Stormwater Quality Improvement Feasibility Study

August 2024

Town of Palm Beach









- Review of the Countywide MS4 Related to the Town
- Review of Town's Current Reduction Strategies
- Review of Additional Water Quality Treatment Options
- Implementation Planning for Each Basin
- Cost and Comparison of Options
- Open Discussion





REVIEW OF THE COUNTYWIDE MS4 RELATED TO LWL

FDEP Administered Permit

Municipal Separate Storm Sewer System (MS4) National Pollutant **Discharge Elimination System** (NPDES)

PB County Joint Permit

- Palm Beach County MS4 NPDES (PBC NPDES) Steering Committee
- Town is a co-permittee



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This website has been authorized by the Palm Beach County MS4 NPDES (PBC NPDES) Steering Committee as a resource for all permittees within the county. It is intended that this site will provide the permittee with helpful information on understanding and complying with the requirements of the MS4 NPDES permit

Coogle Site Search

	obligit offer offering	Jearen
Home	The MS4 Permit	
News	The Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge	
The MS4 Permit	Elimination System (NPDES) permit allows a permittee to discharge stormwater from its stormwater collection and conveyance system into a receiving water owned by the	Legal Authority Ordinanc
What is SWMP?	state and/or federal government. The requirements detailed in the permit are intended to reduce stormwater pollutant discharges into those receiving water bodies.	
omponents of the MS4 Permit \bigtriangledown	In 1987, the U.S. Environmental Protection Agency (EPA) was required, under Section 402 (p) of the Clean Water Act (N40CFR Part 112.26), to establish final regulations	
Group/Joint Activities	governing stormwater discharge permit application requirements. Shortly thereafter, the MS4 owners within the Palm Beach County geographic area were required to collectively apply for a Phase I MS4 permit. Permits are issued for a 5-year period,	
mpaired Waters & TMDLs	however, each permit remains in effect until a subsequent permit is issued. For the Palm Beach County group, the following permits have been issued:	
Annual Reporting	 Cycle 1 - February 1, 1997 Cycle 2 - November 18, 2002 	
Meetings and Minutes	• Cycle 3 - March 2, 2011	
Contacts	Cycle 4 - September 8, 2016	
Definitions	The Cycle 5 Phase I permit template is currently being drafted by FDEP and negotiated with the U.S. EPA. Once the template is approved, FDEP will begin drafting	
Links/References	the individual Cycle 5 permits for each of the Phase I permittees in Florida.	



REPORTED POLLUTANT LOADING IN LWL (2018)

Watershed Lake Worth Lago 2018 Pollutant Loads (lbs./vr.	on)							
Municipality	BOD ₅	TSS	ТР	CU	ZN	TN	Area	Percent
Boynton Beach, City of	8,620	15,801	289	17	84	3,148	408.56	1.56%
FDOT – District Four	14,699	76,553	676	72	276	5,091	576.47	2.21%
Hypoluxo, Town of	691	3,207	47	2	8	928	25.48	0.10%
Juno Beach, Town of	2,428	12,239	112	4	21	735	65.35	0.25%
Lake Park, Town of	22,371	123,807	1,003	66	280	6,797	687.90	2.63%
Lake Worth, City of	56,199	303,733	2,591	143	646	17,499	1,884.69	7.21%
Lantana, Town of	4,781	22,143	239	13	48	1,661	189.78	0.73%
Manalapan, Town of	1,790	8,401	177	5	20	4,976	65.81	0.25%
North Palm Beach, Village of	29,922	150,572	1,430	76	329	11,574	1,116.58	4.27%
NPBCID	2,589	12,368	165	8	32	3,001	95.60	0.37%
Ocean Ridge, Town of	1,531	5,719	225	5	11	6,704	82.88	0.32%
Palm Beach, Town of	35,452	183,437	1,606	91	389	10,967	1,174.78	4.50%
Palm Beach County	7,098	40,034	325	33	129	2,440	319.51	1.22%
Palm Beach Gardens, City of	3,696	7,595	160	8	27	1,504	221.92	0.85%
Palm Beach Shores, Town of	4,277	23,858	377	11	48	9,770	123.79	0.47%
Riviera Beach, City of	19,006	105,736	851	54	228	5,888	606.00	2.32%
South Palm Beach, Town of	49	333	2	0	1	13	0.88	0.00%
West Palm Beach, City of	90,087	419,214	4,032	241	1,008	28,318	3,024.44	11.57%
All MS4 Total	305,284	1,514,753	14,307	4,434	3,586	121,016	10,670.41	40.83%
All Watersheds Total	718,096	3,395,653	33,279	1,543	6,818	285,882	26,134.41	100.00%

