



Annual Report Form For Individual NPDES Permits For Municipal Separate Storm Sewer Systems (RULE 62-624.600(2), F.A.C.)

- This Annual Report Form must be completed and submitted to the Department to satisfy the annual reporting requirements established in Rule 62-621.600, F.A.C.
- Submit this fully completed and signed form and any REQUIRED attachments by email to the NPDES Stormwater Program Administrator or to the MS4 coordinator (<http://www.dep.state.fl.us/water/stormwater/npdes/contacts.htm>). Files larger than 10MB may be placed on the FTP site at: ftp://ftp.dep.state.fl.us/pub/NPDES_Stormwater/. After uploading files, email the MS4 coordinator or NPDES Program Administrator to notify them the report is ready for downloading; or by mail to the address in the box at right.
- Refer to the Form Instructions for guidance on completing each section.
- Please print or type information in the appropriate areas below.

Submit the form and attachments to:
 Florida Department of Environmental Protection
 Mail Station 3585
 2600 Blair Stone Road
 Tallahassee, Florida 32399-2400

SECTION I. BACKGROUND INFORMATION

A.	Permittee Name: Lake Park, Town of		
B.	Permit Name: Palm Beach County MS4		
C.	Permit Number: FLS000018-004		
D.	Annual Report Year: <input type="checkbox"/> Year 1 <input type="checkbox"/> Year 2 <input checked="" type="checkbox"/> Year 3 <input type="checkbox"/> Year 4 <input type="checkbox"/> Year 5 <input type="checkbox"/> Other, specify Year:		
E.	Reporting Time Period (month/year): 10 / 2018 through 09 / 2019		
F.	Name of the Responsible Authority: John D'Agostino		
	Title: Town Manager		
	Mailing Address: 535 Park Avenue		
	City: Town of Lake Park	Zip Code: 33404	County: Palm Beach
	Telephone Number: 561-881-3304	Fax Number: 561-881-3314	
	E-mail Address: Townmanager@lakeparkflorida. com gov		
G.	Name of the Designated Stormwater Management Program Contact (if different from Section I.F above): Richard Scherle		
	Title: Public Works Director		
	Department: Public Works		
	Mailing Address: 650 Old Dixie Highway		
	City: 650 Old Dixie Highway	Zip Code: 33404	County: Palm Beach
	Telephone Number: 561-881-3345	Fax Number: 561-881-3349	
E-mail Address: rscherle@lakeparkflorida. com gov			

SECTION II. MS4 MAJOR OUTFALL INVENTORY (Not Applicable in Year 1)

A.	Number of outfalls ADDED to the outfall inventory in the current reporting year (insert "0" if none): (Does this number include non-major outfalls? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Applicable)
B.	Number of outfalls REMOVED from the outfall inventory in the current reporting year (insert "0" if none): (Does this number include non-major outfalls? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Applicable)
C.	Is the change in the total number of outfalls due to lands annexed or vacated? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Applicable

SECTION III. PART V.B. ASSESSMENT PROGRAM

A.	<p>Provide a brief statement as to the status of water quality monitoring plan implementation. Status may include sampling frequency changes, monitoring location changes, or sampling waiver conditions. <i>DEP Note: If permittee participates in a collaborative monitoring plan, permittee may refer to a joint response as defined by the interlocal agreement.</i></p> <p>Name and date of the approved plan: Town of Lake Park Cycle 4, MS4 Assessment Plan (Approved by FDEP on 4/9/2019)</p> <p>Status: The Cycle 4, year 3 water quality monitoring program is under reevaluation to address the proposed use of Green Infrastructure Best Management Practices (BMP's) such as bioswales, bioretention, bioretention as part of the Town of Lake Park 2020 Stormwater Masterplan update</p>
B.	<p>Provide a brief discussion of the monitoring and loading results to date which includes a summary of the water quality monitoring data and / or stormwater pollutant loading changes from the reporting year. <i>DEP Note: Results must be specific to the permittee's SWMP.</i></p> <p>The monitoring and loading results to date are provided in the Town's 2018-2019 Annual Assessment Report</p>
C.	<p>Attach a monitoring data summary as required by the permit. An analysis of the data discussing changes in water quality and/or stormwater pollutant loading from previous reporting years. <i>DEP Note: Analysis must be specific to the permittee's SWMP.</i></p> <p>The monitoring data summary required by the permit is provided in the Town's 2018-2019 Annual Assessment Report</p>

SECTION IV. FISCAL ANALYSIS

A.	Total expenditures for the NPDES stormwater management program for the current reporting year: \$876,643
B.	Total budget for the NPDES stormwater management program for the subsequent reporting year: \$953,918
C.	<p>Did the current reporting year resources decrease from the previous year? Y <input type="checkbox"/> / N <input checked="" type="checkbox"/></p> <p>If program resources decreased, provide a discussion of the impacts on the implementation of the SWMP.</p> <p>N/A</p>

SECTION V. MATERIALS TO BE SUBMITTED WITH THIS ANNUAL REPORT FORM

Only the following materials are to be submitted to the Department along with this fully completed and signed Annual Report Form (check the appropriate box to indicate whether the item is attached or is not applicable):

Attached	N/A	Required Attachments	Permit Citation	Attachment Number/Title
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Any additional information required to be submitted in this current annual reporting year in accordance with Part III.A of your permit that is not otherwise included in Section VII below.	Part III.A	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	An explanation of why the minimum inspection frequency in Table II.A.1.a. was not met, if applicable.	Part II.A.1	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	A list of the flood control projects that did not include stormwater treatment and an explanation for each of why it did not (if applicable).	Part III.A.4	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A monitoring data summary as directed in Section III.C above and in accordance with Rule 62-624.600(2)(c), F.A.C.	Part V.B.3	See Joint Report and Town's 2018-2019 Annual Assessment Report
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 1 ONLY: An inventory of all known major outfalls and a map depicting the location of the major outfalls (hard copy or CD-ROM) in accordance with Rule 62-624.600(2)(a), F.A.C.	Part III.A.1	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 2: A summary review of codes and regulations to reduce the stormwater impact from development.	Part III.A.2	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	YEAR 3 ONLY: The estimates of pollutant loadings and event mean concentrations for each major outfall or each major watershed in accordance with Rule 62-624.600(2)(b), F.A.C.	Part V.A	See attachment #1
<input type="checkbox"/>	<input type="checkbox"/>	YEAR 3: Summary of TMDL Monitoring Results (if applicable).	Part VIII.B.2	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 3: Bacteria Pollution Control Plan (if applicable).	Part VIII.B.3	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 4: A follow-up report on plan implementation of changes to codes and regulations to reduce the stormwater impact from development.	Part III.A.2	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 4: A report on any amendments to the applicable legal authority (if applicable).	Part III.A.7.a	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 4: Permit re-application information in accordance with Rule 62-624.420(2), F.A.C. <ul style="list-style-type: none"> The monitoring plan (with revisions, if applicable). If the total annual pollutant loadings have not decreased over the past two permit cycles, revisions to the SWMP, as appropriate. 	Part V.B.3 Part V.A.3	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	YEAR 4: TMDL Supplemental SWMP (if applicable).	Part VIII.B.3	

DO NOT SUBMIT ANY OTHER MATERIALS
(such as records and logs of activities, monitoring raw data, public outreach materials, etc.)

SECTION VI. CERTIFICATION STATEMENT AND SIGNATURE

The Responsible Authority listed in Section I.F above must sign the following certification statement, as per Rule 62-620.305, F.A.C.:

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

Name of Responsible Authority (type or print): John D Agostino

Title: Town Manager

Signature: 

Date: 1/2/2020

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE

A.	B.	C.	D.	E.	F.		
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments		
Part III.A.1	Structural Controls and Stormwater Collection Systems Operation						
	Report the current known inventory.						
	Report the number of inspection and maintenance activities conducted for each applicable type of structure included in Table II.A.1.a, and the percentage of the total inventory of each type of structure inspected and maintained.						
	<i>Note: Delete structures that are not in your MS4's inventory. The permittee may choose its own unit of measurement for each structural control to be consistent with the unit of measurement in the documentation. Unit options include: miles, linear feet, acres, etc.</i>						
	Type of Structure	Number of Structures	Number of Inspections	Percent Inspected	Number of Maintenance Activities	Percent Maintained	
	Dry retention systems	1	1	100	0	0	Public Works
	Underdrain filter systems	0					
	Exfiltration trench / French drains (lf)	9503	0	1.06	101	1.06	Public Works
	Grass treatment swales (miles)	33.84	1.34	3.96	0.07	0.206	Public Works
	Dry detention systems	6	6	100	0	0	Public Works
	Wet detention systems	0					
	Detention with filtration systems	0					
	Alum Injection systems	0					
	Pollution control boxes	0					
	pump stations	0					
	Major outfalls	11	11	100	11	100	Public Works
	Weirs or other control structures	35	9	25.71	9	25.71	Public Works
	pipes / culverts (miles)						Remove Barnacles Exfil Trench Control Struc.
	Canals	0					1.03 Mi Vac. 0.08 Mi CIP 0.03 Mi Replac.
	Inlets / catch basins / grates	409	42	10.27	42	10.27	Public Works
	Ditches / conveyance swales (miles)	33.84	1.34	3.96	0.07	0.206	Public Works
	If the minimum inspection frequencies set forth in Table II.A.1.a. were not met, provide as an attachment an explanation of why they were not and a description of the actions that will be taken to ensure that they will be met.			<input checked="" type="checkbox"/>			Did not meet minimum 10% for swale maintenance due to faulty equipment and repair of equipment.
	Did not meet minimum 10% for exfiltration trench maintenance due to lack of CCTV equipment. Will make it up in FY4 by acquisition of equipment & prioritization to achieve 20% of system O&M.						Did not meet minimum 10% for exfiltration trench maintenance due to lack of CCTV equipment. Will make it up in FY4 by acquisition of equipment & prioritization to achieve 20% of system O&M.

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
Part III.A.1 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit. Strengths: Structural controls have been inspected and maintained on a regular basis and have been found to be functioning as designed Limitations: None SWMP revisions implemented to address limitations: None				
Part III.A.2	Areas of New Development and Significant Redevelopment Report the number of significant development projects, including new and redevelopment, reviewed and approved by the permittee for post-development stormwater considerations. Provide in the Year 2 Annual Report the summary report of the review activity. Provide in the Year 4 Annual Report the follow-up report on plan implementation. Year 2 ONLY: Attach the summary report of the review activity Year 4 ONLY: Attach the follow-up report on plan implementation Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit. Strengths: Review of site plans by new Stormwater Masterplan consultant Limitations: None SWMP revisions implemented to address limitations: None	4 4	Comments Approval Letter	Consultant/Staff Consultant/Staff	
Part III.A.3	Roadways Report on the litter control program, including the frequency of litter collection, an estimate of the total number of road miles cleaned or amount of area covered by the activities, and an estimate of the quantity of litter collected. <i>Note: If the permittee does not contract activities, delete CONTRACTOR activities.</i> PERMITTEE Litter Control: Frequency of litter collection PERMITTEE Litter Control: Estimated amount of area maintained (lf) PERMITTEE Litter Control: Estimated amount of litter collected (cy) CONTRACTOR Litter Control: Frequency of litter collection CONTRACTOR Litter Control: Estimated amount of area maintained (lf) CONTRACTOR Litter Control: Estimated amount of litter collected (cy) OPTIONAL: If an Adopt-A-Road or similar program is implemented, report the total number of road miles cleaned and an estimate of the quantity of litter	Weekly 50.64 Ac 276.6 Weekly 11.09 18.75	Coll. Reports Coll. Reports Coll. Reports Coll. Reports Coll. Reports Coll. Reports	Public Works Public Works Public Works Town Landscape Maint Contractor Town Landscape Maint Contractor Town Landscape Maint Contractor Town Landscape Maint Contractor	1 Road/2Parks

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	<p>collected. If you do not participate in an Adopt-A-Road program, report "0". N/A</p> <p>Trash Pick-up Events: Total miles cleaned Estimated amount of litter collected (cy) Adopt-A-Road: Total miles cleaned Estimated amount of litter collected (cy)</p> <p>Adopt-A-Road: Estimated amount of litter collected (cy)</p>	<p>0</p> <p>0</p> <p>0</p> <p>0</p>			
	<p>Report on the street sweeping program, including the frequency of the sweeping, total miles swept, an estimate of the quantity of sweepings collected, and the total nitrogen and total phosphorus loadings that were removed by the collection of sweepings. If no street sweeping program is implemented, provide the explanation of why not in column F.</p> <p>Frequency of street sweeping Total miles swept</p> <p>Estimated quantity of sweeping material collected (cy / tons) Total phosphorus loadings removed (pounds) Total nitrogen loadings removed (pounds)</p> <p>Report the equipment yards and maintenance shops that support road maintenance activities, and the number of inspections conducted for each facility.</p>	<p>Monthly</p> <p>261</p> <p>39.15</p> <p>28.3</p> <p>44.1</p>	<p>Sweeper Logs</p> <p>Sweeper Logs</p> <p>SWA Receipts</p> <p>FSA Calculator</p> <p>FSA Calculator</p>	<p>Public Works</p> <p>Public Works</p> <p>Public Works</p> <p>Public Works</p> <p>Public Works</p>	<p>Dry</p> <p>Dry</p> <p>Dry</p> <p>Dry</p>
	<p>Name of Facility</p> <p>Public Works Maintenance Yard</p>	<p>Number of Inspections</p> <p>12</p>	<p>Insp. Records</p>	<p>Public Works</p>	
<p>Part III.A.3 Summary</p>	<p>Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.</p> <p>Strengths: Regular maintenance of roadways via street sweeping and litter collection programs</p> <p>Limitations: None</p> <p>SWMP revisions implemented to address limitations: None</p>				
<p>Part III.A.4</p>	<p>Flood Control Projects</p> <p>Report the total number of flood control projects that were constructed by the permittee during the reporting period and the number of those projects that did NOT include stormwater treatment. The permittee shall provide a list of the projects where stormwater treatment was not included with an explanation for each of why it was not.</p> <p>Report on any stormwater retrofit planning activities and the associated implementation of retrofitting projects to reduce stormwater pollutant loads from existing drainage systems that do not have treatment BMPs.</p>				
	<p>Flood control projects completed during the reporting period</p> <p>Flood control projects completed that did not include stormwater treatment Stormwater retrofit projects planned/under construction Stormwater retrofit projects completed</p> <p>If there were projects that did not include stormwater treatment, provide as an attachment a list of the projects and an explanation for each of why it did not.</p>	<p>1</p> <p>0</p> <p>0</p> <p>5</p> <p><input type="checkbox"/></p>	<p>Insp. Reports</p> <p>Insp. Reports</p> <p>Insp. Reports</p> <p>Insp. Reports</p>	<p>Public Works</p> <p>Public Works</p> <p>Public Works</p> <p>Public Works</p>	<p>354' of swales Regrade/Sod</p> <p>491' Mi pipe CIPP Lined</p> <p>177' RCP replacement</p>

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
Part III.A.4 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit. Strengths: Flood control devices perform adequately Limitations: Old infrastructure is approaching useful life expectancy SWMP revisions implemented to address limitations: Currently updating Stormwater Masterplan based on Green Infrastructure BMP's				
Part III.A.5	Municipal Waste Treatment, Storage, and Disposal Facilities Not Covered by an NPDES Stormwater Permit Report the applicable facilities and the number of the inspections conducted for each facility.	Number of Inspections 12			
Part III.A.5 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit. Strengths: The Town's maintenance yard is inspected on a monthly basis Limitations: None SWMP revisions implemented to address limitations: None				
Part III.A.6	Pesticides, Herbicides, and Fertilizer Application Report the number of permittee personnel applicators and contracted commercial applicators of pesticides and herbicides who are FDACS certified / licensed. Report the number of permittee personnel who have been trained through the Green Industry BMP Program and the number of contracted commercial applicators of fertilizer who are FDACS certified / licensed.				
	PERSONNEL: FDACS public applicators of pesticides/herbicides CONTRACTORS: FDACS commercial applicators of pesticides/ herbicides PERSONNEL: Green Industry BMP Program training completed CONTRACTORS: FDACS certified / licensed applicators of fertilizer	1 1 1 1	State License Certificate State License State License	FDACS IFAS FDACS FDACS	
	Provide a copy of the adopted ordinance with the Year 2 Annual Report. If this provision is not applicable because the permittee is not within the watershed of a nutrient-impaired water body, indicate that in Column F.				
	Year 2 ONLY: Attach copy of adopted Florida-friendly ordinance	<input type="checkbox"/>			
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage citizens to reduce their use of pesticides, herbicides and fertilizers including the type and number of activities conducted, the type and number of materials distributed, and the number of Web site visits (if applicable).				
	Public Education and Outreach Program The public outreach and education plan is carried out as a joint effort by the Palm Beach County Co-permittees. Please see the Palm Beach County Joint Annual Report for the public education and outreach information.	1171 0 0	Brochure	Public Works	
	Brochures/Flyers/Fact sheets distributed Neighborhood presentations: Number conducted Neighborhood presentations: Number of participants				

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	<p>Newspapers & newsletters: Number of articles/notices published Newsletters: Number of newsletters distributed Public displays (e.g., kiosks, storyboards, posters, etc.)</p> <p>Radio or television Public Service Announcements (PSAs) School presentations: Number conducted School presentations: Number of participants Seminars/Workshops: Number conducted Seminars/Workshops: Number of participants Special events: Number conducted</p> <p>Special events: Number of participants</p> <p>Number of visitors to stormwater-related pages</p>	<p>8 15948 130 0 0 0 0 0 2 2150 0</p>	<p>Newsletter Newsletter Photograph Email Email</p>	<p>Public Works Public Works Public Works</p>	<p>Posters at Marina, Town Hall, Library</p>
Part III.A.6 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
Part III.A.7.a	Strengths: Applicators are licensed to perform service Limitations: None SWMP revisions implemented to address limitations: Increase staff training				
Part III.A.7.c	<p>Illicit Discharges and Improper Disposal — Inspections, Ordinances, and Enforcement Measures</p> <p>Report amendments in Year 4.</p> <p>Year 4 ONLY: Attach a report on amendments to applicable legal authority <input type="checkbox"/></p> <p>Illicit Discharges and Improper Disposal — Investigation of Suspected Illicit Discharges and/or Improper Disposal</p> <p>Report on the proactive inspection program, including the number of inspections conducted by the permittee, the number of illicit activities found, and the number and type of enforcement actions taken.</p> <p>Proactive inspections for suspected illicit discharges</p> <p>Illicit discharges found during a proactive inspection</p> <p>NOV/WL/citation/fines issued for illicit discharges found during proactive inspection</p> <p>Report on the reactive investigation program as it relates to reports of suspected illicit discharges, including the number of reports received, the number of investigations conducted, the number of illicit activities found, and the number and type of enforcement actions taken.</p> <p>Reactive investigations of reports of suspected illicit discharges etc.</p> <p>Illicit discharges etc. found during reactive investigation</p>	<p>87 0 0</p>	<p>Insp Reports Insp Reports Insp Reports</p>	<p>Public Works Public Works Public Works</p>	<p>Inlets/Catch Basins Inspections</p>

