million.

In parallel with the development of this RAP, the Comprehensive Conservation and Management Plan for Indian River Lagoon is currently being updated. Priority corrective actions in that document and management actions being proposed in this RAP are complementary.

4.3 RESPONSIBLE PARTICIPATING ENTITIES

The following are the responsible participating entities in this RAP:

- City of Edgewater.
- City of New Smyrna Beach.
- City of Oak Hill.
- FDOT.
- Volusia County.

4.4 POINT SOURCES WITH NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS

Two significant wastewater treatment plants (WWTPs) are permitted to discharge treated effluent into the Mosquito Lagoon watershed:

- Edgewater (NPDES Permit No. FL0021431).

- New Smyrna Beach (NPDES Permit No. FL0172090).

Four NPDES concrete batch plants also exist within the Mosquito Lagoon watershed:

- Florida Rock-Edgewater (NPDES Permit No. FLG110765).
- Balduf Concrete (NPDES Permit No. FLG110798).
- Titan Florida Edgewater RMP (NPDES Permit No. FLG 110583).
- CEMEX Construction Materials Florida, LLC – New Smyrna Beach Ready Mix Plant (NPDES Permit No. FLG110670).

Volusia County Utilities also has a WWTP (NPDES Permit No. FLA017413) that applies a portion of its reuse within the Mosquito Lagoon watershed. Section 6 of the *Watershed Model Development Report* provides additional details on point sources.

The WWTPs have invested extensively in reuse and processes to reduce their nutrient concentrations. For example, the New Smyrna Beach WWTP has not had a surface discharge since 2009. Because of the past investments made in the WWTPs and their relatively small contributions to nutrient loading (see Figures 2-6 through 2-17), further reductions of these sources are not being considered as a part of this RAP.

4.5 LIST OF NONPOINT SOURCE CATEGORIES

Mosquito Lagoon receives non-point-source pollutant loading from the following categories:

- Direct runoff.
- Base flow.
- OSTDS (also known as septic systems).
- Atmospheric deposition directly on the Mosquito Lagoon.

Sections 4 through 9 of the *Watershed Development Model Report* provide quantification of the pollutant loads from these sources.

4.6 CONFIRMED SOURCES OF FUNDING AND IDENTIFICATION OF DEFICIENCIES

Funding sources include general funds and stormwater utility funds from the sponsors. The sponsors will also seek grant funding where possible. No deficiencies are currently identified for a 15-year implementation. The stakeholders have approved the projects in their jurisdiction. In addition to sources of funding stakeholders may generate, the DEP administers grant funds received from EPA and the Florida Legislature to implement projects and activities that reduce sources of pollution in priority watersheds. Waterbodies included in a RAP are considered priority watersheds.

5 DESCRIPTION OF PROCEDURES FOR MONITORING, COMPLIANCE ASSESSMENT, AND REPORTING

5.1 REPORTING

An annual report will be prepared each year that will outline the progress of the RAP. The annual report will include:

- Results of the water quality and seagrass assessments.
- Explanation of deficiencies in achieving targets.
- Status of the monitoring plan.
- Updates on the status of project implementation.
- Estimates of the load reductions made to date.

Every 5 years an update to the RAP will be completed. Items to be included are:

- Results of the water quality and seagrass assessments.
- An update of the annual pollutant loads.
- Explanation of deficiencies in achieving targets.
- Status of the monitoring plan.
- Updates on the status of project implementation.
- Estimates of the load reductions made to date.
- Any additional projects needed to meet the load-reduction requirements.

5.2 WATER QUALITY MONITORING

Volusia County and SJRWMD have a partnership that collects water quality samples in the Volusia County portion of Mosquito Lagoon. The County collects the samples, and SJRWMD analyzes and uploads the data to FDEP's data repository for analysis and as part of the water quality assessment cycle. We recommend that the stakeholders maintain this level of spatial resolution in the North and Central ENRs. The spatial distribution in the South ENR will be expanded to include two additional sites not under the direct influence of the Haulover Canal.

Regarding the temporal scale, while quarterly monitoring is deemed acceptable in terms of meeting the data sufficiency of the Impaired Waters Rule, it limits the understanding of the intra-annual variability. To address the intra-annual variability, the sampling frequency will revert to monthly as had been achieved before 2010. Since the proposed water quality targets were based on a monthly sampling frequency, the assessment of compliance with those targets is more defensible if also based on a monthly sampling frequency.

5.3 SEAGRASS MONITORING

The stakeholders will continue to support the seagrass monitoring efforts conducted by SJRWMD and their partners. Of particular importance is the aerial mapping effort. This product provided the basis for formulating the water quality targets. The Central and South ENRs have seagrass acreage and depth colonization targets that would be useful to assess when new data become available.

5.4 POLLUTANT-LOADING ASSESSMENT

As part of the 5-year RAP update (see Section 5.1), pollutant loadings will be estimated following the methods defined in Jones Edmunds *Watershed Model Development Report* (2017). The updates will account for changes in land use, implementation of stormwater best management practices, and other additional management actions put in place during that period. These estimates will be used to assess compliance with the proposed loading targets, while the enhanced water quality data will be used to assess compliance with the NNC.

5.5 VERIFICATION OF COMPLIANCE

Compliance with the RAP will be based on evaluating the ambient water quality, seagrass extent, and pollutant-loading targets.

On an annual basis, ENR-specific AGMs will be estimated following the methods required by the Impaired Waters Rule or Chapter 62-303 FAC. These values will be compared to the existing NNC water quality targets. Following the methods used by FDEP, compliance will be achieved if the current NNC water quality targets are met at least twice in every 3-year period. This will maintain consistency with past and future FDEP assessments.

Given the importance of seagrasses to the Mosquito Lagoon and to the development of the water quality targets, a seagrass assessment will be conducted as additional data become available. Comparisons of seagrass coverage (area) and mean deep-edge depth to established seagrass targets will be conducted in each of the three ENRs.

Every 5 years, the pollutant-loading estimates will be compared to the proposed loading targets, along with the annual comparison of water quality concentrations to the current NNC mentioned above. Based on the project schedule outlined in this document, the current NNC are expected to be achieved within 15 years.

