

The information provided here is for informational and educational purposes and current as of the date of publication. The information is not a substitute for legal advice and does not necessarily reflect the opinion or policy position of the Municipal Association of South Carolina. Consult your attorney for advice concerning specific situations.

Distributed Management of Stormwater Solids as a Nutrient Reduction Strategy

A. R. Rubin, Professor Emeritus
NCSU BAE
Presentation to South Carolina Municipal Association
March 2021



Overview

- Why consider distributed stormwater management infrastructure in South Carolina River Basins
- What are basin inserts and what is Trash Guard (TG)
- Examples of selected benefits
- Results
- O and M



Why Distributed Management for SW Solids

- Removes pollutants close to source
- Targets specific areas where trash, solids or nutrients are an aesthetic or water quality issue
- Allows potential beneficial use for solids in yard and leaf compost programs
- Optimum performance requires periodic maintenance
- Cost effective
 - Lower cost per pound of pollutant removed



Why consider distributed approach to stormwater management

- Distributed approach traps pollutants at or near their source
- Historically river basins throughout the country have been listed on state 303d list and TMDL's have been established for N and P
- State Rules often contain criteria for nutrient management
- In NC on 10 March 2021, NCEMC item reiterated integrating NPDES and Stormwater programs
- 29 October 2019 memo established nutrient reduction credits available through stormwater management (Culpepper, 2019)

2019 Culpepper Memorandum

- Storm Drain Cleaning is defined as the practice of periodic removal of gross solids and associated material from storm drain catch basins.
 - To determine the nutrient removal credit, the weight of material collected is converted to a representative weight of nitrogen and phosphorus removed from the system.
 - $RC = W \times CF$
 - RC is reduction credit, W is weight of solids removed, CF is conversion factor
 - W is the weight of solids removed from a basin
 - CF_N is for nitrogen and is 0.023 pounds of N per 1000 pounds removed
 - CF_P is for phosphorus and is 0.002 pounds of P per 1000 pounds removed
- Source: nutrient reduction practices and crediting, DWR

Basin management and inserts

- Stormwater solids refers to combined material collected from unaltered catch basins or catch basins with a gross solids collection device installed. These devices are designed to alter catch basins to store more material than unaltered catch basins.
- Basin inserts refer to the devices deliberately installed as part of a distributed storm basin management effort

Trash Guard is a locally manufactured basin insert

- Screen
 - Initially
- Filter
 - As solids accumulate



Impacts

- Visual, aesthetic - litter removal
- Organic Matter
- Chemical (nutrients)
- Sediment and regulated metals



Impacts

- Visual (trash)
- Organic Matter (BOD/COD)
- Chemical (nutrients N and P)
- Sediment and regulated metals



Industrial Site-Fayetteville, NC

- City requested
- Dec 07 installed
- Jan 08 – 90lb
- 08-09 Total – 1990 lb
- Significant regulated metal removal
- DRO, BTEX & TPH 4.9 PPM, 1211 & 3380 PPB respectively in retained solids sampled '09
- DRO 37.9 PPM in '10



Solids Quality, Industrial Facility (Metal Recycling) Fayetteville, NC

Industrial	Solids	TN mg/kg (lb)	TP	TOC	Zn	Cu	Pb
2012	2100 lb	1090 (0.3)	165 (0.3)	26200 (53)	1231 (2.5)	662 (1.3)	192 (.6)
2010	2380 lb	1710	182 (0.4)	28110 (56)	1323 (2.6)	579 (1.2)	441 (.9)

Success Story - Gainsborough Dr.

- 2 acre drainage area
- Enters catch-basin at base of hill
- Significant vegetation
- Drainage directly into creek



Gainsborough Drive, March 2021 – The Hard Way...!!!

Over 1000 lb removed





Vac-All
20 minutes to set up and remove
1000 pounds of SW solids

Gainsborough Dr
'05-'08: 3000 lb Solids
'09: Vac-All (1000 est)
Winter '11: 1000 lb solids removed
Spring 2012: 1000 VacAll (est)
SPRING 2020: 1100 (EST)



Solids Removed, Gainsborough Dr,
Mar 2021 as Mass and Pounds/1000 lb solids

	1	2	3	AVERAGE
TOC (lb/K-lb)	211	150	444	268 lb/K - Lb
TN (lb/K-lb)	12	9	24	15 lb/K-Lb
P (Lb/K-lb)	1.5	1.7	2.2	1.8 lb/K-Lb

Solids and Nutrients Removed, 2020 VacAll Demo

Site	TN	IN	NH3	NO3	P	K	Zn	Cu	Pb	CD	C
Ave	5123	214	121	85	335	683	86.3	26	8.2	0.3	105330
Mass	5.123	0.21	0.12	0.085	0.33	0.68	0.09	0.03	0.01	0.00	105.3



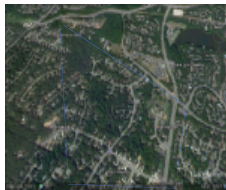
Immediate drainage area

- 2 basins in immediate area



3rd Order Stream to Snipe Creek

- 70 plus basins
- 50 in similar landscape
- Potential catchment significant
- Pollutant removal significant (as lb/yr)
 - 50,000 pounds organics
 - 750 pounds of N
 - 90 pounds of P
- Vac-All requires 20 minutes per basin per year



Thank you

- A. R. Rubin
- NCSU-BAE
- Rubin@ncsu.edu