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	NOV/WL/citation/fines issued for illicit discharges etc. found during reactive investigation	0	Insp. Reports	Public Works	Slit Fence Replaced
	Report the type of training activities, and the number of permittee personnel and contractors trained (both in-house and outside training) within the reporting year.	56	Annual NPDES Training Sign In	Palm Beach County NPDES	Safety, IDD, LID
	Personnel trained	0			
	Contractors trained	0			
Part III.A.7.d	Illicit Discharges and Improper Disposal — Spill Prevention and Response				
	Report on the spill prevention and response activities, including the number of spills addressed.	0	0	0	0
	Hazardous and non-hazardous material spills responded to				
	Report the type of training activities, and the number of permittee personnel and contractors trained (both in-house and outside training) within the reporting year.	10	Annual NPDES Training Sign In	Palm Beach County NPDES	
	Personnel trained	0			
	Contractors trained	0			
Part III.A.7.e	Illicit Discharges and Improper Disposal — Public Reporting				
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage the public reporting of suspected illicit discharges and improper disposal of materials, including the type and number of activities conducted, the type and number of materials distributed, and the number of Web site visits (if applicable).				
	Public Education and Outreach Program	1171	Brochure	Public Works	Printed
	Brochures/Flyers/Fact sheets distributed	0			
	Neighborhood presentations: Number conducted	0			
	Neighborhood presentations: Number of participants	8	Newsletter	Public Works	Email/Printed
	Newspapers & newsletters: Number of articles/notices published	15948	Newsletter	Public Works	Email/Printed
	Newsletters: Number of newsletters distributed	130	Newsletter	Public Works	Email/Printed
	Public displays (e.g., kiosks, storyboards, posters, etc.)	0			
	Radio or television Public Service Announcements (PSAs)	0			
	School presentations: Number conducted	0			
	School presentations: Number of participants	0			
	Seminars/Workshops: Number conducted	0			
	Seminars/Workshops: Number of participants	0			
	Special events: Number conducted	2	Email	Library/Public Works	
	Special events: Number of participants	2150	Email;	Library/Public Works	
	Number of visitors to stormwater-related pages	0			Undermined

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Part III.A.7.f	<p>Illicit Discharges and Improper Disposal — Oils, Toxics, and Household Hazardous Waste Control</p> <p>Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage the proper use and disposal of oils, toxics, and household hazardous waste, including the type and number of activities conducted, the type and number of materials distributed, the amount of waste collected / recycled / properly disposed, and the number of Web site visits (if applicable).</p> <p>Public Education and Outreach Program</p> <p>Brochures/Flyers/Fact sheets distributed Neighborhood presentations: Number of participants Neighborhood presentations: Number of participants Newspapers & newsletters: Number of articles/notices published Newsletters: Number of newsletters distributed Public displays (e.g., kiosks, storyboards, posters, etc.)</p> <p>Radio or television Public Service Announcements (PSAs) School presentations: Number conducted School presentations: Number of participants Seminars/Workshops: Number conducted Seminars/Workshops: Number of participants Special events: Number conducted Special events: Number of participants</p> <p>Storm sewer inlets newly marked/replaced Number of visitors to stormwater-related pages</p>	<p>The public outreach and education plan is carried out as a joint effort by the Palm Beach County Co-permittees. Please see the Palm Beach County Joint Annual Report for the public education and outreach information.</p> <p>1171 0 0 8 15948 130 0 0 0 0 0 2 2150 0 0</p>	<p>Brochure Newspaper Newspaper Photographs Email</p>	<p>Public Works Public Works Public Works Public Works Public Works Library/Public Works</p>	<p>Printed Email/Printed Email/Printed Posters at Marina, Town Hall, Library Undermined</p>
Part III.A.7.g	<p>Illicit Discharges and Improper Disposal — Limitation of Sanitary Sewer Seepage</p> <p>Report on the type and number of activities undertaken to reduce or eliminate SSOs and inflow/ infiltration, the number of SSOs or inflow / infiltration incidents found and the number resolved, and the name of the owner of the sanitary sewer system within the permittee's jurisdiction. Report only the SSOs and inflow / infiltration incidents into the MS4.</p> <p>Owner of the sanitary sewer system Activity to reduce/eliminate SSOs and I&I: (description) Activity to reduce/eliminate SSOs and I&I: (description) SSO incidents discovered SSO incidents resolved Inflow / infiltration incidents discovered Inflow / infiltration incidents resolved</p>	<p>0 0 0 0 0</p>	<p>Seacoast Utility Authority</p>	<p>Seacoast Utility Authority</p>	<p>Undermined</p>

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments										
Part III.A.7 Summary	<p>For activities required by Part III.A.7: Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.</p> <p>Strengths: Staff performs regular inspections via pipe/inlet cleaning and CCTV inspections program</p> <p>Limitations: SWMP Update will address the need for additional CCTV equipment</p> <p>SWMP Revisions implemented to address limitations: Budget increase for additional CCTV inspection of stormsewer lines</p>														
Part III.A.8.a	<p>Industrial and High-Risk Runoff — Identification of Priorities and Procedures for Inspections</p> <p>Report on the high-risk facilities inventory, including the type and total number of high risk facilities and the number of facilities newly added each year.</p> <p>Report on the high-risk facilities inspection program, including the number of inspections conducted and the number and type of enforcement actions taken.</p>	<table border="1"> <thead> <tr> <th data-bbox="553 884 581 953">Number of Facilities</th> <th data-bbox="553 678 581 768">Number of Inspections</th> <th data-bbox="553 474 581 678">Enforcement Actions</th> </tr> </thead> <tbody> <tr> <td data-bbox="581 884 737 953">2</td> <td data-bbox="581 678 737 768">2</td> <td data-bbox="581 474 737 678">2</td> </tr> <tr> <td data-bbox="737 884 841 953"></td> <td data-bbox="737 678 841 768"></td> <td data-bbox="737 474 841 678"></td> </tr> </tbody> </table>	Number of Facilities	Number of Inspections	Enforcement Actions	2	2	2						Copy of report sent to Public Works Director	
Number of Facilities	Number of Inspections	Enforcement Actions													
2	2	2													
Part III.A.8.b	<p>Industrial and High-Risk Runoff — Monitoring for High Risk Industries</p> <p>Report the number of high risk facilities sampled.</p>	<table border="1"> <thead> <tr> <th data-bbox="857 678 885 884">High risk facilities sampled</th> </tr> </thead> <tbody> <tr> <td data-bbox="885 678 974 884">0</td> </tr> </tbody> </table>	High risk facilities sampled	0	0	0	0								
High risk facilities sampled															
0															
Part III.A.8 Summary	<p>Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.</p> <p>Strengths: Staff performs regular inspections of facilities.</p> <p>Limitations: None</p> <p>SWMP revisions implemented to address limitations: SWMP update will address additional SWMP O&M needs</p>														
Part III.A.9.a	<p>Construction Site Runoff — Site Planning and Non-Structural and Structural Best Management Practices</p> <p>Report the number of permittee and private pre-construction site plans reviewed for stormwater, erosion, and sedimentation controls, and the number approved.</p>	<table border="1"> <tbody> <tr> <td data-bbox="1123 678 1167 884">0</td> </tr> <tr> <td data-bbox="1167 678 1211 884">0</td> </tr> <tr> <td data-bbox="1211 678 1255 884">1</td> </tr> <tr> <td data-bbox="1255 678 1299 884">1</td> </tr> </tbody> </table>	0	0	1	1	<table border="1"> <tbody> <tr> <td data-bbox="1123 474 1167 678"></td> </tr> <tr> <td data-bbox="1167 474 1211 678">Comments Letters</td> </tr> <tr> <td data-bbox="1211 474 1255 678">Approval Letter</td> </tr> </tbody> </table>		Comments Letters	Approval Letter	<table border="1"> <tbody> <tr> <td data-bbox="1123 270 1167 474"></td> </tr> <tr> <td data-bbox="1167 270 1211 474">Consultant/ Comm Dvlp Staff</td> </tr> <tr> <td data-bbox="1211 270 1255 474">Consultant/ Comm Dvlp Staff</td> </tr> </tbody> </table>		Consultant/ Comm Dvlp Staff	Consultant/ Comm Dvlp Staff	
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Comments Letters															
Approval Letter															
Consultant/ Comm Dvlp Staff															
Consultant/ Comm Dvlp Staff															

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE

A.	B.	C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Report the number of development permit applicants notified of the ERP and CGP, and the number of applicants who confirmed ERP and CGP coverage.				
	Notified of ERP stormwater permit requirements Confirmed ERP coverage	0			
	Notified of CGP stormwater permit requirements	0			
	Confirmed CGP coverage	1	Comments Letters	Consultant/ Comm Dvlp Staff	
	Confirmed CGP coverage	1	Approval Letter	Consultant/ Comm Dvlp Staff	
Part III.A.9.b	Construction Site Runoff — Inspection and Enforcement				
	Report on the inspection program for privately-operated and permittee-operated construction sites, including the number of active construction sites during the reporting year, the number of inspections of active construction sites, the percentage of active construction sites inspected, and the number and type of enforcement actions / referrals taken.				
	PERMITTEE SITES: Active construction sites	0			
	PERMITTEE SITES: Pre-, During, and Post inspections of active construction sites for E&S and waste control BMPs	0			
	PERMITTEE SITES: Percentage of active construction sites inspected	0			
	PRIVATE SITES: Active construction sites	3	Photos	Consultant	Const. Ongoing
	PRIVATE SITES: Pre-, During, and Post inspections of active construction sites for E&S and waste control BMPs	3	Photos	Consultant	Inspections to be completed in YR4
	PRIVATE SITES: Percentage of active construction sites inspected	100			
	Enforcement Action	0			
Part III.A.9.c	Construction Site Runoff — Site Operator Training				
	Report the type of training activities, the number of inspectors, site plan reviewers and site operators trained (both in-house and outside training).				
	Annual Training				
	DEP Certification	2			
	Permittee construction site inspectors	2	FSA NPDES Training	Public Works	
	Permittee construction site plan reviewers	2	FSA NPDES Training	Public Works	
	Permittee construction site operators	2	FSA NPDES Training	Public Works	
Part III.A.9 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: Staff and consultants perform regular inspections to ensure maintenance of pollution prevention devices.				
	Limitations: None				
	SWMP revisions implemented to address limitations: None				

SECTION VIII. CHANGES TO THE STORMWATER MANAGEMENT PROGRAM (SWMP) ACTIVITIES (Not Applicable in Year 4)

A.	Permit Citation/ SWMP Element	Proposed Changes to the Stormwater Management Program Activities Established as Specific Requirements Under Part III.A of the Permit (Including the Rationale for the Change) — REQUIRES DEP APPROVAL PRIOR TO CHANGE IF PROPOSING TO REPLACE OR DELETE AN ACTIVITY. None at this time. Update of SWMP in late 2020 will make recommendations for O&M of stormsewer system for proposed new Green Infrastructure.
B.	Permit Citation/ SWMP Element	Changes to the Stormwater Management Program Activities NOT Established as Specific Requirements Under Part III.A of the Permit (Including the Rationale for the Change) None

SECTION IX. TMDL Status Report

YEAR 1 Provide a table summarizing the status of the TMDL process. Include a list of prioritized TMDLs and their monitoring and implementation schedule; and include the identification number of the outfall prioritized for TMDL monitoring. No TMDL's adopted at this time

WBID Number	Segment/ Waterbody/ Basin	Pollutant of Concern	TMDL DEP / EPA	Percent Reduction (WLA)	Priority Rank	Priority Outfall	Monitoring Summary / BPCP Due Date	Supplemental SWMP Due Date
			<input type="checkbox"/> / <input type="checkbox"/>		1		(Year 3 AR)	(Year 4 AR; N/A) if BPCP
			<input type="checkbox"/> / <input type="checkbox"/>					
			<input type="checkbox"/> / <input type="checkbox"/>					

YEAR 3 and annually thereafter, provide a summary of the estimated load reductions that have occurred for the pollutant(s) of concern being discharged from the MS4 to the TMDL water body during the reporting period and cumulatively since the date the Supplemental SWMP was implemented.

Year 3: Submit a Monitoring data summary or BPCP (if applicable). N/A

Year 4: Submit a Supplemental SWMP (if applicable).

WBID Number	Pollutant of Concern	Monitoring Summary / BPCP Submitted	Supplemental SWMP Submitted	Projected load reductions OR Actual load reductions to date
		(Year 3 AR)	(Year 4 AR; N/A if BPCP)	

Provide a brief statement as to the status of TMDL implementation according to Part VIII.B of the permit (e.g. status of monitoring to validate WLA):

ATTACHMENT #1

ESTIMATES OF POLLUTANT LOADINGS AND EVENT MEAN CONCENTRATIONS PER MS4 AREA

December 18, 2019

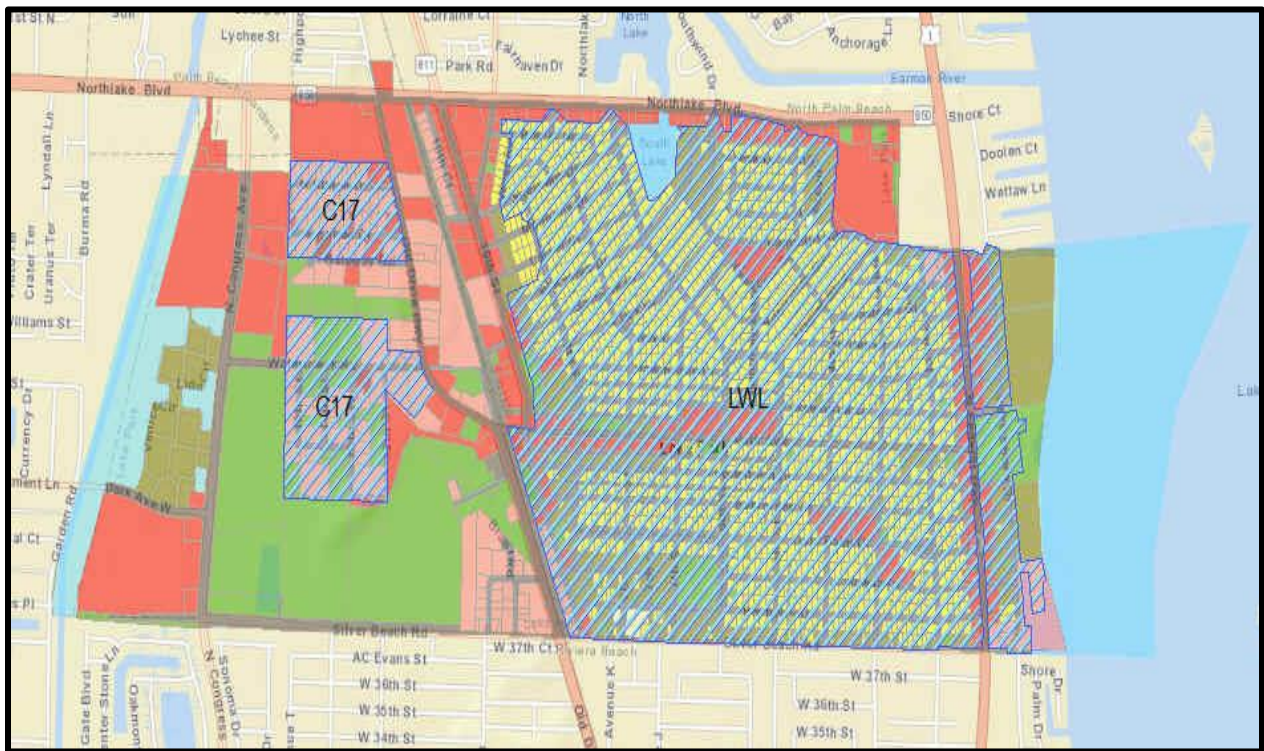
Note: The source of the information presented below is from the Municipal Separate Storm Sewer System National Pollutant Discharge Elimination System, Joint Annual Report, Cycle 4 -Year 3, October 1, 2017 Thru September 30, 2018.

The Town of Lake Park has been assigned two MS4 areas by the Palm Beach County NPDES Group permit for monitoring purposes. The western areas discharging toward the C-17 Canal, and the eastern areas toward the Lake Worth Lagoon (LWL).