5.6 SUMMARY OF COMPLIANCE

As described, at various points in the 5-year RAP cycle key indicators are being assessed to provide assurance that the stakeholders are moving in the right direction to meet the water quality criteria. These include seagrasses as the primary biological end point, water quality as the key stressor, and pollutant loading as the main driver. A system will be in place (see Section 6.1) that will allow stakeholders an opportunity to assess any failures and adjust the plan accordingly through adaptive management in case the failures are not caused simply by changes in rainfall patterns. The outcomes of these assessments will be included in the annual report (water quality/seagrass) and as part of the 5-year update (water quality/seagrass/loadings). This plan provides a 15-year restoration schedule to meet the current NNC water quality targets.

6 COMMITMENT TO CORRECTIVE ACTIONS

RAPs are adopted by agency order, which are legally enforceable under Florida Statute and penalties can be applied for violation of the orders.

6.1 DESCRIPTION OF POTENTIAL CORRECTIVE ACTIONS

The annual report will include an assessment of the ambient water quality data where the AGMs will be estimated and compared to the NNC. Also, as part of the 5-year compliance report, an assessment of the updated watershed loads and seagrass coverage will take place.

Table 6-1 shows the decision framework that the annual report and the 5-year compliance report will follow to guide the actions of the stakeholders if any of the criteria are not met, adjusting the future actions where necessary through adaptive management. This framework follows similar steps used by the Tampa Bay Nitrogen Management Consortium for implementing the Tampa Bay RAP. The framework recommends a series of actions to follow if a criterion is not met. This will include a comparison of any updated aerial mapped seagrass coverages, if available, to assess seagrass target attainment.

Table 6-1 Assessment Steps for the Mosquito Lagoon RAP

Assessment Step	Result	Action
I. Annually determine if the ENR-specific AGM TN, TP, and Chlorophyll <i>a</i> concentrations achieve the water quality concentration thresholds.	Yes	Stakeholder Action 1
	No	Go to II.
II. Review data and determine if an anomalous event(s) influenced non-attainment of the ENR-specific threshold.	Yes	Stakeholder Action 2
	No	Go to III.
III. Determine if the ENR-specific NNC have been exceeded more than once in a 3-year period.	Yes	Go to IV.
	No	Stakeholder Action 1.
IV. Determine if the ENR-specific loading targets have been achieved.	Yes	Stakeholder Action 3
	No	Go to V.
V. For a given year or for multiple years, compile and report source loads compared to the reasonable assurance target load.	Compile and Report	Stakeholder Action 4

Stakeholder actions outlined in Table 6-1 performed during RAP implementation is as follows:

Stakeholder Action 1. A report assessing attainment of ENR-specific AGM TN, TP, and Chlorophyll *a* concentrations is delivered to FDEP. If attainment is not achieved, the process will move to the next action.

Stakeholder Action 2. A report of the anomalous event(s) or data that influenced the ENR specific exceedance(s) is delivered to FDEP upon review of the

stakeholders. If an anomalous event(s) did not influence non-attainment, the process will move to the next action.

Stakeholder Action 3. Consider re-evaluation of the ENR-specific assimilative capacity based on non-attainment of the current NNC while meeting the annual loading targets. If a re-evaluation is warranted and the ENR-specific assimilative capacity remains the same after re-evaluation, the process will move to the next action.

Stakeholder Action 4. If loading targets are not achieved, compile the results including a hydrologic evaluation for FDEP's review, and identify potential further adaptive management actions needed to achieve reasonable assurance for ENR loading targets.

7 REFERENCES

- Duarte, C.M., Conley, D.J., Carstensen, J. 2009. *Return to Neverland: Shifting Baselines Affect Eutrophication Restoration Targets*. Estuaries and Coasts. 32:29-36.
- FDEP, 2012. *Overview of approaches for numeric nutrient criteria development in marine waters*. Tallahassee, FL: Standards and Assessment Section.
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- IRL 2011 Consortium, 2015. *2011 Superbloom Report: Evaluating Effects and Possible Causes with Available Data*. St. Johns River Water Management District.
- Janicki Environmental, Inc. 2017. *Determination of the Mosquito Lagoon Nutrient Loading Targets*. Prepared for Volusia County, FL and Mosquito Lagoon RAP Stakeholder Group.
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- Morris, Lori. *Personal Communication*.
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Appendix A

Project 14: Reclaimed Water Main Extension Phases 1, 2 and 3



Fiscal Year 2018-2019 Districtwide Cost-Share (FY19 DWCS) Application

INSTRUCTIONS FOR USE OF THIS FORM:

This form is designed to assist in submitting a complete application for consideration by the St. Johns River Water Management District (District) for the FY19 DWCS Program. Detailed guidance on completing this application can be found in the Funding Guidance Document. All sections of the form must be completed to be considered a complete application. **Any information listed on the checklist that is not included in the application will result in an automatic deduction of 5 points in the evaluation.** If additional space is needed to fully complete a section, please attach separately. County governments, municipalities, water supply authorities, and other interested public and private entities as determined eligible may submit.

A. BASIC INFORMATION	
A-1	NAME OF ENTITY / ORGANIZATION: City of Edgewater PROJECT NAME (please see below): Reclaimed Water Main Extension Phases 1, 2 and 3
A-2	Contact information of project manager or contact person: <i>(District will send correspondence concerning this application ONLY this person)</i> Name/title: Brenda Dewees, Environmental Services Director Email address: bdewees@cityofedgewater.org Mailing address: 104 N. Riverside Dr., Edgewater, FL 32132 Office Phone: (386) 424-2400 ext. 4001 Mobile Phone: (386) 547-3819
A-3	Contact information of person with authority to enter into a contractual agreement, if other than project manager or contact person: If same as A-2 above, do not complete this section. Name/title: Tracey T. Barlow, City Manager Email address: tbarlow@cityofedgewater.org Mailing address: 104 N. Riverside Dr., Edgewater, FL 32132 Office Phone: (386)424-2400 ext. 1201 Mobile Phone: (386) 566-3715
A-4	What County is this project located? ☐ Alachua ☐ Baker ☐ Bradford ☐ Brevard ☐ Clay ☐ Duval ☐ Flagler ☐ Indian River ☐ Lake ☐ Marion ☐ Nassau ☐ Orange ☐ Osceola ☐ Putnam ☐ Seminole ☐ St. Johns ☐ Okeechobee ☒ Volusia
A-5	What Water Supply Planning Region is this project located (Refer to map at https://www.sjrwmd.com/water-supply/planning/) ☐ North Florida (North Florida Regional Water Supply Partnership/North Florida Water Initiative) ☒ Central Springs and East Coast ☐ Central Florida (Central Florida Water Initiative)
A-6	Is the project located in an area that has an established Total Maximum Daily Load (TMDL) or Basin Management Action Plan (BMAP)? If the proposed project is listed within a BMAP, please provide the BMAP name and BMAP project number (e.g., VC-3 or LM-4) and ensure that the project name corresponds to the BMAP project name. If the project is part of a BMAP project but

