City of Charlotte
NPDES MS4 Permit Program

Water Quality Recovery Program

Long Creek Turbidity TMDL

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Permit Number NCS000240

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Purpose

The purpose of this Water Quality Recovery Program (WQRP) Plan is to reduce the levels of turbidity, to the maximum extent practicable, in accordance with the assigned MS4 NPDES regulated Waste Load Allocation (WLA) identified in the approved Turbidity Total Maximum Daily Load (TMDL) for Long Creek.

The goals of this Water Quality Recovery Program (WQRP) are to identify BMPs, management strategies, time frames and costs necessary to address the MS4 NPDES regulated Waste Load Allocation (WLA) identified in the TMDL, which in turn will assist in returning the impaired segments to compliance with state water quality standards.

Background

The Long Creek watershed includes portions of the City of Charlotte and drains north central Mecklenburg County between Charlotte and Huntersville in the Southern Outer Piedmont Ecoregion. The watershed is located within hydrologic unit 3050101170020 and includes Vances Twin Lakes, Dixon Branch, Swaringer Lake and McIntyre Creek (NCDENR 2005).[1]

Urban runoff can contribute significant amounts of turbidity to water bodies. However, much of this runoff is regulated in compliance with the NPDES Storm Water Phase I and Phase II program (EPA, 2000). This rule applies to a unit of government such as a city or county, which owns or operates a municipal separate storm sewer system (MS4). The MS4 is required to obtain a National Point Source Discharge Elimination System (NPDES) permit for their stormwater discharges to surface waters. As such, stormwater runoff from areas within an MS4 is considered a point source. The cities of Charlotte and Huntersville, Mecklenburg County, and NCDOT fall under the NPDES stormwater rules and therefore maintain stormwater management programs. There are no continuous point sources in the watershed with NPDES permit limits for turbidity or TSS (NCDENR 2005).[1]

According to the 2000 US Census Urbanized Area, the Long Creek watershed includes portions of the Charlotte "urbanized area." The total Phase I & II area included as part of the Charlotte urbanized area within the Long Creek watershed is approximately 13,817 acres (21.5 mi2), or approximately 59.5% of the total Long Creek watershed (NCDENR 2005).[1]

The 2002 North Carolina Water Quality Assessment and Impaired Waters List (Integrated 305(b) and 303(d) Report) identified Long Creek in the Catawba River Basin as impaired by elevated turbidity (NCDENR 2005).[1]

The Long Creek Turbidity TMDL document was prepared by the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ) during 2004 and was approved on February 8, 2005.

Figures 1, 2, and 3 below show the location of Long Creek watershed within the Charlotte-Mecklenburg area, the Long Creek watershed impaired reach and tributary streams, and the Long Creek watershed land uses, respectively. Figure 4 on page 9 shows the WQRP life cycle process.

