

City of Lake Worth
MS4 Permit No. FLS000018-004
Part V. – Monitoring Requirements;
Sub-part A. – Assessment Program

Assessment Program Objective

The purpose of this assessment program is to provide information for the City of Lake Worth to determine the overall effectiveness of its Stormwater Management Program (SWMP) in reducing stormwater pollutant loadings from its Municipal Separate Storm Sewer System (MS4) to receiving water bodies.

Assessment Program Components

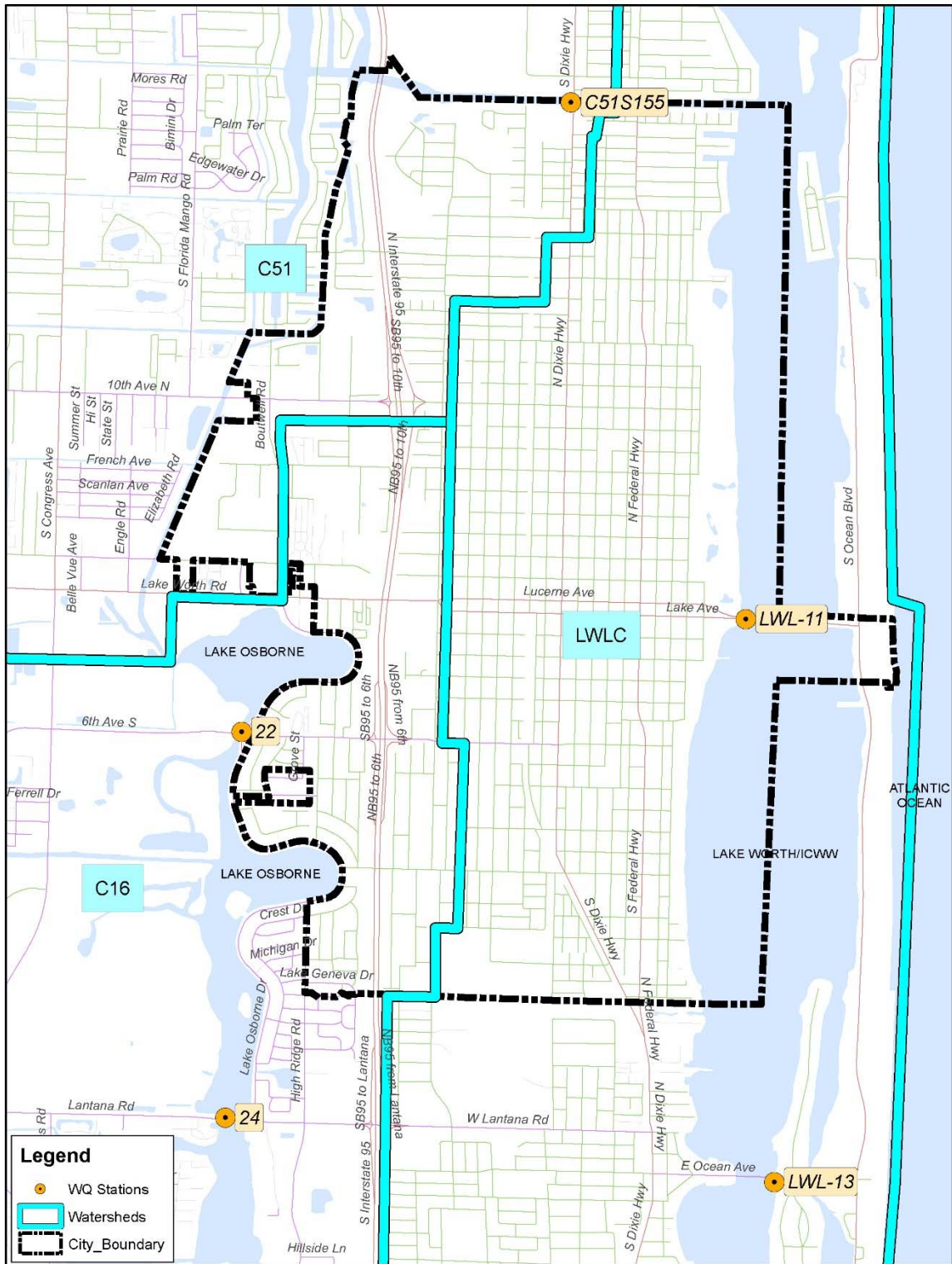
As required by the MS4 Permit, the following parts make up this Assessment Program:

- A. **A Water Quality Monitoring Plan** – The water quality monitoring plan is intended to identify local sources where urban stormwater is adversely affecting surface water resources.
- B. **A Pollutant Loading Estimate Plan** – The pollutant loading exercise is to estimate the Pollutant Loading from the MS4 contributing area, based on land uses and BMPs.
- C. **An Evaluation and Response Plan** – The response plan is the plan of action to be taken based on the results from A. and B. and will be used to:
 - 1. evaluate trends in pollutants loading from the MS4
 - 2. evaluate trends in water quality (of discharge from the MS4)
 - 3. identify portions of the MS4 to be targeted for loading reduction/corrective action

Part A – Water Quality Monitoring Plan

The City’s MS4 lies within four watersheds – the C51E, the Lake Worth Lagoon Central (LWLC), Lake Worth Lagoon South (LWLS), and the C-16 (see Figure 1). The MS4 has at least one major outfall to each of these watersheds. The City intends to make use of the ambient water quality monitoring that has been and will continue to be done by the Palm Beach County group of permittees in the receiving water bodies for each of these watersheds. Water quality trends for parameters of interest (phosphorus and nitrogen) will be developed and/or examined to establish if a relationship exists between the MS4 SWMP and receiving water quality.

Figure 1
Monitoring Locations with Watersheds



Monitoring Locations

Based on the location of the outfalls of the City’s MS4, the ambient water quality monitoring stations to be used in this assessment program are identified in the following table, along with relevant information about each location.

Ambient Water Quality Monitoring Stations Table

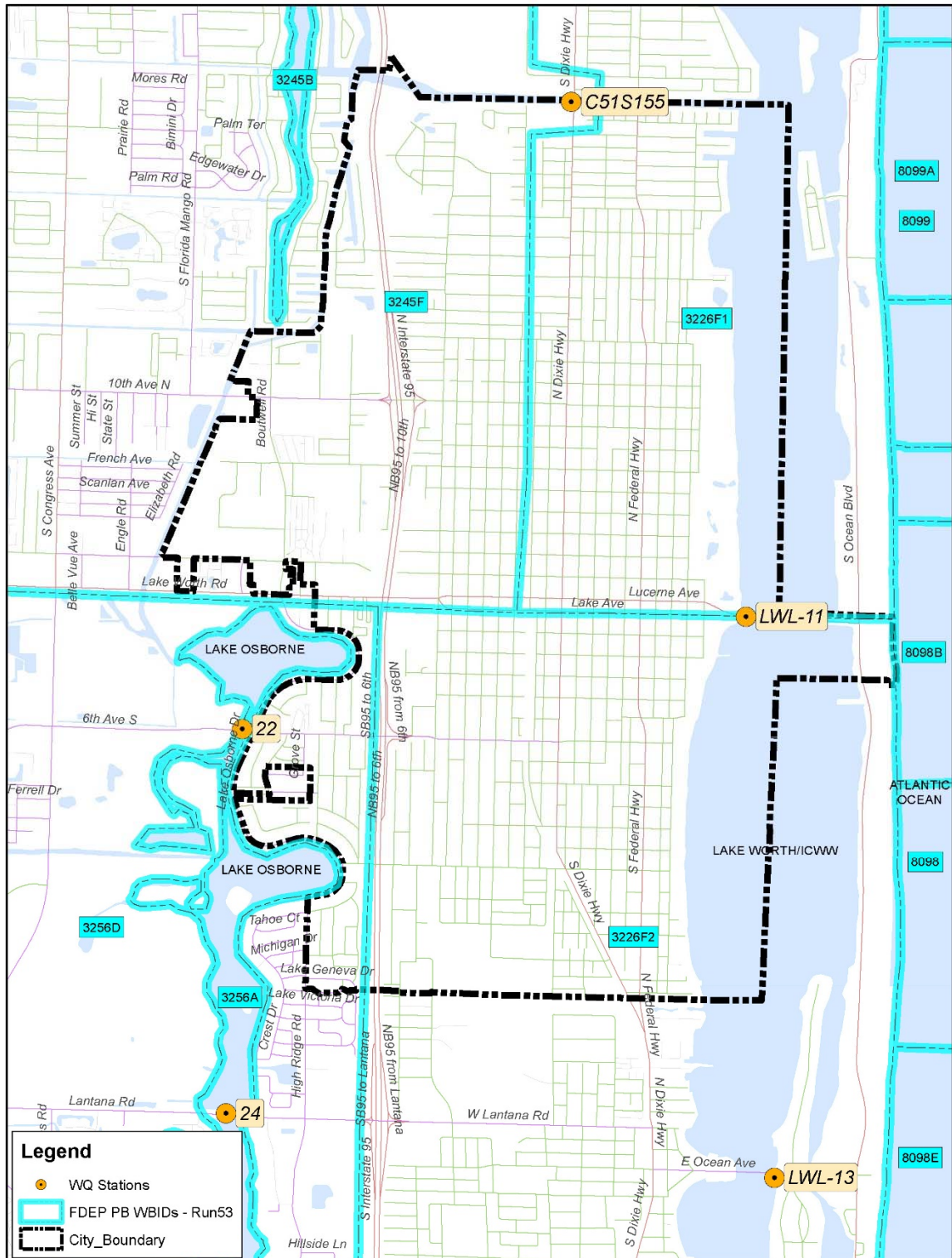
Monitoring Station Number	Location Description	Northing/ Easting	Type	Watershed WBID
C51S155 (SFWMD)	S-155 Discharge Structure in the C-51E Canal	N841132.85 E964349.43	Freshwater	C-51E 3245F
LWL-11 (ERM)	Lake Avenue Bridge LWLC	N830580.53 E967926.64	Marine	LWLC 3226F1
LWL-13 (ERM)	Ocean Avenue Bridge in LWLS	N819086.28 E968516.09	Marine	LWLS 3226F2
22 (ERM)	6 th Avenue South Bridge in Lake Osborne	N828280.34 E957602.68	Freshwater	Lake Osborne 3256A
24 (ERM)	Lantana Road Bridge in Lake Osborne	N820399.97 E957270.70	Freshwater	Lake Osborne 3256A