LWL MS4 Area: 687.90 acres or 2.63 % of the total LWL MS4 area of 10,670.41 acres

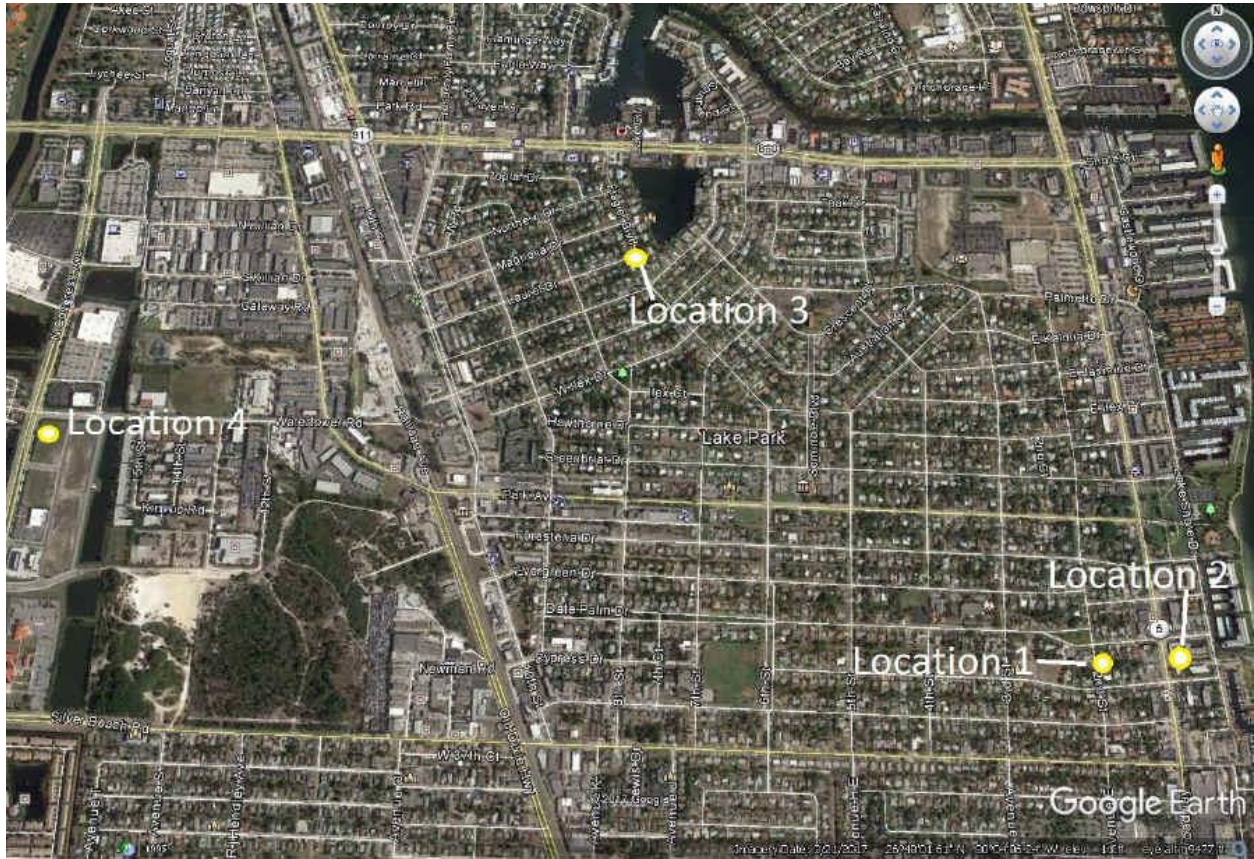
C-17 MS4 Area: 94.21 acres or 0.41% of the total C-17 Basin MS4 area of 14,45.84 acres

Town of Lake Park MS4 Areas



The purpose of the Town of Lake Park Water Quality Assessment Program, as a participant within the Palm Beach County NPDES/MS4 Group Permit, is to provide information for the Town of Lake Park to determine the overall effectiveness of its Stormwater Management Program (SWMP) in reducing stormwater pollutant loadings from its Municipal Storm Sewer System (MS4) to

receiving water bodies. To this end, the assessment program includes water quality monitoring sampling at four (4) locations throughout the Town where the sampled water is representative of the water quality discharges from the assigned C-17 and LWL MS4 contributing areas. These sample locations are shown below.



Utilizing DEP approved lab Pace Laboratories, sampling at four locations will take place four times per year for six test parameters:

- Chlorophyll-A,
- Dissolved Oxygen (DO),
- Total Phosphorus (TP),
- Total Nitrogen (TN),
- Total Suspended Solids (TSS) and Turbidity.

In-situ grab samples are obtained following a rain event, of 0.75 inches or greater, at low tide if possible, to avoid tidal effects. The water quality sampling is intended to be ambient data on Lake Park freshwater discharges. Flow weighted sampling is not collected in that it is insufficient for estimating site specific Event Mean Concentrations (EMC's)

Event Mean Concentration

The Event Mean Concentration EMC values are defined as the total load of a given pollutant divided by the total runoff volume for a storm event. These values are derived from monitoring watersheds, and sampling stormwater during rain events. In order to estimate the loading from a storm, the flow-weighted average concentration (or EMC) is necessary. The data EMC values used in the SIMPLE non-point source water quality model for Cycle 4 is presented in Table 5 of the Joint Annual Report, Cycle 4 -Year 3.

Table 5 Event Mean Concentration for Parameters by Land Use (mg/l)

Land Use	TN	TP	TSS	BOD ₅	Cu	Zn
Agricultural/Crop Land	2.67	0.89	19.8	3.8	0.022	0.030
Agricultural / Improved Pasture	2.3	0.44	94.3	5.1	0.013	0.021
Commercial	1.79	0.26	57.5	7.7	0.018	0.094
Forest / Open	1.15	0.06	8.4	1.4	0.013	0.021
Golf Course	2.07	0.33	37.5	7.9	0.016	0.062
Highways / Major	1.2	0.2	37.3	5.2	0.032	0.126
Industrial	1.2	0.26	60.0	7.6	0.003	0.057
Residential / Low Density	1.61	0.19	23.0	4.7	0.008	0.031
Residential / Medium Density	2.07	0.33	37.5	7.9	0.016	0.062
Residential / High Density	2.32	0.52	77.8	11.3	0.009	0.086
Residential / with Equestrian	3.45	0.5	69.1	4.7	0.008	0.031
Water	0.84	0.11	11.0	3.0	0.001	0.006
Wetland	1.01	0.05	11.0	3.0	0.001	0.006

Regional Pollutant Loading Comparisons (Lake Worth Lagoon)

Tables 12 and 13 of the Joint Annual Report, Cycle 4 -Year 3 present the loadings for each major MS4 area within the group permit.

The Town of Lake Park is included in the C-17 and LWL MS4 areas and the effectiveness of the Town's monitoring program is reflected in the total pollutant loadings calculated for these areas. A comparison of the loadings between the 2013 and 2018 reporting cycles is presented.

A comparison of the loadings in Table 12 and 13 for the C-17 and LWL MS4 areas indicates a trend of lower pollutant loads from 2013 to 2018. This is indicative that Best Management Practices being applied in the form of dry/wet detention and retention is having a positive effect.

Table 13 Loading Estimates Cycle 4 Year 3 in mg/L

Watershed	BOD ₅	TSS	TP	CU	ZN	TN
	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3
C15	1,035,576	3,308,847	45,366	2,322	10,456	422,172
C16	1,314,644	4,201,904	54,807	2,756	13,003	612,669
C17	748,576	2,933,718	30,944	1,702	7,663	311,079
C18	1,747,703	5,093,882	54,145	2,204	9,693	693,855
C51	2,990,483	9,387,559	136,117	6,332	28,061	1,725,169
Hillsboro	943,216	3,640,819	44,011	2,246	9,554	348,386
ICWWN	429,380	1,229,472	17,269	928	4,241	193,500
ICWWS	267,863	1,367,076	12,758	644	2,794	106,657
L8	2,225,830	7,361,863	83,488	2,828	10,957	931,884
LOX	709,032	2,038,886	31,659	1,456	5,840	439,785
LWL	718,096	3,395,653	33,279	1,543	6,818	285,882
S-2_6_7	3,021,209	10,444,784	317,153	10,652	29,783	1,706,412
WPBWS	515,843	1,626,169	16,161	586	2,545	202,125

Local Pollutant Loading Comparisons (Town of Lake Park MS4 Areas for C-17 and LWL Watersheds)

Tables A and B include loading information extracted from the Joint Annual Report, Cycle 4 - Year 3 Summary of Average Annual Pollutant Loading Model Activities, Tables 16 and 26 which is specific to the Town of Lake Park C-17 and LWL MS4 areas.

Table B for the discharge to the C-17 and LWL watersheds within the Town’s MS4 areas has been adjusted for the Town’s Year 3 ARF street sweeping program (a reduction for TP = 28 lbs and TN= 44 lbs) and Public Education Activities (6% reduction for all six water quality parameters).

MS4 Basin	Table A -2013 Pollutant Loading (lbs/year)					
	BOD ₅	TSS	TP	CU	ZN	TN
LWL	22,478	124,813	1,004	66	283	6,802
C-17	5,159	35,307	195	14	41	1,449
Total	27,637	160,120	1,199	80	324	8,251

MS4 Basin	Table B - 2018 Pollutant Loading (lbs/year)					
	BOD ₅	TSS	TP	CU	ZN	TN
LWL	21,029	116,379	917	62	263	6,348
C-17	4,412	29,131	150	12	54	1,283
Total	25,441	145,510	1,067	74	317	7,631
Total Net Percent Reduction in Year 4						
Net Total	7.95	9.12	11.01	7.50	2.16	7.51

Tables A and B Town of Lake Park MS4 areas net total discharges to the C-17 and LWL watersheds indicate a trend of lower pollutant loads from 2013 to 2018. This is indicative that Best Management Practices being applied in the form of dry/wet detention and retention, and street sweeping are having a positive effect.

Conclusion

The Town of Lake Park's Stormwater Management Programs are effective in reducing pollutant loading especially for nutrients. Additionally, the Town of Lake Park is currently in the process of updating the Stormwater Masterplan (SWMP) with the proposed implementation of Green Infrastructure Low Impact Development (GI/LID) Best Management Practices such as bioswales, raingardens, bioretention, pervious pavement, etc. It is expected that the implementation of GI facilities Town-wide will enhance the Plan's effort to reduce pollutant loading from the C-127 and LWL MS4 areas.

THE TOWN OF LAKE PARK



MS4 STORMWATER MASTERPLAN ASSESSMENT PROGRAM

ANNUAL RESULTS REPORT CYCLE 4, YEAR 3

January 25, 2020



TABLE OF CONTENTS

1.0	Town of Lake Park Assessment Program
1.1	Assessment Program Objective
1.2	Assessment Program Components
2.0	Water Quality Monitoring Plan
2.1	Identification and Monitoring of Land-Based Pollutants in the Town of Lake Park
2.2	Lake Worth Lagoon Water Quality Issues
2.3	LWL Water Quality Monitoring Network
2.4	Town of Lake Park Water Quality Monitoring Program
2.5	Monitoring Site Locations Adequacy
2.6	Water Quality Monitoring Results – Tabular
2.7	Water Quality Monitoring Results – Trend Analysis
2.8	Sampling Location Trend Analysis
3.0	Pollutant Loading Estimate Plan
4.0	Evaluation and Response Plan

FIGURES

Figure 1	Existing Land Use Map for The Town of Lake Park
Figure 2	Future Land Use Map for The Town of Lake Park
Figure 3	Location of NPDES Site 13 And LWL Monitoring Sites LWL2, 3 And 4
Figure 4	Town of Lake Park Location of Four Sampling Sites
Figure 5	MS4 Areas at The Town of Lake Park
Figure 6	MS4 Basin Areas Per System of Roads and Current Drainage Infrastructure
Figure 7	Sampling Site 4 Location at Water Tower Road
Figure 8	Original Ditch Discharge for Site 4 Outfall Sampling Site
Figure 9	TSS Data from The International Stormwater Database, Version 3 (2008)
Figure 10	Lake Worth Lagoon Water Quality Trends For 2007-2012
Figure 11	Source of The Water at Location 4 Outfall
Figure 12	Town of Lake Park MS4A Areas as A Function of The Receiving Water Bodies
Figure 13	EMC Values Used in The SIMPLE Water Quality Model for Cycle 4, Year 3
Figure 14	Pollutant Loadings Discharged to the C-17 and LWL for Cycle 4 Year 2
Figure 15	Pollutant Loadings Discharged to the C-17 and LWL for Cycle 4 Year 3
Figure 16	Location of Current Dry/Wet Detention BMP's at The Town of Lake Park
Figure 17	Proposed Extend of Bioswale Coverage Per MS4 Area
Figure 18	Typical ROW BMP Layout for Bioswales Along The 10 th Street Pilot Project

TABLES

Table 1	Regional Pollutant Load with Reductions for Non-Structural BMP Practices
Table 2	2013 Pollutant Loading (Lbs/year)
Table 3	2018 Pollutant Loading (Lbs/year)
Table 4	Pollutant Loading reductions (Lbs/year) for Additional Bioswale BMPs

1. TOWN OF LAKE PARK ASSESSMENT PROGRAM

1.1 - Assessment Program Objective

The purpose of this assessment program is to provide information for the Town of Lake Park to determine the overall effectiveness of its Stormwater Management Program (SWMP) in reducing stormwater pollutant loadings from its Municipal Storm Sewer System (MS4) to receiving water bodies. Phase 1 MS4 Monitoring Plans are required to meet the following goals:

- A. Identify areas that can be targeted for corrective action that have a potential for water quality problems related to stormwater runoff. The corrective actions include, but are not limited to, non-structural BMP's (i.e. trash collection, street sweeping, public education), structural BMP's and retrofits.
- B. Measure the effectiveness of stormwater pollution reduction measures, such as BMP's that have or will be implemented.
- C. For specific outfalls or watersheds, document pollutant loadings and/or trends in pollutant loadings.

1.2 - Assessment Program Components

As required by the MS4 Permit, the following components make up this Assessment Program:

- A. Water Quality Monitoring Plan – the plan identifies local sources where urban stormwater adversely affects surface water resources.
- B. Pollutant Loading Estimate Plan – the plan is intended to estimate the Pollutant Loading from the MS4 contributing area, based on BMP's and land use.
- C. Evaluation and Response Plan – the plan is intended to propose a plan of action to be taken based on the results of the Water Quality Monitoring Plan and Pollutant Loading Estimate Plan. The plan will be used for the following:
 1. Analyze trends in Pollutant Loading from the MS4.
 2. Analyze trends in water quality that discharge from the MS4.
 3. Identify areas of the MS4 to be targeted for corrective measures and loading reduction.

2. WATER QUALITY MONITORING PLAN

2.1 Identification and Monitoring of Land-Based Pollutants in the Town of Lake Park

The amount of polluted runoff from various land uses in the Town of Lake Park varies depending on the types of practices employed at each site. Sediment concentrations of heavy metals such as cadmium, copper, lead and zinc, tended to be highest in urbanized areas such as the Town of Lake Park. Metals are released to the environment from brake pads, plumbing, industrial and commercial activities. Nutrient-rich wastewater is released from cesspits and septic tanks. Other sources of water pollution in the Lake Worth Lagoon (LWL) are stormwater runoff containing fertilizers, pesticides, herbicides, petroleum products, and heavy metals all of which may be affecting brackish water communities including seagrasses, and mangroves.

During rainfall fertilizer can quickly wash away from lawns, flow down streets, and dump into nearby streams and ditches until reaching the LWL. Chemical pollutants present in fertilizer attach to sediment loads that are transported by runoff a lawn and end up providing excess nutrients such as nitrogen and phosphorus to waterways such as the LWL. Algal blooms are a serious threat to our economy, health, and environment. Algae can release toxins leading to skin and breathing problems for people. Blooms also lead to fish kills and deplete seagrass beds that are key food sources for many species in the LWL.

Existing Land Use Map

The total Town boundary encompasses 1383.7 acres or 2.16 SM. Of this total 1,116 total acres, or 1.74 square miles of non-water areas contained within the corporate limits. **Figure 1** shows the existing land use map for the Town of Lake Park. Existing land use data is indicative of how the land and water areas in Lake Park have developed. Lake Park is an older mature urban area incorporated originally as Kelsey City in 1923. The Town is essentially a platted, residential community with linear commercial areas along U.S. Highway No. 1, Northlake Blvd, Tenth Street and Park Avenue. There is a large mixed commercial and light industrial area located to the west of the Florida East Coast Railroad, which divides the Town.

Single family, low density residential development comprises the largest single land use category within the Town. Approximately 305 acres or 34.4% of the total area of the Town is used for single-family residential purposes, while 56.4 acres are used for medium density and 22.2 acres are used for high density development. Almost all of the low-density development is located west of the Florida East Coast Railroad and west of U.S. Highway No. 1.

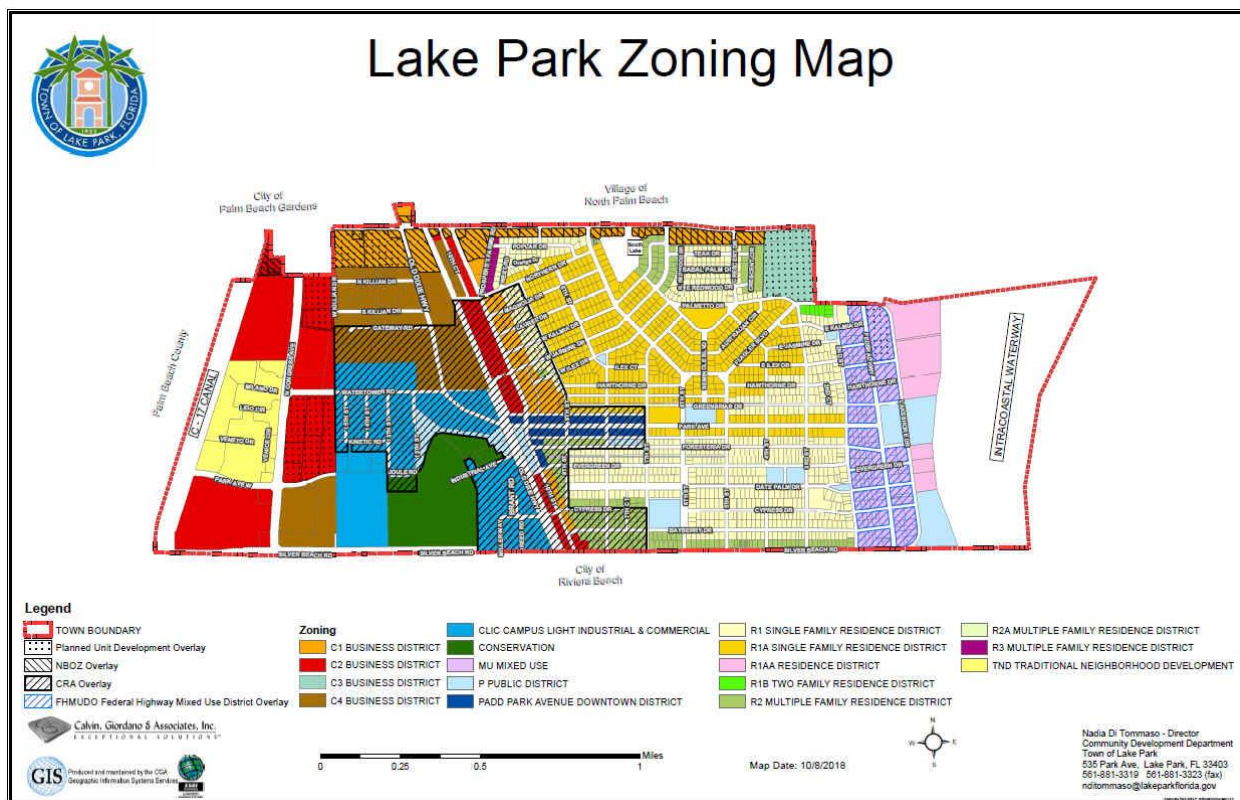


Figure 1. Existing Land Use

All commercial development in the Town is located along four corridors: (1) U.S. Highway No. 1; (2) Northlake Boulevard; (3) Prosperity Farms Road/Tenth Street; and (4) Park Avenue. There are two major

shopping centers, the Twin City Mall (i.e. shared with the Village of North Palm Beach) located in Lake Park, with the balance consisting of small, highway-oriented centers and free-standing businesses. Commercial uses in these facilities are primarily retail, service and professional businesses. Commercial uses utilize 135.9 acres, or 8.5% of the total area of the Town.