	<i>is not identical, please provide the BMAP name, project name, and BMAP project number that most closely corresponds to the project in the BMAP and explain the relationship of your proposed project to the project contained in the BMAP within section B-2 Project Description. Indicate the FDEP Waterbody IDs (WBIDs) that the project benefits (http://www.dep.state.fl.us/water/tmdl/index.htm). Does the project benefit a water body with an established Minimum Flows & Levels (MFL)? If so, name the water body. For MFL projects, indicate whether or not there is an implemented Prevention / Recovery strategy.</i>		
	The Project is located in an area that has an established TMDL or BMAP: ☒ Yes ☐ No		
	TMDL. Waterbody: Indian River Lagoon and Banana River Lagoon	BMAP. Waterbody: Indian River Lagoon Basin: North Indian River Lagoon	
	MFL. Waterbody:	WBID: 2942B	
	Prevention/Recovery Strategy Implemented? ☒ Yes ☐ No		
	Is the project specifically named in the BMAP identified above? ☐ Yes ☒ No		
A-7	Is the Applicant a Rural Economic Development Initiative (REDI) Community? ☐ Yes ☒ No If yes, please attach a signed Waiver of Matching Funds Letter on your letterhead. See format at https://www.sjrwmd.com/funding		
A-8	For County or Municipal applicants: Have you adopted the District's model Landscape Irrigation Ordinance? (Scoring Criterion #5): ☒ Yes ☐ No		
B. PROJECT INFORMATION			
B-1	PROJECT TYPE <i>Check only one and provide evidence in Section B-3.</i> ☐ Water Supply ☐ Water Conservation ☒ Water Quality ☐ Flood Protection ☐ Natural Systems		
B-2	PROJECT DESCRIPTION (Scoring Criterion #1) a. Short Description <i>Succinctly describe the project, e.g. what is being constructed or what is the program to be implemented (attach supporting documentation if necessary)?</i> Construction of reclaimed water main extensions, a new reuse storage reservoir and wetland outfall. Reclaimed water system components are intended to eliminate effluent discharges into the Indian River Lagoon (IRL). Please see Attachment #1 – Facility Plan Executive Summary.		

	b. Measures of Success <i>Describe how will you measure the effectiveness of your project?</i> Success will be measured by the volume of effluent not directed to surface waters and the Indian River Lagoon. The project will also reduce groundwater consumption. Project will enable beneficial recovery of effluent and eliminate IRL discharge except under severe wet weather conditions.
	c. Is this project multi-phased or part of a larger overall effort? If so, describe the larger project. The project is a stand alone project; however, extensions of reclaimed water west of I-95 will enable connection of developer funded wetland restoration efforts and connection of developer installed reuse mains.
	d. Describe the location, include a map. The map should identify any potentially affected MFL, TMDL, BMAP, or impaired water bodies, or affected wetlands or springs. Identify the WBID. Please see Attachment #2. Figure #1 depicts the areas served. The reclaimed water main extensions will be constructed from: • The Public Works Facility on Mango Tree Dr. to Dale St. • Willow Oak Dr. to the Coral Trace Subdivision • The Coral Trace Subdivision to west of I-95 Figure #2 depicts the project location and affected waterbody.
	Coordinates for the project (use centroid for large areas): Latitude: 28.989166666666666 Longitude: -80.90944444444443 (Please provide in decimal degrees)
B-3	BENEFITS TO DISTRICT MISSIONS (<i>Scoring Criterion #2</i>) <i>Describe the benefit to one (or more) of the District's main missions (Water Supply/Conservation, Water Quality, Flood Protection and/or Natural Systems). Indicate which is the primary mission benefit. Attach separate pages if necessary. Be sure to refer to the Funding Guidance Manual for additional pertinent information</i> Primary benefit: The project is needed to significantly reduce surface water discharge to the Indian River. Additionally, the reservoir and wetland outfall at the proposed Public Works Facility will provide a site for wet weather discharge during low irrigation periods. These improvements align with the District's mission to protect the water quality in the Indian River Lagoon basin.

	Secondary benefit(s) (if applicable): Reclaimed water will be extended to an existing 'dry line' subdivision, Coral Trace. It will also be extended west of I-95 to (2) new D.R.I. developments for irrigation and wetland rehydration.																								
B-4	If the Project is for Water Resource Development or Alternative Water Supply Development identify the source water (<i>check all that apply</i>): ☐ Fresh Groundwater ☐ Brackish Groundwater ☐ Stormwater ☒ Reclaimed Water ☐ Surface Water: Identify surface water body: _____ ☐ Brackish Surface Water: Identify surface water body: _____ ☐ Other: Identify Source: _____																								
B-5	District Permit Information: <i>If the applicant has an SJRWMD-issued Consumptive Use Permit and or an Environmental Resource Permit for the project site, provide the following:</i> <table border="1"> <tr> <th>Permit Type:</th><th>Permit #</th><th>Expiration date/Compliant (yes / no)</th></tr> <tr> <td>Consumptive Use Permit</td><td>9157</td><td>12/11/2027/yes</td></tr> <tr> <td> </td><td> </td><td> </td></tr> <tr> <td> </td><td> </td><td> </td></tr> </table>	Permit Type:	Permit #	Expiration date/Compliant (yes / no)	Consumptive Use Permit	9157	12/11/2027/yes																		
Permit Type:	Permit #	Expiration date/Compliant (yes / no)																							
Consumptive Use Permit	9157	12/11/2027/yes																							
B-6	Project likelihood of successful completion: a. Project Readiness (<i>Scoring Criterion #3</i>): <i>Check all that apply and supply requested dates (month/day/year) and attach a detailed project construction schedule.</i> <table border="1"> <tr> <td></td><td>Current % Complete</td><td></td></tr> <tr> <td>Planning</td><td>100 %</td><td>Start Date: 11/15 Completion Date: 7/16</td></tr> <tr> <td>Design</td><td>100 %</td><td>Start Date: 8/16 Completion Date: 12/17</td></tr> <tr> <td>Permitting</td><td>80 %</td><td>Start Date: 11/17 Completion Date: 3/18</td></tr> <tr> <td>Bidding</td><td>0 %</td><td>Start Date: 8/18 Completion Date: 9/18</td></tr> <tr> <td>Construction</td><td></td><td>Start Date: 11/18 Completion Date: 6/20</td></tr> <tr> <td>Future Phases</td><td></td><td>Start Date: Completion Date:</td></tr> <tr> <td>Other</td><td></td><td>Start Date: Completion Date:</td></tr> </table> Design plans are complete, permitting is under way, SRF Facility Plan is complete, SRF funding for city cost-share is pending. Please see Attachment #3 – Construction Schedule and Critical Milestones. <i>Include documentation that demonstrates that the construction start date is realistic (e.g. critical milestones, commission approval dates, procurement timeline, etc.).</i>		Current % Complete		Planning	100 %	Start Date: 11/15 Completion Date: 7/16	Design	100 %	Start Date: 8/16 Completion Date: 12/17	Permitting	80 %	Start Date: 11/17 Completion Date: 3/18	Bidding	0 %	Start Date: 8/18 Completion Date: 9/18	Construction		Start Date: 11/18 Completion Date: 6/20	Future Phases		Start Date: Completion Date:	Other		Start Date: Completion Date:
	Current % Complete																								
Planning	100 %	Start Date: 11/15 Completion Date: 7/16																							
Design	100 %	Start Date: 8/16 Completion Date: 12/17																							
Permitting	80 %	Start Date: 11/17 Completion Date: 3/18																							
Bidding	0 %	Start Date: 8/18 Completion Date: 9/18																							
Construction		Start Date: 11/18 Completion Date: 6/20																							
Future Phases		Start Date: Completion Date:																							
Other		Start Date: Completion Date:																							

