

Garrison Creek Pollution Reduction Plan

Last updated: 11/25/2014
Re: MS4 Permit, **Section 3.1 Discharges to Water Quality Impaired Waters**
(Including requirements in 5.1, 5.2)

Waterbody I.D. #: TN05130203023_0210
Subwatershed: East Fork Stones River (water shed – 971 acres)

Purpose of this report is to document actions taken to fulfill requirements for the MS4 (City of Murfreesboro) related to impaired waters. These actions include: BMP implementation, monitoring and sampling schedules, and other actions related to these requirements.

- I. TMDL's
- II. Waste Load Allocations (WLA)
- III. BMP's
 - a. Existing
 1. Restoration
 2. Structural
 3. Non structural
 4. In stream
 5. Total imperviousness
 - b. Recommended
- IV. Monitoring
- V. Notes



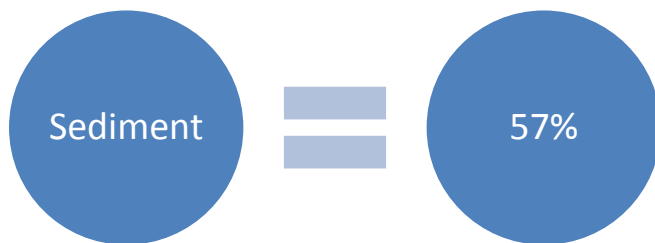
I. TMDL's

Garrison Creek is listed on the 303d list for three impairments. All three impairments also have an EPA approved TMDL in which the MS4 is listed as the source.

Cause/ TMDL Priority	Is MS4 a source?	Approved?	MS4 assigned to WLA?
Alteration in stream-side or littoral vegetative cover	Yes	Yes	--
Physical Substrate Habitat Alteration	Yes	Yes	--
Loss of biological integrity due to siltation	Yes	Yes	57%

II. Waste Load Allocation

A Sediment TMDL with a reduction goal of 57% percent has been assigned to the MS4. The MS4 permit, section 3.1 requires that a MS4 discharging into such waters must implement BMP's which help achieve the assigned WLA. Furthermore, the MS4 must initiate sampling and monitoring component to assess the effective of such BMP's.



III. Best Management Practices (BMP's)

A. Existing BMP's

Garrison Creek has been altered several times in the past, possibly for agricultural reasons as seen in historical aerial photography. The stream was also maintained as a wet weather conveyance for many years. Much of the stream lacks natural hydrology and supports upland vegetation as seen in the stream substrate. The stream also has only cut down to the bedrock in a couple of locations. Furthermore, an inconsistent flow regime makes it hard to support any type of habitat or biological diversity.

1. Restoration

- **Garrison Creek Habitat Restoration Area**

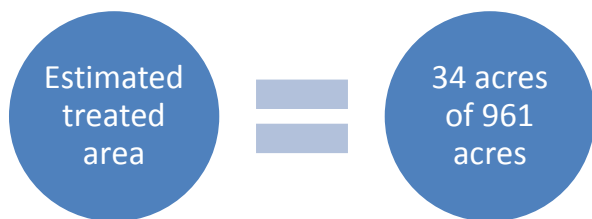
The city of Murfreesboro established a 30 foot no mow zone on either bank adjacent to Garrison Creek from the confluence with Bushman Creek to Rutherford Blvd. Partners supplemented the established riparian zone with volunteer tree plantings of bare root seedlings, live stakes, and larger native vegetation. Vegetative fauna and macro invertebrate populations are being monitored.

Activity	Date	Actions/ materials	Monitoring
Volunteer tree planting	2011, 2012, 2013	Live stakes, seedlings, mulch	Benthic macro
Tree plantings	2012, 2013	Large diameter trees	--
Algae pull	2013		--
10k Tree Day	March 1 st 2014	Clean up/ planting	--



2. Structural

A variety of structural BMP's exist in the Garrison Creek Watershed. A good portion of the watershed was constructed after stormwater control requirements. BMP numbers will be updated annually.