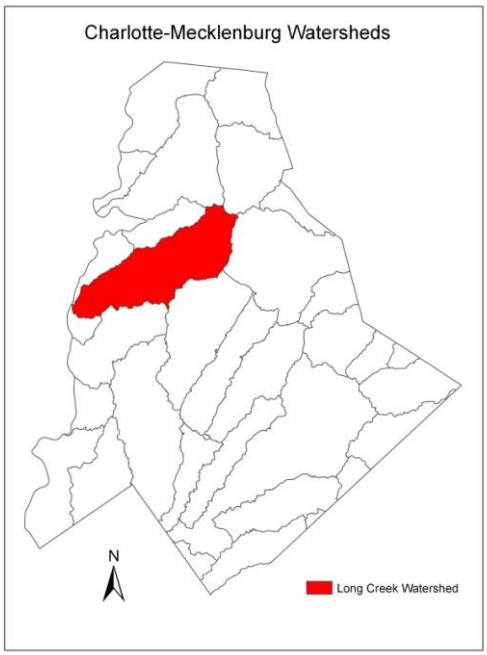


Figure 1: Charlotte-Mecklenburg Watersheds

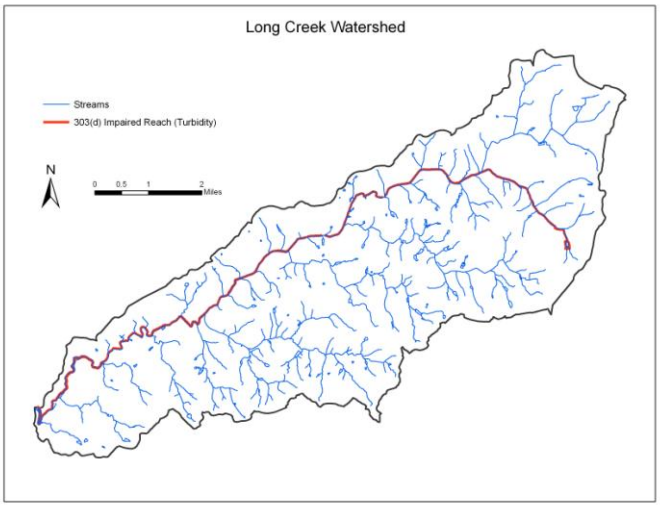


Figure 2: Long Creek Watershed

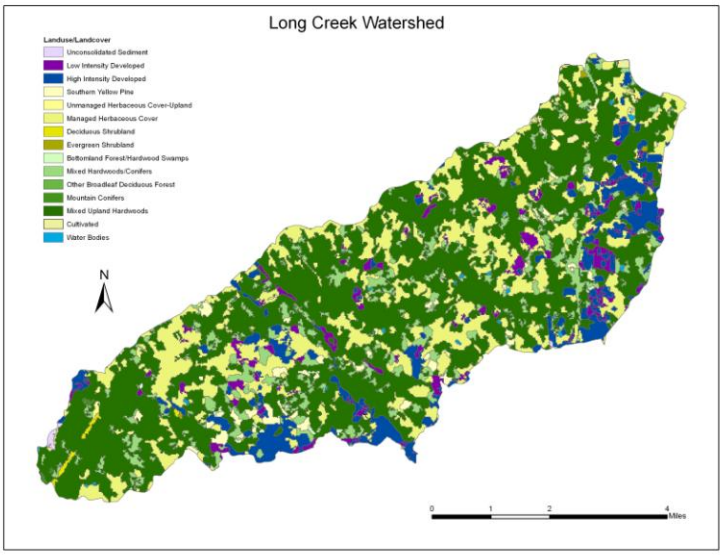


Figure 3: Long Creek Watershed Land Uses

TMDL WQRP Implementation Team

During WQRP year 3, a team of staff representatives will be assembled from affected municipal agencies that conduct activities within the TMDL watershed. In addition, other potential staff resources will be identified as necessary to serve on TMDL WQRP Implementation Team. Based on the pollutant of concern, municipal agencies could include stormwater, wastewater, public works, street maintenance, solid waste, animal control, and others. The NPDES MS4 Permittee will be responsible for interpreting data, judging BMP effectiveness, reporting to DWQ, and coordinating activities and reviews with the Implementation Team to meet the components and goals of the WQRP.

Public Education and Outreach Program

During WQRP year 3, a Public Education and Outreach Program will be established to provide information concerning the WQRP. At a minimum, a website will be established to document and disseminate information and results. In addition, the program may include items such as:

- Pollutant of concern specific information in brochures, bill inserts, etc.
- Adopt-a-Stream or Storm Drain Marking activities
- Presentations to groups
- Participation in public events

Pollutant or Pollutants of Concern

The pollutant of concern and the focus of this WQRP is the MS4 WLA for turbidity. Over the past 10 years, the Long Creek watershed has seen increased residential and commercial development including the construction of I-485, which has impacted many acres in the watershed. NCDOT had implemented increased erosion protection measures and monitoring for sediment and turbidity related to this highway project, which is now completed.

Potential non-point and stormwater sources for turbidity within the watershed include various erosion processes, such as sheet wash, gully and rill erosion, wind, landslides, dry ravel, and human excavation that contribute sediment during storm or runoff events. Sediments are also often produced as a result of stream channel and bank erosion and channel disturbance (EPA, 1999) (NCDENR 2005)[1]

Non-point sources account for the vast majority of sediment loading to surface waters. A few of these sources include (NCDENR 2005)[1]:

- Natural erosion occurring from the weathering of soils, rocks, and uncultivated land; geological abrasion; and other natural phenomena[1].
- Erosion from agricultural activities. This erosion can be due to the large land area involved and the land-disturbing effects of cultivation. Grazing livestock can leave areas of ground with little vegetative cover. Unconfined animals with direct access to streams can cause stream bank damage and erosion[1].

