



# Municipal Separate Storm Sewer System (MS4)

## ANNUAL REPORT

SEPTEMBER 2016

KPDES PERMIT NO. KYS000001  
AI NO. 8235

Reporting Year 5  
07.2015 - 06.2016

COMPILED AND SUBMITTED BY:  
Louisville and Jefferson County  
Metropolitan Sewer District  
700 West Liberty Street  
Louisville, KY 40203

REPORTING TO:  
Kentucky Division of Water  
Surface Water Permits Branch  
300 Sower Boulevard  
Frankfort, KY 40601



### CO-PERMITTEES:

City of Anchorage  
City of Jeffersontown  
City of St. Mathews  
City of Shively  
Louisville Metropolitan Government  
Metropolitan Sewer District





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700 West Liberty Street | Louisville, KY 40203-1911  
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September 30, 2016

Ms. Abigail Rains  
Kentucky Division of Water  
Surface Water Permits Branch  
300 Sower Boulevard, 3rd Floor  
Frankfort, Kentucky 40601

Subject: Annual Report Submittal for KYS000001 (AI No. 8235)

Dear Ms Rains:

Enclosed is the Annual Report for the Louisville and Jefferson County MS4 stormwater discharge permit. The primary co-permittee for this municipal stormwater discharge permit is the Louisville and Jefferson County MSD. Other co-permittees include Louisville Metro and the cities of Anchorage, Jeffersontown, St. Matthews, and Shively. The current MS4 permit became effective on August 1, 2011. Enclosed is the permit year five Annual Report for the reporting period of July 1, 2015 to June 30, 2016.

Pursuant to the MS4 permit and 401 KAR 5:060 KPDES Application Requirements, MSD submitted an MS4 permit renewal application in January 2015, and as such, is continuing program administration, including annual reporting, under the effective MS4 permit that expired July 31, 2016.

The enclosed Annual Report documents the efforts of each of the co-permittees to comply with the MS4 permit by implementing MS4 permit elements during the reporting period. Co-permittee reports and certification statements are provided in Chapter 3.

For this report, MSD has included a 5-year trend analysis of monitoring data, as required by Part III.B.2 (A) of the permit. Please advise on additional feedback or questions that you may have regarding this report.

MSD hereby submits the Annual Report as required by KPDES Permit KYS000001.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,  
  
Mr. Wes Sydnor  
MS4 Program Manager

  
Mr. David Johnson  
Development and Stormwater Services Director

/ebw

Enclosures: MS4 Annual Report  
cc: File



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## EXECUTIVE SUMMARY

The mission of the Municipal Separate Storm Sewer System (MS4) Stormwater Quality Management Program (SWQMP) is to enhance stormwater runoff quality and protect streams and riparian habitat in order to promote public health, safety, and welfare.

Stormwater runoff quality and volume are growing concerns in Louisville. The Louisville and Jefferson County Metropolitan Sewer District (MSD) has been responsible for flood control and drainage in Jefferson County (except for the co-permittee cities of Anchorage, Jeffersontown, Shively, St. Matthews, and Louisville Metro) since 1987. MSD began comprehensive water quality monitoring of local streams in collaboration with the U.S. Geological Survey (USGS) in 1988. When the MS4 Kentucky Pollutant Discharge Elimination System (KPDES) permitting program began in the early 1990s, KYS000001 was the first Large MS4 Permit issued in U.S. Environmental Protection Agency (EPA) Region IV.



*Rain Garden at MSD's Main Office*

Each permit cycle, MSD enhances and improves the program through planning, activities, regulatory authority, environmental education programs, and leadership. The requirements in this permit represent the Kentucky Division of Water's (KDOW's) determination of maximum extent practicable (MEP) for Louisville MSD and Jefferson County and co-permittee communities covered by this permit. This permit, effective August 1, 2011, represents a significant increase in MEP and MS4 stormwater control since the previous permit term.

This annual report covers the reporting period from July 1, 2015, through June 30, 2016, for permit year (PY) 5. MSD has made significant progress on permit activities for PY 5. This report builds upon activities from previous permit years.

Along with MSD, its co-permittees continually work to improve the water quality of our local streams. Louisville Metro, the City of Anchorage, the City of Jeffersontown, the City of St.



Matthews, and the City of Shively are co-permittees. Co-permittee annual reports include documentation and reporting of co-permittee activities, including certification statements, in Chapter 3.

The annual report is a valuable tool to document, report and track progress that ultimately helps protect and improve the water quality in our streams. These areas of reporting include the following eight activities and programs:

- Public Education, Outreach, Participation & Learning Experiences (PEOPLE)
- Illicit Discharge Detection and Elimination (IDDE)
- Industrial Program (IP)
- Construction Site Stormwater Runoff Controls (CS)
- Post-Construction Stormwater Runoff Controls (PC)
- Good Housekeeping and Pollution Prevention (GH/P2)
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## MS4 POINTS OF CONTACT

The MSD is the primary permittee for the MS4 Program and is co-permitted with Louisville Metro, City of Anchorage, City of Jeffersontown, City of St. Matthews, and City of Shively. Points of contact including executive staff and MS4 Program coordinators are provided below. The MSD Engineering Division organizational chart effective July 2016, including full-time MS4 program staff (page 13) is provided in Appendix 1.2.1 MSD Organizational Chart.

### Louisville & Jefferson County MSD

| Name              | Agency                            | Role   | Phone Number   |
|-------------------|-----------------------------------|--|----------------|
| Mayor Greg Fisher | Louisville Metro                  | Mayor  | (502) 574-2003 |
| James A. Parrott  | Louisville & Jefferson County MSD | Executive Director                           | (502) 540-6000 |
| Angela Akridge    | Louisville & Jefferson County MSD | Chief Engineer                               | (502) 540-6000 |
| David Johnson     | Louisville & Jefferson County MSD | Development and Stormwater Services Director | (502) 540-6000 |
| Wes Sydnor        | Louisville & Jefferson County MSD | MS4 Program Manager                          | (502) 540-6000 |

### Louisville Metro

| Name              | Agency                | Role  | Phone Number   |
|-------------------|-----------------------|---|----------------|
| Mayor Greg Fisher | Louisville Metro      | Mayor   | (502) 574-2003 |
| Dirk Gowin        | Public Works          | Executive Administrator                             | (502) 574-5925 |
| Mark Zoeller      | Facilities Management | Assistant Director of Facilities Project Management | (502) 574-0104 |
| Steve Goodwin     | Louisville Zoo        | Maintenance Manager                                 | (502) 459-2181 |
| Jason Canuel      | Metro Parks           | Assistant Director                                  | (502) 485-8113 |

### City of Anchorage

| Name                   | Agency            | Role                        | Phone Number   |
|------------------------|-------------------|-----------------------------|----------------|
| Mayor W. Thomas Hewitt | City of Anchorage | Mayor                       | (502) 245-4654 |
| Renee Major            | City of Anchorage | City Clerk/MS4 Coordinator  | (502) 245-4654 |
| Erwin Booth            | City of Anchorage | Public Works                | (502) 245-4654 |
| Greg Smith             | City of Anchorage | Stormwater/Drainage Officer | (502) 245-4654 |

### City of Jeffersontown

| Name              | Agency                            | Role            | Phone Number   |
|-------------------|-----------------------------------|-----------------|----------------|
| Mayor Bill Dieruf | City of Jeffersontown             | Mayor           | (502) 267-8333 |
| Matt Meunier      | City of Jeffersontown             | MS4 Coordinator | (502) 267-8333 |
| Rob Huckaby       | Stantec for City of Jeffersontown | Consultant      | (502) 212-5046 |

### City of St. Matthews

| Name                    | Agency               | Role                     | Phone Number   |
|-------------------------|----------------------|--------------------------|----------------|
| Mayor Richard J. Tonini | City of St. Matthews | Mayor                    | (502) 895-9444 |
| Jim Birch               | City of St. Matthews | City Engineer            | (502) 899-2518 |
| Kenan Stratman          | City of St. Matthews | Public Works/Coordinator | (502) 899-2517 |

### City of Shively

| Name                        | Agency                           | Role            | Phone Number   |
|-----------------------------|----------------------------------|-----------------|----------------|
| Mayor Sherry Sinegra Conner | City of St. Shively              | Mayor           | (502) 449-5000 |
| John Haywood                | City of St. Shively              | MS4 Coordinator | (502) 449-4749 |
| Rick Storm                  | BA Engineers for City of Shively | Consultant      | (502) 775-5741 |



## DEFINITIONS, ACRONYMS AND UNITS

**Baseline.** The existing conditions. An initial set of observations or data used as a comparison or starting point from which the magnitudes of an alternative's effects are measured.

**BMPs, Best Management Practices.** Management procedures, equipment or facilities that either prevents pollutant from contaminating runoff or that treat runoff before it enters a stream. BMPs may also reduce runoff velocity or volume in order to prevent stream degradation from excessive erosive forces. BMPs also include treatment requirements, operating procedures, and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**BIA, Building Industry Association of Greater Louisville.** MSD coordinates with this organization to educate the development and construction community on the requirements of the stormwater quality permit.

**BOD, Biochemical Oxygen Demand.** A measurement of the amount of oxygen used by the decomposition of organic material over a specified time period (usually 5 days) in a wastewater sample. Used as a measurement of the readily decomposable organic content of water. Also referred to as BOD5, this is a measure of the amount of oxygen required by microbes to consume the pollutants in a sample of water during the five days after the sample is taken.

**CFR, Code of Federal Regulations.** A codification of the general and permanent rules published by the Federal Register by the executive departments and agencies of the federal government.

**Clean Water Act.** The MS4 permit is a result of the 1987 amendments to the Clean Water Act, where congress mandated that the EPA address non-point source pollution in stormwater runoff.

**Consent Decree.** Is a judicially recognized and enforceable voluntary settlement of potential claims, charges or violations in which a party agrees to take or perform specific actions, without admitting fault or guilt for the situation that led to the potential charges, in resolution of the potential case.

**CPESC, Certified Professional in Erosion and Sediment Control.** A CPESC is a recognized specialist in soil erosion and sediment control by EnviroCert International, Inc. CPESCs have educational training, demonstrated expertise, experience in controlling erosion and sedimentation, and meet certification standards.

**CPSWQ, Certified Professional in StormWater Quality.** A CPSWQ is a recognized specialist in stormwater quality by EnviroCert International, Inc. CPSWQs have educational training, demonstrated expertise, experience in managing storm water quality, and meet certification standards.



**CRS**, Community Rating System. The CRS was developed by the National Flood Insurance Program (NFIP) and is a voluntary incentive-based program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Benefits of participation in the program include reduced flood insurance premium rates and reduced flood risk due to community action to meet the goals of the CRS.

**CS**, Construction Site stormwater management. One of the requirements (section 2.4) under the NPDES stormwater program to address erosion prevention and sediment control issues on construction sites.

**CSO**, Combined Sewer Overflow. An outfall identified as a combined sewer overflow or CSO in MSD's KPDES permit for the Morris Forman WQTC, from which MSD is authorized to discharge during wet weather. Dry Weather CSO – An unauthorized overflow from a permitted outfall identified as a combined sewer overflow or CSO in MSD's Morris Forman WQTC KPDES permit that is not the result of a wet weather event. Wet Weather CSO - An overflow from a permitted outfall identified as a combined sewer overflow or CSO in MSD's Morris Forman WQTC KPDES permit that is the result of a wet weather event. Combined sewers carry both sanitary waste and stormwater drainage. CSOs are outlets that relieve sewers into streams and rivers, keeping the sewers from backing up into homes, businesses and streets when it rains.

**CSS**, Combined Sewer System. The portion of MSD's Sewer System designed to convey municipal sewage (domestic, commercial, and industrial wastewaters) and stormwater runoff through a single-pipe system to MSD's Morris Forman WQTC or CSOs. The system of drainage pipes built in the urban area of the City of Louisville after a public water supply was provided in the 1860s. The CSS conveys combined stormwater and sewage away from urbanized areas into the Ohio River and Beargrass Creek during wet weather. During dry weather, sewage is conveyed to the water quality treatment plant. The MS4 does not include the CSS area.

**DO**, Dissolved Oxygen. A measurement of the amount of oxygen dissolved in water, typically expressed in mg/L.

**Drainage and Flood Protection**, MSD's (formerly Infrastructure and Flood Protection) crews address improvements associated with the combined and storm sewer systems as well as inspect and repair the levee system to improve community flood protection.

**DRI**, Drainage Response Initiative. Project DRI is a partnership between Louisville Metro government and MSD that was created to respond to local drainage issues.

**EPA**, Environmental Protection Agency. The US federal agency responsible for regulating environmental hazards.

**EPSC**, Erosion Prevention and Sediment Control. EPSC measures and best management practices are designed to reduce sediment runoff and erosion from occurring on construction sites and other locations.



**ERPI**, Emergency Response Pretreatment Inspector. MSD utilizes with ERPIs to respond to spills, including HAZMAT response, to comply with illicit discharge detection and elimination components of this permit. This has been renamed to Senior Environmental Compliance Inspector.

**FEMA**, Federal Emergency Management Agency. An agency of the US Department of Homeland Security that was created to coordinate response to disasters, recovery efforts, and disaster preparation and planning.

**FPO**, Floodplain Management Ordinance. The local ordinance enacted in 1997. The FPO has specific requirements for storage of hazardous materials in the floodplain as well as limits on development and redevelopment.

**GDP**, General Discharge Permit. A general discharge permit is issued to a category of dischargers and covers all projects or activities associated with their permit.

**GHP2**, Good Housekeeping and Pollution Prevention. Programs and activities performed to reduce pollution by not creating it or by not releasing it from the source at municipal facilities. Includes materials substitution by use of less-toxic alternatives, management procedures that minimize the quantity of waste generated, housekeeping practices that reduce spillage and recover materials, reuse of materials recovered and recycling of waste.

**GIS**, Geographic Information System. An information system for capturing, storing, analyzing, managing and presenting data which are spatially referenced. MSD uses GIS platforms to efficiently and effectively manage and store data associated with its storm sewer system and stormwater permit. This capability includes producing maps, displaying the results of data queries, and conducting spatial analysis.

**Gray Infrastructure**. Constructed structures such as treatment facilities, sewer systems, stormwater systems, or storage basins. The term “gray” refers to the fact that such structures are typically made of, or involve the use of concrete and steel.

**Green Infrastructure**. An adaptable term used to describe an array of materials, technologies, and practices that use natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide utility services. As a general principal, green infrastructure techniques use soils and vegetation to infiltrate, evapotranspire, and/or recycle stormwater runoff. Examples of green infrastructure include green roofs, porous pavement, rain gardens, and vegetated swales. “Green” infrastructure is a combination of natural and engineered infrastructure that is designed to reduce the environmental footprint of the system.

**HANSEN®**. Trademark name of the database and software program used by MSD for recording, tracking, and reporting geocoded data. HANSEN® houses MSD sewer and drainage system asset data, the MIDAS property and permit data, the customer service request data and the pretreatment program permit and hazardous materials response program data. HANSEN® geocoded tables are theme layers in the LOJIC GIS.



**HMO**, Hazardous Materials Ordinance. First adopted in 1986, the local HMO requires HMPC plans and local HAZMAT release reporting. The amended HMO was approved July 2, 2007.

**HMPC**, Hazardous Materials (spill) Prevention and Control. Local facilities that store reportable quantities of hazardous materials are required to file a plan application with MSD. There are currently over 3,000 approved plans. HMPC plans include requirements for adequate secondary containment, training, release response, and reporting requirements.

**HSPF**, Hydrological Simulation Program – A comprehensive package developed by the USEPA for simulation of watershed hydrology and water quality for both conventional and toxic organic pollutants. The program incorporates hydrology and water quality to allow the integrated simulation of land and soil contaminant runoff processes with in-stream hydraulic and sediment-chemical interactions.

**IDDE**, Illicit Discharge Detection and Elimination. One of the requirements (section 2.2) under the NPDES stormwater program to address non-stormwater discharges into waterways through regulatory measures, identification and removal.

**IWD**, Industrial Waste Department. The MSD Industrial Waste Department is part of the Support Services Division. It administers the WDRs through the industrial pretreatment program, the customer service request response and HAZMAT incident response program, and the HMO through the hazardous materials plan program. The motor vehicle accident (MVA) mitigation program is also administered by IWD.

**JCPS**, Jefferson County Public Schools. JCPS is the local county-wide public school system. MSD coordinates with JCPS on several public education, outreach and involvement initiatives associated with the stormwater permit.

**KDOW**, Kentucky Division of Water. (In the Department for Environmental Protection in the Environment and Public Protection Cabinet). Responsible for issuing all permits for discharges into the waters of the Commonwealth.

**KPDES**, Kentucky Pollutant Discharge Elimination System. Any National Pollutant Discharge Elimination System permit issued to MSD by the Cabinet pursuant to the authority of the Clean Water Act and Kentucky Revised Statutes (KRS) Chapter 224 and the regulations promulgated thereunder. KPDES is the state regulatory permitting program through which MSD's stormwater program is directed.

**KPPC**, Kentucky Pollution Prevention Center. The KPPC at the University of Louisville provides pollution prevention and energy efficiency services to Kentucky's businesses, industries, state government agencies and communities. KPPC also provides free, non-regulatory waste assessments to Kentucky businesses.

**KRS**, Kentucky Administrative Regulations. Administrative regulations published by the Kentucky Legislative Commission. An unofficial posting of the KAR is available via the Commission's website at [www.lrc.ky.gov](http://www.lrc.ky.gov).



**KWA**, Kentucky Waterways Alliance. A non-profit organization that promotes networking, communication and mutual support among groups, government agencies, and businesses working on waterway issues.

**KYTC**, Kentucky Transportation Cabinet. The Kentucky Transportation Cabinet operates storm sewers on their properties and state road and highway rights-of-way within the Louisville Metro MS4. KYTC was previously co-permitted with MSD, and in 2011 received an individual MS4 stormwater permit. KYTC continues to partner with MS4 communities across the state to implement their permit.

**LDP**, Louisville Downtown Partnership. Formed in 2013 and is comprised of two governmental entities: the Louisville Downtown Management District (LDMD) and the Louisville Downtown Development Corporation. The mission of the partnership is to improve the economy of Louisville Metro by coordinating an aggressive public/private program to promote the redevelopment, vitality and economic growth of the Central Business District and surrounding areas and to promote Downtown's quality of life by creating a safer, cleaner and more enjoyable environment.

**LIMS**, Laboratory Information Management System. This database houses the monitoring location and analytical results for MSD monitoring.

**LLW**, Living Lands and Waters. An organization that promotes the riparian restoration of watersheds and mobilizes local volunteers to participate in stream clean up, planting and invasive species removal efforts.

**LMDPHW**, Louisville Metro Department of Public Health and Wellness. A branch of the Louisville Metro Government operating under the direction of the Mayor and Louisville Metro Council, with the role of improving health and wellness in the Louisville Metro area.

**LMEMA**, Louisville Metro Emergency Management Agency. A branch of the Louisville Metro Government responsible for preparation, mitigation, response, and recovery from natural and manmade disasters.

**LMFD**, Louisville Metro Fire Department. A branch of the Louisville Metro Government that provides fire protection, prevention, environmental protection, education, building inspection, and fire cause determination throughout the Louisville Metro area.

**LMPD**, Louisville Metro Police Department. A branch of the Louisville Metro Government and built through the merger of the City of Louisville and Jefferson County governments. LMPD provides law enforcement, security, and education for the Louisville Metro area.

**LNC**, Louisville Nature Center. A community resource that provides nature education and recreation for community members to enjoy. Projects and resources are sponsored by community donations and supported by MSD.



**Loading.** Pounds of pollutants per day in running water calculated as concentration in parts per million (mg/L), multiplied by water flow in million gallons per day (MGD), multiplied by 8.34 pounds per gallon: Parts/million x million gallons/day x 8.34 pounds/gallon = pounds/day.

**LOJIC**, Louisville and Jefferson County Information Consortium. The local ArcView GIS project founded by MSD in partnership with the Louisville Water Company, Louisville Metro Government and the Jefferson County Property Valuation Administration. LOJIC mapping capabilities include physical, commercial, socioeconomic and political geographic information. The LOJIC ArcView and the HANSEN® data tables are linked. LOJIC mapping is available to the public at [www.lojic.org](http://www.lojic.org).

**LTMN**, Long Term Monitoring Network. System of in-stream monitoring locations that have a data sonde continuously recording water quality parameters and USGS flow gages. Samples are taken and laboratory analyses performed for other pollutants of concern as described in this SWQMP. Data is available online at <http://waterdata.usgs.gov/ky/nwis>.

**M**, Monitoring. One of the requirements (section 2.7 and Chapter 5) under the NPDES stormwater program to monitor improvements to local water quality and the overall effectiveness of permit activities.

**mg/L**, Milligrams per Liter. Unit of concentration of pollutants in water in parts per million.

**MGD**, Million Gallons per Day. Unit of measure for water flow used to calculate pollutant loading.

**MIDAS**, Metro Information, Development and Assets System. The portion of the HANSEN® database used by Louisville Metro government for permit and inspection programs.

**MS4**, Municipal Separate Storm Sewer System. Jefferson County contains MS4s operated by MSD, Anchorage, Jeffersontown, St. Matthews, and Shively. The Kentucky Transportation Cabinet also operates storm sewers on their properties and state road and highway rights-of-way within the other Metro MS4s. Louisville Metro Government provides for stormwater conveyance in public streets and parks.

**MSD**, the Louisville and Jefferson County Metropolitan Sewer District. MSD is responsible for wastewater collection, conveyance and treatment, stormwater drainage and flood control within its District except for those drainage areas operated by the co-permittees and those areas located outside the boundaries of the MS4 drainage service area. MSD is also responsible for response, mitigation, notification, and reporting of overflows, including unauthorized discharges. MSD administers the Louisville Metro Erosion Prevention and Sediment Control Ordinance, the Floodplain Ordinance, the Hazardous Materials Ordinance and the Wastewater/Stormwater Discharge Regulations. [www.msdlouky.org](http://www.msdlouky.org)

**NOD**, Notice of Deficiency. Permittees not meeting the regulatory intent of their permit may receive a NOD. A NOD includes the deficient item or items and necessary corrective actions.



**NOV**, Notice of Violation. Permittees not meeting the regulatory requirements of their permit may receive a NOV. A NOV may include the item or items in violation, corrective actions and fines incurred.

**NPDES**, National Pollutant Discharge Elimination System. NPDES is the federal regulatory permitting program through which MSD's stormwater program is directed.

**NPS**, Nonpoint Source. Nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, and eventually deposits them into lakes, rivers, wetlands and other waterbodies. Nonpoint source pollutants often include excess fertilizers and herbicides from agricultural and residential areas, oil and grease from urban areas, sediment from improperly managed construction sites and eroding streambanks, and bacteria and nutrients from livestock and pet wastes.

**OHWM**, Ordinary High Water Mark. Ephemeral streams that are tributary to other waters of the U. S. are also waters of the U. S., as long as they possess an OHWM. The upstream limit of waters of the United States is the point where the OHWM is no longer perceptible (see 51FR 41217). An ephemeral stream that does not have an OHWM is not a water of the United States. The frequency and duration at which water must be present to develop an OHWM has not been established for the USACE regulatory program. District engineers use their judgment on a case-by-case basis to determine whether an OHWM is present.  
<http://www.epa.gov/owow/wetlands/regs/nwfinal.pdf>

**PAR**, Program Assessment and Reporting. One of the requirements under the NPDES stormwater program to evaluate the stormwater program on a regular basis to determine program improvement and progress, and to document activities for regulatory compliance.

**PAT**, Project Activity Tracking – Access database used to track plan development project names and numbers.

**Pathogen**. An organism capable of causing disease, including disease-causing bacteria, protozoa, and viruses.

**PC**, Post-Construction stormwater runoff and pollutant controls. One of the requirements (section 2.5) under the NPDES stormwater program to manage stormwater runoff and maintain stormwater best management practices in a sustainable fashion to allow effective long-term stormwater treatment.

**PCR**, Primary Contact Recreation. PCR is a surface water use of full-body contact recreation that includes immersion of the head and face, such as swimming.

**PEOPLE**, Public Education, Outreach, Participation and Learning Experiences. One of the requirements (section 2.1) under the NPDES stormwater program to improve the knowledge of the general public and target audiences to make individual behavior changes to improve stormwater quality.



**PER**, Program Evaluation and Reporting. One of the requirements under the NPDES stormwater program to evaluate the stormwater program on a regular basis to determine program improvement and progress, and to document activities for regulatory compliance.

**POTW**, Publicly Owned Treatment Works. Wastewater collection, conveyance and treatment utility owned and operated by a public agency. MSD is a POTW.

**Project XL**, Project eXcellence in Leadership Program. The US EPA national pilot program designed to allow selected sewage treatment agencies to test whether better and more cost-effective methods can be used to improve water quality.

**PRR**, Preliminary Response Report. A report issued by IWD in response to a hazardous materials release incident call and investigation. The report is issued to the responsible party and directs them to immediate corrective actions that are required. PRRs and inspection findings are reviewed by the IWD Response Group.

**PS**, Point Source. Point source pollution is a single, identifiable point discharge of pollution. An example of a point source discharge would include a sewage treatment plant or an industrial discharge facility.

**PY**, Permit Year. A permit year starts on August 1 and ends July 31 of the following year.

**QA/QC**, Quality Assurance/Quality Control. This is a process to check the quality of work and activities.

**QPCI Training**, Qualified Post Construction Inspector Training. This training course produced by MSD is intended to transfer knowledge of proper Green Management Practice (GMP) inspection and maintenance protocols to individuals responsible for maintaining GMPs in Jefferson County.

**S&F**, Solids and Floatables. Materials in sewage that are large enough to be visibly recognizable. Most solids and floatables in combined sewage are comprised of street litter and debris, but some plastic and paper products flushed down toilets stay in a visibly recognizable form, and are objectionable to some people.

**Sanitary Sewer**. A pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the publicly owned treatment works.

**SCR**, Secondary Contact Recreation. SCR is a surface water use for recreational contact with surface waters that does not include full-body immersion.

**SEC**, Specific Electrical Conductance. The measure of the electrical conductance of water normalized to a unit length and a unit cross-section at a specific temperature.



**SIU**, Significant Industrial User. As defined by the EPA, any industry which is designated as such on the basis that the industrial user has a reasonable potential for adversely affecting the operation of the collection system or treatment plant, or violating any pretreatment requirement.

**SOP**, Standard Operating Procedure. These procedures are defined by MSD and are followed by MSD staff and personnel.

**SSO**, Sanitary Sewer Overflow. Any discharge of wastewater to waters of the United States from MSD's Sewer System through a point source not authorized by a KPDES permit, as well as any release of wastewater from MSD's Sewer System to public or private property that does not reach Waters of the United States, such as a release to a land surface or structure that does not reach Waters of the United States; provided, however, that releases or wastewater backups into buildings that are caused by blockages, flow conditions, or malfunctions in a building lateral, or in other piping or conveyance system that is not owned or operationally controlled by MSD are not SSOs.

**SSS**, Sanitary Sewer System. The portion of MSD's sewer system designed to convey only municipal sewage (domestic, commercial, and industrial wastewaters) to MSD's WQTCs.

**Stream.** Surface water channel having well-defined banks and bed, either constantly or intermittently flowing. "Ephemeral stream" means a watercourse which only flows in direct response to precipitation in the immediate watershed, or in response to the melting of a cover of snow and ice, and which has a channel bottom that is above the local water table. An ephemeral stream is a water of the United States, provided it has an OHWM. "Intermittent stream" means a stream or part of a stream that does not flow continuously throughout the calendar year; but that has a bed below the local water table for at least one month of the calendar year during which it obtains its flow from both surface water and ground water discharge. The term does not include an ephemeral stream. "Perennial stream" means a stream or part of a stream that flows continuously during all of the calendar year as a result of ground-water discharge or surface runoff. The term does not include "intermittent stream" or "ephemeral stream".

**Surface Waters.** Those waters having well-defined banks and beds, either constantly or intermittently flowing; lakes and impounded waters; marshes and wetlands; and any subterranean waters flowing in well-defined channels and having a demonstrable hydrologic connection with the surface.

**SWO**, Stop Work Order. A permit holder or regulatory authority may issue a stop work order for permit violations within their jurisdiction.

**SWPPP**, Stormwater Pollution Prevention Plan. A plan for stormwater discharge that when implemented will decrease nonpoint source pollution.

**SWQMP**, Stormwater Quality Management Plan. As stated in the MSD's MS4 Permit, the SWQMP is a plan that MSD is required to develop, implement, and enforce. This includes controls intended to reduce the discharge of pollutants from MS4 conveyances.



**TDS**, Total Dissolved Solids. The fine particles that are suspended in water as measured by a laboratory analysis. TDS are typically small enough to pass through a sieve size of two micrometers.

**TMDL**, Total Maximum Daily Load. A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.

**TTO**, Total Toxic Organics. The sum of the analytical results greater than 0.01 mg/L of a list of toxic organics as specified by EPA.

**TSS**, Total Suspended Solids. The fine particles suspended in water as measured by a laboratory analysis. High TSS causes adverse water quality conditions for sensitive aquatic organisms.

**TVS**, Total Volatile Solids. TVS includes organic compounds of animal or plant origin.

**Unauthorized Discharge.** (a) any discharge of wastewater to waters of the United States from MSD's Sewer System or WQTCs through a point source not authorized by a KPDES permit and (b) any Bypass at MSD's WQTCs prohibited pursuant to the provisions of 40 CFR § 122.41(m)(2) and (4) or 401 KAR 5:065, Section 1(13)(a) and (c).

**USACE**, U.S. Army Corps of Engineers. A branch of the US Government, made up of civilians and military members with a wide diversity of disciplines. From biologists, engineers, geologists, hydrologists, natural resource managers, to other professionals needed within this entity. The Corps plans, designs, builds, operates, and regulates water resources projects that are crucial to the citizens of the United States.

**USGS**, United States Geological Survey. A division of the US Government, Department of Interior. USGS is the sole science agency for the Department of Interior.

**WAH**, Warm Water Aquatic Habitat. "Warm Water Aquatic Habitat" or "WAH" means any surface water and associated substrate capable of supporting indigenous warm water aquatic life.

**WASP**, Water Quality Analysis Simulation Program. This is a model created by the EPA to model contaminant fate and transport in surface waters.

**WAT!**, Watershed Assessment Tool! A spreadsheet watershed characterization tool that models point and non-point source pollution loads to assess green infrastructure.

**Water.** From [KRS 224.1-010](#) (33) "Water" or "waters of the Commonwealth" means and includes any and all rivers, streams, creeks, lakes, ponds, impounding reservoirs, springs, wells, marshes, and all other bodies of surface or underground water, natural or artificial, situated wholly or partly within or bordering upon the Commonwealth or within its jurisdiction; Effluent ditches and lagoons used for waste treatment which are situated on property owned, leased, or



under valid easement by a KPDES-permitted discharger are not considered to be waters of the Commonwealth. From USEPA [40 CFR 230.3](#) “waters of the United States” means all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flows of the tide, all interstate waters including interstate wetlands, and territorial seas. This also includes all bodies of water near the aforementioned waters including wetlands, ponds, lakes, oxbows, impoundments, and similar waters.

**Watershed.** Land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean.

**WDR,** Jefferson County Wastewater/Stormwater Discharge Regulations. The WDR applies to all users of the sewer collection system as well as the MS4. It contains regulations that prohibit discharge of materials that could cause damage to the sewer system or the environment in WDR Section 2. WDR Section 5 prohibits discharges to stormwater conveyances. Penalties and enforcement are authorized by WDR Section 6. MSD’s IWD administers the WDR.

**WQS,** Water Quality Standards. Standards that set the goals, pollution limits, and protection requirements for each waterbody. These standards are composed of designated (beneficial) uses, numeric and narrative criteria, and antidegradation policies and procedures.

**WQTC,** Water Quality Treatment Center. MSD owns and operates five wastewater treatment centers in Louisville Metro. These include the Morris Forman, Derek R. Guthrie, Hite Creek, Cedar Creek, and Floyds Fork WQTCs. Jeffersontown WQTC was eliminated December 2015.

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## **ACRONYMS & UNITS**

|         |  |
|---------|--|
| APCD    | Air Pollution Control District                         |
| BIA     | Building Industry Association of Greater Louisville    |
| BMP     | Best Management Practice                               |
| BOD     | Biochemical Oxygen Demand                              |
| CFR     | Code of Federal Regulations                            |
| cfs     | Cubic feet per second                                  |
| cfu     | Colony forming unit                                    |
| CMF     | Central maintenance facility                           |
| COD     | Chemical oxygen demand                                 |
| CPESC   | Certified Professional in Erosion and Sediment Control |
| CPSWQ   | Certified Professional in StormWater Quality           |
| CRS     | Community Rating System                                |
| CS      | Construction Site                                      |
| CSO     | Combined sewer overflow                                |
| CSRs    | Customer Service Requests                              |
| CSS     | Combined sewer system                                  |
| CWA     | Clean Water Act  |
| DAG     | Developers Advisory Group                              |
| DMR     | Discharge monitoring report                            |
| DO      | Dissolved oxygen                                       |
| DWS     | Drinking Water Standard                                |
| E. Coli | Escherichia Coli                                       |
| EMS     | Emergency Management Service                           |
| EPA     | U.S. Environmental Protection Agency                   |
| EPSC    | Erosion Prevention and Sediment Control                |
| ERP     | Enforcement Response Plan                              |
| ERPI    | Emergency Response Pretreatment Inspector              |
| EWB     | Engineers without Borders                              |
| FAQS    | Frequently Asked Questions                             |
| FEMA    | Federal Emergency Management Agency                    |
| FOG     | Fats, oils, and grease                                 |
| FPMP    | Floodplain Management Plan                             |
| FPO     | Floodplain Management Ordinance                        |
| FS      | Fully Supports the Use                                 |
| FTE     | Full time equivalents                                  |



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|       |  |
|-------|--|
| FY    | Fiscal Year  |
| GDP   | General Discharge Permit                           |
| GH    | Good Housekeeping                                  |
| GH/P2 | Good Housekeeping/ Pollution Prevention            |
| GIS   | Geographic Information System                      |
| GMP   | Green Management Practice                          |
| GPD   | Gallons per day                                    |
| GPP   | Groundwater Protection Plan                        |
| HMO   | Hazardous Materials Ordinance                      |
| HMPC  | Hazardous Materials (spill) Prevention and Control |
| HRIFs | High Risk Industrial Facilities                    |
| HSPF  | Hydrological Simulation Program – FORTRAN          |
| IDDE  | Illicit Discharge Detection and Elimination        |
| IFPD  | Infrastructure and Flood Protection Division       |
| IOAP  | Integrated Overflow Abatement Plan                 |
| IP    | Industrial Program                                 |
| IPCC  | Intergovernmental Panel on Climate Change          |
| IWD   | Industrial Waste Department                        |
| JCPS  | Jefferson County Public Schools                    |
| JTown | Jeffersontown                                      |
| KAMM  | Kentucky Association of Mitigation Managers        |
| KAR   | Kentucky Administrative Regulations                |
| KDEP  | Kentucky Department of Environmental Protection    |
| KDOW  | Kentucky Division of Water                         |
| KEEC  | Kentucky Environmental Education Council           |
| KEPSC | Kentucky Erosion Prevention and Sediment Control   |
| KPDES | Kentucky Pollutant Discharge Elimination System    |
| KPPC  | Kentucky Pollution Prevention Center               |
| KRS   | Kentucky Revised Statute                           |
| KSA   | Kentucky Stormwater Association                    |
| KWA   | Kentucky Waterway Alliance                         |
| KYTC  | Kentucky Transportation Cabinet                    |
| LD    | Legal Department                                   |
| LDC   | Louisville Development Code                        |
| LDMD  | Louisville Downtown Management District            |
| LEED  | Leadership in Energy and Environmental Design      |
| LG&E  | Louisville Gas & Electric                          |



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|         |  |
|---------|--|
| LIMS    | Laboratory Information Management System                         |
| LLW     | Living Land & Water  |
| LMDPHW  | Louisville Metro Department of Public Health and Wellness        |
| LMEMA   | Louisville Metro Emergency Management Agency                     |
| LMFD    | Louisville Metro Fire Department                                 |
| LMG     | Louisville Metro Government                                      |
| LNC     | Louisville Nature Center   |
| LOJIC   | Louisville and Jefferson County Information Consortium           |
| LTCP    | Long-Term Control Plan   |
| LTMN    | Long Term Monitoring Network                                     |
| LWC     | Louisville Water Company   |
| M       | Monitoring   |
| MEP     | Maximum Extent Practicable                                       |
| mg/L    | Milligrams per liter   |
| MGD     | Million gallons per day  |
| MIDAS   | Metro Information, Development and Assets System                 |
| MS4     | Municipal Separate Storm Sewer System                            |
| MSD     | Louisville and Jefferson County Metropolitan Sewer District      |
| MVA     | Motor Vehicle Accident   |
| NEXRAD  | Next-Generation Radar  |
| NFIP    | National Flood Insurance Program                                 |
| NICET   | National Institute for Certification in Engineering Technologies |
| NMC     | Nine Minimum Controls  |
| NOAA    | National Oceanographic and Atmospheric Administration            |
| NOD     | Notice of Deficiency   |
| NOV     | Notice of Violation  |
| NPDES   | National Pollutant Discharge Elimination System                  |
| NPS     | Nonpoint Source  |
| NS      | Non-Support of the use   |
| NWS     | National Weather Service   |
| O&M     | Operations and Maintenance                                       |
| OHWM    | Ordinary High Water Mark   |
| ORSANCO | Ohio River Sanitation Commission                                 |
| OSHA    | Occupational Safety and Health Administration                    |
| P2      | Pollution Prevention   |
| PAR     | Program Assessment and Reporting                                 |
| PAT     | Project Activity Tracking  |



|             |  |
|-------------|--|
| PC          | Post construction  |
| PCR         | Primary Contact Recreation   |
| PE          | Professional Engineer  |
| PEOPLE      | Public Education, Outreach, Participation and Learning Experiences |
| PER         | Program Evaluation and Reporting                                   |
| PIO         | Public Information and Outreach                                    |
| PM          | Preventive maintenance   |
| POTW        | Publicly owned treatment works                                     |
| Project DRI | Project Drainage Response Initiative                               |
| Project WIN | Project Waterway Improvements Now                                  |
| Project XL  | Project eXcellence in Leadership Program                           |
| PRR         | Preliminary Response Report  |
| PS          | Point Source   |
| PVA         | Jefferson County Property Valuation Administrator                  |
| PVC         | Polyvinyl chloride   |
| PY          | Permit Year  |
| QA/QC       | Quality Assurance / Quality Control                                |
| QAPP        | Quality Assurance Project Plan                                     |
| QPCI        | Qualified Post-Construction Inspector                              |
| RBP         | Stream Rapid Bioassessment Protocol                                |
| ROW         | Right-of-way   |
| RTC         | Real time control  |
| S&F         | Solids and Floatables  |
| SCADA       | Supervisory Control and Data Acquisition                           |
| SCR         | Secondary Contact Recreation (wading or boating)                   |
| SEC         | Specific Electrical Conductance                                    |
| SIU         | Significant Industrial User  |
| SMMP        | Stormwater Management Master Plan                                  |
| SOP         | Standard Operating Procedure                                       |
| SORP        | Sewer Overflow Response Protocol                                   |
| SPCC        | Spill Prevention, Control and Countermeasure                       |
| SPCC        | Spill Prevention, Control and Countermeasure                       |
| SSDP        | Sanitary Sewer Discharge Plan                                      |
| SSES        | Sanitary Sewer Evaluation Survey                                   |
| SSO         | Sanitary Sewer Overflow  |
| SSOP        | Sanitary Sewer Overflow Plan                                       |
| SSS         | Sanitary Sewer System  |



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|        |   |
|--------|---|
| SWMM   | Stormwater and Wastewater Management Model                    |
| SWO    | Stop work order   |
| SWPPP  | Stormwater Pollution Prevention Plan                          |
| SWQMP  | Stormwater Quality Management Plan                            |
| TARC   | Transit Authority of River City                               |
| TDS    | Total Dissolved Solids  |
| TKN    | Total Kjeldahl Nitrogen                                       |
| TMDL   | Total maximum daily load                                      |
| TRI    | Toxic Release Inventory                                       |
| TSS    | Total suspended solids  |
| TTO    | Total Toxic Organics  |
| TVS    | Total Volatile Solids   |
| U of L | University of Louisville                                      |
| UAA    | Use Attainability Analysis                                    |
| UPS    | United Parcel Service   |
| USACE  | United States Army Corps of Engineers                         |
| USGS   | United States Geological Survey                               |
| WAH    | Warm Water Aquatic Habitat                                    |
| WASP   | Water Quality Analysis Simulation Program                     |
| WATERS | Watershed Approach to Environmentally Responsible Stewardship |
| WDR    | Wastewater/Stormwater Discharge Regulations                   |
| WEF    | Water Environment Federation                                  |
| WERF   | Water Environment Research Foundation                         |
| WLA    | Waste Load Allocation   |
| WQS    | Water Quality Standards                                       |
| WQT    | Water Quality Tool  |
| WQTC   | Water Quality Treatment Center                                |
| WWT    | Wet Weather Team  |

## CHAPTER 1 INTRODUCTION AND SWQMP ASSESSMENT

### 1.1 INTRODUCTION AND PURPOSE

The purpose of the Municipal Separate Storm Sewer System (MS4) stormwater quality program is to improve stormwater runoff quality in Jefferson County, and to protect public health, safety, and welfare by preventing the introduction of harmful materials into the separate storm sewer systems that discharge into the streams in our community. The MS4 permit outlines the regulatory requirements for discharging municipal stormwater into local water bodies.



Louisville Metro is a consolidated city of about 740,000 residents, qualifying it as a Large MS4 by the U.S. Environmental Protection Agency (EPA) and Kentucky Division of Water (KDOW). KDOW regulates activities that discharge pollutants to the Waters of the Commonwealth, including municipal stormwater runoff. Louisville Metro stormwater discharges from its MS4 are regulated by Kentucky Pollutant Discharge Elimination System (KPDES) Permit KYS000001, which became effective August 1, 2011.

The Louisville and Jefferson County Metropolitan Sewer District (MSD) is the primary co-permittee, with Louisville Metro and the cities of Anchorage, Jeffersontown, Shively, and St. Matthews for the MS4 permit. MSD operates the stormwater drainage utility in Jefferson County that is outside the jurisdiction of the other co-permittees, and certified co-permittee reports are provided in Chapter 3.

This annual report document summarizes stormwater quality activities conducted during the reporting period of July 1, 2015, to June 30, 2016. The permit identifies the following reporting requirements in *Part III, Section D* of the permit, which is summarized below, along with a description of where this information is available in the annual report.

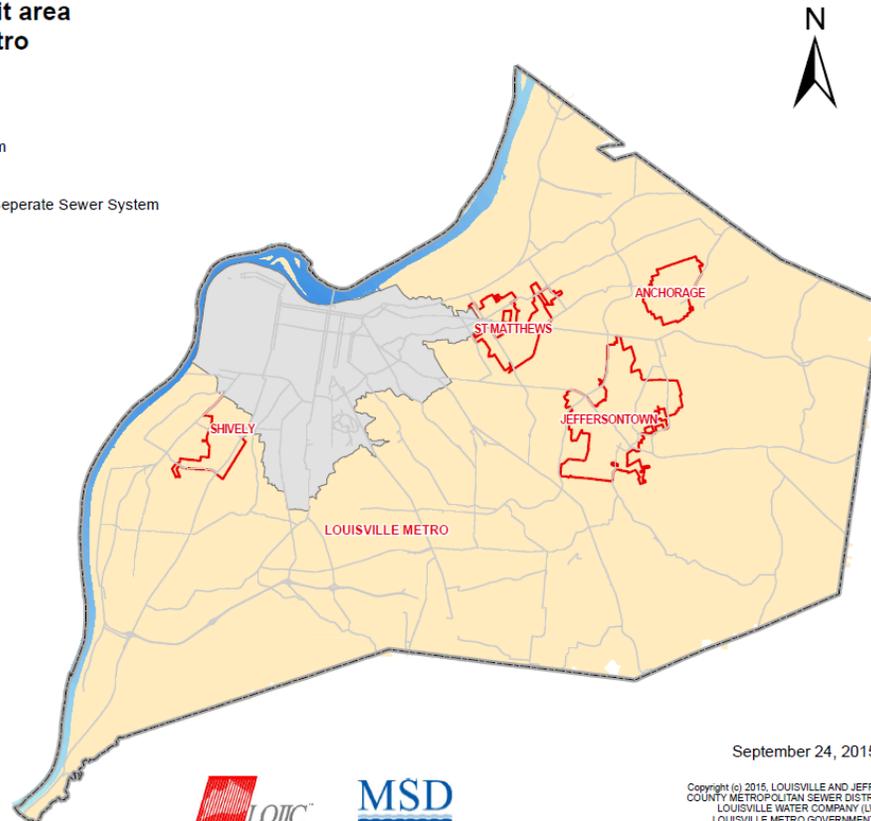
- **Summary of monitoring data** – provided in **Chapter 5 Monitoring**.
- **Evaluation of SWQMP developments and progress** – provided in **Chapter 1, Section 1.2 SWQMP Assessment**.
- **Status of implementation of program elements** (*tables 1-8 in Part II, Section F* of the permit) – provided in **Chapter 2 MSD Third Permit Cycle Program (Fact Sheets)**.

- **Status of implementation and proposed changes to the SWQMP** – provided in **Chapter 1, Section 1.2 SWQMP Assessment**.
- **Summary of inspections and enforcement actions for regulatory programs** – provided in **Chapter 2 MSD Third Permit Cycle Program (Fact Sheets)**.
- **Status of expenditures and budget for the present year and next permit year** – provided in **Chapter 1, Section 1.3 Financial**.
- **Chapter 5 Monitoring provides a five year analysis of the monitoring date**.
- **Annual report submittal to KDOW** – submitted annually by September 30.

MSD and its co-permittees strive to provide the public with an understanding of complex water quality issues and regulatory programs that protect our waterways. MSD-administered regulatory programs are enforced through the following mechanisms: the Erosion Prevention and Sediment Control (EPSC) Ordinance to manage stormwater runoff from construction sites, the Hazardous Materials Ordinance (HMO) to manage stormwater runoff from industrial facilities and detect and eliminate illicit discharges, and the Wastewater/Stormwater Discharge Regulations (WDR) to manage post-construction stormwater runoff and detect and eliminate illicit discharges. Louisville Metro also administers regulatory programs including ordinances and codes enforcing waste disposal and other environmental protection requirements, and the Cornerstone 2020 Land Development Code (LDC).

**MSD - MS4 Permit area  
Louisville Metro**

- State Roads
- Combined Sewer System
- Co-Permittee Cities
- Drainage Service Area/Seperate Sewer System
- Ohio River



September 24, 2015



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## SUPPORTING INFORMATION

Appendix 1.2.1      MSD Organizational Chart

## 1.2 SWQMP ASSESSMENT

Pursuant to the MS4 stormwater quality permit (*Part II*), MSD is required to develop, implement and enforce a Stormwater Quality Management Plan (SWQMP). The SWQMP, along with the MS4 permit, are the two primary documents that guide the stormwater quality program. The SWQMP is a management plan that outlines strategies for addressing program elements identified in the permit to reduce the discharge of pollutants to our local water bodies. MSD and its co-permittees utilize the SWQMP to guide their various agencies and departments to implement the MS4 permit.



*Floyds Fork*

SWQMP updates are provided to KDOW on an annual basis through the annual reporting process. MSD submitted the original SWQMP for this permit in October 2011, and most recently provided a SWQMP update in the September 2015 Annual Report. Annual reports include updates to the SWQMP – this section of the annual report provides an evaluation of the SWQMP (as required by *Part III, Section D* of the permit), including reporting of major findings and accomplishments, overall program strengths and weaknesses and future direction of the program. This section also addresses documentation of changes to the SWQMP as required by *Part II, Section C* of the permit.

### 1.2.1 Major Findings & Accomplishments

For this reporting period, there are significant activities that showcase major accomplishments of the program.

- Customer Education Campaign. MSD rolled out a customer education campaign to communicate MSD's commitment to safe, clean waterways. The campaign has included updated print and event materials and education campaigns.
- Election on National Board. In June 2016, Louisville MSD Executive Director James A. Parrott was elected to serve on the National Association of Clean Water Agencies Board of Directors. This honor recognizes MSD's place as a leader of the nation's water utilities.
- Social Media Program. MSD continued to grow its social media presence on Twitter. Since May 2014, @LouisvilleMSD has generated over 930 Twitter followers and released tweets on topics including: environmental awareness, outreach programs, events, health and safety, and public meetings. Public outreach campaigns supported by Twitter included Fun Fact Mondays, World Health Day,



*Rain Barrel Demonstration with WDRB*



*Rain Garden Interview with WAVE3*

Imagine a Day without Water, MSD interviews with WDRB and WAVE3, and Ohio River Sweep.

- Public education and outreach materials (see section 2.1 for more details). Bill inserts were provided to customers on stormwater topics including watershed awareness and downspout disconnection. In addition, MSD updated materials as a result of the customer education initiative and continues to distribute brochures to support regulatory programs and initiatives, including green infrastructure inspection and qualified post-construction inspector materials.
- Public education and outreach events (see section 2.1 for more details). MSD staff facilitated numerous events, including a presentation at the Louisville Free Public Library's How-To Festival, Home Show, Homearama, Adventures in Water Festival, and Construction Field Day. The Construction Field Day included construction of a rain garden at King Fish restaurant on River Road.
- Ohio River Sweep. MSD led clean-up activities at multiple locations along the Ohio River.
- Behavior Change Assessment Survey. MSD compared the 2015 survey results to the 2013 baseline survey conducted in 2013. The survey comparison reported several positive trends in public awareness, including a 26% increase in awareness of stormwater runoff and flooding as a cause of waterway pollution. More information on the survey comparison is available in Section 2.1.
- Metro Parks Partnership. MSD partnered with Metro Parks to implement the Engaging CHILDren Outdoors (ECHO) program. This is a Metro Parks environmental education program directed at fourth grade students who typically have limited opportunities to experience natural forest, meadow, or riparian environments. Six field opportunities help introduce students to the outdoors.
- Give-A-Day. MSD staff volunteered for the Mayor's Give-A-Day week of service in April 2016. Employees participated in rain garden workshops and tree plantings.
- Kentucky Waterways Alliance Partnership. MSD partnered with the Kentucky Waterways Alliance to implement the "Every Drop" program. The Every Drop program works with homeowners and renters (with landlord consent) in the Beargrass Creek



*Adventures in Water Festival*



*Ohio River Sweep*



*Rain Garden Workshop and Maupin Elementary*



*Sun Valley Tree Planting*

Watershed to install best management practices. Beargrass Creek Alliance members perform a stormwater audit to assess the suitable best management practices. The goals for this program are to improve water quality in Beargrass Creek as well as provide financial and technical incentives to install BMPs.

- **Floyds Fork Educational Partnership.** MSD continued the educational partnership with the Louisville Water Company and the Parklands at the Floyds Fork Water Quality Treatment Center. Students are educated on the water cycle, including a demonstration on drinking water, tour of the wastewater treatment plant, and exploration of the watershed at the plant outfall and overlook of Beckley Creek, where students discuss pollutant sources and their impact to the watershed as well as explore the habitat and the environment of the creek.
- **Rain Garden Workshops.** MSD conducted two rain garden workshops at Maupin Elementary and at the Waldorf School of Louisville. The workshops gave students, teachers, and family members practical, hands-on experience with nature, a lesson in caring for the environment, and an opportunity to express their creativity. MSD staff



*Floyds Fork Educational Partnership*



*Rain Garden Workshop and Maupin Elementary*

discussed stormwater runoff and pollution, how to build a rain garden, and the value of native plants. Participants were provided rain garden seed packets to take home.

- **Thermal Imagery and Illicit Discharge Field Identification.** MSD continued to review aerial thermal data collected by the second flyover. The desktop investigation was followed by field identification to confirm and mitigate illicit discharges. See section 2.2 of this report for more details.
- **Downspout Disconnection Program.** MSD continues to promote this program through residential bill inserts. Additional mailings in key areas were sent during the reporting period in key areas. Residents with downspout connections to the combined sewer system are offered a \$100 stipend for each downspout they disconnect from the sewer.
- **Reorganize Construction Inspection Staff.** MSD reorganized the majority of construction inspectors and brought staff in house for capital and private projects under a single Construction Inspection group in October 2015. Large capital projects are required to have an on-site contract inspector. MSD also conducts oversight inspections of these



*Thermal Imagery Anomalies*

large capital projects. Updates to the SOP for construction field verification inspections are underway to incorporate changes from the reorganization.

- Post-Construction Inspection Training. The Qualified Post-Construction Inspector (QPCI) course (see Section 2.5 of this report for more details) trains inspectors to observe the performance of green infrastructure. MSD was invited to participate in steering and reviewing content for the National Green Infrastructure Certification Program (NGICP). This certification program, initiated by WEF and DC Water, will standardize green infrastructure inspections and support green technology job growth across the country.



*Stream Monitoring*

- Phased Requirements for Green Infrastructure. As of August 1, 2015, MSD green infrastructure requirements for development went into effect throughout the county, including the combined sewer area. All new construction projects of one acre or greater are required to treat stormwater runoff with green infrastructure.
- Review of MSD Design Manual Chapter 18 (Green Infrastructure). MSD completed an extensive review of this chapter, which was released for public comment in June 2016. See Section 2.5 of this report for details. This includes updates to requirements for Water Quality Units. MSD is collaborating with a group of other communities on requirements for Water Quality Units.
- Green Infrastructure Financial Incentive Program. MSD continues to implement this program, which has resulted in green infrastructure installations on public and private property in a variety of land uses in the combined and separate sewer system areas.
- Monitoring Program. The monitoring program continues to be a robust tool for evaluating program progress and performance. MSD has made significant progress in systems to manage and learn from the millions of data points. Quarterly meetings are now held to discuss sample collection, lab procedures, USGS partnership activities, and analysis of data. Development of a Memorandum of Understanding between MSD and USGS is underway. The MOU will outline responsibilities, points of contact, and schedules for collection, review and reporting of continuous water quality data. Pursuant to the MS4 permit, MSD reviewed water quality data collected over the current permit cycle. Chapter 5 of this report includes a five year analysis of the available monitoring data.
- Water Quality Data. MSD collected samples to assess fish and macroinvertebrate communities. These surveys report the integrity of biological communities as a contributor to overall stream health at each of MSD's Long Term Monitoring Network locations. More information is available in Section 2.7 and Chapter 5 of this report.
- Industrial Program Training. Industrial training continues to be provided to Environmental Compliance Inspectors (see Section 2.3 of this report for more details). MSD staff attended individual field trainings for MS4 inspections, followed by classroom style training, and MSD continues to implement a robust industrial program regulating industrial facilities. As part of the Hazardous Material Spill Prevention Control (HMPC) Plan program, MSD continued with the pilot effort this year for HMPC-exempt facilities to inspect and educate property owners of the importance of good housekeeping practices to protect stormwater quality.