Mixed commercial and light industrial land use account for 95.1 acres and constitutes 8.5% of the municipal land area. All of these uses are located along Congress Avenue and are buffered from the remainder of the Town by the Florida East Coast Railroad. Also, the greatest amount of vacant land is located in this area. Land use activities consist primarily of a variety of light industrial types mixed with various commercial support, warehouse, wholesale and service businesses

Recreation/open space land use consists of 31.9 acres, or 2.9% of the corporate area and Public building and grounds land use currently utilizes 9.4 acres and constitutes approximately 0.8% of the corporate area. Existing rights-of-way for roads and streets and the Florida East Coast Railroad consume approximately 22.4% or 250 acres of the total area in Lake Park. Water areas constitute a minor portion (i.e. 0.8%) of the total area of the Town.

Future Land Use Map

Figure 2 shows the future land use map for the Town of Lake Park. Presently, the Town is built-out to approximately 84% of the corporate area. Only 16% or 158 acres of the total area is vacant and potentially available for future development. Of this total, 132 acres or 84% of the total vacant area is designated and zoned for future mixed commercial/industrial development.

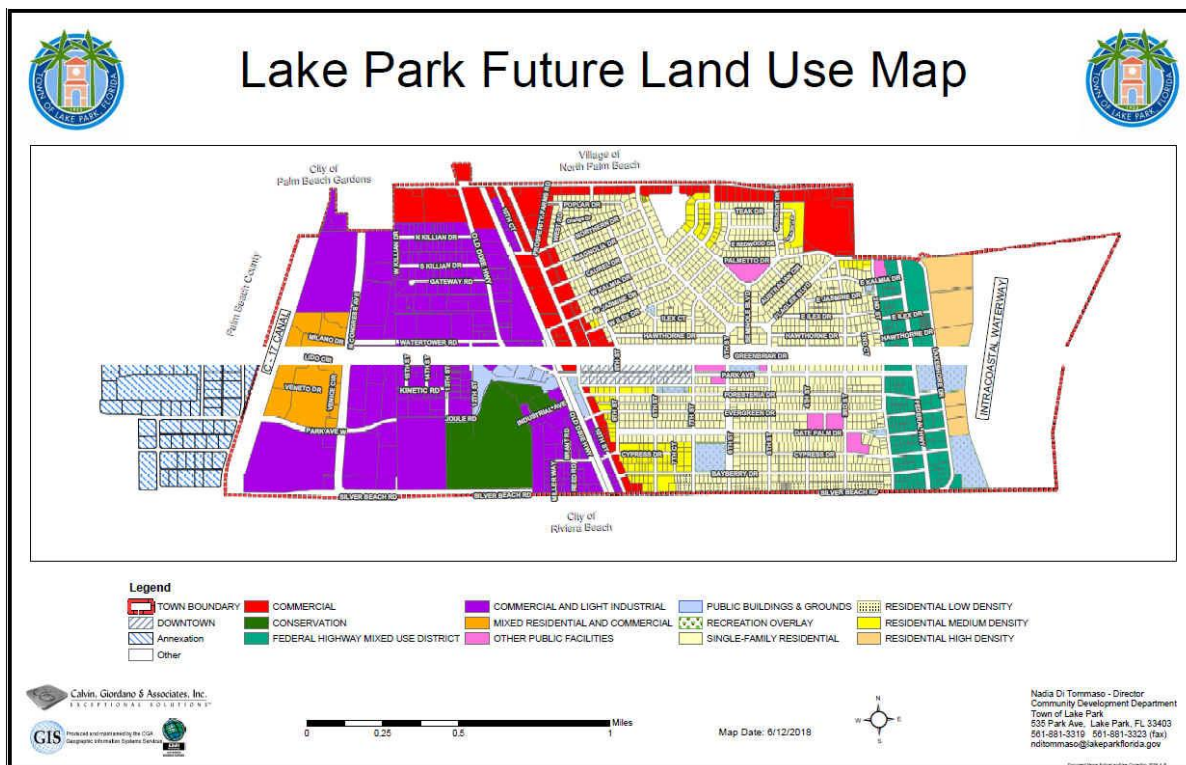


Figure 2. Future Land Use

Figure 2 includes some land for potential expansion along the western boundary of the Town’s current limits. However, there are no specific plans for implementing the future annexation at this time.

Comparisons of both Figure 1 and 2 land uses indicate that potential pollutants from water quality discharges from the Town of Lake Park jurisdiction to the C-17 Canal and LWL will not change in the near future.

2.2 Lake Worth Lagoon Water Quality Issues

All surface waters in Palm Beach County including the LWL, are classified as Class III waters with few exceptions. Population increases in Palm Beach County have altered regional watershed hydrology and large-scale freshwater releases from regional canals such as the C-17 Canal, along the west boundary of the Town of Lake Park, are the main stressors for potential habitat loss and degradation of water quality in the LWL.

Water quality within the lagoon has been significantly degraded by various drainage, dredging, and coastal development projects in the past. These projects have caused significant alterations in the timing, distribution, quality and quantity of fresh water that enters the coastal waterways including the C-17 Canal. Large volumes of pollutant-laden freshwater discharges into the Lagoon, primarily through the C-17, C-51, and C-16 canals, can cause extreme salinity fluctuations which can be harmful to many aquatic organisms, such as oysters and seagrasses unable to tolerate excessive freshwater inflows.

While salinity fluctuations are a problem with freshwater discharges, a major threat to the recovery of the LWL is excess *suspended sediments*. Suspended sediments increase turbidity and thereby decrease the amount of sunlight that reaches the bottom; nutrients cause proliferation of phytoplankton in the water column further deteriorating water clarity. As sediments fall out of suspension, they accumulate on the bottom, sometimes forming a silty layer over previously natural sediments which affect the flora and fauna. At present, water quality within the Lagoon is highly variable and it is best in the vicinity of the inlets, where the water bodies are subjected to tidal flushing and enhanced circulation.

There are three major freshwater inflows from the watershed discharged to the LWL estuary via regional canals. One of these is the Earman River Canal (C-17 Canal) that discharges to the northern segment of the lagoon (LWL) where the Town of Lake Park is situated. The Town of Lake Park stormwater discharges occur to both the C-17 (Earman River) Canal along the west and north and to the LWL directly along the east.

2.3 LWL Water Quality Monitoring Network

The LWL monitoring network implemented in October 2007 consist of twenty-two (22) sites. **Figure 3** shows the location of NPDES Site 13 and LWL Monitoring sites LWL2, 3 And 4. These are the sites that are used to correlate the upland water quality discharges to the receiving water body (LWL). LWL4 is the most applicable to the Town of Lake Park direct and C-17/Earman River pollutant load discharges.

Several parameters have been analyzed on a monthly basis including dissolved oxygen (DO), pH, salinity; Kjeldahl Nitrogen (TKN), Ammonia Nitrogen (NH₄), Nitrite-Nitrate Nitrogen (NO_x), Total Phosphorus (TP) And Orthophosphorus (OPO₄), Turbidity, And Chlorophyll-A.



Figure 3. NPDES and LWL Water Quality Monitoring Sites

2.4 Town of Lake Park Water Quality Monitoring Program

As a co-permittee of the Palm Beach County NPDES /MS4 permit program, where the Northern Palm Beach County Improvement District is the Lead Permittee, the Town of Lake Park collects quarterly ambient water quality data throughout the Town at four (4) designated sampling sites.

As required by the MS4 Permit, the Town utilizes a FDEP approved lab using NPDES-approved procedures to perform quarterly sampling at these locations for five test parameters, including Chlorophyll-A, Dissolved Oxygen (DO), Total Phosphorus (TP), Total Nitrogen (TN), and Total Suspended Solids (TSS). **Figure 4** shows the location of the four sampling sites. The four sampling locations were selected based on the type of water quality pollutant that could be generated by the land uses in the surrounding areas.

- Location 1
148 Data Palm Drive – Basin 12, Structure #103. Google Earth: 26°47'41.25"N, 80°3'22.30"W
(Samples pulled from 60" RCP outflow that leads to Lake Worth Lagoon)
This sampling location is supposed to be representative of the residential district
- Location 2
301 Federal Hwy – Basin 12, Structure #131A. Google Earth: 26°47'41.93"N, 80°3'13.85"W
(Samples are pulled from 60" RCP outflow to Lake Worth Lagoon)

This sampling location was selected to assess the impact of discharges from the US Highway 1 right-of-way and adjacent business District. Site 2 is located along the same 72" CMP pipe outfall that includes site 1 just west of the US 1 Highway ROW at 2nd Street.

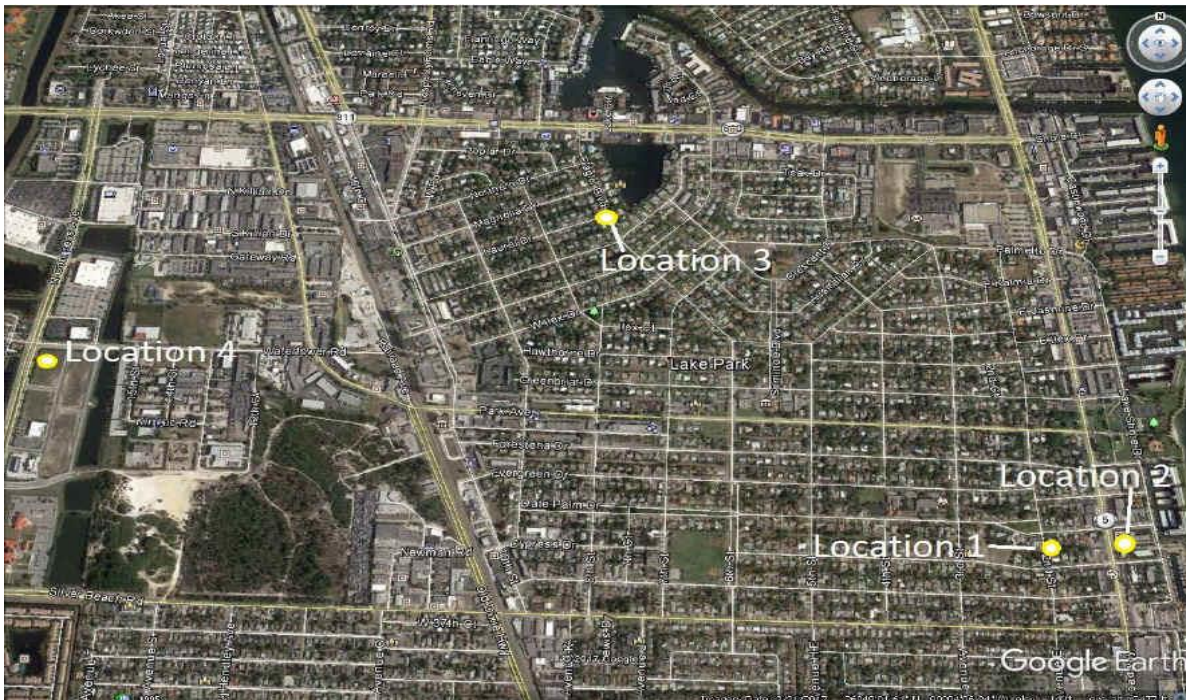


Figure 4. Town of Lake Park NPDES Sampling Location Sites

- Location 3
1406 Flagler Blvd – Basin 15, Structure #35A. Google Earth: 26°48'17.43"N, 80°4'5.63"W
(Samples area pulled from 36" RCP outflow to South Lake)

This sampling location was selected to assess the impact of discharges from the residential district area south of South Lake or representative of the outfalls to the Earman River.

- Location 4
Intersection of Congress Ave. and Watertower Road (Southeast Corner) – Basin 26, Structure unnamed. Google Earth: 26°48'1.67"N, 80°5'4.21"W.
(Samples are pulled from the downstream site of a control structure discharging a 96" RCP outflow to SFWMD C-17).

This sampling location was selected to assess the impact of discharges representative of the Campus Light Industrial and Commercial area west of the Florida East Coast Railroad tracks.

As part of the NPDES Permit program specific MS4 areas have been designated for the purpose of monitoring water quality discharges and the application effectiveness of Best Management Practices (BMP's) for the reduction of pollutant loads to the LWL. **Figure 5** shows these areas as a function of the Town's land uses and stormwater management system discharging to the C-17/Earman River and LWL. **Figure 6** depicts the MS4 Basin areas as a function of the system of roads and the current drainage infrastructure composed mainly of roadside inlets and stormsewers discharging to the LWL (east), the C-17 Canal (West) and the Earman River (north).

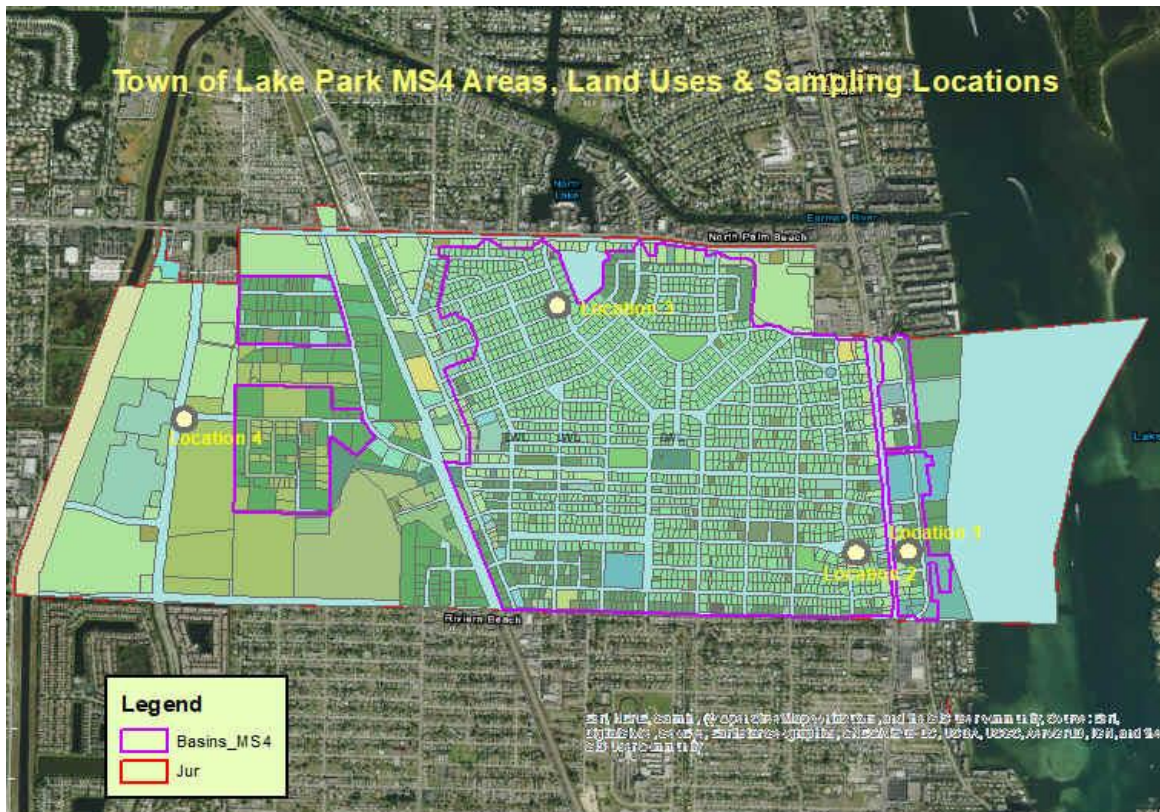


Figure 5. MS4 Basin Areas, Land Uses & Monitoring Locations



Figure 6. MS4 Basin Areas, Monitoring Locations & Drainage System Infrastructure

2.5 Monitoring Site Locations Adequacy

Figures 5 and 6 indicate that the current MS4 Basin areas are representative of the residential, commercial and light industrial areas and the stormwater management system discharging runoff pollutant loads from these areas. However, two observations can be made.

Sampling Location 1: The location of this site is 750 feet from Site 2 upstream along the same outfall. Site 1 was selected to measure the pollutant discharges from the US Highway 1 ROW and adjacent commercial district area with a time of concentration much shorter than that the runoff measured at Site 2 with a contributory area and time of concentration much larger than that of site 1. This means that the first flush of runoff which carries the bulk of the pollutant load would pass through and discharge much sooner than that of the pollutant load arriving at Site 2 much later. It is very likely that the US Highway1 ROW drainage area pollutant-laden runoff peak discharges well before the three (3) hours after the storm sampling requirement. It is also very likely that the Site 1 pollutant baseline is reflective of the Site 2 baseflow after 3 hours.

The results of the 2019 sampling plan will be reviewed to assess the validity of this observation.

There is also the issue of the proximity of these sampling locations to tidewater. Sampling locations 1, 2, and 3 are manholes with inverts well below LWL tides and it is very important to perform the sampling during low tide. This issue will become progressively more difficult as Sea Level Rise (SLR) will increase tide depths. Locations 1 and 2 will be impacted the most.

Sampling Location 4: This sampling location was selected to assess the impact of stormsewer discharges representative of the Campus Light Industrial and Commercial area west of the Florida East Coast Railroad tracks. **Figure 7** shows that Site 4 is located at the outfall pipe discharging from a detention lake south of Water Tower Road that collects runoff from the surrounding commercial sites.