- Erosion from unpaved roadways can be a significant source of sediment to rivers and streams. Exposed soils, high runoff velocities and volumes and poor road compaction all increase the potential for erosion[1].
- Runoff from active or abandoned mines may be a significant source of solids loading. Mining activities typically involve removal of vegetation, displacement of soils and other significant land disturbing activities[1].
- Soil erosion from forested land that occurs during timber harvesting and reforestation activities. Timber harvesting includes the layout of access roads, log decks, and skid trails; the construction and stabilization of these areas; and the cutting of trees. Established forest areas produce very little erosion[1].
- Stream bank and streambed erosion processes often contribute a significant portion of the overall sediment budget. The consequence of increased stream bank erosion is both water quality degradation as well as increased stream channel instability and accelerated sediment yields. Stream bank erosion can be traced to two major factors: stream bank characteristics (erodibility potential) and hydraulic/gravitational forces (Rosgen, online)[1]. The predominant processes of stream bank erosion include: surface erosion, mass failure (planar and rotational), fluvial entrainment (particle detachment by flowing water, generally at the bank toe), freeze-thaw, dry ravel, ice scour, liquifaction/collapse, positive pore water pressure, both saturated and unsaturated failures and soil piping (NCDENR 2005).[1]

In addition, urban stormwater runoff can contribute significant amounts of turbidity to the watershed. Since portions of the watershed are within the City of Charlotte MS4, discharges of urban stormwater runoff from this area are considered point sources. There are no continuous point Source discharges in the watershed with NPDES permit limits for turbidity or TSS (NCDENR 2005).[1]

The Long Creek Turbidity TMDL uses Total Suspended Sediment (TSS) as a surrogate measure for turbidity. As such, the MS4 regulated waste load allocation identified in the TMDL for TSS is 1000 lbs/day at 15.3 cfs stream flow.

MS4 Major Outfall Identification

During WQRP year 3, an inventory and map will be developed detailing the location of known major outfalls (as defined in the MS4 NPDES permit) within the watershed NPDES MS4 jurisdictional area that have the possibility of discharging the pollutant of concern to the impaired segments as defined by the MS4 permit, its tributaries or to segments and tributaries within the watershed contributing to the impaired segments.

During WQRP year 4, a schedule will be developed to locate the position of unknown major outfalls within the watershed that may discharge the pollutant of concern to the impaired segment, its tributaries or to segments and tributaries within the watershed contributing to the impaired segments.

Monitoring Plan

During WQRP year 5, a monitoring plan will be developed for turbidity and TSS and submitted to DWQ for approval.

The goals of the WQRP monitoring plan will be to:

1. Identify the significant sources of the pollutant of concern related to MS4 regulated WLA.
2. Evaluate the performance of BMPs utilized in the WQRP, where possible.
3. Assess progress toward the goals of the WQRP at the TMDL identified compliance point.

The monitoring plan will include components such as:

1. Written description and GIS map of sample locations
2. Monitoring methods
3. Sample type and frequency
4. Seasonal considerations
5. Sample analytical methods
6. Quality assurance
7. Record keeping

The monitoring plan shall include in-stream and/or major outfall monitoring at locations deemed necessary to support assessment of activities in the WQRP to address the MS4 NPDES regulated Waste Load Allocation (WLA) identified in the TMDL. Where appropriate, the permittee may reduce the monitoring burden by proposing to monitor in-stream sites and/or major outfalls that the Division would consider substantially similar to other in-stream sites and/or major outfalls in the defined TMDL watershed. The monitoring plan shall be adjusted as additional in-stream sites and/or major outfalls are identified in accordance with the schedule required in the Storm Water Management Plan and as accumulating data may suggest.

BMP Identification & Associated Cost

During WQRP year 4, the results of the watershed and water quality data analysis and outfall identification will be utilized to develop initial BMP strategies aimed at addressing the MS4 NPDES regulated Waste Load Allocation (WLA) identified in the TMDL. As part of the BMP identification, existing programs, ordinances, initiatives, etc., will be evaluated for applicability and use within the WQRP. Further assessment in future WQRP years will evaluate if any additional BMPs should be employed to address the MS4 NPDES regulated Waste Load Allocation identified in the TMDL to the maximum extent practicable. This assessment will be based on factors such as cost/benefit analysis, MEP standards, water quality data trends, status of activities & accomplishments relative to defined end-point in the WQRP, etc.

