

City of Boca Raton  
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 Boca Raton 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:

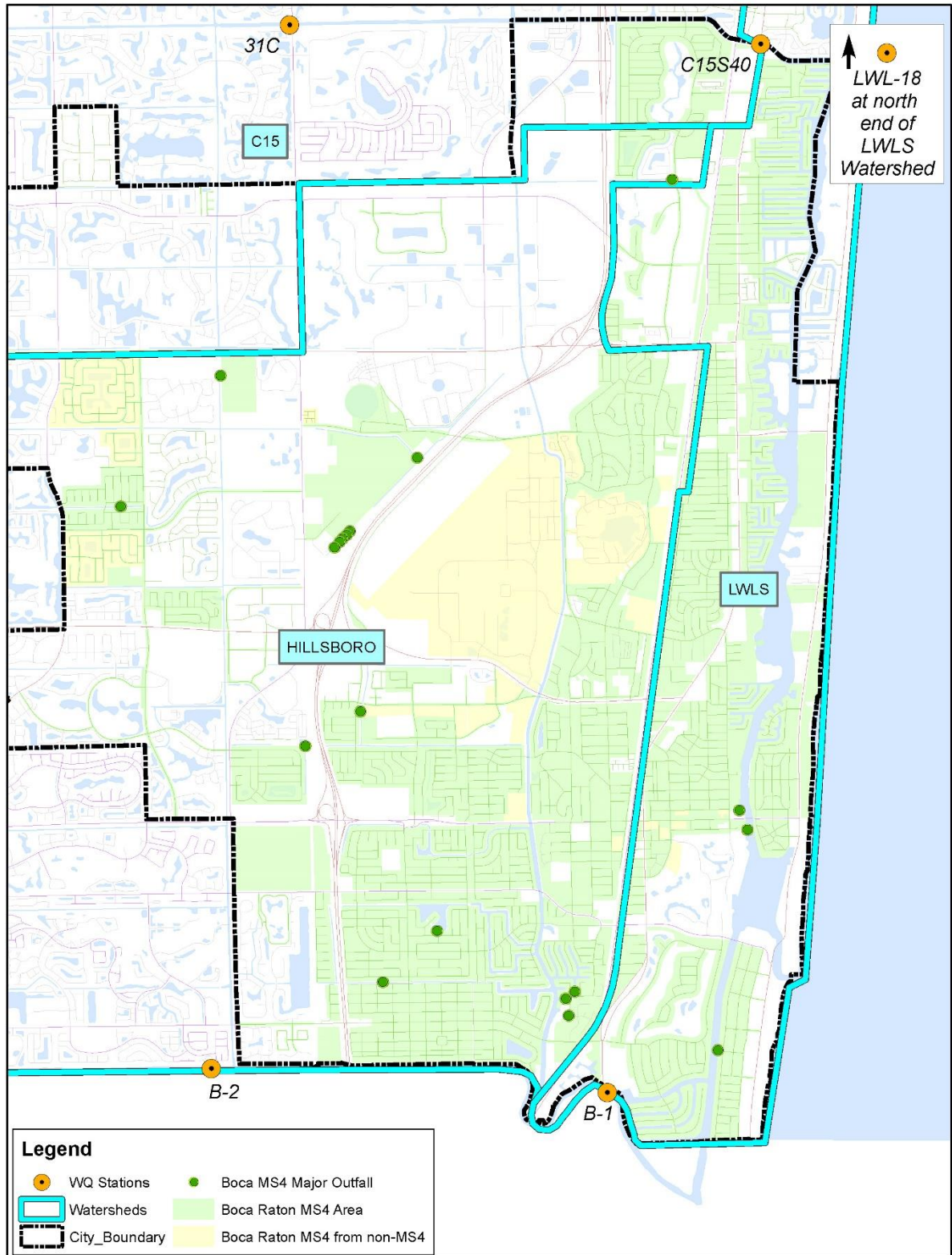
- A. **A Water Quality Monitoring Plan** – The water quality monitoring plan is intended to identify local sources where urban stormwater is adversely affecting surface water resources.
- B. **A Pollutant Loading Estimate Plan** – The pollutant loading exercise is to estimate the Pollutant Loading from 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 three watersheds – the Hillsboro, the Lake Worth Lagoon South (LWLS), and the C-15 (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, nitrogen, and DO) will be developed and/or examined to establish if a relationship exists between the MS4 SWMP and receiving water quality.

*Other factors and influences on the receiving water bodies will also be considered, and should it be determined that the receiving water body water quality does not show overall improvement for the pollutants targeted by the SWMP, the City will consider revising this Assessment Program to include water quality monitoring of water discharged from the City's MS4. A discharge monitoring program, should it be necessary, will include the sampling of discharge from a representative major outfall to each of the receiving watersheds. The sampling will be done on a quarterly basis, or as approved by FDEP in a revised Assessment Program submittal.*

Figure 1 – Monitoring Locations with Watersheds



### Monitoring Locations

Based on the location of the outfalls of the City’s MS4, the following 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
31C (ERM)	In the C-15 Canal	N760879.83 E943443.02	Freshwater	C-15 Basin 3262D
C15S40 (SFWMD)	SFWMD S-40 Discharge Structure in the C-15 Canal	N760236.00 E959269.79	Freshwater	C-15 Basin 3262
LWL-18 (ERM)	Intracoastal Waterway (LWLS)	N798402.11 E965585.04	Marine	LWLS 3226F
B-2 (Broward)	Hillsboro Canal	N725803 E940718	Freshwater	LWLS 3226F
B-1 (Broward)	Hillsboro Canal/ICWW (LWLS)	N725014 E954108	Marine	LWLS 3226F

