

**CATEGOR**  
DB

**BMP TYPE**  
DB

## Greenville Pond

**Detention Basin (Dry) - Surface Grass-Lined Basin That Empties Out After A Storm**  
CITY: Greenville

ZIP: 27858

STATE: NC

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### COMMENTS:

In October 1989 the city of Greenville was awarded a grant to construct a 1.75 acre extended dry detention pond on a 3.5-acre site that is adjacent to the Tar River. Details of the project design, construction, and hydrologic characteristics are in the City of Greenville's report to APES prepared by Belk et al. (1992).

The field study included 8 storm events that occurred in the period between February 25 and August 17, 1992. Median pond treatment efficiencies were 71% for TSS, 45% for particulate organic carbon and particulate nitrogen, 33% for particulate phosphorus, and 26-55% for metals. Dissolved pollutant loads leaving the pond were about the same as the runoff loads, except for PO<sub>4</sub>-P which was 25%. For dissolved nitrogen and carbon, the efficiency was small or negative. Treatment brought the copper levels below the standard, but zinc effluent levels were 2 times the standard. Typically, the first 20% of total storm runoff from the Greenville detention pond basin carried 24-27% of the total particulate loads and 23-37% of the total dissolved pollutant loads, thus, not exhibiting a first flush runoff pattern.

Settling column tests were done and the results included in the appendix. Particulate pollutant removals were higher in the settling column than in the pond. Strict comparisons cannot be made.

Eight storms were monitored during the study. All the storms displayed a variety of characteristics and antecedent conditions. The first 20% of the total storm runoff for the pond carried 24-27% of the total particulate pollutant loads and 23-37% of the total dissolved pollutant loads. It does not exhibit first flush runoff patterns. Measured efficiencies for other dry detention ponds vary widely, but overall it appears the Greenville Pond is typical.

Calculations show that total nutrient loading to the Tar River cannot be significantly reduced by urban runoff detention treatment. Urban runoff contributes a minor part (1-4%) of the total nitrogen and phosphorus loading to the system. Detention causes no significant removal of dissolved inorganic nutrient fractions and only partial removal of the particulate forms.

The author published two papers (1.3.1.075 and 1.3.1.073) on this dry detention pond study, with 1.3.1.075 containing the complete data sets. 1.3.1.073 contains a summary of event mean concentrations and rainfall data. Since there are no changes on the studied BMPs, the information from the two papers are summarized in one set of data in the database. The study provides comparisons between 6 other dry detention pond systems, with respect to watershed acres, imperviousness, drain time, number of storms monitored, and removal efficiencies. In paper 1.3.1.075; 15-minute precipitation data was provided for storm events in 1992. Graphs of inflow, outflow, and storage of runoff for 8 storms were provided. Both concentration and event mean concentration and treatment efficiency summary tables are included in the appendices.

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Watershed Parameters	Summary of Flow and Precip. Data	Nearest Climate ID Station Data
Total Watershed Area 81 ha	Start Date: 2/25/92	Climate ID Station #: 7069
Total Watershed Length 31	End Date: 8/12/92	Location: RALEIGH DURHAM WS
Percent Impervious %	# events monitored: 8	Average # Storms/Year: 62
<b>By Land Use</b>	Sample Period (days): 169	Average Annual Precip (cm): 101.90
High Density Residential:	Minimum Depth (cm): 1.22	Average Storm Depth (cm): 1.651
Low Density Residential:	Maximum Depth (cm): 23.57	Average Storm Duration (hr): 9.6
Medium Density Residential:	Average Depth (cm): 2.35	Average Storm Intensity (cm/hr) 0.25146
93 Multi-Family Residential:	Median Depth (cm): 5.12	
7 Office Commercial:	Standard Deviation of Depth: 7.57	
Retail:	# Flow Events Monitored: 19	
Light Industrial:	Average Total Flow Volume (l): 8797189	
Rangeland:	Minimum Total Flow Volume (l): 679293	
Unknown:	Maximum Total Flow Volume (l): 43034130	
	Standard Deviation Flow: 10598950	

### Water Quality Summary

Parameter Name	Inlet Count	Outlet Count	Inlet		+ci		-ci		Outlet		Inlet COV	Outlet COV	% Removal	ANOVA P-Value
			-ci	Mean	+ci	-ci	Mean	+ci						
Solids, Total Suspended (mg/l)	8	8	91.77	<b>129.85</b>	226.7	24.89	<b>32.01</b>	45.16	0.63	0.43	<b>75%</b>	0		
Nitrogen, Total (mg/l as N)	8	8	1.05	<b>1.39</b>	2.11	0.69	<b>0.9</b>	1.34	0.5	0.47	<b>35%</b>	0.09		
Nitrogen, Total Organic (mg/l as N)	8	8	0.61	<b>0.87</b>	1.54	0.28	<b>0.39</b>	0.66	0.64	0.61	<b>55%</b>	0.02		
Nitrate Nitrogen, Total (mg/l as N)	8	8	0.28	<b>0.39</b>	0.64	0.27	<b>0.37</b>	0.58	0.57	0.54	<b>5%</b>	0.85		
Phosphorous, Total (mg/l as P)	8	8	0.32	<b>0.41</b>	0.59	0.24	<b>0.3</b>	0.4	0.43	0.36	<b>27%</b>	0.15		
Phosphorous, Suspended (mg/l as P)	8	8	0.19	<b>0.25</b>	0.39	0.11	<b>0.15</b>	0.23	0.51	0.53	<b>40%</b>	0.04		
Phosphorous, Dissolved Ortho-Phosph	8	8	0.12	<b>0.17</b>	0.28	0.12	<b>0.15</b>	0.21	0.6	0.41	<b>12%</b>	0.98		
Carbon, Dissolved Organic (mg/l as C)	8	8	15.09	<b>18.75</b>	25.25	13.08	<b>16.04</b>	20.88	0.37	0.34	<b>14%</b>	0.41		
Cadmium, Total (mg/l as Cd)	4	3	-999	<b>0.0044</b>	-999	-999	<b>0.0035</b>	-999	1.5012	0.9832	<b>20%</b>	0.993		
Copper, Total (mg/l as Cu)	8	8	0.02	<b>0.0305</b>	0.1	0.01	<b>0.0201</b>	0.07	1.2007	1.276	<b>34%</b>	0.362		
Lead, Total (mg/l as Pb)	8	8	0.03	<b>0.0702</b>	0.37	0.02	<b>0.0333</b>	0.2	1.6438	1.7666	<b>53%</b>	0.192		
Nickel, Total (mg/l as Ni)	8	7	-999	<b>0.0071</b>	-999	-999	<b>0.0037</b>	-999	1.2066	0.9241	<b>48%</b>	0.273		
Zinc, Total (mg/l as Zn)	8	8	0.19	<b>0.3437</b>	1.2	0.12	<b>0.2231</b>	0.76	1.2539	1.2234	<b>35%</b>	0.401		