- Stormwater Pollution Prevention Plans (SWPPPs). MSD continues to conduct facility inspections and provide training. MSD revised the SWPPPs to include stormwater pollution prevention committee updates as well as facility changes at Morris Forman WQTC and Hite Creek WQTC. See Section 2.6 of this report for more details.
- Salt River Watershed Watch Partnership. Over the permit year, MSD provided monitoring data to the SRWW for the draft 2015 Floyds Fork Bacteria Study.
- Floodplain Ordinance Workgroup. MSD is working with the Floodplain Ordinance Workgroup and facilitating updates to the Floodplain Ordinance.
- Stream Inspections. Over the permit year, MSD updated the 2010 Stream Inspection Report to include 24 stream restoration sites and 8 no-mow areas that have been documented since the report was revised in 2012. This process documents the condition of stream restoration sites and new restoration projects that have been constructed since the previous inspection report.
- Quality Assurance Project Plan. MSD began reviewing and updating the QAPP during the permit year to assess the need for updates.

### 1.2.2 Overall Program Strengths and Weaknesses

The MS4 program's organizational support and internal passions for water quality and quality of life in Louisville are its greatest strengths. As the City of Louisville and Jefferson County merged and small community co-permittees grew, Louisville MSD has served as a steady driver of the program. Naturally, since the first MS4 permit was issued in 1994, there have been staff and organizational changes in all the involved agencies and departments. MSD's 2014 re-organization created a group of three full-time employees (one of whom is serving as MSD's first internal MS4 manager) dedicated to facilitating permit compliance. MSD and the co-permittees continue to institutionalize the program.

While staffing and budgets are a continual concern for every local government agency, MSD has demonstrated its commitment to the program through a robust and highly-qualified staff. This is particularly true of MSD's construction/development oversight, illicit discharge/industrial and monitoring groups.

Furthermore, Louisville Metro has a strong regulatory footing as established by the:

- Erosion Prevention and Sediment Control Ordinance
- Hazardous Materials Ordinance
- Floodplain Management Ordinance
- Wastewater/Stormwater Discharge Regulations
- Enforcement Response Protocols
- Land Development Code
- Health Codes
- MS4 Permit Interlocal Agreements



In 2012, MSD was audited by EPA Region IV, and received a compliance evaluation inspection letter in March 2013. MSD provided additional data requested in a response dated April 25, 2013. The evaluation requested resolution of the following three MS4 program components:

- Co-permittee interlocal agreements
- Industrial inspection and enforcement program procedures
- Construction inspection and enforcement program procedures

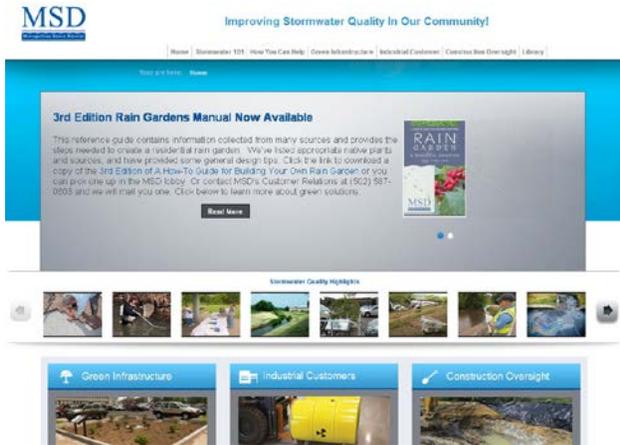
MSD addressed these program components and has provided further updates on program enhancements, including signed co-permittee interlocal agreements, co-permittee certification statements, third-party industrial inspector training, review and updates for construction and industrial standard operating procedures, and overall expansion of construction and post-construction training and inspection programs to meet needs associated with green infrastructure requirements. More information on specific programmatic activities is provided in Chapter 2 MSD Third Permit Cycle Program Fact Sheets.

MSD was audited by KDOW on September 24, 2015. MSD provided summaries of the MS4 program including: the use of thermal imagery as part of the illicit discharge detection and elimination program; EPSC inspection progress; and post-construction inspection findings for green infrastructure.

Pursuant to the MS4 permit and 401 KAR 5:060 KPDES Application Requirements, MSD submitted an MS4 permit renewal application in January 2015, and as such, is continuing program administration, including annual reporting, under the effective MS4 permit that expired July 31, 2016.

### 1.2.2.1 Outreach and Involvement

MSD facilitates a culture of participation at appropriate education and outreach opportunities to expand public knowledge of MS4, water quality, and environmental issues, and how everyday behaviors can have significant impacts on Louisville’s waterways. MSD conveys MS4 and Consent Decree messages in a coordinated manner to optimize exposure and impact.

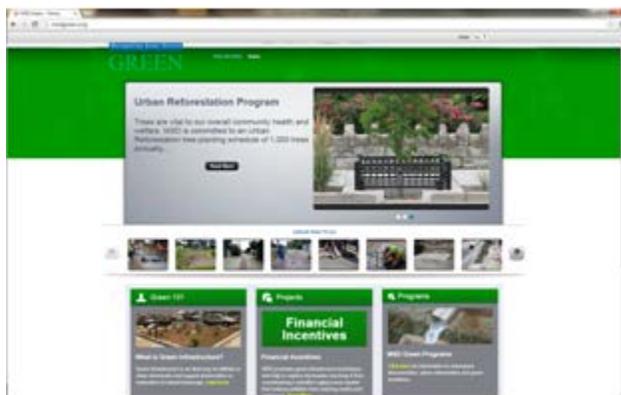


*Stormwater Quality Website*



*Project WIN Website*

In 2013, MSD rolled out it’s Stormwater Quality website, [www.msdstormwaterquality.org](http://www.msdstormwaterquality.org). The site uses the same content management system and templates as Project WIN and highlights core MS4 program areas of green infrastructure, industrial customers and construction oversight. The website includes a public library and scrolling homepage features section to prominently display key stories, public notices or events.



*MSD Green Website*



*Know Where it Goes Campaign*

MSD created a website in August 2014 to promote green infrastructure, [www.msdkgreen.org](http://www.msdkgreen.org). The website was published in August 2014, and includes information about green infrastructure projects and the incentives program.

In 2012, MSD kicked off their “Know Where it Goes” campaign, which highlights crossover messages between the consent decree and stormwater programs. The “Know Where it Goes” campaign is focused on typical actions that an individual might make, like picking up pet waste, and delivers the message that they can have an impact on stormwater.

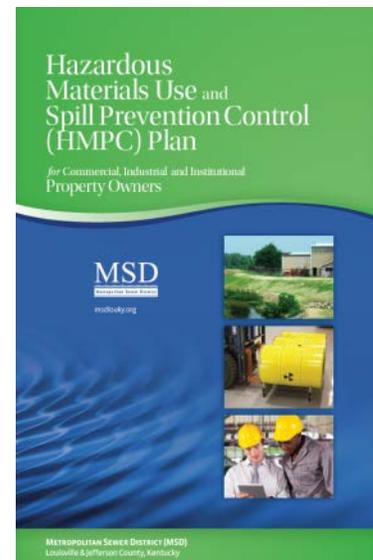
The success of MSD’s program has come with its outreach challenges. The principal challenges have been coordination between departments and documentation of the many outreach and involvement activities. MSD is responsible not only for stormwater drainage, but for wastewater collection and treatment, flood protection, floodplain management, the community Geographic Information System (GIS), development plan review and the EPSC program, and the hazardous materials spill prevention and control regulatory programs. Although these programs are managed by different divisions and at different locations throughout the county, the MS4 permit program includes aspects from all of these areas. Various MSD staff members in different departments have traditionally worked independently to develop and maintain education and outreach programs tailored to their regulatory sphere. Tracking and recording many disparate activities for the purposes of documenting compliance with the MS4 Permit remains a challenge, but one that has been mitigated by adding education and outreach staff, coordinating public messages, and implementing strategic planning initiatives throughout the District.

A continued challenge to the MSD Public Education, Outreach, Participation, and Learning Experiences (PEOPLE) program is connecting behaviors to water quality. The education and outreach program in the past has emphasized telling people what they should do, with little personal motivation to actually do it.

In 2013, MSD began developing educational materials to support the industrial stormwater program. Materials included Environmental BMP flyers for outside container storage and waste disposal, loading and unloading materials, vehicle and equipment washing, and outside storage of raw materials; an Industrial Stormwater brochure; and a Hazardous Materials booklet.

In addition to MSD’s own public outreach and educational efforts, MSD coordinates with co-permittees, including collaborations between Louisville Metro Government, Jefferson County Public Schools (JCPS), the University of Louisville, and educational activities through Louisville Metro’s Office of Sustainability.

In 2014, MSD created an educational partnership with the Louisville Water Company and the Parklands, which was launched in April 2015 at the Floyds Fork Water Quality Treatment Center. Students are educated on the water cycle, including a demonstration on drinking water, tour of the wastewater treatment plant, and exploration of the watershed at the plant outfall and



*HMPC Booklet for Industrial Customers*

overlook of Beckley Creek, where students discuss pollutant sources and their impact to the watershed as well as explore the habitat and the environment of the creek.

As documented earlier, the internal passions of MSD for water quality and quality of life in Louisville are some of its greatest strengths. In 2016, MSD unveiled a new customer education campaign that communicated MSD's commitment to water quality and quantity in Louisville Metro.



### 1.2.2.2 Illicit Discharge and Industrial Programs

MSD began outfall screening through an aerial infrared thermal imaging process beginning in the winter of 2013. Thermal screening during winter months allows optimal visibility and temperature conditions to identify thermal anomalies potentially associated with illicit discharges. A desktop analysis of thermal imagery for anomalies was performed along 150-foot stream buffers and industrial land uses in the MS4 system. This desktop analysis identified anomalies for field screening, which then identified illicit discharges for mitigation. MSD conducted its second thermal flyover in winter 2015, to determine anomalies for field screening. Results from the desktop analysis and field screening are available in section 2.2.

The industrial program is enabled and enforced through the Wastewater/Stormwater Discharge Regulations (WDR), Hazardous Materials Ordinance (HMO), and Enforcement Response Protocol (ERP). In 2011, MSD defined high, moderate and low risk facilities, and began development of a priority ranking system. Metrics used in the Threat Matrix assess risk and account for proximity to a waterway, hazardous materials storage, and history of environmental compliance, among other factors.

In 2014, MSD held an Industrial Users Working Group to coordinate with and disseminate technical and educational messages to industrial users.

MSD has a robust inspection program for industrial facilities, which includes prioritized inspections based on the facility's risk category in the threat matrix and annual third party inspection oversight for consistency between inspectors and facilities. MSD documents enforcement actions ranging from field correction notices to notices of violation and referrals to KDOW.

MSD has developed SOPs to document and guide efforts for both illicit discharge and industrial programs.

### 1.2.2.3 Construction/Development Oversight

MSD's approach to managing and directing construction in the service area has gradually expanded since it assumed the role of a stormwater utility in 1987. MSD has a well-trained and experienced staff of MS4, plan review, inspection and enforcement professionals in the Engineering Division who support the mission of safe, clean waterways by limiting the impacts from construction site runoff. During permit year 5, MSD hired in-house staff and reorganized the majority of construction inspectors for capital and private projects under a single

Construction Inspection group. Large capital projects are required to have an on-site contract inspector. MSD staff inspects large capital projects through oversight during EPSC inspections.

On November 21, 2000, the Jefferson County Fiscal Court adopted an EPSC Ordinance. This Ordinance conserves, preserves, and enhances the natural resources of Jefferson County by regulating and minimizing the adverse impacts and offsite degradation of soil erosion and sedimentation arising from land disturbing activities. The Ordinance evolved through a community stakeholder consensus building process. Consequently, this process brought diverse groups together to develop a comprehensive set of standards to address construction activities within the community. Homebuilders and contractors are trained and certified every 3 years.



*MSD Staff Inspecting Erosion Control Features*

MSD uses a robust construction enforcement log database to track inspector actions and construction site compliance for the Erosion Prevention and Sediment Control Ordinance.

MSD inspectors participate annually in third party oversight inspections, which observe and assess the MSD inspector's activities at the site and documentation of inspection and enforcement measures. These third party oversight inspections and other ongoing training sessions support the evolution of MSD's construction inspection program.

With the renewal of the KYR10 General Construction Stormwater Permit in December 2014, MSD began review of the permit and assessment of its Construction and EPSC program for consistency. This review process and coordination with KDOW continued in permit year 5.

#### **1.2.2.4 Post-Construction/Long-Term Stormwater Quality**

MSD has many programs to support post-construction stormwater quality. These include the green infrastructure program, financial incentive program, urban reforestation program and residential downspout disconnection program.

Green Infrastructure is a critical component to the long-term success of the post-construction program. The primary local green construction and design industry guidance document, MSD Design Manual, was amended to include a new Chapter 18 to address green infrastructure design, operation, inspection and maintenance. Chapter 18 is titled the Green Infrastructure Design Manual. The intent is to provide the designer a variety of options for incorporating green infrastructure that also supports aesthetic expectations for the owner. The Green Infrastructure Design Manual also includes engineering design fact sheets that emphasize the process for sizing, constructing and maintaining the GMPs as well as construction details, design, and operation and maintenance checklists.

In 2013, the Wastewater/Stormwater Discharge Regulations (WDRs) were amended to include post-construction requirements for developments at or over one acre of land disturbance. The amendments to the regulations achieved the following:

- Defined projects/developments that are required to implement green infrastructure
- Defined process for project application, plan review submittal, and review standards and criteria
- Required green infrastructure to benefit stormwater quality and reduce localized flooding
- Required a stormwater quality maintenance agreement between MSD and the property owner
- Required a Qualified Post-Construction Inspector (QPCI) program to perform self-inspections for green infrastructure maintenance and performance



*Contractors Installing Permeable Pavers*

A summary fact sheet and Frequently Asked Questions (FAQs) were developed to facilitate public understanding of proposed WDR amendments. To further support the amended WDRs and provide stormwater quality design guidance, the Green Infrastructure Design Manual (Chapter 18) is being updated.

MSD's financial incentive program for green infrastructure became effective August 1, 2011. The financial incentive program encourages qualifying stormwater utility customers to participate through the option to receive in a short-term incentive, known as a stipend to offset construction costs. The incentive program also provides a long-term incentive through drainage service charge reductions for incorporating green stormwater BMPs on private property. MSD has approved over 100 financial incentive projects on private property since the program's inception.



*Bioswale in Downtown Louisville*

In 2013, Chapter 18 of the MSD Design Manual was updated to provide guidance on Green Infrastructure and support the new post-construction stormwater requirements in the WDRs. The design manual is a tool for: planners selecting green practices, engineers designing them, contractors constructing them, inspectors reviewing them, and property owners maintaining them. The updates addressed input from the development community and the public since the 2011 release as well as lessons learned from implementation of financial incentives and demonstration projects. This included streamlining the overall standards and selection process; new and revised drawings, illustrations and examples; GMP-specific calculation sheets, checklists to facilitate plan preparation and review, checklists for inspection, operation



*MSD Green Infrastructure Design Manual*

and maintenance; and standardized maintenance agreements. In 2014, MSD began the process of another review to update Chapter 18 of the Design Manual, which was published for public comment in permit year 5. Updates to Chapter 18 are expected to be published in the next permit year.

In 2016, MSD held a series of stakeholder meetings to receive input on revisions to Chapter 18 of the MSD Design Manual. Comments from the stakeholders were from various sections of the manual, but focused on Section 18.3 Design. The stakeholder comment edits were incorporated prior to the release of the Design Manual for public comment. In June 2016, the Design Manual was released for public comment and is currently being updated based on public comments received. In 2013, Chapter 13 of the MSD Design Manual was updated to include vegetation suitable for green infrastructure practices. The chapter previously focused on native re-vegetation, and was dramatically updated to better communicate a wide variety of vegetative options for green infrastructure practices. Updates included a comprehensive native and cultivar plant list with photos, concept renderings and planting plans, and list with photos of prohibited invasive plants. Green infrastructure requirements enabled by the WDRs were phased in and as of August 1, 2015, all developments disturbing one acre or greater are required to capture and treat post-construction stormwater runoff through green infrastructure techniques. MSD issued a press release titled, *Full Implementation of MSD Green Infrastructure Standards for Construction Sites*, to promote the full implementation of the green infrastructure BMPs.

MSD developed and began teaching a Qualified Post-Construction Inspector (QPCI) course in 2014. The course is administered by JCPS and trains inspectors on the basic components of green infrastructure practices and how to observe and document the performance of green infrastructure. Per the 2013 WDR amendments, all new development with green infrastructure is required to sign a long-term maintenance agreement whereby they are responsible for operating and maintaining, hiring a QPCI, and reporting the maintenance status of green infrastructure on their property.

MSD expanded the downspout disconnection residential incentive program county-wide in 2014. The program pays homeowners \$100 per downspout to disconnect from the sewer system, up to \$400. Disconnections improve stormwater quality by reducing the volume of stormwater that flows to the sewer and thereby reduces sewage overflows, and allows runoff to infiltrate into lawns or rain gardens. The program was advertised in residential bill inserts in the spring of 2015. Additional mailings have targeted participation in key areas.

MSD's Urban Reforestation Program finances entities wishing to plant and maintain trees in Jefferson County within the combined sewer system boundary. The average tree captures 1,350 gallons of stormwater per year, which captures and removes stormwater from the sewer system. MSD continued to invest in urban reforestation through the funding of the 2015 Louisville Urban Tree Canopy Study, which documented the status and trends of tree canopy throughout the county.



*MSD Staff Maintaining Green Infrastructure*

#### **1.2.2.5 Good Housekeeping and Pollution Prevention**

MSD's commitment to its good housekeeping and pollution prevention within the organization's operations and maintenance activities has expanded and

broadened since it unified field services at the Central Maintenance Facility (CMF) in 2001.

MSD has a well-trained and experienced staff of more than 200 in the Drainage and Flood Protection and Support Services Divisions.

Staff perform the day-to-day repair and maintenance of thousands of miles of MSD infrastructure, manage a storeroom and inventory control, maintain a records archive, and keep a fleet of more than 600 vehicles/pieces of equipment functioning. Other MSD staff manages the backflow prevention device installation program; sample and monitor industrial wastewater, sewage, and streams; perform field inspections of illicit discharge reports; and respond to hazmat spill incidents. MSD also administers the drainage and stormwater infrastructure maintenance program and the Industrial Waste and Hazmat permitting and compliance programs. Other employees operate and maintain five regional WQTCs, sanitary pump stations, and the community flood protection infrastructure system and related facilities. These employees are responsible for preventing stormwater pollution in their own activities while they perform operations and maintenance of the Flood Protection, MS4 and Publicly Owned Treatment Works (POTW) facilities for the benefit of the community.



*Street Sweeper Maintaining  
Green Infrastructure*

MSD developed Stormwater Pollution Prevention Plans (SWPPPs) for the Derek Guthrie WQTC, Morris Forman WQTC, Central Maintenance Facility, Floyds Fork WQTC, Jeffersonstown WQTC, Cedar Creek WQTC, and Hite Creek WQTC in 2013, and finalized in 2014. In 2016, these plans were updated to include staffing changes as well as changes improving chemical storage practices at Hite Creek WQTC and Morris Forman WQTC. A General Stormwater Plan for pollution prevention at small facilities like package plants and pump stations was developed in 2015. In 2014, facilities were inspected for good housekeeping measures and to perform on-site staff training on pollution prevention. In 2013, internal MS4 stormwater workgroup meetings consisting of MSD directors or their designees, were held and topics included SWPPP training and development.

### 1.2.2.6 Monitoring

The monitoring program is robust in part because of MSD's well-trained and experienced engineering field technicians as well as laboratory staff. As a team, staff performs sampling and analysis of thousands of ambient stream and other samples per year.

MSD implemented a detailed monitoring network during the past reporting year, with 27 Long Term Monitoring Network (LTMN) sites and 25 stream flow gages using trained staff. Monitoring includes continuous monitoring at 24 locations, stream flow at 25 gages, and at 27



*Stream Monitoring*

sites: quarterly water quality monitoring, recreational season monitoring for bacteria, and biological monitoring every other year. In 2011 and 2014, MSD published an engaging and scientifically based synthesis report summarizing selected monitoring results over the past 10 and 15 years of data, respectively. In 2013, MSD began to include in the annual report a summary of enhanced analysis of monitoring data, including analysis of continuous monitoring data for temperature and dissolved oxygen, and updated analysis of required water quality monitoring parameters. MSD continues efforts to migrate large water quality monitoring databases into the Telog system, which will enable more rapid access to data and live graphical displays.

In October 2014, the USEPA approved the removal of 30.1 miles of Harrods Creek (in Jefferson and Oldham Counties) from the Kentucky impaired waters list for fecal coliform bacteria. This upgrade in classification, based on Kentucky Division of Water data, is the first for a stream within Jefferson County.

In 2015, MSD held the first Water Quality Standards Academy. The academy included a 2-hour short course and an expanded 14-hour course to provide water quality professionals information on the background and application of water quality regulations and standards in Kentucky. The course was inspired by the EPA Water Quality Standards Academy. Content was created and focused on Jefferson County and Kentucky streams and Water Quality Standards. Topics included sample analysis and quality assurance, integrated report and impaired waters, TMDLs and bacteria sources, water quality standards and permits, and partnerships. Over 85 participants attended from MSD partner communities and agencies.

Over time, data management has evolved and improved significantly allowing reporting capabilities to enable comparison of stream monitoring data against the 'moving targets' of hardness-based water quality standards (WQS). As the complexity and extent of the monitoring program expanded over the years, there have been technical and organizational challenges inherent to a database with literally millions of data points. For example, MSD has addressed the historical challenge of receiving incorrect sample requests that did not specify the correct method to return an adequately low Minimum Detection Limit on analytical results. As a result, laboratory results that have a minimum detection limit higher than the WQS will not be averaged into datasets for stream monitoring results, as if they were valid concentration data. This process is the result of refining SOPs and quarterly meetings with the lab, monitoring, and data analysis teams. This enables MSD to use the many data points to better understand system performance and program progress.

#### **1.2.2.7 Record Keeping and Information Infrastructure**

Over the years, MSD developed electronic systems of communication, documentation and reporting to support the complexities and extent of its organization, partnerships, activities and community responsibilities. These systems include a robust LOJIC (Louisville/Jefferson County Information Consortium) GIS database, a file management system (eB), Telog, Laboratory Information Management System (LIMS), rain database, Oracle, and an asset management database system (HANSEN®).

### 1.2.3 MSD Assessment and Tracking Approach

It is important to gauge the effectiveness of the overall MS4 program and the individual activities. Each co-permittee is responsible for gauging the effectiveness of their respective activities (provided in Chapter 3). MSD tracks activities (*tables 1-8 of the MS4 permit*) through fact sheets that are utilized to evaluate the program (provided in Chapter 2). MSD also has developed an approach to identify tiers of the six level program assessment methodology that apply to each activity. The EPA began advocating this approach in 2008 to assist MS4 programs identify success and future areas of focus. Activity fact sheets provided in Chapter 2 include items as shown in the following key.

#### Fact Sheet Key:

Agency leading or reporting the activity

KYS000001  
2014 Annual Report  
Chapter 2 MSD Third Permit Cycle Program  
September 2014

Permit number, document name and chapter, and report submittal date

Table # assigned in the MS4 permit

| CS1 Legal Prohibition/Control Authority |  |          |  |   |                |
|---|--|----------|--|---|----------------|
| Construction Site Inspection Frequency  |  |          |  |   |                |
| SWQMP ID                                | Activity Required  | Schedule | Frequency or Measure of Success  | Result  | Propose Change |
| 2.4.5                                   | Permittee (Site Operator) is required to conduct inspections monthly or after 0.5 inch rain events with less frequent MSD oversight inspections of at least 90% of active sites. | Annually | MSD shall report the number of inspections performed in the annual report. | Oversight Inspections of Self-Inspections Performed | No             |

Summary of result and proposed changes

SWQMP activity ID # (unique identifier for tracking program elements identified in tables 1-8 of the MS4 permit), activity required and frequency or measure of success as stated in the MS4 Permit.

**Progress Summary Narrative**

MSD verifies inspections of active construction sites on a bi-monthly basis, which does include some inspections following a half-inch rain event. MSD's inspection team conducts inspections for all permitted active construction sites, which includes oversight of the property owner's self-inspection records. Some construction sites are inspected on a more frequent basis based on site drainage characteristics or impact to sensitive features/streams. MSD oversight inspections review the documentation of self-inspections that the property owners maintain. MSD does not maintain copies of the property operators' self-inspections. In addition to these required inspections, MSD inspects other potential violations referred to MSD by other city and county inspectors for follow-up and enforcement action.

Brief narrative describing the progress of the activity

Metric(s) appropriate for the activity are shown for the baseline year and each permit year (PY)

**Tracking and Assessment**

MSD maintains an electronic database of inspection activity to assign inspectors and track activities (see Activity 2.4.2). MSD also monitors rain events through the rain gauge system and ILog software. MSD has a number of rain gauges located around Louisville Metro, as shown on the map above. There were 35 days during the reporting period that had rainfall totals above 0.5 inches at the Nightingale Pump Station Rain Gauge (TR12). Daily totals were calculated based on calendar days. The Nightingale gauge is the most central rain gauge location in Jefferson County and was used to approximate the number of rain events that qualified for self-inspections.

Brief narrative, table or graphic, as appropriate, describing how information is tracked

Metric(s) appropriate for the activity are shown for the baseline year and each permit year (PY)

| Reporting Period July 1 - June 30 | PY | Estimated No. Qualifying Rain Events | Estimated Number of Inspections Performed |
|-----------------------------------|----|--------------------------------------|---|
| 2010-11                           |    | 33                                   | 7,009 (Enforcement)                       |
| 2011-12                           | 1  | 35                                   | 22,104                                    |
| 2012-13                           | 2  | 35                                   | 12,027 (Enforcement)                      |
| 2013-14                           | 3  |                                      |   |
| 2014-15                           | 4  |                                      |   |
| 2015-16                           | 5  |                                      |   |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Change in Behavior         |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

Six level program assessment methodology applicability



#### 1.2.4 Water Quality Improvements

MSD and its co-permittees continue to implement programs designed to minimize stormwater impacts to water quality to the maximum extent practicable over the course of the permit term. Through the 2011 and 2014 Synthesis Reports, MSD reported water quality trends for the previous ten years and subsequent Synthesis Reports will expand upon these efforts. In 2015, MSD eliminated the Jeffersontown WQTC.

#### 1.2.5 New or Expanded MS4 Discharges

As development occurs, developers participate in the plan approval process with MSD. New or expanded discharges to MSD's system include connections to the MS4 conveyance system as a result of new or redevelopment in the county. MSD requires that development plans, including system connections and outfalls, be submitted in drawings. These records are maintained in MSD's enterprise document management system, eB.

#### 1.2.6 Change Reporting

There are no changes to report for this reporting period. Minor modifications requested in previous years are provided for reference, listed below.

**Developers Advisory Group (DAG) Activity 2.1.11:** This activity required MSD to participate in DAG meetings three times per year to provide a forum to communicate issues and discuss program changes. In 2012, MSD proposed changing this requirement to once or twice annually because economic conditions and resulting development activities have diminished to a point where there was a lack of interest for discussions in this setting. MSD met with the DAG once during this Annual Report period. As economic conditions recover, MSD anticipates the need for these meetings will return and it intends resume the planned meeting frequency. It should also be noted that MSD communicates with the broader development industry through the Building Industry Association of Greater Louisville (BIA Louisville) meetings through activity 2.1.12 and continues to meet/exceed the meeting frequency set in that requirement. MSD communicated frequently with BIA Louisville over the course of the permit year, including participating in meetings to communicate pending changes to the WDRs and Green Infrastructure Design Manual.

**“Go Green Louisville” Program Assistance Activity 2.1.19:** The “Go Green Louisville” initiative was a precursor to the installation of the Office of Sustainability in 2012. As Louisville's green programs evolved and gained support by the mayor and elected officials, Louisville Metro established the Office of Sustainability and has dedicated staff to support Sustain Louisville, the sustainability plan published in March 2013. MSD plans to continue to support Louisville Metro green initiatives under this new Office of Sustainability and the green infrastructure program. The change from Go Green Louisville to the Office of Sustainability is documented in the SWQMP and annual report fact sheet 2.1.19.

### 1.2.7 Future Direction of the Program

During permit year 5, MSD collaborated with co-permittees and submitted the MS4 permit renewal application. MSD met with KDOW to discuss the future direction of MSD's MS4 Program in May 2016. The draft MS4 permit is expected for public notice in 2016.

It is generally expected that significant improvements in local stormwater quality will be realized through growth of the green infrastructure initiatives. MSD has created momentum for this to occur via the incentives program, WDR requirements, and QPCI course. Developers that had submitted a preliminary plan before August 1, 2013, had an expiration date of two years on their permit that allowed developers to use previous development regulations, without green infrastructure controls treating their stormwater, as long as construction began before August 1, 2015. Green infrastructure requirements were fully phased in on August 1, 2015, and MSD issued a press release in July 2015 to notify developers of the expiration of the grandfathering period.

MSD is currently exploring expansion of its MS4 and green infrastructure inspection staff, which is responsible for reviewing annual green infrastructure inspection reports and conducting follow-up compliance inspections.

During permit years four and five, MSD collaborated with other Phase I and Phase II communities to share program information to facilitate program planning. During the current permit year, MSD met with the City of Nashville, and Sanitation District No. 1, and participated in Kentucky Stormwater Association Meetings.

There are many other aspects of the program with potential for growth which MSD plans to continue to pursue:

- Customer education opportunities to re-focus on MSD's core functions and values
- Outreach activities and events to communicate messages to the public
- Thermal imagery analysis to identify illicit discharges
- Assessment of industrial facility risks and enforcement/referral to the state
- Education, training and assessment for construction inspectors at green infrastructure sites
- Development of programs to support the green infrastructure program, including fee in lieu of program (FILO)
- Evaluation of monitoring program and data
- Updates to the Green Infrastructure Design Manual from "lessons learned"
- Targeting outreach to youth of Jefferson County
- Construction Field Day

In 2013, a cooperative relationship, "One Water" was announced between Louisville MSD and its sister agency, the Louisville Water Company (LWC). This process is ongoing, and is not anticipated to impact the MS4 program.



**CHAPTER 1 INTRODUCTION AND STORM WATER QUALITY MANAGEMENT  
PLAN (SWQMP) ASSESSMENT**

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**1.3 Financial ..... 2**

**SUPPORTING INFORMATION**

Appendix 1.3.1 Schedule of Rates, Rentals and Charges



### 1.3 Financial

This Section provides a summary of the Storm Water Quality Management Plan (SWQMP) Financing. MSD and the other co-permittees utilize the SWQMP as a business plan to guide the various agencies and departments in how they will implement the various requirements of the MS4 Permit. While there are interlocal agreements between co-permittees, including compensation for the monitoring program, finances are managed separately.

| Historical MSD Annual Operating Budget (\$,000)    |             |         |         |         |         |         |         |
|--|-------------|---------|---------|---------|---------|---------|---------|
|  | Fiscal Year |         |         |         |         |         |         |
|  | 2010        | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    |
| Total Operating Budget                             | 103,945     | 107,607 | 111,795 | 117,433 | 115,281 | 115,975 | 116,021 |
| Estimated Stormwater Operating Budget <sup>1</sup> | 20,573      | 22,381  | 24,381  | 26,325  | 25,660  | 25,833  | 26,181  |

<sup>1</sup>Includes operating budgets for stormwater related efforts from several departments including drainage, floodwall, etc.

| Annual Capital Budget (\$,000) |             |       |       |       |       |       |       |
|--------------------------------|-------------|-------|-------|-------|-------|-------|-------|
|                                | Fiscal Year |       |       |       |       |       |       |
|                                | 2010        | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
| MS4 Capital Budget             | 2,937       | 3,425 | 3,250 | 5,711 | 6,128 | 1,781 | 1,084 |

| Historical Estimated Full Time Equivalents (FTEs) |             |      |      |      |      |      |      |
|---|-------------|------|------|------|------|------|------|
|   | Fiscal Year |      |      |      |      |      |      |
|   | 2010        | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Stormwater Staff Position (FTE) <sup>2</sup>      | 128         | 139  | 152  | 153  | 152  | 153  | 153  |

<sup>2</sup>Includes staff from various departments including drainage, engineering, administration, floodwall, maintenance, etc. Staff with a portion of their time related to stormwater are consolidated.

MSD is funded through customer user fees and not through taxes. See Appendix 1.3.1 for the MSD rates, rentals and charge policy that became effective August 1, 2015.



## 2.1 PUBLIC EDUCATION, OUTREACH, PARTICIPATION AND LEARNING EXPERIENCE (PEOPLE) FACT SHEETS

| TABLE 2.1 - PEOPLE  |  |
|---|--|
| SWQMP ID  | PEOPLE General Public & Stakeholder Education Program                |
| 2.1.1   | General Public-Mass Media Integration/Distribution                   |
| 2.1.2   | General Public-Direct Interaction                                    |
| 2.1.3   | General Public-Meeting Topic Integration                             |
| 2.1.4   | Volunteer Programs, Participation, Promotion or Support              |
| 2.1.5   | MetroCall Hotline and MSD Customer Relations                         |
| 2.1.6   | Elected Officials  |
| 2.1.7   | Public Speakers  |
| 2.1.8   | News Media-Press Releases  |
| 2.1.9   | MSD Web Site   |
| 2.1.10  | Behavior Change Assessment Survey                                    |
| 2.1.11  | Developers Advisory Group  |
| 2.1.12  | Homebuilders Association Land Development Committee Monthly Meetings |
| 2.1.13  | Greater Louisville Inc. Environmental and Water Committees           |
| 2.1.14  | Construction Operators   |
| 2.1.15  | Rain Garden Outreach   |
| 2.1.16  | Green Infrastructure Demonstration Projects                          |
| 2.1.17  | Public Notification of Major Program Changes                         |
| <b>Cooperative Efforts (MSD provides supportive or other non-lead role)</b> |  |
| 2.1.18  | Jefferson County MS4 Workgroup-Communication                         |
| 2.1.19  | "Go Green Louisville" Program Assistance                             |

### SUPPORTING INFORMATION

|                 |  |
|-----------------|--|
| Appendix 2.1.1a | Local Media Advertisements                 |
| Appendix 2.1.1b | Metro TV                                   |
| Appendix 2.1.1c | Streamline                                 |
| Appendix 2.1.1d | Bill Inserts                               |
| Appendix 2.1.1e | Brochures                                  |
| Appendix 2.1.2a | Outreach Events Summary                    |
| Appendix 2.1.5  | Customer Satisfaction FY16 Year End Report |
| Appendix 2.1.8a | Press Release                              |
| Appendix 2.1.8b | Earned Media                               |
| Appendix 2.1.10 | Public Survey Results                      |

| General Public – Mass Media Integration / Distribution |   |          |  |   |                |
|--|---|----------|--|---|----------------|
| SWQMP ID   | Activity Required   | Schedule | Frequency or Measure of Success  | Result  | Propose Change |
| 2.1.1  | The permittee shall integrate MS4 stormwater quality topics in to existing print mass media, local government cable channel, social marketing materials, and/or new materials with the intent of affecting behavior change. | Annually | Report the number of potential households and estimate the numbers of households were reached. | Materials integrated into over 4 media forums | No             |

### Progress Summary Narrative

MSD educates the public through mass media message integration and distribution including newspaper advertisements, MetroTV, MSD publications and press releases, brochures/flyers, and social media. See Appendix 2.1.1 for a summary of media messages. The main forums for stormwater quality topics are provided below:

- **Local Media Advertisement:** published in Louisville Magazine, Business First, and the Courier Journal (Derby edition) (see Appendix 2.1.1a).
- **Television:** MetroTV (Channel 25 or [www.louisvilleky.gov/MetroTV](http://www.louisvilleky.gov/MetroTV)) runs MSD public meetings, how-to and stormwater informational topics (see Appendix 2.1.1b)
- **MSD Publications:** The *StreamLine* newsletter is sent monthly to over 360 recipients via GovDelivery distribution. 190 recipients via postal mail.
  - **Streamline** – 12 issues per year (see Appendix 2.1.1c) [www.msdlouky.org/aboutmsd/updatenews.htm](http://www.msdlouky.org/aboutmsd/updatenews.htm)
  - **Current News-** 12 or more issues per year
  - **Bill Inserts** – two bill inserts were published in PY5 to approximately 250,000 customers for each distribution (see Appendix 2.1.1d).
  - **Brochures** – MSD published brochures (see Appendix 2.1.1e).
- **Press Releases:** MSD emails press releases via GovDelivery to promote earned media reported in Activity 2.1.8 News Media – Press Releases.
- **Social Media:** MSD updates its Twitter account, @LouisvilleMSD, with campaigns to raise awareness for safe, clean waterways. MSD currently has over 930 Twitter followers.



### Tracking and Assessment

MSD estimates distribution of the *StreamLine* and *Courier Journal* readership. It was determined that recipients of StreamLine are added to the database after calling in a complaint or request, and are removed after three years. This process will be revised in the next reporting period to restore subscribers.

| Reporting Period July 1 – June 30 | PY | <i>StreamLine</i> (formerly MSD Update) Number of Households Reached Monthly | Courier-Journal Number of Households Reached |
|-----------------------------------|----|--|--|
| 2010-11                           |    | 155  | ~700,000                                     |
| 2011-12                           | 1  | 165  | ~600,000                                     |
| 2012-13                           | 2  | 230  | ~232,811                                     |
| 2013-14                           | 3  | 2,665  | ~225,000                                     |
| 2014-15                           | 4  | 2,931  | ~600,000                                     |
| 2015-16                           | 5  | 1,778  | ~374,200                                     |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| General Public – Direct Interaction |  |                         |  |  |                |
|-------------------------------------|--|-------------------------|--|--|----------------|
| SWQMP ID                            | Activity Required  | Schedule                | Frequency or Measure of Success  | Result                                     | Propose Change |
| 2.1.2                               | The permittee shall present the "Key Messages" at community events, through the use of a display booth, "enviroscape" or other direct personal integration approaches. | Six event days per year | Permittee shall present educational materials to the public at least six event days per year; update booth material annually. Provide summary of the educational activities in annual report | Participation at greater than 6 event days | No             |

### Progress Summary Narrative

General public education through direct interaction at community events continues to be conducted using the key messages for stormwater quality as the primary focus. Below are examples of direct, interactive community outreach activities and the number of event days that MSD participated in this permit year. Appendix 2.1.2a Outreach Events Summary provides a summary of public outreach events/activities with stormwater messages (see Activity 2.1.8 News Media – Press Releases for press releases associated with events).

- Ohio River Sweep (2015 and 2016) (2 days)
- Urban Heat Island Youth Summit (1 day)
- Adventures in Water Festival, Water Tower Park (3 days)
- Home, Garden, and Remodeling Show (3 days)
- Tree planting at Sun Valley Park (1 day)
- Floyds Fork Educational Tour (1 day)
- School rain garden workshops (3 days)
- Homearama 2015 (16 days)
- Interview on Wave 3 "Listens Live" (1 day)
- Interview on WDRB (1 day)
- Louisville Free Public Library's How-To Festival
- Waterfront Wednesday (2 days)

### Tracking and Assessment

MSD has increased its presence in public outreach and involvement over the course of the permit term.

| Reporting Period<br>July 1 – June 30 | PY | Number Event Days |
|--------------------------------------|----|-------------------|
| 2010-11                              |    | 8                 |
| 2011-12                              | 1  | 22                |
| 2012-13                              | 2  | 20                |
| 2013-14                              | 3  | 34                |
| 2014-15                              | 4  | 69                |
| 2015-16                              | 5  | 60                |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| General Public – Meeting Topic Integration |  |                                    |  |   |                |
|--|--|------------------------------------|--|---|----------------|
| SWQMP ID                                   | Activity Required  | Schedule                           | Frequency or Measure of Success  | Result  | Propose Change |
| 2.1.3                                      | Starting in year two (2), Permittee shall integrate water quality topics in MS4 public meetings at least six (6) events per year; provide summary of the events in the annual report | Begin in PY 2, six events per year | The permittee shall integrate MS4 stormwater quality topics, as feasible and appropriate into other MSD sponsored public meetings. | Key messages integrated in at least 6 events per year | No             |

### Progress Summary Narrative

MSD facilitates and sponsors public meetings throughout the year to meet, interact and educate the public on a variety of topics and/or projects. As part of MSD's core values, MSD communicates the importance of public health, safety and protection, including messages related to the stormwater quality. Where feasible and appropriate, MSD incorporates stormwater quality and MS4 topics or educational materials into MSD-sponsored public meetings and events held for other programs including the Integrated Overflow Abatement Plan (IOAP), Wet Weather Team and Pardon our Dust. For more information on direct interaction activities with the public, see Activity 2.1.2 General Public – Direct Interaction.

Stormwater quality topics were presented at MSD-sponsored public meetings included the following:

- Clifton Heights CSO Storage Basin Public Meeting
- Southwestern Parkway Storage Basin Public Meeting
- Southwestern Parkway CSO Storage Basin Public Meeting
- Lexington & Payne CSO Storage Basin Public Meeting
- Portland CSO Storage Basin Public Meeting
- Story Avenue and Main Street CSO Storage Basin Public Meeting
- I-64 and Grinstead Drive CSO Storage Basin Public Meeting
- Lexington and Payne Street CSO Storage Basin Public Meeting
- Clifton Heights Pardon Our Dust Meeting
- Portland CSO Storage Basin Public Meeting

### Tracking and Assessment

MSD continues to host public meetings and uses these opportunities to present stormwater quality messages. The frequency of meetings has remained steady over the course of the permit term.

| Reporting Period<br>July 1 – June 30 | PY | Number of Public Meetings with MS4 integrated |
|--------------------------------------|----|---|
| 2010-11                              |    | NA  |
| 2011-12                              | 1  | 9   |
| 2012-13                              | 2  | 13  |
| 2013-14                              | 3  | 14  |
| 2014-15                              | 4  | 11  |
| 2015-16                              | 5  | 33  |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| Volunteer Programs Participation, Promotion or Support |  |   |   |  |                |
|--|--|---|---|--|----------------|
| SWQMP ID   | Activity Required  | Schedule  | Frequency or Measure of Success   | Result                                       | Propose Change |
| 2.1.4  | Starting in PY two (2), Permittee shall have direct participation in at least three (3) events per year; and promote additional two (2) events per year, provide summary of volunteer opportunities the permittee participated, facilitate, or supported in the annual report. | Begin in PY 2, three events per year and promote two events | The permittee shall participate in, facilitate, encourage or support volunteer program opportunities on a case by case basis to optimize resources and potential to affect behavioral changes through participation events. | More than 5 events promoted and participated | No             |

### Progress Summary Narrative

MSD promotes and facilitates local environmental responsibility in the community to encourage volunteer participation. MSD continues to promote, participate in and make community watershed related events available. Promotion of events continues to be determined on a case-by-case basis, but routinely includes the following organizations: Louisville Nature Center, Jefferson Memorial Forest Interpretive Center, ORSANCO, and Louisville Zoo. MSD is partnering with the Kentucky Waterways Alliance (KWA), in the Every Drop Program, to subsidize the costs of stormwater BMPs for homeowners.

MSD typically participates or has volunteer staff for activities that it promotes. MSD promoted and participated in volunteer programs during the permit year including the following (see Appendix 2.1.2a Outreach Events Summary for further information on event dates).

- Urban Heat Island Youth Summit (1 day)
- Mayor's Give-A-Day Week (3 days)
- Floyds Fork Educational Tour (1 day)
- Home Gardening and Remodeling Show (3 days)
- Homearama 2015 (16 days)
- Ohio River Sweep (2 days)
- Cane Run Elementary School Science Technology Engineering and Math (Steam) Day Adventures in Water Festival (3 days)
- Engaging Children Outdoors (ECHO) Program (7 days)

MSD uses its intranet, website, and press releases to promote volunteer participation in events. Information on press releases published during the reporting period is available in Activity 2.1.8 News Media – Press Releases.

### Tracking and Assessment

MSD has increased its participation and promotion in volunteer events over the course of the permit term. The 2014 reorganization of the District resulted filling three full-time positions for the MS4 Program that continues to provide support and momentum for support of volunteer programs. MSD as an organization had fewer charitable giving (MSD Cares) events, this is expected to increase again in 2017.

| Reporting Period<br>July 1 – June 30 | PY | Number of Events that MSD Participates in and Promotes |
|--------------------------------------|----|--|
| 2010-11                              |    | >3   |
| 2011-12                              | 1  | >3   |
| 2012-13                              | 2  | 7  |
| 2013-14                              | 3  | 24   |
| 2014-15                              | 4  | 36   |
| 2015-16                              | 5  | 20   |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| MetroCall Hotline and MSD Customer Relations |  |          |   |                     |                |
|--|--|----------|---|---------------------|----------------|
| SWQMP ID                                     | Activity Required  | Schedule | Frequency or Measure of Success   | Result              | Propose Change |
| 2.1.5  | Permittee shall provide a summary of MS4 complaints and comments received in the annual report | Annually | The permittee shall provide support to the 24-hour central reporting hotline "MetroCall" and internet communication channels for use by the public and MSD employees to report complaints, spills, and illegal dumping. | Database maintained | No             |

## Progress Summary Narrative

MSD's Customer Relations Call Center is staffed 24 hours per day, 7 days per week and responds to customer calls and web requests for service. The department also assists walk-in customers.

MSD previously provided services for MetroCall. Calls to the Louisville Metro line were previously routed to and managed by MSD Customer Relations staff during Metro Government's non-business hours. Beginning in the third quarter of FY14, Customer Relations discontinued taking Metro Calls. This allowed implementation of a new Customer Care program to improve communications and provide information to customers who have requested service work from MSD. MSD continues to receive incoming inquiries 24 hours per day, 7 days per week, which are recorded and coded in a central database and routed to the appropriate staff for follow-up. Follow-up is also recorded in the database.

For more information on customer calls specific to illicit discharges, see Activity 2.2.3 Public Illicit Discharge Report Investigation.

In FY15, MSD began implementation of the Effective Utility Management (EUM) program, which includes metrics for customer satisfaction. Through this program, it updated reporting metrics and methods for tracking customer data. A summary of the Customer Satisfaction FY16 Year End Report is provided in Appendix 2.1.5 Customer Satisfaction FY16 Year End Report.

## Tracking and Assessment

The HANSEN®/MIDAS database is used by both Louisville Metro and MSD to record inquiries and track response activity. The database format enables robust data analysis.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Elected Officials |   |                 |   |                               |                |
|-------------------|---|-----------------|---|-------------------------------|----------------|
| SWQMP ID          | Activity Required   | Schedule        | Frequency or Measure of Success   | Result                        | Propose Change |
| 2.1.6             | Permittee shall provide a summary of its attendance of meetings at Mayors and/or Council Member's discretion in the annual report | Report annually | The permittee shall attend and participate at the discretion of Mayor's office and Louisville Metro Council members to address resident's concerns and questions. | Meeting attendance summarized | No             |

## Progress Summary Narrative

**The Mayor's Office:** MSD participates in Metro Council Committee and public meetings as requested by the Mayor's office or council representatives. In FY15, "Talk to Greg" meetings were phased out and replaced by social media communication and public meetings.

Public meetings address residents' concerns and questions pertaining to sewers, drainage, flood control, water quality, and the MS4 program. Community suggestions and requests received at meetings are placed in the city tracking database for follow-up.

**Metro Council District Meetings.** Louisville Metro Council meetings are held bi-monthly and are shown on Louisville MetroTV Channel 25. Metro Council District Meetings are open and available to the public to attend. MSD staff attends Metro Council and District meetings as needed to address council members' concerns. Upcoming meetings with elected officials are often published in MSD board packets at <http://msdrecords.louisvillemad.org/openmsd/board.aspx>.

For more information on Louisville Metro activities, see Chapter 3 for co-permittee reports.

## Tracking and Assessment

For the current reporting period, MSD representatives participated in meetings at the request of and in support of Metro Government elected officials, as detailed in Appendix 2.1.2a Outreach Events Summary.

| Reporting Period<br>July 1 – June 30 | PY | Number of Mayor/Council<br>Meetings attended by<br>MSD Staff |
|--------------------------------------|----|--|
| 2010-11                              |    | 12   |
| 2011-12                              | 1  | 18   |
| 2012-13                              | 2  | 16   |
| 2013-14                              | 3  | 15   |
| 2014-15                              | 4  | 18   |
| 2015-16                              | 5  | 31   |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Public Speakers |  |                     |  |                        |                |
|-----------------|--|---------------------|--|------------------------|----------------|
| SWQMP ID        | Activity Required  | Schedule            | Frequency or Measure of Success  | Result                 | Propose Change |
| 2.1.7           | Permittee shall provide public speakers to various community stakeholders at least six (6) events per year | Six events per year | The permittee shall provide speakers to various community stakeholder groups that could benefit from environmental stormwater information. | > 6 presentations made | No             |

### Progress Summary Narrative

MSD provides speakers to various community, special interest, and civic groups upon request to promote community awareness and involvement in stormwater quality topics and activities. MSD staff continues to attend and participate in community group meetings to educate and promote involvement of stakeholders in stormwater quality activities. Speaking events for community groups are determined on a case-by-case basis, but routinely include, home builders and contractors associations, school audiences, planning agencies, watershed agencies, neighborhood associations, community clubs, boy/girl scouts and other service organizations. During the reporting period, public speaking events were held for numerous stakeholder groups, including the following examples (public speaking events and event dates are provided in Appendix 2.1.2a Outreach Events Summary):

- Construction Field Day
- Water Environment Federation Annual Technical Exhibition and Conference (WEFTEC)
- Canoemobile
- Botanica
- 2015 Sustainability Summit
- Cane Run Elementary School Science, Technology, Engineering, Arts and Math (STEAM) Day
- Green Infrastructure Design Manual Stakeholder Meetings
- Urban Heat Island Press Conference -
- Kentucky Stormwater Association (KSA) Conference Presentation and Green Infrastructure Walking Tour

### Tracking and Assessment

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Speaking Events |
|--------------------------------------|----|------------------------------|
| 2010-11                              |    | >30                          |
| 2011-12                              | 1  | 40                           |
| 2012-13                              | 2  | 22                           |
| 2013-14                              | 3  | 36                           |
| 2014-15                              | 4  | 27                           |
| 2015-16                              | 5  | 57                           |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| <b>News Media – Press Releases</b> |  |              |   |  |                |
|------------------------------------|--|--------------|---|--|----------------|
| SWQMP ID                           | Activity Required  | Schedule     | Frequency or Measure of Success   | Result                                       | Propose Change |
| 2.1.8                              | Permittee shall provide at least two (2) press releases per year highlighting public participation opportunities | Two per year | The permittee shall provide press releases to the local news media highlighting opportunities for the public to participate in outreach and involvement events to make a positive difference through behavior change. | > 2 press releases or earned media published | No             |

### Progress Summary Narrative

MSD provides press releases to the local news media via the GovDelivery (see Activity 2.1.1). Press releases typically highlight community events and activities focused on how residents can help improve the safety and water quality of our local streams, as well as MSD program updates. In addition, announcements are made at monthly MSD Board meetings, which are open to the press and members of the public to attend. The following press release was distributed during the reporting period: Full Implementation of MSD Green Infrastructure Standards for Construction Sites (see Appendix 2.1.8a Press Release).

MSD also posts announcements on the MSD Stormwater Quality and MSD Green websites (see Activity 2.1.9), the MSD main page at [www.louisvillemsd.org](http://www.louisvillemsd.org), and through social media, including MSD's Twitter account. Press releases and updates from MSD Board and public meetings are often picked up by local news media, providing earned media credit for MSD events and programs. Examples of earned media stories for the current reporting period are provided below (see Appendix 2.1.8b Earned Media):

- Comment: Clean Water is Key to Life
- MSD Plants Trees in Sun Valley Park
- Louisville Tree Canopy to Benefit From MSD Tree Planting at Sun Valley Park
- Small Sewage Plant Demolition Marks End of Era for Louisville
- MSD Caps \$1 Billion Investment in Clean Water
- Commentary: A New Day At MSD
- MSD Funding will use Nature to Reduce Sewage Overflows in Popular Entertainment District
- How Current City Data Could Help Louisville Reduce Urban Heat
- Rain Garden Interview with Wave 3 "Listens Live"
- Rain Barrel and Rain Garden Interview with WDRB

### Tracking and Assessment

Not applicable.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>MS4 Related Press Releases and<br>Earned Media |
|--------------------------------------|----|---|
| 2010-11                              |    | >2  |
| 2011-12                              | 1  | 4   |
| 2012-13                              | 2  | >2  |
| 2013-14                              | 3  | 4   |
| 2014-15                              | 4  | 6   |
| 2015-16                              | 5  | 11  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

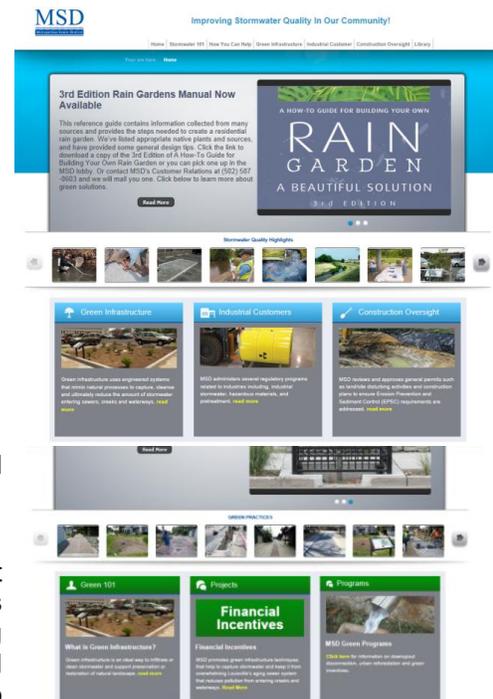
| MSD Website |   |           |   |                   |                |
|-------------|---|-----------|---|-------------------|----------------|
| SWQMP ID    | Activity Required   | Schedule  | Frequency or Measure of Success   | Result            | Propose Change |
| 2.1.9       | Permittee shall report summary of updates in the annual reports of PYs 2 and 4. | PYs 2 & 4 | The permittee shall review and revise the website with the "Key Messages" content and other related PEOPLE plan elements. | Website Developed | No             |

## Progress Summary Narrative

The MSD website, [www.louisvillemsd.org](http://www.louisvillemsd.org), includes announcements on the home page as well as links to the Transparency website and departmental pages.

MSD's Stormwater Quality website was published in 2013 at [www.msdstormwaterquality.org](http://www.msdstormwaterquality.org). The home page contains three main portals that aid in navigation of the site: Green Infrastructure, Industrial Customers, and Construction Oversight. These portals direct users to specific program components to locate information quickly and efficiently. Each portal provides specific information to that topic as well as related links and resource materials. A series of dropdown menus allows the user to access topics such as what stormwater is, why stormwater quality is important, and what individuals can do to help.

MSD launched the MSD Green website in 2014 at [www.msdgreen.org](http://www.msdgreen.org). The green website focuses on various green infrastructure programs that MSD offers, including financial incentives, urban reforestation and residential downspout disconnection programs. The website also links to the Green Infrastructure Design Manual and the MSD stormwater resource library.



MSD Stormwater Quality and Green Websites

## Tracking and Assessment

MSD Stormwater Quality website launched August 1, 2013 at [www.msdstormwaterquality.org](http://www.msdstormwaterquality.org). Updates and maintenance of the website are ongoing.