• Lake Worth Lagoon is currently an impaired water body

TOPB accounts for less than 5% of the total pollutant load

• No TMDLs or BMAPs exist



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CURRENT REDUCTION STRATEGIES

- Street sweeping
 - Collects materials from roadway and gutter sweeping
- Stormwater retention (2-inches) required on individual lots

"Beginning in 1992, all lots with new construction or substantial improvements to property that exceed 50% of the property value, must provide 1-inch storm water retention. This retention is provided by depressed areas and exfiltration systems. In October 2002, in response to the severe flooding that occurred in November 2001, Town Council increased the required storm water retention on individual lots to 2-inches."

- Town of Palm Beach Storm Water Pollution Prevention Plan (2008)







CURRENT REDUCTION STRATEGIES

Lake Worth Lagoon Pollutant Loadings (lbs/year) Town of Palm Beach

Parameter	BOD5	TSS	ТР	CU	ZN	TN
Cycle 3 Loads	35,444	183,401	1,606	91	389	10,964
Cycle 4 Loads	35,452	183,437	1,606	91	398	10,967
Other Reductions:						
Public Education (6%)	2,127	11,006	96	5	23	658
FY21-22 Street Sweeping			66			121
Total Adjusted Cycle 4 Loads	33,325	172,431	1,444	86	363	10,188
Percent Reduction	6%	6%	10%	6%	6%	7%

Excerpted from 2018 MS4 Report



Missing credit for load reductions from land development code retention requirement





CURRENT REDUCTION STRATEGIES



Legend

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*From the last pollutant loading analysis in Year 2 of Cycle 4. The new cycle may begin within the next year.

POTENTIAL CREDIT: BMP REMOVAL EFFICIENCIES (%)

Types of Existing Stormwater Practices	TN	ТР	TSS	BOD ₅	Cu	ZN
Dry Detention Basin (Dry)	10	10	50	40	35	70
Exfiltration Basin (Exf)	45	65	90	75	80	80
Proprietary Control Device (PCD)	30	40	90	25	50	45
Wet Detention Basin (Wet)	50	80	90	40	70	50
Dry/PCD Combination	37	46	95	55	67	83
Dry/Wet in Combination	55	82	95	64	80	85
Exf/Dry in Combination	51	69	95	85	87	84
Exf/PCD in Combination	62	79	99	81	90	89
Alum Injection	50	90	90	75	80	80
Swales	20	20	15	20	35	25

Retrieved from Northern Palm Beach NPDES Program's Joint Annual Report Cycle 4- Year 3

BMPs currently in use and accounted for by the Town



BMP currently in use and not accounted for by the Town



Additional Administrative Controls



- Roadways (Right-of-Way)
 - Increased
 - Street Sweeping, Litter Control, Yard Debris
- Redevelopment Areas
 - Increase the retention on private property
- Pesticide, Herbicide, Fertilizer Application
 - Beyond the FDEP's Model Ordinance
- Public Education Campaign











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OPTIONS FOR ADDITIONAL WATER QUALITY TREATMENT

- Baffle Box
- 4. Complex Construction
 5. Complex Construction
 6. Less Frequent Maintenance
- Vortex Separator



- Moderate Construction
- Moderately Frequent Maintenance



• Catch Basin Inlet Filters







METHODOLOGY: SIZE OR QUANTITY OF STRUCTURES

Since Town's ordinance provides 2" of retention for private property, treatment based on flow rate calculated using runoff from Town ROW for a 2" rainfall intensity was developed.

- Baffle Box sized based on flow rate (or max pipe size) and treatment flow capacity from the manufacturer
- Vortex Separator quantity=(flow rate)/(1.25 cfs)
 - Where 1.25 cfs is the treatment capacity of one unit
- Inlet Filter quantity= number of catch basins





SUMMARY OF CALCULATED DEVICES BY BASIN

Stormwater Basin	NSBB Dimension (in feet)	Vortex Separator Quantity	Inlet Filter Quantity
Basin 2	8X16	6	95
Basin 3	8X16	1	102
Basin 4	8X16	17	112
Basin 6	10X20	12	119
Basin 7	8X16	13	127
Basin 8	8X16	7	106
Basin 9	8X16	8	116
Basin 10	8X16	14	165
Basin 12	12X24	16	165
Basin 14	10X20	13	121
Basin 16	4X8	1	21
Basin 17	4X8	1	16
Basin 18	5X10	1	15





OPTIONS FOR APPLICATION

Plan 1	Plan 2	Plan 3
Combined Baffle & Vortex • Developed according to each basin's layout, capacity, and pipe sizes • Includes detailed concept drawings	 • Developed according to basin flow rate and manufacturer's device capacity specifications • No drawings or individual analysis 	 Inlet Filters Only Developed according to basin flow rate No drawings or individual analysis



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*A large device (baffle box) only treatment plan was removed due to inability to size device within allowable ROW areas.