Initial BMP strategies may include:

- Existing regulatory strategies and ordinances
- Targeted public education and outreach programs
- Development of a WQRP specific webpage
- Targeted public participation programs
- Increased IDDE efforts
- Targeted municipal storm system maintenance activities
- Increased site inspections where applicable
- Targeted monitoring and complaint response
- Existing strategies/requirements for structural BMPs
- Non-regulatory strategies such as LID

During WQRP year 7, an assessment of available data and cost benefit analysis will be performed to determine effectiveness of BMP strategies.

Program Implementation Schedule

Program elements and associated activities identified in the WQRP will be conducted in various permit years within the current and future MS4 NPDES 5-year permit terms. The proposed implementation schedule for this WQRP is as follows:

1. Identify the purpose and goals of the TMDL Water Quality Recovery Program (WQRP) by the end of year 2, (June 30, 2009).

2. Identify the watershed and provide brief description by the end of year 2, (June 30, 2009).

3. Assemble a team of staff representatives from affected municipal agencies by the end of year 3, (June 30, 2010).

4. Establish a Public Education and Outreach Program by the end of year 3, (June 30, 2010).

5. Identify location and map major known outfalls in TMDL watershed by the end of year 3, (June 30, 2010).

6. Conduct an assessment of the available data by the end of year 3, (June 30, 2010).

7. Develop and submit a schedule to discover and locate all other MS4 major outfalls within the MS4 jurisdictional area that may be discharging the pollutant(s) of concern to the impaired stream segments, to their tributaries, and to segments and tributaries within the watershed contributing to the impaired segments by the end of year 4, (June 30, 2011).

8. Develop non-structural and structural BMP strategies by the end of year 4, (June 30, 2011).

9. Develop a WQRP monitoring plan for the pollutant of concern and submit to DWQ for approval by the end of year 5, (June 30, 2012).

10. Develop a schedule to implement appropriate regulatory strategies, non-structural BMPs, and structural BMPs to control the pollutant(s) of concern to the maximum extent practicable by the end of year 5, (June 30, 2012).

11. Conduct Year 6 WQRP assessment by the end of year 7, (June 30, 2014 and annual thereafter).

12. Conduct a cost-benefit analysis by the end of year 7, (June 30, 2014 and annual thereafter).

13. Define the end point of the WQRP within MEP standards by the end of year 7, (June 30, 2014).

Implementation of the Program to the Maximum Extent Practicable

During WQRP year 7, an assessment of available data, BMP strategies, cost benefit analysis, and WQRP effectiveness will be conducted and utilized to define the end point of the WQRP within MEP standards.

As part of this, activities being conducted to address the MS4 NPDES regulated Waste Load Allocation (WLA) identified in the TMDL will be evaluated and defined as to their contribution toward reaching the end point in the WQRP. The results of the analysis and definition will be used to prioritize locally limited funding aimed at elimination of the greatest MS4 waste load allocation reduction for the least amount of expenditure.

WQRP Assessment

During WQRP year 3, an assessment of available watershed and water quality data will be performed and utilized to assist in developing initial BMP strategies. Subsequently during WQRP year 7, an assessment of activities conducted under the WQRP will be performed to evaluate the overall progress of the WQRP. The assessment will include a review of programmatic management measures, existing water quality data, watershed data, cost benefit analysis, monitoring data and other relevant data. The assessment will be used, where possible, to evaluate the performance of existing BMPs and identify additional BMP strategies as necessary.

