JOINT STORMWATER MANAGEMENT PROGRAM

MS4 PERMIT #MO-0136557

Coverage for:

Boone County, Missouri

Columbia, Missouri

University of Missouri (MU)

Prepared by:

Boone County Resource Management

Columbia Public Works Department

MU Department of Environmental Health and Safety

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Boone County/Columbia/MU

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4.1 REQUIREMENTS

This Joint Stormwater Management Plan (SWMP) has been developed in accordance with The Stormwater Phase II Final Rule requirements specified in the site-specific permit MO-0136557 for discharges from small regulated Municipal Separate Storm Sewer Systems (MS4s), as well as state regulation 10 CSR 20-6.200 and federal regulations 40 CFR Part 122. The three co-permittees, Boone County, Columbia and MU, have developed and implemented this program to in order to protect water quality and effectively reduce stormwater pollutant runoff within their respective jurisdictions to the maximum extent practicable. MU will serve as the coordinating authority for this joint SWMP; however, MU does not have regulatory authority over either of the other co-permittees. Responsibility for implementation of all MCMs will be shared jointly among the three co-permittees. Program success will be evaluated based on the effective reduction of pollutants into receiving water bodies. This plan will be reviewed on an annual basis and updated as necessary.

IN ACCORDANCE WITH SECTION 4.1 OF THE PERMIT:

- Good housekeeping practices will be followed to prevent solid waste from entering waters of the state to the maximum extent practicable,
- Fueling facilities will adhere to underground storage and spill prevention regulations, including Spill Prevention Control and Countermeasures (when applicable),
- Substances regulated by the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation and Liability Act will be managed accordingly,
- All paints, solvents, petroleum products and waste products will be stored so that these materials are not exposed to stormwater,
- Containment systems will be constructed of materials compatible with the substances contained and shall prevent the contamination of groundwater.

This plan contains Best Management Practices (BMPs) and Measurable Goals (MGs) for the six Minimum Control Measures (MCMs) described in Section 4.2 of the permit. Measurable goals are selected to evaluate the effectiveness of individual control measures and the stormwater management program as a whole.

<u>BMPs will be described as follows:</u>

BMP: Best Management Practice

MG: Measurable Goal (Responsible Permittee—Status)

BACKGROUND INFORMATION

POPULATION AND LAND USE:

Boone County has a population of 165,332 (2010 US census). The largest city is Columbia, with a population over 108,000. Columbia is fifth largest city, and the second fastest growing community in Missouri. The City's current land mass is over 60 mi^2, with an annexation rate of 0.6 mi^2 per year.

Columbia is the home of the University of Missouri, with more than 30,000 students, as well as Stephens College (1,750 students) and Columbia College (1,082 daytime students only). Other towns in Boone County include Centralia (3,500), Ashland (3,000), Hallsville (958), Sturgeon (915) Rocheport (208), Harrisburg (184), and Hartsburg (104).

Approximately 27% of the population lives in the rural areas of Boone County. According to the 2007 US Agriculture Census, there are over 1,300 farms in the county with an average size of 196 acres. The total land used for farming is almost 259,000 acres.

CLIMATE:

The average winter temperature is 29.6^{o} F. In summer, the average temperature is 74.7^{o} F and the average daily maximum of 85.9^{o} F. The highest recorded temperature of 116 degrees occurred on July 15, 1954.

The total annual precipitation is 38.94 inches. The heaviest recorded 1-day rainfall was 5.37 inches on August 12, 1993. Thunderstorms are common from May to August. The average seasonal snowfall is 22.4 inches. During the three year period between January 1, 2008 and December 31, 2010 annual precipitation was more than 14 inches higher than average. (56.98, 53.15, and 53.50 respectively)

The average relative humidity in mid-afternoon is about 60%. Humidity is higher at night, peaking at dawn with an average of 83%. It is sunny 66% of the time in summer and 49% of the time in winter. The growing season in Boone County is 192 days. The first frost is around October 19th, while the last frost is around April 10th. (Boone County Soil Survey, 2005)

HYDROLOGY:

Boone County is bordered by the Missouri River on the southwest, and by Cedar Creek on the east. There are twenty-three sub-basins that are entirely or partially within the county boundaries. Drainage is mainly towards the Missouri River, from northeast to southwest. However, the extreme northeastern section of the county (Centralia) flows towards the Salt River. The largest watershed is Perche Creek which drains more than 70% of the landmass. Hinkson Creek, a 90 mi^2 watershed, is the single largest contributor to Perche Creek. Hinkson is fed by Grindstone Creek, Flat Branch, Hominy Branch, County House Branch,

Meredith Branch, and Mill Creek. More than 90,000 people live in the Hinkson Creek Watershed.