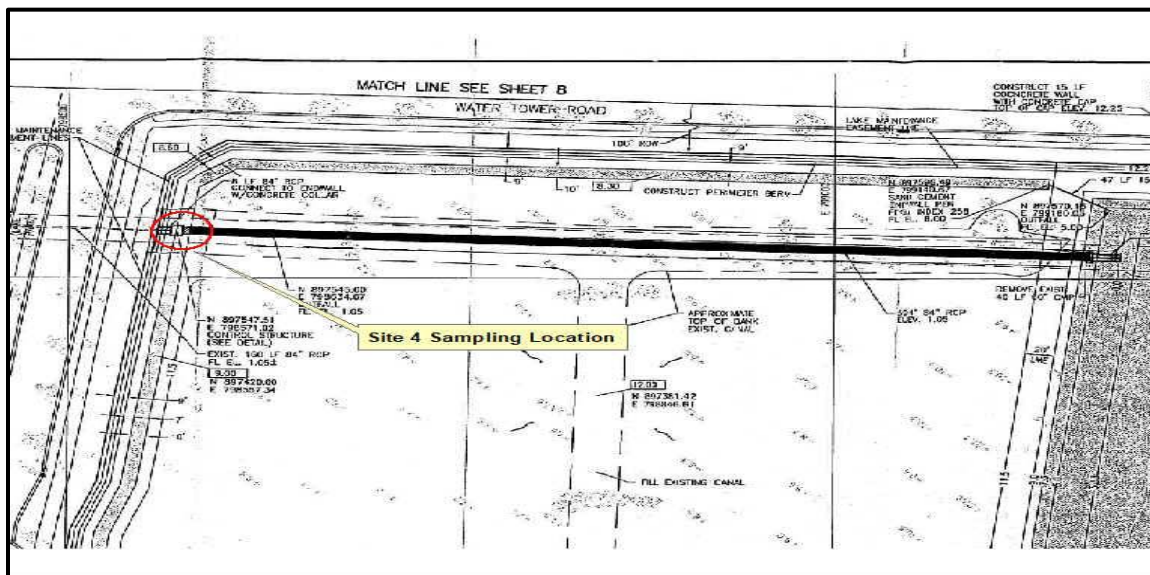


Figure 7. Site 4 Sampling Location

Figure 8 indicates that although originally the discharge from Site 4 flowed west to C-17 canal via an existing ditch to a culvert at C-17, this stormwater transport system was radically changed when privately-owned residential development took place west of Congress and eats of the C-17 ROW.

Currently, the Site 4 outfall discharges under Congress Avenue into a system of wet detention lakes at the privately-owned residential development with a significant residence time of treatment prior to

discharge to the C-17 canal. This means that pollutant loadings from the Town's MS4 Campus Light Industrial and Commercial areas get further treated or attenuated at the stormwater management system of these developments.

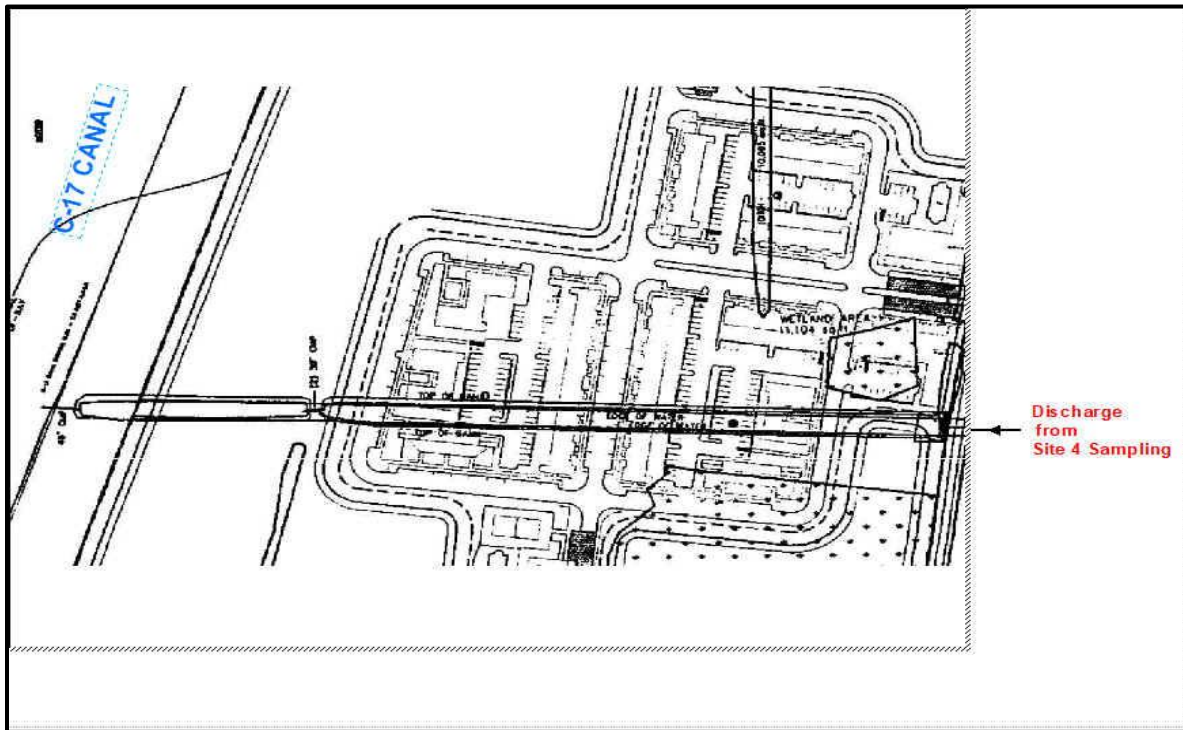


Figure 8. Original Site 4 West Discharge to C-17 Transport System

2.6 Water Quality Monitoring Results – Tabular

Results of the sampling period from March 2019 to September 2019 have been tabulated and are presented in X-Y scatter plots. The plots also include the State of Florida Standard Minimum Detection limits by which these pollutant values are compared to for program assessment.

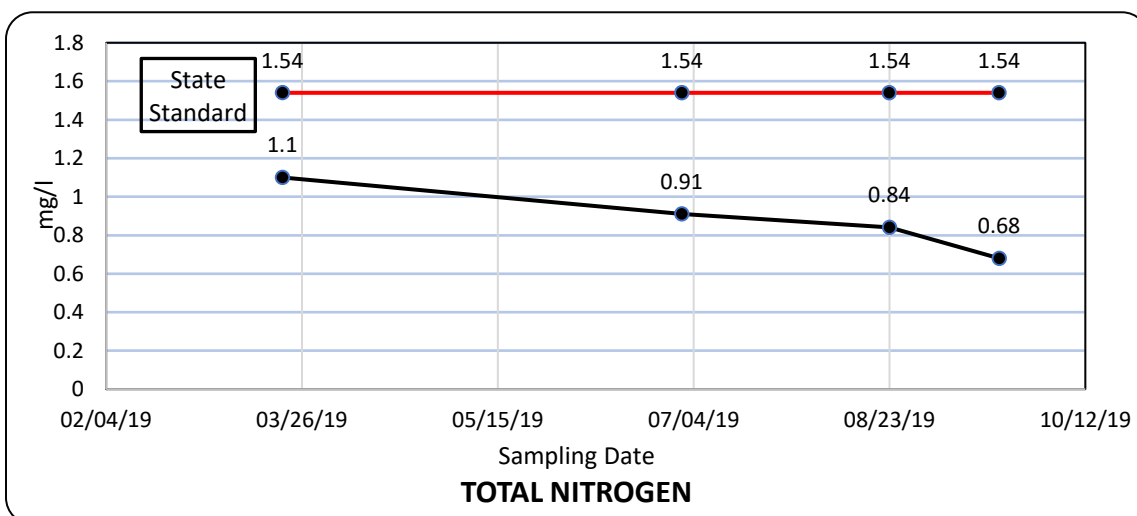
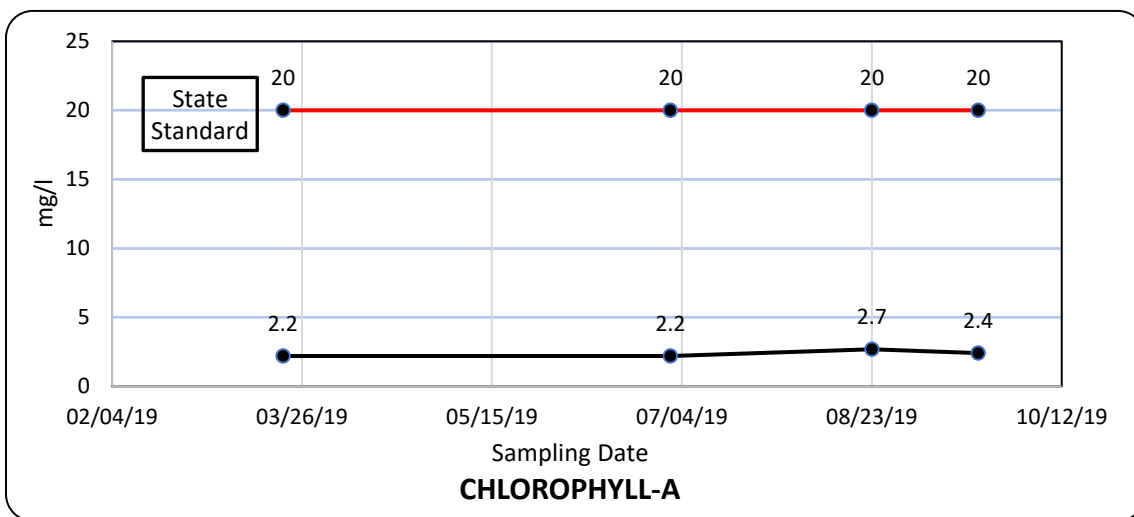
The following sampling guidelines were observed:

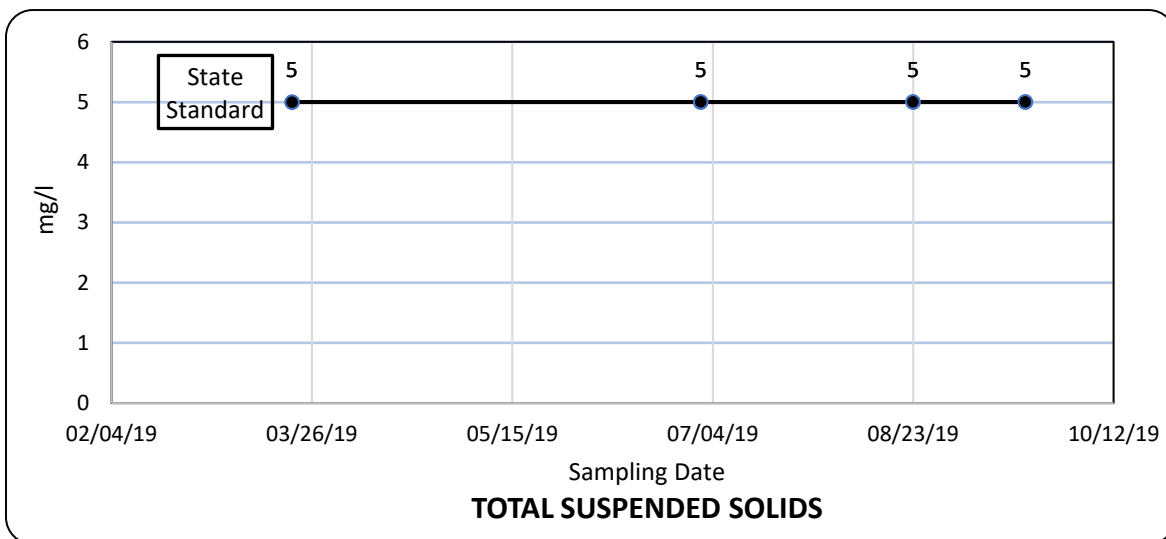
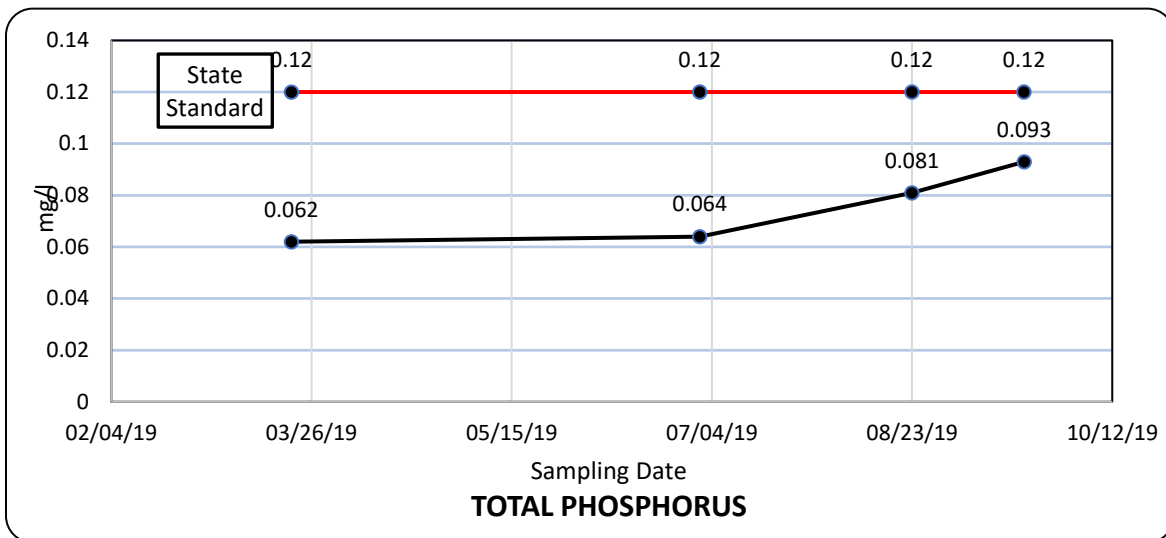
- Sampling was performed for storms of 0.75 inches or greater.
- Sampling was performed (when possible) within 3 hours after the storm event.
- Sampling was performed at low tide to avoid brackish water influence on pollutant concentrations.

Additionally, there was no sampling performed in the first quarter of 2019 and no Dissolve Oxygen (DO) % Saturation Data was obtained at any of the sites.

Location #1 Data and Plots

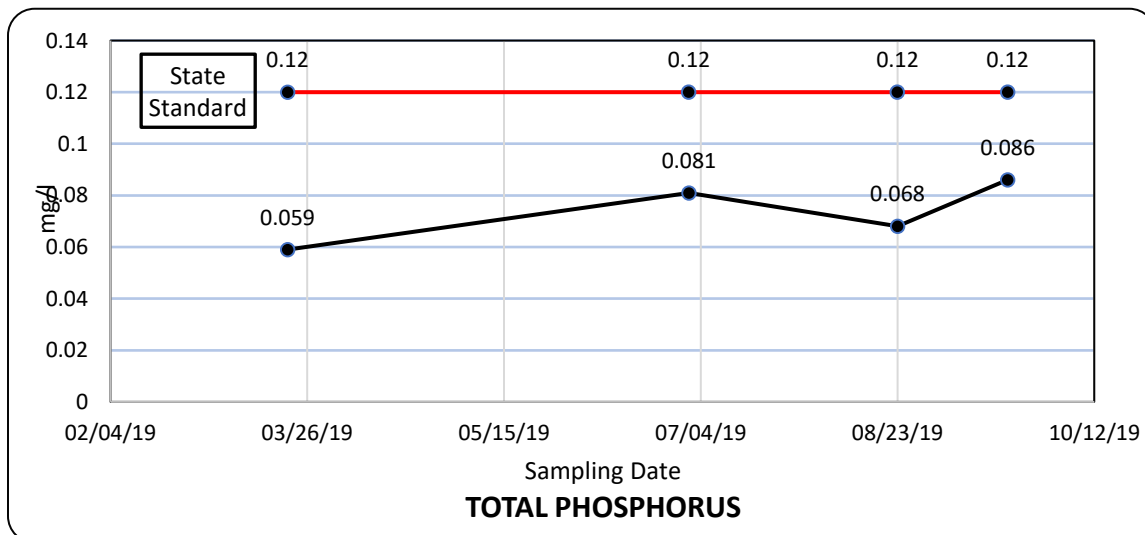
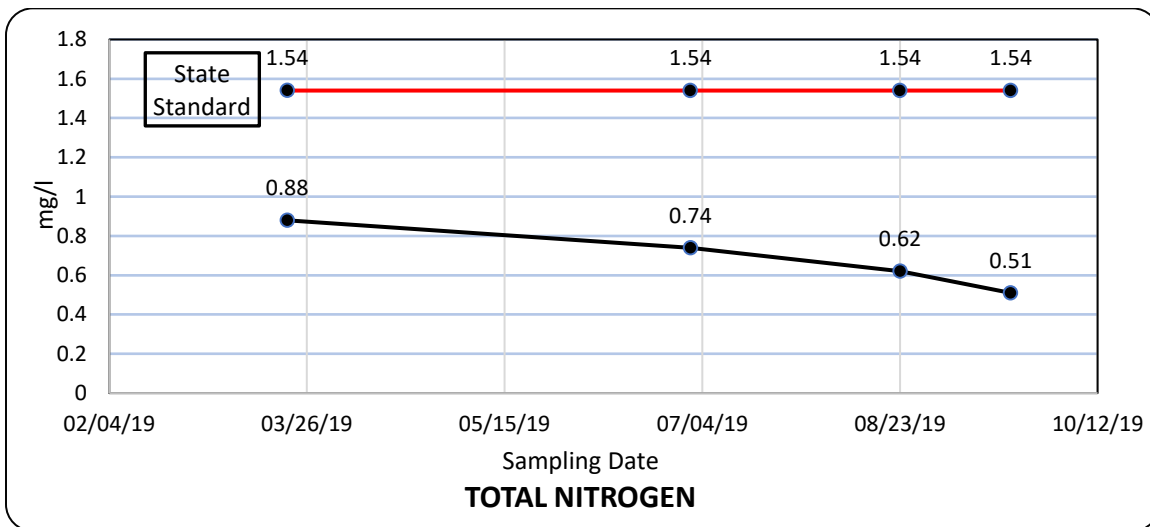
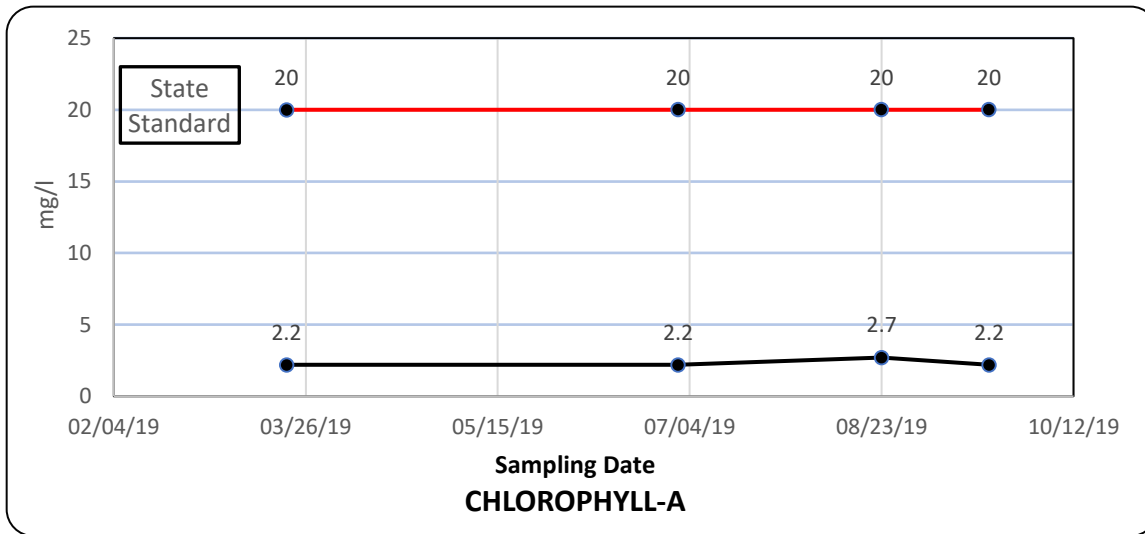
LOCATION #1 Single-Family Medium	Chlorophyll-A ug/l	Total Nitrogen mg/l	Total Phosphorus mg/l	Total Suspended Solids mg/l	Dissolved Oxygen % Saturation
State Standard Criteria	20	1.54	0.120	N/A	>38
March 21, 2019	2.2	1.1	0.062	5.0	No Data
July 1, 2019	2.2	0.91	0.064	5.0	No Data
August 23, 2019	2.2	0.84	0.081	5.0	No Data
September 20, 2019	2.4	0.68	0.093	5.0	No Data

