TOWN OF HIGHLAND BEACH
MS4 Permit No. FLS000018-004
Part V. – Monitoring Requirements
Sub-part A. –Assessment Plan

Assessment Program Objective

The purpose of this assessment program is to provide information for the Town of Highland Beach 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

As a co-permittee, the Town of Highland Beach uses the ambient water quality data obtained through the Palm Beach County NPDES program, where the Northern Palm Beach County Improvement District is the Lead Permittee.

Monitoring Locations

Based on the location of the outfalls of our MS4, one monitoring stations has been established. The following table identifies this monitoring station, along with relevant information about the location.

MS4 Monitoring Stations Table

Monitoring Station Number	Location Description	Latitude/ Longitude	Receiving Water Body	Verified Impaired?	Adopted TMDL?
LWL-18	Lake Worth Lagoon South	798402.11/ 965585.04	Intracoastal Waterway	No	No

Sampling Method

Staff from the Palm Beach County ERM initially collects and analyzes samples in-situ using a multi- parameter water quality monitoring instrument. Water Samples are collected, preserved and stored according to the Department 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 the site is conducted by an independent laboratory under contract with PBC ERM.

Monitoring Parameters

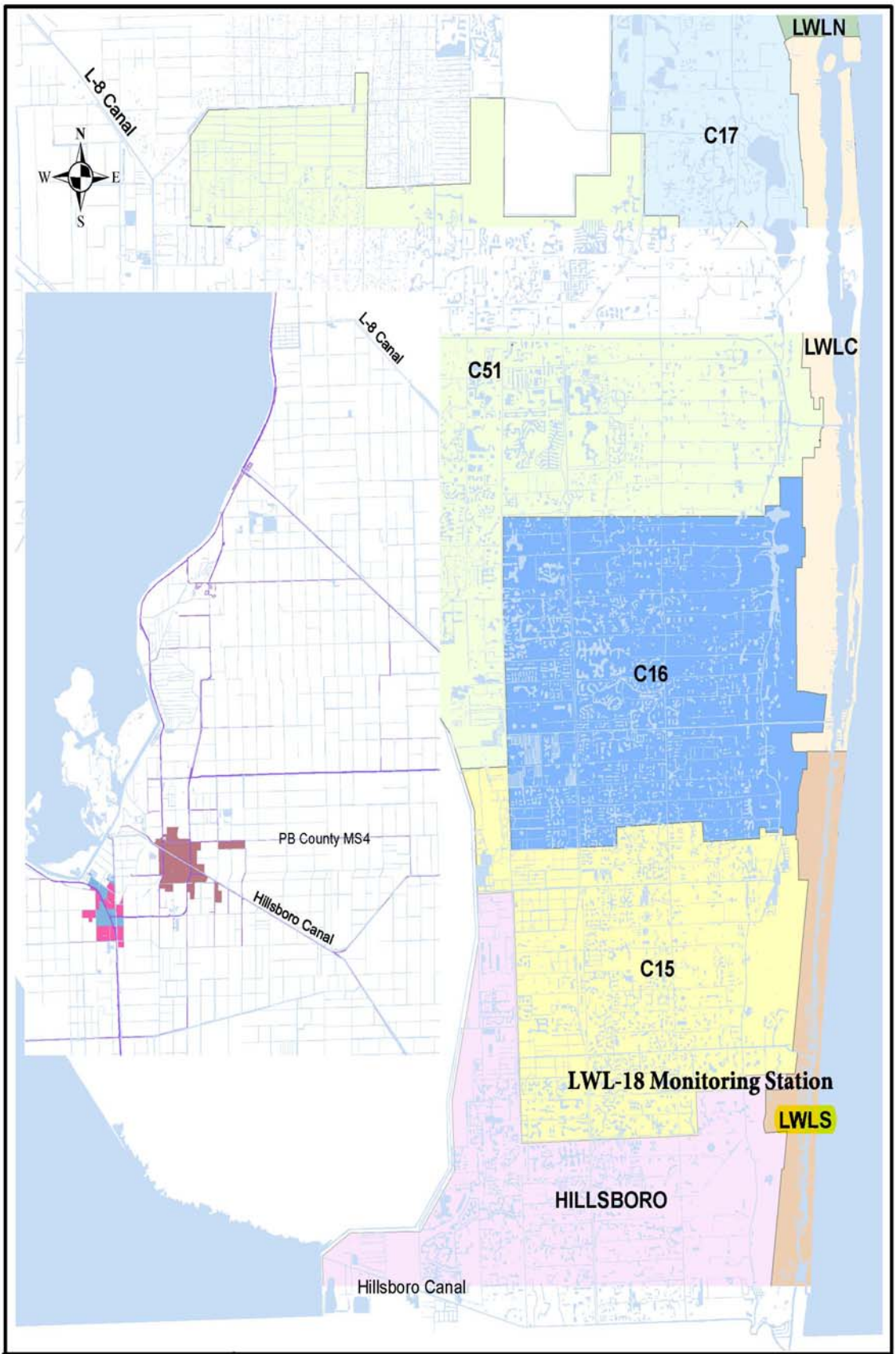
The parameters to be sampled for the monitoring station, and that will be used as part of the Town of Highland Beach's Assessment Program, include those shown in the table below.