The MSD Green website launched August 8, 2014, at [www.msdgreen.org](http://www.msdgreen.org). Further revisions will continue to maintain and update the site.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Behavior Change Assessment Survey |   |           |  |   |                |
|-----------------------------------|---|-----------|--|---|----------------|
| SWQMP ID                          | Activity Required   | Schedule  | Frequency or Measure of Success  | Result  | Propose Change |
| 2.1.10                            | Permittee shall provide summary in the annual report of the Baseline Survey in PY one (1) and the Behavior Assessment in PY four (4). | PYs 1 & 4 | The permittee shall perform a statistical survey to gauge the population's knowledge of stormwater quality issues and establish baseline to assess the changes in behavior and outreach program effectiveness. The permittee shall utilize the survey results to refocus and reprioritize PEOPLE activities. | Phone surveys completed in 2009 and 2011. Focus group and online survey conducted in 2013. Survey trends reported 2015. | No             |

### Progress Summary Narrative

MSD contracted a professional marketing research firm to perform a statistically-valid telephone survey of Louisville Metro residents in 2011. Results were reviewed and it was determined that a focus group was a more accurate tool to assess public knowledge and behavior.

During PY 3, two focus groups were selected and research was conducted on October 23, 2013. The study included 23 participants with 12 and 11 participants in each of the two sessions. Participant knowledge on stormwater quality topics varied. The objective of the focus group study was to provide guidance in developing an online survey that will measure the public's understanding of the impacts of personal behaviors on water quality of local waterways. Specifically, the moderated discussion in the focus group sessions was used to better understand what knowledge gaps exist, and how to educate and communicate to affect sustained behavior change.

### Trends and Assessment

During PY 4, a second online public survey was conducted in July 2015, with an incentive drawing for respondents on August 3, 2015. A total of 1,018 participants completed the survey.

In PY 5, analysis of these survey results found favorable shifts in awareness of and attitudes towards a number of issues, including waterway protection (+11.0%), willingness to take action (+6.3%), runoff and flooding given as reasons for polluted waterways (+25.8%) and rating the overall quality of local waterways as fair or poor (+19.3%). It finds unfavorable shifts in other areas, like lack of desire to use local waterways for recreational purposes due to pollution (+7.0%). Overall, citizens view the current state of Jefferson County's waterways as an issue and are willing to help combat waterway pollution, but still lack knowledge of relevant details, such as the causes of rainwater runoff pollution. Full findings of the report can be found in Appendix 2.1.10 Public Survey Results.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Households Reached         |
|--------------------------------------|----|---|
| 2010-11                              |    | 1,200 (Phone Survey)                    |
| 2011-12                              | 1  | 1,205 (Phone Survey)                    |
| 2012-13                              | 2  | Focus Group in planning                 |
| 2013-14                              | 3  | 23 participants (Focus Group conducted) |
| 2014-15                              | 4  | 1,018 online survey respondents         |
| 2015-16                              | 5  | Survey analyzed and results reported    |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Developers Advisory Group (DAG) |   |                       |  |                               |                               |
|---------------------------------|---|-----------------------|--|-------------------------------|-------------------------------|
| SWQMP ID                        | Activity Required   | Schedule              | Frequency or Measure of Success  | Result                        | Propose Change                |
| 2.1.11                          | Permittee shall participate in at least three (3) events per year | Three events per year | The permittee shall participate in Building Industry Association of Greater Louisville (BIA) meetings to address concerns and comments from key local development professionals and provide information regarding changes in construction procedures, checklist, regulations, etc. | Combined with Activity 2.1.12 | Combined with Activity 2.1.12 |

### Progress Summary Narrative

MSD participates in meetings with the Building Industry Association of Greater Louisville (BIA) to address concerns and comments from local development professionals and provides information regarding changes in construction procedures, checklist, and regulations. The BIA meeting audience includes members of the development community, including developers, engineers and contractors.

For PY 5, DAG topics planned for BIA meetings were covered by Activity 2.1.12 and combined. During PY 5, MSD attended 12 BIA Land Development Meetings. During these meetings, the same opportunities were presented to discuss topics that were historically discussed in the DAG meetings.

### Trends and Assessment

Not Applicable.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>DAG Meetings |
|--------------------------------------|----|---------------------------|
| 2010-11                              |    | 2                         |
| 2011-12                              | 1  | 1                         |
| 2012-13                              | 2  | 1                         |
| 2013-14                              | 3  | 3                         |
| 2014-15                              | 4  | 2                         |
| 2015-16                              | 5  | 12                        |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Building Industry Association of Greater Louisville Land Development Committee Monthly Meetings |  |                          |   |               |                |
|---|--|--------------------------|---|---------------|----------------|
| SWQMP ID  | Activity Required  | Schedule                 | Frequency or Measure of Success   | Result        | Propose Change |
| 2.1.12  | Permittee shall participate in at least 75% of the meetings annually | 75% of meetings annually | The permittee shall attend Building Industry Association of Greater Louisville land development committee meetings to address concerns and comments from the local homebuilder professional and provide information regarding changes in procedures, checklist, regulations, etc. | 100% attended | No             |

### Progress Summary Narrative

MSD attends the Building Industry Association of Greater Louisville (BIA Louisville), formerly the Homebuilders Association, land development committee meetings to address concerns and comments from local homebuilder professionals and provide information regarding changes in procedures, checklists, regulations, etc. MSD participates in these meetings regularly and anticipates that meetings will continue to play an important role in receiving information from the development community about their challenges to implement MSD's expectations.

For the reporting period, MSD attended all meetings that they were requested to participate in through the BIA Louisville land development committee. During the reporting period, meetings were held monthly.

- July 8, 2015
- August 5, 2015
- September 2, 2015
- October 7, 2015
- November 4, 2015
- December 2, 2015
- January 6, 2016
- February 10, 2016
- March 2, 2016
- April 6, 2016
- May 11, 2016
- June 8, 2016

### Trends and Assessment

Not Applicable.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>HBAL Meetings |
|--------------------------------------|----|----------------------------|
| 2010-11                              |    | 11                         |
| 2011-12                              | 1  | 11                         |
| 2012-13                              | 2  | 5                          |
| 2013-14                              | 3  | 13                         |
| 2014-15                              | 4  | 12                         |
| 2015-16                              | 5  | 12                         |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Greater Louisville Inc. Environmental & Water Committees |   |                       |  |                            |                |
|--|---|-----------------------|--|----------------------------|----------------|
| SWQMP ID   | Activity Required   | Schedule              | Frequency or Measure of Success  | Result                     | Propose Change |
| 2.1.13   | Permittee shall participate in at least three (3) events per year | Three events per year | The permittee shall participate in committee meetings to address concerns and comments from key local development professionals and provide information regarding changes in construction procedures, checklist, regulations, etc. | Participated in > 3 events | No             |

### Progress Summary Narrative

MSD participates in committee meetings to address concerns and comments from key local development professionals and provide information regarding changes in construction procedures, checklists, regulations, etc. MSD participates in these meetings regularly, typically at least three annually, and anticipates that the venue will continue to play an important role in receiving information from the industrial, commercial and development communities about their challenges to implement MSD's expectations.

### Tracking and Assessment

Greater Louisville, Inc. meetings are generally held on the second Wednesday of every month. MSD participation in these meetings during the reporting period included in Appendix 2.1.2a Outreach Events Summary.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Meetings Attended |
|--------------------------------------|----|--------------------------------|
| 2010-11                              |    | 11                             |
| 2011-12                              | 1  | 9                              |
| 2012-13                              | 2  | 7                              |
| 2013-14                              | 3  | 11                             |
| 2014-15                              | 4  | 6                              |
| 2015-16                              | 5  | 9                              |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Construction Operators |   |          |   |                                 |                |
|------------------------|---|----------|---|---------------------------------|----------------|
| SWQMP ID               | Activity Required   | Schedule | Frequency or Measure of Success   | Result                          | Propose Change |
| 2.1.14                 | Permittee shall evaluate educational materials and/or multimedia presentations for the construction industry related to point and non-point source pollution and stormwater pollution annually. | Annually | The permittee shall make available educational materials and/or multimedia presentations for the construction industry related to point and non-point source pollution, green infrastructure and stormwater pollution prevention measures for operational procedures and erosion and sediment controls. | Materials updated and available | No             |

### Progress Summary Narrative

MSD routinely evaluates and updates its educational materials and presentations related to point and non-point source pollution, green infrastructure and stormwater pollution geared toward the construction industry on an annual basis. MSD updated the Design Manual in 2009, including topics on EPSC. MSD also completed the Green Infrastructure Design Manual (Chapter 18) in June 2011, and updated in December 2013 and in 2016. Minimization of site disturbance as well as preservation and conservation of natural site design features are included. The manual is available at [www.msdlouky.org/insidemsd/standard-drawings.htm](http://www.msdlouky.org/insidemsd/standard-drawings.htm). More information on updates to Chapter 18 is provided in Activity 2.5.10 Post-Construction and Green Infrastructure BMP Guidance Materials.

During this report period, the following educational events were provided to educate the construction and development community:

- Construction Field Day held on September 22, 2015
- Qualified Post-Construction Inspection Program (QPCI) Trainings

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Rain Garden Outreach |  |  |   |                                |                |
|----------------------|--|--|---|--------------------------------|----------------|
| SWQMP ID             | Activity Required  | Schedule   | Frequency or Measure of Success   | Result                         | Propose Change |
| 2.1.15               | Permittee shall estimate handbook distribution and report in the annual report | Annually report; updates at least every even numbered year | The permittee shall maintain and update rain garden handbook with the intent of general public outreach. Consider expanding use to support residential, non-residential professional and non-professional audiences. The permittee shall evaluate changes and make updates at least every even numbered year. | Numerous handbooks distributed | No             |

### Progress Summary Narrative

MSD maintains and updates a rain garden handbook with the intent of general public outreach. MSD will consider expanding its use to support residential, non-residential professional and non-professional audiences. The third edition of the “A How-To Guide for Building Your Own Rain Garden” handbook is available at [www.msdlouky.org/aboutmsd/pdfs/RainGardenRev.pdf](http://www.msdlouky.org/aboutmsd/pdfs/RainGardenRev.pdf) as well as at [msdgreen.org](http://msdgreen.org) and [msdstormwaterquality.org](http://msdstormwaterquality.org). The third edition includes an expanded plant list and more information about understanding urban stormwater and the role rain gardens play with infiltrating runoff.

On-site retrofits for private residential properties including the installation of rain gardens continue to be encouraged through educational campaigns, demonstration projects and incentives to residents. Residential rain gardens provide valuable on-site treatment to improve stormwater quality and limit the volume of stormwater that enters the sewer system.

During the previous reporting period, the third edition Rain Garden Handbook was reviewed for potential updates. Development and printing of a fourth edition handbook will be considered when existing supplies are exhausted.

MSD is exploring options for rain garden workshops with community partners in future permit years.

### Tracking and Assessment

MSD purchased prints of a third edition Rain Garden Handbook. In April 2012, 10,000 copies were printed. In the reporting period, MSD increased the distribution of the Rain Garden Handbook significantly by providing the document as the standard give-away package at public meetings and outreach events. As of July 2016, approximately 900 handbooks were remaining for distribution.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Handbooks Distributed |
|--------------------------------------|----|------------------------------------|
| 2010-11                              |    | Unknown                            |
| 2011-12                              | 1  | 1,209                              |
| 2012-13                              | 2  | 300                                |
| 2013-14                              | 3  | 800                                |
| 2014-15                              | 4  | 500                                |
| 2015-16                              | 5  | >5,000                             |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Green Infrastructure Demonstration Sites |  |          |   |  |                |
|--|--|----------|---|--|----------------|
| SWQMP ID                                 | Activity Required  | Schedule | Frequency or Measure of Success   | Result   | Propose Change |
| 2.1.16                                   | Permittee shall provide a Summary Report of Green Infrastructure demonstration projects in the annual report | Annually | The permittee shall implement series of projects aimed at demonstrating the feasibility and effectiveness of green infrastructure including, but not limited to rain gardens, green roofs, pervious pavement, bio-swales and infiltration. Prioritize, select and implement projects to support a variety of residential, non-residential, professional and non-professional audiences in MSD and co-permittee areas. Where feasible collaborate and/or cooperate with local government agencies, schools, co-permittees and/or private properties with significant use and exposure to the general public. | Green infrastructure demonstration project update provided in Activity 2.5.19 Green Infrastructure Demonstration Sites | No             |

## Progress Summary Narrative

MSD has constructed several highly visible green infrastructure demonstration projects to encourage the public to adopt the green practices. Example projects include rain gardens, pervious pavement, bio-swales, tree boxes and infiltration trenches. MSD continues to collaborate with the Mayor's office, Louisville Downtown Partnership, University of Louisville (UofL) and Louisville Metro to implement projects and maximize public opportunities to raise public awareness. Projects often include signage that describes the project and sites are often included in green infrastructure tours for conferences and community groups. In the current reporting period, this included working with Louisville Downtown Management District to install porous pavement in downtown tree wells. These efforts have raised awareness of green infrastructure in the community. An update on green infrastructure demonstration projects is included in Activity 2.5.19 Green Infrastructure Demonstration Sites.

MSD partners with Louisville Metro's Department of Sustainability to provide matching funding and support for green infrastructure projects. More information on this partnership is provided in Activity 2.1.19 Office of Sustainability Program Assistance.

During PY 5, MSD conducted rain garden workshops and installed two rain gardens at local elementary schools, Maupin Elementary and The Waldorf School of Louisville. These events were interactive demonstrations where students, parents, and community members prepared and installed a rain garden. Participants learned about the value of native plants and the water quality benefits that rain gardens have on downstream waterways.

## Tracking and Assessment

See Activity 2.5.19 Green Infrastructure Demonstration Sites.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| Y        | <b>Level 4: Reduce Pollutant Loading</b>   |
| Y        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| Public Notification of Major Program Changes |   |                            |   |                 |                |
|--|---|----------------------------|---|-----------------|----------------|
| SWQMP ID                                     | Activity Required   | Schedule                   | Frequency or Measure of Success   | Result          | Propose Change |
| 2.1.17                                       | Permittee shall finalize notification system within twelve (12) months of effective date of permit. | Within 12 months of permit | The permittee shall develop a web site-based system to notify the public and affected stakeholders of proposed major program changes that will significantly impact stormwater runoff quality, negatively or positively. The public shall be given the opportunity to informally comment on proposed changes and these comments will be summarized and made available on the website. | System in place | No             |

### Progress Summary Narrative

MSD currently provides notification to the public and stakeholders regarding proposed program changes that will significantly impact stormwater quality negatively or positively through GovDelivery, MSD Stormwater Quality website and public MSD Board Meeting announcements. The website includes a form for public questions and comments. In addition, members of the public who wish to provide comment on pending MSD Board decisions may request to speak at board meetings.

In 2013, amendments were proposed for the Wastewater/Stormwater Discharge Regulations (WDRs) to include requirements to manage post-construction stormwater runoff. These amendments were opened to public comment and addressed prior to being finalized.

During the reporting period, MSD issued a press release reminding the development community of green infrastructure requirements, as the two-year grandfathering period for prior approvals ended August 1, 2015. All land disturbance activities of one acre or greater after August 1, 2015 must manage stormwater per green infrastructure specifications.

During PY 5, MSD released a press release on full implementation of MSD green infrastructure standards for construction sites (Appendix 2.1.8a). For information on press releases distributed via the media contact list, see Activity 2.1.8 News Media – Press Releases.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Cooperative Efforts (MSD provides supportive or other non-lead role) |   |                     |   |  |                |
|--|---|---------------------|---|--|----------------|
| Jefferson County MS4 Workgroup – Communication                       |   |                     |   |  |                |
| SWQMP ID   | Activity Required   | Schedule            | Frequency or Measure of Success   | Result                                   | Propose Change |
| 2.1.18   | Permittee shall attend at least two (2) meetings per year | Two events per year | The permittee shall participate in the Jefferson County MS4 Co-Permittee Workgroup meetings discussing program progress, challenges, activity changes, shared activity requests communication needs and lesson learned. | > 2 co-permittee workgroup meetings held | No             |

### Progress Summary Narrative

The Jefferson County MS4 Workgroup is comprised of Jefferson County MS4 communities that are co-permitted with MSD. The meetings, usually held at MSD, promote discussion among co-permitted communities on program progress, challenges, activity changes, shared activity requests, communication needs and lessons learned. MSD continues to lead and facilitate the Jefferson County MS4 Workgroup meetings at least twice per PY.

During this reporting period, the group met five times and completed and signed interlocal agreements, MS4 annual report and co-permittee certification statements, co-permittee invoices, and trainings including good housekeeping practices.

### Tracking and Assessment

Meeting agendas and attendance sheets are maintained. For the reporting period, meetings included the following dates:

- MS4 Co-permittee Workgroup Meetings
  - August 3, 2015
  - January 7, 2015
  - April 28, 2016
  - May 12, 2016 (conference call)
  - May 16, 2016 (conference call)

Co-permittee workgroup meetings have remained relatively consistent over the permit term, with an increase in PY2 to coordinate and respond to the EPA audit of the MS4 program.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Workgroup Meetings |
|--------------------------------------|----|---------------------------------|
| 2010-11                              |    | 3                               |
| 2011-12                              | 1  | 2                               |
| 2012-13                              | 2  | 5                               |
| 2013-14                              | 3  | 3                               |
| 2014-15                              | 4  | 4                               |
| 2015-16                              | 5  | 5                               |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

| Cooperative Efforts (MSD provides supportive or other non-lead role) |  |          |  |   |                          |
|--|--|----------|--|---|--------------------------|
| "Go Green Louisville" Program Assistance                             |  |          |  |   |                          |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success  | Result  | Propose Change           |
| 2.1.19 (original)  | Permittee shall report its activities and support of the "Go Green Louisville" initiatives in the annual report                            | Annually | The permittee shall continue to support Louisville Metro and the "Go Green Louisville" initiatives with development of guidance materials to be applied to new Metro Government Facilities incorporating green infrastructure.     | Sustainability Plan in place and MSD project support ongoing. | Changed in PY 2 as shown |
| 2.1.19 (updated PY2)   | Permittee shall report its activities and support of the <b>Louisville Metro Office of Sustainability</b> initiatives in the annual report | Annually | The permittee shall continue to support <b>Louisville Metro's Office of Sustainability</b> initiatives with development of guidance materials to be applied to new Metro Government Facilities incorporating green infrastructure. |   |                          |

## Progress Summary Narrative

Mayor Fischer created the Office of Sustainability in 2012 to enhance Louisville's quality of life and to create lasting environmental, economic and community vitality for both current and future generations of Louisville residents ([www.louisvilleky.gov/Sustainability](http://www.louisvilleky.gov/Sustainability)). The Office published the city's first comprehensive sustainability plan, [Sustain Louisville](#), in March 2013, which charts the course for Louisville to be among the greenest cities in the country. The Sustain Louisville plan includes goals to improve waterway quality, incorporate sustainability into the Land Development Code (LDC) and the Comprehensive Plan, and expand green infrastructure incentives citywide. The Sustain Louisville 2013 Progress Report was published in June 2014.



With the aid of \$50,000 in funding support and data and staff resources provided by MSD, Sustain Louisville was able to develop and prioritize tree planting locations for the Urban Tree Canopy Study, a two year study published this year which provides targeted, neighborhood-specific solutions to the issue of heat within the urban core of cities.

During the current permit year, MSD supported its partnership with the Office of Sustainability through participation in the following events:

- LSC Fall Sustainability Summit, 11/06/2015
- Urban Heat Island Summit, 12/11/2015
- Tree Planting at Sun Valley Metro Park, 4/15/2016

For more information on Louisville Metro activities, see Chapter 3 for co-permittee reports.

## Tracking and Assessment

Not applicable.



## 2.2 ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE) FACT SHEETS

| TABLE 2.2 - IDDE  |  |
|---|--|
| SWQMP ID  | IDDE 1 Legal Prohibition/ Control Authority          |
| 2.2.1   | Assess Legal Prohibition/ Control Authority          |
| 2.2.2   | IDDE Source Investigation and Elimination Procedures |
| 2.2.3   | Public Illicit Discharge Report Investigation        |
| 2.2.4   | Dry Weather Screening                                |
| 2.2.5   | Screening Follow-up                                  |
| 2.2.6   | Mapping - Stormwater Infrastructure Inventory        |
| 2.2.7   | Non-industrial IDDE Program Enforcement              |
| 2.2.8   | Hazmat/Spill Unified Response Program                |
| 2.2.9   | On-site SWPPP  |
| 2.2.10  | MVA Mitigation Kit Program                           |
| 2.2.11  | IDDE Identification SWPPP Training Integration       |
| <b>Cooperative Efforts (MSD provides supportive or other non-lead role)</b> |  |
| 2.2.12  | KDOW Support   |

### SUPPORTING INFORMATION

|                |  |
|----------------|--|
| Appendix 2.2.1 | 2013 Wastewater/Stormwater Discharge Regulations   |
| Appendix 2.2.2 | SOP IWD-01 for MS4 Industrial Facility Inspections |



| IDDE 1 Legal Prohibition/Control Authority |  |          |  |  |                |
|--|--|----------|--|--|----------------|
| Assess Legal Prohibition/Control Authority |  |          |  |  |                |
| SWQMP ID                                   | Activity Required  | Schedule | Frequency or Measure of Success  | Result                                     | Propose Change |
| 2.2.1                                      | <p>The permittee shall evaluate existing ordinances and regulations with an emphasis on Article 5 of the MSD Wastewater/Stormwater Discharge Regulations (WDR) to determine if they are sufficient relative to MSD's ability to implement an effective IDDE program per 40 CFR. 122.26(b) (2). The permittee shall periodically update the WDR as needed to identify and eliminate the risk of illicit discharges due to changes in technology, industrial management processes, regulations or program modifications.</p> <p>The permittee shall provide a summary of the adoption of such changes and information about implementation, and effective date in the annual report.</p> | Annually | <p>Permittee shall evaluate, in the odd-numbered PYs, the proposed changes in WDR for consideration by MSD Board</p> | <p>Revised WDR effective date 8/1/2013</p> | No             |

### Progress Summary Narrative

The Hazardous Materials Ordinance (HMO) and the Louisville Metro Integrated Emergency Incident Response program includes procedures to prevent, contain, and respond to spills that may discharge into a waterway or the municipal separate storm sewer. The Louisville Metro Emergency Management Agency (LMEMA), Public Health & Wellness Department (LMPHW), Fire Departments, Police, EMS, Coast Guard, EPA, USACE, and MSD responders are on-call for hazardous materials incident response.

The MSD Wastewater/Stormwater Discharge Regulations (WDR) were revised in FY13 to support the MS4 Post-Construction permit requirements and adopted by the MSD Board effective August 1, 2013. The adopted modifications are in Appendix 2.2.1 2013 Wastewater/Stormwater Discharge Regulations (WDR). No changes were made to Article 5 that supports the IDDE and Industrial Facility programs. Article 5 of the WDR requires industrial facilities to abate and alleviate violations and implement control measures to mitigate non-stormwater discharges identified by MSD inspectors. MSD will continue to periodically evaluate the effectiveness of the language in Article 5 of the WDR to support its ongoing efforts to identify and eliminate illicit discharges.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 1 Legal Prohibition/Control Authority           |   |                          |   |   |                |
|--|---|--------------------------|---|---|----------------|
| IDDE Source Investigation and Elimination Procedures |   |                          |   |   |                |
| SWQMP ID   | Activity Required   | Schedule                 | Frequency or Measure of Success   | Result  | Propose Change |
| 2.2.2  | The permittee shall develop and implement a formal plan of illicit discharge detection including how to trace the source of an illicit discharge and procedures for removing or eliminating them once they are located or reported. The plan should also include the enforcement procedures outlined in the WDRs for illicit discharge elimination, which includes ten (10) days from the receipt of the Notice of Violation (NOV); the source of the illicit discharge shall submit a mitigation plan for removal. | To be developed by FY13. | Submit to the KDOW of Water within six (6) months of the effective date of the permit | ERP, effective 1/23/12; Implementation Plan for Illicit Discharge Detection and Elimination and Industrial Programs 1/25/12; SOP IWD-01 effective 4/25/13 | No             |

### Progress Summary Narrative

In PY 1 and 2, MSD developed an Implementation Plan for Illicit Discharge Detection and Elimination and Industrial Programs and revised the existing Enforcement Response Plan (ERP) to facilitate enforcement with respect to eliminating illicit discharges. The ERP was revised concurrently with revisions to the WDR in 2012 and was approved by the MSD Board effective January 23, 2012. The effective ERP provides guidance to MSD's IWD and Legal Division staff on investigating and enforcing violations of the Wastewater/Stormwater Discharge Regulations (WDR) and Hazardous Materials Ordinance (HMO). The ERP specifies how enforcement actions are escalated in the event of noncompliance and allows for violations with aggravating circumstances to be recommended to receive harsher enforcement action.

The Implementation Plan for Illicit Discharge Detection and Elimination and Industrial Programs was finalized on January 25, 2012. Additionally, MSD developed a step-by-step Standard Operating Procedure (SOP) to complement the ERP and support staff implementation of the enforcement program, see Appendix 2.2.2 SOP IWD-01 for Industrial Facility Inspections. The SOP addresses inspection preparation, conducting inspections, and HANSEN® data entry. SOPs were finalized on April 25, 2013.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 1 Legal Prohibition/Control Authority    |   |          |   |                         |                |
|---|---|----------|---|-------------------------|----------------|
| Public Illicit Discharge Report Investigation |   |          |   |                         |                |
| SWQMP ID                                      | Activity Required   | Schedule | Frequency or Measure of Success   | Result                  | Propose Change |
| 2.2.3   | The permittee shall continue to receive and investigate public reports of potential illicit discharges via customer service hotline, webpage reporting and MetroCall. The permittee shall update and perform customer service hotline staff training for receiving calls regarding potential illicit discharges and appropriate routing procedures. | Annually | Permittee shall provide in the annual report, a summary of the investigations of illicit discharges performed | Service calls addressed | No             |

### Progress Summary Narrative

The MSD Industrial Waste Department (IWD) Incident Response staff conducts investigations of reported pollutant discharges by residents, businesses, and public agencies. This includes responding to reports that come in via the Customer Service 24-hour hotline, the MSD webpage, activities observed by staff while patrolling their assigned area, and referrals from other agencies. The program is authorized and administers compliance and enforcement under the MSD WDR.

In particular, MSD has updated and performed customer service hotline staff training for receiving calls regarding potential illicit discharges and appropriate routing procedures.

The HANSEN@MIDAS database is used by both Louisville Metro and MSD to record inquiries and track response activity. The database format enables robust data analysis. See Activity 2.1.5 MetroCall Hotline and MSD Customer Relations for more information on public calls to MSD customer service.

For the current reporting period, a total of 53 requests for investigations were made to IWD. Emergency response investigation case outcomes and enforcement actions resulting from these investigations are reported in Activity 2.2.7 Non-Industrial IDDE Program Enforcement.

### Tracking and Assessment

As more data is tracked, trends will be identified to effectively assess this program element for past/future permit years.

| Reporting Period<br>July 1 – June 30 | PY | Number of Requests for Investigation |
|--------------------------------------|----|--------------------------------------|
| 2010-11                              |    | 178                                  |
| 2011-12                              | 1  | 44                                   |
| 2012-13                              | 2  | 49                                   |
| 2013-14                              | 3  | 48                                   |
| 2014-15                              | 4  | 33                                   |
| 2015-16                              | 5  | 53                                   |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 1 Legal Prohibition/Control Authority |   |          |  |  |                |
|--|---|----------|--|--|----------------|
| Dry Weather Screening                      |   |          |  |  |                |
| SWQMP ID                                   | Activity Required   | Schedule | Frequency or Measure of Success  | Result   | Propose Change |
| 2.2.4                                      | The permittee shall conduct dry weather screening of representative outfalls. The recommended level of effort is 20% of the major outfalls per year. However, all the major outfalls shall be addressed within the permit term. The permittee shall also conduct dry-weather screenings at ninety 90% of large industrial outfalls of industrial facilities once every two years. | Annually | Permittee shall provide in the annual report, a summary of the dry weather screenings performed. | 100% major outfalls screened and 90% large industrial outfalls screened via thermal imagery screening and field investigations | No             |

### Progress Summary Narrative

MSD began outfall screening through an aerial infrared thermal imaging process beginning in the winter of 2013. Thermal screening during winter months allows optimal visibility and temperature conditions to identify thermal anomalies potentially associated with illicit discharges. Infrared thermal imagery methods allow MSD to identify and quantify the following types of possible illicit discharges: leaking sewage collection lines, non-stormwater discharges from outfalls and pipes, illegal connections to storm drainage ditches and systems, septic tank or degraded sanitary sewer discharges, non-stormwater industrial discharges, groundwater to surface water discharges, and force main exfiltration. A desktop analysis of thermal imagery for hotspots was performed along 150-foot stream buffers and industrial land uses in the MS4 system. This desktop analysis identified anomalies for field screening, which then identified illicit discharges.

Dry weather screening is augmented by SORP training with the intent that a large number of staff operating in the field will be able to recognize potential illicit discharges. Many MSD employees receive quarterly training and all staff attends SORP annual training which includes IDDE recognition and reporting (see Activity 2.2.11 IDDE Identification SWPPP Training Integration).

### Tracking and Assessment

In PY 3, thermal anomalies were identified and field investigations were completed for stream buffered and industrial areas. For stream buffer areas, 148 anomalies were identified and 78 of those were field screened, which resulted in five confirmed illicit discharges and 30 KPDES permitted discharges.

During PY5, thermal anomalies were again identified for stream buffered and industrial areas. 225 anomalies were detected, 88 of those were field screened, and 9 were KPDES permitted discharges. There were no confirmed illicit discharges detected from the 2015 flyover.

| Reporting Period<br>July 1 – June 30 | PY | MS4 Major Outfalls Screened<br>(Stream Buffer Area) | MS4 Industrial<br>Area Outfalls<br>Screened | Relative | Program Assessment Levels           |
|--------------------------------------|----|---|---|----------|-------------------------------------|
| 2010-11                              |    |   |   | Y        | Level 1: Activity Measures          |
| 2011-12                              | 1  |   |   | Y        | Level 2: Raise Awareness            |
| 2012-13                              | 2  |   |   | Y        | Level 3: Changes in Behavior        |
| 2013-14                              | 3  | 100%  | 90%   | N        | Level 4: Reduce Pollutant Loading   |
| 2014-15                              | 4  | 100%  | 90%   | N        | Level 5: Improve Stormwater Quality |
| 2015-16                              | 5  | 100%  | 90%   | N        | Level 6: Receiving Waters           |



| IDDE 1 Legal Prohibition/Control Authority |  |          |  |   |                |
|--|--|----------|--|---|----------------|
| Screening Follow-up                        |  |          |  |   |                |
| SWQMP ID                                   | Activity Required  | Schedule | Frequency or Measure of Success  | Result  | Propose Change |
| 2.2.5                                      | After the initial follow-up to insure the illicit discharge has been mitigated, the permittee shall re-evaluate outfalls that were previously found to have had contaminated discharges to determine the current status of those outfalls. | Annually | Permittee shall starting in PY One (1) inspect at least 25% of suspect outfalls per year | 100% Follow-up field investigations performed | No             |

### Progress Summary Narrative

All potential illicit discharges identified through the customer service hotline are investigated as they are identified. As calls are received and documented by the Customer Relations Department, they are sent to the IWD for investigation and enforcement. IWD performs follow-up inspections for 100% of potential illicit discharges identified to confirm that they have been mitigated (see Activities 2.2.3 Public Illicit Discharge Report Investigation and 2.2.7 Non-Industrial IDDE Program Enforcement). While this is a vital component to eliminating potential illicit discharges, MSD also performed a county-wide infrared thermal imagery screening in winter 2013 and began field follow-up investigations to capture in greater depth and breadth information on potential illicit discharges (see Activity 2.2.4 Dry Weather Screening).

After initial field screening investigations, MSD re-visits these outfalls to determine whether the illicit discharge has been mitigated or further enforcement action is needed.

### Tracking and Assessment

During PY 3, 100% of illicit discharges identified in Activity 2.2.4 Dry Weather Screening were re-visited to perform follow-up screening.

A second flyover was performed in the first quarter of 2015. During PY 5, illicit discharges identified in Activity 2.2.4 Dry Weather Screening were mitigated or referred to KDOW, and no enforcement actions were issued. Referrals to KDOW are provided in Activity 2.3.1 Industrial IDDE Program Enforcement and requests from KDOW are provided in Activities 2.2.12 KDOW Support and 2.3.11 KDOW Support.

| Reporting Period<br>July 1 – June 30 | PY | Illicit Discharge Location Follow-up<br>Inspections Performed (%) |
|--------------------------------------|----|---|
| 2010-11                              |    |   |
| 2011-12                              | 1  |   |
| 2012-13                              | 2  |   |
| 2013-14                              | 3  | 100%  |
| 2014-15                              | 4  | Desktop Screening Underway  |
| 2015-16                              | 5  | 100%  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 2 Management Activities                  |  |          |  |                           |                |
|---|--|----------|--|---------------------------|----------------|
| Mapping - Stormwater Infrastructure Inventory |  |          |  |                           |                |
| SWQMP ID                                      | Activity Required  | Schedule | Frequency or Measure of Success                    | Result                    | Propose Change |
| 2.2.6   | The permittee shall continue to maintain the GIS LOJIC layers constituting its storm sewer system map, showing the location of all known major outfalls, and the names and location of all waters of the Commonwealth that receive discharges from those outfalls. | Annually | Permittee shall maintain a storm sewer system map. | Mapping routinely updated | No             |

### Progress Summary Narrative

MSD maintains an extensive drainage system electronic map through LOJIC. The data is utilized by many field and office staff throughout MSD for the daily implementation of their duties. This data maps the public drainage system, including pass-through drainage and public stormwater outfalls.

This process is ongoing as new plans come in and LOJIC is updated weekly. Information on LOJIC and its data is available at: <http://www.lojic.org/>.

During PY 5, MSD requested co-permittees submit newly annexed areas with Annual Report.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 2 Management Activities            |  |          |   |  |                |
|---|--|----------|---|--|----------------|
| Non-Industrial IDDE Program Enforcement |  |          |   |  |                |
| SWQMP ID                                | Activity Required  | Schedule | Frequency or Measure of Success   | Result   | Propose Change |
| 2.2.7                                   | The permittee shall continue to utilize the WDR, related checklists, and procedures for investigation of potential illicit discharges and elimination of illicit discharges. | Annually | Permittee shall report annually, including number of investigations, enforcement actions and referrals to KDOW, and follow-up investigations. | ERI investigation outcomes and enforcement actions | No             |

### Progress Summary Narrative

MSD will continue to enforce the WDRs, Hazardous Materials Ordinance (HMO) and related policies, regulations, and procedures for the enforcement of non-industrial illicit discharges. Incidents of possible illicit discharges are immediately investigated by the IWD and enforcement action is taken when necessary. This includes enforcement and non-enforcement actions by IWD and referrals to KDOW, Health Department, USACE, or other agencies.

During PY3, the Residential Field Correction Notice Form was created, effective August 20, 2013 (see Activity 2.3.8 Enforcement/Inspections).

Customer Service calls requesting investigations are provided in Activity 2.2.3 Public Illicit Discharge Report Investigation. IWD records these emergency response incident (ERI) cases, performs investigations, documents findings and issues enforcement actions or referrals to KDOW as needed. Comments by IWD on the investigation and enforcement actions taken are documented for each incident. Of the total investigations, fourteen required enforcement action due to violations of the WDR or HMO. The following summarizes outcomes from the ERI investigations:

- 39 No Further Action Required (NFAN)
- 4 Field Correction Notices (FCNs)
- 10 Notice of Violations (NOVs)
- 7 Referred to KDOW

### Tracking and Assessment

As more data is tracked, trends will be identified to effectively assess this program element for past/future permit years.

| Reporting Period<br>July 1 – June 30 | PY | Number of Resulting<br>Enforcement Cases (NOVs) |
|--------------------------------------|----|---|
| 2010-11                              |    | 125   |
| 2011-12                              | 1  | 11  |
| 2012-13                              | 2  | 9   |
| 2013-14                              | 3  | 7   |
| 2014-15                              | 4  | 4   |
| 2015-16                              | 5  | 10  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 2 Management Activities          |  |          |  |                      |                |
|---------------------------------------|--|----------|--|----------------------|----------------|
| Hazmat/Spill Unified Response Program |  |          |  |                      |                |
| SWQMP ID                              | Activity Required  | Schedule | Frequency or Measure of Success  | Result               | Propose Change |
| 2.2.8                                 | The permittee shall continue to maintain and enforce the ordinances, policies, programs and procedures for response and containing spills that may discharge into the MS4. The spill response procedures outlined in Section 95.07 of the Louisville Metro Code of Ordinances relating to hazardous materials shall continue to be implemented and enforced. | Annually | Permittee shall report, if necessary, any changes to the policies and programs and procedures, in the annual report. | No changes to report | No             |

### Progress Summary Narrative

The Louisville Metro Coordinated Response Program responds to hazmat incidents throughout the community. The IWD on-call personnel respond to the scene of hazardous materials incidents when paged by the responding fire department Incident Commander. IWD has developed a working relationship with Metro fire departments relative to releases to the public sewer system.

MSD will continue to maintain and when needed coordinate the improvement of ordinances, and improve MSD policies, programs and procedures for response and the containment of spills that may discharge into the MS4.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 2 Management Activities |  |          |   |   |                |
|------------------------------|--|----------|---|---|----------------|
| On-site SWPPP                |  |          |   |   |                |
| SWQMP ID                     | Activity Required  | Schedule | Frequency or Measure of Success   | Result  | Propose Change |
| 2.2.9                        | The permittee shall institute procedure for receiving SWPPP for qualifying construction sites within six months of the effective date of the permit. | 6 months | Permittee shall document SWPPP procedures and expectations and make the procedures and expectations publicly available. | Procedure in place for receiving SWPPPs for qualifying construction sites | No             |

### Progress Summary Narrative

Effective July 14, 2008, MSD instituted a requirement and procedure for receiving SWPPP for qualifying construction sites. This requirement was intended to reduce confusion associated with pre-existing MSD requirements for a “BMP Plan” and KDOW’s KPDES General Construction Permit (KYR10) references to a “SWPPP.” Certified developers, homebuilders and related stakeholders were sent letters indicating the requirement for SWPPPs.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 2 Management Activities |  |          |  |                              |                |
|------------------------------|--|----------|--|------------------------------|----------------|
| MVA Mitigation Kit Program   |  |          |  |                              |                |
| SWQMP ID                     | Activity Required  | Schedule | Frequency or Measure of Success  | Result                       | Propose Change |
| 2.2.10                       | The permittee shall continue MVA mitigation kit distribution program to meet Fire Department and emergency response spill containment needs. | Annually | Permittee shall report metrics for kit distribution and after-use collection in the annual report. | Metrics for kit distribution | No             |

### Progress Summary Narrative

As part of MSD's efforts to detect and eliminate illicit discharges, the IWD motor vehicle accident (MVA) Mitigation Program provides 18 fire departments in Louisville Metro with mitigation materials to prevent fluids released due to motor vehicle accidents from escaping into stormwater conveyances. MSD continues the MVA mitigation kit distribution program to meet Fire Department and emergency response containment needs.

MSD tracks the cost of the MVA mitigation kits that are distributed to the firehouses. The firehouses pick up kits for use in motor vehicle accidents to prevent wash-off from spills and drop off expended spill materials at MSD's Central Maintenance Facility (CMF).

Although after-use collection data is not available to be tracked, MSD does keep records of the after-use collection dumpster. The dumpster is used for mitigation kit disposal, and collection occurs as the dumpster is filled, which is typically needed only on an annual or bi-annual basis. Where available, dumpster collection costs will be reported for after-use collection.

### Tracking and Assessment

MSD tracks the cost purchasing mitigation kits for the program on an annual basis. During the current reporting period, MSD spent \$21,336.38 to purchase mitigation kits.

| Reporting Period<br>July 1 – June 30 | PY | Estimated MVA Mitigation Kit<br>Materials Purchased |
|--------------------------------------|----|---|
| 2010-11                              |    | \$8,958   |
| 2011-12                              | 1  | \$16,000  |
| 2012-13                              | 2  | \$13,784  |
| 2013-14                              | 3  | \$10,610  |
| 2014-15                              | 4  | \$11,574  |
| 2015-16                              | 5  | \$21,336  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IDDE 2 Management Activities                   |  |          |   |                         |                |
|--|--|----------|---|-------------------------|----------------|
| IDDE Identification SWPPP Training Integration |  |          |   |                         |                |
| SWQMP ID                                       | Activity Required  | Schedule | Frequency or Measure of Success   | Result                  | Propose Change |
| 2.2.11   | The permittee shall integrate techniques and practices to assist staff identify potential illicit discharges into facility and system operations and maintenance training. | Annually | Training shall occur at least once per year and the permittee shall report in the annual report the date of training and the number of staff participating in training. | SORP training performed | No             |

### Progress Summary Narrative

Training to recognize potential illicit discharges is incorporated into the Sewer Overflow Response Protocol (SORP) training received by all permanent and temporary employees, and some consultants on an annual basis. IDDE recognition and reporting has been easily integrated into the existing SORP training program so that all MSD staff is aware of the need to recognize and report illicit discharges. Additionally, MSD personnel responsible for implementation of the SORP receive more in-depth quarterly SORP training. See Activity 2.6.3 for a summary of staff training, including SORP.

MSD also conducts training specific to stormwater pollution prevention at MSD facilities. MSD has integrated facility and system operation and maintenance training with techniques and practices to assist staff in identifying potential illicit discharges. This activity provides MSD facility and office staff with the information needed to recognize potential illicit discharges during the normal course of their duties. This training is a more effective and efficient alternative to one-pass dry-weather field screening approaches for identifying potential illicit discharges. The training provides MSD personnel with instructions on who to notify in the event that a potential illicit discharge is observed. Responding professionals investigate, confirm, and mitigate potential source(s) as appropriate.

In the current reporting period, facility inspection training for SWPPPs included staff communication and SWPPP training on identification of potential illicit discharges and system operation and maintenance. See Activity 2.6.2 Training on MSD Facility SWPPPs for more information on training. MSD also continued training the MS4 Co-permittees using the same SORP program that includes IDDE identification.

### Tracking and Assessment

Not applicable.

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of<br>Employees Attending Annual<br>SORP Training |
|--------------------------------------|----|--|
| 2010-11                              |    | 661  |
| 2011-12                              | 1  | 651  |
| 2012-13                              | 2  | 596  |
| 2013-14                              | 3  | 574  |
| 2014-15                              | 4  | 558  |
| 2015-16                              | 5  | 546  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| Cooperative Efforts (MSD provides supportive or other non-lead role) |  |          |  |                   |                |
|--|--|----------|--|-------------------|----------------|
| KDOW Support   |  |          |  |                   |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success  | Result            | Propose Change |
| 2.2.12   | As KDOW requests, the permittee shall accompany KDOW on inspection of KPDES stormwater permitted facilities in Jefferson County. | Annually | Permittee shall summarize and include in the annual report any assistance given to the KDOW by MSD | Requests reported | No             |

### Progress Summary Narrative

Upon KDOW requests, MSD accompanies KDOW inspections of KPDES stormwater permit facilities in Jefferson County. The KDOW issues KPDES permits for all point-source and stormwater discharges from industrial facilities which include a program to monitor and control pollutants in stormwater discharges from landfills, hazardous waste treatment, disposal and recovery facilities and industrial facilities. The program identifies priorities and procedures for inspections and establishes the control measures for those discharges. The MSD industrial pretreatment and hazardous materials programs complement the KDOW permit and compliance programs for stormwater by referring potential illicit discharges from KPDES permitted facilities to KDOW for enforcement action.

### Tracking and Assessment

During the permit term, KDOW has requested assistance for one facility.

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of KDOW Requests |
|--------------------------------------|----|-----------------------------------|
| 2010-11                              |    | 0                                 |
| 2011-12                              | 1  | 1                                 |
| 2012-13                              | 2  | 2                                 |
| 2013-14                              | 3  | 0                                 |
| 2014-15                              | 4  | 7                                 |
| 2015-16                              | 5  | 1                                 |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



## 2.3 INDUSTRIAL PROGRAM (IP) FACT SHEETS

| TABLE 2.3 - IP   |      |   |
|--|------|---|
| SWQMP ID   | IP 1 | Legal Prohibition / Control Authority                 |
| 2.3.1  |      | Industrial IDDE Program Enforcement (Implementation)  |
| 2.3.2  |      | Industrial IDDE Program Enforcement (Legal Authority) |
| 2.3.3  |      | Industrial Facility Inventory                         |
| IP 2 Inventory and Inspection of Industrial Facilities               |      |   |
| 2.3.4  |      | "High Risk" Facility Definition                       |
| 2.3.5  |      | HRIF Inventory Update                                 |
| 2.3.6  |      | HRIF and High-Risk HMPC Inspection                    |
| 2.3.7  |      | Industrial Facility Control Measures                  |
| 2.3.8  |      | Enforcement / Inspections                             |
| 2.3.9  |      | MSD Plan Review                                       |
| 2.3.10   |      | Industrial & Commercial Community Outreach            |
| Cooperative Efforts (MSD provides supportive or other non-lead role) |      |   |
| 2.3.11   |      | KDOW Support  |

### SUPPORTING INFORMATION

|                  |   |
|------------------|---|
| Appendix 2.3.8a  | Residential Field Correction Notice Form                    |
| Appendix 2.3.8b  | Training Log for Industrial Stormwater Inspector Evaluation |
| Appendix 2.3.10a | Maintaining Healthy Waterways Brochure                      |
| Appendix 2.3.10b | Environmentally Responsible BMPs                            |
| Appendix 2.3.10c | HMPC Plan Booklet   |
| Appendix 2.3.10d | Pool Manners Flyer  |
| Appendix 2.3.10e | Stormwater Program Brochure                                 |
| Appendix 2.3.10f | Keeping Our Waterways Safe Brochure                         |



| IP 1 Legal Prohibition/Control Authority             |   |          |  |  |                |
|--|---|----------|--|--|----------------|
| Industrial IDDE Program Enforcement (Implementation) |   |          |  |  |                |
| SWQMP ID   | Activity Required   | Schedule | Frequency or Measure of Success  | Result   | Propose Change |
| 2.3.1  | For industrial properties, the permittee shall continue to utilize the WDR's, HMO and related checklists and procedures for identification of potential illicit discharges and elimination of illicit discharges/ unauthorized stormwater discharges. The permittee shall perform analysis of the industry property data layer in LOJIC cross-linking with properties holding a Hazardous Materials (spill) Prevention Control (HMPC) Plan to identify potential sites that should be added to the program with consideration for High Risk Industrial Facilities designation (determined in other activities). | Annually | Permittee shall summarize in the annual report the industrial enforcement actions and referrals to KDOW. | Facility risks identified and enforcement actions and KDOW referrals documented. | No             |

### Progress Summary Narrative

MSD utilizes the MSD Wastewater/Stormwater Discharge Regulations (WDR), Hazardous Materials Ordinance (HMO), and Enforcement Response Protocol (ERP) to identify and eliminate illicit discharges from industrial facilities.

### Trends and Assessment

During the current reporting period, MSD continued inspections at industrial facilities identified in FY12 and FY13 as high (HRIF) and moderate (MRIF) risk. The purpose of the inspections was twofold; first to meet MS4 permit requirements and second, to validate the assumptions utilized by MSD in what it refers to as the MS4 Threat Matrix to categorize and prioritize facilities as HRIF, MRIF or low risk (LRIF). If an inspection determined the risk category should be changed based on field investigations or other data, the facility's risk category was changed to reflect actual conditions. MSD issued enforcement actions when violations were identified during the inspections.

During the current reporting period, MSD made seven referrals to KDOW regarding facilities with designated Standard Industrial Classification (SIC) Codes that possibly required a KPDES Stormwater Permit. KDOW requested one incident of inspection assistance from MSD. MSD received 53 requests for industrial facility investigations resulted in the following outcomes: 39 No Further Action Required (NFAN), 10 Notice of Violations (NOV), and four Field Correction Notices (FCN). Seven of the investigations were referred to KDOW by MSD.

| Reporting Period<br>July 1 –<br>June 30 | PY | Est. No.<br>Referrals<br>to KDOW | Est. No.<br>No Further<br>Action<br>Required<br>(NFAN) | Est. No.<br>Notice of<br>Violation<br>(NOV) | Est. No.<br>Correction<br>Notice<br>(CN) | Est. No.<br>Field<br>Correction<br>Notice<br>(FCN) |
|---|----|----------------------------------|--|---|--|--|
| 2010-11                                 |    | 1                                |  |   |  |  |
| 2011-12                                 | 1  | 4                                |  |   |  |  |
| 2012-13                                 | 2  | 5                                |  |   |  |  |
| 2013-14                                 | 3  | 10                               | 33   | 7   | 1  | 4  |
| 2014-15                                 | 4  | 7                                | 23   | 4   | 0  | 5  |
| 2015-16                                 | 5  | 7                                | 39   | 10  | 0  | 4  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IP 1 Legal Prohibition/Control Authority              |  |          |  |  |                |
|---|--|----------|--|--|----------------|
| Industrial IDDE Program Enforcement (Legal Authority) |  |          |  |  |                |
| SWQMP ID  | Activity Required  | Schedule | Frequency or Measure of Success  | Result   | Propose Change |
| 2.3.2   | The permittee shall maintain adequate legal authority, per 401 KAR 5:060, Section 12(9)(b)3 and 40 CFR 122.26(b)(2), to require compliance and inspection of sites, inspection of priority industrial and commercial facilities, including establishing control measure requirements such as HMPC, Spill Prevention, Control and Countermeasure (SPCC) Plan and/or the Groundwater Protection Plan (GPP) for facilities that have a potential to discharge to the MS4 and enforce stormwater requirements. | 6 months | Within six (6) months of the effective date of the permit the Permittee shall have established adequate legal authority to require compliance with this measure. | Revised WDR effective date 01/23/12<br><br>Revised WDR effective date 08/01/13 | No             |

### Progress Summary Narrative

The MSD WDR were revised in FY13 to support the MS4 Post-Construction permit requirements and adopted by the MSD Board effective August 1, 2013. No changes were made to Article 5, which supports the IDDE and Industrial Facility programs.

Article 5 of the WDR requires industrial facilities to abate and alleviate violations and implement control measures to mitigate non-stormwater discharges identified by MSD inspectors. MSD will continue to periodically evaluate the effectiveness of the language in Article 5 of the WDR to support its ongoing efforts to identify and eliminate illicit discharges.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IP 2 Inventory and Inspection of Industrial Facilities |  |          |  |                   |                |
|--|--|----------|--|-------------------|----------------|
| Industrial Facility Inventory                          |  |          |  |                   |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success  | Result            | Propose Change |
| 2.3.3  | The permittee shall maintain an inventory of all potential industrial and commercial sites/sources that could contribute substantial pollutant loads to the MS4. | Annually | Permittee shall update annually and made available to the KDOW upon request. | Inventory updated | No             |

## Progress Summary Narrative

MSD has developed an inventory of industrial/commercial sites/sources that could potentially contribute pollutants to the MS4. Currently, through the HMPC Program, MSD requires businesses such as gas stations, manufacturing facilities, hospitals, medical laboratories, cleaning establishments, pest exterminators, and state and local government offices that handle hazardous materials above their designated reportable quantities, to submit an HMPC plan. This list of facilities, referred to as the “HMPC Data Set” is updated as a part of MSD IWD’s day-to-day activities and tracked in HANSEN®. The HMPC Data Set is the starting point for prioritization of facility risk categorization and is updated as existing facilities close, new facilities open and/or a facility’s risk status changes due to inspection by MSD. New facilities must submit plans to the Metro Planning and Design Services Department where MSD reviews the plans to determine the need for pretreatment, a HMPC plan, as well as, their potential risk to the MS4.

## Trends and Assessment

As the MS4 Industrial Facility Inspection Program has matured, inspectors have discovered and inspected additional facilities for potential stormwater impacts. Some of these new facilities are not subject to the HMPC Program, and therefore were not identified in the original Industrial Facility Inventory. A running inventory of industrial facilities is kept, based on inspection records and knowledge of facilities that have closed. During the current reporting period, MSD identified a total of 1,339 industrial facility sources that could impact the MS4. This represents a net gain of 101 facilities from PY 3 which is the last time MSD performed the complete dataset comparison to update the HRIF inventory.

Designated sites/sources inventoried are assessed for their risk; risk parameters are defined in Activity 2.3.4 High Risk Facility Definition and an update on high-risk industrial facility inventory is provided in Activity 2.3.5 HRIF Inventory Update.

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of Potential Industrial & Commercial Sites/Sources Contributing Pollutants to MS4 |
|--------------------------------------|----|--|
| 2010-11                              |    | 1,225  |
| 2011-12                              | 1  | 1,228  |
| 2012-13                              | 2  | 1,211  |
| 2013-14                              | 3  | 1,240  |
| 2014-15                              | 4  | 1,238  |
| 2015-16                              | 5  | 1,339  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IP 2 Inventory and Inspection of Industrial Facilities |  |          |  |                                      |                |
|--|--|----------|--|--------------------------------------|----------------|
| "High Risk" Facility Definition                        |  |          |  |                                      |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success                      | Result                               | Propose Change |
| 2.3.4  | The permittee shall identify Risk Factors to define facilities as "High Risk", "Moderate Risk" and "Low Risk". | Ongoing  | Permittee shall report results by end of PY one (1). | High, moderate and low risks defined | No             |

### Progress Summary Narrative

MSD has developed risk factors to define High Risk or HRIF facilities in the community. This process is complex and incorporates the experiences of the Industrial Waste Department (IWD) staff and metrics utilized by similar communities in the region. MSD has used this definition to sort and distinguish the hundreds of Significant Industrial Users (SIUs) and qualifying facilities already participating in the HMO requirements in a Threat Matrix. The Threat Matrix includes provisions for facilities classified as seemingly low risk based on categorical descriptions, but have a history of poor environmental performance, multiple spills, or history of non-compliance. The following questions are used to rank facilities:

- Is the facility outside the Combined Sewer Service Area?
- Is the facility classified by an MS4-targeted SIC code?
- Are Hazardous Materials stored in the Floodplain?
- Are Hazardous Materials stored within 250-ft. of a blue line stream?
- Has the facility had one or more incidents in the last 3 years?
- Does the facility have a KPDES Permit? (Excludes KYR10: Stormwater Construction permit)

A weighted scoring system is utilized to determine a facility's inspection risk category, which is defined by the following:

- High: Ranked 70% to 100%
- Moderate: Ranked 51% to 69%
- Low: Ranked 50% or below

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IP 2 Inventory and Inspection of Industrial Facilities |   |                             |  |   |                |
|--|---|-----------------------------|--|---|----------------|
| HRIF Inventory Update                                  |   |                             |  |   |                |
| SWQMP ID   | Activity Required   | Schedule                    | Frequency or Measure of Success  | Result  | Propose Change |
| 2.3.5  | MSD shall compare the datasets for local Approved HMPC Plan Facilities to the publicly available facility data from local and state environmental and emergency response agencies to address the completeness and accuracy of High Risk Industrial Facilities identification.<br><br>MSD shall update the list of HRIFs at least twice over the permit term, to account for the most recently available North American Industry Classification System (NAICS), Standard Industrial Classification (SIC) codes, Toxic Release Inventory (TRI) data, MSD's HMPC data and MSD's pretreatment program data with the goal of establishing a tiered list of industries to support priorities in MSD's industrial facility inspection program. | Twice over the permit term. | MSD shall summarize and report annually, the assessment and updates of any industrial facilities identified as "High", "Moderate", and "Low" risk. | Inventory completed in FY11 and updated in FY14 | No             |

### Progress Summary Narrative

The Threat Matrix screening process supports the goal of establishing a tiered stormwater pollution risk of industries and supports the priorities of MSD's industrial facility inspection program. MS4 industrial facility inspections began in PY 1, focusing largely on the high (HRIF) and medium (MRIF) risk industrial facilities. Inspections continued through PY 3, which included several low risk industrial facilities (LRIFs). As inspections have progressed, MSD has notified KDOW of potential facilities needing KPDES permits. Some facilities closed prior to the scheduling of an inspection and, therefore were removed from the inventory. Other facilities have been removed due to field verification that they are not located within the MS4 service area. As facility inspections are conducted, the risk category is confirmed and updated as needed based on field verification.