Between Columbia and Ashland is the Bonne Femme Watershed. This area is well known for Karst topography, with numerous caves, sinkholes and losing streams. The area also contains several state parks. The Bonne Femme feeds the cave system for the Devil's Icebox, and Rockbridge State Park. Also in this area is Three Creeks Conservation Area, maintained by the Missouri Department of Conservation. The streams running through these parks are designated as State Resource Waters.

WATER QUALITY AND TMDLs IN BOONE COUNTY:

Several area streams do not support warm water aquatic life or whole body contact recreation. These streams have been listed on the State's List of Impaired Waters as required by section 303(d) of the Clean Water Act (CWA). Once a waterbody is listed, then a Total Maximum Daily Load (TMDL) must be developed to set the maximum amount of pollution that can enter the stream and still maintain water quality standards. The following table shows the waterbodies in Boone County that are on the 2010 Impaired Waters List (Section 303(d)).

Waterbody Name	Pollutant	Source	Miles/acres impaired	TMDL
Bonne Femme	Bacteria	Urban/Rural NPS	7.0	2011
Cedar Creek	Unknown	Unknown	7.0	2014
Foster Creek	Ammonia	Ashland WWTP	0.5	2016
Fowler Creek	Low D.O.		6.0	2016
Grindstone Creek	Bacteria	Unknown	1.5	2011
Hinkson Creek	Unknown	Urban Runoff	18.0	Developed
Hinkson Creek	Bacteria	Unknown	18.0	2011
Lake of the Woods	Mercury	Atmospheric	1.3	2015
Philips Lake	Mercury	Atmospheric	32.0	2015

In streams where the identified pollutant is bacteria, the sources could be from leaky septic systems, sanitary sewer or lagoon overflows, or cross connected pipes in the suburban areas.

Agricultural land use can be a source of bacteria, pesticides and sediment nutrients, which contribute to sediment deposition, low DO and nutrient enrichments. The National Agricultural Statistics Service (NASS) reported in 2007 that there were 31,547 head of cattle, 1,278 hogs and pigs, 409 horses and ponies and 365 broilers in the county, (USDA, 2007). This problem is further exacerbated by cattle breaking down the stream banks and riparian cover.

In both suburban and rural areas, wildlife and domestic pets could be the source of bacteria. The Central Missouri Humane Society estimates that approximately 55,000 dogs reside in Columbia Missouri.

4.2 MINIMUM CONTROL MEASURES

MCM 1: PUBLIC EDUCATION AND OUTREACH

Through public education and outreach, residents can gain an understanding of how their actions affect local streams and rivers. By connecting poor water quality to common everyday activities such as over fertilizing lawns, flicking a cigarette into the drain, or even walking the dog without litter pick-up, major causes of pollution in stormwater can be eliminated.

Permit Requirement: Implement a coordinated public education program which involves the distribution of educational materials to the community, as well as equivalent outreach activities about the impacts of stormwater discharges on water bodies and steps the public can take to reduce pollutants in the stormwater runoff. The requirement continues to be met by each of the three co-permittees with the following BMPs and associated Measurable Goals.

BMP: Distribute educational materials to the community

MG: Identify target audience (All Permittees—Completed)

MG: Select topics for each calendar year, develop and distribute outreach materials, including hazards associated with illegal discharges and improper disposal of waste

(All Permittees—Ongoing)

BMP: Conduct outreach activities about the impacts of stormwater runoff

MG: Identify target audience (All Permittees—Completed)

MG: Select topics for each calendar year, schedule and present outreach activities

(All Permittees—Ongoing)

MCM 2 - PUBLIC INVOLVEMENT/PARTICIPATION

Public participation and stakeholder involvement can help increase the awareness and understanding of issues and challenges, help determine priorities, increase support for stormwater programs, and increase the likelihood of program success. Stakeholder processes often provide the reality check for federal and state requirements: they seek to synthesize ecological, technical, social, cultural, political, and economic concerns through a process that helps to define what is actually doable. (Adapted from EPA 2002)

Permit Requirement: Implement an effective public involvement/participation program that complies with State and local public notice requirements. The requirement continues to be met by each of the three co-permittees with the following BMPs and associated Measurable Goals.

