

Village of Tequesta
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 Village of Tequesta 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

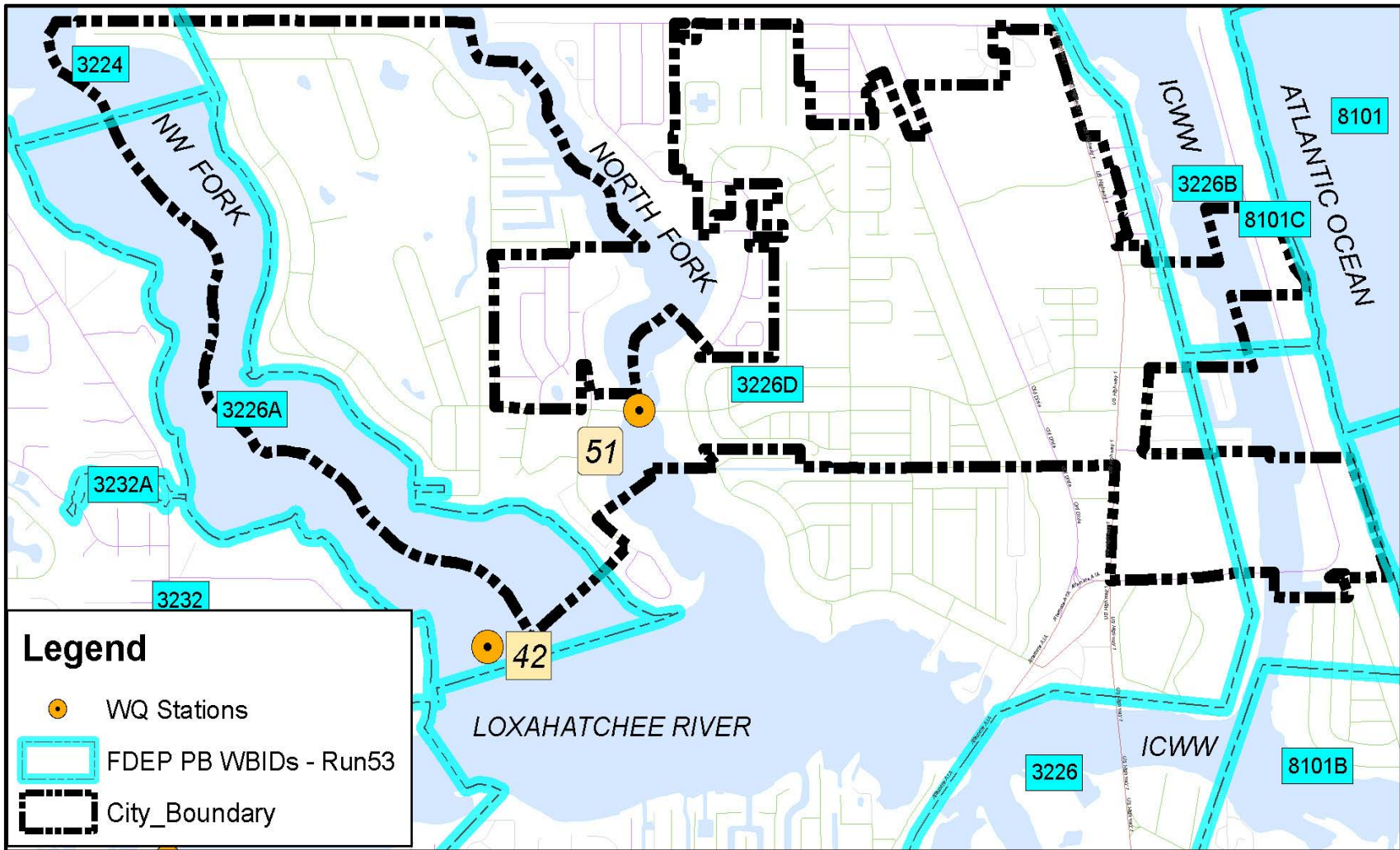
As required by the MS4 Permit, the following parts make up this Assessment Program:

- 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 Village’s MS4 lies within the Loxahatchee River Watershed with discharges into the NW Fork and the North Fork. (see Figure 1). The MS4 has six major outfalls into this watershed. The Village intends to make use of the ambient water quality monitoring that has been and will continue to be done by the Loxahatchee River District (LRD). 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 Village’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.