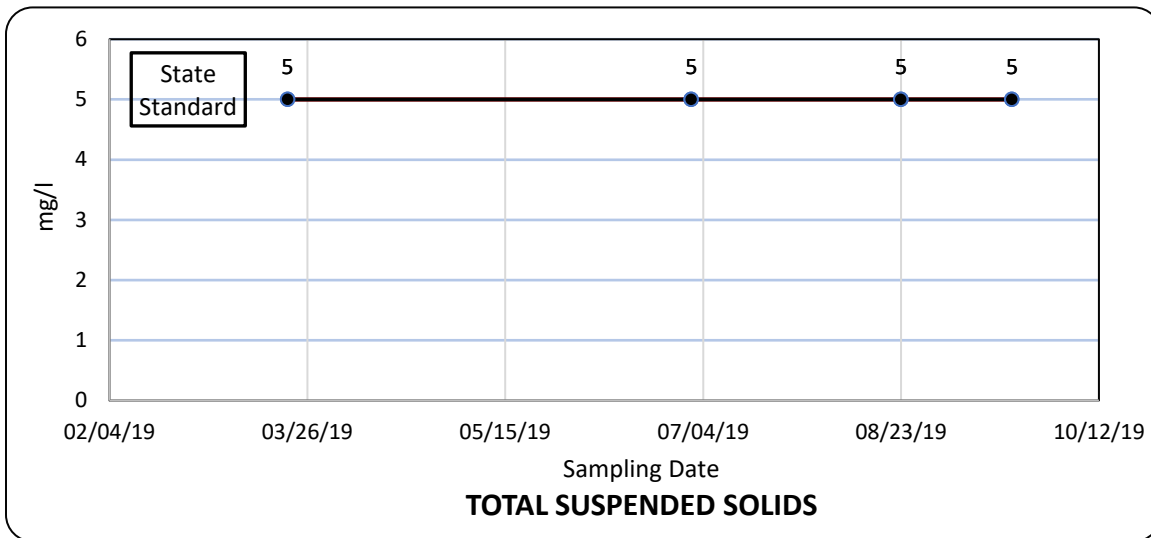




Location #2 Data and Plots

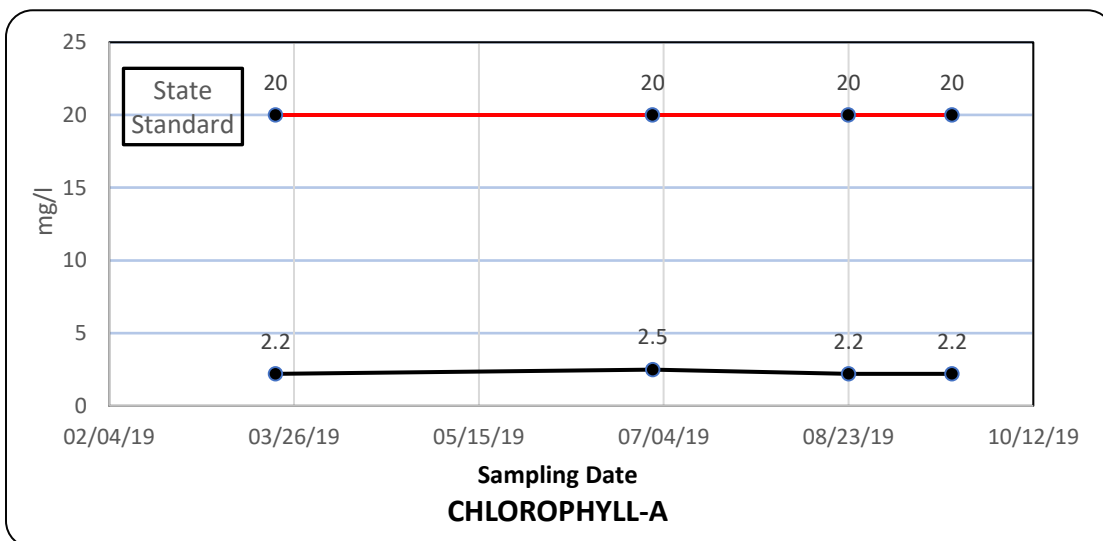
Location #2 Business District US Highway1	Chlorophyll-A ug/l	Total Nitrogen mg/l	Total Phosphorus mg/l	Total Suspended Solids mg/l	Dissolved Oxygen % Saturation
State Standard Criteria	20	1.54	0.120	N/A	>38
March 21, 2019	2.2	0.88	0.059	5.0	No Data
July 1, 2019	2.2	0.74	0.081	5.0	No Data
August 23, 2019	2.7	0.62	0.068	5.0	No Data
September 20, 2019	2.2	0.51	0.086	5.0	No Data

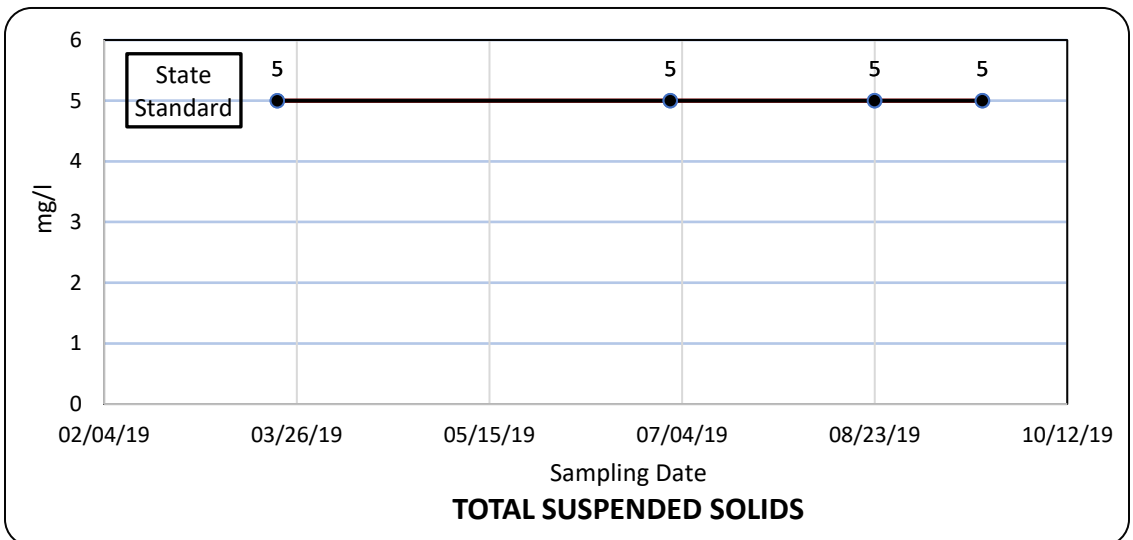
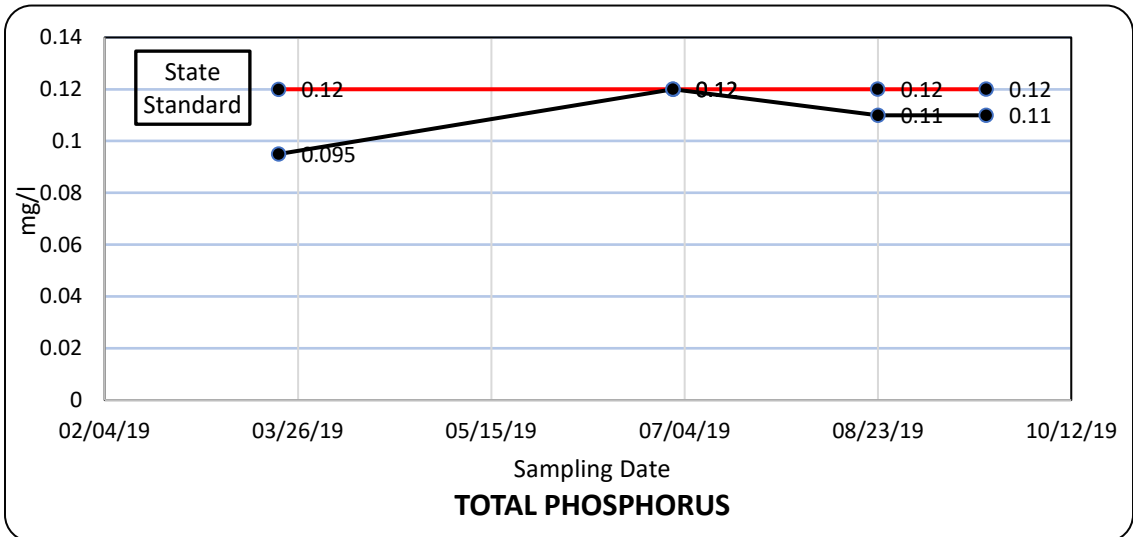
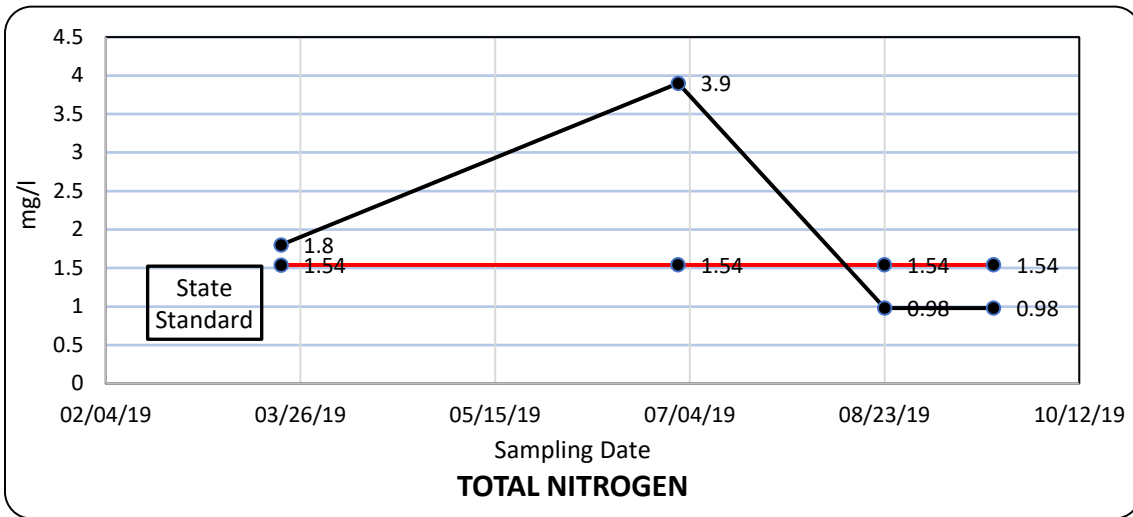




Location #3 Data and Plots

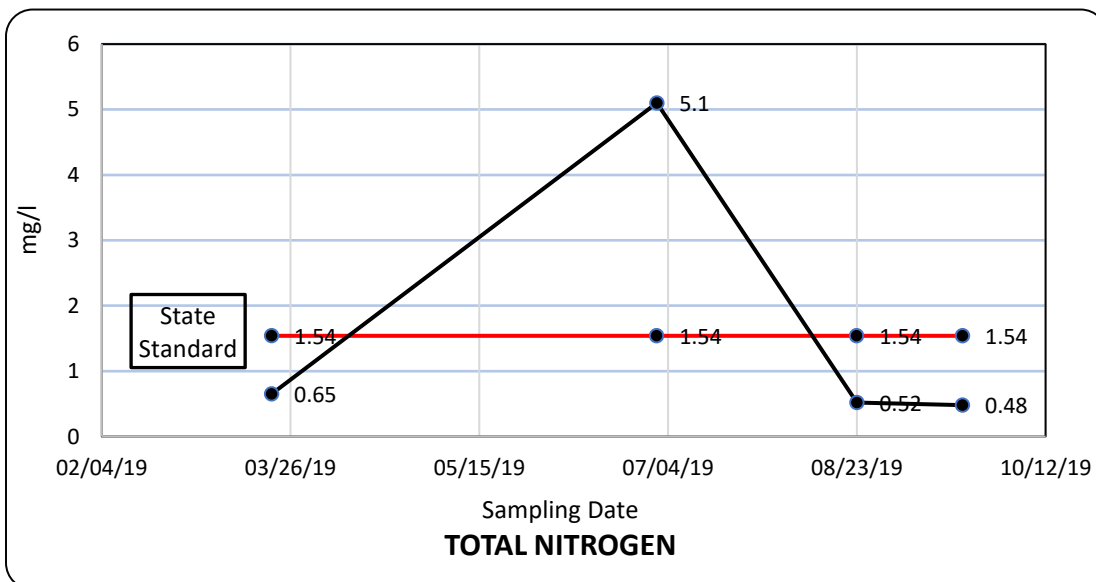
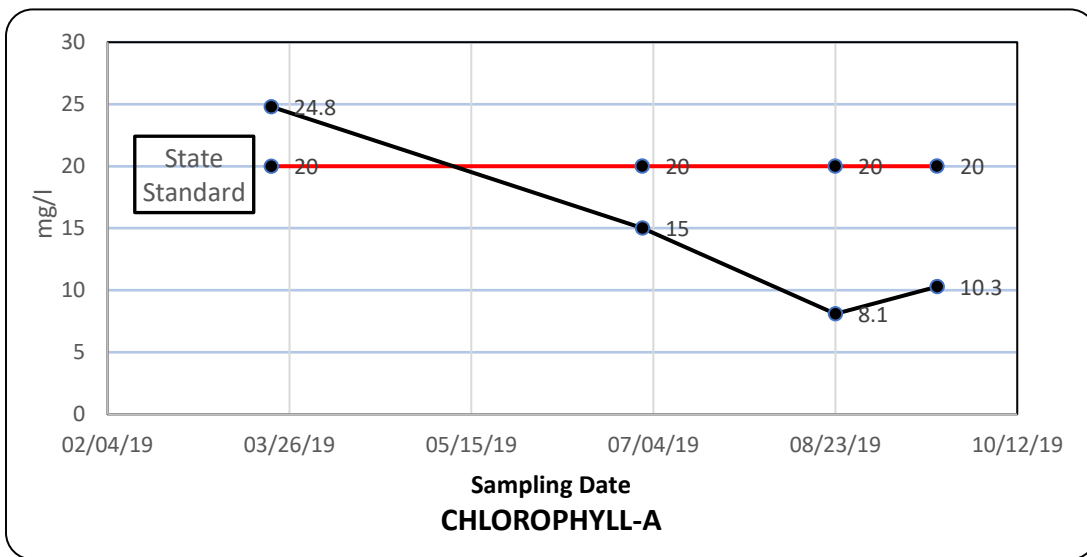
Location #3 Residential district south of South Lake	Chlorophyll-A ug/l	Total Nitrogen mg/l	Total Phosphorus mg/l	Total Suspended Solids mg/l	Dissolved Oxygen % Saturation
State Standard Criteria	20	1.54	0.120	N/A	>38
March 21, 2019	2.2	1.8	0.095	5.0	No Data
July 1, 2019	2.5	3.9	0.12	5.0	No Data
August 23, 2019	2.2	0.98	0.11	5.0	No Data
September 20, 2019	2.2	0.98	0.11	5.0	No Data