BMP: Implement an effective public involvement/participation program that complies with State and local public notice requirements.

> ***MG:*** Observe all public notice requirements (All Permittees—Ongoing)
>
> ***MG:*** Hold public hearings/stakeholder meetings when properties are annexed or request a change in zoning, during the platting process, and throughout the project design stage (All Permittees—Ongoing)
>
> ***MG:*** Annually publicize the Campus Master Plan, which identifies planning principles and includes current and proposed construction projects (MU—Ongoing)
>
> ***MG:*** Select targeted topic for each calendar year, schedule and present public involvement/participation activities (All Permittees—Ongoing)

MCM 3 - ILLICIT DISCHARGE DETECTION AND ELIMINATION

An illicit discharge from a storm drain is a dry weather flow that contains pollutants and/or pathogens. (Dry weather flows that do not contain pollutants are simply a discharge). The most significant sources of illicit discharges are:

- Cross-connections with a wastewater system,
- Infiltration of wastewater to the stormwater sewer system from cracked sanitary sewer systems or malfunctioning septic systems,
- Inappropriate discharges from industrial and commercial areas,
- Paint, used oil or other pollutants dumped directly into storm drains.

Illicit discharges can cause high levels of pollutants such as heavy metals, toxics, oil and grease, solvents, nutrients, viruses and bacteria to local water bodies. Finding and removing illicit discharges will help to improve local water quality.

Permit Requirement: Develop, implement and enforce a program to detect and eliminate illicit discharges into the MS4. The responsibility will be shared jointly among the three co-permittees. The requirement continues to be met by each of the three co-permittees with the following BMPs and associated Measurable Goals.

BMP: Develop and maintain a storm sewer map

MG: Update as necessary (All Permittees—Ongoing)

BMP: Effectively prohibit, through ordinance, or other regulatory mechanism, non-stormwater discharges into the storm sewer system

MG: Develop IDDE Ordinance/Regulatory Mechanism (All Permittees—Completed)

MG: Implement IDDE Ordinance/Regulatory Mechanism (All Permittees—Ongoing)

BMP: Develop a plan and implementation schedule to detect and address non-stormwater discharges, including discharges from illegal dumping and spills to the MS4

MG: Implement plan to detect and address non-stormwater discharges which may include on-site visual inspections, smoke and dye testing, closed circuit television (CCTV) inspections as well as public watch and reporting programs with established hotlines (All Permittees—Ongoing)

BMP: Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste

MG: Include this information as an element in the outreach, education and municipal training programs (All Permittees—Ongoing)

BMP: Address certain categories of non-stormwater discharges or flows only if the permittees identify them as significant contributors of pollutants to the MS4

MG: Evaluate occasional incidental non-stormwater discharges on a case-by-case basis by to determine whether such discharges may appropriately be directed to the storm sewer system. The co-permittees have not identified any of the listed non-stormwater discharges as significant contributors to the regulated MS4

(All Permittees—Ongoing)

Examples of several education needs that have been addressed since 2006. The picture on the left was taken by a municipal employee with their cell phone. The concrete driver is washing out the waste product into a local road ditch. The other picture shows a local stream that was used as a dumping ground. This stream has since been cleaned up with the help of volunteers.

MCM 4 - CONSTRUCTION SITE STORMWATER RUNOFF CONTROLT

Construction site runoff is the most publicly visible element of the stormwater program. During a very short period of time, construction sites can contribute more sediment to streams than agriculture, forest, or grassland combined. EPA found that on average, 75 tons of soil per acre per year leaves construction sites, compared to 7.5 from row crops, and 0.4 from grassland.

Permit Requirement: Develop, implement and enforce a program that reduces pollutants in stormwater runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. The requirement continues to be met by each of the three co-permittees with the following BMPs and associated Measurable Goals.

BMP: Implement an ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State or local law.

> ***MG:*** Require MDNR Land Disturbance Permit for sites one acre and greater
>
> (All Permittees—Ongoing)
>
> ***MG:*** Develop ESC/Land Disturbance Ordinance/Regulatory Mechanism
>
> (All Permittees—Ongoing)
>
> ***MG:*** Implement ESC/Land Disturbance Ordinance/Regulatory Mechanism (City Chapter 12 Land Disturbance Ordinance, County Chapter 24 Erosion and Sediment Control Ordinance, MU Business Policy and Procedure Manual Chapter 7, Section 7.001) (All Permittees—Ongoing)

BMP: Require construction site operators to implement appropriate erosion and sediment control best management practices.