The location of the monitoring stations relative to the FDEP identified WBIDs is shown in Figure 2.

Sampling Methods

The sites monitored by ERM are sampled and initially analyzed in-situ by ERM staff using a multiparameter water quality monitoring instrument. Water samples are collected, preserved and stored in accordance with ERM’s Standard Operating Procedures. Quality assurance/quality control measures include pre-cleaned equipment blanks, field cleaned equipment blanks, field spikes, and the collection of duplicate samples. Further analysis of samples from all ERM sites is conducted by an independent laboratory under contract with ERM.

Figure 2
Monitoring Locations with WBIDs



Monitoring Parameters

The following parameters have been and will continue to be included in the ambient water quality sampling program for Palm Beach County:

MS4 Monitoring Parameters Table

Parameter	Frequency Freshwater/Marine
Chlorophyll A	Bi-monthly/Monthly
Copper, Dissolved	Bi-monthly/Quarterly
Hardness	Bi-monthly
Nitrate + Nitrite*	Bi-monthly/Monthly
Nitrogen, Total Kjeldahl*	Bi-monthly/Monthly
Nitrogen, Total*	Bi-monthly/Monthly
Oxygen, Dissolved*	Bi-monthly/Monthly
pH*	Bi-monthly/Monthly
Phosphorus, Total *	Bi-monthly/Monthly
Specific Conductivity*	Bi-monthly/Monthly
Suspended Solids, Total*	Bi-monthly/Monthly
Turbidity*	Bi-monthly/Monthly
Zinc, Dissolved	Bi-monthly/Quarterly

Parameters denoted with an “*” are also sampled at the South Florida Water Management monitoring station on a monthly basis.