	b. Local Government / Public Support: <i>Describe the public support for your project (meetings attended, community workshops, presentations to councils, notification in newsletters, etc.). If your project requires participation from certain communities or homeowners, provide a description of methods used to ensure participation in your project. Provide the percentage of participation that can be documented at the time of the application.</i> City Commission has approved the project. SRF Facility Plan has been approved and public advertisement has been completed per SRF guidelines. The City anticipates approximately 75% connection for residential utilization of approximately 0.60 MGD. The proposed reservoir will enable seasonal storage and the proposed wetland discharge will provide for an alternate discharge site.																			
B-7	Applicant has identified all required permits necessary for project construction and has indicated whether any property needed is under its ownership or control. Applicant initial here:																			
C. PROJECT COST INFORMATION																				
C-1	a. Breakdown of project cost <i>(provide details in separate attachment)</i> <i>Attach a table or spreadsheet with detailed project costs for each task or segment of the project. The District will contribute only to the construction costs of the project; however, the table should detail all project costs. Indicate at the end of the table/spreadsheet, a cost effectiveness evaluation as described below.</i> Please see Attachment #4 for detailed project cost estimate and cost effectiveness calculator. b. Cost-share request funding table <i>The District's share (C) cannot exceed 33% for Alternative Water Supply, Water Quality, Flood Protection and Natural Systems projects and 50% for Water Conservation projects of the total construction cost (B) except for REDI communities that have submitted a waiver, up to 100% of total construction cost can be reimbursed.</i> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">A. Total estimated project cost: (includes capital, construction, land acquisition, planning, permitting & design costs)</td><td colspan="2">\$ 4,891,200</td></tr> <tr> <td>B. Construction costs:</td><td>Year 1 (FY2019)</td><td>Year 2 (FY2020)</td></tr> <tr> <td></td><td>\$ 3,222,000</td><td>\$ 1,074,000</td></tr> <tr> <td>C. Cost-share amount requested:</td><td colspan="2">\$ 1,417,680</td></tr> <tr> <td>D. Estimated Applicant's Annual Operation & Maintenance Costs:</td><td colspan="2">\$ 20,000.00</td></tr> <tr> <td>E. Estimated Service life of components:</td><td colspan="2">40 years</td></tr> </table>		A. Total estimated project cost: (includes capital, construction, land acquisition, planning, permitting & design costs)	\$ 4,891,200		B. Construction costs:	Year 1 (FY2019)	Year 2 (FY2020)		\$ 3,222,000	\$ 1,074,000	C. Cost-share amount requested:	\$ 1,417,680		D. Estimated Applicant's Annual Operation & Maintenance Costs:	\$ 20,000.00		E. Estimated Service life of components:	40 years	
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D. Estimated Applicant's Annual Operation & Maintenance Costs:	\$ 20,000.00																			
E. Estimated Service life of components:	40 years																			