During PY 5, based on field verification through the inspection program, the updated HRIF Inventory as of June 30, 2016, consisted of 10 HRIF, 31 MRIF, and 1,298 LRIF, with a total of 1,339 facilities. The net gain of 101 facilities from PY 3 is largely associated with the identification of facilities during the HRIF inventory update exercise (see Activity 2.3.3). All of the additional facilities were rated as LRIF based on the inspection conducted.

### Tracking and Assessment

MSD will continue to track this data.

| Reporting Period<br>July 1 – June 30 | PY | Estimated<br>No. HRIF | Estimated No.<br>MRIF | Estimated No.<br>LRIF |
|--------------------------------------|----|-----------------------|-----------------------|-----------------------|
| 2010-11                              |    | NA                    | NA                    | NA                    |
| 2011-12                              | 1  | 7                     | 64                    | 1,158                 |
| 2012-13                              | 2  | 6                     | 50                    | 1,155                 |
| 2013-14                              | 3  | 6                     | 49                    | 1,185                 |
| 2014-15                              | 4  | 8                     | 49                    | 1,181                 |
| 2015-16                              | 5  | 10                    | 31                    | 1,298                 |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| N        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| IP 2 Inventory and Inspection of Industrial Facilities |  |                  |  |                       |                |
|--|--|------------------|--|-----------------------|----------------|
| HRIF and High-Risk HMPC Inspection                     |  |                  |  |                       |                |
| SWQMP ID   | Activity Required  | Schedule         | Frequency or Measure of Success  | Result                | Propose Change |
| 2.3.6  | Based on the results of the updated HRIF assessment, the permittee shall inspect high priority facilities at least once every three (3) years and moderate risk facilities at least once every five (5) years. | Starting in PY 2 | Starting in PY two (2), the Permittee shall report the summary of prioritized inspections completed, and any enforcement resulting from the inspections. | Inspections performed | No             |

### Progress Summary Narrative

MSD has completed inspections for high and moderate risk industrial facilities, as identified in the Threat Matrix. In addition to high and moderate risk facilities, MSD has also inspected many low risk facilities.

### Trends and Assessment

As more data is tracked, trends will be identified to effectively assess this program element for past/future permit years. During PY 5, MSD performed 4 HRIF, 1 MRIF, and 33 LRIF inspections. One of these inspections was no risk.

| Reporting Period July 1 – June 30 | PY | Number of Inspections at HRIF | Number of Inspections at MRIF | Number of Inspections at LRIF |
|-----------------------------------|----|-------------------------------|-------------------------------|-------------------------------|
| 2010-11                           |    | NA                            | NA                            | NA                            |
| 2011-12                           | 1  | 6                             | 15                            | 22                            |
| 2012-13                           | 2  | 1                             | 33                            | 28                            |
| 2013-14                           | 3  | 3                             | 9                             | 92                            |
| 2014-15                           | 4  | 4                             | 0                             | 59                            |
| 2015-16                           | 5  | 4                             | 1                             | 33                            |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| IP 2 Inventory and Inspection of Industrial Facilities |  |                  |  |   |                |
|--|--|------------------|--|---|----------------|
| Industrial Facility Control Measures                   |  |                  |  |   |                |
| SWQMP ID   | Activity Required  | Schedule         | Frequency or Measure of Success  | Result  | Propose Change |
| 2.3.7  | The permittee shall require the High Risk industrial and commercial facilities to select, install, implement, and maintain control measures that promote prevention and source control for discharge of applicable pollutants of concern. This requirement may be addressed through HMPC Plan and/or federal programs such as SPCC Plan and/or the GPP that are already implemented at the industrial and commercial facilities. The permittee shall require the applicable facilities to identify the specific control measures, good housekeeping and maintenance procedures, and employee training necessary. | Starting in PY 2 | Starting in PY two (2), the Permittee shall report annually on control measures required of the high-risk industrial and commercial facilities to ensure compliance with this measure. | HMPC Ordinance in place since 1985. Inspections and if necessary, enforcement actions | No             |

### Progress Summary Narrative

During the current reporting period, MSD continued to administer the HMO; soliciting, reviewing and approving HMPC plans and verifying control measures through facility inspections. Additionally, MSD worked with high risk industrial and commercial facilities to implement and maintain control measures that promote prevention and source control for discharge of applicable pollutants.

During PY 3, as part of the Hazardous Material Spill Prevention Control (HMPC) Plan program, MSD began a pilot effort for HMPC-exempt facilities in an effort to inspect and educate property owners of the importance of good housekeeping practices to protect stormwater quality.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| IP 2 Inventory and Inspection of Industrial Facilities |  |            |  |  |                |
|--|--|------------|--|--|----------------|
| Enforcement / Inspections                              |  |            |  |  |                |
| SWQMP ID   | Activity Required  | Schedule   | Frequency or Measure of Success  | Result   | Propose Change |
| 2.3.8  | The permittee shall develop criteria or procedures for site inspections and enforcement including criteria to address how the MS4 will use enforcement authorities to ensure compliance with the industrial program requirements. The permittee shall enforce the procedures outlined in Section 95.11 of the Louisville Metro Code of Ordinances relating to hazardous materials. | Six months | Within six months of the permit issuance, the Permittee shall develop the required criteria or procedures to comply with this measure. | SOP developed, third party inspections conducted | No             |

### Progress Summary Narrative

MSD has developed and implemented inspection and enforcement procedures and authority to ensure compliance with the industrial program requirements. In 2012, MSD revised its ERP to facilitate enforcement with respect to eliminating illicit discharges concurrently with revisions to the WDR. Both documents were approved by the MSD Board effective January 23, 2012. The effective ERP provides guidance to MSD's Industrial IWD and legal department staff on investigating and enforcing violations of the WDR and HMO) The ERP specifies that violations with aggravating circumstances are recommended to receive harsher enforcement action.

During the reporting period, the step-by-step SOP for industrial facility inspections and enforcement continued to be implemented by MSD. This SOP may be modified as necessary, to compliment the ERP and support staff implementation of the enforcement program. The SOP includes inspection preparation, conducting inspections and HANSEN® data entry.

During PY 3, the Residential Field Correction Notice Form was created effective August 20, 2013 (see Appendix 2.3.8a Residential Field Correction Notice Form).

In response to EPA recommendations stemming from the 2012 EPA MS4 Stormwater Program Audit, third party reviews mirroring construction EPSC inspector refresher trainings began for the industrial program in 2013. MSD's IWD staff is accompanied by a third party consultant on field inspections at MSD facilities to support consistent inspection methodology. In the current reporting period, six third party inspections were performed. A classroom training will be held in the fall of 2016 to review the field inspections and to provide training to new staff, anticipated to be hired in September 2016. Appendix 2.3.8b Training Log for Industrial Stormwater Inspector Evaluation documents the classroom training in 2015.

### Trends and Assessment

| Reporting Period<br>July 1 – June 30 | PY | Estimated No. of<br>Third Party Inspections Conducted |
|--------------------------------------|----|---|
| 2010-11                              |    |   |
| 2011-12                              | 1  |   |
| 2012-13                              | 2  |   |
| 2013-14                              | 3  | 9   |
| 2014-15                              | 4  | 6   |
| 2015-16                              | 5  | 7   |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| Y        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| IP 2 Inventory and Inspection of Industrial Facilities |   |               |   |                            |                |
|--|---|---------------|---|----------------------------|----------------|
| MSD Plan Review  |   |               |   |                            |                |
| SWQMP ID   | Activity Required   | Schedule      | Frequency or Measure of Success   | Result                     | Propose Change |
| 2.3.9  | The permittee shall determine if existing triggers in the new development and redevelopment plan and plumbing systems review process are sufficient to include appropriate industrial stormwater quality specialists/inspectors in the plan approval process. | Every 3 Years | Permittee shall assess at least every three (3) years and report changes to process in the annual report. | Adequate triggers in place | No             |

### Progress Summary Narrative

As a matter of routine business, the MSD Stormwater Department (construction plan review) refers potential projects to the IWD for additional review. Periodically, MSD determines if triggers in the new development and redevelopment plan and plumbing systems review process are sufficient to include appropriate industrial stormwater quality specialists/inspectors in the plan approval process. The existing plan review triggers provide a means to involve the IWD. This task is intended to refresh associated staff with the indicators and/or checklists used to trigger their involvement and provide a basis for the expanded plan review process.

New industrial facilities are incorporated into the industrial facility inventory, as discussed in Activity 2.3.3 Industrial Facility Inventory.

### Trends and Assessment

Not applicable.

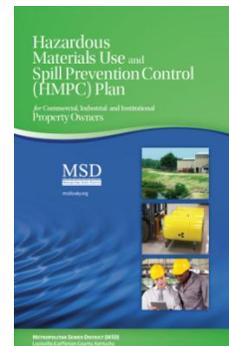
| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |

| IP 2 Inventory and Inspection of Industrial Facilities |   |                  |   |                                     |                |
|--|---|------------------|---|-------------------------------------|----------------|
| Industrial & Commercial Community Outreach             |   |                  |   |                                     |                |
| SWQMP ID   | Activity Required   | Schedule         | Frequency or Measure of Success   | Result                              | Propose Change |
| 2.3.10   | The permittee shall develop and distribute outreach materials (brochure, fact sheets, etc.) to HMPC Facilities and other commercial operations of concern to promote illicit discharge elimination awareness. | Starting in PY 2 | Starting in PY two (2), the Permittee shall identify materials developed and distribution estimates and summarize in the annual report. | Brochures developed and distributed | No             |

### Progress Summary Narrative

MSD developed outreach materials focused toward industrial/commercial sectors in order to promote awareness of related stormwater quality issues, including a Hazardous Materials Use and Spill Prevention Control Plan (HMPC) brochure. In addition, information is available on the MSD website specific to stormwater awareness for the industrial/commercial sectors.

MSD sends letters to businesses that appear to be required to submit a HMPC Plan concerning the schedule for submission. Businesses which believe they should be exempt from a submission are required to submit an exemption request form as described in the letter. The HMPC Plan must be submitted on an application form provided by MSD. MSD IWD personnel review and approve plans and inspect the facility to verify the plan accurately identifies control measures. Plans that are considered to be deficient are returned to the facility for correction and resubmission. Once approved, businesses are responsible for implementing their plan including initiation of a training program for employees within their business. MSD developed an Industrial Users Working Group to share information.



*Industrial BMP  
 Guidance (Top);  
 HMPC and Spill  
 Prevention  
 Control Plan  
 (Bottom)*

### Tracking and Assessment

In PY 5, the following brochures were distributed (see Appendix 2.3.10a – Appendix 2.3.10f) to support industrial and commercial facility education of stormwater impacts:

- Maintaining Healthy Waterways (Causes and Prevention of Fish Kills) brochure
- Environmentally Responsible Best Management Practices flyer series
- Hazardous Materials Use and Spill Prevention Control (HMPC) Plan booklet
- Pool Manners Flyer
- Stormwater Program Brochure
- Keeping Our Waterways Safe Brochure

| Reporting Period July 1 – June 30 | PY | Estimated Number of Outreach Materials Distributed  |
|-----------------------------------|----|---|
| 2010-11                           |    | N/A   |
| 2011-12                           | 1  | N/A   |
| 2012-13                           | 2  | HMPC Plan Brochure distribution initiated   |
| 2013-14                           | 3  | 275 (HMPC Plan booklet), 40 (Pool brochures)  |
| 2014-15                           | 4  | Fish Kills brochure, Stormwater Inspection Brochure, HMPC Plan Booklet, BMPs Brochure, Keeping Our Waterways Safe Brochure  |
| 2015-16                           | 5  | Fish Kills Brochure, Stormwater Inspection Brochure, HMPC Plan Booklet, BMPs Brochure, Keeping Our Waterways Safe Brochure, Environmentally Responsible BMPs Brochure |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| <b>IP 2 Inventory and Inspection of Industrial Facilities</b>               |  |          |  |             |                |
|---|--|----------|--|-------------|----------------|
| <b>Cooperative Efforts (MSD provides supportive or other non-lead role)</b> |  |          |  |             |                |
| <b>KDOW Support</b>   |  |          |  |             |                |
| SWQMP ID  | Activity Required  | Schedule | Frequency or Measure of Success  | Result      | Propose Change |
| 2.3.11  | As KDOW requests, the permittee shall accompany KDOW on inspection of KPDES stormwater permitted facilities in Jefferson County. | Annually | Permittee shall summarize and include in the annual report any assistance given to the KDOW by MSD | No requests | No             |

### Progress Summary Narrative

As KDOW makes requests, MSD will accompany KDOW on inspection of KPDES stormwater permit facilities in Jefferson County. KDOW issues KPDES permits for all point-source and stormwater discharges from industrial facilities. The KPDES permits include a program to monitor and control pollutants in stormwater discharges from landfills, hazardous waste treatment, disposal and recovery facilities and industrial facilities. The program identifies priorities and procedures for inspections and establishes and implements the control measures for those discharges. The MSD industrial pretreatment and hazardous materials programs complement the KDOW permit and compliance programs for stormwater by referring potential illicit discharges from facilities with a KPDES permit to KDOW for enforcement action. MSD will report these activities to KDOW. MSD will continue to offer training to local industry for technical assistance in developing and implementing Facility HMPC and compliance with local requirements.

### Tracking and Assessment

During the reporting period, KDOW requested MSD to assist with one inspection. Referrals made by MSD to KDOW are provided in Activity 2.3.1 Industrial IDDE Program Enforcement (Implementation).

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of KDOW Requests for MSD Inspection Support |
|--------------------------------------|----|--|
| 2010-11                              |    | 0  |
| 2011-12                              | 1  | 0  |
| 2012-13                              | 2  | 2  |
| 2013-14                              | 3  | 0  |
| 2014-15                              | 4  | 1  |
| 2015-16                              | 5  | 1  |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



## 2.4 CONSTRUCTION SITE (CS) FACT SHEETS

| TABLE 2.4 - CS   |   |
|--|---|
| SWQMP ID   | CS 1 Legal Prohibition/Control Authority                            |
| 2.4.1  | Assess Legal Prohibition / Control Authority                        |
| 2.4.2  | Implement Legal Prohibition / Control Authority                     |
| 2.4.3  | Site Plan Review  |
| 2.4.4  | Construction Site Inspection  |
| 2.4.5  | Construction Site Inspection Frequency                              |
| 2.4.6  | Construction Site Inventory   |
| CS 2 CS Management Activities  |   |
| 2.4.7  | Construction BMP Guidance Materials                                 |
| 2.4.8  | On-site SWPPP   |
| 2.4.9  | Construction Stormwater Runoff Control Program Inspection Refresher |
| 2.4.10   | Construction Inspector Training                                     |
| 2.4.11   | Plan Preparers and Reviewers Training (MSD Facilitates)             |
| 2.4.12   | Local Utility Construction General Permit Entities                  |
| 2.4.13   | MSD General Construction Permits Evaluation                         |
| 2.4.14   | Enforcement Tracking Log / Database                                 |
| Cooperative Efforts (MSD provides supportive or other non-lead role) |   |
| 2.4.15   | Plan Development Process Identification                             |
| 2.4.16   | Metro IP & L Enforcement Coordination                               |

### SUPPORTING INFORMATION

|                 |   |
|-----------------|---|
| Appendix 2.4.4a | EPSC Construction Site Inspection SOP CS-01 |
| Appendix 2.4.4b | EPSC Inspector Training SOP CS-02           |
| Appendix 2.4.8  | MSD Construction SWPPP Memo                 |
| Appendix 2.4.13 | LG&E General Permit 2015                    |
| Appendix 2.4.15 | Green Infrastructure Plan Review Checklist  |



| CS 1 Legal Prohibition/Control Authority   |  |             |   |                                     |                |
|--|--|-------------|---|-------------------------------------|----------------|
| Assess Legal Prohibition/Control Authority |  |             |   |                                     |                |
| SWQMP ID                                   | Activity Required  | Schedule    | Frequency or Measure of Success   | Result                              | Propose Change |
| 2.4.1                                      | MSD shall assess existing ordinance and regulations to identify changes needed to account for changes in standard of care (as directed by KDOW General Construction Permit KYR10), changes in technology, changes to development management process and related program needs in satisfaction of 40 CFR 122.26(b)(15)(i) for construction activities that result in a land disturbance of greater than or equal to one acre and construction activity disturbing less than one acre that is part of a larger common plan of development that would disturb one acre or more. | PYs 1 and 3 | MSD shall summarize proposed changes enumerated by end of PYs one (1) and three (3) and report proposed changes in to Wastewater/ Stormwater Discharge Regulations for consideration by MSD Board in the annual report. | WDR became effective August 1, 2013 | No             |

### Progress Summary Narrative

MSD's Erosion Prevention and Sediment Control (EPSC) Ordinance was adopted in 2000. In 2011, MSD began reviewing the legal controls to identify changes needed to account for the changes in standard of care as directed by KDOW General Construction Permit, changes in technology, changes to development management processes and related program needs in satisfaction of 401 KAR 5:060, Section 12(a)(b)(4)a, b and 40 CFR 122.26(b)(15)(i) for construction activities that result in a land disturbance of greater than or equal to one acre and construction activity disturbing less than one acre that is part of a larger common plan of development that would disturb one acre or more. MSD continues to implement its program for construction activities greater than 2,000 square feet.

In July 2012, MSD drafted proposed EPSC and Post-Construction updates to the EPSC Ordinance for Metro Council. After consideration by Metro Council members and receipt of public stakeholder comments, MSD pursued changes through the Wastewater/Stormwater Discharge Regulations (WDRs) and MSD's existing regulatory authority. The changes became effective August 1, 2013, and include post-construction related matters.

There were no changes to the EPSC Ordinance or construction regulations during the reporting period.

During the last reporting period, KDOW released the updated KYR10 General Permit for Stormwater Discharges from Construction Sites, effective December 1, 2014. MSD continues to assess existing policies, regulations, and updates as well as coordinating with KDOW to assess updates, as needed.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| CS 1 Legal Prohibition/Control Authority      |  |          |  |  |                |
|---|--|----------|--|--|----------------|
| Implement Legal Prohibition/Control Authority |  |          |  |  |                |
| SWQMP ID                                      | Activity Required  | Schedule | Frequency or Measure of Success  | Result   | Propose Change |
| 2.4.2   | MSD shall continue to enforce existing ordinances and regulations intended to limit construction phase stormwater quality impacts from new construction and significant redevelopment. | Annually | MSD shall require routine inspections of active construction sites with reasonable potential to discharge to MS4. A summary of these inspections and any enforcement actions resulting from inspections shall be included in the annual report | Approximate number of construction site inspections reported | No             |

### Progress Summary Narrative

MSD performs construction site inspections through its Construction Inspection Group. Data is tracked for private construction sites by enforcement inspectors in the EPSC and Enforcement Log database. The types of inspections performed include: EPSC compliance; subdivision site disturbance; general permit release; enforcement request (which are typically referrals from field inspectors); Customer Service Request (CSR); builder-bond for individual construction sites that are not in bonded subdivisions. Compliance and enforcement actions are taken where deficiencies are noted by inspectors, including issuing Field Correction Notices (FCNs) for required remedial actions; Notice of Violations (NOVs) for failure to comply with a correction notice; Stop Work Orders (SWOs) for non-compliant practices; and fines.

Construction Inspection Group inspectors inspect MSD construction projects. Inspection notes are recorded in log books and enforcement actions are documented and referred to the Enforcement Division. MSD construction projects are inspected daily by a staff of inspectors. Construction inspectors may perform up to five inspections in a day. Large capital projects are required to have an on-site contract inspector.

Enforcement activities resulting from the site inspections below are reported in Activity 2.4.14 Enforcement Tracking Log/Database.

### Tracking and Assessment

The approximate number of inspections by the construction inspectors is provided in the tables here.

| July 1-June 30<br>Data from EPSC Enforcement Log Application | Approximate Number<br>of Inspections |
|--|--------------------------------------|
| Builder Bond Inspection                                      | 3,080                                |
| HANSEN® Service Request                                      | 117                                  |
| Enforcement Request  | 128                                  |
| SDP Release  | 0                                    |
| Subdivision Inspection                                       | 3,455                                |
| WM EPSC Inspection   | 6,750                                |
| <b>Total</b>   | <b>13,530</b>                        |

| Reporting Period<br>July 1 – June 30 | PY | Approximate No. of Site Inspections |
|--------------------------------------|----|-------------------------------------|
| 2010-11                              |    | 7,009                               |
| 2011-12                              | 1  | 22,104                              |
| 2012-13                              | 2  | 12,027                              |
| 2013-14                              | 3  | 16,959                              |
| 2014-15                              | 4  | 14,450                              |
| 2015-16                              | 5  | 13,530                              |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| CS 1 Legal Prohibition/Control Authority |  |          |  |                          |                |
|--|--|----------|--|--------------------------|----------------|
| Site Plan Review                         |  |          |  |                          |                |
| SWQMP ID                                 | Activity Required  | Schedule | Frequency or Measure of Success  | Result                   | Propose Change |
| 2.4.3                                    | MSD shall conduct site plan reviews in accordance with the procedures outlined in Section 159.02 of the Louisville/Jefferson County EPSC to assess whether the plans include measures that address potential water quality impacts from construction prior to authorization of land disturbance. | Annually | MSD shall review plans as needed and report the number of plans reviewed in the annual report. | Number of Permits Issued | No             |

## Progress Summary Narrative

Per the EPSC Ordinance, MSD requires a construction permit and plan review for projects with greater than 2,000 square feet of disturbance.

Prior to the issuance of a permit, MSD typically performs multiple reviews. MSD conducts site plan reviews for the construction permits issued. The image here is an example query from the MSD HANSEN® database, used to track projects.

*MSD EPSC Database*

## Tracking and Assessment

During the current reporting period, 336 construction permits were issued.

| Reporting Period<br>July 1 – June 30 | PY | Construction Permits Issued |
|--------------------------------------|----|-----------------------------|
| 2010-11                              |    | 213                         |
| 2011-12                              | 1  | 303                         |
| 2012-13                              | 2  | 248                         |
| 2013-14                              | 3  | 312                         |
| 2014-15                              | 4  | 355                         |
| 2015-16                              | 5  | 336                         |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| CS 1 Legal Prohibition/Control Authority |   |  |  |               |                |
|--|---|--|--|---------------|----------------|
| Construction Site Inspection             |   |  |  |               |                |
| SWQMP ID                                 | Activity Required   | Schedule                                 | Frequency or Measure of Success          | Result        | Propose Change |
| 2.4.4                                    | MSD shall develop and implement criteria and/or procedures for site inspection. The procedures shall include an Enforcement Response Plan outlined in Section 159.05 of the Louisville/Jefferson County EPSC Ordinance. | Within 60 days of permit effective date. | Within 60 days of permit effective date. | SOPs in place | No             |

### Progress Summary Narrative

To ensure compliance with approved plans, MSD inspects land disturbing activities for compliance with Section 159.05 of the EPSC Ordinance. The intent of the ordinance is to pursue and secure negotiated compliance wherever practicable and effective prior to alternative enforcement measures being invoked.

MSD's Engineering Development and Stormwater Services and Technical Services groups EPSC inspection staff, as well as contract inspectors, have been trained and pass a qualifying exam via a Jefferson County Public School program with materials documenting procedures and expectations to comply with Section 159.05 of the ordinance.

In 2013, MSD developed the following Standard Operating Procedures (SOPs) to document protocols for construction site inspections and oversight:

- EPSC Construction Site Inspection (SOP CS-01) documents how inspections are conducted and documented as well as how enforcement procedures are implemented and tracked
- EPSC Inspector Field Verification Training (SOP CS-02) documents oversight inspection review responsibilities, frequency and standards

In 2015, MSD updated the Standard Operating Procedures to include third party inspector verification and training.

During PY 4, updates were made to the SOPs, including adding the state e-notification process for the general construction permit (see Appendix 2.4.4a EPSC Construction Site Inspection SOP CS-01 and Appendix 2.4.4b EPSC Inspector Training SOP CS-02). More information on the inspector oversight and training program is provided in Activity 2.4.9 Construction Stormwater Runoff Control Program Inspector Refresher.

During PY 5, MSD reorganized the majority of construction inspectors for capital and private projects under a single Construction Inspection group. Large capital projects are required to have an on-site contract inspector which MSD performs oversight inspections.

### Trends and Assessment

Not applicable.

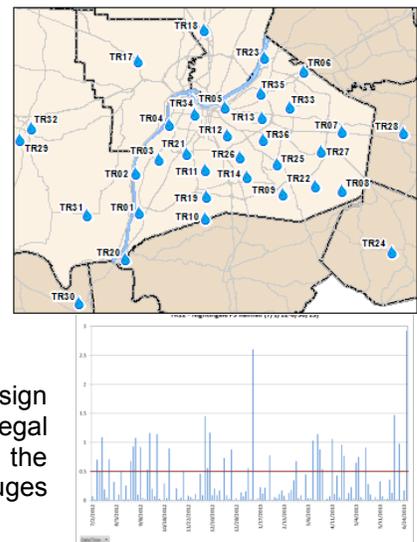
| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |

| CS 1 Legal Prohibition/Control Authority |  |          |  |   |                |
|--|--|----------|--|---|----------------|
| Construction Site Inspection Frequency   |  |          |  |   |                |
| SWQMP ID                                 | Activity Required  | Schedule | Frequency or Measure of Success  | Result  | Propose Change |
| 2.4.5                                    | Permittee (Site Operator) is required to conduct inspections monthly or after 0.5 inch rain events with less frequent MSD oversight inspections of at least 90% of active sites. | Annually | MSD shall report the number of inspections performed in the annual report. | Oversight inspections of self-inspections performed | No             |

### Progress Summary Narrative

MSD verifies inspections of active construction sites on a bi-monthly basis, which includes inspections following a half-inch rain event. MSD's inspection team conducts inspections for all permitted active construction sites, which includes oversight of the property owner's self-inspection records. Some construction sites are inspected on a more frequent basis based on site drainage characteristics or impact to sensitive features/streams. MSD oversight inspections review the documentation of self-inspections that the property owners maintain. MSD does not maintain copies of the property operators' self-inspections.

MSD maintains an electronic database of inspection activity to assign inspectors and track activities (see Activity 2.4.2 Implement Legal Prohibition/Control Authority). MSD also monitors rain events through the rain gauge system and Telog software. MSD has a number of rain gauges located around Louisville Metro, as shown on the map above.



### Tracking and Assessment

During the current reporting period, 40 calendar days had a rainfall total above 0.5 inches at the Nightingale Pump Station Rain Gauge (TR12). Daily totals were calculated based on calendar days. The Nightingale gauge is the most central rain gauge location in Jefferson County and was used to approximate the number of rain events that qualified for self-inspections.

*MSD Rain Gage Locations (Top); Example of Rain Gage Report Chart (Bottom)*

MSD inspects at least 90% of active construction sites. More information on construction inspections performed over the course of the reporting period is provided in Activity 2.4.2 Implement Legal Prohibition/Control Authority.

| Reporting Period July 1 – June 30 | PY | Estimated No. Qualifying Rain Events |
|-----------------------------------|----|--------------------------------------|
| 2010-11                           |    | 33                                   |
| 2011-12                           | 1  | 36                                   |
| 2012-13                           | 2  | 35                                   |
| 2013-14                           | 3  | 36                                   |
| 2014-15                           | 4  | 30                                   |
| 2015-16                           | 5  | 40                                   |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| CS 2 CS Management Activities |   |                     |   |                                       |                |
|-------------------------------|---|---------------------|---|---------------------------------------|----------------|
| Construction Site Inventory   |   |                     |   |                                       |                |
| SWQMP ID                      | Activity Required   | Schedule            | Frequency or Measure of Success   | Result                                | Propose Change |
| 2.4.6                         | MSD shall develop and maintain an inventory of all active public and private construction sites that result in a total land disturbance of greater than or equal to one acre and less than one acre that is part of a larger common plan of development. Inventory should include the project's name, address, contact person, inspection dates, and any enforcement actions issued to the project. | Continually updated | Inventory continually updated as projects are permitted and projects are completed. | Project inventory database maintained | No             |

### Progress Summary Narrative

MSD tracks active construction sites greater than 2,000 sq. ft. per the EPSC Ordinance, and the inspection team conducts inspections for all permitted active construction sites. Sites are tracked using the Home Building and Service Request Inspection Report in the EPSC Enforcement Log database. The database catalogs construction site project name, address, primary site contact and inspection dates and tracks any enforcement actions issued for the site.

### Tracking and Assessment

The number of active sites varies daily based on the number of site disturbance permits issued (new sites added) and released to/from the system. In addition, MSD adjusts the frequency of construction site inspections based on site drainage characteristics or impact to sensitive features/streams with more frequent inspections to protect sensitive areas. More information on construction inspections performed over the course of the reporting period is provided in Activity 2.4.2 Implement Legal Prohibition/Control Authority.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| CS 2 CS Management Activities       |  |                       |   |  |                |
|-------------------------------------|--|-----------------------|---|--|----------------|
| Construction BMP Guidance Materials |  |                       |   |  |                |
| SWQMP ID                            | Activity Required  | Schedule              | Frequency or Measure of Success   | Result   | Propose Change |
| 2.4.7                               | As needed to account for changes in the KDOW general construction permit(s), MSD shall update the guidance materials facilitating current technology use, local plan review/inspection requirements and related implications, Design Manual chapters and Standard Specifications sections to address EPSC and other construction phase (waste concrete, fueling and repairs operations, etc) topics including BMP selection, feasibility, design considerations, operation, maintenance, inspection checklist and related matters. | By end of PYs 1 and 4 | MSD shall update the Design Manual and Standards Specifications by end of PYs one (1) and four (4) and make the updates publicly available. | Design Manual updated in 2009, 2011, and 2013; Construction Field Day 2015 | No             |

### Progress Summary Narrative

MSD updated the Design Manual for EPSC issues in 2009. MSD Chapter 12, Design Manual updates were posted to the website during PY 5.

MSD completed the Green Infrastructure (Chapter 18) Design Manual in June 2011. Minimization of site disturbance as well as preservation and conservation of natural site design features are included in Chapter 18. Chapter 18 includes an Operation and Maintenance (O&M) section to guide operators on the proper maintenance of green infrastructure. An update to the Green Infrastructure Design Manual was completed in December 2013. During PY5, Chapter 18 was updated. MSD held stakeholder workshops to solicit feedback on potential changes to the Design Manual. The proposed Chapter 18, Crosswalk, and Stormwater Unit Memorandum were also made available for public comment until Monday, June 20, 2016 on the MSD website. <http://www.msddgreen.org/Green-101.aspx>

The Design Manual, as well as Chapter 18 is available to the public at: <http://www.msdlouky.org/insidemsd/standard-drawings.htm>.

For information on contractor training/education, see Activity 2.1.14.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| CS 2 CS Management Activities |  |          |   |  |                |
|-------------------------------|--|----------|---|--|----------------|
| On-site SWPPP                 |  |          |   |  |                |
| SWQMP ID                      | Activity Required  | Schedule | Frequency or Measure of Success   | Result   | Propose Change |
| 2.4.8                         | MSD shall institute procedure for receiving SWPPP for qualifying construction sites within six months of the effective date of the permit. | 6 Months | MSD shall document SWPPP procedures and expectations and make the procedures and expectations publicly available. | EPSC Ordinance effective 2000; SWPPP memorandum effective 2008 | No             |

### Progress Summary Narrative

Effective July 14, 2008, MSD instituted a requirement and procedure for receiving SWPPPs for qualifying construction sites. MSD notified the development community that SWPPPs should be submitted to the KDOW as well as to MSD as part of the construction plan submittal. This requirement was intended to reduce confusion associated with pre-existing MSD requirements for a “BMP Plan” and KDOW’s KPDES General Construction (KYR10) Permit language references to a “SWPPP.” Certified developers, homebuilders and related stakeholders were sent letters indicating the requirement for SWPPPs. A copy of the memorandum dated May 30, 2008, can be found in Appendix 2.4.8 MSD Construction SWPPP Memo.

Through its EPSC Ordinance, MSD requires that qualifying construction plan submittals include a SWPPP, as shown on MSD’s Site Plan Review Checklist. SWPPPs must be prepared for sites disturbing greater than one acre. The site plan checklist is available on MSD’s website at: <http://www.msdlouky.org/insidemsd/pdfs/chklist2.pdf>.

Additionally, MSD provides a sample site grading and SWPPP plan sheet as guidance to developers on the website at: <http://www.msdlouky.org/insidemsd/standard-drawings.htm>.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| Y        | <b>Level 4: Reduce Pollutant Loading</b>   |
| Y        | <b>Level 5: Improve Stormwater Quality</b> |
| Y        | <b>Level 6: Receiving Waters</b>           |



| CS 2 CS Management Activities                                       |  |          |  |   |                |
|---|--|----------|--|---|----------------|
| Construction Stormwater Runoff Control Program Inspection Refresher |  |          |  |   |                |
| SWQMP ID  | Activity Required  | Schedule | Frequency or Measure of Success  | Result  | Propose Change |
| 2.4.9   | MSD shall review inspector practices with individual MSD and contract inspectors to communicate and confirm oversight responsibilities, documentation requirements, and frequency of inspection, inspection standards and protocols. The refresher review (performed on-site) will include EPSC and non-EPSC construction stormwater control metrics, the most current KDW General Construction Permit and the current USEPA MS4 Program Evaluation Construction Site Checklist. | Annually | MSD shall complete refresher with Construction inspectors annually, reporting the date and the number of attendees in the annual report. | Completed January 2012, additional training conducted summer 2013 | No             |

### Progress Summary Narrative

MSD staff reviews inspector practices annually with individual MSD and contract inspectors to communicate and confirm oversight responsibilities, documentation requirements, inspection frequency, and inspection standards and protocols. For more information on standard operating procedures for inspections and oversight, see Activity 2.4.4 Construction Site Inspection.

MSD performs third party on-site EPSC inspector refresher trainings in a one-on-one audit style format at various construction sites. Refresher trainings involve the consultant's trainer observing and documenting MSD's EPSC inspectors as they perform inspections.

### Trends and Assessment

During the current reporting period, MSD contracted with a third-party consultant to continue on-site EPSC inspector refresher trainings, conducted between March and June 2016. 15 inspectors were trained. 43% of these trainings were conducted after a qualifying rain event.

| Reporting Period<br>July 1 – June 30 | PY | Number of On-Site Inspector<br>Refresher Trainings Conducted |
|--------------------------------------|----|--|
| 2010-11                              |    | TBD  |
| 2011-12                              | 1  | 5  |
| 2012-13                              | 2  | 19   |
| 2013-14                              | 3  | 41   |
| 2014-15                              | 4  | 15   |
| 2015-16                              | 5  | 15   |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| CS 2 CS Management Activities   |   |                      |   |                    |                |
|---------------------------------|---|----------------------|---|--------------------|----------------|
| Construction Inspector Training |   |                      |   |                    |                |
| SWQMP ID                        | Activity Required   | Schedule             | Frequency or Measure of Success   | Result             | Propose Change |
| 2.4.10                          | MSD shall continue construction inspector training program placing new emphasis on delivering similar messages and understanding between MSD inspectors (regular and contracted) and qualified local contractor inspectors. | Three times annually | MSD shall provide at least three (3) training opportunities annually reporting the date and the number of attendees in the annual report. | Training Conducted | No             |

### Progress Summary Narrative

MSD partners with Jefferson County Public Schools (JCPS) to facilitate construction inspector training. The training was one of the first programs in the state focused on increasing the knowledge and accountability of private construction contractors. The training course has been a useful point of reference to improve the quality of inspections performed and provide creditability to the resulting BMP improvements and maintenance identification. Classes are held based on demand. Minimum enrollment of five attendees is required to feasibly conduct a class. The class requires passing an exam.

### Tracking and Assessment

During the reporting period, training was held on the following dates. The estimated number of individuals trained is provided below. It was opined that the recovery of the economy and homebuilding led to a spike in training in PY 4, followed by normalization in PY 5. Participants fluctuate based on certification renewal and the economy.

#### Contractor EPSC Training:

- July 21, 2015
- August 18, 2015
- September 24, 2015
- October 27, 2015
- November 24, 2015
- December 17, 2015
- January 15, 2016
- January 26, 2016
- February 18, 2016
- February 23, 2016
- March 29, 2016
- April 22, 2016
- April 26, 2016
- May 10, 2016
- May 24, 2016

#### Homebuilder EPSC Training:

- August 8, 2015
- October 27, 2015
- December 17, 2015
- February 23, 2015
- April 14, 2016

**Construction Field Day:** September 22, 2015

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of<br>Inspectors Trained |
|--------------------------------------|----|---|
| 2010-11                              |    | 360                                       |
| 2011-12                              | 1  | 244                                       |
| 2012-13                              | 2  | 386                                       |
| 2013-14                              | 3  | 397                                       |
| 2014-15                              | 4  | 663                                       |
| 2015-16                              | 5  | 402                                       |

| Training Audience                | Estimated Number of<br>Individuals Trained |
|----------------------------------|--|
| Contractor EPSC Training (JCPS)  | 341  |
| Homebuilder EPSC Training (JCPS) | 52   |
| MSD Inspector EPSC Training      | 3  |
| Certified Plan Reviewer/Preparer | 6  |
| <b>Total</b>                     | <b>402</b>                                 |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| CS 2 CS Management Activities                           |   |   |  |                              |                |
|---|---|---|--|------------------------------|----------------|
| Plan Preparers and Reviewers Training (MSD Facilitates) |   |   |  |                              |                |
| SWQMP ID  | Activity Required   | Schedule  | Frequency or Measure of Success  | Result                       | Propose Change |
| 2.4.11  | MSD shall identify updates to the plan preparers training program currently administered through the JCPS System placing new emphasis on identifying sensitive features (305b listed streams, threatened or endangered species, etc.) and customizing site SWPPP's to account for the special conditions. | Two events annually;<br>Starting in PY 2 report in the annual report. | MSD shall offer at least two (2) events annually and starting in PY two (2) report program updates in the annual report. | Training mechanism available | No             |

### Progress Summary Narrative

MSD continues its partnership with JCPS and tracks the number of individuals who are trained through the partnership between MSD and the JCPS system. This mechanism is available as an option for additional MSD courses. MSD is in the planning phase to update the Plan Preparers Training. In recent years, there has been little demand for this training, possibly due to economic impacts. A minimum of five attendees is required to hold a class.

In addition, MSD adjusts the frequency of their construction site inspections based on potential impacts to sensitive features/streams with more frequent inspections to protect sensitive areas. These more frequent inspections are used as a tool for in the field training to raise awareness of contractors to special site conditions and impacts of stormwater runoff.

- Plan review meetings were held on:
  - February 26, 2016;
  - March 4, 2016;
  - March 11, 2016;
  - April 1, 2016;
  - April 8, 2016;
  - April 15, 2016;
  - April 22, 2016;
  - April 29, 2016;
  - May 20, 2016;
  - May 27, 2016;
  - June 3, 2016;
  - June 17, 2016
- Modeling and software trainings were attended by five MSD plan review staff
- 2015 Construction Field Day on September 22, 2015

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| CS 2 CS Management Activities                      |  |                  |  |                                   |                |
|--|--|------------------|--|-----------------------------------|----------------|
| Local Utility Construction General Permit Entities |  |                  |  |                                   |                |
| SWQMP ID   | Activity Required  | Schedule         | Frequency or Measure of Success  | Result                            | Propose Change |
| 2.4.12   | MSD shall continue to coordinate policy level stakeholders from local utility agencies holding construction general permits from MSD to confirm inter-agency communication protocols and review changes to standard, policies, procedures, BMP operation expectations and related matters. | Starting in PY 2 | MSD shall hold meetings with at least 90% of MSD's EPSC general permit holders at least every two years. | Permit Holders Attending Meetings | No             |

### Progress Summary Narrative

MSD routinely coordinates with policy level stakeholders from local utility agencies holding construction general permits from MSD to confirm inter-agency communication protocols and review changes to standards, policies, procedures, BMP operation expectations and related matters. MSD is developing a schedule to meet with general permit holders. Some of the general permit holders include, but are not limited to, the following: City of Louisville, Metro Parks, Jefferson County, LG&E, MSD, and LWC.

### Tracking and Assessment

During PY 5, informal meetings were held with six of the general permit holders: City of Louisville, Jefferson County, LG&E, MSD, City of Jeffersontown and LWC.

| Reporting Period<br>July 1 – June 30 | PY | Total Number of<br>General Permit<br>Holders | Number of Permit<br>Holders Attending<br>Meetings |
|--------------------------------------|----|--|---|
| 2010-11                              |    | 7  | 1   |
| 2011-12                              | 1  | 6  | 2   |
| 2012-13                              | 2  | 6  | 2   |
| 2013-14                              | 3  | 6  | 1   |
| 2014-15                              | 4  | 6  | 6   |
| 2015-16                              | 5  | 6  | 6   |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| CS 2 CS Management Activities               |   |   |  |                                      |                |
|---|---|---|--|--------------------------------------|----------------|
| MSD General Construction Permits Evaluation |   |   |  |                                      |                |
| SWQMP ID                                    | Activity Required   | Schedule  | Frequency or Measure of Success  | Result                               | Propose Change |
| 2.4.13                                      | MSD shall evaluate General Construction Permits issued by MSD to utilities and other entities to determine adequacy with revisions to the KDOW general construction permits, changes in organization/practices, MSD standards, etc. | Evaluate general permits by end of PY 3. Reported annually. | MSD shall evaluate all general permits by the end of PY three (3); and report general construction permits issued by MSD in the annual report. | General construction permit reviewed | No             |

### Progress Summary Narrative

MSD evaluated General Construction Permits issued by MSD to utilities and other entities to determine adequacy with revisions to the KDOW general construction permits, changes in MSD organization and practices, MSD standards, etc. No changes to the general construction permit were made. This is not to be confused with entities holding general construction permits issued by the KDOW. This activity is focused on entities the MSD has issued a general permit per its local EPSC ordinance.

Four general permits are being reviewed for updates. Coordination with respective utilities are ongoing in PY 5, and the final revisions are occurring. In 2015, the general permit for LG&E was updated and approved by both parties (See Appendix 2.4.13 LG&E General Permit 2015).

### Tracking and Assessment

Final revisions are being made to the general permits for LGE, LWC, MSD and the City of Jeffersontown.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |

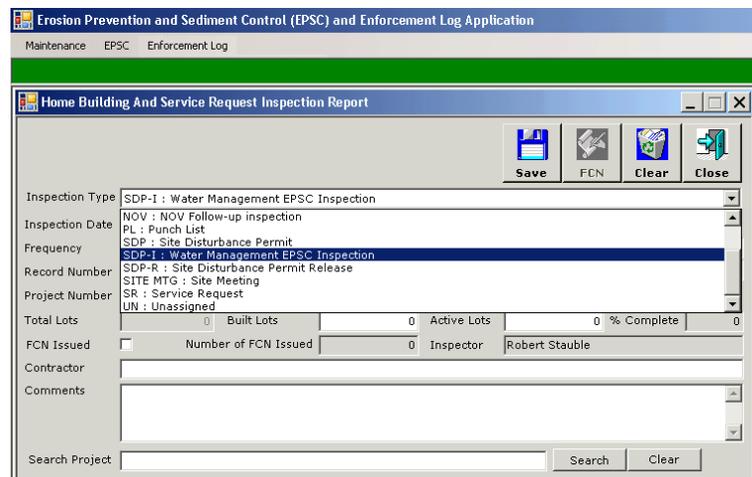


| CS 2 CS Management Activities     |  |          |   |                             |                |
|-----------------------------------|--|----------|---|-----------------------------|----------------|
| Enforcement Tracking Log/Database |  |          |   |                             |                |
| SWQMP ID                          | Activity Required  | Schedule | Frequency or Measure of Success   | Result                      | Propose Change |
| 2.4.14                            | MSD shall continue to track enforcement actions issues (SWO/NOV's) to support follow-up inspections and issuance of penalties and/or Notice of Compliance. | Annually | MSD shall summarize enforcement actions in the annual report. A summary of the tracked enforcement actions issued shall be included in the annual report. | Enforcement actions tracked | No             |

### Progress Summary Narrative

MSD tracks enforcement actions where NOVs and SWOs were issued to support follow-up inspections and issuance of penalties and/or Notice of Compliance via its enforcement tracking database. The EPSC Enforcement Log database catalogs construction sites project name, address, primary site contact and inspection dates as well as tracks any enforcement actions issued for the site.

For more information on the number and type of construction site inspections, see Activity 2.4.2 Implement Legal Prohibition/Control Authority.



*MSD EPSC Enforcement Database*

### Tracking and Assessment

The amount of enforcement actions and fines is tracked below.

In addition to the MSD-issued enforcement actions below, in the current permit year, one MSD capital project received enforcement actions from KDOW and USACE inspectors.

| Reporting Period<br>July 1 – June 30 | PY | No. of<br>FCN | No. of<br>NOVs | No. of<br>SWOs | Total Fines (\$) |
|--------------------------------------|----|---------------|----------------|----------------|------------------|
| 2010-11                              |    | 1,392         | 80             | 80             | \$ 7,664.18      |
| 2011-12                              | 1  | 1,977         | 127            | 127            | \$11,100.00      |
| 2012-13                              | 2  | 3,899         | 84             | 84             | \$18,600.00      |
| 2013-14                              | 3  | 4,449         | 81             | 81             | \$12,600.00      |
| 2014-15                              | 4  | 3,704         | 61             | 57             | \$13,450.00      |
| 2015-16                              | 5  | 3,081         | 74             | 71             | \$25,600.00      |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| CS 2 CS Management Activities  |   |          |  |                            |                |
|--|---|----------|--|----------------------------|----------------|
| Cooperative Efforts (MSD provides supportive or other non-lead role) |   |          |  |                            |                |
| Plan Development Process Identification                              |   |          |  |                            |                |
| SWQMP ID   | Activity Required   | Schedule | Frequency or Measure of Success  | Result                     | Propose Change |
| 2.4.15   | MSD shall review and update, as needed guidance materials identifying the process that developers must follow to obtain related construction permits, including process flow charts and checklists. | Annually | MSD shall make up-to-date guidance documents publicly available. A summary of the revised guidance materials shall be included in the annual report. | Updated Guidance Materials | No             |

## Progress Summary Narrative

MSD reviews and updates guidance materials as needed to identify the process that developers must follow to obtain related construction permits, including process flow charts and checklists. Over the years, several documents have been utilized to communicate with the development community the complex process of construction plan approval involving several Metro Louisville government agencies, utilities and MSD. The means of communication includes, but is not limited to: the Design Manual, PowerPoint presentations, handbooks, memorandums, and web pages. An assessment for contractors training was updated in June 2010, and MSD updated the slides for Certification Training Class in July 2011.

In 2014, the plan review checklists were updated to include green infrastructure requirements (see Appendix 2.4.15 Green Infrastructure Plan Review Checklist) to reflect the green infrastructure requirements adopted August 1, 2013 through the WDRs. Updates to Chapter 18 of the Design Manual, also referred to as the Green Infrastructure Design Manual, were available for public comment in June 2016.

## Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| Y        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| CS 2 CS Management Activities  |  |          |   |  |                |
|--|--|----------|---|--|----------------|
| Cooperative Efforts (MSD provides supportive or other non-lead role) |  |          |   |  |                |
| Metro IP & L Enforcement Coordination                                |  |          |   |  |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success   | Result   | Propose Change |
| 2.4.16   | MSD shall coordinate program enforcement actions with Metro Inspections, Permits and Licensing (IP& L), as necessary, to support overall site compliance with an emphasis on Notices of Deficiency (NOD), NOV and SWO's issued by MSD and implications on land disturbance and "in building" activities. | Annually | MSD shall hold at least one (1) conference every other year starting in PY one (1). | Frequent communication with Develop Louisville staff | No             |

### Progress Summary Narrative

MSD coordinates construction program enforcement actions with Develop Louisville (formerly Metro Inspections, Permits and Licenses), as necessary, to support overall site compliance with an emphasis on NODs, NOVs and SWOs issued by MSD and implications on land disturbance and "in building" activities. MSD's enforcement policies allow MSD to issue a SWO to halt work on land disturbing activities that have failed to comply with EPSC requirements, while Develop Louisville has responsibility for applying enforcement on activities on or inside the structures.

The MSD and Develop Louisville regularly communicate, when appropriate, to make each other aware of enforcement activities that halt work. MSD also routinely coordinates with Develop Louisville field staff. Continual communication is occurring between MSD and Metro inspection staff in an effort to educate and streamline inspection requirements. Currently, there is not an official system for documenting these field conferences since the field conferences occur as a matter of common business practice.

MSD regularly coordinates construction program enforcement actions with Develop Louisville. This includes education and coordination on green infrastructure features such as rain gardens and no-mow areas, which use native plants to provide stormwater uptake and increase infiltration rates. MSD coordinates with Develop Louisville on these green infrastructure practices so that violations are not issued by Develop Louisville for these features.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| Y        | <b>Level 4: Reduce Pollutant Loading</b>   |
| Y        | <b>Level 5: Improve Stormwater Quality</b> |
| Y        | <b>Level 6: Receiving Waters</b>           |



## 2.5 POST-CONSTRUCTION (PC) FACT SHEETS

| TABLE 2.5 - PC   |   |
|--|---|
| SWQMP ID   | PC 1 Legal Prohibition/Control Authority  |
| 2.5.1  | Assess Legal Prohibition / Control Authority  |
| 2.5.2  | Implement Legal Prohibition / Control Authority   |
| 2.5.3  | Site Plan Review  |
| 2.5.4  | Stormwater Infrastructure Inventory   |
| 2.5.5  | Post-Construction Site BMP Inventory Update   |
| 2.5.6  | Post-Construction Inspector Training  |
| 2.5.7  | Regional Flood Control BMP Retrofit Analysis  |
| 2.5.8  | Inspect "Credit" Basins   |
| 2.5.9  | Inspection Plan Procedures for Treatment BMPs   |
| 2.5.10   | Post-Construction and Green Infrastructure BMP Guidance Materials                               |
| PC 2 PC Plan Maintenance and Update                                  |   |
| 2.5.11   | Plan Preparers & Reviewers Training (MSD Facilitates)   |
| 2.5.12   | Plan Preparers and Reviewers Training   |
| 2.5.13   | Project DRI   |
| 2.5.14   | User Fee Credits (Green Infrastructure Incentives) Program Planning                             |
| 2.5.15   | Stream Restoration Inspection and Maintenance   |
| 2.5.16   | Certified / Qualified Construction BMP Inspector Program  |
| 2.5.17   | Stormwater Runoff Quality Treatment Standard for all New Development and Redevelopment Projects |
| 2.5.18   | Private BMP Maintenance Agreement Assessment / Long Term O&M                                    |
| Cooperative Efforts (MSD provides supportive or other non-lead role) |   |
| 2.5.19   | Green Infrastructure Demonstration Site(s)  |
| 2.5.20   | Rain Barrels and Louisville Nature Center   |
| 2.5.21   | Pond Creek and Mill Creek Recreational Planning   |

### SUPPORTING INFORMATION

|                  |  |
|------------------|--|
| Appendix 2.5.1a  | 2013 Wastewater/Stormwater Discharge Regulations                           |
| Appendix 2.5.1b  | Land Development Code Revisions Round Two                                  |
| Appendix 2.5.3   | Stormwater Quality Maintenance Agreement                                   |
| Appendix 2.5.7   | Regional Flood Control BMP Retrofit Analysis                               |
| Appendix 2.5.15a | Prioritized Maintenance & Inspection Schedule for Stream Restoration Sites |
| Appendix 2.5.15b | Stream Restoration Maintenance Initiatives                                 |
| Appendix 2.5.17  | Post-Construction Treatment Standard                                       |
| Appendix 2.5.21  | MSD Maintenance for Pond Creek Corridor of Louisville Loop                 |



| PC 1 Legal Prohibition/Control Authority   |   |  |   |                                       |                |
|--|---|--|---|---------------------------------------|----------------|
| Assess Legal Prohibition/Control Authority |   |  |   |                                       |                |
| SWQMP ID                                   | Activity Required   | Schedule   | Frequency or Measure of Success   | Result                                | Propose Change |
| 2.5.1                                      | The permittee shall assess existing Wastewater/Stormwater Discharge Regulations and other relevant ordinances and regulations, to identify changes needed to account for changes in standard of care, changes in technology, changes to development management process and related program needs for new development and redevelopment projects that disturb greater than or equal to one acre and construction activity disturbing less than one acre, including projects less than one acre that are part of a larger common plan of development. | Assessments in PY 1 and if necessary, in PYs 2 and 4 | Permittee shall make assessments in PY one (1) and if necessary, in PYs two (2) and four (4) report proposed changes in the WDR for consideration by MSD Board. | Revised WDRs effective August 1, 2013 | No             |

### Progress Summary Narrative

In 2011, MSD began an assessment of the existing EPSC Ordinance, WDR and other relevant ordinances and regulations to identify changes to address post-construction regulations for new and redevelopment projects. MSD drafted changes requiring green infrastructure, and responded to public comments on the proposed WDRs in July 2013. The MSD Board approved modifications to the existing WDRs. Article 6, Post-Construction became effective on August 1, 2013 (see Appendix 2.5.1a). As part of the WDR update, MSD updated supporting program elements including the Design Manual and Standard Drawings, development plan review checklists and internal procedures. The WDRs also impact the IDDE and Industrial programs (see Activity 2.2.1).