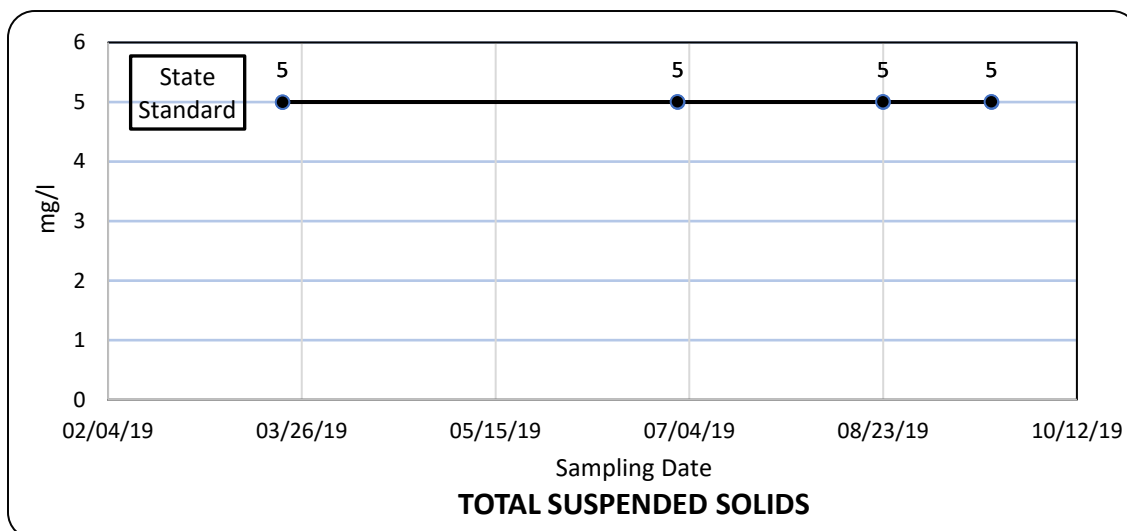
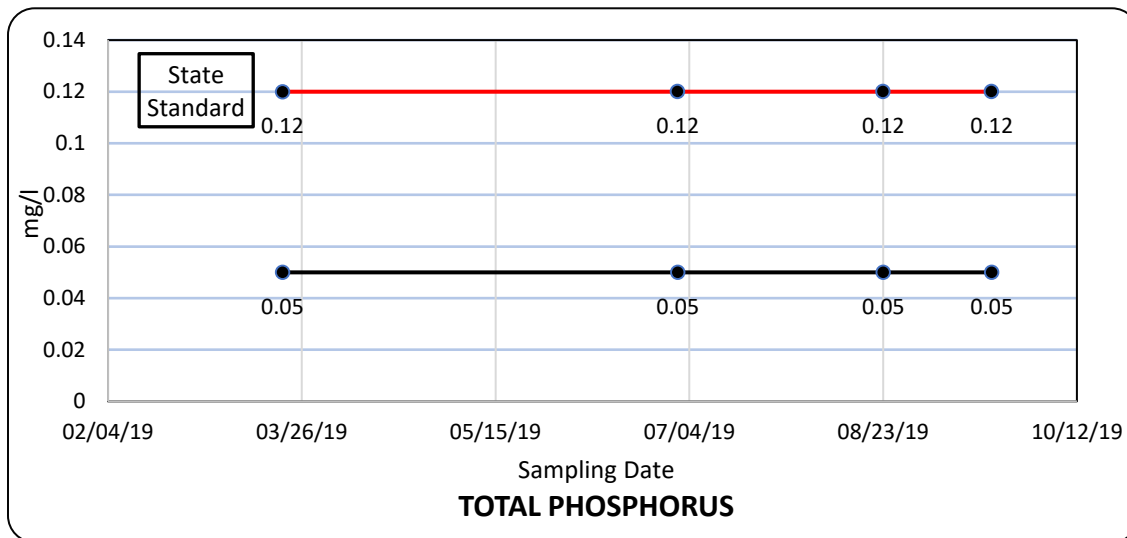




Location #4 Data and Plots

Location #4 Residential district south of South Lake	Chlorophyll-A ug/l	Total Nitrogen mg/l	Total Phosphorus mg/l	Total Suspended Solids mg/l	Dissolved Oxygen % Saturation
State Standard Criteria	20	1.54	0.120	N/A	>38
March 21, 2019	24.8	0.65	0.050	5.0	No Data
July 1, 2019	15.0	5.1	0.050	5.0	No Data
August 23, 2019	8.1	0.52	0.050	5.0	No Data
September 20, 2019	10.3	0.48	0.050	5.0	No Data





2.7 Water Quality Monitoring Results – Trend Analysis

Trend analysis involves the collection of information from varying time periods and plotting the information for detail analysis to spot patterns of change in the collected information. A primary objective of most long-term environmental water quality monitoring surveys is to detect and estimate trends in the parameters that are measured over a significant period of time.

The data to be analyzed in the trend analysis is for the period from 3/2019 to 9/2019 and not long enough to detect sustained trends of significance. Instead, the short-term monitoring can be used to detect subtle changes in environmental parameters that can indicate an upcoming event such as Algal Bloom from spike in Nutrient Loads.

There are specific water quality parameter characteristics that can be applied to assess trends in water quality discharges to the LWL.

Chlorophyll- a is a measure of the number of algae growing in a waterbody. It can be used to classify the trophic condition of a waterbody. Although algae are a natural part of freshwater ecosystems, too much algae can cause aesthetic problems such as green scums and bad odors and can result in decreased levels of dissolved oxygen. One of the symptoms of degraded water quality condition is the increase of algae biomass as measured by the concentration of Chlorophyll-a. Waters with high levels of nutrients from fertilizers, septic systems, sewage treatment plants and urban runoff may have high concentrations of Chlorophyll-a and excess amounts of algae.

Nitrogen is an essential nutrient for plants. Small amounts of Nitrogen are a natural component of ecosystems, but agricultural and urban land use can add more nitrogen to waterways such as the LWL. Trends in three indicators of Nitrogen are very important for maintaining a healthy LWL habitat: total nitrogen, nitrate-nitrogen and ammoniacal nitrogen. Too much total nitrogen and nitrate-nitrogen can lead to excessive growth of algae, which can deteriorate river habitats. Nitrate-nitrogen and ammoniacal nitrogen can be toxic to aquatic life.

Agricultural activities, primarily row crop and livestock production, account for over 80 percent of all Nitrogen added to the environment. Non-agricultural sources of Nitrogen contribute less than 20 percent of the Nitrogen released into the environment. Six percent is released from point sources (such as outfalls) into water bodies, while fourteen percent is deposited from atmospheric sources. The typical sources of Nitrogen pollution in urban areas such as the Town of Lake Park include fertilizer use on lawns, septic tank sewage disposal, and leaks from sewer lines.

Phosphorus. Runoff from both urban and rural areas is loaded with nutrients such as phosphorus and nitrogen. Phosphorus is the nutrient of greatest concern because it promotes weed and algae growth in lakes and streams and waterways such as the LWL. Typically, phosphorus concentrations are lower in urban runoff than in rural runoff, but annual phosphorus loads. However, because phosphorus compounds attach to soil particles, urban areas with high sediment loads also produce high phosphorus load which mean that urban construction sites are significant sources of sediments and phosphorus loads. Other sources of phosphorus include fertilizer spills, leaves and grass left on paved areas, and orthophosphate in vehicle exhaust

Total Suspended Solids (TSS). Total suspended solids (TSS) is the dry weight of suspended particles, that are not dissolved in water. TSS are particles that are larger than two (2) microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials. These solids include debris drifting or floating in the water, sediment, silt, and sand to plankton and algae. Organic particles from decomposing materials can also contribute to the TSS concentration. As algae, plants and animals' decay the decomposition process allows small organic particles to break away and enter the water column as suspended solids

TSS is a water quality parameter used to assess the quality of a specimen of any type of water or waterbody such as the LWL. Is a significant factor in observing water clarity and the more solids present in the water, the less clear the water will be. Some sediment will settle to the bottom of a body of water, while others remain suspended. Some suspended solids can settle out into sediment at the bottom of a

body of water over a period of time. Although this settling improves water clarity, the increased silt can smother benthic organisms and eggs.

The flow rate of the water body is a primary factor in TSS concentrations. Fast running water can carry more particles and larger-sized sediment. Heavy rains can pick up sand, silt, clay, and organic particles (such as leaves, soil, tire particles) from the land and carry it to surface water. A change in flow rate can also affect TSS. TSS is listed as a conventional pollutant in the U.S. Clean Water Act and a major source of water quality degradation as the sediment load becomes the transport mechanism for pollutants from upland urban /suburban watersheds such as the Town of Lake Park.

Concentrations of TSS in urban stormwater runoff are highly variable. Concentrations are similar across different land uses. A Florida state standard has not been established in Florida. **Figure 9** includes data from the International Stormwater Database, Version 3 (2008).

Land use	Median (mg/L)	Minimum (mg/L)	Maximum (mg/L)	Number of observations
Commercial	52	< 0.5	2385	857
Industrial	75	< 1	2490	619
Residential	58	< 0.5	4168	2257
Open space	58	< 1	4168	105

Figure 9. Land Use TSS Concentrations - International Stormwater Database, Version 3 (2008).

Lake Worth Lagoon water quality trends for the period from 2007-2012 for all three segments of the LWL are presented in Table 10 of the 2013 Lake Worth Lagoon Management Plan and shown here as **Figure 10**. The Town of Lake Worth is located in the Northern LWL segment.

Parameters	Statistics	Segments			IRL04
		LWN	LWC	LWS	
Salinity	minimum	14.80	6.93	0.36	30.10
	maximum	38.00	36.60	38.00	38.10
	median	33.4 _a	30.8 _c	32.8 _b	35.10
	average	32.55	29.05	30.30	34.10
	standard deviation	3.66	6.18	6.37	1.88
Chlorophyll <i>a</i>	minimum	1.00	1.00	1.00	0.50
	maximum	31.00	38.00	45.00	5.00
	median	2.00 _b	4.00 _a	4.00 _a	2.00
	average	3.22	5.00	5.69	1.75
	standard deviation	3.03	4.66	5.24	1.04
TN	minimum	0.12	0.22	0.08	0.09
	maximum	1.07	1.13	1.23	0.37
	median	0.30 _c	0.40 _a	0.37 _b	0.19
	average	0.33	0.48	0.42	0.20
	standard deviation	0.14	0.21	0.22	0.07
TP	minimum	0.004	0.014	0.006	0.010
	maximum	0.087	0.098	0.222	0.033
	median	0.022 _c	0.039 _a	0.03 _b	0.014
	average	0.024	0.041	0.036	0.014
	standard deviation	0.012	0.014	0.023	0.005
Secchi Disc Depth	minimum	0.5	0.4	0.5	0.9
	maximum	4.8	4.2	3.3	2.8
	median	1.2 _b	1.4 _a	1.3 _a	1.6
	average	1.4	1.5	1.5	1.6
	standard deviation	0.6	0.7	0.6	0.5
TSS	minimum	1.5	1.5	1.5	1.50
	maximum	59.0	37.0	43.0	22.00
	median	6.0 _c	8.0 _a	7.0 _b	8.00
	average	7.8	9.9	9.1	8.47
	standard deviation	7.3	6.4	6.9	6.05

Figure 10. Lake Worth Lagoon Management Plan Water Quality Values (mg/l)

Dissolved Oxygen

The dissolved oxygen (DO) is oxygen that is dissolved in water. The oxygen dissolves by diffusion from the surrounding air and as a waste product of photosynthesis. The concentration of dissolved oxygen in surface water is affected by temperature and has both a seasonal and a daily cycle. Cold water can hold more dissolved oxygen than warm water. In winter and early spring, when the water temperature is low,

the dissolved oxygen concentration is high. In summer and fall, when the water temperature is high, the dissolved-oxygen concentration is often lower.

Dissolved oxygen in surface water is used by all forms of aquatic life; therefore, this constituent typically is measured to assess the "health" of waterbodies such as the LWL. Oxygen enters a stream from the atmosphere and from groundwater discharge. Photosynthesis is the primary process affecting the dissolved oxygen/temperature relation; water clarity and strength and duration of sunlight, in turn, affect the rate of photosynthesis.

In a stable body of water with no stratification, dissolved oxygen will remain at 100% air saturation. 100% air saturation means that the water is holding as many dissolved gas molecules as it can in equilibrium

2.8 Sampling Location Trend Analysis

Chlorophyll- a

Water sampling at Locations 1-3 is from the bottom of manholes discharging directly the outfalls. Typical low values ranged from 2.2 to 2.7 ug/l with the exception of Location 4. Chlorophyll- a values at this location ranged from 8.1 to 24.8 exceeding the State Standard of 20 ug/l. Chlorophyll- a concentration for the sampling for the preceding (10/2017 to 9/2018) period indicates values ranging from 6.4 to 18 ug/l almost reaching the 20 ug/l state standard. Both of these year's readings are substantially higher than at the three other sampling location.

Examination of the source and discharge point of the loadings provides a clue as to the higher Chlorophyll- a concentrations at Location 4. **Figure 11** shows that the source of the water at the Location 4 outfall is a system of lakes for stormwater management of the Light Industrial and Commercial area east of Congress Avenue and north and south of Water Tower Road.

It is likely that nutrient-laden sediments are being discharged into these lakes from the adjacent parking lots and roadside landscape features that could results in the Chlorophyll- a spikes. However, Nitrogen and Phosphorus concentrations at Location 4 are well below state standards (with one exception in July during summer months) which indicate that these lakes are not the main culprit for the higher Chlorophyll- a concentrations at Location 4.

A more likely explanation is that the water at the stormwater management system in the receiving end has a much higher level of nutrients and therefore Chlorophyll- a concentrations are being reflected in the sampling. Examination of sampling procedures indicate that sampling has been historically performed in the discharge side of the weir control structure at Location 4 which is the side connecting to the residential stormwater management system of lakes on the west side of Congress. **Figure 11 shows** large floating algae mats at these lakes.

It is also likely that by switching the sampling to the incoming side of the outfall better (lower) Chlorophyll- a concentrations will be obtained that are more in line with values at the three other sites. This assumption will be tested during the remaining 2018/2019 sampling period.



Figure 11. Source of water for Location #4

Although the residential lakes west of Congress are under private ownership and maintenance, better Best Management Practices (BMP's) to control nutrient/sediments loads need to be recommended for implementation to reduce future pollutant discharges to the C-17 Canal and the LWL.

Total Nitrogen (TN)

Review of the Total Nitrogen records at all Locations indicate that all values were below the 1.54 mg/l state standard with the exception of the July 1 readings at Locations 3 and 4. A value of 3.9 and 5.1 mg/l were measured at Locations 3 and 4, respectively.

Examination of rainfall records at the nearby SFWMD S-44 meteorological station indicated that 1.57 inches of rainfall was recorded for the period of June 27 to July 1. It is very likely that nutrients from fertilizers at the Location 3 residential areas and at the heavily landscaped areas of the Commercial District were responsible for the high TN at these sites after this relatively high rainfall storm event. Locations 1 and 2 also reflected high TN concentration values (but less than 1.54) during this storm event.

Total Phosphorus (TP)

All location experienced TP concentrations lower than the state standard of 0.120 mg/l. However, Location 3 measurements reflected higher values of 0.11 and 0.12 mg/l for the 7/1, 8/23 and 9/20/2019 sampling events. Review of rainfall records at the SFWMD S-44 meteorological station for these sampling dates indicated higher than normal rainfall. It is likely that fertilizer spills, leaves and grass left on paved areas, and orthophosphate in vehicle exhaust were responsible for these higher TP concentrations.

Total Suspended Sediments (TSS)

TSS concentration values of 5.00 mg/l were recorded at all sampling locations. Examination of the previous (2017/2018) sampling year reflected high TSS values of 7.0, 16.0, 32.5 and 6.5 at each location.

These values are all below the median TSS value of 58 for the International Stormwater database but higher than the LWL median trending value of 7.8 for the LWL North segment (Figures 9 and 10).

The LWL Management Plan indicates that while salinity fluctuations are a problem with freshwater discharges, a major threat to the recovery of the LWL is excess suspended sediments. There is a need to reduce the TSS levels from the Town, and this goal is being addressed in the proposed Town of Lake Park Stormwater Management Plan Update via Green Infrastructure BMP implementation.

Dissolved Oxygen

Dissolved Oxygen values were not obtained during the 3/2019 to 9/2019 sampling period. However, an empirical analysis assessment of the DO value can be obtained by the use of EPA-approved charts using the temperature of the water and barometric pressure during the sampling event. For non-hurricane barometric pressure and temperatures in the 75 to 95-degree F⁰ values of DO saturation of nearly 100% are obtained. These are well above the >38 % saturation recommended which is indicative that the Town of Lake Park enjoys stable surface water domains with no significant stratification and where dissolved oxygen will remain at 100% air saturation.

3. POLLUTANT LOADING ESTIMATE PLAN

Figure 12 shows that the Town of Lake Park MS4 areas as a function of the receiving water bodies for which pollutant discharges are being monitored as part of the Palm Beach County NPDES Group permit. The western MS4 areas discharge toward the C-17 Canal, and the eastern MS4 areas toward the Earman River/Lake Worth Lagoon (LWL). The total MS4 areas are:

Area to Earman River/ LWL: 687.90 acres or 87.9 % of the total LWL MS4 area of 782.11 acres

Area to C-17 Canal: 94.21 acres or 12.1% of the total C-17 Basin MS4 area of 782.11 acres

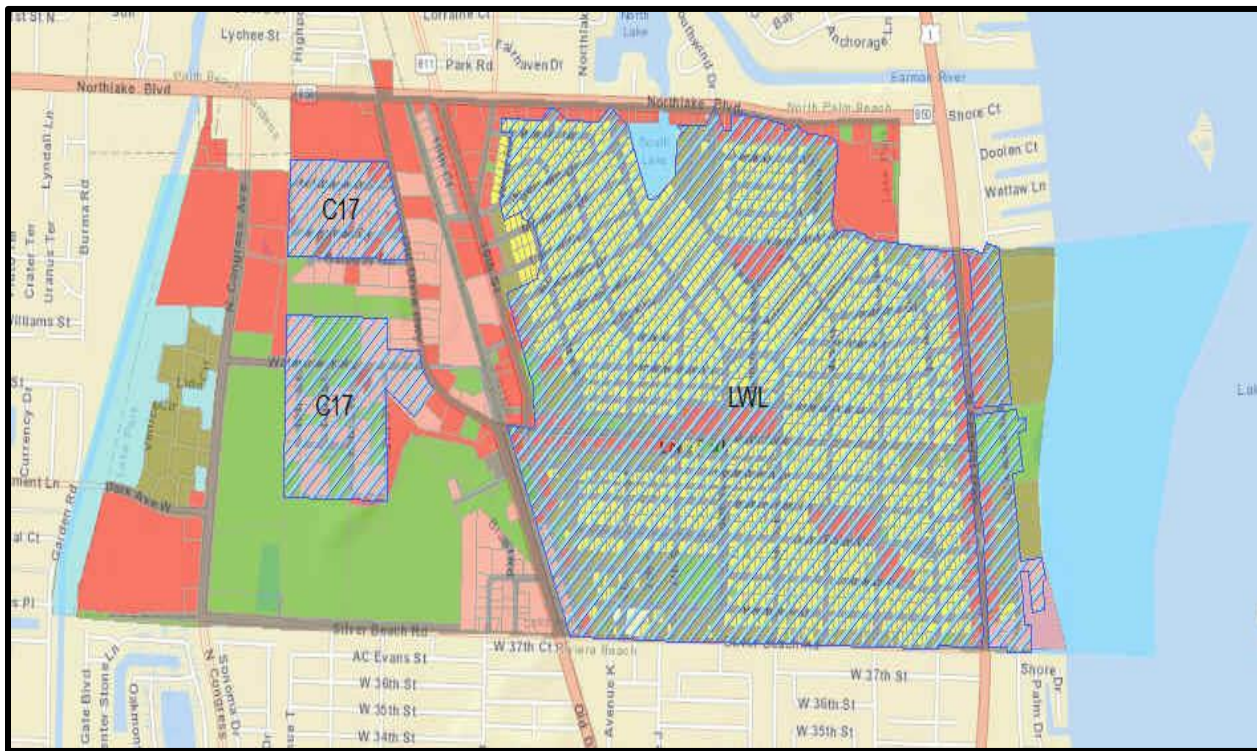


Figure 12. Town of Lake Park NPDES/ MS4 Areas

The purpose of the Town of Lake Park Water Quality Assessment Program, as a participant within the Palm Beach County NPDES/MS4 Group Permit, is to provide information for the Town of Lake Park to determine the overall effectiveness of its Stormwater Management Program (SWMP) in reducing stormwater pollutant loadings from its Municipal Storm Sewer System (MS4) to the C-17 and LWL receiving water bodies.