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

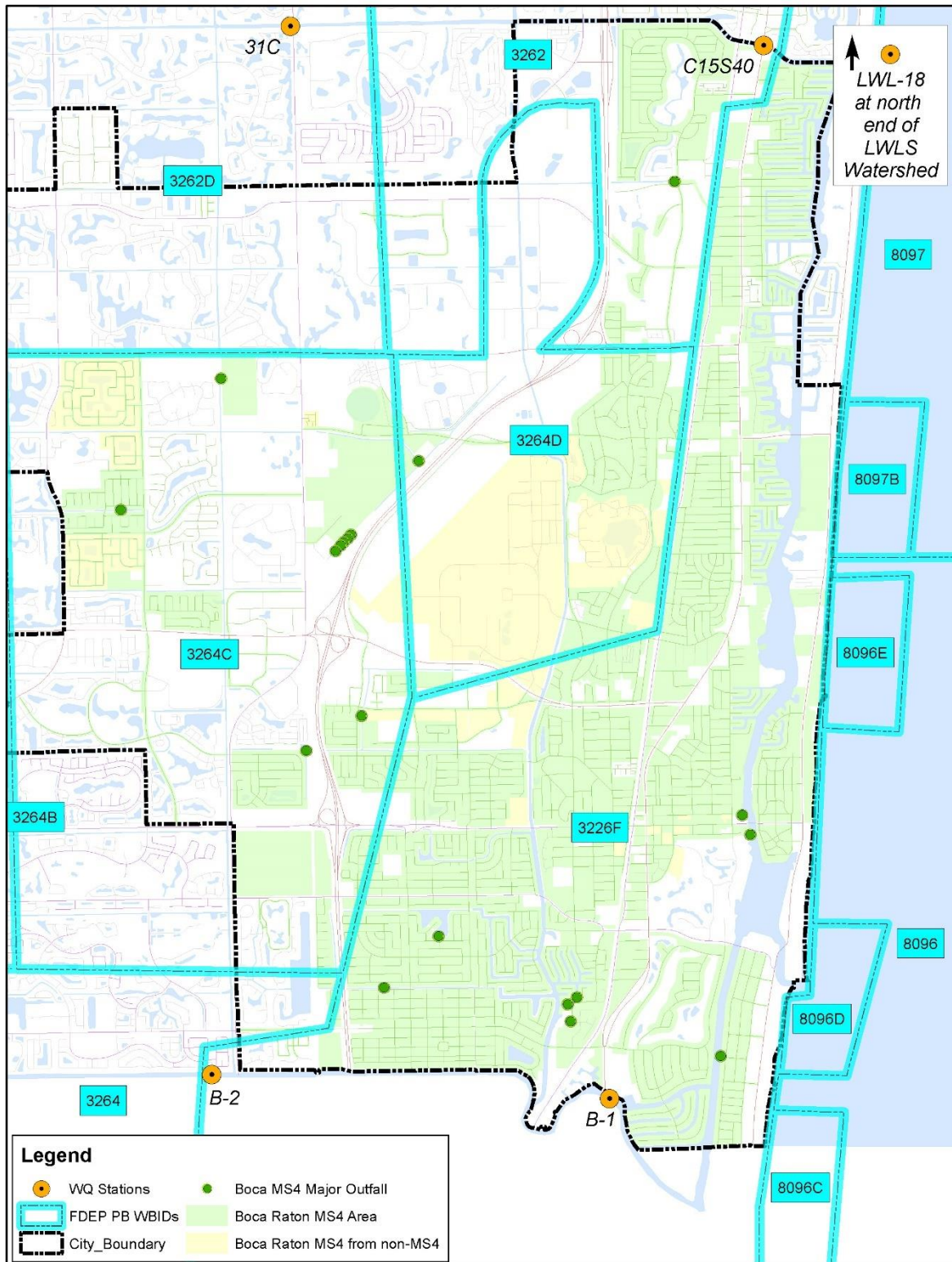
### Sampling Methods

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.

Broward County established an ambient surface water quality monitoring program that measures the chemical, physical and biological conditions of its surface waters and gathers baseline data to assess overall conditions in each of its major waterways.

Samples are collected on a quarterly basis each year. The canals and Intracoastal Waterway (ICWW) are sampled for the following water quality parameters: total nitrogen, total phosphorus, chlorophyll-a, dissolved oxygen, specific conductance, and salinity.

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**

<b>Parameter</b>	<b>Frequency Freshwater/Marine</b>
Chlorophyll A*	Bi-monthly/Monthly
Conductivity (salinity)*	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
Suspended Solids, Total	Bi-monthly/-
Turbidity	Bi-monthly/Monthly
Zinc, Dissolved	Bi-monthly/Quarterly

Parameters denoted with an “\*” are also sampled at the Broward County monitoring stations, but on a quarterly basis.

### Part B – Pollutant Loading Estimate Plan

The Palm Beach County MS4 permittee group will be developing pollutant loading estimates during the 3<sup>rd</sup> 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, Boca Raton 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 (BOD<sub>5</sub>), 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 <sub>5</sub>	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 Boca Raton 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 Boca'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.