#### 2013 WDR Changes included the following items

- Simplify types of plan reviews to reduce expensive delays
- Require green infrastructure to benefit stormwater quality and reduce flooding
- Require a Long-Term Operation and Maintenance Agreement so the community can realize benefits over the long-term
- Clarify existing enforcement communication protocols to reduce confusion and aid transparency
- Replace the term, "BMP Plan" with "Stormwater Pollution Prevention Plan" to be consistent with current national nomenclature
- Define qualified inspector to help property owners know who can be trusted to inspect green infrastructure

In 2010, MSD began a review of the Land Development Code (LDC) with respect to green infrastructure. MSD reviewed and provided input on proposed Round 1 changes (PY 3) and Round 2 changes (PY 4) to the LDC Improvement Committee (for Round 2 changes, see Appendix 2.5.1b). Round I amendments and proposed Round II improvements, are available at: <https://louisvilleky.gov/government/planning-design/land-development-code-improvement-committee>. MSD continues to be engaged with the LDC process by promoting green infrastructure.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| Y        | <b>Level 4: Reduce Pollutant Loading</b>   |
| Y        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| PC 1 Legal Prohibition/Control Authority      |   |          |  |   |                |
|---|---|----------|--|---|----------------|
| Implement Legal Prohibition/Control Authority |   |          |  |   |                |
| SWQMP ID                                      | Activity Required   | Schedule | Frequency or Measure of Success  | Result  | Propose Change |
| 2.5.2   | The permittee shall enforce existing ordinances and regulations intended to limit long-term stormwater quality impacts from new construction. | Annually | Permittee shall summarize enforcement actions in the annual report. The permittee shall include the number of inspections and enforcement actions. | Regulations adopted;<br>Design Manual updated | No             |

### Progress Summary Narrative

Previously, MSD and Metro Louisville regulated post-construction stormwater runoff controls through the LDC and Design Manual, which include requirements for floodplains and setbacks. Effective August 1, 2013, MSD's WDR amendments authorized the Design Manual as the standards for green infrastructure stormwater plan review and approval. The amendments enable and the Design Manual requires property owners to sign a long-term operation and maintenance agreement and provide an annual self-inspection report. MSD began performing post-construction inspections to confirm that property owners were maintaining green infrastructure.

MSD also provides green infrastructure incentives, including a stipend and credit on the user's stormwater utility fee for implementing green infrastructure on private property. To protect ratepayer investment and stormwater quality, participants sign a long-term maintenance agreement and provide an annual self-inspection report. MSD also inspects green infrastructure incentive program projects for compliance with long-term maintenance agreements. Where projects are not maintained, property owners can forfeit and re-pay stipend and credit funds.

### Tracking and Assessment

For the current reporting period, MSD received 4 annual self-inspection reports. MSD issued pending enforcement/warning letters to 50 projects that required immediate repair. Letters of warning for self-inspection non-response notifies property owners of maintenance and self-inspection reporting requirements, including the Qualified Post-Construction Inspector (QPCI) program (see Activity 2.5.16 Certified/Qualified Post-Construction BMP Inspector Training).

| Reporting Period<br>July 1 – June 30 | PY | Estimated<br>No. Letters of<br>Warning | Estimated<br>No. NOV's |
|--------------------------------------|----|--|------------------------|
| 2010-11                              |    |  |                        |
| 2011-12                              | 1  |  |                        |
| 2012-13                              | 2  |  |                        |
| 2013-14                              | 3  | 59                                     | 0                      |
| 2014-15                              | 4  | 2                                      | 2                      |
| 2015-16                              | 5  | 50                                     | 50                     |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 1 Legal Prohibition/Control Authority |  |  |  |                        |                |
|--|--|--|--|------------------------|----------------|
| Site Plan Review                         |  |  |  |                        |                |
| SWQMP ID                                 | Activity Required  | Schedule                                 | Frequency or Measure of Success              | Result                 | Propose Change |
| 2.5.3                                    | The permittee shall conduct site plan reviews through procedures for reviewing development plans for compliance with stormwater management requirements. | Within 30 days of permit effective date. | Within thirty days of permit effective date. | Plan review is ongoing | No             |

### Progress Summary Narrative

MSD continues to review development plans for compliance with stormwater management requirements with the intent of routinely inspecting stormwater quality treatment BMPs with reasonable potential to discharge pollutants of concern to the MS4. As the amount of public and private green infrastructure increases in the community, it is anticipated that inspection resource demands will increase to verify proper construction, operation and maintenance. This requirement has been satisfied as a matter of regular business and the plan review staff responsibilities.

Per the WDR amendments effective August 1, 2013, MSD incorporated green infrastructure requirements into plan reviews. MSD continues to use the Preliminary Plan Checklist, Site Plan Checklist, and Subdivision Review Checklist updated in PY 2.

In Permit Year 1, MSD began tracking plans reviewed with post-construction BMPs in HANSEN®.

During PY 3, MSD updated the Stormwater Quality Maintenance Agreement (see Appendix 2.5.3).

### Tracking and Assessment

For the current reporting period, 81 permits were listed and reviewed as including green infrastructure. The number of plans reviewed with green infrastructure has increased over time as new development has occurred and as green infrastructure standards have gone into effect. Developments that submitted preliminary plans prior to August 1, 2013, were exempt from including green infrastructure on plans, and required to begin construction by August 1, 2015. Since August 1, 2015, all developments disturbing one acre or greater are required to include green infrastructure.

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of<br>Plans Reviewed with Post-<br>Construction BMPs |
|--------------------------------------|----|---|
| 2010-11                              |    |   |
| 2011-12                              | 1  | 30  |
| 2012-13                              | 2  | 26  |
| 2013-14                              | 3  | 21  |
| 2014-15                              | 4  | 67  |
| 2015-16                              | 5  | 81  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 1 Legal Prohibition/Control Authority |  |  |  |   |                |
|--|--|--|--|---|----------------|
| Stormwater Infrastructure Inventory      |  |  |  |   |                |
| SWQMP ID                                 | Activity Required  | Schedule                                 | Frequency or Measure of Success  | Result                                  | Propose Change |
| 2.5.4                                    | The permittee shall continue to maintain the GIS-LOJIC layers incorporating system changes from new development plans, MSD projects and related system projects. | Within 60 days of permit effective date. | Permittee shall update the GIS LOJIC System as data becomes available. | GIS-LOJIC layers are updated routinely. | No             |

### Progress Summary Narrative

MSD routinely maintains the GIS LOJIC layers incorporating system changes from new development plans, MSD projects and related system projects. MSD has extensive sets of geographic and attribute data managed LOJIC and HANSEN® databases. This data was developed through an intense plan conversion and field data collection effort and has been maintained to include changes, improvements and modifications. MSD manages changes from new development through the Development Team and on-site MSD/LOJIC staffs as new development projects are approved for construction. Similarly, other system improvements and modifications are incorporated into the datasets.

Much of the LOJIC data is publically available through a series of interactive mapping tools administered by LOJIC such as the “LOJIC Online Map” available at: <http://www.lojic.org/main/apps/index.htm>. More information about LOJIC is available at: <http://www.lojic.org>.

LOJIC updates and maintenance are ongoing.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 1 Legal Prohibition/Control Authority    |  |                   |  |  |                |
|---|--|-------------------|--|--|----------------|
| Post-Construction Site BMP Inventory Update |  |                   |  |  |                |
| SWQMP ID                                    | Activity Required  | Schedule          | Frequency or Measure of Success  | Result   | Propose Change |
| 2.5.5                                       | The permittee shall develop and maintain an inventory and map of post-construction stormwater controls, including retention ponds, detention basins, and stormwater quality treatment facilities. The permittee shall update LOJIC and HANSEN® datasets to reflect the location, extent, and condition of post-construction stormwater quality BMPs. | Every other year. | Permittee shall incorporate related data on ongoing basis; Permittee shall assess data to identify and fill dataset gaps every other year. | Baseline assets and green infrastructure inventory updated | No             |

### Progress Summary Narrative

MSD maintains an asset inventory in the HANSEN® database that includes all MSD assets and some private stormwater controls. In Permit Year 1, MSD completed an inventory and evaluation program of the existing volume control stormwater basins and riparian restoration areas. Contracts for these projects include evaluation of “credit” basins that are privately owned as well as regional flood control basins. Stream restoration areas were evaluated for current water quality and riparian habitat and recommendations for enhancements.

While MSD already has several datasets on basins, reconciling them is necessary to better support operation and maintenance agreement needs assessments, credit basin inspections, retrofit analyses, and treatment BMP inspections (presented in the activities 2.5.7 through 2.5.9 and 2.5.18). MSD completed an update to the datasets for regional flood control basins and credited detention basins and integrated results into HANSEN®. This activity identified gaps in the data that were filled, for a significant portion of the basins, with field visits and other research.

In PY 3, MSD began tracking green infrastructure in Hansen and the GIS. Construction inspections are performed by MSD staff which then auto creates an annual Self-Monitoring inspection to be performed by the person or company responsible for maintenance of the site.

In PY 4, MSD created a green infrastructure protocol that covers MSD internal project management procedures including design approval, procurement, tracking, and post-construction inspection.

During the current permit reporting period, MSD continues to track green infrastructure in Hansen and GIS, consistent with the protocol developed in PY 4.

### Tracking and Assessment

During the current reporting period, new post-construction control asset types continued to be improved and utilized for the HANSEN® database in order to record and report on BMPs installed and to process inspection and work order schedules.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 1 Legal Prohibition/Control Authority |  |  |   |  |                |
|--|--|--|---|--|----------------|
| Post-Construction Inspector Training     |  |  |   |  |                |
| SWQMP ID                                 | Activity Required  | Schedule                                 | Frequency or Measure of Success   | Result   | Propose Change |
| 2.5.6                                    | The permittee shall provide training to the inspectors including internal staff that have been designated to inspect the effectiveness of the post-construction BMPs as well as the local residents who are required to provide operation and maintenance of privately-owned Post-Construction BMPs. | Two trainings per year, report annually. | At least two trainings per year for the inspectors of Post-Construction BMPs. Report in the annual report the dates of training, number of attendees, and subject matter. | Training performed primarily through weekly reviews and incentive projects | No             |

### Progress Summary Narrative

MSD is providing training to internal staff much more frequently than the minimum requirement. This primarily takes place at weekly MSD plan review staff meetings. Plan review staff attends meetings regularly, while inspection staff attends the meetings less frequently. Additional training across MSD departments takes place at least twice annually. Emphasis is placed on design and inspection of green infrastructure and lessons learned through demonstration projects, private development and redevelopment activities. Training for inspectors in other departments has been enhanced to include additional water quality controls (riparian buffers, bioswales, pervious pavement, etc.).

MSD expanded inspector training to support Wastewater/Stormwater Discharge Regulation (WDR) requirements that annual green infrastructure self-inspections must be completed by a QPCI. In addition to the QPCI course that is available to the public (see Activity 2.5.16 Certified/Qualified Post-Construction BMP Inspector Program), MSD requires that its inspectors attend QPCI training that is held internally, and pass an exam. A public listing of available QPCI inspectors was published in 2016, to facilitate contact between property owners and qualified inspectors to complete private property annual maintenance inspection reports. This list is available at: <http://lifelonglearning4u.com/msd/QPCIP-Inspsvcs.htm>.

### Tracking and Assessment

The majority of training is conducted at weekly plan review meetings. During the current reporting period, the following training sessions occurred:

- Plan review meetings, various (see Activity 2.5.11 Plan Preparers and Reviewers Training)
- The dates for the QPCI Training were the following with 14 certificates given for the training:
  - November 17, 2015;
  - March 24, 2016;
  - May 19, 2016.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 2 PC Plan Maintenance and Update          |   |   |   |                                |                |
|--|---|---|---|--------------------------------|----------------|
| Regional Flood Control BMP Retrofit Analysis |   |   |   |                                |                |
| SWQMP ID                                     | Activity Required   | Schedule  | Frequency or Measure of Success   | Result                         | Propose Change |
| 2.5.7  | The permittee shall evaluate regional flood control basins to determine stormwater quality treatment incorporation/retrofit feasibility. Explore opportunities to cost-share, incentives or otherwise finance the projects. | Assessment by PY 3. Summarize in annual report. | Permittee shall complete assessment report identifying with high, moderate, and low retrofit potential by the end of PY 3 and summarize in the annual report. | Assessment of basins complete. | No             |

### Progress Summary Narrative

MSD evaluated regional flood control basins to determine stormwater quality treatment incorporation/retrofit feasibility. MSD explored opportunities to cost-share, provide incentives or otherwise finance the projects. Retrofits were also considered as an off-site alternative to meet post construction requirements for new projects. The assessment report identified facilities with high, moderate and low retrofit potential/benefit.

During PY 5, MSD modeled two private property credit basins to assess feasibility for stormwater retrofit opportunities. Modeling and assessment of these properties is ongoing. MSD does not have authority via local regulations to require private BMP owners to retrofit their facilities; this includes regional facilities that are privately held. However, MSD has implemented a financial incentive program, effective August 1, 2011, to aid those discussions. While it is premature to project outcomes, MSD is committed to developing a framework that encourages incorporation and retrofit of privately held regional BMPs to address stormwater quality in addition to the existing flood control benefits. Furthermore, the updated WDRs, effective August 1, 2013, require installation of green infrastructure BMPs for new development and redevelopment of one acre or greater. Regional flood control basin retrofits will also be considered as an off-site alternative to meet post-construction requirements for new projects.

### Trends and Assessment

MSD evaluated 19 regional flood control basins for retrofit potential in February 2012.

See Appendix 2.5.7 Regional Flood Control BMP Retrofit Analysis.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| N        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| PC 2 PC Plan Maintenance and Update |  |   |   |                                     |                |
|-------------------------------------|--|---|---|-------------------------------------|----------------|
| Inspect "Credit" Basins             |  |   |   |                                     |                |
| SWQMP ID                            | Activity Required  | Schedule                                      | Frequency or Measure of Success   | Result                              | Propose Change |
| 2.5.8                               | The permittee shall inspect private flood control basins, (retention ponds) receiving a stormwater utility user fee credit (reduction) to determine ability to fulfill original, current and projected drainage demands. Continue to enforce, per existing basin credits documentation requirements, necessary to fulfill maintenance agreements and long-term system integrity. | Starting in PY 2. Summarize in annual report. | Permittee shall perform spot check inspections for at least 50% of qualifying facilities annually starting in PY two (2) and summarize for the annual report. | Inspections performed, letters sent | No             |

### Progress Summary Narrative

MSD promotes and encourages stormwater utility customers to participate in its credits policy, where the user has the option to receive a rate reduction by incorporating retention basins. MSD continues to inspect these stormwater control systems to monitor effectiveness and the adequacy of the maintenance schedule. This process includes communication with the property owner to identify maintenance and improvements necessary to fulfill long-term system integrity. MSD staff continues to spot inspect at least 50% of qualifying facilities annually.

### Trends and Assessment

During the current reporting period, MSD inspected 176 of 187 credited basins, or 94% of basins, exceeding the goal of inspecting 50% of basins annually. MSD sent letters of correction to all basins that failed inspections, and follow-up inspections are performed. Some of the credited basins that were not inspected are waiting for a capital project to be completed for structural damage to the basin that is MSD responsibility.

| Reporting Period<br>July 1 – June 30 | PY | Estimated Number of Private Flood Control Basin Inspections | % Facilities Inspected |
|--------------------------------------|----|---|------------------------|
| 2010-11                              |    |   |                        |
| 2011-12                              | 1  | NA  |                        |
| 2012-13                              | 2  | 161   | 86%                    |
| 2013-14                              | 3  | 144   | 75%                    |
| 2014-15                              | 4  | 144   | 78%                    |
| 2015-16                              | 5  | 176   | 94%                    |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 2 PC Plan Maintenance and Update           |   |  |  |  |                |
|---|---|--|--|--|----------------|
| Inspection Plan Procedures for Treatment BMPs |   |  |  |  |                |
| SWQMP ID                                      | Activity Required   | Schedule                                       | Frequency or Measure of Success  | Result                                     | Propose Change |
| 2.5.9   | The permittee shall develop and implement inspection and oversight protocol for private stormwater quality treatment BMPs to facilitate long-term maintenance demands including requirements for qualified private inspection of private BMPs with local government oversight access inspection and controls. | Starting in PY 2. Summarized in annual report. | Permittee shall perform spot check inspections for at least 20% of treatment BMPs annually starting in PY two (2). All BMPs should be inspected by the end of the permit cycle. A summary of this activity shall be included in the annual report. | Regulations adopted, Design Manual updated | No             |

### Progress Summary Narrative

During PY 2, MSD developed an inspection and oversight protocol for private stormwater quality treatment BMPs to facilitate long-term maintenance demands including requirements for qualified private inspection of private BMPs with local government oversight access inspection and controls. These requirements were incorporated into the WDRs, Article 6, Section 6.04, Post-Construction (long-term) BMP Self-Inspections and became effective August 1, 2013.

As the number of public and private stormwater quality treatment BMPs increases, consistent procedures to inspect for proper construction, operation and maintenance have been implemented. Procedures for inspections and inspection checklists are available on MSD's website, [www.msddgreen.org](http://www.msddgreen.org). The revised procedures include applicable checklists and review items to address issues including private green infrastructure owner inspection responsibilities, inspector qualifications, frequency, documentation and related expectations.

Starting in PY 3, MSD prioritized green infrastructure incentive projects for oversight inspections. In PY 5, MSD inspected incentive and other private green infrastructure projects. All green infrastructure managed through the incentive program and green infrastructure treatment standard requirements were inspected by the end of the permit cycle.

### Trends and Assessment

During the current reporting period, follow-up inspections were conducted for 43 green infrastructure incentive projects, or 48% of total inspections completed. Seventy-one inspections were performed on non-incentive projects. 83% of the inspections were completed. Notices are being sent to property owners with green infrastructure best management practices that require maintenance.

| Reporting Period<br>July 1 – June 30 | PY | Green Infrastructure Incentives Projects | Follow-up Inspections | Percentage Inspected |
|--------------------------------------|----|--|-----------------------|----------------------|
| 2010-11                              |    |  |                       |                      |
| 2011-12                              | 1  |  |                       |                      |
| 2012-13                              | 2  |  |                       |                      |
| 2013-14                              | 3  | 63                                       | 13                    | 21%                  |
| 2014-15                              | 4  | 83                                       | 17                    | 20%                  |
| 2015-16                              | 5  | 43                                       | 121                   | 100%                 |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

| PC 2 PC Plan Maintenance and Update                               |   |                               |   |  |                |
|---|---|-------------------------------|---|--|----------------|
| Post-Construction and Green Infrastructure BMP Guidance Materials |   |                               |   |  |                |
| SWQMP ID  | Activity Required   | Schedule                      | Frequency or Measure of Success   | Result   | Propose Change |
| 2.5.10  | The permittee shall evaluate and update the guidance materials facilitating current technology use and to reflect local plan review, construction site inspection and post-construction inspection requirements. Design Manual chapters and Standard Specifications sections to address long-term BMP operation, inspection and maintenance including checklists. "Green Infrastructure" is a combination of natural and engineered infrastructure that is designed to reduce the environmental footprint of the system. In terms of stormwater, green infrastructure can effectively manage stormwater runoff through the use of infiltration, biofiltration, detention, and other stormwater management techniques. | Update the guidance materials | Permittee shall update the guidance materials specifically the Design Manual chapters and Standards Specifications sections and make the document publicly available. | Design manual evaluation for post-construction and green infrastructure complete. The design manual updates are publicly available on MSD's website. | No             |

### Progress Summary Narrative

In June 2011, MSD issued guidance for green infrastructure through updates to the Design Manual. Chapter 18 of the Design Manual, also referred to as the Green Infrastructure Design Manual, was developed to address green infrastructure design, long-term operation, inspection and maintenance. Both vegetative and non-vegetative practices are included. The Manual provides engineering design fact sheets that emphasize the process for sizing, constructing and maintaining the GMPs. Construction details, design, operation and maintenance checklists supplement design for each fact sheet.



*MSD Green Infrastructure Design Manual*

In Permit Year 3, MSD updated Chapter 18 and added sections describing plan development standards, aggregate specifications, green infrastructure forms, and infiltration testing specifications. MSD also updated Chapter 13 Plant Guide, which includes information on native and cultivar plants for use in green infrastructure, updated plant list, example green infrastructure planting plans, plant guide, and invasive species list. The Design Manual is publicly available at: <http://www.msdlouky.org/insidemsd/standard-drawings.htm>.

During the permit year, MSD reviewed and edited Chapter 18. This process included significant public input through stakeholder workshops, a stakeholder comments and review period, and a public comments and review period. Updates and training workshops were held on March 04, 2016, and February 08, 2016. Incorporation of comments to update the manual is currently underway.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| PC 2 PC Plan Maintenance and Update                   |   |                     |   |                  |                |
|---|---|---------------------|---|------------------|----------------|
| Plan Preparers & Reviewers Training (MSD Facilitates) |   |                     |   |                  |                |
| SWQMP ID  | Activity Required   | Schedule            | Frequency or Measure of Success   | Result           | Propose Change |
| 2.5.11  | The permittee shall provide available content, such as EPA web casts, through periodic training classes, workshops and meetings for designers, planners, and developers including emphasis on green infrastructure, post-construction planning, and design procedures for structural and non-structural BMPs, pollutant removal and inspection. | Two events annually | Permittee shall continue to offer at least two (2) events annually. A summary of workshops topics and attendance shall be submitted in the annual report. | Training offered | No             |

### Progress Summary Narrative

MSD provides at least twice a year, available content, such as EPA webcasts, through periodic training classes, workshops and meetings for designers, planners, and developers including emphasis on green infrastructure, post-construction planning, and design procedures need status or structural and non-structural BMPs, pollutant removal and inspection.

MSD employees attend in-house training classes taught/facilitated by MSD staff/representatives. The training instructs staff on regulatory requirements as well as field installation procedures for BMPs. The training is intended to make plan reviewers day-to-day jobs easier.

### Tracking and Assessment

During the current reporting period, MSD hosted the following events:

- WEF Webinar: Faster, Cheaper, Greener: Ecological Built Environments - October 21, 2015
- EPA Webinar: Green Infrastructure O&M During Winter Months - November 3, 2015
- EPA Webinar: Water Quality Modeling – Sediment - January 12, 2016
- EPA Webinar: Potential Impacts of the Proposed Phase II MS4 General Permit Remand Rule - January 19, 2016
- EPA Webcast: Greening Vacant Lots - February 9, 2016
- Green Infrastructure Solutions- The Right Choice for MS4 Communities - February 18, 2016
- EPA-NAHB Webinar: Small Lot SWPPP Template - March 15, 2016
- Green BMP Standardization meetings - February 8, 2016, February 11, 2016, and a workshop on March 14, 2016

See Activity 2.5.12 Plan Preparers and Reviewers Training for additional plan preparer training dates.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Training Sessions |
|--------------------------------------|----|--------------------------------|
| 2010-11                              |    | 5                              |
| 2011-12                              | 1  | 4                              |
| 2012-13                              | 2  | 5                              |
| 2013-14                              | 3  | 4                              |
| 2014-15                              | 4  | 10                             |
| 2015-16                              | 5  | 10                             |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

| PC 2 PC Plan Maintenance and Update   |  |                          |  |                  |                |
|---------------------------------------|--|--------------------------|--|------------------|----------------|
| Plan Preparers and Reviewers Training |  |                          |  |                  |                |
| SWQMP ID                              | Activity Required  | Schedule                 | Frequency or Measure of Success  | Result           | Propose Change |
| 2.5.12                                | The permittee shall update, as necessary, content to the existing training program currently administered by JCPS System or to a new program to address green infrastructure, post-construction stormwater quality BMP issues. | Three trainings annually | Permittee shall summarize in the annual report, training updates and offer at least three (3) training opportunities annually. | Training offered | No             |

### Progress Summary Narrative

MSD provides training to internal staff at weekly MSD plan review staff meetings. Plan review staff attends meetings regularly, while inspection staff attends the meetings less frequently. Additional training across MSD departments takes place at least twice annually. Emphasis is placed on design and inspection of green infrastructure and lessons learned through demonstration projects, private development and redevelopment activities. Training for inspectors in other departments has been enhanced to include additional water quality controls (riparian buffers, bioswales, pervious pavement, etc.).



*Rain Garden in Downtown Louisville*

MSD also used the Construction Field Day, held on September 22, 2015, to educate engineers, designers and developers on green infrastructure. See Activity 2.1.14 for more information.

MSD expanded its program to include qualified post-construction inspection requirements for green infrastructure. See Activity 2.5.16 Certified/Qualified Post-Construction BMP Program for more information on the QPCI course and training program.

### Tracking and Assessment

During the current reporting period, the following internal plan review/green infrastructure training/workshops were held:

- Construction Field Day – September 22, 2015
- Plan Review Meetings –with plan review staff. These meetings were held on February 26, 2016, March 4, 2016, March 11, 2016, April 1, 2016, April 8, 2016, April 15, 2016, April 22, 2016, April 29, 2016, May 20, 2016, May 27, 2016, June 3, 2016, and June 17, 2016

See Activity 2.5.11 Plan Preparers and Reviewers Training for additional plan preparer training dates.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

| PC 2 PC Plan Maintenance and Update |  |          |  |                                    |                |
|-------------------------------------|--|----------|--|------------------------------------|----------------|
| Project DRI                         |  |          |  |                                    |                |
| SWQMP ID                            | Activity Required  | Schedule | Frequency or Measure of Success  | Result                             | Propose Change |
| 2.5.13                              | The permittee shall continue to implement Drainage Response Initiative (DRI) program aimed at identifying and solving the local drainage problems in Jefferson County. | Annually | Permittee shall provide program progress summarizing cost, number and type of projects in the annual report. | Project DRI initiative documented. | No             |

## Progress Summary Narrative

The spending priorities for Project DRI are determined by citizen input, city officials and Metro Council members. The standard remains uniform – projects that solve drainage problems for the greatest number of people have the highest priority. Project DRI projects are tracked in LOJIC and HANSEN®.

Phase 4 of Project DRI began in July 2012 and extended through the summer of 2015. Phase 1, 2 and 3 included the completion of almost 170 projects and investing \$9 million in Louisville Metro drainage infrastructure.

Phase 5 of the DRI began in July 2015. There are approximately 166 projects planned to be completed by July 2018 with a total construction dollar value of approximately \$8.4 million.

During the current reporting period, approximately 73 projects and 4 emergency projects have been completed or are close to completion with a total construction dollar value of approximately of \$3 million.

In addition to efforts that are associated specifically with Project DRI, MSD's crews perform routine and preventive maintenance for the Louisville Metro drainage infrastructure. This work entails the routine cleaning of more than 30,000 catch basins, mowing of over 16 miles of large channels and the levee, removal of obstructions in the system, repair of cave-ins over storm facilities, and scheduled cleaning of concrete and earthen ditches.



## Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

| PC 2 PC Plan Maintenance and Update                                 |   |              |  |                  |                |
|---|---|--------------|--|------------------|----------------|
| User Fee Credits (Green Infrastructure Incentives) Program Planning |   |              |  |                  |                |
| SWQMP ID  | Activity Required   | Schedule     | Frequency or Measure of Success  | Result           | Propose Change |
| 2.5.14  | The permittee shall assess the feasibility of implementing a utility user fee credits program for green infrastructure and post-construction BMPs. The permittee shall perform a feasibility assessment to include considerations for financial sustainability, billing system administration, utilization potential, credit longevity, oversight inspections and related matters. Develop a schedule that addresses feasibility study issues to setup a program to promote stormwater utility user fee credits opportunities for properties implementing stormwater quality BMPs beyond minimum requirements with the intent of encouraging flood control pond retrofit, redevelopment GI BMP incorporation and new development GI BMP implementation. This program may offer incentives for developers to use cost-effective, eco-friendly solutions. | End of PY 2. | Permittee shall provide assessment and planning results by the end of PY two (2) in the annual report. | Policy in Place. | No             |

### Progress Summary Narrative

MSD assessed the feasibility of implementing a utility user fee credits program for green infrastructure and post-construction BMPs. MSD determined that an incentive policy was viable, and developed and adopted a credit policy that became effective August 1, 2011, in advance of the permit requirement. The Incentives Program promotes stormwater utility customers to participate through the option to receive a short-term incentive, known as a stipend, to offset construction costs. It also provides a long-term (10-year renewable) incentive through drainage service charge reductions, known as credits, for incorporating and maintaining green stormwater best management practices on their property. Owners are required to sign a long-term operation and maintenance agreement in order to receive the stormwater credits.

### Trends and Assessment

The MSD rates rentals and charges program that included green infrastructure incentives, became effective August 1, 2014. More information about the policy and green infrastructure program is publicly available at: <http://www.msdlouky.org/insidemsd/rates.htm>. During the reporting period, MSD transitioned the stipend program from a "right-sizing" model, to one that incorporates benefits to residual CSO annual overflow volume reductions.



*Green Infrastructure Construction,  
University of Louisville*

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |

| PC 2 PC Plan Maintenance and Update           |  |                |  |   |                |
|---|--|----------------|--|---|----------------|
| Stream Restoration Inspection and Maintenance |  |                |  |   |                |
| SWQMP ID                                      | Activity Required  | Schedule       | Frequency or Measure of Success  | Result                                    | Propose Change |
| 2.5.15  | The permittee shall identify restored stream reaches that MSD has maintenance responsibilities. The permittee shall also determine status of restored reaches and identify, prioritize/schedule and implement maintenance needs. | Start in PY 2. | Permittee shall provide in the annual report, summarized stream reaches and maintenance performed to be started in PY two (2). | Inventory updated; 2-3 projects completed | No             |

### Progress Summary Narrative

An inventory of restored reaches was performed to evaluate the overall condition and to identify potential maintenance factors (see Appendix 2.5.15a Prioritized Maintenance and Inspection Schedule for Stream Restoration Sites). The evaluation considered the extent and severity of erosion, bank instability, trash/litter, invasive species and riparian corridor condition. Restored stream reaches were prioritized for maintenance activities based upon these factors. Additionally, MSD performs stream assessments as part of other projects related to sewers.

MSD assessed sites for stream restoration maintenance projects in Permit Year 4 that MSD crews performed along Beargrass Creek at Watterson Trail. Crews installed 29 boulder toe rocks to prevent erosion of the stream bank and grass-seed mesh and landscaping materials. The project was completed in July 2015. Stream restoration improvements are planned to continue next permit year.

Additional information on stream restoration maintenance is provided in Appendix 2.5.15b Stream Restoration Maintenance Report.



*MSD crew installation of boulder toe wall to stabilize stream bank along Beargrass Creek at Watterson Trail/ Mansfield Estates Lane.*

### Tracking and Assessment

During the reporting period, MSD maintained 9 stream restorations reaches and 32 sites (235 stream restoration reaches) were inventoried with a total value of \$32,904.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Stream Restoration<br>Reach Locations<br>Inventoried | Number of<br>Stream Restoration<br>Reaches Maintained | Relative | Program Assessment Levels           |
|--------------------------------------|----|---|---|----------|-------------------------------------|
| 2010-11                              |    | 32  | NA  | Y        | Level 1: Activity Measures          |
| 2011-12                              | 1  | 32  | 0   | Y        | Level 2: Raise Awareness            |
| 2012-13                              | 2  | 0   | 2   | Y        | Level 3: Changes in Behavior        |
| 2013-14                              | 3  | 32  | 9   | N        | Level 4: Reduce Pollutant Loading   |
| 2014-15                              | 4  | 32  | 9   | N        | Level 5: Improve Stormwater Quality |
| 2015-16                              | 5  | 32  | 9   | N        | Level 6: Receiving Waters           |



| PC 2 PC Plan Maintenance and Update                         |  |   |  |             |                |
|---|--|---|--|-------------|----------------|
| Certified/Qualified Post-Construction BMP Inspector Program |  |   |  |             |                |
| SWQMP ID  | Activity Required  | Schedule                                    | Frequency or Measure of Success  | Result      | Propose Change |
| 2.5.16  | The permittee shall outline and determine the feasibility of a program to identify and hold accountable third party private BMP inspectors (such as home inspectors) to facilitate periodic operation and maintenance of private facilities resulting from the credits program, regulations changes and demonstration projects. If results warrant, develop schedule to implement requirements for private BMP inspections and resulting training/testing program. | By end of PY 2. Summarized in annual report | Permittee shall by the end of PY two (2), summarize the feasibility report study result and schedule of action items and include summary in the annual report. | Implemented | No             |

### Progress Summary Narrative.

Effective August 1, 2013, MSD's WDRs enable MSD to develop and require a QCPI training course to educate third-party inspectors on how long-term stormwater BMPs and green infrastructure practices should be operated and maintained. MSD outlined and determined the feasibility of developing a local training program. MSD considered the following aspects of a Qualified Post-Construction Inspector (QPCI) program goals, administration, registration, instructor qualifications, participant qualifications and pre-requisites, format of instruction, testing options, course completion, course fees, dispute management and resolution, qualified inspector tracking, periodic training program review and update. The feasibility analysis included recommendations regarding each of these aspects of the training program.

MSD considered the feasibility analysis, implications and responsibilities associated with implementing the training program, and partnered with the Jefferson County Public Schools (JCPS) through a training agreement for conducting QCPI classes in PY 3. During Permit Years 4 and 5, MSD continues to offer the QCPI trainings course.

See Activity 2.5.6 Post-Construction Inspector Training for dates of QPCI training.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| PC 2 PC Plan Maintenance and Update   |   |  |  |                             |                |
|---|---|--|--|-----------------------------|----------------|
| Stormwater Runoff Quality Treatment Standard for all New Development and Redevelopment Projects |   |  |  |                             |                |
| SWQMP ID  | Activity Required   | Schedule                                 | Frequency or Measure of Success  | Result                      | Propose Change |
| 2.5.17  | The permittee shall develop an on-site stormwater runoff quality treatment standard, to be adopted by ordinance or other regulatory mechanism for all new development and redevelopment projects. The proposed local standard will require, in combination or alone, management measures that are designed, built and maintained to infiltrate, evapotranspire, harvest and reuse stormwater runoff, or otherwise manage the stormwater runoff quality. The standard shall be based, at a minimum, on an analysis of precipitation records to determine the equivalent surface depth of runoff (e.g. 0.75 inches) produced from an 80 <sup>th</sup> percentile precipitation event. | Within 60 days of effective permit date. | Within 60 days of effective permit date, permittee shall submit a local treatment standard for addressing stormwater runoff quality. | Treatment standard in place | No             |

### Progress Summary Narrative

The MSD developed an on-site stormwater runoff quality treatment standard in 2011 to treat the 80<sup>th</sup> percentile storm event, or the first 0.60 inches. The standard is based on an analysis of long-term precipitation records from the National Weather Service (NWS) station at the Louisville International Airport. It was determined and verified that the equivalent surface depth of runoff produced from an 80<sup>th</sup> percentile precipitation event is 0.60 inches (see Appendix 2.5.17 Proposed Post Construction Treatment Standard).

This standard was incorporated into the Chapter 18 Green Infrastructure Design Manual and enabled by the WDR updates for development projects disturbing one or more acres. The local standard requires, in combination or alone, management measures that are designed, built and maintained to infiltrate, evapotranspire, harvest and reuse stormwater runoff, or otherwise manage the stormwater runoff quality. The design manual requires calculation of a site's water quality volume and provides ways through green infrastructure stormwater management to manage that volume.

### Trends and Assessment

MSD's post-construction treatment standard is available in the Green Infrastructure Design Manual, Section 18.3. The Green Infrastructure Design Manual is publicly available at: <http://www.msdlouky.org/insidemsd/standard-drawings.htm>.

During Permit Year 3, the treatment standard was included in the Green Design Manual and required for new development greater than 1 acre by WDRs.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PC 2 PC Plan Maintenance and Update                          |  |   |   |                    |                |
|--|--|---|---|--------------------|----------------|
| Private BMP Maintenance Agreement Assessment/Long Term O & M |  |   |   |                    |                |
| SWQMP ID   | Activity Required  | Schedule  | Frequency or Measure of Success   | Result             | Propose Change |
| 2.5.18   | The permittee shall require all new development or redevelopment to establish and enter into a long-term maintenance agreement and maintenance plan approved management practices for property owners. Alternatively, the permittee may establish other enforceable mechanisms for requiring long-term maintenance of structural and non-structural BMPs. Such authorities shall allow the MS4, or its designee, to conduct inspections of the management practices and also account for transfer of responsibility in leases and/or deed transfers. The agreement shall also allow the MS4s, or its designee, to perform necessary maintenance or corrective actions neglected by the property owner/operator, and authority to recover costs from the property owner/operator when the owner/operator has not performed the necessary maintenance. | Within 12 months from the effective date of the permit. | Within 12 months from the effective date of the permit all new development and redevelopment projects shall be required to have this agreement. | Agreement in place | No             |

### Progress Summary Narrative

MSD developed a long-term maintenance agreement as part of its Green Infrastructure Incentives Program, where property owners are required to maintain post-construction green infrastructure on their site. The MSD Board approved the Incentives Program, effective August 1, 2011. The Incentives Program long-term maintenance agreement allows MSD to conduct inspections, account for transfer of responsibility in leases or deed transfers and perform maintenance or corrective actions that were not addressed by the property owner/operator.

Effective August 1, 2013, Section 6.03 of the WDRs enabled MSD to develop, implement, and administer a Post-Construction BMP Long-Term Maintenance Program requiring all new development and redevelopment projects of one acre or greater to enter into a long-term maintenance agreement. The agreement includes responsibilities, inspection, operation and maintenance schedules. These agreements also allow MSD to conduct oversight inspections, account for transfer of responsibility in leases or deed transfers, and perform maintenance or corrective actions that were not addressed by the property owner/operator. See Activity 2.5.9 Inspection Plan Procedures for Treatment BMPs for more information on green infrastructure follow-up inspections performed by MSD.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| PC 2 PC Plan Maintenance and Update                                  |  |          |  |                      |                |
|--|--|----------|--|----------------------|----------------|
| Cooperative Efforts (MSD provides supportive or other non-lead role) |  |          |  |                      |                |
| Green Infrastructure Demonstration Site(s)                           |  |          |  |                      |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success  | Result               | Propose Change |
| 2.5.19   | The permittee shall continue, in cooperation with Louisville Metro Mayor's administration, University of Louisville and other local agencies, to pursue development of stormwater quality and green infrastructure interpretative center(s) at strategic location(s) around Jefferson County with the intent of providing a positive highly visible platform to promote the viability and desirability of green infrastructure BMPs. Where feasible explore the opportunity for BMP evaluation and pre-/post-monitoring. | Annually | Permittee shall report its role and activities, lessons learned, and overall project progress and summarize for the annual report. | Projects constructed | No             |

### Progress Summary Narrative

MSD has constructed several highly visible green infrastructure demonstration projects to encourage the public to adopt the green practices. Example projects include rain gardens, pervious pavement, bio-swales, tree boxes and infiltration trenches. MSD continues to collaborate with the Mayor's office, U of L and local entities to implement projects and maximize public opportunities to raise public awareness. MSD is partnered with EPA Office of Research and Development in a Cooperative Research and Development Agreement to assess performance of green infrastructure.

| Project Name  | Location       | Type of BMP                            |
|---|----------------|--|
| MSD Main Office Parking Lot Bioswale                        | Ohio River     | Bioinfiltration Technique              |
| Seventh and Cedar Green Parking Lot                         | Ohio River     | Bioinfiltration Technique              |
| Scholar House Green Parking Lot                             | South Fork     | Bioinfiltration Technique              |
| Third and Ormsby Bioinfiltration Swales                     | Ohio River     | Bioinfiltration Technique              |
| Sixth and MLK (Federal Building) Parking Lot                | Ohio River     | Bioinfiltration Technique              |
| Housing Authority Green Roof at 801 Vine Street             | Ohio River     | Bioinfiltration Technique              |
| W. Gaulbert and W. Hill Permeable Alley                     | Ohio River     | Permeable Alley                        |
| 2300 Congress Permeable Alley                               | Ohio River     | Permeable Alley                        |
| Billy Goat Strut Permeable Alley                            | South Fork     | Permeable Alley                        |
| Swift Parking Lot Bioswale                                  | Ohio River     | Bioinfiltration Technique              |
| Speed Art Museum Infiltration Trench                        | Middle Fork    | Bioinfiltration Technique              |
| CSO 130 Green Street  | Middle Fork    | Green Street                           |
| University of Louisville - Grawmeyer Hall Green Parking Lot | Ohio River     | Bioinfiltration Technique              |
| Wilson Crossings - Green Parking Lot                        | Ohio River     | Bioinfiltration Technique              |
| 3rd Street Ventures   | Ohio River     | Bioinfiltration Technique              |
| Clifton Triangle Rain Garden                                | Muddy Fork     | Bioinfiltration Technique              |
| Brandeis Apartments Rain Garden                             | Ohio River     | Bioinfiltration Technique              |
| German/Paristown Green Street/Rain Garden                   | South Fork     | Green Street/Bioinfiltration Technique |
| Brown Forman Green Roof                                     | Ohio River     | Bioinfiltration Technique              |
| Fairdale High School  | Pond Creek     | Bioinfiltration Technique              |
| Shake's Run Section 5B                                      | Floyd's Fork   | Bioinfiltration Technique              |
| Kosair Children's Hospital Brownsboro                       | Harrod's Creek | Bioinfiltration Technique              |
| Ford LAP Assembly Plant                                     | Pond Creek     | Permeable Pavement                     |
| CSO 190 Green Projects                                      | Ohio River     | Green Streets (in planning)            |

### Tracking and Assessment

As of August 2015, MSD had completed 24 green infrastructure demonstration projects, as shown in the following table. See Activity 2.1.16 Green Infrastructure Demonstration Sites for more information. During PY 5, Louisville MSD approved one new project with Louisville Metro. The East Market Street/NULU Streetscape & Green Infrastructure Project will transform 10 blocks on Market Street just east of downtown Louisville and create attractive stormwater controls at ground level. In addition, educational signage will be present to inform visitors and residents of the role that green infrastructure plays in keeping Louisville's waterways safe and clean.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| <b>PC 2 PC Plan Maintenance and Update</b>                                  |   |          |   |   |                |
|---|---|----------|---|---|----------------|
| <b>Cooperative Efforts (MSD provides supportive or other non-lead role)</b> |   |          |   |   |                |
| <b>Rain Barrels and Louisville Nature Center</b>                            |   |          |   |   |                |
| SWQMP ID  | Activity Required   | Schedule | Frequency or Measure of Success   | Result  | Propose Change |
| 2.5.20  | The permittee shall explore the opportunity for MSD to continue program with Louisville Nature Center that provided public guidance to construct and maintain rain barrels. | Annually | Permittee shall report its role, lessons learned and overall programs progress and summarize for the annual report. | Promotes Nature Center and commercial vendors | No             |

### Progress Summary Narrative

MSD continues the program with Louisville Nature Center (LNC) that provides public guidance to construct and maintain rain barrels. MSD has committed significant resources to encourage the use of rain barrels by the public and to foster the market. The response was overwhelmingly positive. In 2008, MSD shifted from directly selling barrels to the public to providing support to LNC and providing contact information for local vendors on the MSD website.

**Rain Barrels Are Available At LNC**

Rain barrels collect, store, and divert rooftop runoff during a rain event. They are good for the environment and help save money on your water bill. The LNC has rain barrels available for \$74 each (tax already included), or \$69 each for two or more. The barrels come already assembled with a spigot, downspout adapter, and overflow spout. The assembly work is done for you by LNC volunteers and staff.

### Tracking and Assessment

The demand for rain barrels continues to increase beyond MSD's capacity to provide them. MSD plans to continue encouraging the use of rain barrels in various outreach efforts. Currently, the LNC provides assembled rain barrels for purchase. LNC volunteers and staff do the assembly work and proceeds benefit the LNC. More information is available at: <http://www.louisvillnaturecenter.org/>

During PY 3, MSD partnered with the LNC to develop and install rain garden signage at LNC and provided 500 copies of the rain garden handbook.

During PY 4, , MSD participated in a Give-A-Day work day at the Nature Center and also developed educational signage for the rain garden. Rain garden signage is planned to be installed in the next permit year.

During PY 5, 500 copies of the rain garden handbook were provided to the LNC. MSD also participated in public events with rain barrel give-aways. When asked about where to purchase a rain barrel, LNC was offered as a resource.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| <b>PC 2 PC Plan Maintenance and Update</b>                           |  |          |  |  |                |
|--|--|----------|--|--|----------------|
| Cooperative Efforts (MSD provides supportive or other non-lead role) |  |          |  |  |                |
| <b>Pond Creek and Mill Creek Recreational Planning</b>               |  |          |  |  |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success  | Result   | Propose Change |
| 2.5.21   | The permittee shall continue to collaborate with the US Army Corps of Engineers in their efforts to develop a trail system integrating community assets and environmental resources. | Annually | Permittee shall report its role, lessons learned and overall program progress and summarize for the annual report. | MSD crews maintain trailhead and no mow areas. | No             |

### Progress Summary Narrative

MSD continues to collaborate with the USACE in their efforts to restore riparian zones and habitat and to develop a trail system integrating community assets and environmental resources. This includes maintenance of the Pond Creek corridor of the Louisville Loop. MSD crews maintain by mowing immediately adjacent to the trail (six feet on either side), mowing the trailhead, and maintaining no-mow areas in the vicinity (Appendix 2.5.21 MSD Maintenance for Pond Creek Corridor of Louisville Loop).

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



## 2.6 GOOD HOUSEKEEPING/POLLUTION PREVENTION (GH/P2) FACT SHEETS

| TABLE 2.6 – GH/P2  |  |
|--|--|
| SWQMP ID   | GH/P2 Plan Maintenance and Update                  |
| 2.6.1  | SWPPPs for MSD Operations                          |
| 2.6.2  | Training on MSD Facility SWPPPs                    |
| 2.6.3  | Maintenance Staff Training on Pollution Prevention |
| 2.6.4  | Pesticides Management                              |
| 2.6.5  | Incident Response Staff Training                   |
| 2.6.6  | MSD Capital Project Control                        |
| 2.6.7  | MSD Stormwater Quality BMP Data                    |
| 2.6.8  | Catch Basin and Storm Sewer Cleaning               |
| 2.6.9  | Channel Maintenance                                |
| Cooperative Efforts (MSD provides supportive or other non-lead role) |  |
| 2.6.10   | SWPPPs for Co-Permittee Operations                 |



| GH/P2 Plan Maintenance and Update |   |  |   |                      |                |
|-----------------------------------|---|--|---|----------------------|----------------|
| SWPPPs for MSD Operations         |   |  |   |                      |                |
| SWQMP ID                          | Activity Required   | Schedule   | Frequency or Measure of Success   | Result               | Propose Change |
| 2.6.1                             | <p>The permittee shall periodically update and implement SWPPPs (also known as BMP Plans or Stormwater Plans) to control the discharge of pollutants from POTWs and other applicable MSD-owned facilities as defined in 40 CFR 122.26 including wastewater treatment plants and major operating facilities.</p> <p>SWPPPs will include provisions for maintenance activities on facility grounds, materials and equipment storage, security, preventative maintenance, risk identification and assessment, materials inventory, floor drain protection/controls, inspections and records.</p> | <p>Assess plans within 6 months of major facility changes or at least once every two years</p> | <p>Permittee shall assess plans within six (6) months of major facility changes or at least once every two years by the facility superintendents and operation managers who make up the SWP3 Committee.</p> | <p>Signed SWPPPs</p> | <p>No</p>      |

### Progress Summary Narrative

Each MSD facility has an approved Hazardous Materials Spill Prevention and Control (HMPC) plan, spill control equipment and trained hazmat response teams. MSD's Water Quality Treatment Centers (WQTCs) are issued discharge permits for wastewater that have included requirements for stormwater BMPs since the 1980s, and are required to have groundwater protection plans, hazardous materials spill plans and disaster response plans. MSD also maintains internal standards manuals and inspection programs for employee health and safety and emergency preparedness and response.

In June 2014, MSD updated and signed the SWPPPs for the following facilities: Central Maintenance Facility, Cedar Creek WQTC, Derek R. Guthrie WQTC, Floyds Fork WQTC, Hite Creek WQTC, Jeffersontown WQTC, and Morris Forman WQTC. This effort included good housekeeping trainings for facility staff, the development of inspection forms, facility inspections, recommendations for good housekeeping practices, and the development of work orders. The following signed SWPPPs are provided: Cedar Creek WQTC, Derek Guthrie WQTC, Floyds Fork WQTC, Hite Creek WQTC, Jeffersontown WQTC, Morris Forman WQTC, and Central Maintenance Facility.

In PY 4, MSD began development of a general stormwater plan for small facilities, including water quality treatment centers, pump stations, and Buechel Basin.

In PY 5, MSD updated the SWPPPs to include facility changes and to reflect changes on SWPPP committees. The Jeffersontown WQTC was removed from service in December 2015 and therefore a SWPPP is no longer needed.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| GH/P2 Plan Maintenance and Update |   |   |   |  |                |
|-----------------------------------|---|---|---|--|----------------|
| Training on MSD Facility SWPPPs   |   |   |   |  |                |
| SWQMP ID                          | Activity Required   | Schedule  | Frequency or Measure of Success   | Result   | Propose Change |
| 2.6.2                             | The permittee shall utilize the facility SWPPP Committees to perform routine training of key SWPPP issues | Address at least 3 SWPPP issues annually. Summarize in annual report. | Permittee shall address at least three (3) SWPPP issues annually and summarize training and attendance for the annual report. | Implementing SWPPPs and Training being implemented | No             |

### Progress Summary Narrative

During PY 5, SWPPP and MS4 program education were performed at MSD facilities during the SWPPP updates. This classroom style training presented an overview of the SWPPP process including: inspections, good housekeeping practices, work order development, forms, and document maintenance. These trainings will be adapted to cross-train staff regarding good housekeeping practices at the regional WQTCs. 69 employees were trained over 10 training sessions.

During PY 5, SWPPP trainings were conducted at the regional WQTCs. Multiple training sessions were held at the Morris Forman WQTC to accommodate the multiple shifts at the treatment center. The trainings occurred on the following dates:

- Hite Creek WQTC, April 13, 2016
- DRG WQTC, April 20, 2016
- Cedar Creek WQTC, April 27, 2016
- Floyds Fork WQTC, May 4, 2016
- Morris Forman WQTC, May 10, 2016, May 11, 2016, and May 18, 2016

### Tracking and Assessment

Ongoing training will continue to be implemented as a result of these updates to the SWPPPs.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| GH/P2 Plan Maintenance and Update                  |  |          |  |                          |                |
|--|--|----------|--|--------------------------|----------------|
| Maintenance Staff Training on Pollution Prevention |  |          |  |                          |                |
| SWQMP ID   | Activity Required  | Schedule | Frequency or Measure of Success  | Result                   | Propose Change |
| 2.6.3  | The permittee shall provide training to key maintenance staff on good housekeeping activities related to stormwater quality in MSD operations including but not limited to: green infrastructure operation and maintenance, fleet and building maintenance, and stormwater conveyance/drainage system maintenance. | Annually | Permittee shall report the number of staff attending, related training and include in the annual report. | Staff Training Conducted | No             |

### Progress Summary Narrative

The MSD Training Department maintains records of employees with state herbicide certifications and ensures that re-certifications are obtained. MSD provided the following training during the permit year and tracked the number of employees trained and number of hours of training for each training session, as follows:

- 8 Hour Hazmat Refresher
- Basic Crane Training
- Basin Cleaner (Atlas)
- Combination Sewer Cleaner (Basic for temps.)
- Combination Sewer Cleaner (for operators)
- Crawler Carrier
- CSO, Siphon & Regulator PM
- CSO/Gate Regulator
- Drainage Repair & Regrade
- Erosion Control
- Hazardous Communications
- Jet Rodder
- Job Pre-planning
- Mini-Excavator
- Herbicide Training
- Plate Truck/Articulating Boom Crane
- Sewer Cleaning & Maint.
- SORP Annual Overview
- SORP Quaterly Field Training
- Telespection
- Traffic Control
- Traffic Control and Work Zones
- Trench Excavation Safety

Note: The equipment and other related training covers safety and environmental concerns. More information on SORP training is provided in Activity 2.2.11.

### Tracking and Assessment

Not applicable.

| Reporting Period<br>July 1 – June 30 | PY | No. Employee Participants | Employee Training Hours Per Session Completed |
|--------------------------------------|----|---------------------------|---|
| 2010-11                              |    | 3,016                     | 343.5   |
| 2011-12                              | 1  | 1,409                     | 355   |
| 2012-13                              | 2  | 1,552                     | 160.5   |
| 2013-14                              | 3  | 1,450                     | 166.5   |
| 2014-15                              | 4  | 1,215                     | 155   |
| 2015-16                              | 5  | 1,216                     | 142   |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| GH/P2 Plan Maintenance and Update |   |          |  |                   |                |
|-----------------------------------|---|----------|--|-------------------|----------------|
| Pesticides Management             |   |          |  |                   |                |
| SWQMP ID                          | Activity Required   | Schedule | Frequency or Measure of Success                                    | Result            | Propose Change |
| 2.6.4                             | The permittee shall utilize Commonwealth of Kentucky pesticide management registration and certifications to qualify MSD employees applying pesticides. The permittee shall develop and maintain a list of pesticides used and stored, including storage locations. | Annually | Permittee shall track employees with related state certifications. | Employees Trained | No             |

### Progress Summary Narrative

MSD contracts with Louisville Metro Department of Public Health and Wellness (LMDPHW) apply pesticides for mosquito control. Louisville Metro applies pellets in catch basins to control mosquitos.

Although MSD does not manage pesticide treatment or application, it does use herbicides, which are managed through the Commonwealth of Kentucky herbicide management registration and certifications to qualify MSD employees applying herbicides. MSD maintains a database of chemicals used and stored, including storage locations. The MSD Training Department maintains records of employees with state certifications and ensures that re-certifications are obtained (see Activity 2.6.3).

The Louisville Metro Department of Public Health and Wellness (LMDPHW) leads a coordinated effort of appropriate agencies in Louisville Metro to address mosquito control. MSD contracts with Louisville Metro Department of Public Health and Wellness (LMDPHW) apply pesticides for mosquito control. Louisville Metro applies pellets in catch basins to control mosquitoes.

MSD uses pellets and briquettes for mosquito control as needed. Proper application and disposal procedures are followed.

MSD discourages the use of herbicides on residential lawns in their environmental education programs.

### Tracking and Assessment

During PY 5, MSD offered a two-hour herbicide training course to 16 employees. See Activity 2.6.3 Maintenance Staff Training on Pollution Prevention for more information on MSD training activities.

| Reporting Period<br>July 1 – June 30 | PY | Number of<br>Employees Trained |
|--------------------------------------|----|--------------------------------|
| 2010-11                              |    | 10                             |
| 2011-12                              | 1  | 16                             |
| 2012-13                              | 2  | 7                              |
| 2013-14                              | 3  | 19                             |
| 2014-15                              | 4  | 22                             |
| 2015-16                              | 5  | 16                             |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| GH/P2 Plan Maintenance and Update |  |                  |   |                   |                |
|-----------------------------------|--|------------------|---|-------------------|----------------|
| Incident Response Staff Training  |  |                  |   |                   |                |
| SWQMP ID                          | Activity Required  | Schedule         | Frequency or Measure of Success   | Result            | Propose Change |
| 2.6.5                             | The permittee shall provide training to unified incident response staff on related stormwater issues including good housekeeping, IDDE, construction, post-construction BMP/controls and program management. | Starting in PY 2 | Permittee shall report incident response staff training participation starting in PY two (2). | Employees trained | No             |

### Progress Summary Narrative

MSD provides training to unified incident response staff on related stormwater issues including good housekeeping, IDDE, construction, post-construction, BMP/controls and program management. The training provides information to the incident response staff to support their recognition of the controls while responding to incidents. The raised awareness supports identification of longer-term implications and needs resulting from any incidents.

The Industrial Waste Department (IWD) staff is trained on IDDE, MS4 permit administration, and industrial program updates and implementation. The staff is assessed in the field during an inspection, and participates in a classroom style training.