Part B – Pollutant Loading Estimate Plan

The Palm Beach County MS4 permittee group will be developing pollutant loading estimates during the 3rd year of this permit cycle, using the SIMPLE protocol. In order to provide each permittee with pollutant loading estimates that reflect their respective MS4 areas, the group effort will provide the loading estimates “by MS4,” in addition to “by watershed” (as was done in past permit cycles). Prior to Year 3, Lake Worth will review its MS4 contributing areas to each receiving water, and will provide updated information on the area extents and the land uses located therein. In addition, any water quality best management practices (BMPs) that are in place within the MS4 area, will be identified, along with their geospatial extent.

In accordance with the MS4 Permit, pollutant load estimates for the following parameters will be developed once during each permit cycle: Biochemical Oxygen Demand (BOD₅), Copper (Cu), Total Nitrogen (TN), Total Phosphorus (TP), Total Suspended Solids (TSS), Zinc (Zn).

The EMC values to be used in the Cycle 4 pollutant loading estimates are the same as those used in Cycle 3. This will provide consistency in comparing data to previous estimates.

The EMC values used in the Cycle 3 pollutant loading estimates were taken from the 2012 City of Lake Worth Stormwater Master Plan completed by CDM Smith, because the values were determined to be representative of all of the Palm Beach County MS4s. CDM Smith chose EMC values appropriate for each land use category, from sources including NPDES data, Harvey Harper’s studies, and NURP studies.

Event Mean Concentrations (mg/l)

Land Use	% DCIA	BOD ₅	Cu	TN	TP	TSS	Zn
Agriculture/Pasture	1	3.8	0.013	1.86	0.430	43.2	0.021
Forest/Open	0	13.0	0.001	0.71	0.210	16.0	0.010
Cropland	1	3.8	0.013	1.86	0.430	43.2	0.021
Single-Family, Low Density	5	10.0	0.005	1.18	0.280	21.0	0.026
Single-Family, Medium Density	25	7.0	0.008	1.64	0.340	26.0	0.042
Single-Family, High Density	50	12.0	0.010	1.90	0.450	74.0	0.100
Industrial, Heavy	90	11.0	0.015	1.27	0.350	64.0	0.096
Industrial, Light/Office	60	17.0	0.006	2.20	0.430	94.0	0.170
Commercial	75	17.0	0.006	2.20	0.430	94.0	0.170
Highway, Major	75	5.2	0.025	1.10	0.200	46.0	0.116
Wetlands	25	3.0	0.001	1.18	0.020	11.0	0.006
Water	25	3.0	0.001	1.18	0.020	11.0	0.006

A concurrent evaluation of DCIA values within Palm Beach County was also completed by CDM Smith. The DCIA values developed for that effort are reasonably believed to be more representative of Palm Beach County than national data, and therefore, will be used for the pollutant loading estimation. These values have been provided in the table above.

The land use based pollutant loading estimates provided by the group in Year 3 will be used as a baseline from which future BMP reductions will be subtracted. The pollutant load reductions will be estimated based on the BMPs that have been put in place within the MS4 contributing areas. The pollutant loading estimates will be reviewed and compared to previous estimates for use in this assessment program.

The City reserves the option to conduct the baseline pollutant load estimates themselves.

Part C – Evaluation and Response Plan

Once the Assessment Program is approved by FDEP, presumably sometime during Year 2 of the permit cycle, the City of Lake Worth will begin implementation of the activities outlined above. The first annual report on the Assessment Program will be concurrent with the Year 3 Annual Report Form (March 2020).

Water quality monitoring results will be available annually, and the most recent year's data will be compared to that which came before, with respect to our MS4 receiving waterbodies/watersheds. A summary of the water quality monitoring data, with respect to our MS4 will be developed and included in Assessment Program Annual Report.

The pollutant loading estimates developed during Year 3 of the permit cycle will be reviewed, and if possible, compared with previous permit cycles, with respect to our MS4. A discussion of the comparison will be included in the Assessment Program Annual Report.

Receiving water trending reports/graphs for various parameters, as presented in the Joint Annual Report, or as redeveloped specifically for Lake Worth's use, will be reviewed, and a discussion will be included in the annual Assessment Report.

Based on the data from the water quality monitoring and the pollutant loading estimates, an effort will be made to determine if one portion of the MS4 should be targeted for additional loading reduction efforts, or additional pollutant control measures.