	c. Funding Sources: <i>Identify any other outside sources of funding including State or Federal appropriations or grant monies, municipal bonds. Identify source and status of applicant funding.</i> An SRF design loan was received and a loan application package has been completed for the construction loan. A Request for Inclusion will be submitted to DEP for the May 2018 hearing. SRF funding will be available by August 2018. <i>The District would like to recognize in-kind financial contributions for REDI communities requesting 100% funding of the construction costs. Describe your in-kind contribution and estimate the monetary value of that contribution. This will not affect your score or ranking.</i>			
	d. Project partners: <i>Check one below and if multi-jurisdictional include the percent of funding to be contributed by each partner.</i> X Single entity ☐ Multi-jurisdictional (attach copy of partnership agreement or memorandum of understanding, if available, and includes status of agreement). Identify other partners:			
C-2	Quantification of Project Benefits: District staff will quantify benefits for Septic to Sewer projects, Flood Protection Projects and projects benefiting MFL water bodies using the information provided below and the map provided in B-2 e. <i>For water quality projects accepted engineering methods may be used to estimate benefits however, backup information showing those calculations must be provided. If the project is a project listed within a BMAP provide the credited nutrient reduction value associated with the project within the BMAP.</i> Please see Attachment #4. <i>For calculation of quantified benefit for Water Supply/ Conservation Projects, Water Quality Projects (other than septic to sewer), and Natural Systems Projects (other than MFL projects). Show all work and include assumptions.</i> <table border="1" data-bbox="285 1430 1505 1925"> <tr> <td data-bbox="285 1430 899 1925"> For Water Supply/Conservation Projects: _____ MGD conserved/alternative water supplied For Water Quality Projects: <u>4,929</u> Lbs/year TN removed/reduced annually <u>1,643</u> Lbs/year TP removed/reduced annually For Flood Protection projects: _____ Acres protected from flooding Annual Exceedance probability - As is: 1/_____ years </td> <td data-bbox="899 1430 1505 1925"> For Natural Systems projects: _____ Acres Wetlands Restored/Enhanced _____ Acres Uplands Restored/Enhanced _____ Linear feet of shoreline Restored/Enhanced For projects benefiting MFL waterbodies: _____ MGD of water withdrawn or recharged _____ MGD of alternative source to offset withdrawals. </td> </tr> </table>		For Water Supply/Conservation Projects: _____ MGD conserved/alternative water supplied For Water Quality Projects: <u>4,929</u> Lbs/year TN removed/reduced annually <u>1,643</u> Lbs/year TP removed/reduced annually For Flood Protection projects: _____ Acres protected from flooding Annual Exceedance probability - As is: 1/_____ years	For Natural Systems projects: _____ Acres Wetlands Restored/Enhanced _____ Acres Uplands Restored/Enhanced _____ Linear feet of shoreline Restored/Enhanced For projects benefiting MFL waterbodies: _____ MGD of water withdrawn or recharged _____ MGD of alternative source to offset withdrawals.
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After implementation: 1/____years		
Cost Effectiveness (Scoring Criterion #4) (complete for all that apply) <i>For Water Supply and Water Conservation projects, and for Water Quality projects, please attach the Cost Effectiveness Calculator (as provided on website) and appropriate supporting documentation. (Failure to use the cost effectiveness calculator may result in a zero score for cost effectiveness.) For Water Quality, Flood Protection, and Natural Systems projects, please provide methodology used and additional supporting documentation, including, for Water Supply and Water Quality projects, the cost effectiveness calculator. Please see Attachment #4.</i>		
Water Supply:	_____	cost per 1000 gallons made available
Water Conservation:	_____	cost per 1000 gallons conserved
Water Quality (TP or TN): (Septic to sewer will be Calculated by District staff)	<u>47.86</u>	cost per lb TN
	<u>143.58</u>	cost per lb TP
Flood Protection:	_____	Benefit/Cost ratio (will be calculated by District staff)
Natural Systems:	_____	cost per acre or linear feet shoreline
MFL projects:	_____	cost per % recovery of MFL water body (will be calculated by District staff)
Provide the required attachments: project map, construction schedule/timeline, project cost table or spreadsheet, and cost effectiveness calculator; plus, additional information required for your specific project type in accordance with the District's 2019 District wide Cost-Share (DWCS) Funding Program Guidance.		

Application Checklist

- ✓ All sections of the application are filled in completely
 - ✓ Dates are within timeframes prescribed in the Funding Guidance Document (construction/program must begin by 12/31/2019 and be completed within 2 years)
REDI Waiver of Matching Funds document is attached for REDI projects (if applicable)
 - ✓ Detailed project construction schedule with backup
Construction phasing information (if applicable)
 - ✓ Detailed project cost breakdown
 - ✓ Calculations for quantification of project benefits
 - ✓ Cost effectiveness calculations and a copy of the cost effectiveness calculator for water supply/water conservation or water quality projects
 - ✓ Applicant has identified all required permits necessary for project construction
 - ✓ Application is signed and dated
-

I certify that all information on this form and the attached document(s),
if applicable, is true and correct.

Signature of the person with authority to enter into a contractual agreement.

Name (print): Tracey T. Barlow

Signature: _____

Title: City Manager

Date: _____

Attachment #1

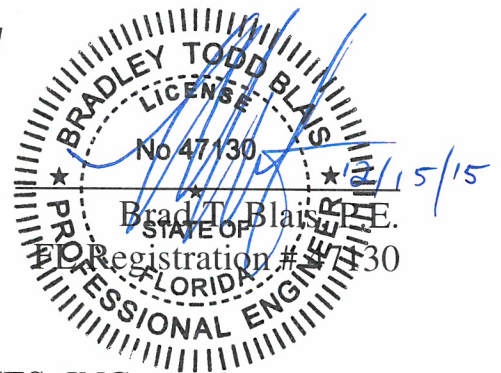
City of Edgewater RWM Extension Phases 1, 2 & 3

Facility Plan Executive Summary

CITY OF EDGEWATER



WASTEWATER FACILITY PLAN UPDATE



Prepared by:
QUENTIN L. HAMPTON ASSOCIATES, INC.
-Consulting Engineers-
December 2015