### Tracking and Assessment

See Activity 2.6.3 Maintenance Staff Training on Pollution Prevention.

| Reporting Period<br>July 1 – June 30 | PY | Number of Training Sessions |
|--------------------------------------|----|-----------------------------|
| 2010-11                              |    | NA                          |
| 2011-12                              | 1  | NA                          |
| 2012-13                              | 2  | 1                           |
| 2013-14                              | 3  | 2                           |
| 2014-15                              | 4  | 2                           |
| 2015-16                              | 5  | 9                           |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| GH/P2 Plan Maintenance and Update |  |                  |   |          |                |
|-----------------------------------|--|------------------|---|----------|----------------|
| MSD Capital Project Control       |  |                  |   |          |                |
| SWQMP ID                          | Activity Required  | Schedule         | Frequency or Measure of Success   | Result   | Propose Change |
| 2.6.6                             | The permittee shall, for MSD directed capital, rehabilitation and reconstruction projects, disturbing more than one acre, performed by a contractor, ensure the contract documents/agreements/work orders will include stipulations that require the work be designed /performed/ implemented/ constructed under the same standards for construction and post-construction stormwater quality that MSD requires of private development it regulates. | Starting in PY 2 | Permittee shall summarize changes to MSD Capital Project requirements starting in PY two (2). | Complete | No             |

### Progress Summary Narrative

MSD capital construction projects are required to uphold the same requirements as those required of private development. Each project is required to obtain land disturbance permits and corresponding inspections. While the state requirement is for land disturbance of more than one acre, the MSD requirement applies to any project that disturbs 2,000 square feet of land.

Post-construction BMPs are required for all projects disturbing one acre of land or greater, including MSD capital projects. Requirements are enforced through the Wastewater/Stormwater Discharge Requirements (WDRs), effective August 1, 2013.

MSD capital projects are reviewed identically to private development projects. MSD reviews projects to meet the requirements set forth in the Design Manual, WDR's, EPSC and Floodplain Management Ordinances. The reviews and permits are tracked in the Project Activity Tracking system and Hansen.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| GH/P2 Plan Maintenance and Update |  |  |  |                                |                |
|-----------------------------------|--|--|--|--------------------------------|----------------|
| MSD Stormwater Quality BMP Data   |  |  |  |                                |                |
| SWQMP ID                          | Activity Required  | Schedule                                   | Frequency or Measure of Success  | Result                         | Propose Change |
| 2.6.7                             | The permittee shall update LOJIC and HANSEN® datasets to identify stormwater-quality BMPs located on MSD properties, rights-of-way and easements that MSD is responsible for operating and/or maintaining. The datasets will be updated in a manner to support ongoing prioritization and tracking of operation and maintenance. | Starting in PY 2 and then every other year | Permittee shall every other year assess datasets for completeness and ability to support staff scheduling stormwater-quality BMPs MSD is responsible for maintaining starting in PY two (2). | Dataset created and maintained | No             |

### Progress Summary Narrative

MSD continuously updates the LOJIC and HANSEN® datasets to identify stormwater-quality BMPs located on properties, rights-of-way and easements that MSD is responsible for operating and/or maintaining. The datasets are updated in a manner to support ongoing prioritization and tracking of operation and maintenance. HANSEN® software is used to record and track complaints, inspections, work orders and enforcement cases, including reports of illicit discharges. MSD and Louisville Metro infrastructure and property assets are geocoded in the HANSEN® database, and the asset data tables are linked in the LOJIC GIS.

A major (multi-year) system update was rolled out in 2013 to HANSEN®. The upgrade included tracking to identify inspection of private and public stormwater quality BMPs. The LOJIC and HANSEN® system have been updated to track green infrastructure practices at the site local level and individual practice location level. Practices are characterized in a way to match the types of green infrastructure presented in the Chapter 18 Design Manual that focuses on green infrastructure. The system provides for tracking property owner contacts at project onset and some physical characteristics including contributing drainage area. Mechanisms that continue to be expanded include tracking MSD spot maintenance inspections, credit inspections and related operation and maintenance inspection metrics. Further progress will be reported in future annual reports.

In PY 4, MSD developed a green infrastructure tracking protocol (see Activity 2.5.5). While MSD continues to refine their tracking system, green infrastructure sites are tracked within LOJIC and HANSEN®, including routine inspections. Operation and maintenance is performed based on the results of those inspections. During PY 5, MSD continues to use the protocol to assist with inspections.

More information on green infrastructure project tracking is available in Activity 2.5.4 Stormwater Infrastructure Inventory and Activity 2.5.5 Post-Construction BMP Inventory Update.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| GH/P2 Plan Maintenance and Update    |  |          |   |                   |                |
|--------------------------------------|--|----------|---|-------------------|----------------|
| Catch Basin and Storm Sewer Cleaning |  |          |   |                   |                |
| SWQMP ID                             | Activity Required  | Schedule | Frequency or Measure of Success                             | Result            | Propose Change |
| 2.6.8                                | The permittee shall continue to clean catch basins and sewers (closed pipe systems) to prevent debris from entering receiving streams and address drainage/flooding issues in MSD area based on known priorities and information gathered from the customer hotline. | Annually | Permittee shall summarize and include in the annual report. | System maintained | No             |

### Progress Summary Narrative

Catch basin and storm sewer cleaning is tracked in HANSEN® by work orders. Catch basins and storm sewers outside the combined sewer (inside the MS4) service area were cleaned as issued by work orders and tracked in HANSEN® by activity codes CBC, CBCL, V, FLUSH, RC and SF. The following table includes the storm sewer cleaning performed during the report year:

| Catch Basin & Storm Sewer Cleaning                  | Inside CSSA      |               |               | MS4 Service Area (Outside CSSA) |               |              | Total            |               |               |
|---|------------------|---------------|---------------|---------------------------------|---------------|--------------|------------------|---------------|---------------|
|   | Costs            | Footage       | Work Orders   | Costs                           | Footage       | Work Orders  | Costs            | Footage       | Work Orders   |
| Catch Basin Cleaning                                | \$280,868        | -             | 21,813        | \$122,733                       | -             | 6,033        | \$403,602        | -             | 27,846        |
| Catch Basin Cleaning - Customer Request             | \$15,158         | -             | 989           | \$4,365                         | -             | 350          | \$19,522         | -             | 1,339         |
| <b>Total Catch Basin Cleaning</b>                   | <b>\$296,026</b> | <b>-</b>      | <b>22,802</b> | <b>\$127,098</b>                | <b>-</b>      | <b>6,383</b> | <b>\$423,124</b> | <b>-</b>      | <b>29,185</b> |
| Flush Asset   | \$18,636         | 45,461        | 450           | \$11,529                        | 12,755        | 185          | \$30,165         | 58,216        | 635           |
| Root Cutting  | \$14,732         | 12,667        | 180           | \$1,723                         | 1,084         | 12           | \$16,454         | 13,751        | 192           |
| Routine (PM) Sewer Flushing                         | \$79,371         | 22,046        | 363           | -                               | -             | -            | \$79,371         | 22,046        | 363           |
| Vactor  | \$35,229         | 4,043         | 549           | \$41,173                        | 240           | 123          | \$76,402         | 4,283         | 672           |
| <b>Total Storm Sewer Cleaning</b>                   | <b>\$147,967</b> | <b>84,217</b> | <b>1,542</b>  | <b>\$54,425</b>                 | <b>14,079</b> | <b>320</b>   | <b>\$202,392</b> | <b>98,295</b> | <b>1,862</b>  |
| <b>Total Catch Basin &amp; Storm Sewer Cleaning</b> | <b>\$443,993</b> | <b>84,217</b> | <b>24,344</b> | <b>\$181,522</b>                | <b>14,079</b> | <b>6,703</b> | <b>\$625,516</b> | <b>98,295</b> | <b>31,047</b> |

Storm sewer cleaning outside the CSSA includes only work performed on storm assets.

### Tracking and Assessment

During the current reporting period, there were 6,703 work orders for catch basin and storm sewer cleaning in the MS4 service area.

| Reporting Period July 1 – June 30 | PY | Total Number of Work Orders in the MS4 |
|-----------------------------------|----|--|
| 2010-11                           |    | 2,159                                  |
| 2011-12                           | 1  | 9,836                                  |
| 2012-13                           | 2  | 7,295                                  |
| 2013-14                           | 3  | 5,145                                  |
| 2014-15                           | 4  | 2,992                                  |
| 2015-16                           | 5  | 6,703                                  |

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| Y        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| GH/P2 Plan Maintenance and Update |   |          |   |                   |                |
|-----------------------------------|---|----------|---|-------------------|----------------|
| Channel Maintenance               |   |          |   |                   |                |
| SWQMP ID                          | Activity Required   | Schedule | Frequency or Measure of Success                             | Result            | Propose Change |
| 2.6.9                             | The permittee shall continue to maintain open channel system in MSD area based on priorities and information from the customer hotline including ditch cleanings, ditch regrading, drainage obstruction removals, erosion repairs, floodwall levee maintenance, headwall install/repair, concrete channel installation, tree removal, driveway apron restoration, routine mowing and closed pipe installations. | Annually | Permittee shall summarize and include in the annual report. | System maintained | No             |

### Progress Summary Narrative

The following table includes the work orders performed for channel maintenance during the report year:

| Channel Maintenance                       | Inside CSSA      |              |              | MS4 Service Area (Outside CSSA) |                |              | Total              |                |               |
|---|------------------|--------------|--------------|---------------------------------|----------------|--------------|--------------------|----------------|---------------|
|   | Costs            | Footage      | Work Orders  | Costs                           | Footage        | Work Orders  | Costs              | Footage        | Work Orders   |
| Areas Trimmed                             | \$60,650         | -            | 288          | \$24,974                        | 50             | 93           | \$85,624           | 50             | 381           |
| Debris Removal                            | \$35,809         | 26           | 868          | \$31,931                        | 5              | 52           | \$67,740           | 31             | 920           |
| Ditch Cleaning                            | \$24,936         | 4,455        | 20           | \$628,532                       | 211,356        | 518          | \$653,467          | 215,811        | 538           |
| Ditch Regrading                           | \$32,214         | 1,377        | 16           | \$558,310                       | 30,575         | 367          | \$590,524          | 31,952         | 383           |
| Drainage Obstruction Removal              | \$4,759          | 1            | 20           | \$216,724                       | 346            | 441          | \$221,483          | 347            | 461           |
| Driveway Apron Restoration                | \$90             | -            | 2            | \$302,635                       | 2,203          | 91           | \$302,725          | 2,203          | 93            |
| Erosion Repair                            | \$51,595         | -            | 10           | \$318,721                       | 989            | 298          | \$370,316          | 989            | 308           |
| Floodwall / Levee Maintenance             | \$11,816         | -            | 26           | \$6,538                         | -              | 14           | \$18,354           | -              | 40            |
| Headwall Installation / Repair            | \$1,113          | -            | 1            | \$15,346                        | 10             | 20           | \$16,460           | 10             | 21            |
| Install Concrete Channel                  | -                | -            | -            | \$68,284                        | 1,229          | 28           | \$68,284           | 1,229          | 28            |
| Pipe Installation                         | \$501            | 16           | 2            | \$161,826                       | 479            | 45           | \$162,327          | 495            | 47            |
| Routine Mowing                            | \$329,621        | 2,903        | 1,758        | \$874,636                       | 17,036         | 3,876        | \$1,204,257        | 19,939         | 5,634         |
| Storm Line Repairs                        | \$1,007          | 5            | 1            | -                               | -              | 1            | \$1,007            | 5              | 2             |
| Trash / Debris Pickup                     | \$10,909         | -            | 4            | \$334                           | -              | 4            | \$11,243           | -              | 8             |
| Tree Removal                              | \$20,036         | -            | 8            | \$197,130                       | -              | 77           | \$217,166          | -              | 85            |
| <b>Total Channel Maintenance</b>          | <b>\$585,056</b> | <b>8,783</b> | <b>3,024</b> | <b>\$ 3,405,920</b>             | <b>264,279</b> | <b>5,925</b> | <b>\$3,990,976</b> | <b>273,061</b> | <b>8,949</b>  |
| Hot Spots                                 | \$54,298         | -            | 64           | \$ 68,762                       | -              | 976          | \$123,060          | -              | 1,040         |
| Storm Events                              | \$138,544        | -            | 18           | -                               | -              | -            | \$138,544          | -              | 18            |
| <b>Total Hot Spots &amp; Storm Events</b> | <b>\$192,842</b> | <b>-</b>     | <b>82</b>    | <b>\$68,762</b>                 | <b>-</b>       | <b>976</b>   | <b>\$261,604</b>   | <b>-</b>       | <b>1,058</b>  |
| <b>Total Channel Maintenance</b>          | <b>\$777,899</b> | <b>8,783</b> | <b>3,106</b> | <b>\$ 3,474,682</b>             | <b>264,279</b> | <b>6,901</b> | <b>\$4,252,581</b> | <b>273,061</b> | <b>10,007</b> |

### Tracking and Assessment

The total number of work orders for the reporting period is tracked below.

| Reporting Period<br>July 1 – June 30 | PY | MS4 Service Area<br>Channel Maintenance:<br>Number of Work<br>Orders | MS4 Service Area<br>Hotspots and Storm<br>Events: Number of<br>Work Orders |
|--------------------------------------|----|--|--|
| 2010-11                              |    | 2,021  | 2,071  |
| 2011-12                              | 1  | 4,791  | 1,856  |
| 2012-13                              | 2  | 3,079  | 981  |
| 2013-14                              | 3  | 5,502  | 746  |
| 2014-15                              | 4  | 8,700  | 1,330  |
| 2015-16                              | 5  | 5,925  | 976  |



| <b>GH/P2 Plan Maintenance and Update</b>                                    |  |                        |   |                |                |
|---|--|------------------------|---|----------------|----------------|
| <b>Cooperative Efforts (MSD provides supportive or other non-lead role)</b> |  |                        |   |                |                |
| <b>SWPPPs for Co-Permittee Operations</b>                                   |  |                        |   |                |                |
| SWQMP ID  | Activity Required  | Schedule               | Frequency or Measure of Success   | Result         | Propose Change |
| 2.6.10  | As co-permittees make request, the permittee shall provide periodic 3 <sup>rd</sup> -party technical assistance and/or review of the facility SWPPPs, BMP plans, or Stormwater Plans and BMPs and/or site visit/walkthrough to help identify opportunities to improve the effectiveness of the plans and their implementation. | Annually, if requested | Permittee shall assist in the review of at least one (1) facility annually if requested by co-permittees. | None requested | No             |

### Progress Summary Narrative

Upon request by a co-permittee, MSD provides third-party technical assistance and/or review of the facility stormwater pollution prevention plans (SWPPPs, BMP plans, or Stormwater Plans and BMPs) and/or site visits or walkthroughs to help identify opportunities to improve the effectiveness of the plans and their implementation. The permit requires at a minimum that MSD shall assist in the review of at least one facility annually if requested.

### Tracking and Assessment

During PY 5, no co-permittees requested SWPPP assistance.

| Reporting Period<br>July 1 – June 30 | PY | Number of Assessments<br>Requested / Provided |
|--------------------------------------|----|---|
| 2010-11                              |    | 1/1   |
| 2011-12                              | 1  | 0/0   |
| 2012-13                              | 2  | 0/0   |
| 2013-14                              | 3  | 1/1   |
| 2014-15                              | 4  | 0/0   |
| 2015-16                              | 5  | 0/0   |

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



## 2.7 MONITORING FACT SHEETS

| TABLE 2.7 - M |   |
|---------------|---|
| SWQMP ID      | M Monitoring Plan Maintenance and Update              |
| 2.7.1         | Long-Term Monitoring Network (LTMN)                   |
| 2.7.2         | Monitoring Summary                                    |
| 2.7.3         | Trend Analysis  |
| 2.7.4         | Flow Estimate to Support Quarterly Ambient Monitoring |
| 2.7.5         | Monitoring Location Maintenance                       |
| 2.7.6         | Precipitation Estimate                                |
| 2.7.7         | Water Quality Standards                               |
| 2.7.8         | Location Mapping                                      |
| 2.7.9         | Sampling Methodology and Test Procedures              |
| 2.7.10        | Annual Data Summary                                   |

### SUPPORTING INFORMATION

|                |   |
|----------------|---|
| Appendix 2.7.1 | Raw Monitoring Data                                       |
| Appendix 2.7.3 | State of the Streams: 2014 Water Quality Synthesis Report |
| Appendix 2.7.4 | USGS Flow Monitoring Data                                 |
| Appendix 5     | Analyzed Monitoring Data                                  |



| M Monitoring Plan Maintenance and Update |   |          |   |                      |                |
|--|---|----------|---|----------------------|----------------|
| Long-Term Monitoring Network (LTMN)      |   |          |   |                      |                |
| SWQMP ID                                 | Activity Required   | Schedule | Frequency or Measure of Success                                     | Result               | Propose Change |
| 2.7.1                                    | The permittee shall continue the existing program of the collection of long-term data on stream quality and habitat for at least 25 LTMN locations selected to support the various types of data collected. This program includes: <ul style="list-style-type: none"> <li>· <b>Continuous</b> – pH, conductivity, temperature, dissolved oxygen, percent dissolved oxygen and stream flow.</li> <li>· <b>Once Every Two Years</b> – Biological sampling and/or evaluation rotating to include: algae, fish and benthic macro invertebrates.</li> <li>· <b>Quarterly</b> – Ambient monitoring for TSS; TDS; Fecal Coliform; E. coli; Oil and Grease; BOD5; COD; Lead, Total Recoverable; Cadmium, Total Recoverable; Copper, Total Recoverable; Zinc, Total Recoverable; Dissolved Phosphorus; Total Phosphorus; Total Ammonia Nitrogen (as N); Total Kjeldahl Nitrogen (as N); Nitrate plus Nitrite Nitrogen (as N); and pH</li> <li>· <b>5/month (May-October)</b> - Recreational monitoring for fecal Coliform.</li> <li>· <b>1/month (May-October)</b> – Recreational monitoring for E. coli.</li> </ul> | Annually | Permittee shall provide datasets electronically with annual report. | Monitoring Completed | No             |

## Progress Summary Narrative

**Continuous:** Continuous monitoring data was collected at 27 LTMN stations on 15-minute intervals for pH, specific conductance, temperature, and dissolved oxygen. Stream flow data was collected by USGS under cooperative agreement at 25 LTMN locations. Modifications to the Long Term Monitoring Network locations are adjusted as needed to accommodate MSD capital project construction.

**Biological:** Biological samples were collected at 27 LTMN locations. Fish communities and habitat data were collected in the fall of 2013, and the fall of 2015. Benthic macroinvertebrates and habitat were sampled May 2013, and May 2015. A database and report for the May 2015 sample event will be included in the next MS4 Annual Report. Algae communities were sampled in November 2011, October 2013, and September, 2015. A database and report for the September 2015 sample event will be included in the next MS4 Annual Report.

**Quarterly:** Between July 1, 2015, and June 30, 2016, monitoring was performed quarterly at 27 LTMN locations, during July 2015, September 2015, January 2016, and April 2016.

**Fecal Coliform and E. Coli:** At least five fecal coliform samples and one *E. coli* sample per month were collected during the recreational season at 27 LTMN locations: July through October 2015, May through June 2016, and one sample per quarter during the non-recreational season.

## Tracking and Assessment

Monitoring data is provided in Appendix 2.7.1.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| Y        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| M Monitoring Plan Maintenance and Update |  |          |   |                      |                |
|--|--|----------|---|----------------------|----------------|
| Monitoring Summary                       |  |          |   |                      |                |
| SWQMP ID                                 | Activity Required  | Schedule | Frequency or Measure of Success                         | Result               | Propose Change |
| 2.7.2                                    | The permittee shall provide a summary of monitoring collection efforts and results in the annual report. | Annually | Permittee shall summarize and include in annual report. | Monitoring Completed | No             |

## Progress Summary Narrative

**Continuous:** Continuous monitoring data for pH, temperature, dissolved oxygen and conductivity at 27 stations were summarized, including number of records, percent complete, minimum, average and maximum concentrations and values. There are up to 35,040 records per parameter per LTMN station, for a total of 3.7 million records. USGS performs data review and finalization for temperature and dissolved oxygen in the 4<sup>th</sup> quarter of each year. Final data for temperature and dissolved oxygen were available for October 1, 2014 – September 30, 2015. Final data were compared to applicable water quality criteria for dissolved oxygen and temperature and summarized. Daily monitoring data for flow were compared to long term monthly average flows to characterize daily flows as “wet” or “dry”.

**Biological:** A total of 164 biological samples and 27 habitat quality assessments are summarized in the monitoring report including fish community sampling and habitat assessments performed in 2013 and 2015, benthic macroinvertebrate communities and habitat assessments performed in 2013 and 2015 and algae communities sampled in 2011 and 2013. The report on algae communities performed in the fall of 2015 is pending.

**Quarterly:** Between July 1, 2015 - June 30, 2016, MSD collected quarterly water quality samples in July and September 2015 and January and April 2016. The 27 LTMN sites were sampled over a consecutive four-day period during each quarterly sampling event for a total of 108 samples. Data for metals, pH, and un-ionized ammonia are summarized and compared to applicable water quality criteria in Chapter 5 of this report. Data for other parameters without water quality criteria are also summarized in Chapter 5.

**Fecal Coliform:** At least five grab samples per month were collected from 27 LTMN sites during the six-month recreational season (May 1 to October 31). Results were summarized and compared to the applicable water quality criteria.

## Tracking and Assessment

Raw monitoring data is provided in Appendix 2.7.1.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| Y        | <b>Level 6: Receiving Waters</b>           |

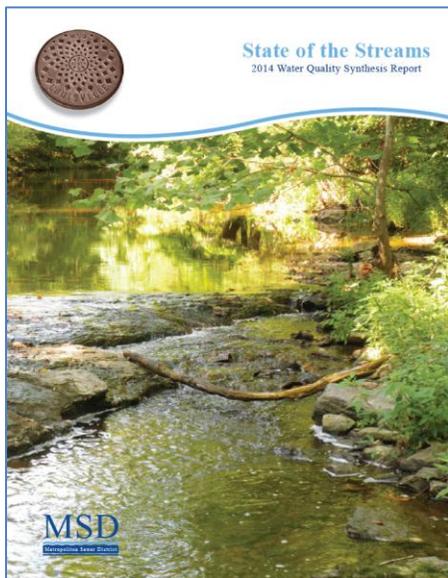
| M Monitoring Plan Maintenance and Update |  |                       |  |                       |                |
|--|--|-----------------------|--|-----------------------|----------------|
| Trend Analysis                           |  |                       |  |                       |                |
| SWQMP ID                                 | Activity Required  | Schedule              | Frequency or Measure of Success  | Result                | Propose Change |
| 2.7.3                                    | The permittee shall perform trend analysis to support long-term assessments of local waterways and program performance. Report analysis through the "Synthesis Reports" at least once every permit cycle | Once per permit cycle | Permittee shall, at least once per permit cycle, provide synthesis report. | 2014 Report Completed | No             |

### Progress Summary Narrative

MSD completed and published a *State of the Streams: 2014 Water Quality Synthesis Report* (Available on the ProjectWIN website). This report includes a watershed based assessment of eleven watersheds that are partially or completely within the MSD service area. The Synthesis Report included a long-term status and trends assessment of monitoring data collected between 1999 and 2014, including stream flow, fish, benthic macroinvertebrate and algal communities, aquatic habitat quality and water quality. The Synthesis Report was written in an accessible manner with extensive use of photographs, graphs, charts and call out boxes to highlight the status and trends in water quality throughout Jefferson County watersheds. During PY 5, MSD initiated the 2016 Synthesis Report.

### Tracking and Assessment

*State of the Streams: 2014 Water Quality Synthesis Report* is provided in Appendix 2.7.3.



| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| Y        | Level 6: Receiving Waters           |



| M Monitoring Plan Maintenance and Update              |  |          |   |                |                |
|---|--|----------|---|----------------|----------------|
| Flow Estimate to Support Quarterly Ambient Monitoring |  |          |   |                |                |
| SWQMP ID  | Activity Required  | Schedule | Frequency or Measure of Success                                       | Result         | Propose Change |
| 2.7.4   | The permittee shall utilize total precipitation estimates over the previous twenty-four (24) hour period to estimate flow. When flow is measured with in stream gauging equipment, that data will be utilized rather than precipitation based estimates. | Annually | Permittee shall provide available data and include in annual reports. | Flow Estimated | No             |

### Progress Summary Narrative

Final daily average flow data collected between July 1, 2015, and September 30, 2015, and provisional daily average flow data collected between October 1, 2015, and June 30, 2016, were used to characterize stream flow on the day of sample collection for this report. If the average stream flow on the day of sample collection was at least 50% greater than the long-term monthly average stream flow, the sample was characterized as being collected under wet conditions; all other samples were characterized as being collected under dry conditions. For three locations, adjacent flow gages were used to characterize flow on the day of sample collection.

Three LTMN stations do not have flow gages: Wolf Pen Branch at 8200 Wolf Pen Branch Road (LTMN Site EHCWP002), South Fork of Beargrass Creek at Brownsboro Road (LTMN Site ESFSF006), and Middle Fork of Beargrass Creek at Browns Lane (LTMN Site EMIMI009). Samples collected at these sites were characterized as being collected under wet or dry conditions based on final and provisional stream flow data from Little Goose Creek at US 42 (LTMN Site EGCLG001, USGS Gage 03292480), Middle Fork of Beargrass Creek at Lexington Road (LTMN Site EMIMI010, USGS Gage 03293500) and Middle Fork of Beargrass Creek at Old Cannons Lane (LTMN Site EMIMI002, USGS Gage 03293000), respectively.

### Tracking and Assessment

USGS Flow Monitoring Data is provided in Appendix 2.7.4.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| N        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| M Monitoring Plan Maintenance and Update |  |             |   |                  |                |
|--|--|-------------|---|------------------|----------------|
| Monitoring Location Maintenance          |  |             |   |                  |                |
| SWQMP ID                                 | Activity Required  | Schedule    | Frequency or Measure of Success                                     | Result           | Propose Change |
| 2.7.5                                    | The permittee shall continue its collaboration with United States Geological Survey (USGS) on flow gages and monitoring locations maintenance and data management. | Continually | Permittee shall summarize activities and include in annual reports. | Sites maintained | No             |

### Progress Summary Narrative

MSD continues to collaborate with USGS on the operation of 25 flow gages throughout the MSD service area. USGS maintains the flow gages, manages flow data and provides access to the data through the National Water Information System website (<http://waterdata.usgs.gov/ky/nwis>).

MSD continues to collaborate with USGS on the operation of 24 water quality sondes throughout the MSD service area. Through its contract with USGS, MSD operates and maintains the sondes and USGS provides on-line access to provisional (i.e., as collected) water quality data through the National Water Information System website (<http://waterdata.usgs.gov/ky/nwis>). USGS reviews and finalizes the data annually and delivers the final sonde water quality data.

### Trends and Assessment

Not applicable.

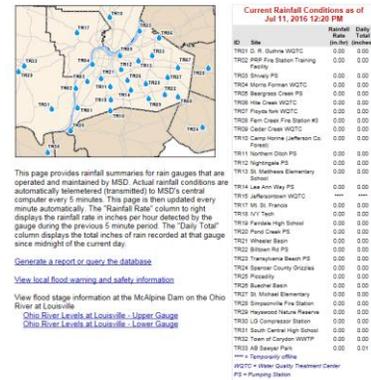
| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| N        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| Y        | <b>Level 6: Receiving Waters</b>           |



| M Monitoring Plan Maintenance and Update |   |          |  |                           |                |
|--|---|----------|--|---------------------------|----------------|
| Precipitation Estimate                   |   |          |  |                           |                |
| SWQMP ID                                 | Activity Required   | Schedule | Frequency or Measure of Success  | Result                    | Propose Change |
| 2.7.6                                    | The permittee shall continue to maintain the continuous rain gage network and on-line public access to that data. | Maintain | Permittee shall continue to make rain gage network data available on-line. | Data available on Website | No             |

### Progress Summary Narrative

MSD continues to maintain a rain gage network and provides on-line public access to that data. This rain gage network data is currently available on MSD's website (<http://www.msdlouky.org/aboutmsd/rainfall.cfm>), as demonstrated in the Rainfall Conditions screenshot to the right. In the 2015-2016 reporting year, MSD installed rainfall gages at ten (10) new locations to more comprehensively monitor rainfall throughout Jefferson County and surrounding areas:



- TR24 – Spencer County
- TR25 – Piccadilly
- TR26 – Buechel Basin
- TR27 – St. Michael Elementary
- TR28 – Simpsonville Fire Station
- TR29 – Hayswood Nature Reserve
- TR30 – LG Compressor Station
- TR31 – South Central High School
- TR32 – Town of Corydon WWTP
- TR33 – AB Sawyer Park

In the 2015-2016 fiscal year, the construction activity related to the decommissioning of the Jeffersontown Water Quality Treatment Center will interrupt the data collection at TR-15 Jeffersontown WQTC gage.

### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| M Monitoring Plan Maintenance and Update |  |          |  |  |                |
|--|--|----------|--|--|----------------|
| Water Quality Standards                  |  |          |  |  |                |
| SWQMP ID                                 | Activity Required  | Schedule | Frequency or Measure of Success                    | Result   | Propose Change |
| 2.7.7                                    | The permittee shall compare stream monitoring analytical results to the applicable water quality standards for each parameter of the monitoring program. The most stringent applicable standard shall be used for comparison. Constituents that exceed applicable Water Quality Standards shall be highlighted. The permittee shall include a discussion of possible pollutant sources through the annual report | Annually | Permittee shall apply the most stringent standard. | Comparison Completed,<br><br>Source evaluation currently performed using wet vs. non-wet | No             |

### Progress Summary Narrative

MSD compared analytical results of the stream monitoring to the most stringent applicable water quality standards for each parameter of the monitoring program. Constituents that exceed applicable Water Quality Standards were highlighted. The comparison with water quality criteria is provided in Chapter 5 Monitoring. Parameters without numeric criteria are also summarized in Chapter 5.

The determination of possible pollutant sources is a very complex undertaking, particularly in dynamic and urbanized watersheds where numerous factors influence water quality and the magnitude of those influences varies with storm, season and site specific factors. Therefore, an analysis that considers the flow conditions under which samples were collected, the types of land uses and amount of impervious surfaces draining to each monitoring station was performed. This analysis provides a relative indication of whether specific pollutants or conditions are associated with wet weather and stormwater or non-storm conditions. Water quality data collected by MSD were analyzed and reported in the context of whether the samples were collected under “wet” or “dry” conditions. This analysis of stream conditions is available in the 2014 Synthesis Report (see Activity 2.7.3).

When data indicate that illicit discharges may be present that are causing or contributing to exceedances of applicable water quality standards, follow-up investigation will be performed per IDDE procedures.

In addition, MSD is in the early stages of water quality model development for major watersheds in the county for possible pollutant source identification and activity impact assessment on water quality. Progress and results will be communicated in future reports.

### Tracking and Assessment

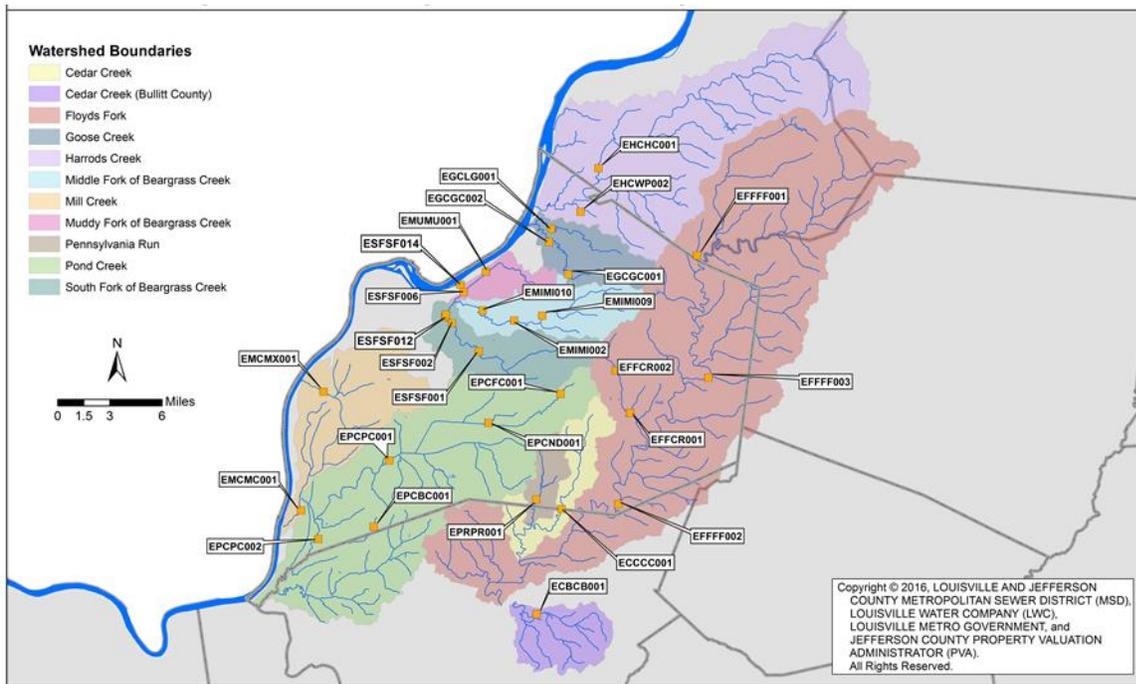
The comparison to water quality standards is reported in Chapter 5 and assessment results are provided in Appendix 5, Analyzed Monitoring Data.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| Y        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |

| M Monitoring Plan Maintenance and Update |   |          |   |              |                |
|--|---|----------|---|--------------|----------------|
| Location Mapping                         |   |          |   |              |                |
| SWQMP ID                                 | Activity Required   | Schedule | Frequency or Measure of Success   | Result       | Propose Change |
| 2.7.8                                    | The permittee shall maintain the geo-coded monitoring station locations and descriptions through related geographic datasets and databases. | Maintain | Permittee shall maintain the monitoring stations reflected in mapping system. | Maps updated | No             |

### Progress Summary Narrative

The LOJIC database maintains geocoded LTMN monitoring station locations and descriptions.



### Trends and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| <b>M Monitoring Plan Maintenance and Update</b> |   |          |   |                     |                |
|---|---|----------|---|---------------------|----------------|
| <b>Sampling Methodology and Test Procedures</b> |   |          |   |                     |                |
| SWQMP ID  | Activity Required   | Schedule | Frequency or Measure of Success   | Result              | Propose Change |
| 2.7.9   | The permittee shall perform the sampling methodology according to the EPA stormwater application regulations at 40 CFR 122.26. The permittee shall perform the analyses according to the procedures approved under 40 CFR Part 136, unless other test procedures have been specified. | Annually | Permittee shall perform the sampling methodology to insure compliance with 40 CFR 122.26 and 136. | Procedures followed | No             |

### Progress Summary Narrative

Sampling methodology is conducted according to the EPA stormwater application regulations. Analyses are conducted according to procedures approved under 40 CFR Part 136 or similar methods.

### Trends and Assessment

Analytical methods are included with raw monitoring data in Appendix 2.7.1.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| N        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| M Monitoring Plan Maintenance and Update |  |          |  |               |                |
|--|--|----------|--|---------------|----------------|
| Annual Data Summary                      |  |          |  |               |                |
| SWQMP ID                                 | Activity Required  | Schedule | Frequency or Measure of Success  | Result        | Propose Change |
| 2.7.10                                   | The permittee shall submit a stormwater monitoring report annually. The monitoring reports shall include: status of implementation of the monitoring program, methods of evaluating data, graphical summaries of the data, and an explanation/discussion of the data for each component of the monitoring program. The monitoring data/results obtained each year will be submitted electronically with the annual report. A narrative data analysis shall be submitted annually within the annual report. | Annually | Permittee shall provide a summary electronically with the annual report. | Data Provided | No             |

### Progress Summary Narrative

See Chapter 5 Monitoring.

### Trends and Assessment

Monitoring data assessment is reported in Chapter 5 Monitoring and assessment results are provided in Appendix 5. Analyzed Monitoring Data.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| N        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| Y        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| Y        | <b>Level 6: Receiving Waters</b>           |



## 2.8 PERFORMANCE ASSESSMENT AND REPORTING (PAR) FACT SHEETS

| TABLE 2.8 - PAR |   |
|-----------------|---|
| SWQMP ID        | PAR   |
| 2.8.1           | Activity Measures Reporting                 |
| 2.8.2           | PEOPLE                                      |
| 2.8.3           | Illicit Discharge Trend Analysis            |
| 2.8.4           | Industrial / IDDE Compliance Actions Portal |
| 2.8.5           | Post-Construction Inspection Portal         |
| 2.8.6           | Six-Level Program Assessment Methodology    |
| 2.8.7           | Cooperative Annual Report                   |



| PAR                         |   |          |   |   |                |
|-----------------------------|---|----------|---|---|----------------|
| Activity Measures Reporting |   |          |   |   |                |
| SWQMP ID                    | Activity Required   | Schedule | Frequency or Measure of Success   | Result  | Propose Change |
| 2.8.1                       | As described in the specific activity listings, the permittee shall compile information necessary to provide in an annual compliance report. The metrics defined by "Measure of Success" shall be reported and kept for program assessment purposes. The permittee shall track the appropriate metrics through existing databases/spreadsheets to support staff assignments and budget development. | Annually | Permittee shall develop and retain annual reports for three years beyond permit term. | Annual report submitted and posted on website | No             |

### Progress Summary Narrative

MSD compiles the information necessary to provide in annual compliance reports. Metrics defined by the Frequency or Measures of Success per the permit are reported in the fact sheets (see table above) in this section (2.1-2.8) and kept for program assessment purposes. MSD utilizes other metrics tracked through existing databases/spreadsheets to support staff assignments and budget development. Previous MS4 annual reports are available on MSD's stormwater website at [www.msdstormwaterquality.org](http://www.msdstormwaterquality.org).

As applicable, some data, including raw and analyzed monitoring data, is provided electronically or made available through web applications and not submitted in hard-copy format (see Chapter 5 Monitoring). In addition, MSD maintains large datasets for GIS and programmatic data in LOJIC and Hansen databases, respectively. MSD's MS4 annual compliance reports will be retained in electronic form for at least three years beyond the permit term.

### Tracking and Assessment

Tracking for the various metrics is performed by the various MSD departments, utilizing a variety of databases and tools. MS4 Program staff compiles data for inclusion in annual reports.

| Relative | Program Assessment Levels                  |
|----------|--|
| Y        | <b>Level 1: Activity Measures</b>          |
| Y        | <b>Level 2: Raise Awareness</b>            |
| N        | <b>Level 3: Changes in Behavior</b>        |
| N        | <b>Level 4: Reduce Pollutant Loading</b>   |
| N        | <b>Level 5: Improve Stormwater Quality</b> |
| N        | <b>Level 6: Receiving Waters</b>           |



| PAR      |  |                                 |  |                                       |                |
|----------|--|---------------------------------|--|---------------------------------------|----------------|
| PEOPLE   |  |                                 |  |                                       |                |
| SWQMP ID | Activity Required  | Schedule                        | Frequency or Measure of Success  | Result                                | Propose Change |
| 2.8.2    | The permittee shall develop and implement an activity tracking procedure to support consistent coordination and integrated reporting in a way that enables the variety of MSD staff to report their individual activities, target audiences, and related metric. | End of PY 2. Summarize Annually | Permittee shall, by the end of PY two (2), summarize tracking procedures and results and include with annual | MS4-Calendar tracking system in place | No             |

### Progress Summary Narrative

This activity supports gathering pertinent data from a wide variety of staff and MSD business units involved in the stormwater public education and outreach activities. Targeted public education and outreach events and activities have been identified for MSD to disseminate stormwater messages. In addition, MSD receives requests to for tours or event attendance from the public. As requests are made for MSD support at events and tours, individual activities and staffing are assessed to determine whether staffing of the event is feasible. More information on public education and outreach activities can be found in Section 2.1 PEOPLE of this report.

In August 2014, MSD created an MS4-Calendar resource in their email/scheduling system, Microsoft Outlook. The resource can be copied on scheduled events and viewed as a calendar to easily locate outreach events and other trainings or meetings for compliance tracking. This system allows MSD staff from multiple departments to easily copy the shared calendar and send a follow-up response to the event to track materials and attendees.

During PY 5, MSD further improved the MS4 calendar to track activities, including access for staff to document and track events.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| N        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PAR                              |   |          |   |        |                |
|----------------------------------|---|----------|---|--------|----------------|
| Illicit Discharge Trend Analysis |   |          |   |        |                |
| SWQMP ID                         | Activity Required   | Schedule | Frequency or Measure of Success   | Result | Propose Change |
| 2.8.3                            | The permittee shall perform a trend analysis of illicit discharge investigations and enforcement actions over the term of the permit. | PY 5     | Permittee shall provide, during PY Five (5) a report of trends and potential implications of IDDE investigations. | TBD    | No             |

### Progress Summary Narrative

MSD has conducted two thermal imagery flyovers during the PY 3 and PY 5 (Activity 2.2.4 Dry Weather Screening). Followed by digital imagery analysis to identify thermal anomalies, the data provides locations for targeted field investigations. Results of the two illicit discharge screenings, investigations and enforcement activities have been compared below.

### Trend Assessment

Infrared thermal imagery methods allow MSD to identify and quantify the following types of possible illicit discharges: leaking sewage collection lines, non-stormwater discharges from outfalls and pipes, illegal connections to storm drainage ditches and systems, septic tank or degraded sanitary sewer discharges, non-stormwater industrial discharges, groundwater to surface water discharges, and force main exfiltration. Low findings for confirmed illicit discharges are attributed to MSD's robust reporting program and employee training practices over the last 20 years.

| FINDINGS              | Total Digitally Detected Anomalies | IDDE (confirmed) | Ground-water | Shallow Ponds | Permitted | Notice of Violation | Referrals (Board of Health, Water Company) |
|-----------------------|------------------------------------|------------------|--------------|---------------|-----------|---------------------|--|
| <b>2013 Anomalies</b> | 142                                | 2                | 26           | 18            | 33        | ***                 | 4  |
| <b>2015 Anomalies</b> | 225                                | 0                | 46           | 16            | 9         | ***                 | 1  |

Referrals to KDOW are provided in Activity 2.3.1 Industrial IDDE Program Enforcement and requests from KDOW are provided in Activities 2.2.12 KDOW Support and 2.3.11 KDOW Support.

MSD recognizes the efficiencies in digital detection as an alternative to dry weather screening. During the next permit cycle, MSD has requested to reduce the number of inspections per permit cycle to once per every 5 years.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PAR   |   |             |  |  |                |
|---|---|-------------|--|--|----------------|
| Industrial / IDDE Compliance Actions Portal |   |             |  |  |                |
| SWQMP ID                                    | Activity Required   | Schedule    | Frequency or Measure of Success  | Result   | Propose Change |
| 2.8.4                                       | The permittee shall develop strategies and establish a schedule to initiate a Compliance Actions Web Portal supplementing existing databases for functionality for internal use to expedite follow-up inspections of HRIFs. | End of PY 3 | Permittee shall, by the end of PY three (3), report progress summarized in annual compliance demonstration report. | Plan developed for Hansen improvements and implementation schedule defined | No             |

### Progress Summary Narrative

During the current reporting period, MSD reviewed current data collection processes and developed a plan to improve the current industrial facility inspections tracking system. Currently, MSD uses the Threat Matrix spreadsheet in conjunction with Hansen to collect and maintain data (see Activity 2.3.1 Industrial IDDE Program Enforcement).

In 2013, MSD designed a customized table in its Hansen Asset Data Management system to host the data contained in the spreadsheet version of the Threat Matrix, which assesses facility risk into low, moderate and high risk categories. Hansen does not currently include a mechanism to score facilities based on inspection results. Therefore, Industrial Waste Department (IWD) staff has been entering inspection information into both Hansen and the spreadsheet version of the Threat Matrix.

In 2014, MSD developed an Industrial Inspection Compliance Actions Portal Implementation Plan Memo for Hansen improvements to modify Hansen to include risk assessment and scoring capability.

During PY 5, MSD continued to use HANSEN and document inspections and follow-up inspections for industrial facilities.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PAR                                 |   |             |  |  |                |
|-------------------------------------|---|-------------|--|--|----------------|
| Post-Construction Inspection Portal |   |             |  |  |                |
| SWQMP ID                            | Activity Required   | Schedule    | Frequency or Measure of Success  | Result   | Propose Change |
| 2.8.5                               | Permittee shall develop strategies and establish a schedule to initiate a Compliance Actions Web Portal for internal use to expedite follow-up inspections of private post-construction BMPs. | End of PY 3 | Permittee, shall, by the end of PY three (3), report progress summarized in annual compliance demonstration report | Plan developed for Hansen improvements and implementation schedule defined | No             |

### Progress Summary Narrative

MSD currently tracks post-construction (green infrastructure) sites and inspections in Hansen. In 2013, MSD updated its Hansen Asset Data Management system to track long-term inspections for green infrastructure projects. This process begins at the plan review stage where a green infrastructure application is added for sites with proposed green infrastructure practices. After the project is reviewed and constructed, a green infrastructure license is issued in Hansen to track the long-term operation of the project, triggering annual self-inspection documentation from the property owner and follow-up inspections by MSD every five years. Letters requesting self-inspection reports from property owners and notifying them of MSD inspections are currently sent manually and entered into Hansen. For MSD inspections resulting in enforcement, the MSD Finance Department is notified to remove the property owner's stormwater credit or bill the partner for a prorated amount to the construction stipend provided. For more information on green infrastructure inspections, see Activity 2.5.2 Implement Legal Prohibition/Control Authority.

MSD plans to continue to update Hansen to include automated features and design a mobile user interface for data collection during inspections. Hansen will continue be used to track green infrastructure inspections and enforcement.

In 2014, MSD developed a Post-Construction Inspection Compliance Actions Portal Implementation Plan Memo for Hansen improvements to modify Hansen to automate processes.

During PY 4, MSD developed a green tracking protocol (see Activity 2.5.5).

During PY 5, MSD continues to implement and refine the green tracking protocol.

### Tracking and Assessment

Not applicable.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |

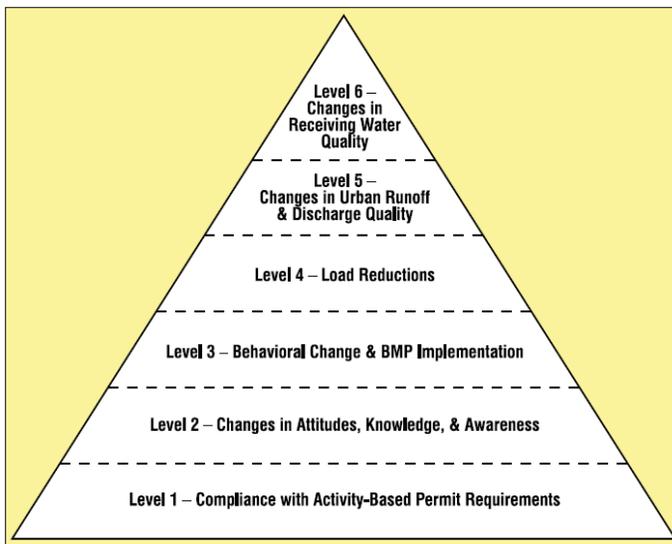
| PAR                                      |   |  |   |                                  |                |
|--|---|--|---|----------------------------------|----------------|
| Six-Level Program Assessment Methodology |   |  |   |                                  |                |
| SWQMP ID                                 | Activity Required   | Schedule   | Frequency or Measure of Success   | Result                           | Propose Change |
| 2.8.6                                    | The permittee shall develop an approach to implement [applicable] portions of the six-level program EPA began advocating in 2008 to assist MS4 programs in identifying success and future areas of focus. | Enumerated by end of PY 2 and implemented by end of PY 4 | Permittee shall develop approaches enumerated by the end of PY two (2) and implemented by the end of PY four (4). | In place on activity fact sheets | No             |

## Progress Summary Narrative

As a part of the activity reporting fact sheets in the annual report, MSD has provided a quick view of the applicable program assessment levels identified by the EPA in 2008 (EPA 833-F-07-010 and EPA-833-R-07-003). MSD's assessment of each activity is illustrated in the lower right hand corner of activity fact sheets.

## Trends and Assessment

Activity assessment identified.



Levels of MS4 Program Effectiveness

### Evaluating the Effectiveness of Municipal Stormwater Programs

January 2008

**Introduction**

**NPDES Stormwater Management Programs**

EPA stormwater regulations require National Pollutant Discharge Elimination Program (NPDES) permits for stormwater discharges from many municipal separate storm sewer systems (MS4s). Phase II of the stormwater permit program generally addresses municipalities with greater than 100,000 in population, while Phase II addresses smaller jurisdictions within urban areas. Additional information on EPA's stormwater program is available at [www.epa.gov/npdes/stormwater](http://www.epa.gov/npdes/stormwater).

Stormwater Phase II programs address the following program components:

- Public education and outreach
- Public involvement
- Illicit discharge detection and elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping for Municipal Operations

In addition to the programs above, Stormwater Phase I programs also must address stormwater runoff from industrial facilities.

Operators of regulated MS4s are required to develop a stormwater management plan (SWMP) that includes measurable goals and to implement needed stormwater management controls (BMPs). The process of developing a plan, implementing the plan, and evaluating the plan is a dynamic, iterative process that helps move communities toward achievement of their goals (Figure 1).

**Purposes of Program Evaluation**

- Assessing program operations.
- Evaluating social indicators; and
- Monitoring water quality.

Other guidance is available to assist managers in evaluating overall implementation of the SWMP to the maximum extent practicable, e.g., EPA's MS4 Program Evaluation Guidance ([www.epa.gov/npdes/pubs/ms4guide\\_wthappendix.pdf](http://www.epa.gov/npdes/pubs/ms4guide_wthappendix.pdf)).

- Meet regulatory requirements.** EPA stormwater regulations require that the effectiveness of the SWMP be evaluated, including assessment of SWMP implementation, evaluation of BMP effectiveness, and the extent to which improvements in stormwater outfall discharge quality have occurred.
- Document progress toward water quality goals.** Evaluation of SWMP effectiveness is essential to measure progress toward meeting benchmark conditions, complying with water quality standards, or restoring beneficial uses.
- Justify commitment of resources.** Knowledge of program effectiveness can help justify SWMP expenditures to decision-makers and to the public, and help improve cost-effective implementation and management of the SWMP.
- Provide feedback to the management program.** Stormwater management is an iterative process and knowledge of program effectiveness is essential for the permit renewal process and for mid-course corrections to improve the program.
- Assess reductions in pollutants of concern.** If a waterbody is impaired, it may be helpful to assess the effectiveness of the SWMP in reducing the pollutants of concern.

Figure 1. The iterative process of stormwater management (Develop, implement, evaluate, repeat).

### EPA Guidance on MS4 Program Effectiveness Evaluation

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
| N        | Level 5: Improve Stormwater Quality |
| N        | Level 6: Receiving Waters           |



| PAR                       |  |          |  |                               |                |
|---------------------------|--|----------|--|-------------------------------|----------------|
| Cooperative Annual Report |  |          |  |                               |                |
| SWQMP ID                  | Activity Required  | Schedule | Frequency or Measure of Success                                      | Result                        | Propose Change |
| 2.8.7                     | The permittee shall coordinate and cooperate with co-permittees in compilation of the annual compliance demonstration reports. | Annually | Permittee shall prepare and submit annual report in a timely manner. | First annual report completed | No             |

### Progress Summary Narrative

MSD coordinates and cooperates with co-permittees to compile annual compliance reports. Ultimately, the co-permittees are responsible for their own annual reports, just as they are for their portions of the SWQMP. MSD continues to provide leadership and assistance to the co-permittees as they compile the reports and utilize MS4 program partner opportunities.

During PY 5, MSD requested co-permittees to sign certification statements for reporting consistency (see Chapter 3 for co-permittee certification statements and annual reports. Electronic versions of the certification statements were provided to the co-permittees after the meeting for inclusion in the annual report. The certification statements were signed and submitted by the co-permittees with their annual reports.

### Tracking and Assessment

Not applicable; co-permittee sections are submitted with annual report.

| Relative | Program Assessment Levels           |
|----------|-------------------------------------|
| Y        | Level 1: Activity Measures          |
| Y        | Level 2: Raise Awareness            |
| N        | Level 3: Changes in Behavior        |
| N        | Level 4: Reduce Pollutant Loading   |
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## **CHAPTER 3 CO-PERMITTEE CYCLE PROGRAMS**

### **TABLE OF CONTENTS**

- 3.1 Louisville Metro Government**
- 3.2 City of Anchorage**
- 3.3 City of Jeffersontown**
- 3.4 City of St. Matthews**
- 3.5 City of Shively**

### **INTRODUCTION**

In accordance with the Stormwater Quality Management Plan (SWQMP), the MS4 Co-permittees comprised of the Cities of Anchorage, Jeffersontown, St. Matthews, and Shively, as well as Louisville Metro Government are required to submit an annual report to Louisville MSD to be included in the MS4 Annual Report. These co-permittee annual reports contain narrative on activities performed during the permit year, plans for future activities, and general documentation on SWQMP compliance. Each co-permittee report includes a signed certification statement for their submittal.

**CO-PERMITTEE CERTIFICATION  
2014 MS4 STORMWATER ANNUAL REPORT  
KPDES PERMIT NUMBER KYS000001**

LOUISVILLE METRO is designated as a co-permittee covered by the Municipal Separate Storm Sewer System (MS4) permit that has been issued by the Kentucky Division of Water under the Kentucky Pollutant Discharge Elimination System (KPDES) program. LOUISVILLE METRO has prepared the attached annual compliance report for the reporting period of **July 1, 2015 to June 30, 2016**

Under the terms of KPDES Permit No. KYS000001 [Part I.A.2], and implemented through a Memorandum of Understanding with Louisville and Jefferson County Metropolitan Sewer District, LOUISVILLE METRO certifies that it has responsibility for the following:

- Construction oversight and permitting in addition to that provided through Louisville MSD by the Erosion Prevention and Sediment Control Ordinance, Chapter 159;
- Implement education and outreach at the applicable levels of neighborhood and local community that compliment the education and outreach provided by MSD tailored to local waterbodies pollutants of concern;
- Inspection, operation, maintenance and/or applicable certification that permanent (also known as post-construction) water quality devices, controls, and management practices are operating effectively;
- Road maintenance including snow and ice removal related stormwater management activities;
- Preparation and implementation of fleet and facility stormwater pollution prevention;
- Report and refer potential illicit discharges observations by municipal employees or other reports from residents to MSD for investigation and potential enforcement;
- Preparation and timely submittal of annual compliance demonstration report to MSD according to agreed upon formats and standards; and
- Administration of other codes and ordinances including, but not limited to, solid waste management, animal control and land development

Certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the above statements are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

LOUISVILLE METRO

Name: Mark Zeller

Signature: 

Title: AD - Facilities Mgmt

Date: 9-3-15

**CO-PERMITTEE CERTIFICATION  
MS4 STORMWATER ANNUAL REPORT  
KPDES PERMIT NUMBER KYS000001**

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LOUISVILLE METRO

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



### 3.1 Compliance Activities Report for Louisville Metro Government

Following the merger of the City of Louisville and Jefferson County (Kentucky) in January of 2003, a single Metro Government body was developed and initiated. In January 2007, Louisville Metro Government (LMG) then proceeded to consolidate its agencies into twelve (12) primary departments, all of which report to the Office of the Mayor. These departments, each with separate specialized operations, resources, facilities, and command-control, are specifically organized by function. Ultimately, the overall missions of the departments are to efficiently provide services to citizens in the Metro Area, support departments providing those services, and maintain all operations of the LMG. The Louisville Metro Government Organizational Chart can be found at the following link: <http://www.louisvilleky.gov/YourGovernment/> "See Organization Chart".