The sampling data collected by the Town of Lake Park, as well as data collected by other municipalities has been applied by the Palm Beach County MS4 permittee group to develop pollutant loading estimates during the third year of this permit cycle. The Spatially Integrated Model for Pollutant Loading Estimates (SIMPLE) SIMPLE protocol has been applied to calculate pollutant loads.

Pollutant loading estimates are calculated by the SIMPLE water quality model using flow-weighted average concentration or Event Mean Concentration (EMC) for each pollutant of interest. EMC values are defined as the total load of a given pollutant divided by the total runoff volume for a storm event. These values are derived from watershed monitoring, and sampling stormwater during rain events. **Figure 13** shows the EMC values used in the SIMPLE water quality model for Cycle 4 (Table 5 of the Joint Annual Report, Cycle 4 -Year 3).

Table 5 Event Mean Concentration for Parameters by Land Use (mg/l)

Land Use	TN	TP	TSS	BOD ₅	Cu	Zn
Agricultural/Crop Land	2.67	0.89	19.8	3.8	0.022	0.030
Agricultural / Improved Pasture	2.3	0.44	94.3	5.1	0.013	0.021
Commercial	1.79	0.26	57.5	7.7	0.018	0.094
Forest / Open	1.15	0.06	8.4	1.4	0.013	0.021
Golf Course	2.07	0.33	37.5	7.9	0.016	0.062
Highways / Major	1.2	0.2	37.3	5.2	0.032	0.126
Industrial	1.2	0.26	60.0	7.6	0.003	0.057
Residential / Low Density	1.61	0.19	23.0	4.7	0.008	0.031
Residential / Medium Density	2.07	0.33	37.5	7.9	0.016	0.062
Residential / High Density	2.32	0.52	77.8	11.3	0.009	0.086
Residential / with Equestrian	3.45	0.5	69.1	4.7	0.008	0.031
Water	0.84	0.11	11.0	3.0	0.001	0.006
Wetland	1.01	0.05	11.0	3.0	0.001	0.006

Figure 13. Event Mean Concentrations

The Palm Beach County MS4 permittee group provided in the Joint Annual Report, Cycle 4 Year 3 pollutant estimates by MS4 areas in addition to by regional watershed that reflect the respective permittee's MS4 area pollutant discharges. Pollutant load estimates have been provided for the following parameters: Biochemical Oxygen Demand (BOD), Copper (Cu), Total Nitrogen (TN), Total Phosphorus (TP), Total Suspended Solids (TSS), Zinc (Zn).

The Annual Report, Cycle 4-Year 3 also includes pollutant loading data for the Cycle 3 Year 3 for comparison between the 2013 And 2018 reporting cycles. **Figure 14 and 15** show pollutant loadings discharged to the C-17 and LWL regional watersheds provided in Tables 12 and 13 of the Annual report. A comparison of the loadings in Table 12 and 13 for the C-17 and LWL MS4 areas indicates a trend of lower pollutant loads from 2013 to 2018 (Approximately 2%).

Table 12 Loading Estimates Cycle 3 Year 3 in mg/L

Watershed	BOD ₅ Cycle 3 Year 3	TSS Cycle 3 Year 3	TP Cycle 3 Year 3	CU Cycle 3 Year 3	ZN Cycle 3 Year 3	TN Cycle 3 Year 3
C15	1,085,890	3,780,619	47,511	2,491	11,414	428,992
C16	1,319,230	4,294,861	55,301	2,817	13,229	613,163
C17	746,421	3,001,973	30,455	1,762	8,095	306,205
C18	1,795,960	5,281,837	55,081	2,234	9,914	716,469
C51	3,015,247	9,577,086	137,506	6,440	28,706	1,770,218
Hillsboro	954,749	3,768,384	44,540	2,341	10,028	349,585
ICWWN	441,016	1,365,455	17,839	1,002	4,522	195,209
ICWWS	278,171	1,471,489	13,128	683	2,986	108,085
L8	2,226,117	7,363,771	83,490	2,829	10,963	931,902
LOX	746,513	2,390,398	33,363	1,554	6,224	456,387
LWL	727,658	3,479,044	33,667	1,579	6,984	289,708
S-2_6_7	3,001,967	10,348,659	316,928	10,656	29,755	1,702,345
WPBWS	516,116	1,628,588	16,166	588	2,558	202,132

Figure 14. C-17 and LWL Pollutant Loadings for Cycle 4 Year 2

Table 13 Loading Estimates Cycle 4 Year 3 in mg/L

Watershed	BOD ₅ Cycle 4 Year 3	TSS Cycle 4 Year 3	TP Cycle 4 Year 3	CU Cycle 4 Year 3	ZN Cycle 4 Year 3	TN Cycle 4 Year 3
C15	1,035,576	3,308,847	45,366	2,322	10,456	422,172
C16	1,314,644	4,201,904	54,807	2,756	13,003	612,669
C17	748,576	2,933,718	30,944	1,702	7,663	311,079
C18	1,747,703	5,093,882	54,145	2,204	9,693	693,855
C51	2,990,483	9,387,559	136,117	6,332	28,061	1,725,169
Hillsboro	943,216	3,640,819	44,011	2,246	9,554	348,386
ICWWN	429,380	1,229,472	17,269	928	4,241	193,500
ICWWS	267,863	1,367,076	12,758	644	2,794	106,657
L8	2,225,830	7,361,863	83,488	2,828	10,957	931,884
LOX	709,032	2,038,886	31,659	1,456	5,840	439,785
LWL	718,096	3,395,653	33,279	1,543	6,818	285,882
S-2_6_7	3,021,209	10,444,784	317,153	10,652	29,783	1,706,412
WPBWS	515,843	1,626,169	16,161	586	2,545	202,125

Figure 15. C-17 and LWL Pollutant Loadings for Cycle 4 Year 3

The State of Florida allows for assumed pollutant loading reductions as a result of nonstructural BMPs such as public education and outreach (Up to 6%). These reductions, not included in the SIMPLE model used to calculate the pollutant loadings, are presented in **Table 1** below for the C-17 and LWL group pollutant load calculations comparison.

Table 1 – Regional Pollutant Load with Reductions for Non-Structural BMP Practices

Watershed	BOD ₅	TSS	TP	CU	ZN	TN
Cycle 3, Year 3						
C-17	701,636	2,821,855	28,628	1,656	7,609	287,833
LWL	683,998	3,270,301	31,647	1,484	6,565	272,326
Cycle 4, Year 3						
C-17	703,661	2,757,695	29,087	1,600	7,203	292,414
LWL	675,010	3,191,914	31,282	1,450	6,409	268,729
Net Percent Reduction (increase) in Year 4						
C-17	+0.29	-2.27	+0.10	-3.38	-5.34	+1.59
LWL	-1.31	-2.40	-1.15	-2.29	-2.38	-1.33

The Annual Report, Cycle 4-Year 3 also provides the local pollutant loading from each participating municipality MS4 area to C-17/LWL Watersheds. **Tables 2 and 3** include loading information extracted from the Annual Report, Cycle 4 -Year 3 Tables 16 and 26 that is specific to the Town of Lake Park C-17 and LWL MS4 areas.

Tables 2 and 3 pollutant discharge data to the C-17 and LWL from the Town's MS4 areas has been adjusted for the non-structural BMP's (6%) reduction as well as for the street sweeping program reduction of TP & TN in year 2 and 3 as follows:

Cycle 3 Year 3 - TP = 25lbs, TN= 39 lbs

Cycle 4 Year 3 - TP = 28 lbs, TN= 44 lbs

MS4 Basin	Table 2 -2013 Pollutant Loading (Lbs/year)					
	BOD ₅	TSS	TP	CU	ZN	TN
LWL	21,129	117,324	920	62	266	6,357
C-17	4,849	33,188	160	13	53	1,325
Total	25,978	150,512	1,080	75	319	7,682

MS4 Basin	Table 3 - 2018 Pollutant Loading (Lbs/year)					
	BOD ₅	TSS	TP	CU	ZN	TN
LWL	21,029	116,379	917	62	263	6,348
C-17	4,412	29,131	150	12	54	1,283
Total	25,441	145,510	1,067	74	317	7,631
Total Net Percent Reduction (increase) in Year 4						
Net Total	-2.07	-3.32	-1.20	-1.33	-0.63	-0.66

4. EVALUATION AND RESPONSE PLAN

The net total for Tables 2 and 3 for the Town of Lake Park MS4 areas discharges to the C-17 and LWL watersheds indicate a trend of lower pollutant loads from 2013 to 2018. This means that current Best Management Practices being applied in the form of dry/wet detention and retention, and street sweeping are having a positive effect.

Figure 16 shows the location of the current dry/wet detention BMP's that were used in the SIMPLE model for pollutant load estimation reduction.

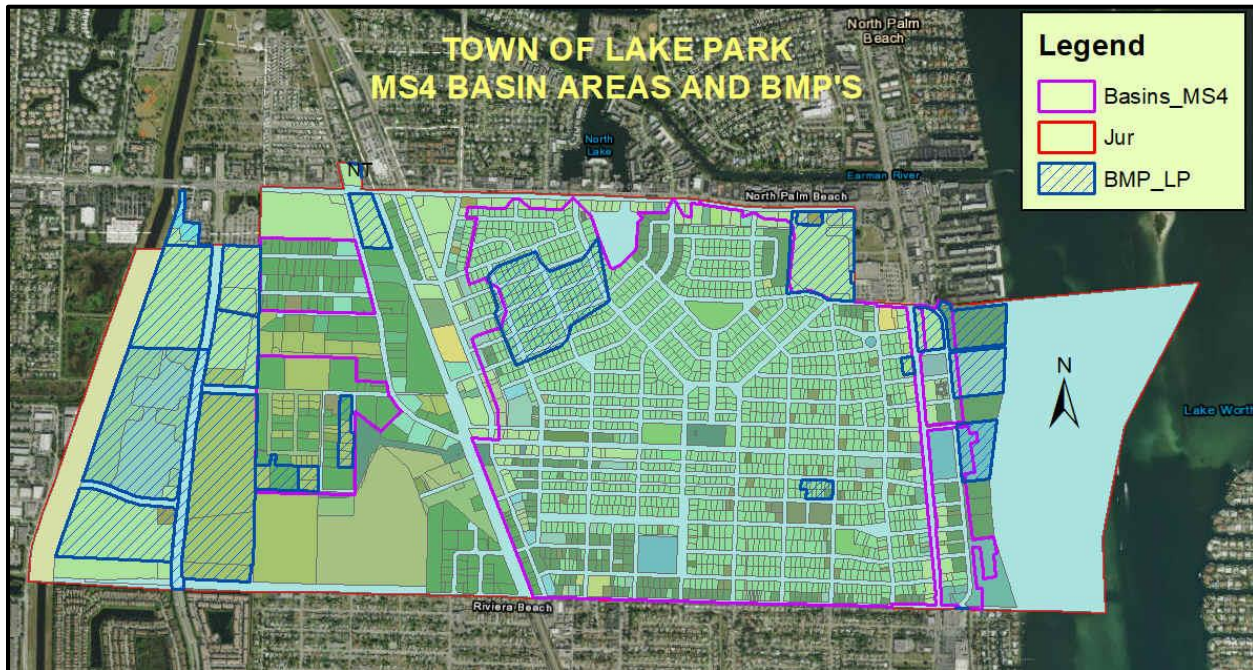


Figure 16. Current BMP's in the Town of Lake Park

Based on the results of the comparison for the 2013/2018 cycle reporting years, the Palm Beach County MS4 permittee group believes that implementation of additional programs is not warranted for PBC MS4s in the C-17 Watershed. However, much more need to be done by permittees for discharges to the LWL watershed. The Town of Lake Park is joining this effort.

The Town of Lake Park is currently in the process of updating the Stormwater Masterplan (SWMP) with the proposed implementation of Green Infrastructure Low Impact Development (GI/LID) Best Management Practices such as bioswales, raingardens, bioretention, pervious pavement, etc. It is expected that the implementation of GI facilities Town-wide will significantly enhance the Town's Plan effort to reduce pollutant loading to the LWL north watershed.

To assess the potential impact of GI/LID BMP implementation at the Town of Lake Park MS4 areas, the Town's SWMP consultant has obtained a copy of the recently applied SIMPLE model protocol and performed various model simulation scenarios for pollutant load reductions.

The SIMPLE protocol uses attributes for BMP effectiveness to assess the reduction in pollutant loading to systems that incorporate Best Management Practices (BMPs) such as wet or dry retention/detention systems, exfiltration trenches, pollution control devices.

Percent effectiveness for GI/LID-based BMP's such as bioswales, bio-detention and pervious pavement vary in the literature and is an ongoing field of research. Pollutant removal effectiveness for various GI/LID-based BMP's proposed for the Town of Lake Park were obtained from various sources including from the University of Central Florida BMP Trains 2020 research for nutrients.

Various scenarios were studied for GI BMP infrastructure implementation. These are mostly based on the physical availability of green areas and cost of implementation. One of these scenarios contemplates placing bioswales in approximately 5% of all road rights-of-way green areas in the Town. **Figure 17** shows the 5% extend of bioswale coverage per MS4 areas.



Figure 17. Additional Green Infrastructure-Based BMP's

Figure 17 shows that the majority of the proposed bioswales are located in the eastern MS4 area with outfalls discharging to the Earman River/LWL.

Table 4 indicates that if approximately 5% of the total Town of Lake Park road ROW green areas are converted to Bioswales pollutant loading percent reductions to the LWL in the range of 2.5 (N) to 22.2 (TSS) can be achieved.

Receiving Waterbody	Table 4 Pollutant Loading Reductions (Lbs/year) for Additional Bioswale BMPs					
	BOD ₅	TSS	TP	CU	ZN	N
LWL (Current BMPs)	22,418	98,253	883	53.7	261.5	10,630
LWL (Proposed Bioswales)	20,081	76,444	796	50.8	238.6	10,366
Reduction %	10.4	22.2	9.8	5.4	8.8	2.5

The Town of Lake Park is still researching the cost of optimum BMP implementation throughout the Town jurisdiction and final plan alternative decisions will be made upon the completion of the SWMP in late 2020. In the meantime, the Town has applied for grants to design and implement a pilot BMP project along 0.45 miles of the 10 Street ROW in 2020/2021. This is an ideal location as the ROW is located near the Town west ridge with higher elevations and significant underlying sand formations for optimum bioswale infiltration. **Figure 18** shows a typical ROW BMP layout for bioswales along the 10th Street Pilot project.

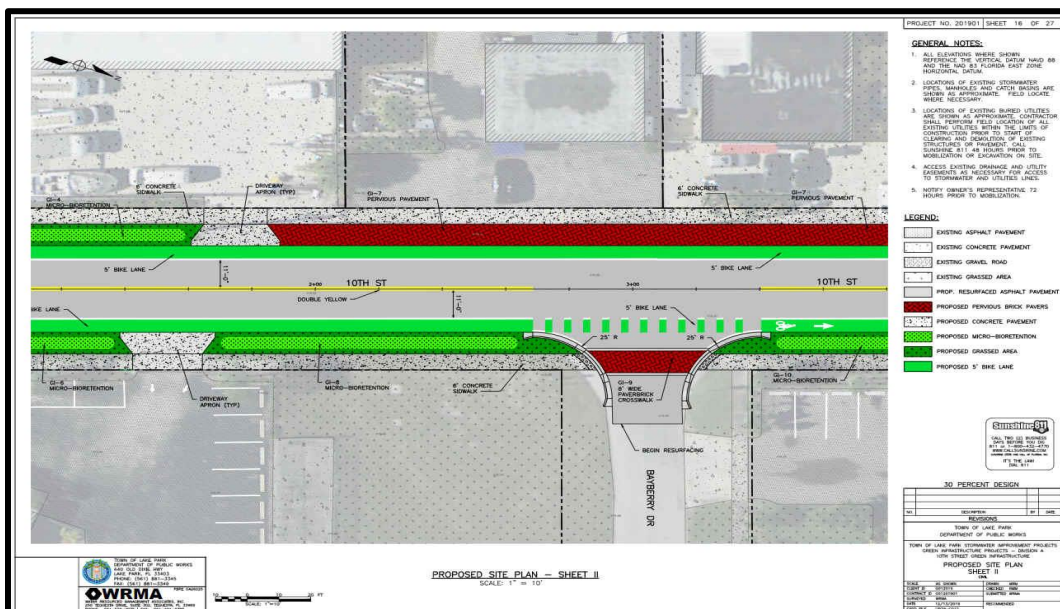


Figure 18. 10th Street Bioswales BMP Pilot Project layout