Control Type	Quantity	Directly connected	Annual change
Ponds	9/5 acres	1	--
Weirs	2	1	--
Filter Strip	1/51 ft	0	--
Infiltration trench	1/336 ft	0	--
Porous Pavement	6,310 sq ft	0	--
Bioretention	33,085 sq ft	No	--

3. Non structural

- **Education/Outreach**

The City of Murfreesboro in conjunction with Middle Tennessee State University actively targets the Garrison Creek Watershed with education/ outreach activities. These activities range from city TV programming to volunteer events.



- **Sediment line clearing**

A jet vacuum truck clears all lines directly connected to Garrison Creek with the exception of lines located on private property. Quantities of sediment removed are tracked in an operations and maintenance work order management system. Lines are coded in the GIS to correspond with sub watersheds.

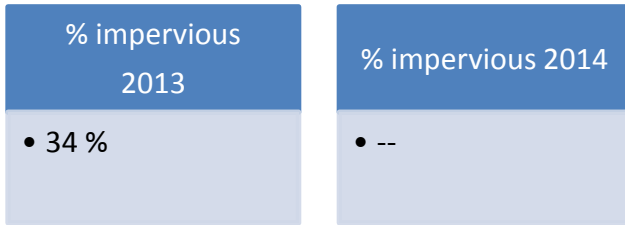
Activity	Target Impairment	Audience/ participants	Outcome
Public meeting	Nutrients (yard waste)	Garrison Creek watershed residents/ city TV audience	Reoccurring TV slot
Direct mail	Nutrients (yard waste)	Watershed residents	
Line clearing	Sediment	--	tons removed

4. In Stream

Fall outs have occurred in the upper reaches of the wet weather conveyance that becomes Garrison Creek. These fall out have been repaired by the city street department.

5. Total Imperviousness

The Garrison Creek property is currently being built out with some church properties containing large green spaces.



B. Recommended BMP's

In order to meet waste allocation numbers for sediment, it is recommended that the few outfalls that discharge directly into Garrison Creek be monitored for sediment loading. If contributions are found upstream micro basins should be retrofitted. Watershed infiltration will encourage base flow in Garrison Creek and allow the stream to become less intermittent, although available large scale commercial parking lots are sparse. In-stream structure will also off set the impacts of channelization. Finally, staff will continue education/ outreach efforts to improve nutrient levels in Garrison Creek.

BMP	location	Pollutant	Schedule
Outfall treatments	Applicable outfalls	Sediment	--
Landscaping educ.	--	Nutrients	2015 or 2016
Impervious retrofit	Watershed	sediment	--
Channel structure	Main channel	Habitat	--

In-stream

As mention previously, in-stream structure is recommended.

IV. Sampling and Monitoring

Permit language requires sampling and monitoring activities in order to gage the effectiveness of installed BMP's. Specific sampling is also required when certain pollutants are contributing to stream impairment. Furthermore, staff samples city wide to establish general water quality conditions. The SWMM model will also be ran to generate sediment removal numbers. *Sampling results are compiled in a GIS database which can be viewed online:*

<http://mwsdmaps.murfreesborotn.gov/gisapps/Stormwater/>

Parameter	Schedule/ frequency	Quality Trend up/down	Rule or BMP Effectiveness
Outfall	Summer 2015/ annually		3.1, BMP effectiveness
Biological SQSH	2014, Spring 2015/ bi-annually	2014 = 14/ 2015 =	5.1
Biological Cursory	Spring 2015/ annually		3.1, BMP effectiveness
Nutrients	Spring/ Fall 2015/annually		3.1, BMP effectiveness
Visual Stream Assessment	Summer 2015/ 3 yrs		5.2

Model Runs

Model Type	TSS removal estimates	watershed

V. Notes

- *Garrison Creek has been altered in the past as noted in historical aerial photography. The stream has also been maintained as a wet weather conveyance allowing for what flow that exists in the wet season to be conveyed. Due to these reason the stream has kept a dirt and grass substrate.*
- *The lack of flow and a dirt substrate does not create habitat for macro invertebrate population. Until the stream cuts to the bedrock or evolves to a more course substrate TMI scores may be low.*
- *The area directly behind Kroger does support life and displays stream or wetland like characteristics.*
- *Mixed public opinion exists about the project.*