#### **KPDES Large MS4 Permit**

As one of the Co-Permittees with MSD on the Kentucky Pollutant Discharge Elimination System (KPDES) Large Municipal Separate Storm Sewer System (MS4) stormwater discharge permit, it is necessary for LMG to fulfill applicable permit requirements. These requirements are contained within seven (7) MS4 program elements: Illicit Discharge Detection and Elimination (IDDE), Construction Site Runoff Controls (CS), Post-Construction Controls (PC), Good Housekeeping/Pollution Prevention (GH), Public Education/Outreach (PE), Monitoring (M), and Reporting (R).

Through an interlocal agreement with MSD, the primary co-permittee on the KPDES MS4 permit, LMG is not responsible for performing certain tasks. Those tasks are overseen and implemented by MSD. With that being said, the compliance activities included in the permit for which LMG are responsible are documented in this section under applicable program elements. The 2016 MS4 Annual Report is defined by the time period of July 1, 2015 - June 30, 2016.

#### **3.1.1 Illicit Discharge Detection and Elimination (IDDE)**

Through the previously mentioned interlocal agreement, MSD performed the following IDDE program tasks on behalf of LMG:

- Implement an Aggressive Follow-up Program (IDDE-1)
- Stormwater Outfall Location, Structure Inventory and Screening Program (IDDE-2)
- Database/Case Tracking System (IDDE-3)
- Illicit Discharge/Illegal Dumping Ordinance (IDDE-4)
- Education (IDDE-5)

The following IDDE tasks were performed and completed by LMG:



3.1.1.1 IDDE-1: Implement an Aggressive Follow-up Program

When applicable, LMG aggressively initiates follow-up in regards to illicit discharges for the facilities that it governs in correspondence with MSD. Reports are maintained in a HANSEN database regarding hazmat incident response activities performed by LMG.

3.1.1.2 IDDE-2: Stormwater Outfall Location, Structure Inventory and Screening Program

Stormwater asset inventory data is continually supplied to the Louisville-Jefferson County Information Consortium (LOJIC) GIS system through LMG Public Works & Assets GIS team.

3.1.1.3 IDDE-3: Database/Case Tracking System

MSD is primarily responsible for database management. The MetroCall system that uses MIDAS (a common HANSEN software database) records and tracks municipal assets and citizen service requests.

3.1.1.4 IDDE-4: Illegal Dumping Ordinance

In an effort to enforce and prevent illegal dumping in the city, LMG adheres to the illegal dumping ordinance. Signs are posted which prohibit dumping at locations that are considered problematic. Related LMG employees are responsible for investigating problem dumping areas on a regular basis, and responding to resident complaints. The Illegal Dumping Ordinance also requires that all drainage from waste storage areas be discharges to a municipal sewer or on-site wastewater treatment system or collection system.

3.1.1.5 IDDE-5: Education

Education is required on revised Wastewater Discharge Regulations (WDRs). MSD distributes informational pamphlets to the public in reference to proper disposal of wastes. These pamphlets are provided to co-permittees as requested for distribution at their educational events. In addition, LMG maintains Codes and Ordinances, in addition to informational pages on requirements for proper disposal of waste, on the LMG website: [www.louisvilleky.gov](http://www.louisvilleky.gov).

3.1.2 Construction Site Runoff Controls (CS)

Through the previously mentioned interlocal agreement, MSD performed the following CS program tasks on behalf of LMG:

Erosion Prevention and Sedimentation Control (EPSC) Plan (CS-1)



Training for Designers/Planners/Developers (CS-2)  
Training for Operators (CS-3)  
Guidance Materials (CS-4)  
Scheduled Inspections of BMPs (CS-5)  
BMP Maintenance Schedule (CS-6)

The following CS tasks were performed and completed by LMG:

3.1.2.1 CS-1: Erosion Prevention and Sedimentation Control (EPSC) Plan

LMG re-adopted the EPSC Ordinance as promulgated by MSD after city-county merger in 2003. The ordinance still remains effective and continues to be overseen by MSD to date.

3.1.2.2 CS-2: Training for Designers/Planners/Developers

LMG ensures that appropriate employees attend the EPSC Methods for designers and planners. Topics covered include pre-construction planning (basic development practices), design procedures for structural and non-structural BMPs, pollutant removal (maintenance of the BMPs), and inspections.

3.1.2.3 CS-3: Training for Operators

Numerous LMG employees have participated in and attended the EPSC Training class. All building permits are issued through LMG. The plans must receive approval through MSD and the Health Department before a permit can be issued.

3.1.2.4 CS-4: Guidance Materials

Guidance materials for EPSC plans and inspections are utilized by LMG employees.

3.1.2.5 CS-5: Scheduled Inspections of BMPs

Scheduled inspections of construction sites operated by LMG are conducted specifically by LMG Inspectors. A checklist developed by MSD is completed to assist the inspectors and developers on proper procedures and requirements. In addition, LMG also completes building inspections on an as-needed basis. Bonds are required as part of drainage and construction projects. LMG notifies MSD if an EPSC violation is discovered at a construction site to follow-up and ensure compliance with the program.

3.1.2.6 CS-6: BMP Maintenance Schedule



A maintenance schedule is required for every structural BMP at every construction site. LMG Inspectors are required to visit respective sites on scheduled occasions, as well as random, non-scheduled site visits. This is done to ensure that the required maintenance schedule is being followed and properly completed.

### **3.1.3 Post-Construction Controls (PC)**

Through the previously mentioned interlocal agreement, MSD performed the following PC program tasks on behalf of LMG:

Watershed Planning (PC-1)  
Source Controls (PC-4)

LMG began or continued to perform the following PC Controls tasks and Watershed related programs:

#### **3.1.3.2 PC-2: Pilot BMP Projects**

Over the permit term, LMG was required to complete a minimum of three (3) BMP Pilot Projects. The following stormwater BMPs have been implemented by LMG for its operated jurisdiction during the five-year MS4 Permit period:

- LMG increased green space on West Main Street and at Park Duvalle. Phase 1 and Phase 2 of the Park Duvalle redevelopment were completed.
- The 9<sup>th</sup> Street extension project incorporated vegetated islands and roadside easements into the design.
- Parking lot runoff at four (4) LMG fire stations was redirected to one outfall for treatment. The runoff is filtered at the end of the pipe in order to minimize the amount of petroleum entering the stream.

In conjunction with MSD, LMG required the following BMPs on private development projects:

- Riverport Area - A portion of the Mill Creek drainage channel was dammed to provide water for a wetlands restoration area.
- St. Anthony's Landing - A riparian buffer adjacent to the creek was required to contain wetland vegetation.
- Fern Creek Christian Church - a "Stormceptor" parking lot runoff treatment unit was required to be installed.
- Krogers on Bardstown Road - a "Stormceptor" was to be installed.



- The Big Rock parking lot project in Cherokee Park on Beargrass Creek – pervious pavers were used in the new parking area. The parking area drains into a water quality basin before discharging to Beargrass Creek.
- Norton Commons – several BMPs were required of the developer to protect the water quality of streams, springs and seeps as well as aquatic and terrestrial habitat.
- Woods of Beckley Station – Three retention basins were installed to control runoff volume.
- Little Spring Farm – numerous water quality basins were specified to capture the first one-half inch of runoff. The basins were planted with wetland vegetation. Open space was also been incorporated into the design.
- Glenmary Village – a water quality basin with a sand filter was installed.
- Southern Farms – the approved plan included wetlands enhancement as well as development of a stream buffer.
- A “Green Roof” was officially installed on the Metro Development Center, 444 S. Fifth Street, in 2007-2008. It has an irrigation system and approximately 10,000 square feet of square feet of native plants.
- LMG also has vegetated green roofs at 444 S 5<sup>th</sup> Street, 635 Industry Road, 769 Barret Avenue, and on the Herp Aquarium at the Louisville Zoo.

#### 3.1.3.4 PC-4: Source Controls

Pollutants in runoff are controlled by LMG after the termination of construction activities to the maximum extent practicable by requiring developers to comply with a "Post-Construction" checklist. For its own facilities, LMG maintains approved Hazardous Material Spill Prevention and Control (HMPC) Plans. Oils and associated fluids from LMG fleet vehicles are collected and properly recycled or recovered. Salt storage is maintained by LMG in covered buildings, on impermeable surfaces, and away from storm drains. LMG presents a diked area for refueling fleet vehicles so that spills are controlled and maintained. Secondary containment is present, where necessary, for associated storage of materials at LMG facilities. At industrial facilities maintained by LMG, best management practices are followed for stormwater management.

LMG initiated a recycling program for condominiums and maintained existing recycling services. Dumpsters and trashcans located within the Urban Service Area of LMG must be covered in order to minimize litter and leakage. Wheeled trash containers with lids are provided by LMG to 80,000 households in the Urban Service Area. No plastic garbage-filled bags are allowed at trash pick-up sites.



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### 3.1.4 Good Housekeeping/Pollution Prevention (GH)

Through the previously mentioned interlocal agreement, MSD performed the following GH program tasks on behalf of LMG:

Catch Basin Cleaning (GH-3)  
Storm Sewer Cleaning (GH-4)  
Channel Maintenance Tasks (GH-5)

The following GH tasks were performed and completed by LMG:

#### 3.1.4.1 GH-1: Street Maintenance

During street maintenance projects involving construction activities, BMPs suitable for use will be utilized to protect storm sewers, ditches, and streams. Examples of these types of BMPs include: inlet and outfall protection, silt fences to keep sediment from entering streams, employee awareness, and etc. Adjacent catch basins will be fitted with temporary sediment traps to provide protection.

LMG adheres to the EPSC General Permit requirements. LMG continued housekeeping and stormwater pollution prevention tasks:

- Use of gravel bags around street maintenance project areas to minimize debris and soil getting into a stream.
- Street maintenance performed as needed; debris is removed by hand and taken to a landfill.
- Plans suitable for use in construction projects, such as inlet and outfall protection and anti-erosion sediment/silt fences are used to protect storm sewers, ditches, and streams during street maintenance projects involving construction activities.
- Adjacent catch basins are fitted with temporary sediment traps to provide protection.

#### 3.1.4.2 GH-2: Street Sweeping

All curbed and uncurbed streets located within the Urban Services District are subject for sweeping and flushing litter, debris, and leaves on a regular cleaning schedule by LMG. Street sweeping is scheduled from March through November. Street cleaning is determined by temperature/weather conditions from December to February.

The Metro Central Business District is defined as the area bound by Hancock on the east, Fifteenth Street (15<sup>th</sup>) on the west, Broadway on the south, and the Ohio River on the north. A vacuum truck and street sweepers clear debris from sidewalks and curbs in this area. This area is typically swept daily. Exceptions to this schedule are made for various neighborhood festivals and/or special events. Street sweeping for special and



major events include: Blitz-cleanups, Derby Festival events (Mini Marathon, Thunder Over Louisville, Pegasus Parade route and float staging area, Kentucky Oaks, and the Kentucky Derby, as well as sweeping of the parking lots at the University of Louisville, Light Up Louisville, Mayor's Hike and Bike Sweep, Portland Festival, Cherokee Art Festival, Light Up Louisville, and St. James Art Festival and many other community events.

In the Urban Service District (formerly the City of Louisville), which spans an area covering twelve (12) neighborhood divisions, streets are swept an average of two times a year.

#### 3.1.4.3 GH-6: Pollution Prevention (De-Icing Operations)

In a continual effort to keep citizens safe on Louisville roads, and to keep the city moving during the winter months, a Metro Snow Fleet is utilized. The Metro Snow Fleet is comprised of two Public Works & Assets divisions (Operations and Maintenance, Solid Waste Management), Metro Parks department, and auxiliary support from Vacant Lots.

An annual meeting is conducted for these agencies in which snow removal and de-icing operations are thoroughly discussed, and the most efficient techniques are evaluated. LMG actively searches new application techniques, practices, and technologies to ultimately reduce potential detrimental environmental impacts.

LMG has four (4) salt storage domes, located throughout the Louisville metro-area. Approximately 14,000 tons of salt were stored within these salt storage facilities in the reporting year. An additional 20,000 tons of salt were stored underground for emergency reserve. Before application, salt may be pre-wetted with liquid calcium chloride, which is based on the temperature at the time of application. Calcium chloride allows the salt to melt ice at colder temperatures. Light-utility or medium/heavy dump trucks conduct salt spreading. As part of the agency pre-season snow fleet preparation, the associated salt spreaders are checked and reset or recalibrated as needed. Based on the speed of the truck, salt spreaders are set for predetermined rates of application.

Brine solution was incorporated into LMG pre-event wetting in 2004, and currently continues to expand its use to the greatest extent possible. Salt spreading pretreatment was replaced by the use of the newly introduced brine solution. The solution adheres to pavement, which leads to melting and direct sublimation at lower temperatures. It also prevents snow from sticking to pavement, making it easier to remove with snow plows during heavy snowfall events.

Magic -0°, an anti-icing additive, is used as an additional component added to the brine mixture during winter months de-icing operations. This additive allows LMG to apply brine at a much lower temperature (below 30 degrees). LMG stores approximately



10,000 gallons of pure Magic -0° solution, which is considered to be biodegradable. The solution is typically mixed at 10% with brine. The remaining amount after completing treatment is stored in separate 5,000 gallon containers at LMG Operations and Maintenance Districts. Not only is this technique more effective in keeping thoroughfares safe and clear, but it is also considered more efficient by reducing the amount of road salt/calcium chloride needed to accomplish the task.

In conjunction with the Louisville Jefferson County Information Consortium (LOJIC), the LMG Public Works & Assets department operates a “Snow Removal Center” accessible online. An interactive snow routes map is available on the site. The interactive map allows the public easy access to the real-time status of snow removal on routes by simply entering an address. Designated snow routes accessible during storm events can be located through the “Snow Removal Center.” The mapping feature and additional information regarding de-icing operations is available to the public online at:

[www.louisvilleky.gov/PublicWorks/snowremovalcenter.htm](http://www.louisvilleky.gov/PublicWorks/snowremovalcenter.htm).

#### 3.1.4.4 GH-7: BMP Inspections

LMG has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain GH program tasks. MSD performed the GH-7 BMP Inspections on behalf of LMG.

#### 3.1.4.5 GH-8: BMP Maintenance

LMG has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain GH program tasks. MSD performed the GH-8 BMP Maintenance on behalf of LMG.

#### 3.1.4.6 GH-9: SWPPP

LMG maintains SWPPP plans at all applicable locations. The plans are revised as necessary and training on the plans is provided to necessary personnel.

#### 3.1.4.7 GH-10: Pollution Prevention (Herbicides and Pesticides)

LMG Public Works & Assets department uses herbicides and pesticides to control weeds and vectors in vacant lots that are owned by Metro. The Metro Parks department uses herbicides on golf courses and at some parks while the LMG Public Health and Wellness department uses fogs, pellets and briquettes for mosquito control. Employees who apply pesticides are trained and certified as Pest Control Applicators.

#### 3.1.4.8 GH-11: Continuation of Existing Programs



In general, all applicable LMG facilities have approved and implemented HMPC plans. Oils and associated fluids from LMG fleet vehicles are properly collected, recovered and recycled. Secondary containment is provided, where necessary, for associated materials. LMG salt storage continues to remain under covered buildings, on impermeable surfaces, and away from storm drains. A recycling program for condominiums has been initiated and existing recycling services maintained. Dumpsters and trashcans are required to be covered in order to minimize litter and leakage within the Urban Service Area of LMG.

A variety of key solid waste management programs, including once-a-week garbage, yard waste, and recycling collections for Urban Service Area residents (single family to eight-family dwellings) have continued to play a vital role in reducing stormwater pollution:

#### **Sustainability Plan**

In January, 2013, the Office of Sustainability released its first sustainability plan. Among many initiatives announced in the plan were two items intended to address waterway quality.

1. Launch a program to decrease the amount of impervious surfaces that impact watershed systems.
2. Develop a pilot project to restore ten miles of riparian vegetation.

Both of these initiatives have a planned implementation date of 2018.

#### **Adopt-A-Mile**

Adopt-A-Mile (formerly Green Mile) anti-litter campaign operated by Brightside is similar to the Adopt-a-Highway on state-maintained roads. Adopt-A-Mile allows groups or businesses to keep stretches of Metro roads clean and litter-free. Groups that sign up receive recognition on special signage at the site. More than thirty different organizations, some with multiple locations, maintain these “green” miles. Dozens of cleanups were sponsored during the reporting year, recruiting nearly more than 100 volunteers. Keeping Metro area roads clean and litter-free prevents stormwater pollution.

#### **Energy Star**

Louisville continues to participate in the EPA Energy Star program. A team of city representatives continues to work closely with the federal EPA program to measure energy use in city-owned buildings

#### **Single-Stream Recycling**

The Louisville Metro Office of Sustainability, in collaboration with Public Works and Assets, has continued the Louisville Metro Single-Stream Recycling Initiative. This initiative serves to further Mayor Fisher’s goals of making city government more environmentally friendly while reducing waste material disposal costs.



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3.1.4.9 GH-12: New Programs

**Tree Canopy**

LMG completed a comprehensive tree canopy analysis in FY 2015, which established that 37% of Louisville's land is covered by trees. That is slightly lower than American Forests recommendation of 40% overall tree canopy cover. The study estimates that Louisville trees provide approximately \$330 million in benefits annually to the local community. The results of the study are being examined to develop a plan to meet the ultimate goal of a 45% tree canopy cover.

**Green Infrastructure Incentives**

The Office of Sustainability offers an incentive program for green infrastructure projects. The incentive funds are used as matching money for MSD's green infrastructure stipend program such that any project that is approved by MSD is automatically qualified. MSD's incentive program pays stipends for private sector projects (non-residential) that keep stormwater out of the combined sewer system including rain gardens, pervious pavement, vegetative roofs, infiltration drains and water harvesting systems.

**3.1.5 Public Education/Outreach Programs (PE)**

Public education and outreach programs in Louisville focused on citizen involvement have been very successful, and continue to be a vital component in keeping Louisville clean and green. LMG began or continued to perform the following numerous PE tasks and programs:

3.1.5.1 PE-1: Environmental Education

**"Litter-Free Louisville" Initiatives**

Environmental education and volunteerism have strong traditions in the Metro community. Operations Brightside organizes and supports community cleanups, beautification areas, and the local Adopt-A-Mile program. Brightside oversees more than 75 Bright-Sites throughout the Metro area, and involves the community in special projects and programs such as the Fred Wiche Award and environmental education programs.

**Operation Brightside**

Operation Brightside continued to implement Metro environmental education and action strategies, reinforcing LMG's commitment to preserve and enhance the community's environment.

Operation Brightside is a LMG public-private collaboration that promotes civic pride by partnering with citizens to keep our community clean, green and environmentally aware. Brightside organizes community-wide and neighborhood cleanups and involves



the community in special projects and programs such as Adopt-A-Mile, the Fred Wiche Award and various environmental education programs. Brightside continued to provide public-private collaboration for environmental improvements and educational programs during the report year. Brightside's Fred Wiche Award honors individuals, groups, and schools for environmental stewardship. Its environmental education collaborations reach into public and private elementary schools throughout LMG, instilling environmental protection values into the next generation.

### **Community-Wide Planting Day**

In 2014, Brightside launched the "One Bright City" initiative to assist Louisville's community in becoming better environmental stewards. Trees are an integral part of this initiative because of the environmental, economic, and social benefits they assist with. Louisville has been experiencing poor air quality, areas of high heat concentrations, and polluted water; especially in areas where there is a lack of tree canopy. In an effort to bring awareness in assisting our local ecosystem and the continual support of biodiversity, Brightside challenges and invites residents of Louisville to get out on Saturday, November 7th and plant trees, flowers, and plants within the community.

#### **3.1.5.2 PE-2: LMG Services Information**

##### **Online Resources**

LMG's website, [www.louisvilleky.gov](http://www.louisvilleky.gov), addresses littering, water quality, snow removal, recycling issues, pollution prevention and air quality. Mass mailings are sent to residents once a year detailing the entire recycling program. Solid Waste Management Division of LMG Public Works & Assets department provides presentations and publications to encourage establishment of residential compost piles for yard waste, and annually publishes reminders to resident to keep leaves out of street gutters. In addition, new residents receive this information when they move into the Metro area.

##### **Media Resources**

LMG uses all means and media available to inform the public, and encourage citizen and community involvement, on a wide range of environmental protection programs and activities, including littering, recycling, pollution prevention, snow removal, air quality, and water protection. LMG includes related information on its website at [www.louisvilleky.gov](http://www.louisvilleky.gov), and features informational messages on the Metro TV channel. LMG distributes pamphlets regarding proper disposal of waste to the general public, and to MSD and to co-permittees for distribution at their educational events. Established Codes and Ordinances to describe and enforce provisions for this and other environmental protection programs are implemented within LMG.

#### **3.1.6 Monitoring (M)**



LMG has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform the Monitoring program requirements.

### 3.1.7 Reporting (R)

LMG has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform the Annual Reporting requirements. LMG provides information on implementation of the MS4 permit requirements to MSD.

#### Financial Information

| LMG Public Works & Assets: FY 2014-2015 |              |
|---|--------------|
| Total Operating Budget                  | \$55,442,700 |
| Estimated Stormwater Operating Budget*  | \$67,300     |

\*\* Includes staff from various departments. Staff with a portion of their time related to stormwater are consolidated.



### **3.2 COMPLIANCE ACTIVITIES REPORT FOR THE CITY OF ANCHORAGE**

The KPDES Large MS4 stormwater discharge permit program requirements are classified into seven Program Elements, each designated with an acronym. The Program Elements include: Illicit Discharge Detection and Elimination (IDDE), Construction Site Runoff Controls (CS), Post-construction Controls (PC) Good Housekeeping/Pollution Prevention (GH), Public Education/Outreach Programs (PE), Monitoring (M) and Reporting (R).

The Co-Permittees individually and collectively continue to perform the required activities specified in KPDES Permit # KYS000001. This subsection will focus on those activities for which the City of Anchorage, Kentucky was responsible during the permit period and will document the compliance tasks performed by City of Anchorage during the period of July 1, 2015 – June 30, 2016.

#### **3.2.1 Illicit Discharge Detection and Elimination (IDDE)**

The City of Anchorage has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain IDDE tasks. Therefore, only those tasks performed by the City of Anchorage are listed in this report. MSD performs illicit discharge investigation and follow up throughout Louisville Metro, including the City of Anchorage. Previously, most of the City of Anchorage did not have sanitary sewers. With the June 2008 completion of the Hazelwood Extension of its sanitary sewer, the City of Anchorage brought 95 properties previously on septic systems onto an MSD-operated sewer system. Of the 783 residences in Anchorage, 395 are now on MSD-operated sewer systems. As a component of MSD's Federal Consent Decree with EPA and KDOW, MSD will begin the installation of a gravity interceptor sewer in the southwest quadrant of Anchorage. The Anchor Estates Pump Station Elimination Project will eliminate three pump stations in Anchorage, add approximately 30 septic-tank properties to new sewer service, and provide future expansion for other areas on the south side of Anchorage. The estimated completion date is October 1, 2016.

##### **3.2.1.1 Illicit Discharge / Illegal Dumping Ordinance IDDE-4**

The City of Anchorage enforces its illegal dumping ordinance and posts signs that prohibit dumping at locations that are problem areas. City of Anchorage staff investigates areas regularly and responds to resident complaints. In the past year, the City has had no occasion to report illicit dumping or discharge to MSD.

##### **3.2.1.2 Provide education on the revised Wastewater Discharge Regulations IDDE-5**

The City of Anchorage provides education on their local ordinance(s) that prohibit illicit connections and illegal dumping. Anchorage has no waste water treatment plants, but does have six (6) pumping stations, three (3) of which will be taken off-line within the next few months with the installation of MSD's Anchor Estates Pump Station Elimination sewer interceptor with a projected completion date of October 1, 2016. The City of Anchorage has marked all Catch Basins throughout the City with markers informing the public that there is no dumping into the basins and that these basins drain to local creeks. All commercial properties and the Anchorage school system have marked all their Catch Basins. The City of Anchorage monthly newsletter periodically contains information on the prohibition of dumping into catch basins and drains, and proper disposal of leaf and grass debris.



### **3.2.2 Construction Site Runoff Controls (CS)**

The City of Anchorage has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain CS program tasks. MSD administers the Erosion and Sediment Control Ordinance. The City of Anchorage requires contractors to show proof of EPSC Certification before they can obtain a Zoning Compliance Certificate. The City's Public Works department checks worksites to insure EPSC measures are in place. The City's Flood Safety Officer reviews residential building plans for any increase in impervious surface that will exceed 20% of the lot size. During this term, the Flood Safety Office reviewed 21 sites for drainage issues or potential problems. Anchorage ordinances require any lot with more that 20% impervious to retain excess runoff on site.

#### **3.2.2.1 Erosion Prevention and Sediment Control Plan (EPSC) CS-1**

An EPSC Plan with provisions for Best Management Practices (BMPs) to keep sediment on-site (silt fences, staked bales, sediment ponds, gravel mats, etc.) and to capture sediment that would enter local or on-site drainage systems is required for any new development within the City of Anchorage. Sixty-five (65) trenching permits were issued by the City Forester in the last year for various projects from new homes to fence and cable wire installations. Any stockpiled soils are required to be contained by silt fencing. Twenty-five (25) Zoning Compliance Certificates were issued for building projects where contractor or sub was required to be EPSC certified.

The City of Anchorage has an approved EPSC General Permit issued by MSD for Public Works activities.

#### **3.2.2.2 Training for Operators CS-3**

The City of Anchorage ensures that appropriate staff members attend training for equipment operators and construction managers that describes the proper installation and maintenance of construction site BMPs. The Director of Anchorage Public Works attended the EPSC training class and became re-certified in November 2014.

#### **3.2.2.3 Scheduled Inspections of BMPs CS-5**

The City of Anchorage city officials check construction sites to ensure that the EPSC Ordinance is being followed. The Public Works Director visits all construction projects to review compliance with permits. The City of Anchorage reviews plans to ensure the proposed work does not increase or inappropriately divert storm water runoff. The City of Anchorage requires a specific drainage retention plan approval when the construction plans call for a 20% or more impervious area.

### **3.2.3 Post Construction Controls (PC)**

The City of Anchorage has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain PC program tasks. MSD performs the PC-1, Watershed Planning, Post Construction tasks on behalf of the City of Anchorage. The City of Anchorage Flood Safety Officer reviews construction plans and meets with contractors and homeowners



where there may be runoff issues. The City's Flood Safety Officer met with 21 property owners this year to review and remedy storm water/drainage/impervious surface issues. Storm water retention is discussed with contractors and homeowners for projects increasing impervious surface in excess of 20% of the lot size. Bio-swale, rain garden, rain barrel, and other information is discussed with and given (when requested) to contractors and homeowners.

### **3.2.3.1 Pilot BMP Project PC-2**

Over the permit term, the City of Anchorage was required to complete a minimum of three BMP Pilot Projects. Anchorage adopted and continues a policy to not install curbs on city streets so that runoff filters through nearby pervious areas. Residents are required to outlet downspouts into yards or channel to French drains, bio swales, dry wells, etc., to filter runoff before it enters a stream. The City's Annual Canopy Campaign is an effort to repopulate the tree canopy within the City of Anchorage, especially adjacent to roadways. The Annual Canopy Campaign takes place each fall. Through this program, the City pays for one half the cost of a canopy-type tree as determined by the City Forester and Forestry Board and professional planting of the tree selected by the residents. These trees are designated for the right-of-ways only. Last year, residents planted 62 canopy trees. The 2016 campaign is currently taking tree orders. The City also offers a Spring Tree Give-away Program. In 2016, 300 one-inch caliper trees were given free of charge to Anchorage residents for planting anywhere on their properties. The City of Anchorage has a tree preservation ordinance that requires one tree replacement for every one to three trees removed depending on the trunk caliper of the replacement tree. The City of Anchorage has an on-going hazardous tree removal program for trees in the City's right-of-ways. Dead or dying trees are removed, and other trees are pruned, as needed. Trees removed by the Anchorage Public Works Department are chipped and taken to a mulch operation which turns it into compost and mulch. The City of Anchorage has been a "Tree City USA" for 27 years and achieved the Growth Award status level for six years by continuing to provide increased awareness and public education of accepted urban forestry practices.

### **3.2.3.2 Built-Up Area Reductions PC-3**

The City of Anchorage adopted the Land Development Code provisions of Cornerstone 2020. Many provisions in the Land Development Code version that Anchorage follows favor smaller homes on larger lots than traditional zoning allows so that there is a reduction in impervious surface. The streets are narrower and easements adjacent to the drainage swales are wider in order save trees and to provide more green space. The City of Anchorage's floor-area-to-open-space ratio requirement requires more open space than Louisville Metro's floor-area-to-open-space ratio. Residents are required to outlet downspouts into yards or French drains, rain gardens, bio swales, etc. to filter runoff before it enters a stream. The City of Anchorage requires lots with more than 20% of impervious surface to have alternative measures in place to retain on the lot excess stormwater created by the additional impervious surface. Often recommended are rain gardens, dry wells, French drains, retention ponds, bio swales, etc.

### **3.2.3.3 Source Controls PC-4**

City of Anchorage facilities have approved HMPC plans. The City of Anchorage maintains salt storage in a covered building. The salt under roof is also covered with tarps. The City of Anchorage has a refueling area for Public Works vehicles. The area is diked so that spills are controlled and maintained. A spill management system controls any spilled fuel in the dike area, and allows rainwater to be removed without causing erosion to the ground. Employees



are required to stay with vehicles while refueling. In addition, a sign is posted reminding employees of this policy. The City of Anchorage investigates downspout connectivity to the streams. Residents are required to daylight their downspout or direct to a French drain rather than flow entering the stream directly.

### **3.2.4 Good Housekeeping / Pollution Prevention (GH)**

By agreement with the Anchorage Fire Department, all public works vehicles that are heavily soiled (dirt, salt, asphalt, etc.) must be washed inside the Anchorage Firehouse. The Firehouse has a containment pit to catch the material so it can be disposed of properly.

#### **3.2.4.1 Street Maintenance GH-1**

The City of Anchorage follows the EPSC General Permit requirements. Street maintenance in Anchorage is performed on an as-needed basis. During any roadway repair all remaining unused material is swept up and disposed of properly. Staked bales and silt fencing are used to minimize impacts of construction. Public roads are constructed without curbs, allowing the runoff to be filtered through the nearby grasses.

#### **3.2.4.2 Street Sweeping GH-2**

The City of Anchorage picks up trash along all of the roadways within its city limits monthly or more often, if needed. An annual Litter Abatement spreadsheet can be reviewed with the Public Works Director showing miles of road cleaned, number of bags collected and total cost. The City of Anchorage uses a leaf vacuum to keep the culverts and ditch lines clear of leaves during the fall and maintaining a list by month of ditch areas cleaned/restored. Leaves collected throughout the fall are taken to a mulch operation which turns leaves into compost and mulch. Road culverts are cleaned weekly in the fall to remove leaves. A City of Anchorage stormwater management and control ordinance requires property owners to maintain both natural and man-made drainage channels on their properties. It is unlawful for to deposit leaves, grass clippings, or other forms of debris in the drainage channels.

#### **3.2.4.3 Catch Basin Cleaning GH-3**

Catch basins were checked and cleaned by hand 142 times including before and/or after rain events. During this term, all catch basins were inspected and serviced while in the field documenting data for a new outflow map of the City. Outlets are plugged so that debris cannot get into the stream. This debris is taken to a landfill.

#### **3.2.4.4 Storm Sewer Cleaning GH-4**

Storm sewer cleaning is performed on an as-needed basis. Anchorage Public Works performed 12 culvert inspections this year. Through an agreement with the Anchorage Fire Department, blocked Anchorage culverts are flushed with a high-pressure hose and the debris collected. Debris is taken to a landfill, as needed. During this term, no culverts required flushing.



#### **3.2.4.5 Channel Maintenance GH-5**

Grass drainage channels in Anchorage are mowed no lower than 6-inches. Debris is removed from channels and sent to a landfill. Concrete channels are cleaned of sediment manually. Staked hay bales and silt fencing are required during channel maintenance where heavily accumulated siltation needs removal. Anchorage Public Works inspected 14 channels this year.

#### **3.2.4.6 Pollution Prevention for De-Icing GH-6**

The City of Anchorage inspects and adjusts its two salt spreaders distribution rates before and during any long-term snow events. Salt spreaders are adjusted to minimize the amount of overspray. The salt is pre-wetted with calcium chloride and Magic O, a distillers' by-product combined with magnesium chloride, as an additive to salt and brine. Anchorage uses a brine road pre-treatment mixed with Magic O for ice and snow weather conditions. Regular salt treated with Magic O melts ice in weather as low as zero degrees, reducing the total amount of regular salt used to remove snow in Anchorage. Pushing the snow off the roadway is the preferred method for snow removal. The City applied 60 tons of salt, 400 gallons of Magic O, and 1500 gallons of brine this year. The City of Anchorage Public Works does yearly Internet research and employees attend training to learn about new application technologies.

#### **3.2.4.7 BMP Inspections GH-7**

Good Housekeeping/Pollution Prevention BMPs are inspected regularly by the Public Works Director.

#### **3.2.4.8 BMP Maintenance GH-8**

Good Housekeeping / Pollution Prevention BMPs are maintained on a regular basis. The Public Works crew inspects the building and grounds on a daily basis to assure materials and stock are stored properly.

#### **3.2.4.9 Pollution Prevention for Herbicides and Pesticides GH-9**

In the last six years, the City of Anchorage has used no pesticides and only minimal herbicides, and is committed to continue on this course. No herbicides or pesticides are stored.

#### **3.2.4.10 Continuation of Existing Programs GH-10**

An outside contractor continues to collect municipal waste, yard waste and recyclables weekly. The yard waste is taken to a compost site. The City, under the direction of Jefferson County, requires recyclable paper bags for yard waste. Approximately 84% of the City of Anchorage residents participate in the recycling program. The City of Anchorage utilizes a private contractor to reclaim its used oil and antifreeze. The City maintains a collection tank for used oil. This year, 160 gallons of oil and zero gallons of antifreeze were reclaimed and removed.

#### **3.2.5 Public Education/Outreach Programs (PE)**

In a large metropolitan area, the impact of the actions of the citizens can cause great harm to the environment if the actions are careless or uninformed, or can have great benefit if the actions are positive. Individual behavior repeated by many people has a cumulative effect.



### **3.2.5.1 Public Education Programs PE-1**

Water quality issues are discussed in the monthly newsletter and on the City of Anchorage's website at [www.cityofanchorage.org](http://www.cityofanchorage.org). The website includes information on the City of Anchorage's Tree Preservation Program and the Storm water Management ordinance. The newsletter has contained information on the recycling program, leaf pick-up schedules, rain gardens, swimming pool drainage, and mosquito control. This year, 15 articles in the city's newsletter contained information relating to recycling, yard waste, lawns, drainage, and forestation. The City of Anchorage continues to offer the "Forestry Handbook," which is free, to Anchorage residents. The City works with developers who install innovative "green" storm water control, and encourage the developers to allow the City and other organizations to observe the installation, and become more educated about rain gardens, retention ponds, and other storm water retention and water quality.

### **3.2.5.2 Earth Day PE-2**

The City of Anchorage does not have separately planned activities for Earth Day, but they do celebrate Arbor Day. Coordinated through the Anchorage Forestry Board, Arbor Day's celebration focuses on tree-related activities often coordinated with the Anchorage Public School. Past activities have included identifying tree species, clearing invasive plants, spreading wood chips on the Anchorage horse trails, the Emerald Ash Bore, replacing dying trees, and identifying tree diseases and decline. This year 300 free trees were given to Anchorage residents for planting on their properties.

### **3.2.5.3 Litter Control PE-3**

The city supplies the garbage bags and is responsible for disposing of the collected debris. In addition, the City's Public Works Department regularly collects litter and debris from public right-of-ways.

### **3.2.5.4 Internal Training PE-5**

The City Administrative Officer and Public Works Director have attended MS4 presentations by MSD staff. All public works employees will receive SWQMP training three to four times a year. Training will be in the area of IDDE, IDE-4, CS, CS-3 etc. Other areas of training will be spill prevention, disposal of contaminants, etc.

### **3.2.6 Monitoring (M)**

The City of Anchorage has an interlocal agreement with MSD to perform the Monitoring requirements of the MS4 permit.

### **3.2.7 Reporting (R)**

The City of Anchorage provides information on implementation of the MS4 permit requirements to MSD. The City of Anchorage has an interlocal agreement for MSD to prepare the Annual Report.



### 3.3 Financial

This section is a summary of the City of Anchorage's SWQMP budget for FY 2016:

| <b>City of Anchorage FY 2016 Total Operating Budget: \$2,793,388</b> |                              |                                 |                        |                       |
|--|------------------------------|---------------------------------|------------------------|-----------------------|
| <b>Drainage</b>  | <b>Bridge/Culvert Repair</b> | <b>City Storm water Officer</b> | <b>Forestry Budget</b> | <b>Litter Cleanup</b> |
| <b>\$5000.00</b>   | <b>\$50,000.00</b>           | <b>\$900.00</b>                 | <b>\$31,020.00</b>     | <b>\$1,300.00</b>     |

**CO-PERMITTEE CERTIFICATION  
MS4 STORMWATER ANNUAL REPORT  
KPDES PERMIT NUMBER KYS000001**

**THE CITY OF ANCHORAGE** is designated as a co-permittee covered by the Municipal Separate Storm Sewer System (MS4) permit that was issued by the Kentucky Division of Water under the Kentucky Pollutant Discharge Elimination System (KPDES) program. **THE CITY OF ANCHORAGE** has prepared the attached annual compliance report for the reporting period of **July 1, 2015 to June 30, 2016**.

Under the terms of KPDES Permit No. KYS000001 [Part I.A.2], and implemented through an inter-local agreement with Louisville and Jefferson County Metropolitan Sewer District dated April 17, 2014, **THE CITY OF ANCHORAGE** certifies that it has responsibility for the following:

- Construction oversight in addition to the regulatory inspections conducted by Louisville MSD pursuant to the Erosion Prevention and Sediment Control Ordinance, Chapter 159;
- Drainage system and outfall mapping;
- Drainage system operation and maintenance;
- Road maintenance and upkeep, including snow and ice removal and related stormwater management activities;
- Drafting and implementing fleet and facility stormwater pollution prevention plans;
- Reporting and referring potential illicit discharges observations by municipal employees or other reports from residents to MSD for investigation and potential enforcement;
- Inspection, operation, maintenance and/or applicable certification that permanent (also known as post-construction) water quality devices, controls, and management practices are operating effectively;
- Implementation of education and outreach within the City of Anchorage to compliment the education and outreach provided by MSD which is tailored to local water bodies pollutants of concern;
- Preparation and timely submittal of annual compliance demonstration report to MSD according to agreed upon formats and standards; and

Certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the above statements are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

CITY OF ANCHORAGE

Name: Renee M. Major

Title: City Administrative Officer

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

  
5 July 2016



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### 3.5 COMPLIANCE ACTIVITIES REPORT FOR THE CITY OF JEFFERSONTOWN

The City of Jeffersontown has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain tasks. This subsection will focus on those activities for which the City of Jeffersontown, Kentucky was responsible during the permit period and will document the compliance tasks performed by City of Jeffersontown during the period of July 1, 2015 – June 30, 2016.

#### 3.5.1 Public Education, Outreach Participation and Learning Experiences (PEOPLE)

##### 3.5.1.1 Public Education Programs PE-1

The City of Jeffersontown continues to provide downloadable information, services, and participation opportunities available to the public through the Jeffersontown website, <http://www.jeffersontownky.gov/>. These include articles and handouts on recycling and yard waste, as well as pollution prevention activities, catchbasin cleaning, and general dumping requirements. Jeffersontown has continued to update the City's website to create a more fluid page that will engage residents and visitors and supply them with current information. It also includes alerts using Code Red. Currently, the City has 396 registered email addresses which receive newsletters, 4,446 (2,769 in 2015) Facebook page followers, 395 Twitter followers, and 344 Instagram followers. These followers receive all messages by the City, although stormwater messages are periodically included in the posts and are able to reach a greater amount of residents through the City's main outreach platforms.

In the summer of 2009, the City launched an expanded "Spruce Up" program aimed at educating the public on the importance of minimizing erosion and sediment deposits, litter and the importance of a clean and green community. This expanded program was titled "*Clean-n-Green – Growing and Shaping our Vibrant City*" and continued to be implemented over this current reporting period.

The City has found that working with various groups already actively engaged in the community has been the most beneficial for raising public awareness, as well as promoting public involvement. Jeffersontown has identified various groups to seek out an opportunity to work with, along with organizations that approached the City with community service projects. This past reporting period, the City worked with church groups/camps, Boy Scout troops, and businesses actively doing a community service project. These groups performed projects such as picking up trash and debris around designated areas in the City, picked up trash and debris along the bike/pedestrian trail, as well as walked several streams and drainage ways to collect trash and debris. This approach has appeared to be a better strategy to engage the community in the importance of water quality issues, and promote the mission of the "Clean-N-Green" program.

Other notable programs promoted by the City are as follows:



“Gaslight Clean Up”- This is a City wide clean-up day aimed at not only litter control but education of the importance of a clean community and the impact litter/trash has on the environment and the effects to water quality. Various groups assist with the Gaslight Clean Up event, including church groups, Boy Scouts, and various businesses. On average, four (4) to seven (7) groups participate in clean-up efforts, with between ten (10) and twenty-five (25) people per group.

“Gutter Gremlins”- Street sweeping all around the City and clearing drainage ways allows catch basins to function properly and minimizes flooding in neighborhoods and streets. In most instances, maintaining an effective drainage system will also minimize the possibility of erosion and sediment deposits. The City of Jeffersontown, on average, cleans 350 miles of roadway each year through the Litter Abatement Program. In addition, the street sweeping crew has sought to clean every street throughout Jeffersontown at least once this past year, not just the main thoroughfares, in an effort to maintain water quality. The visibility of the street sweeper also raises awareness of litter control.

“Bright Spot” – This program explores places that could become a bright spot for the City instead of areas that may hold water (which may become mosquito breeding grounds), begin or continue to erode, or otherwise be unattractive. Establishing landscaping and vegetation relative to these features enhances the visual quality of community while providing a balance between surface runoff and stormwater management planning.

“Tree Treasure Program”- This is an educational and sponsorship program that supports planting trees throughout the City and along riparian ways. Developing a strategy for plantings will create a stable environment to promote good stewardship of the land. The City has planted over sixty (60) trees throughout the community through either its own efforts or by businesses/group promoting a planting. This program continues to grow as people become aware of the significance of trees and the benefits provided by them.

“Recycle-Reuse-Renew Environmental Educational Program”- This program contains educational materials and interactive field trips to teach students about protecting wetlands and floodplains from erosion, stormwater runoff, and pollutants. Students also learn about air quality issues and climate changes impact on communities. The City has distributed fliers to the schools and churches in an effort to increase awareness of these effects on our community and environment. The community years the City would like to expand this into the field trips once the bike/pedestrian trails get complete and connected. Currently, the City is looking for a sponsor to help develop the program.

“Jefferson Gardens”- This program includes community gardening to promote a healthy lifestyle, while gardens helps promote the absorption of storm water runoff (i.e. rain gardens). Native plants infiltrate greater amounts of stormwater and filter pollutants. This gardening program will develop a strategy for the utilization of the concept for stormwater management procedures. The City has made progress on expanding this program by reaching out to community groups such as the Reserve Officer Training Course (ROTC), Boy Scouts of America and other school



service projects to connect them with the importance of keeping the streams, channels, ditches, and drains free of debris and pollutants from dumping. Through the City-sponsored Farmer's Market, flyers and handouts have been distributed to increase awareness of community gardens and the proper maintenance of them during off-seasons. The City is working with Blackacre Nature Preserve to develop additional programs and education opportunities that promote gardens and placement of gardens that would benefit water quality and stormwater management principles. The Blackacre community garden is the largest in Jefferson County with over 300 plots and has organic and non-organic sections, as well as seasonal and year-round gardening.

#### **3.5.1.2 "Gaslight Clean Up" PE-2**

The City of Jeffersontown organizes "Clean-N-Green Jeffersontown" which promotes national Earth Day efforts. The residents pick up litter and clean creeks throughout the City. As previously mentioned, Jeffersontown works with various groups and civic organizations on volunteer clean-up efforts, such as the ROTC, the Boy Scouts of America, local church groups, and school service project groups. The City supplies garbage bags and was responsible for properly disposing of collected debris. Various groups assist with the Gaslight Clean Up event, including church groups, Boy Scouts, and various businesses. On average, four (4) to seven (7) groups participate in clean-up efforts, with between ten (10) and twenty-five (25) people per group.

#### **3.5.1.3 Litter Control Patrol PE-3**

The City also provides litter abatement five (5) days a week by utilizing work release programs to perform roadside cleanup. There are typically 3-4 inmates in a crew for roadside maintenance activities. Municipal employees routinely inspect high traffic areas to gauge program success, as well as to target new areas in need of attention. City employees are also utilized in collection efforts. In 2015, there were 1,350 trash bags collected through the Litter Abatement Program.

See the expanded "Spruce Up Jeffersontown" program as described in 3.5.4.3 Catch Basin Cleaning GH-3 below. Note the Gutter Gremlins Program; Gaslight Clean Up; Recycle, Reuse, and Renew Environmental Educational Program; Bright Spot; and Jefferson Gardens, as previously mentioned in 3.5.1.1 Public Education Programs.

#### **3.5.1.4 Internal Training of City Officials and Employees PE-4**

The City of Jeffersontown's mayor, City administrator, and maintenance director have attended MS4 presentations and meetings held with MSD staff. These include the co-permittee coordination meetings held throughout the year, as well as Kentucky Stormwater Association (KSA) sponsored quarterly meetings and the Annual KSA Conference, which were attended by Mr. Matt Meunier as the City representative.



In recent years, Jeffersontown had a series of employee training materials developed, in association with a third-party facility inspection, at the City's Public Works Department located at 10317 Grant Avenue. The training materials cover a wide variety of issues pertinent to stormwater awareness for municipal employees. Additionally, the City utilizes available MSD materials for municipal employee and public education. The City also hired a Safety Director, Mr. Brian Spurling, as of March 15, 2015, who has overseen training and safety meetings for municipal Public Works employees. Mr. Spurling has attended safety conferences with KLC, state agencies, equipment safety meetings, and has educated the Public Works Department during meetings and in every day practice.

#### **3.5.1.5 External Training PE-5**

The City of Jeffersontown is in the process of developing educational material that will be used to engage students. The City is pursuing a partnership or sponsorship with members of the community to provide certain amenities to the developing bike/pedestrian trail system in the City. The goal of the partnership is to develop story boards and signs that will educate the biking/walking community about various water quality issues and stormwater management issues including floodplains, erosion and sediment control, stream water quality, and environmental awareness. The City will also continue to seek out funding opportunities and grants as they pursue this project and will be developing a budget in the upcoming year for the project.

The City has three (3) employees who have attended the EPSC certification training course. The City also provides brown bag luncheons on new trends and activities that could benefit the City and community. During this reporting period, City officials received external training on such topics as municipal facilities management, municipal field and maintenance activities, public education and outreach, and overall stormwater quality strategies. This external training, given to department heads, was then distributed to other City employees, in a "train-the-trainer" system. The City is continuing to find ways to connect with key employees and first responders to increase awareness of stormwater management and the things that impede these efforts.

City officials attended training sessions and a conference through the Kentucky American Planning Association (KY APA) Chapter, and attended multiple American Public Works Association (APWA) luncheons which were related to stormwater management.

#### **3.5.1.6 Kentucky Stormwater Association (KSA) PE-6**

The City of Jeffersontown regularly attends Kentucky Stormwater Association (KSA) meetings, and actively participates in KSA discussions. Mr. Matthew Meunier, Director of Community Development & Assistant to the Mayor, has attended each quarterly KSA meeting this period, as well as the past Annual KSA meetings in August 2012, August 2013, June 2014, July 2015, and June/July 2016. KSA provides members with training on MS4 water quality topics, industry trends, new technologies, and shared experiences from across the state of Kentucky. It also provides an opportunity for members to interact with state and federal regulators. KSA routinely



coordinates with the Kentucky Division of Water (KDOW) on current and upcoming regulations, and for education and outreach opportunities. Membership in KSA has helped keep the City of Jeffersontown knowledgeable about MS4 topics which may affect the City.

### **3.5.1.7 Kentucky Transportation Cabinet (KYTC) – Public Education Materials PE-7**

The City of Jeffersontown utilizes existing educational materials whenever feasible, including KYTC's MS4 Toolkit Resources, MSD-developed educational content, EPAs Educational Toolkit, and other educational stormwater materials. Jeffersontown feels that utilizing KYTC, MSD, and EPA educational materials allows for the dissemination of proven educational content, as well as facilitates a regionally consistent message.

### **3.5.1.8 Jeffersontown – Coalition of Neighborhoods PE-8**

In 2002, the City of Louisville was divided into eight (8) Coalition of Neighborhoods as part of a county-wide, grassroots, non-profit group to promote environmental, economic, and community development. Jeffersontown has been implementing a Coalition of Neighborhoods program throughout the City to promote a variety of efforts to benefit the overall stormwater program, including litter control, community beautification, and neighborhood stormwater management.

Home owners associations (HOAs) are active in Jeffersontown, and efforts continue to be implemented to further coordinate with these groups.

## **3.5.2 Illicit Discharge Detection and Elimination (IDDE)**

### **3.5.2.1 Mapping IDDE-1**

Jeffersontown retained a professional consultant to assist with mapping the City's stormwater infrastructure in 2012. Mapping and collection of stormwater outfalls and proximal infrastructure has been compiled into a geographic information system (GIS) to facilitate Citywide sharing, tracking, and simplified infrastructure updates. City staff have been actively involved with the mapping process, and employees have received hands-on training for mapping and system screening efforts. Citywide mapping was completed in January 2014, with annexations being mapped in 2016. The mapping identified areas for the City to monitor for issues and "trouble spots". The City is currently considering enhancements to the Monticello Place detention basin and other areas which could increase water quality benefits, pending available funding.

### **3.5.2.2 Illicit Discharge / Illegal Dumping Ordinance IDDE-2**

The City of Jeffersontown enforces the MSD Wastewater/Stormwater Discharge Regulations ordinance, effective November 26, 2013, which applies to incorporated cities in Jefferson County. The regulations prohibit non-stormwater discharges to the MS4, prevent illicit



discharges and improper disposal of chemicals and other materials which degrade water quality, and provide enforcement mechanisms.

The City posts signs that prohibit dumping at locations that experience habitual problems. City staff investigate problem dumping areas regularly and respond to resident complaints. The City has established a database entry portal called Community Awareness Tracking System to serve as a first line quick response system used to track complaints and concerns from the community in an effort to minimize the response time to various issues. It controls the proper direction of the particular issue to the appropriate department and is web based. The service request entry system is available on the City website.

Outfall inspections were completed in April and August 2015 at eight (8) locations. No major problems were observed.

In 2013, the City executed a Memorandum of Agreement (MOA) with MSD that contains provisions for the enforcement of illicit discharges. This MOA outlines the roles and responsibilities for how investigations will take place, when parties will get involved, and how countermeasures are deployed in the event of an active spill. This agreement will help with appropriate countermeasures and cleanup to larger incidents, as MSD is better equipped to manage such events, should they occur. The Interlocal Agreement is in place as of August 2016.

### **3.5.2.3 Provide Education on Illicit Discharge Detection and Elimination IDDE-3**

The City of Jeffersontown previously published a bi-monthly newsletter which periodically contained information on the proper disposal of leaf debris and other ways in which water quality is affected. Costs associated with the newsletter became prohibitively expensive. Consequently, the City developed an e-newsletter system where residents can subscribe to various newsletters through email regarding City events and news. Subscription services are available on the City's updated website. Text message alerts are also available. Alerts are also available on the City's social media Facebook page and Twitter newsfeed. Currently, the City has 396 registered email addresses which receive newsletters, 4,446 (2,769 in 2015) Facebook page followers, 395 Twitter followers, and 344 Instagram followers. These followers receive all messages by the City, although stormwater messages are periodically included in the posts and are able to reach a greater amount of residents through the City's main outreach platforms. As more constituents embrace tablets, smart-phones, and other handheld devices, the City believes this will be a more effective and efficient system moving forward. This is anticipated as a more effective method for the City to communicate with citizens not only during storm events but as an educational tool to keep people informed.

### **3.5.2.4 Co-permittee IDDE-4**

The City of Jeffersontown attends and actively participates in quarterly co-permittee meetings. Jeffersontown staff and other co-permittees discuss common IDDE problems, detection



strategies, educational and outreach measures, and opportunities for more program consistency countywide.

### **3.5.3 Construction Site Stormwater Runoff Control (CS)**

#### **3.5.3.1 Jeffersontown/MSD Partnership CS-1**

The City of Jeffersontown has continued to partner with MSD through a formal Interlocal Agreement. This agreement, entered into in 2013, outlines the roles and responsibilities for both Jeffersontown and MSD.

The City has a working relationship with MSD for the development review process which includes construction inspection and coordinated approval of construction plans including drainage improvements. MSD is the permitting agency for all development construction and they perform site inspections until such time as the bonds and construction is completed. Once it is completed, the City begins to provide the management oversight and drainage maintenance responsibilities. On all City-funded drainage projects, the City maintains the best management practices (BMPs) for erosion protection and sediment control (EPSC) and general construction inspection services. The City receives an approved EPSC permit from MSD for each project, along with general information under our general permit with the Department of Water (DOW) and MSD.

#### **3.5.3.2 Erosion Prevention and Sediment Control (EPSC) Plan CS-2**

The City has continued to work with MSD on the development of educational handouts that highlight the basic requirements for EPSC practices. Additionally, Jeffersontown has developed a binder containing resource materials and other information that is used to educate contractors, developers, and the general public. The City also relies on KYTC's Environmental Resource Handbook, which contains numerous one-page factsheets on EPSC activities.

The City of Jeffersontown follows the provisions of the Louisville and Jefferson County Erosion Prevention and Sediment Control ordinance, Ord. No. 186, Series 2007. The ordinance was adopted on November 21, 2000 and is intended to conserve, preserve, and enhance the natural resources throughout Jefferson County by controlling degradation caused by soil erosion and sedimentation from land disturbing activities. The required EPSC measures follow the requirements of the KPDES Permit and outlines design standards, maintenance procedures during construction, and enforcement procedures.

#### **3.5.3.3 Scheduled Inspection of Maintenance of BMPs CS-3**

A City of Jeffersontown official inspects construction sites to ensure that the EPSC Ordinance is being followed. Jeffersontown staff continue to work with MSD to ensure a consistent, standardized checklist is used for construction site inspections. As previously mentioned,



Jeffersontown has an interlocal agreement with MSD for approval of EPSC plans, as well as monitoring and inspection of active construction sites.

The City manages and maintains a general permit with MSD and KDOW regarding construction site runoff. Also, the City has three employees certified with EPSC BMP design specifications, on-site requirements, and compliance enforcement. Certificates are valid for three (3) years. The City is considering certifying all Team Leaders of the City public works department.