TABLE 1
Ambient Water Quality Monitoring Stations

Monitoring Station Number	Location Description	Latitude/ Longitude	Type	Watershed WBID
42 (LRD)	NW Fork Pennock Point	26.950246 -80.108791	Marine	Lox 3226A
51 (LRD)	N Fork Tequesta Drive	26.9579.66 -80.103743	Marine	Lox 3226D

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

Sampling Methods

Sample Collection & Processing- LRD’s RiverKeeper water quality sampling stations (42 and 51) are bi-monthly (every other month) by vehicle or boat. At each station, physical water quality conditions (e.g., temperature, pH, conductivity, salinity, and dissolved oxygen) were evaluated using a Hydrolab multiprobe at the surface (0.3 m depth), and where appropriate, at mid-depth and within 20 cm of the bottom. A secchi disk was also used to assess water clarity at each station, and total water depth was recorded. Photosynthetically active radiation (PAR) was assessed by taking 3 replicates of PAR using 3 LI-COR spherical sensors (4 π) simultaneously located at 20 cm, 50 cm, and 100 cm below the water surface.

At each location, water samples were collected from the surface of the water using acid-washed HDPE plastic sampling bottles. Samples collected for nitrate-nitrite, ortho-phosphate, and true color were field filtered using 0.45 μm membrane filters prior to analysis to remove particulate matter; water was filtered into 250ml HDPE bottles and immediately placed on ice. Samples were refrigerated at 4°C and analyzed within 48 hours using a Lachat Flow Injection Analyzer following standard methodologies (Table 2). Water samples collected to analyze ammonia, total kjeldahl nitrogen, and total phosphorus were field-preserved to pH < 2.0 with sulfuric acid and transported on ice. Samples were refrigerated at 4°C and analyzed within 28 days. For ammonia samples, all suspended solids and other potential sources of interference were removed through a distillation process; for total kjeldahl nitrogen

samples, organic sources of nitrogen were converted to ammonium sulfate through a digestion process. Once samples were prepared, ~10ml of sample for each analyte was transferred to a glass cuvette and analyzed via Lachat Flow Injection Analyzer using standard methods (Table 2). Enterococci and fecal coliform bacteria samples were collected using sterile Idexx[®] bottles, placed on ice, and analyzed using standard methods (Table 2). Chlorophyll *a* samples were collected in amber 2L HDPE bottles, placed on ice, and filtered in dark conditions using 0.47mm diameter glass microfiber filters, then analyzed using standard methods (Table 2). Additionally, raw surface water samples (e.g., samples not filtered or acidified) were processed for alkalinity, turbidity, and total suspended solids using standard methodologies (Table 2). All sample collection and field testing activities were performed in accordance with DEP Standard Operating Procedures for Field Activities (DEP-SOP-001/01, March 1, 2014). All sampling protocol and lab analysis during the reporting period were in accordance with National Environmental Laboratory Accreditation (NELAC) requirements.

Water quality data for Station 42 is available from 2004 to the present and for Station 51 dates back to 1991 to the present.

Table 2. Water quality parameters evaluated in the WildPine Laboratory, their unit of measurements, and standard methods used to analyze the samples. Note that all parameters are evaluated in the lab.

Analyte	Unit of Measurement	Standard Method
Alkalinity as CaCO ₃ , titration	Milligrams/Liter	SM2320B
Ammonia N, FIA	Milligrams of N/Liter	SM4500-NH3G
Color	Platinum cobalt units (PCU)	SM20120B
Conductivity	Micromhos (1 ohm/centimeter)	EPA120.1
Chlorophyll <i>a</i> , UV-VIS	Micrograms/Liter	SM10200H
Enterococcus, MF	Colony-forming unit (cfu)/100 milliliters	EPA1600
Fecal Coliform, MF	Colony-forming unit (cfu)/100 milliliters	SM9222D
Total Kjeldahl Nitrogen, FIA	Milligrams of N/Liter	EPA351.2
Nitrate + Nitrite N, FIA	Milligrams of N/Liter	EPA353.2
Ortho-Phosphorus, FIA	Milligrams of P/Liter	SM 4500-P F
Total Phosphorus, UV-VIS	Milligrams of P/Liter	SM4500-P E
Total Suspended Solids (TSS)	Milligrams/Liter	SM2540D
Turbidity	Nephelometric Turbidity Units (NTU)	EPA180.1

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, Village of Tequesta 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 Village 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 Village of Tequesta 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 Tequesta'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.