Parameters and Sampling Table

Monitoring Station #	Monitoring Parameters	Type of Monitoring	Collection Method	Sampling Frequency
LWL-18	Alkalinity	Routine	Grab	1x/yr.
LWL-18	Arsenic	Routine	Grab	1x/yr.
LWL-18	Cadmium	Routine	Grab	1x/yr.
LWL-18	Chlorophyll-a	Routine	Grab	1x/yr.
LWL-18	Copper	Routine	Grab	1x/yr.
LWL-18	DO	Routine	Grab	1x/Q
LWL-18	Lead	Routine	Grab	1x/yr.
LWL-18	Nitrogen, Ammonia	Routine	Grab	1x/Q
LWL-18	Nitrogen, Nitrate + Nitrate	Routine	Grab	1x/Q
LWL-18	Nitrogen, Total	Routine	Grab	1x/Q
LWL-18	Nitrogen, Total Kjeldahl	Routine	Grab	1x/Q
LWL-18	pH	Routine	Grab	1x/Q
LWL-18	Phosphorus, Ortho	Routine	Grab	1x/Q
LWL-18	Phosphorus, Total	Routine	Grab	1x/Q
LWL-18	Salinity	Routine	Grab	1x/yr.
LWL-18	Specific Conductivity	Routine	Grab	1x/Q
LWL-18	Temperature	Routine	Grab	1x/Q
LWL-18	Total Suspended Solids	Routine	Grab	1x/Q
LWL-18	Turbidity	Routine	Grab	1x/Q
LWL-18	Zinc	Routine	Grab	1x/yr.

The location of the monitoring stations to be used in this Assessment Program, are shown below in Figure 1.

More information on this monitoring station and Palm Beach County Program is available in the Palm Beach County MS4 Joint Annual Reports. A copy is included on the MS4 website (www.pbco-npdes.org under Annual Reporting). Last year's annual report for Monitoring Station LWL-18 contained trend graphs (17 years for Total Nitrogen and Total Phosphorous) and Tables (last 9 years for annual Geometric Mean Values for TN and TP). The trend graphs (TN and TP) both show a downward trend indicating a reduction in concentration of TN and TP in the receiving body. Annual geometric mean values Table (TN and TP) shown no exceedances of the State's water quality criteria for any of the last nine years.



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LWL-18 Monitoring Station

Figure 1

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, the Town of Highland Beach will participate in this effort by reviewing 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 must be developed once during each permit cycle: Biochemical Oxygen Demand (BOD_5), 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 recent evaluation of DCIA values within Palm Beach County was completed by CDM Smith in November 2012 for the City of Lake Worth Stormwater Master Plan. The DCIA values developed for that effort are reasonably believed to be more representative of Palm Beach County than national data, and therefore, have been used for this effort.

Land Use	% DCIA
Agriculture/Pasture	1
Forest/Open	0
Cropland	1
Single-Family, Low Density	5
Single-Family, Medium Density	25
Single-Family, High Density	50
Industrial, Heavy	90
Industrial, Light/Office	60
Commercial	75
Highway, Major	75
Wetlands	25
Water	25

The group's estimated pollutant loading results will be provided to each permittee for use in this assessment effort.

To determine a practical estimate of the current pollutant loading, the Town of Highland Beach will use the land use based pollutant loading estimates provided by the group as the starting point from which pollutant load 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. In this way, when future estimates are done, and potentially additional reduction measures or BMPs are put in place, the estimated pollutant loading will reflect the reductions.

Part C – Evaluation and Response Plan

Once the Assessment Program is approved by FDEP, presumably sometime during Year 2 of the permit cycle, the Town of Highland Beach will utilize data based on the sample results performed by the PBC ERM and compiled in the Joint Annual Reports 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 Intracoastal sample point. A summary of the water quality monitoring data trend graphs, with respect to our MS4 and the group's monitoring station LWL-18 will be contained in the group's Joint Annual Report.

The pollutant loading estimates developed during Year 3 of the permit cycle will be reviewed and adjusted based on the Town's Stormwater Management Programs (litter control, public education, etc.) as appropriate. Based on the two assessments, a determination of the effectiveness of the Town's program will be made.