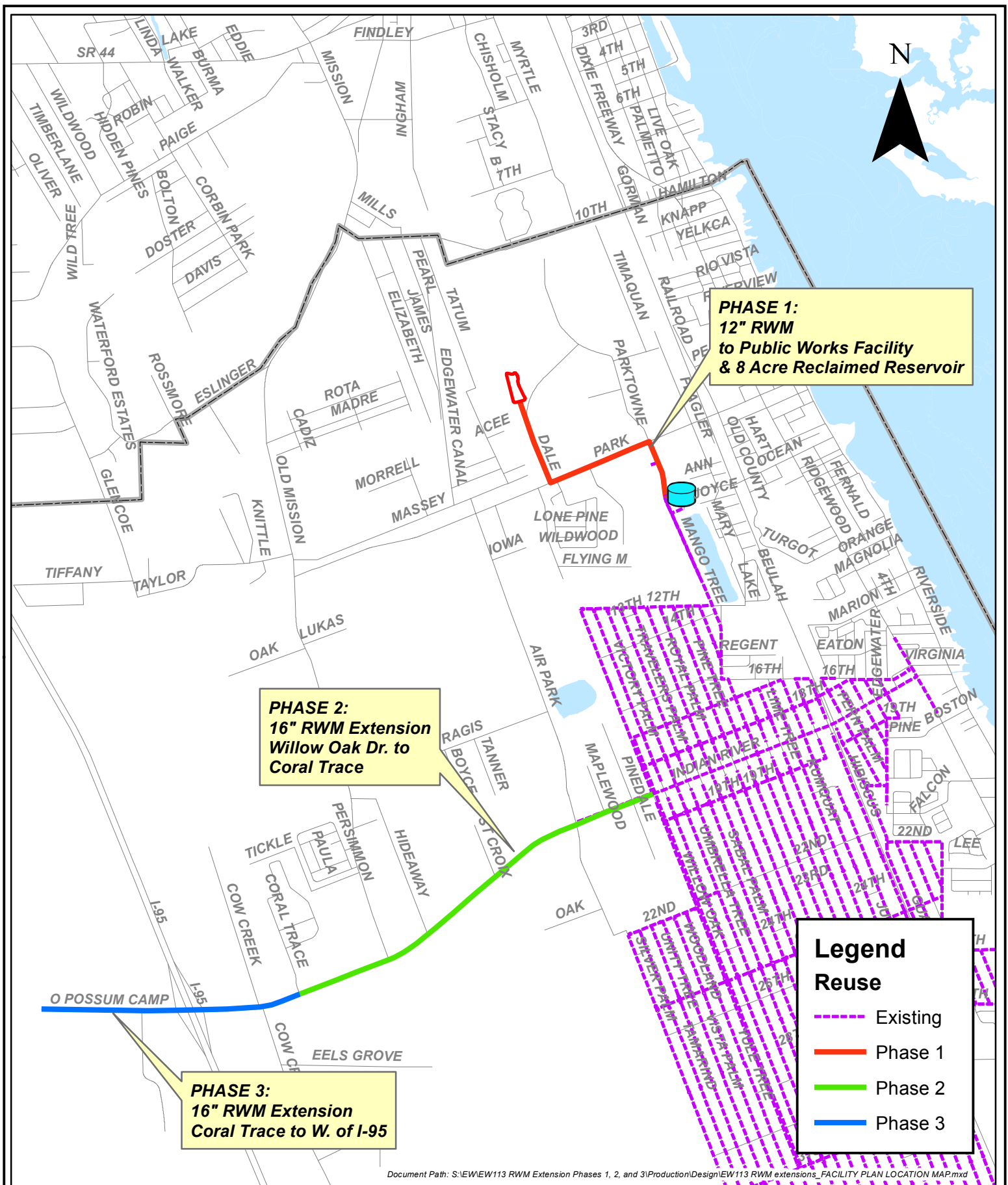
EXECUTIVE SUMMARY

Background

The City of Edgewater has authorized preparation of this Facility Plan Update to identify projected capital need for Reclaimed Water Extensions, Phases 1, 2 and 3 and establish estimated costs and implementation schedules for same. It is anticipated that the City will use the State Revolving Fund (SRF) Program to construct improvements identified herein.

This document addresses reclaimed water system elements and comports with the Facility Plan Review Checklist. This checklist was developed by the Florida Department of Environmental Protection (FDEP). The City may elect to utilize the State Revolving Fund Program to address their reclaimed water system needs. This document will be submitted for review to the clean water section of the State Revolving Fund (SRF) Program.

The City of Edgewater's Water Reclamation Facility has a permitted capacity of 2.75 MGD and operates under FDEP permit number FL0021431. The treatment plant site is located south of Park Ave and east of Mango Tree Dr. The WRF is the only regional wastewater facility in Edgewater and currently treats approximately 1.3 MGD average daily flow. Effluent is treated to AWT standards of 5 mg/L CBOD, 5 mg/L TSS, 3 mg/L TN, and 1 mg/L TP. The plant discharges most of the treated effluent as public access reclaimed water. On average, the City reuses approximately 85% of plant effluent as reclaimed irrigation. During wet weather periods, the facility is permitted to discharge effluent to the Indian River. The City has made a continued effort to reduce effluent discharged to the River and will continue those efforts by expanding the reclaimed water system and installing a storage reservoir with wetland outfall at the proposed Public Works Facility. The attached figure, **Figure 1**, shows the City's existing reclaimed water distribution system and three (3) proposed extensions.



QUENTIN L. HAMPTON ASSOCIATES, INC.
CONSULTING ENGINEERS

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CITY OF EDGEWATER
RECLAIMED WATER
MAIN EXTENSIONS
PHASES 1, 2 & 3
WW FACILITY PLAN UPDATE