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ANALYSIS OF ALL BASINS FOR PLAN 1

- Analyzed every basin for a 2"event, pipe size, and layout
- Determined most effective combination of devices and placement
- Developed concept drawings for Plan 1 approach (not considering all utility conflicts)





EXAMPLE: STORMWATER BASIN D-10

Example of Large Residential Area

Based on the capacity analysis:

- Plan 1 Baffle Box: (12' x 24') and Vortex Separator: 1
- Plan 2 Vortex Separator Quantity: 14
- Plan 3 Catch Basin Inlet Filter Quantity: 165





STORMWATER BASIN D-10

Recommended treatment:

- 12' x 24' baffle box
- 4' diameter vortex separator
- No inlet filters

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STORMWATER BASIN D-17

Example of Single-Family Residential

Based on the capacity analysis:

- Plan 1 4' Diameter Vortex Separator: 1
- Plan 2 Vortex Separator Quantity: 1
- Plan 3 Catch Basin Inlet Filter Quantity: 16



431.051 – Stormwater Quality Improvement Report Initial Feasibility Analysis August 18, 2023





STORMWATER BASIN D-17

Recommended Improvements:

- No baffle box
- 4' diameter vortex separator installed directly upstream of the D-17 Pump Station
- No inlet filters







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CONSTRUCTION COST COMPARISON

• Baffle Box

- Significant underground construction disturbance of existing utilities
- Vortex Separator
 - Can be installed in standard existing manhole that is in good condition by a Contractor
- Inlet Filter
 - Can be installed in existing catch basin by Town staff







DEVICE COST COMPARISON: CAPITAL 0&M

Device	Construction Cost	Maintenance Time			
Baffle Box	HIGH	LOW			
Vortex Separators	MEDIUM	MEDIUM			
Inlet Filters	LOW	HIGH			

- Yearly maintenance assumptions:
 - Baffle Box 4 hrs each, every 4 months
 - Manhole Device 1 hour each, every month
 - Inlet Filter 15 minutes each, every week





CONSTRUCTION AND OPERATIONS COST COMPARISON

	PLAN 1		PLAN 2		PLAN 3	
Stormwater Basin	Construction Cost	10-Yr Maintenance Cost	Construction Cost	10-Yr Maintenance Cost	Construction Cost	10-Yr Maintenance Cost
D-09	\$692,000	\$6,582	\$1,242,000	\$118,480	\$162,963	\$827,168
D-02	\$680,000	\$6,582	\$207,000	\$85,569	\$133,461	\$677,422
D-10	\$866,000	\$13,164	\$3,519,000	\$144,809	\$231,800	\$1,176,576
D-08	\$785,000	\$19,747	\$2,484,000	\$92,151	\$148,914	\$755,861
D-03	\$680,000	\$6,582	\$2,691,000	\$92,151	\$143,295	\$727,338
D-04	\$715,000	\$13,164	\$1,449,000	\$85,569	\$157,343	\$798,645
D-12	\$876,000	\$6,582	\$1,656,000	\$276,454	\$231,800	\$1,176,576
D-14	\$784,000	\$6,582	\$2,898,000	\$223,796	\$169,987	\$862,822
D-06	\$1,303,000	\$13,164	\$3,312,000	\$190,885	\$167,177	\$848,561
D-07	\$1,234,000	\$13,164	\$2,691,000	\$138,227	\$178,416	\$905,607
D-18	\$322,000	\$6,582	\$207,000	\$32,911	\$21,073	\$106,961
D-16	\$380,000	\$6,582	\$207,000	\$19,747	\$29,502	\$149,746
D-17	\$208,000	\$6,582	\$207,000	\$13,164	\$22,478	\$114,092
Total	\$9,525,000	\$125,063	\$22,770,000	\$1,513,916	\$1,798,208	\$9,127,376





RECOMMENDATIONS



- Update GIS with Exfiltration BMPs for next MS4 Permit cycle based on building permits.
- Consider Additional Administrative Controls
- Update current Pump Station CIP plans to include treatment in basin and roll out over time.





QUESTIONS?