WQRP Reporting

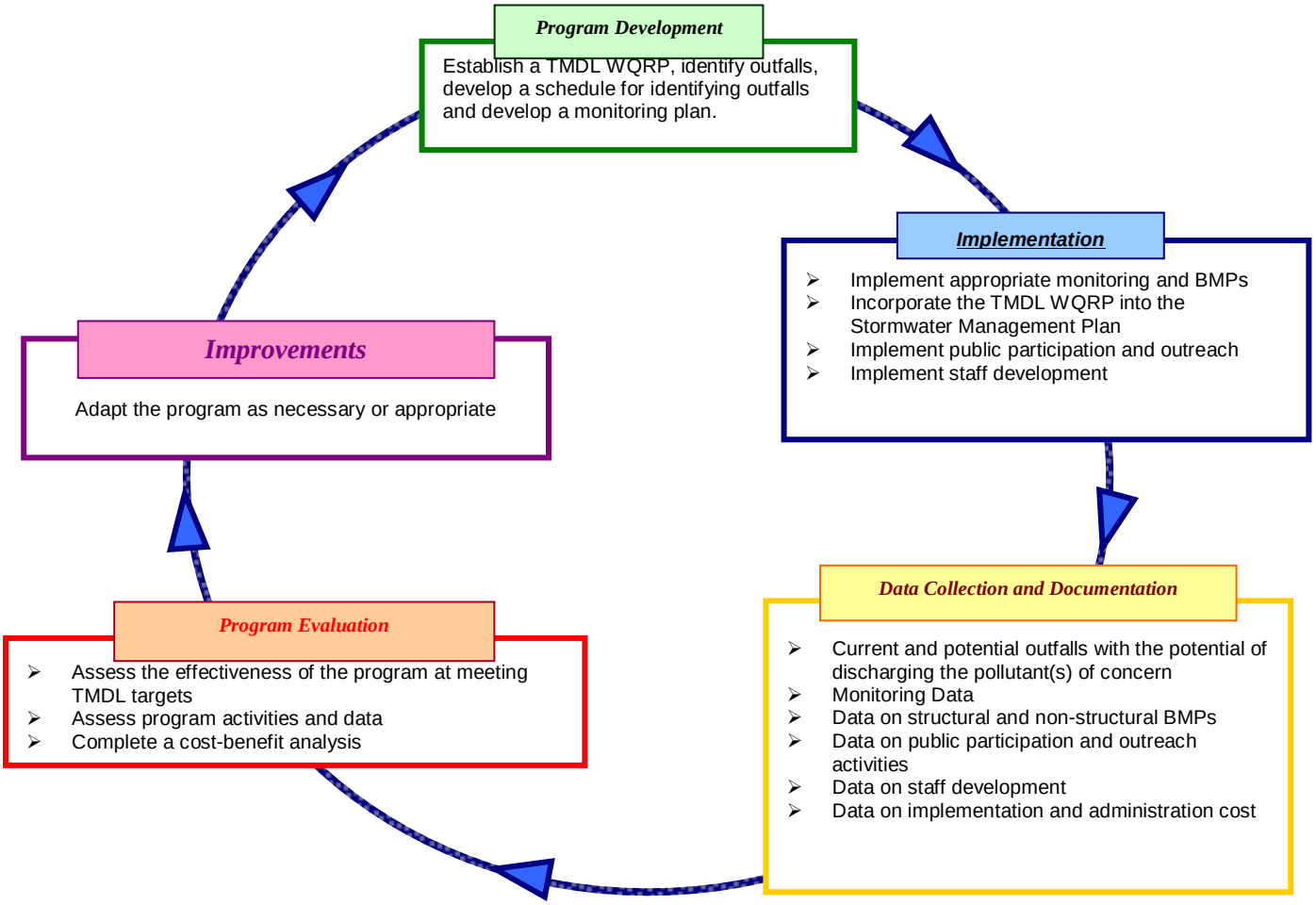
Activities and assessments conducted under the WQRP will be reported to DWQ along with the annual report submitted each year for the MS4 NPDES permit. Annual compliance with the WQRP implementation schedule will constitute compliance with the overall WQRP. The annual report for the WQRP will include, as applicable per WQRP schedule, the following:

- The initial WQRP and subsequent components based on Implementation Schedule.
- Discussion on the status of the WQRP and schedule.
- Discussion of activities conducted for WQRP and progress made toward meeting program elements during report year.
- Annual cost of WQRP.
- An assessment of available data collected under the monitoring plan for each pollutant of concern.
- An assessment of the performance of BMPs employed, where possible.
- A map showing the location of major outfalls in TMDL watersheds with the potential for discharging the pollutant of concern.
- A schedule for locating currently unknown major outfalls that may potentially discharge the POC in TMDL watersheds.
- Identification of in-stream and outfall sampling locations.
- Identification of additional BMPs, if necessary.

Following any review and comment by the Division on the TMDL Water Quality Recovery Program, the permittee shall incorporate any necessary changes into the program. The permittee shall incorporate the revised TMDL WQRP into the Stormwater Management Plan.

Figure 4

Water Quality Recovery Program Life Cycle



REFERENCES

1. NCDENR - Division of Water Quality, January 2005. Total Maximum Daily Loads (TMDLs) for Turbidity in Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork, and Mud Creek in North Carolina

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