FIGURE 1
RECLAIMED WATER MAIN
EXTENSIONS
LOCATION MAP

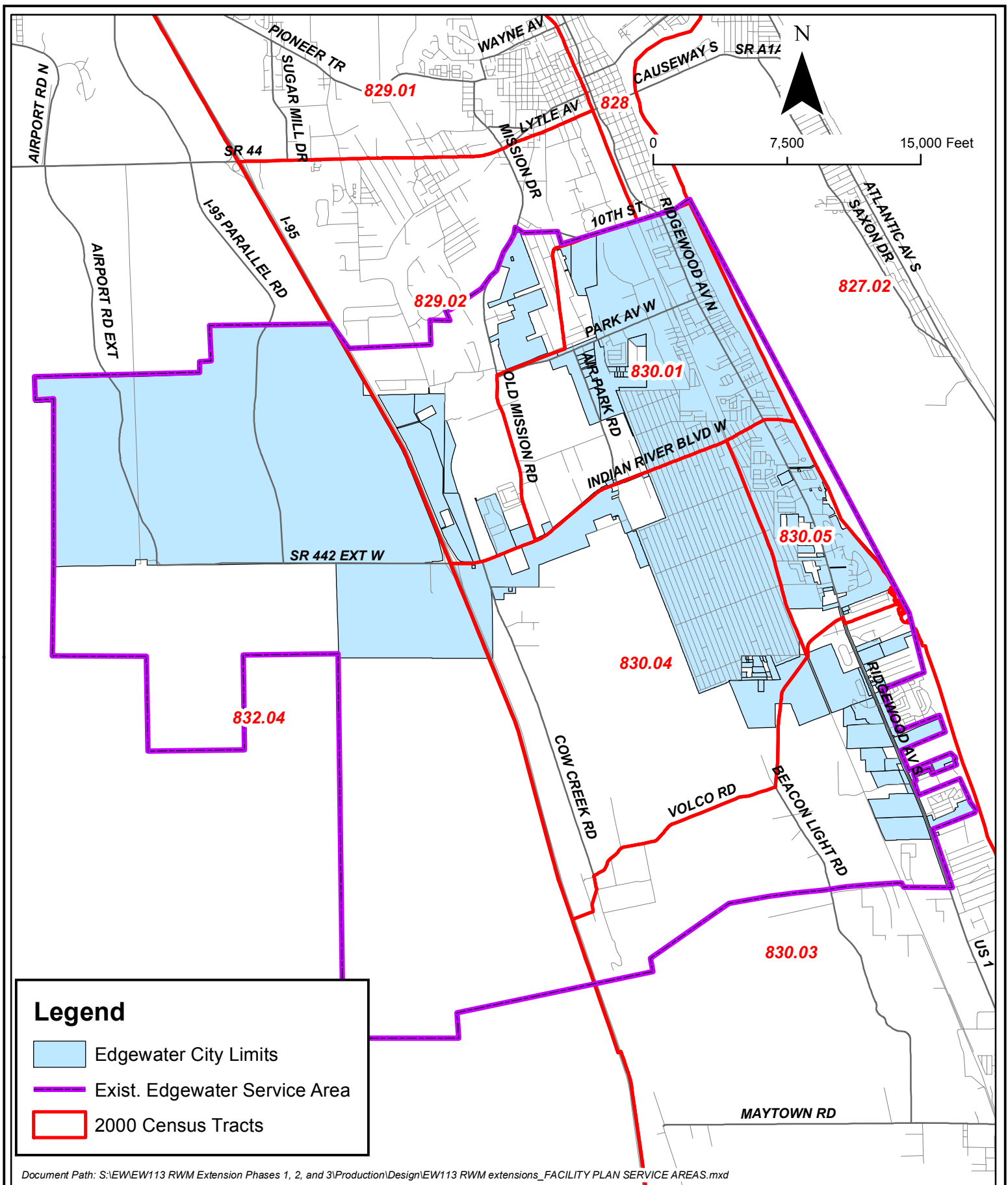
Need and Justification

The project is needed to reduce surface water discharge to the Indian River by expanding the reclaimed water distribution system. Additionally, the reservoir and wetland outfall at the proposed Public Works Facility will provide wet weather discharge during low irrigation periods. These improvements align with the goals of the City and SJRWMD to protect the water quality in the Indian River Lagoon basin.

The NPDES permitted outfall is located within the Indian River Lagoon and reduced freshwater and nutrient loading will serve to improve water quality within the lagoon. The proposed westward reclaimed water extension project will enable connection of 'dry lined' subdivisions and land application of reclaimed water in the vicinity of City's wellfield property. Upon completion of the 'Restoration' development project, reclaimed water and stormwater will be used to restore natural hydroperiods within 'ditched' areas west of I-95.

Project Description

These extensions will expand the system west along SR 442 and north to the City's proposed Public Works Facility. The existing service areas including the Edgewater City Limits and 2000 Census Tracts are included as **Figure 2**. Phase 1 will consist of approximately 6,000 lf of 12" pipe to the proposed Public Works Facility at Dale Ave. The site plan for the Public Works Facility includes an 8 acre reclaimed storage pond with an outfall to adjacent wetlands for augmentation of fresh surface waters. Phases 2 and 3 of the project will include extension of the existing reclaimed water main further west on SR 442. The second phase of reclaimed water main extensions would be from Willow Oak Dr. to Coral Trace. This 16" reclaimed main extension will serve existing and proposed developments with reclaimed water distribution systems. The third phase will extend the system west of I-95 for future developments and additional wetland outfall/aquifer



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**CITY OF EDGEWATER
RECLAIMED WATER
MAIN EXTENSIONS
PHASES 1, 2, & 3**

**FIGURE 2
CENSUS TRACTS,
SYSTEM BOUNDARY,
PROJECT AREA**

recharge. Projected costs for all three (3) phases of the reclaimed main extensions are estimated to total \$3,946,800.

The Phase 1 project involves approximately 6,000 lf of pipe and sitework at the City's proposed Public Works facility. Permitting for this project will require biological work to include jurisdictional surveys and off-site investigations for effluent discharge. The City will engage their biological sub-consultant independently for this work. Additional laboratory analysis of background water quality and/or effluent may also be required. The City has a contract laboratory who can accomplish sampling and testing. QLH will coordinate this work, City will contract directly with laboratory. The conceptual construction cost estimate for Phase 1 is approximately \$1.1M.

Phase 2 requires construction of approximately 10,000 lf of 16" reclaimed water main to Coral Trace subdivision. The conceptual cost estimate is \$1.5M. Phase 3 is an additional 6,000 lf of 16" water main to serve (2) future subdivisions west of I-95. The conceptual cost estimate is approximately \$1.0M. This connection will enable utilization of virtually all effluent from the City's water reclamation facility.

Attachment #2

City of Edgewater RWM Extension Phases 1, 2 & 3

Location Maps

Attachment #3

City of Edgewater RWM Extension Phases 1, 2 & 3

Critical Milestones and Construction Schedule

City of Edgewater
Reclaimed Water Main Extension Phases 1, 2 and 3

Critical Milestones	Start	Finish
Planning Activities	COMPLETE	
Design Activities	COMPLETE	
Permitting Activities	11/17	3/18
Advertisement and Bidding	8/18	9/18
Bid Opening	9/18	10/18
Bid Award by City Council	9/18	10/18
Notice to Proceed Issued	10/18	11/18

Detailed Construction Schedule	Start	Finish
Mobilization	11/18	12/18
Phase 1 Pipeline Construction	1/19	6/19
Phase 1 Reservoir Construction	1/19	9/19
Phase 2 Pipeline Construction	6/19	12/19
Phase 3 Pipeline Construction	12/19	5/20
Project Closeout	5/20	6/20

Attachment #4

City of Edgewater RWM Extension Phases 1, 2 & 3

- **Project Cost Estimate**
- **Calculations for Quantification of Project Benefits**
- **Cost Effectiveness Calculator**

City of Edgewater
Reclaimed Water Main Extensions Phases 1, 2 & 3
Detailed Project Cost Estimate