> ***MG:*** Implement Stormwater Design Manual (City/County—Completed, MU—2011)

MU is currently working with a consultant to develop the Stormwater Master Plan. All construction projects are designed and reviewed by the Planning Design and Construction (PDC) and Environmental Health and Safety department. Architects and engineers are provided guidance related to stormwater management and these specifications are included in construction documents.

BMP: Implement procedures for site plan review which incorporate consideration of potential water quality impacts; require construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter and sanitary waste at the construction site that may cause adverse impacts to water quality.

MG: Require and review Stormwater Pollution Prevention Plans (SWPPPs)

(All Permittees—Ongoing)

BMP: Implement procedures for receipt and consideration of information submitted by the public

MG: Hold public hearings/stakeholder meetings (All Permittees—Ongoing)

BMP: Implement procedures for site inspection and enforcement of control measures

MG: Conduct site inspections (All Permittees—Ongoing)

The above left and center pictures illustrate the frequent problems encountered at construction sites prior to enacting local stormwater ordinances, inspections and enforcement programs. The picture on the right demonstrates how contractors are now implementing protections for erosion and sediment controls.

MCM 5 - POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Developing a strategy to mimic pre-construction runoff conditions is much more difficult than one may think. Before you can mimic pre-development conditions, one has to know about the previous infiltration and runoff rates. Runoff reduction is a difficult sell to developers and engineers in Missouri due in part to the low permeability of our soils, and frequency of intense rainfall events. Preliminary data from the Hinkson Watershed has illustrated that many of Boone County streams are flashy even under pasture and grassland conditions. Construction activities that remove vegetation and topsoil while increasing impervious surfaces have acerbated this situation.

Permit Requirement: Develop, implement and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre. This includes projects less than one acre which are part of a larger common plan for development or sale. The requirement continues to be met by each of the three co-permittees with the following BMPs and associated Measurable Goals.

BMP: Develop strategies combining structural and/or non-structural BMPs to improve the quality of stormwater runoff

> ***MG:*** Identify structural and non-structural strategies (All Permittees—Ongoing)
>
> ***MG***: Implement strategies by developing a Stormwater Management/Water Quality Manual or equivalent (City and County—Ongoing, MU—2011, MU is working with a consultant to develop a Stormwater Master Plan)

BMP: Develop an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects

> ***MG:*** Implement Stormwater Management Ordinance/Regulatory Mechanism
>
> (All Permittees-Ongoing)

MG: Implement Stream Buffer Ordinance (All Permittees—Ongoing)

BMP: Ensure adequate long-term operation and maintenance of BMPs

MG: Inventory BMPs (MU—Completed, City/County—2012)

MG: Establish operation and maintenance schedule (All—2012)

Rain gardens and other stormwater practices are now familiar sights throughout the MS4

MCM 6 - POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

Municipal employees who are directly involved in activities that could cause pollution will receive both general stormwater and targeted BMP training targeting their activities. This will increase the likelihood that receiving waters and the storm drain system will be protected from inadvertent discharges and spills. Municipal staff will receive general stormwater awareness and the detection of illicit discharges. Since municipal staff are residents of Boone County, improving the awareness of municipal employees may also reduce residential impacts and increase reporting of illicit discharges, dumping, and spills. Also, because municipalities expect residents and business owners to practice pollution prevention and good housekeeping, municipal employees should set an example for the rest of the community to follow.

Permit Requirement: Develop an operation and maintenance program that includes a training component and has the ultimate goal of preventing and/or reducing pollutant runoff from municipal operations, including those not currently required to be permitted as associated with industrial activities. The requirement continues to be met by each of the three co-permittees with the following BMPs and associated Measurable Goals.

BMP: Develop and implement operation and maintenance program

MG: Establish operation and maintenance schedule (All Permittees—Ongoing)

BMP: Develop training component

MG: Identify employees to train (All Permittees—Completed)

MG: Develop training presentation; include hazards associated with illegal discharges and improper disposal of waste (All Permittees—Completed)

MG: Schedule and conduct training (All Permittees—Ongoing)

Pictures above and below: Municipal employees receive training on the proper installation of erosion and sediment control practices to protect steep slopes. The practices were installed on a road realignment project.

Picture right: The covered salt shed protects local streams from stormwater runoff during rainfall events.