<i>ITEM #</i>	<i>DESCRIPTION</i>	<i>QTY</i>	<i>UNIT</i>	<i>UNIT PRICE</i>	<i>TOTAL</i>
Phase 1 - PW Facility					
1	12" PVC Reclaimed Water Main	6,000	LF	\$90	\$540,000
2	Valves & Services	1	LS	\$40,000	\$40,000
3	8 ac Reclaimed Storage Pond	120,000	CY	\$8	\$960,000
4	Outfall Structure	1	LS	\$100,000	\$100,000
<i>Subtotal</i>					<i>\$1,640,000</i>
Contingency @ 20%					\$328,000
Engineering and CA @ 15%					\$246,000
Phase 1 Project Cost Estimate					\$2,214,000
Phase 2 - SR 442 Willow Oak Dr to Coral Trace					
1	16" Reclaimed Water Main	10,000	LF	\$110	\$1,100,000
2	Valves & Services	1	LS	\$100,000	\$100,000
<i>Subtotal</i>					<i>\$1,200,000</i>
Contingency @ 20%					\$240,000
Engineering and CA @ 15%					\$216,000
Phase 2 Project Cost Estimate					\$1,656,000
Phase 3 - SR 442 Coral Trace to West of I-95					
1	16" Reclaimed Water Main	6,000	LF	\$110	\$660,000
2	Valves & Services	1	LS	\$80,000	\$80,000
<i>Subtotal</i>					<i>\$740,000</i>
Contingency @ 20%					\$148,000
Engineering and CA @ 15%					\$133,200
Phase 3 Project Cost Estimate					\$1,021,200
TOTAL ESTIMATED PROJECT COST					
					\$4,891,200

Calculations for Quantification of Project Benefits

Average Annual Effluent TN (mg/l) = **3.0 mg/l**

Average Annual Effluent TP (mg/l) = **1.0 mg/l**

Average Annual Effluent Discharge Rate (mg/d) = **0.60 MGD**

Total Annual Effluent Discharge to Indian River Lagoon (mg/yr) = **219 mg/yr**

Estimated % Reduction **90%**

Estimated Annual Effluent Discharge Reduction = $.90 \times 219 \text{ mg/yr} = \mathbf{197 \text{ mg/yr}}$

ESTIMATED TN REDUCTION: $197 \times 3 \times 8.34 = \mathbf{4,929 \text{ lbs. per year}}$

ESTIMATED TP REDUCTION: $197 \times 1 \times 8.34 = \mathbf{1,643 \text{ lbs. per year}}$

Cost Share Program Cost Effectiveness Calculator

Interest rate (annual %) =

3.125%

FY2016 Federal Water Resource Planning Discount Rate

Project / components	lbs TN removed/ year	Total Project Cost*	O&M (\$/year)	Service Life	\$/lbs TN removed
Example Treatment Project	2,300	\$ 2,000,000	\$ 2,000	20	\$ 60.00
					\$ -
Edgewater RWM Ext. Ph 1,2 & 3	4,929	\$4,891,200	\$20,000	40	\$ 47.86
					\$ -
					\$ -
					\$ -
					\$ -

Project / components	lbs TP removed / year	Total Project Cost*	O&M (\$/year)	Service Life	\$/lbs TP removed
Example Treatment Project	20,000	\$ 2,000,000	\$ 2,000	20	\$ 6.90
					\$ -
Edgewater RWM Ext. Ph 1,2 & 3	1,643	\$4,891,200	\$20,000	40	\$ 143.58
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -

* Total Project Cost - include capital , total construction, land acquisition, planning, permitting and design costs

Appendix B

Projects Table

Year Project Added	Estimated Completion Date	Lead Entity	Project Number	Project Name	Project Description	Project Type	Structural, Non-structural, or Trade	Status	Acres Treated	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	DEP Contract Agreement Number	Funding Source	Funding Amount	Cost Estimate	Cost Annual O&M	BMAP/RAP	Latitude	Longitude	Location	Partners	Start Date
2018	2023	New Smyrna Beach	ML-01	Diversion to Borrow Pit South of New Smyrna Beach Airport	Divert flow from the C-05 Canal into the abandoned borrow pit and reconnect to the Canal with a drawdown structure	Wet Detention Pond	Structural	Planned	640	1,300	320	N/A	TBD	TBD	\$910,000	\$10,000	MOSQ	1712035	675093	North ENR	Volusia County	Not provided
2018	2023	Volusia County	ML-02	10th Street Treatment Facility	Diversion and wet detention treatment of the Gabordy Canal and Canals G2 and G11	Wet Detention Pond	Structural	Planned	4,600	5,600	1,400	N/A	TBD	TBD	\$4,500,000	\$30,000	MOSQ	1697370	682967	North ENR	New Smyrna Beach and Edgewater	Not provided
2018	2028	Volusia County	ML-03	Unspecified septic to sewer project(s)	Septic to sewer projects that may be conducted by Volusia County, New Smyrna Beach, Edgewater, and/or Oak Hill. While the county is listed as the lead for reporting purposes, the cities may also be the lead on some projects as they develop. Credits may exceed 2,200 lbs/yr TN.	OSTDS Phase Out	Structural	Planned	N/A	2,200	TBD	N/A	TBD	TBD	TBD	TBD	MOSQ	TBD	TBD	North and Central ENRs	TBD	Not provided
2018	2023	Volusia County	ML-04	Ariel Canal Water Quality Improvement Enhancement	Enhance the existing treatment system to increase efficiency	BMP Treatment Train	Structural	Planned	1,500	1,300	210	N/A	TBD	TBD	\$2,178,000	\$40,000	MOSQ	1659045	702777	Central ENR	Edgewater and Oak Hill	Not provided
2018	2028	Volusia County	ML-05	Lighthouse Cove Treatment Facility	Provide retrofit wet detention treatment	Wet Detention Pond	Structural	Planned	420	760	180	N/A	TBD	TBD	\$2,700,000	\$18,000	MOSQ	1654675	702732	Central ENR	Oak Hill	Not provided
2018	2021	Volusia County	ML-06	Public Education and Outreach	Increased participation in the Florida Yards and Neighborhoods program	Education Efforts	Non-structural	Planned	N/A	4,100	570	N/A	TBD	TBD	\$20,000	\$15,000	MOSQ	N/A	N/A	North and Central ENRs	N/A	Not provided
2018	2020	City of Edgewater	ML-07	Reclaimed Water Main Extension Phases 1, 2 and 3	Reclaimed water expansion	WWTF Diversion to Reuse	Structural	Planned	N/A	4,929	1,643	N/A	TBD	TBD	\$4,891,200	\$20,000	MOSQ	N/A	N/A	North and Central ENRs	N/A	Not provided
2018	2028	Volusia County	ML-08	Southeast Regional WWTP Expansion and Upgrade	Expand WWTP capacity and upgrade to AWT	WWTF Upgrade	Structural	Planned	N/A	400	150	N/A	TBD	TBD	\$5,725,000	\$50,000	MOSQ	1652225	697847	Central ENR	N/A	Not provided

Coordinates are based on the Florida State Plane East NAD 1983 HARN feet coordinate system