#### **3.5.3.4 Construction Development Plan Process CS-4**

The City of Jeffersontown continues to work with MSD to review and update guidance materials for developers regarding construction permits and procedures, as needed. The City works with MSD to review EPSC Plans, as part of the application and construction drawings, for approval. If required, a pre-construction site meeting will be held before a site disturbance permit will be issued. A checklist for EPSC Detailed Construction Plans is available on the MSD website.

#### **3.5.3.5 Collaborative Guidance and Training CS-5**

The City of Jeffersontown continues to work with MSD to help educate design engineers on appropriate erosion prevention and sediment control (EPSC) measures most appropriate for the various construction site conditions. Jeffersontown will continue to encourage engineers and contractors to take the EPSC training certification courses offered by MSD.

### **3.5.4 Post Construction Controls (PC)**

#### **3.5.4.1 Pilot BMP Projects PC-1**

Over the previous permit term, the City of Jeffersontown was required to complete a minimum of three BMP Pilot Projects. One of the projects the City of Jeffersontown implemented was a no-mow forest restoration area on a steep slope of Veteran's Park above Chenoweth Run. The wooded riparian buffer along Chenoweth Run is protected in City easements. Approximately 80% of City of Jeffersontown's grass channels have at least a ten-foot buffer strip, which filters runoff before it reaches the stream and helps improve water quality.

In association with these and other post-construction BMPs, Jeffersontown has developed an appropriate checklist to aid in the review of post-construction BMPs. Copies of these completed checklists will be provided to the Community Development Director for incorporation into the development file for developments with applicable post-construction BMPs.

#### **3.5.4.2 Built-Up Area Reductions PC-2**

The City of Jeffersontown has adopted and observes the water quality provisions of Cornerstone 2020 which represents a vision of Louisville and Jefferson County, including the



City of Jeffersontown, to make the area more attractive, mobile, efficient and environmentally aware. A primary vision of this community plan is to protect environmental resources as the population of the area increases.

#### **3.5.4.3 Source Controls PC-3**

The City of Jeffersontown's Public Works Department has an approved Hazardous Materials Use and Spill Prevention Control (HMPC) Plan to cover such items as salt storage areas and refueling areas. All dumpsters located within the City of Jeffersontown must be covered and fenced. The City continues to monitor these point source areas and maintains a high level of control for possible runoff.

In 2013, the City finalized and adopted a Stormwater Municipal Operations Plan (SMOP) for the Public Works Facility located at 10317 Grand Avenue. This plan contains information regarding water quality with respect to municipal operations at the facility, as well as general recommendations for municipal operations in the field. The plan also contains training logs, outfall inspection sheets, and facility maintenance inspection sheets to document activities on the site. In the process of developing this plan, Jeffersontown reviewed a copy of MSD's facility stormwater pollution prevention plan (SWPPP), which was developed for MSD's central maintenance facility.

The City has updated all documents utilized to record the various activities of the City. Checklists were updated and created to track activities, and proper procedures for various activities such as stormwater management, hazardous material, point source places were developed. In 2013, the City retained a professional consultant to perform a third-party review of the Public Works Department facility for stormwater quality considerations. From this review, Jeffersontown received an observations and findings report, an ongoing facility plan for stormwater, and educational materials for municipal employees reporting to the site. These materials will include checklists to document compliance and will be used to enhance current operations at this facility in the future.

#### **3.5.4.4 Collaborative Guidance and Training PC-4**

The City of Jeffersontown will work with MSD on developing and implementing a post-construction runoff control checklist that will be used for new developments implementing post-construction stormwater management controls. This checklist will be utilized to ensure compliance with applicable standards prior to the bond release for the development.

The City of Jeffersontown encourages people involved with stormwater to attend the MSD Qualified Post-Construction Inspector Program (QPCIP). Certification allows a person to perform inspections and oversee maintenance activities for stormwater quality BMPs.

### **3.5.5 Good Housekeeping / Pollution Prevention for Municipal Operations (GH)**



### 3.5.5.1 Street Maintenance GH-1

The City of Jeffersontown follows the EPSC General Permit requirements. Street maintenance in Jeffersontown is performed on an as-needed basis. Appropriate EPSC measures, such as silt fencing and catch basin inlet protection are used during maintenance activities.

In 2015, there were 1,350 trash bags collected through the Litter Abatement Program. The trash was collected along 350 miles of roadway, which averages to approximately 29 miles per month.

### 3.5.5.2 Street Sweeping GH-2

The City of Jeffersontown performs vacuum sweeping five (5) days per week, except in winter months. City of Jeffersontown vacuum-sweeps all heavily traveled roads more often, but has also swept residential and side-roads during this past year. Woody debris that is collected is sent through the chipper-shredder for easier disposal. The debris collected during street sweeping is sent to a landfill.

### 3.5.5.3 Catch Basin “Gutter Gremlins” GH-3

During 2013, the City mapped its entire storm sewer infrastructure, including all catch basins. Jeffersontown catch basins are vacuum-cleaned as needed, although an effort is made to clear catchbasins prior to a storm event to prevent flooding from clogged drains. The collected debris is sent to a landfill.

In the past, the City has collaborated with MSD to implement the “FROG No Dumping! Drains to our Creeks” program, whereby the City placed decals on catch basins promoting the no dump provisions. This was in conjunction with the City’s annual “Spruce Up” Jeffersontown clean program, which is a communitywide event to pick up litter, clean debris from streams and other parts of the City. Inspections are made of catch basins, detention basins and drainage courses to make sure they are free of debris that would impede positive drainage.

The City has expanded efforts through the “Spruce Up” program aimed at educating the public on the importance of minimizing erosion and sediment deposits, litter, and the importance of a clean and green community. This expanded program was titled “*Clean~n~Green*” – *Growing and Shaping our Vibrant City*”. The program was expanded to include several additional programs beside litter control. Notable programs include:

“Gaslight Clean Up” - This City-wide clean-up day is aimed at not only litter control but educating residents of the importance of a clean community and the impact litter and trash has on the environment and the effects to water quality.



“Gutter Gremlins” - By sweeping the City and clearing drainageway and roadway debris, catch basins can function properly and minimize flooding in neighborhoods and streets. In a most instances, maintaining an effective drainage system will minimize the possibility of erosion and sediment deposits.

“Bright Spot” - This program explores places that could become a “bright spot” for the City instead of an area that may hold water, continue to erode or otherwise be unattractive. By developing “green” features, the City has enhanced community pride while providing a balance between surface runoff and storm water management planning.

“Tree Treasure Program” - This is an educational and sponsorship program that supports planting trees throughout the City and along riparian ways. Developing a strategy for plantings will create a stable environment to promote good stewardship of the land.

“Recycle-Reuse-Renew Environmental Educational Program” - This program will create educational materials and interactive field trips to teach students more about wetlands, floodplains, erosion, stormwater runoff, and pollutants, along with an understanding of air quality issues and the impact of climate changes on communities.

“Jefferson Gardens” - This program promotes community gardening to help residents develop a healthy lifestyle through flower and vegetative gardening. Gardens also promote infiltration of storm water runoff (i.e. rain gardens). This program will develop a strategy for the utilization of this concept inside of the storm water management procedures of the City.

#### **3.5.5.4 Storm Sewer Cleaning GH-4**

Jeffersontown storm sewers are vacuumed as needed, especially prior to a rain event. The City is working to develop inspection standards for drainage easements and stormwater channels. A draft checklist has been created, and will be updated as needed, as conveyance systems are inspected and maintained. The online citizen request tracker has been used to target areas where maintenance is needed.

#### **3.5.5.5 Channel Maintenance GH-5**

The City of Jeffersontown has a fulltime drainage crew that maintains concrete channels as needed. Grass channels are maintained on a regular schedule. The debris removed during drainage channel maintenance is sent to a landfill, although large woody debris is shredded first. A draft checklist has been created, and will be updated as needed as drainage ditches and channels are inspected. The online citizen request tracker has been used to target areas where maintenance is needed.



### **3.5.5.6 Pollution Prevention for De-icing GH-6**

The City of Jeffersontown calibrates their salt spreaders as needed and inspects de-icing equipment at least annually. Brine pretreatment is applied at the beginning of the storm to minimize the amount of salt required. Sand and salt are also used as needed to maintain motorist safety. There are seventeen (17) de-icing trucks used by the City, which are cleaned after every event.

Construction on the new salt storage facility was completed at the beginning of August, 2016, prior to the upcoming winter. This will help reduce salt loss and pollutants from reaching the nearby streams.

### **3.5.5.7 BMP Inspections and Maintenance GH-7**

Good Housekeeping / Pollution Prevention BMPs are inspected monthly by the Public Works/Maintenance Director. Inspections are tracked using a log which is kept in the Stormwater Municipal Operations Plan binder at the Public Works Facility. BMPs inspected include the fuel storage tanks, fuel island, salt barn, vehicle impound lot, AGG piles, oil storage facility, drains in the workshop, and spoil piles. Good Housekeeping / Pollution Prevention BMPs are regularly maintained, however, if a problem is discovered during the monthly inspection, immediate action is taken.

A Spill Inventory Form is utilized by the City to track spills and cleanup actions taken. In 2015, there was one (1) leak in the industrial park area of Jeffersontown. Louisville MSD was called to assist with the situation. Additionally, there was a one (1) instance of oil being intentionally poured into Chenoweth Creek near Grassland Drive. In that instance, Louisville MSD, the Division of Water, and Health Department were called. The spill was contained and the Jeffersontown Fire Department and Environmental Agency were called in to clean it up.

The City has hired a Safety Director, Mr. Brian Spurling, who holds regular training sessions for Public Works employees to enhance oversight of various construction projects, safety, and stormwater within the City.

### **3.5.5.8 Pollution Prevention for Herbicides and Pesticides GH-8**

Appropriate Jeffersontown employees are licensed by the Commonwealth of Kentucky for herbicide and pesticide application. Currently, there is one (1) licensed employee who performs all herbicide and pesticide applications for the City.

### **3.5.5.9 Continuation of Existing Programs GH-9**

The City of Jeffersontown has a contractor collect municipal waste, yard waste and recyclables weekly. Over fifty-five (55%) percent of residents within the City participate in the recycling



program, which has increased five (5%) percent from two years ago. The City's sanitation provider, Rumpke, started a program called "Look Who's Recycling in Jeffersontown" to provide an incentive for residents who submit a pledge to recycle. The City of Jeffersontown picks up appliances with Freon and has a contractor properly manage and recycle these appliances. The City also utilizes Louisville Metro's used oil and waste program, and maintains a collection tank for used oil.

The City has continued to implement the "Spruce Up" Jeffersontown program which includes educating the public on the effects of litter, trash, and illegal dumping. The program provides beautification efforts to promote a healthy lifestyle and balance between the environment and everyday living. It educates the community on erosion and sediment control, floodplains and floodways, pollution of streams and water quality efforts to protect wildlife and the human element. The expanded program is called "Jeffersontown Clean ~n~ Green".

See the expanded "Spruce Up Jeffersontown" program as described in 3.5.4.3 Catch Basin Cleaning GH-3 above. Note the Gutter Gremlins Program; Gaslight Clean Up; Recycle, Reuse, and Renew Environmental Educational Program; Bright Spot; and Jefferson Gardens outreach efforts.

#### **3.5.5.10 Stormwater Pollution Prevention Plans for Co-permittee Operations GH-10**

The City regularly attends Co-permittee meetings with MSD and will continue to actively participate in the co-permittee partnership and explore opportunities to collaborate and share resources, as well as participate in peer reviews for program enhancements.

A major project occurring in the City of Jeffersontown which may affect water quality is the Jeffersontown Water Quality Treatment Center Elimination Plan. Instead, a pump station will be installed. Work was expected to be completed in December 2015. The wastewater treatment plant which is being taken offline lies in an area prone to flooding which had the potential to degrade water quality if flooding occurred.

A Master Plan for Veterans Park, adjacent to the site where the wastewater treatment plant is being removed, has been developed and takes into account water quality. Taylor, Siefker, Williams Design Group gave presentation of the conceptual plan for the New Veterans Park layout to the City Council on January 20, 2015.

#### **3.5.6 Monitoring (M)**

The City of Jeffersontown has an interlocal agreement with MSD to perform the monitoring requirements of the MS4 permit. Watershed monitoring performed on Chenoweth Run characterized the water quality of the stream within the City of Jeffersontown MS4 area.



### 3.5.7 Performance Assessment and Reporting (PAR)

The City of Jeffersontown has an interlocal agreement for MSD to prepare the Annual Report. The City of Jeffersontown has provided information on the implementation of the MS4 permit requirements of the City to MSD for this report.

City personnel provide quarterly updates on the Stormwater Program to the City Council.

### 3.5.8 Budget: Personnel, Capital Projects, and Support Services

The City of Jeffersontown estimates the following summary to support the stormwater program:

#### Personnel/ Staffing

City Hall Staff - MS4 Coordinator – Assistant to the Mayor

Public Works Director

Fifteen (15) full-time employees as of August 2015

#### Capital Projects & Drainage Related Projects (2015-16)

|              |           |
|--------------|-----------|
| Drainage:    | \$300,000 |
| MS4 Program: | \$25,000  |

(Outfall screening; catch basins and drainage ways maintenance; community outreach)

#### Co-permittee Commitment

|   |          |
|---|----------|
| Jeffersontown portion of co-permittee responsibilities (annual fee) | \$20,968 |
|---|----------|

PICTURES, CHECKLISTS, CHARTS AND REPORTS ARE AVAILABLE UPON REQUEST.

**CO-PERMITTEE CERTIFICATION**  
**2015 MS4 STORMWATER ANNUAL REPORT**  
**KPDES PERMIT NUMBER KYS000001**

THE CITY OF JEFFERSONTOWN is designated as a co-permittee covered by the Municipal Separate Storm Sewer System (MS4) permit that was issued by the Kentucky Division of Water under the Kentucky Pollutant Discharge Elimination System (KPDES) program. THE CITY OF JEFFERSONTOWN has prepared the attached annual compliance report for the reporting period of **July 1, 2015 to June 30, 2016**.

Under the terms of KPDES Permit No. KYS000001 [Part I.A.2], and implemented through an inter-local agreement with Louisville and Jefferson County Metropolitan Sewer District dated October 16, 2013, THE CITY OF JEFFERSONTOWN certifies that it has responsibility for the following:

- Construction oversight in addition to the regulatory inspections conducted by Louisville MSD pursuant to the Erosion Prevention and Sediment Control Ordinance, Chapter 159;
- Drainage system and outfall mapping;
- Drainage system operation and maintenance;
- Road maintenance and upkeep, including snow and ice removal and related stormwater management activities;
- Drafting and implementing fleet and facility stormwater pollution prevention plans;
- Reporting and referring potential illicit discharges observations by municipal employees or other reports from residents to MSD for investigation and potential enforcement;
- Inspection, operation, maintenance and/or applicable certification that permanent (also known as post-construction) water quality devices, controls, and management practices are operating effectively;
- Implementation of education and outreach within the City of \_\_\_\_ to compliment the education and outreach provided by MSD which is tailored to local water bodies pollutants of concern;
- Preparation and timely submittal of annual compliance demonstration report to MSD according to agreed upon formats and standards; and

Certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the above statements are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

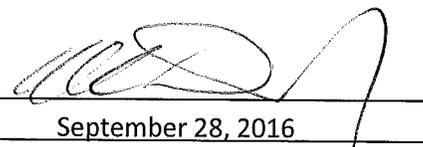
CITY OF Jeffersontown, KY

Name: Bill Dieruf

Title: Mayor

Signature: \_\_\_\_\_

Date: September 28, 2016



**CO-PERMITTEE CERTIFICATION  
MS4 STORMWATER ANNUAL REPORT  
KPDES PERMIT NUMBER KYS000001**

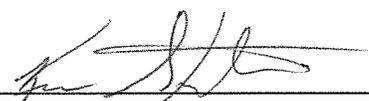
**THE CITY OF ST. MATTHEWS** is designated as a co-permittee covered by the Municipal Separate Storm Sewer System (MS4) permit that was issued by the Kentucky Division of Water under the Kentucky Pollutant Discharge Elimination System (KPDES) program. **THE CITY OF ST. MATTHEWS** has prepared the attached annual compliance report for the reporting period of **July 1, 2015 to June 30, 2016**.

Under the terms of KPDES Permit No. KYS000001 [Part I.A.2], and implemented through an interlocal agreement with Louisville and Jefferson County Metropolitan Sewer District dated April 14, 2014, **THE CITY OF ST. MATTHEWS** certifies that it has responsibility for the following:

- Construction oversight in addition to the regulatory inspections conducted by Louisville MSD pursuant to the Erosion Prevention and Sediment Control Ordinance, Chapter 159;
- Drainage system and outfall mapping;
- Drainage system operation and maintenance;
- Road maintenance and upkeep, including snow and ice removal and related stormwater management activities;
- Drafting and implementing fleet and facility stormwater pollution prevention plans;
- Reporting and referring potential illicit discharges observations by municipal employees or other reports from residents to MSD for investigation and potential enforcement;
- Inspection, operation, maintenance and/or applicable certification that permanent (also known as post-construction) water quality devices, controls, and management practices are operating effectively;
- Implementation of education and outreach within the City of St. Matthews to compliment the education and outreach provided by MSD which is tailored to local water bodies pollutants of concern;
- Preparation and timely submittal of annual compliance demonstration report to MSD according to agreed upon formats and standards; and

Certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the above statements are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

CITY OF St. Matthews  
Name: Kenan Stroutman  
Title: Public Works Dir.

Signature:   
Date: 9/14/16



### **3.4 COMPLIANCE ACTIVITIES REPORT FOR THE CITY OF ST. MATTHEWS**

The City of St. Matthews, Kentucky has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform required activities specified in the KPDES Permit No. KYS000001 to reduce discharge of pollutants and prohibit illicit discharges. The City of St. Matthews was incorporated as a sixth-class city in March of 1950. Since that time, the City's limits have expanded as several neighborhoods been annexed. Since 2000, all residences annexed into the City of St. Matthews, by an ordinances passed by the city council, still pay a storm water fee to MSD. For these specific areas, the City of St. Matthews is not responsible for storm drainage. These areas, and the date they were annexed are as follows:

- Springlee – September 2000
- Plymouth Village – July 2000
- Fairmead – September 2000
- Cherrywood – September 2000
- Broadfields – July 2000
- Springwood – July 2014

This subsection will focus on those activities for which the City of St. Matthews was responsible during the permit period and will document the compliance tasks performed by St. Matthews during the period of July 1, 2015– June 30, 2016.

#### **3.4.1 Illicit Discharge Detection and Elimination (IDDE)**

The IDDE program is intended to detect and eliminate illicit connections and improper disposal to the MS4. St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain IDDE tasks. Therefore, only those tasks performed by the City of St. Matthews are listed in this report. MSD performs illicit discharge investigation and follow-up through out Louisville Metro, including the City of St. Matthews.

In 2011 the City of St. Matthews contracted with HDR to develop a GIS system to map the City's drainage facilities. The interactive site can be used to display all pipes, direction of flow, and sizes. Many of the systems which constructions plans were available can be accessed from the site.

##### **3.4.1.1 Illicit Discharge / Illegal Dumping Ordinance IDDE-4**

In 2008 the City of St. Matthews put together a hotline list and distributed the list to all its residents via a Newsletter sent to residents four times a year. The intention was to provide a quick and easy to use reference for residents. The hotline provides a directory for city personnel from police to council members. Amongst those numbers on the list is a direct line for individuals to report illegal dumping or illegal discharge into the storm sewer system. The goal is to simplify the reporting process of this illegal act, and to inform the appropriate people so that quick action can be taken. The city has also added this directory of numbers to the St. Matthews website. <http://www.stmatthewsky.org/>

The City has two fulltime employees that are dedicated to Code Enforcement. A part of their daily duties are associated with investigating and enforcing our illegal dumping ordinance.

Signs are posted in areas which continue to be problem areas. City maintenance staff performs inspections at these sites throughout the year in an effort to reduce dumping & improve enforcement.

### **3.4.1.2 Provide Education on the Revised Wastewater Discharge Regulations IDDE-5**

The City of St. Matthews publishes and distributes a newsletter at least four times per year to all residential property owners within the city limits. This newsletter is an excellent vehicle with which to provide information to the citizens and to alert them to issues and programs that affect the community. In the past, small narratives have been periodically provided to inform residents of drainage problems and ways to report them.

In 2009 the City of St. Matthews added a “Green” page to its website. The “Green” page provides links to various websites, including <http://www.louisvillegreen.com>, <http://www.stormwater.kytc.ky.gov/>, <http://msdlouky.org>, & <http://rumpke.com>, all of which provide educational material about the Wastewater Discharge Regulations. During this past year, a new section/link was added specifically for education. The link is to the KYTC stormwater webpage “If its on the ground, its in your water.”

The City of St. Matthews City Engineer and Director of Public Works/MS4 Coordinator have attended all MS4 presentations and meetings held with MSD and other co-permittees staff. Information is then relayed to appropriate staff (ie Public Works and City Council).

Annually the City of St. Matthews hosts an elementary school to show then the “insides” of City Hall and how the government operates. A separate break-out session related to public works and maintenance is given. During this session the Director of Public Works provides a 10 min informative session on what happens to water that goes into the drain.

The City is in the planning session of developing an outdoor class room at Community Center Park. The outdoor class room will be located in the city park, next to an existing wetland. The class room can be utilized by local science teachers to aid in the understanding of the environment.

### **3.4.2 Construction Site Runoff Controls (CS)**

Sedimentation and erosion from land disturbing activities can have severe impacts to stream systems. The City of St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit to perform certain CS program tasks. MSD administers and enforces the Erosion & Sediment Control Ordinance. Therefore, only those tasks performed by City of St. Matthews are listed in this report.

#### **3.4.2.1 Erosion Prevention and Sediment Control Plan (EPSC) CS-1**

St. Matthews obtains EPSC and Site Disturbance Permits from MSD on applicable projects constructed with Public Works crews and projects bid out. The City holds themselves and their contractors to the same EPSC standards as private contractors working within the City.

Before a building permit is granted, the developer needs to pay a review fee to MSD for plan approval on all storm and sanitary design. MSD is responsible for all sanitary systems located within St. Matthews, but it does not maintain the storm water system (with the exception of the six areas annexed after 2000). Prior to any approvals, MSD confirms with the City of St. Matthews that there are not any existing complaints or reported problems in the project area.



**3.4.2.2 Scheduled Inspections of BMP’s CS-5**

The City of St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, however MSD administers approval and inspection on EPSC and Site Disturbance Permits for construction projects within the City. For private construction, a city official or representative periodically inspects sites for compliance with the EPSC Ordinance. Should a violation occur, St. Matthews will request MSD’s assistance to bring the site into compliance.

**3.4.3 Post Construction Controls (PC)**

Best Management Practices for managing the increase in impervious area and controlling the subsequent increases in runoff quantity, velocity and pollutant migration include planning for on-site capture systems, protecting stream corridors, and implementing regulations and policies. The City of St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain PC program tasks. Therefore, only those tasks performed by the City of St. Matthews are listed in this report.

**3.4.3.1 Pilot BMP Projects PC-2**

The City of St. Matthews is known as an urban environment populated with many mature trees and the City intends to keep it that way. Following the ice and wind storms in 2008, the City increased its tree planting efforts in an effort to maintain this atmosphere. During this reported cycle, the city has planted approximately 115 two to three-inch diameter trees. The City’s maintenance crews planted the new trees in public parks and in public rights of way. Should residents want a tree in front of their house, inside the City R/W, they can request a tree on the City’s website.

In years past, the City of St. Matthews developed a Storm Water Drainage Master Plan in order to provide a separate storm sewer system for its residents. The City is in its final stages of development of the Master Plan and continuously maintains the areas previously constructed. The plan is continuously updated to handle ongoing issues. The following are a list of projects performed during the last reporting period.

|           |                |             |                 |
|-----------|----------------|-------------|-----------------|
| SEPT '15  | ORMOND DR      | DRY WELL    | 50 LF X 6FT     |
| SEPT '15  | HARRIS PLACE   | STORM SEWER | 1 CB            |
| FEB '16   | RUDY LANE      | STORM SEWER | 1 CB / 20' PIPE |
| MARCH '16 | CORN ISLAND CT | STORM SEWER | 4CB / 300' PIPE |
| APRIL '16 | BAUER AVE      | STORM SEWER | 20' PIPE/1CB    |
| APRIL '16 | LAKE AVE       | STORM SEWER | 3CB             |

The City of St. Matthews has been actively replacing all open throat catch basins with grated type basins where possible. This program provides improved capture and removal of debris from grates, rather than allowing the debris to enter the separate storm sewer system. During this report period the City has replaced 2 open throat catch basin.



In November of 2015 the City of St. Matthews reconstructed a portion of the ditch along Trinity Hills. The area continuously flood as a resident had filled in the ditch and placed a structure in the easement. Continuous erosion and sediment deposits downstream were constant maintenance issues. The \$78,000 project awarded to E/Z Construction reconstructed 200' of channel and included the instillation of diffusers to help reduce velocities in the channel.

The last phase of the City of St. Matthews revitalization project within Community Center Park was initiated in June of 2014 in an attempt to prolong the life of the park and promote a healthy life style. The project provided for stream bank modification and bank grading along approximately 2,660 feet of intermittent tributaries to Middle Fork Beargrass Creek and approximately 40 feet of ephemeral stream channel. The project also provided for the replanting of 260 trees and shrubs. The \$508,000 construction contract awarded to Joe Asher Construction in July of 2015. Construction and stabilization was completed in March of 2016.

#### **3.4.3.2 Built-upon Area Reductions PC-3**

The City has a program to reduce the number of off-street parking pads within the public right of way. This activity will reduce the amount of impervious surfaces and replace with grass; thus decreasing surface runoff and providing additional filtering of runoff before entering the separate storm sewer systems.

This program provides property owners wanting this service an easy and free solution. Once the resident contacts the City; City forces will remove the pad, haul away the material, regrade the area, & then restore the disturbed area back to turf. During this report period, two property owner participated in this program. To date there have been 18 pads removed from the City right of way, including the 3 green-up during this report period. The program was advertised in the newsletter a few years ago. To help shed light on the program the newsletter will run another article.

During this report period the City has embarked on a revitalization project for the City Hall Campus. The project provides for a complete campus parking and circulation over hall. With the construction of 9,000 SF library addition and new parking lots, the design implements “green technologies” to reduce the overall impervious footprint. The project optimizes parking lot layout and is designed with pervious pavements.

#### **3.4.3.3 Source Control PC-4**

Dumpsters in St. Matthews are required to be fenced for litter control. All garbage cans that are proposed or replaced within the city parks are equipped with lids to limit animal access and to reduce litter resulting from wind. Twice a week, City forces empty the trash in all public trash cans to decrease the occurrence of cans over flowing. All City salt storage facilities are covered with permanent roofs. New developments and redevelopments within the City of St. Matthews require downspouts to discharge onto surface areas or rocked French drains rather than tied directly to the storm sewers. The City (Public Works, Fire & Rescue, and Police) refuel all vehicles at commercial fueling stations to limit the occurrence of unmanaged spills.



**3.4.4 Good Housekeeping / Pollution Prevention (GH)**

**3.4.4.1 Street Maintenance GH-1**

The City of St. Matthews abides by the EPSC General Permit regulations. Street maintenance is performed on an as-needed basis, the city utilizes Louisville Metro’s annual contract to resurface local streets. All storm drainage projects are finalized with resurfacing to assure positive drainage. St. Matthews uses inlet protection (stone bags and magnetic inlet filters) and/or silt fence on its storm sewer projects to minimize soil and debris entering the storm sewer system. Throughout the year, on an as needed basis, city crews remove storm debris from public rights-of-way and transport to the landfill.

**3.4.4.2 Street Sweeping GH-2**

The majority of the City’s streets are not curbed. This drainage system allows water to run-off into adjacent yards and into small yard inlets. The small yard inlets or catch basins allow time for the storm water runoff to infiltrate the greenscape prior to entering the storm sewer system. The City uses a private street sweeping company, Sweep All, to clean all curbed streets. This reduces the amount of pollutants that enter the separate storm sewer system by removing sediment and debris from streets and disposing of them properly. Street sweeping is performed on an as needed basis (min of 2 times per year)

**3.4.4.3 Catch Basin Cleaning/ Repair GH-3**

Storm sewers are cleaned as needed by city employees or contract services. The usual problem areas are routinely checked. During the fall months, when catch basin blockages are at their highest, City forces use vacuum systems to remove leaves throughout the community’s rights of way. Debris is transported to a landfill. This report period, the city retained records for removing approximately 38– 30 cubic yard dumpsters of mulched leaves. The leaf collection period runs from October 31<sup>st</sup> – December 5, 2011.

**3.4.4.4 Storm Sewer Cleaning GH-4**

Storm sewers are cleaned as needed by city employees or contract service. Debris is transported directly to a landfill or place in a dumpster and transported. Below is a list of storm sewer cleanings or repairs performed this report period:

|       |                |                       |        |
|-------|----------------|-----------------------|--------|
| April |                |                       |        |
| ‘16   | Corn Island Ct | Cleared Entrance Pipe | 2 TONS |

**3.4.4.5 Channel Maintenance GH-5**

Public Works performs drainage channel maintenance as needed. Maintenance is done during periods of low flow and low frequency. Problem areas are routinely checked and maintained. The debris is transported to a landfill. The following are the areas cleaned and the amount of material removed.

|          |                    |                |         |
|----------|--------------------|----------------|---------|
| Dec. '15 |                    |                | 200     |
| Jan. '16 | WEICHER CREEK      | DITCH CLEANING | TONS    |
| May '16  | WARWICK PARK DITCH | DITCH CLEANING | 80 TONS |



April '16

LAKE AVE

DITCH CLEANING

100 TONS

#### **3.4.4.6 Pollution Prevention for De-icing GH-6**

Beginning in the winter of 2007, the City of St. Matthews began experimenting with the use of Geomelt, a natural anti-icing fluid derived from sugar beets in its street salting program. The use of this material is expected to allow a reduction of the use of salt as well as fewer applications, which translates into a much more environmentally friendly solution to snow and ice response that uses less fuel and causes less wear and tear on equipment.

During this reporting period, the City used 280 TONS OF SALT & 175 GAL. OF BEET JUICE between January 2015 and March 2016.

#### **3.4.4.7 BMP Inspection GH-7**

Good Housekeeping / pollution Prevention BMP's are inspected by public works and construction personnel.

#### **3.4.4.8 BMP Maintenance GH-8**

Maintenance activities are performed by city crews and contract services. On 08/15 the City constructed a secondary covered storage bin constructed for mulch, and debris (overflow for salt if needed). In the past this material was just stockpiled and created opportunities for the material to wash out during heavy rain events. The concrete bins provide a confined area to store the material.

#### **3.4.4.9 Pollution Prevention for Herbicides and Pesticides GH-9**

City of St. Matthews uses "Round-up" sparingly on weeds. These chemicals are not bought or stored in bulk by the City of St. Matthews. No pesticides are used. The lack of necessary license limits us to certain operations.

#### **3.4.4.10 Continuation of Existing Programs GH-10**

The City contracts out the collection of municipal waste, yard waste, and recyclables weekly to Rumpke. The City has operated a leaf collection program citywide since 1990 to assist residents in the collection and disposal of leaves during the fall season. This activity provides the residents a strong incentive to rake leaves in a timely manner and is important in that it dramatically reduces sediment and debris from the separate storm sewer systems and its discharge waters.

This program provides for two leaf pickups along each residential street throughout the City during the fall months. The Fall Newsletter identifies an approximate schedule for each street. Signs are posted approximately 1 week in advance of the pickup to provide residents time to rake leaves to the front of their properties.

- During this reporting period, the City filled approximately 35 – 30 cubic yard dumpsters. This yard waste material was collected and placed in steel dumpsters and was picked up and removed by Rumpke.

### **3.4.5 Public Education/outreach programs (PE)**

The Permit included requirements for support of existing programs plus several new initiatives to increase public awareness of water quality issues and to promote a sense of stewardship for the streams in Jefferson County. The City of St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain public education program tasks. Therefore, only those tasks performed by the city are listed in this report.

#### **3.4.5.1 Public Education Programs PE-1**

The City of St. Matthews publishes and distributes a newsletter at least four times per year to all residential property owners within the city limits. This newsletter is an excellent vehicle with which to provide information to the citizens and to alert them to issues and programs that affect the community. In the past, small narratives have been periodically provided to inform residents of drainage problems and ways to report them. The City implements an annual drainage improvement program to address surface drainage concerns throughout the city. Typically, drainage projects affecting approximately one block have a public information meeting prior to finalizing the design to solicit input from the public on the problems as well as possible solutions.

The City will continue to utilize its newsletter to provide details about the leaf pickup and yard waste bag/sticker program available to its citizens. Specific program details include scheduled leaf pickup dates for areas of town, and phone number/contacts for problems or requests for additional pickups.

The City has revamped its website. [www.stmatthews.org/](http://www.stmatthews.org/). The website provides another, "at your fingertip," source for property and business owners to find the specific information such as leaf pickup, storm damage pickup, recycling programs, etc.. A featured link informs property owners how to choose the correct tree in order to reduce utility costs while maintaining pedestrian and vehicular safety.

Within the website, there is a link for property owners to place a request for a tree to be planted in the R/W at their house. This program not only greens up the city, it gives its residents a viable option to help improve the area at no cost to themselves individually.

#### **3.4.5.2 Earth Day PE-2**

The City of St. Matthews at this time does not hold separate Earth Day activities.

#### **3.4.5.3 Litter Control PE-3**

The City of St. Matthews has not organized specific events, but uses its public works crew to maintain litter control on streets and public properties. The city has hired employees to empty public garbage cans located within public parks and spaces a minimum of twice a week.

The City has initiated a program to install signs and waste receptacles at City parks and community centers to inform/remind the public they are responsible for cleaning up after their pets. The major city owned public parks now have waste receptacles and bags on site for pet owners' use while on the property. These will be placed at strategic locations within the facilities to maximize availability by the public.



#### **3.4.5.4 Internal Training PE-4**

The City of St. Matthews Mayor and City Engineer have attended MS4 presentations by MSD staff. MSD attended a city council meeting during this reporting period to inform city council members and citizens about the MS4 program and the roles the co-permittees play.

#### **3.4.5.5 Children Training PE-5**

Annually the City of St. Matthews hosts an elementary school to show them the “insides” of City Hall and how the government operates. A separate break-out session related to public works and maintenance is given. During this session the Director of Public Works provides a 15 min informative session to each of the 5 classes on what happens to water that goes into the drain.

The City is in the planning session of developing an outdoor class room at Community Center Park. The outdoor class room will be located in the city park, next to an existing wetland. The class room can be utilized by local science teachers to aid in the understanding of the environment.

#### **3.4.5.6 City Festival/Informational Propaganda PE-6**

Beginning in the 2015/2016 reporting period the City will provide handouts and other informational material in the City Tent displayed at the various social events. The two main events that will provide information is at the Halloween Festival (held in October at Brown Park) and the City Street Fair ( held May).

#### **3.4.6 Monitoring (M)**

St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 Permit. St. Matthews provides an annual report which documents the compliance tasks performed during the individual permit periods.

#### **3.4.7 Reporting (R)**

St. Matthews has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 Permit. St. Matthews provides an annual report which documents the compliance tasks performed during the individual permit periods.

#### **3.4.8 Financial**

This Section provides a summary of the SWQMP Financing. St. Matthews utilizes the SWQMP as a business plan to guide the various agencies and departments in how they will implement the various requirements of the MS4 Permit. While there are interlocal agreements between MSD and St. Matthews, including compensation for the monitoring program, finances are managed separately.



### 3.4.8.1 St. Matthews

\*Includes operating budgets for stormwater related efforts.

| St. Matthews Annual Operating Budget for 2015 (\$,000) |             |        |        |        |        |        |
|--|-------------|--------|--------|--------|--------|--------|
|  | Fiscal Year |        |        |        |        |        |
|  | 2012        | 2013   | 2014   | 2015   | 2016   | 2017   |
| Total Operating Budget                                 | 10,195      | 10,200 | 11,517 | 13,145 | 13,145 | 15,919 |
| Estimated Stormwater Operating Budget*                 | 1,682       | 750    | 900    | 725    | 1,000  | TBD    |
| Annual Capital Budget (\$,000)                         |             |        |        |        |        |        |
|  | Fiscal Year |        |        |        |        |        |
|  | 2012        | 2013   | 2014   | 2015   | 2016   | 2017   |
| MS4 Capital Budget                                     | 680         | TBD    | 1,500  | 750    | 700    | TBD    |

| Historical Estimated Full Time Equivalent (FTEs) |             |      |      |      |      |      |
|--|-------------|------|------|------|------|------|
|  | Fiscal Year |      |      |      |      |      |
|  | 2012        | 2013 | 2014 | 2015 | 2016 | 2017 |
| Stormwater Staff Position (FTE) *                | 15          | 13   | 13   | 14   | 15   | TBD  |

\* includes staff from various departments including drainage, engineering, public works, maintenance.. Staff with a portion of their time related to stormwater are consolidated.



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### **3.5 COMPLIANCE ACTIVITIES REPORT FOR THE CITY OF SHIVELY**

The Co-Permittees individually and collectively continue to perform the required activities specified in KPDES Permit # KYS000001. This section will focus on those activities for which the City of Shively was responsible during the permit period and will document the compliance tasks performed by City of Shively during the period of July 1, 2015– June 30, 2016.

#### **3.5.1 Illicit Discharge Detection and Elimination (IDDE)**

City works department installed a total 800 feet of 12” drainage tile on Kingswood Way, Farnsley Road and Kelland Way

##### **3.5.1.1 Illicit Discharge / Illegal Dumping Ordinance IDDE-4**

The City of Shively enforces its illegal dumping ordinance.

- The city’s Code Enforcement Board, is continuing to cite residents with debris blocking their drainage ditches.

##### **3.5.1.2 Provide education on the Revised Wastewater Discharge Regulations IDDE-5**

The City of Shively posts “no dumping” signs at two locations within the city.

#### **3.5.2 Construction Site Runoff Controls (CS)**

The City of Shively has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain CS program tasks.

##### **3.5.2.1 Erosion Prevention and Sediment Control Plan (EPSC) CS-1**

The City of Shively has an approved EPSC General Permit issued by MSD for Public Works activities.

##### **3.5.2.2 Scheduled Inspections of BMPs CS-5**

A City of Shively Code Enforcement Officer inspects construction sites as needed.

#### **3.5.3 Post Construction Controls (PC)**

##### **3.5.3.1 Pilot BMP Projects PC-2**

Shively continued a practice of not installing paved curbs and gutters on residential streets. Grass swales are used to collect street runoff.

- On February 14, 22013, Girl Scout Cayley Crum and her mom, Colleen Crum, along with



the City of Shively and Louisville Metro Tree Commission began a mission of planting 50-200 trees in the City of Shively's two parks. The project was named "ReTree Shively." The project was completed this year with the planting of 50 trees of various species. There is a Facebook page "ReTree Shively" with additional information.

### **3.5.3.2 Built-Up Area Reductions PC-3**

Shively adopted the provisions of Cornerstone 2020.

### **3.5.3.3 Source Controls PC-4**

The City of Shively facilities have approved HMPC plans. De-icing salts are either stored in a building or they are covered.

### **3.5.4 Good Housekeeping / Pollution Prevention (GH)**

The components of the drainage system require routine inspections and maintenance. The City of Shively performed the following activities during the permit year:

- Augured approximately 2,000 feet of drainage pipe.
- Removed silt and debris from 1,100 feet of concrete paved ditch on Fern Lea Rd.
- Removed silt and debris from 350 feet of concrete paved ditch on Moray Ct.
- Cleaned and maintained 5,000 feet of drainage ditches.
- The city contracted with Louisville Paving Inc. to construct two storm water retention basins with ground water recharge located on Hampstead Drive. One basin will have a 17,000 gallon capacity and the other 30,000 gallon capacity. The contractor began work on the project in May of 2015 and the project was completed in June of 2016 at a cost of \$175,000.

#### **3.5.4.1 Street Maintenance GH-1**

Street maintenance by Shively is performed on an as-needed basis. The City of Shively follows the EPSC General Permit requirements.



#### **3.5.4.2 Street Sweeping GH-2**

The City of Shively manually collects debris along Dixie Highway as needed. The City of Shively cleans curb and gutter roads within the city on an average of twice per year. Debris removed from streets and gutters is sent to a landfill.

#### **3.5.4.3 Catch Basin Cleaning GH-3**

Catch basins are manually cleaned as needed. The debris is taken to a landfill.

#### **3.5.4.4 Storm Sewer Cleaning GH-4**

Storm sewers are cleaned as needed with a pressure auger. Debris is collected and sent to a landfill.

#### **3.5.4.5 Channel Maintenance GH-5**

Silt is removed from drainage ditch channels as needed. Silt is generally removed by hand to minimize the impact to the channel, though equipment is sometimes used when necessary. Debris removed from drainage channels is sent to a landfill.

#### **3.5.4.6 Pollution Prevention for De-icing GH-6**

The City of Shively calibrates salt spreaders as needed. Salt is pre-wetted with liquid calcium chloride to maximize effectiveness. De-icing salts are stored in a building.

#### **3.5.4.7 BMP Inspections GH-7**

Good Housekeeping/Pollution Prevention BMPs are inspected regularly by the City of Shively Maintenance Director.

#### **3.5.4.8 BMP Maintenance GH-8**

Good Housekeeping/Pollution Prevention BMPs are regularly maintained.

#### **3.5.4.9 Pollution Prevention for Herbicides and Pesticides GH-9**

The City of Shively does not use pesticides. Herbicides are used sparingly.

#### **3.5.4.10 Continuation of Existing Programs GH-10**

The city collects municipal waste once per week and collects yard waste and recyclables weekly. The numbers of garbage pickup days were reduced from twice a week to once a week to encourage recycling. The City of Shively recycles newspaper, plastic, aluminum cans, cardboard and glass.



The city maintains a fully automated trash collection system that furnishes each residence with a 95-gallon roll-out container. Only trash that fits into the container is allowed to be set out on trash day.

The city offers a monthly “large item” collection, when the citizens may set out three items.

A private contractor picks up used oil from the City of Shively’s maintenance facility.

### **3.5.5 Public Education/Outreach Programs (PE)**

The City of Shively has an interlocal agreement with MSD, the primary Co-Permittee on the MS4 permit, to perform certain public education program tasks. Therefore, only those tasks performed by the City of Shively are listed in this report.

#### **3.5.5.1 Public Education Programs PE-1**

The City of Shively maintained a website, [www.shivelyky.org](http://www.shivelyky.org). Public education also takes place through quarterly newsletters which address services including recycling, leaf pick-up, appliance and junk pickup days and catch basin cleaning.

#### **3.5.5.2 Earth Day PE-2**

The City of Shively does not hold separate Earth Day activities. Community-wide Earth Day celebrations at the Louisville Zoo are sponsored by Louisville Metro.

#### **3.5.5.3 Litter Control PE-3**

Cane Run Elementary and Butler High School have Adopt-A-Stream programs.

#### **3.5.5.4 Internal Training PE-5**

The City of Shively's Mayor, City Administrator and Maintenance Director have attended MS4 presentations by MSD staff.

The Maintenance Director attended quarterly MS-4 meetings and the Annual SORP Overview Presentation.

### **3.5.6 Monitoring (M)**

The City of Shively has an interlocal agreement with MSD to perform the Monitoring requirements of the MS4 permit. Watershed monitoring performed on the Mill Creek Cutoff characterized the water quality downstream from the City of Shively MS4.

### **3.5.7 Reporting (R)**

The City of Shively has an interlocal agreement for MSD to perform the Annual Reporting function. Shively provided MSD with the information regarding its MS4 program activities for this Annual Report.

**CO-PERMITTEE CERTIFICATION  
MS4 STORMWATER ANNUAL REPORT  
KPDES PERMIT NUMBER KYS000001**

THE CITY OF SHIVELY is designated as a co-permittee covered by the Municipal Separate Storm Sewer System (MS4) permit that was issued by the Kentucky Division of Water under the Kentucky Pollutant Discharge Elimination System (KPDES) program. THE CITY OF SHIVELY has prepared the attached annual compliance report for the reporting period of **July 1, 2015 to June 30, 2016**.

Under the terms of KPDES Permit No. KYS000001 [Part I.A.2], and implemented through an interlocal agreement with Louisville and Jefferson County Metropolitan Sewer District dated 7-1-15, THE CITY OF SHIVELY certifies that it has responsibility for the following: 6-30-16

- Construction oversight in addition to the regulatory inspections conducted by Louisville MSD pursuant to the Erosion Prevention and Sediment Control Ordinance, Chapter 159;
- Drainage system and outfall mapping;
- Drainage system operation and maintenance;
- Road maintenance and upkeep, including snow and ice removal and related stormwater management activities;
- Drafting and implementing fleet and facility stormwater pollution prevention plans;
- Reporting and referring potential illicit discharges observations by municipal employees or other reports from residents to MSD for investigation and potential enforcement;
- Inspection, operation, maintenance and/or applicable certification that permanent (also known as post-construction) water quality devices, controls, and management practices are operating effectively;
- Implementation of education and outreach within the City of SHIVELY compliment the education and outreach provided by MSD which is tailored to local water bodies pollutants of concern;
- Preparation and timely submittal of annual compliance demonstration report to MSD according to agreed upon formats and standards; and

Certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the above statements are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

CITY OF SHIVELY  
Name: JOHN HAYWOOD  
Title: DIRECTOR PUBLIC WORKS

Signature:   
Date: 9-14-16



## **CHAPTER 4 TOTAL MAXIMUM DAILY LOADS**

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## CHAPTER 4 TOTAL MAXIMUM DAILY LOADS

### 4.1 Approved TMDLs in Jefferson County

This Section provides an assessment of the Total Maximum Daily Loads (TMDLs) requirements in the MS4 Permit, Section D.1.c. KDOW is responsible for preparing TMDLs for impaired waters and Table 4.1.1 below shows the TMDLs that have been approved and published by KDOW for waterbodies in Jefferson County. TMDL documents are available at: <http://water.ky.gov/waterquality/Pages/ApprovedTMDLs.aspx>.

**TABLE 4.1.1 APPROVED TMDLS**

| Title   | 303(d) Impairment       | Year of Approval | County  |
|---|-------------------------|------------------|---|
| Development of an Ultimate Oxygen Demand (UOD) TMDL for Floyds Fork and its Tributaries   | Organic Enrichment      | 1997             | Jefferson, Shelby                                     |
| Development of a Total Phosphorus TMDL for Chenoweth Run (Phase I)  | Nutrients               | 1997             | Jefferson   |
| Harrods Creek Dissolved Oxygen TMDL   | Organic Enrichment      | 1995             | Oldham, Jefferson                                     |
| Final TMDL for Fecal Coliform - Six Stream Segments within the Beargrass Creek Watershed  | Fecal Coliform          | 2012             | Jefferson   |
| Total Maximum Daily Load for E. coli and Fecal Coliform -18 Stream Segments within the Floyds Fork Watershed-Bullitt, Henry, Jefferson, Oldham, Shelby and Spencer Counties, Kentucky | E. coli, Fecal Coliform | 2014             | Bullitt, Henry, Jefferson, Oldham, Shelby and Spencer |

The 1997 TMDLs for Floyds Fork and Chenoweth Run and the 1995 TMDL for Harrods Creek address wastewater facilities and do not include wasteload allocations for stormwater or load allocations for nonpoint sources. The 2012 TMDL for Beargrass Creek includes wasteload allocations for sanitary sewer overflows, combined sewer overflows, MS4 stormwater KPDES sources and wasteload and load allocations for groundwater sources. The 2014 bacteria TMDL for Floyds Fork includes a margin of safety, sanitary wastewater facilities, future growth, MS4 stormwater and load allocations for nonpoint sources.

### 4.2 303(d) Listed Waterbodies in Jefferson County

KDOW develops a list of impaired waterbodies (i.e., 303(d) list), which is scheduled to be published every two years and approved by USEPA per Clean Water Act requirements. The most recent impaired waterbodies list that has been approved by USEPA was published in 2012 as Integrated Report Volume II, 303(d) List of Surface Waters, which is available at: <http://water.ky.gov/waterquality/Pages/IntegratedReport.aspx>.



The 303(d) listed waterbodies in Jefferson County are summarized in Table 4.2.1. Definitions for abbreviations used in Table 4.2.1 can be found in Table 4.2.2. It is important to note that for many of these waterbodies, stormwater and urban runoff is listed as a suspected source of the impairment.

**TABLE 4.2.1 303(D) LISTED WATERBODIES IN JEFFERSON COUNTY**

| Waterbody & Segment                        | WAH   | PCR  | SCR  | Fish Consumption | DWS  | Assess Date            |
|--|-------|------|------|------------------|------|------------------------|
| Beargrass Creek 0.5 to 1.8                 | 5-NS  | 3    | 3    | 3                | 3    | 3/3/2009               |
| Blue Spring Ditch 0.0 to 2.1               | 2-FS  | 5-NS | 3    | 3                | 3    | 2/22/2006              |
| Cane Run 0.0 to 7.3                        | 2-FS  | 5-NS | 3    | 3                | 3    | 2/11/2011              |
| Cedar Creek 12.05 to 16.1                  | 5-PS  | 3    | 3    | 3                | 3    |                        |
| Cedar Creek 4.3 to 11.1                    | 3     | 5-NS | 2-FS | 3                | 3    | 3/12/2001 - 2/22/2011  |
| Chenoweth Run 0.0 to 5.25                  | 4A-PS | 5-NS | 5-PS | 3                | 3    | 3/12/2001 - 2/22/2011  |
| Chenoweth Run 5.25 to 9.2                  | 4A-PS | 5-NS | 5-NS | 3                | 3    | 3/12/2001              |
| Chickasaw Park Pond                        | 3     | 3    | 3    | 5-PS             | 3    | 10/7/2005              |
| Fern Creek 1.3 to 4.4                      | 5-NS  | 5-NS | 3    | 3                | 3    | 5/2/2001               |
| Fern Creek 0.0 to 1.3                      | 5-PS  | 5-NS | 3    | 3                | 3    | 3/22/2001              |
| Fern Creek 4.4 to 5.9                      | 5-PS  | 5-NS | 3    | 3                | 3    | 3/12/2001              |
| Floyds Fork 11.7 to 24.2                   | 4A-NS | 5-NS | 2-FS | 3                | 3    | 10/15/1999 - 2/22/2011 |
| Floyds Fork 24.2 to 34.1                   | 4A-PS | 5-NS | 2-FS | 3                | 3    | 2/22/2011              |
| Goose Creek 0.3 to 3.6                     | 5-PS  | 5-NS | 3    | 3                | 3    | 3/3/2009               |
| Goose Creek 3.6 to 13.0                    | 5-PS  | 5-NS | 3    | 3                | 3    | 3/3/2009               |
| Hite Creek 0.0 to 5.5                      | 5-NS  | 3    | 3    | 3                | 3    | 4/9/2001               |
| Little Goose Creek 0.0 to 9.2              | 2-FS  | 5-PS | 3    | 3                | 3    | 3/12/2001              |
| Long Run 0.0 to 9.9                        | 2-FS  | 5-NS | 3    | 3                | 3    | 2/24/2011              |
| McNeely Lake                               | 2-FS  | 3    | 3    | 5-NS             | 3    | 8/26/2005 - 3/29/2011  |
| Middle Fork Beargrass Creek 0.0 to 2.0     | 5-NS  | 5-NS | 3    | 3                | 3    | 3/13/2001              |
| Middle Fork of Beargrass Creek 2.0 to 2.9  | 2-FS  | 5-NS | 3    | 3                | 3    | 3/3/2009               |
| Middle Fork of Beargrass Creek 2.9 to 15.3 | 2-FS  | 5-NS | 3    | 3                | 3    | 3/3/2001 - 3/3/2009    |
| Mill Creek 0.0 to 11.2                     | 5-NS  | 5-NS | 3    | 3                | 3    | 3/13/2001              |
| Mill Creek Cutoff 0.0 to 2.4               | 2-FS  | 5-NS | 3    | 3                | 3    | 3/12/2001              |
| Muddy Fork Beargrass Creek 0.0 to 6.9      | 2-FS  | 5-NS | 3    | 3                | 3    | 3/12/2001              |
| Northern Ditch 0.0 to 7.3                  | 5-PS  | 5-NS | 3    | 3                | 3    | 4/1/1998 - 2/24/2011   |
| Ohio River 595.8 to 593.4                  | 2-FS  | 5-PS | 3    | 5-PS             | 2-FS | 7/25/2014              |
| Ohio River 603.1 to 595.8                  | 2-FS  | 2-FS | 3    | 5-PS             | 3    | 7/25/2014              |
| Ohio River 604.3 to 603.1                  | 2-FS  | 5-PS | 3    | 5-PS             | 3    | 7/25/2014              |
| Ohio River 608.7 to 604.3                  | 2-FS  | 5-PS | 3    | 5-PS             | 3    | 7/25/2014              |
| Ohio River 614.0 to 608.7                  | 2-FS  | 5-PS | 3    | 5-PS             | 3    | 7/25/2014              |
| Pennsylvania Run 0.0 to 3.3                | 5-NS  | 5-NS | 5-NS | 3                | 3    | 2/24/2011              |
| Pond Creek/Southern Ditch 5.1 to 8.1       | 5-NS  | 5-NS | 3    | 3                | 3    | 3/13/2001              |
| Pope Lick Creek 0.0 to 2.1                 | 3     | 5-NS | 3    | 3                | 3    | 3/25/2002 - 2/28/2011  |
| Pope Lick Creek 2.1 to 5.5                 | 2-FS  | 5-NS | 3    | 3                | 3    | 2/24/2011              |
| South Fork Beargrass Creek 0.0 to 2.7      | 5-PS  | 5-NS | 3    | 3                | 3    | 3/3/2009               |

*(Continued on next page)*



**TABLE 4.2.1 303(D) LISTED WATERBODIES IN JEFFERSON COUNTY**

| Waterbody & Segment                     | WAH  | PCR  | SCR | Fish Consumption | DWS | Assess Date |
|---|------|------|-----|------------------|-----|-------------|
| South Fork Beargrass Creek 2.7 to 13.6  | 5-NS | 5-NS | 3   | 3                | 3   | 3/15/2001   |
| South Long Run 0.0 to 3.35              | 3    | 5-NS | 3   | 3                | 3   | 3/2/2011    |
| Southern Ditch 0.0 to 5.9               | 2-FS | 5-NS | 3   | 3                | 3   | 4/1/1998    |
| UT to Southern Ditch 0.0 to 2.6         | 5-NS | 3    | 3   | 3                | 3   | 4/16/2004   |
| Wetwoods Creek (Slop Ditch) 2.2 to 4.25 | 5-PS | 5-NS | 3   | 3                | 3   | 4/1/1998    |

**TABLE 4.2.2 REPORTING CATEGORIES**

| Category                                       | Definition   |
|--|--|
| 1  | All designated uses for water body fully supporting.   |
| 2  | Assessed designated use(s) is/are fully supporting, but not all designated uses assessed.  |
| 2B   | Segment currently supporting use(s), but 303(d) listed & proposed to EPA for delisting.  |
| 3  | Designated use(s) has/have not been assessed (insufficient or no data available).  |
| 4A   | Segment with an EPA approved or established TMDL for all listed uses not attaining full support.   |
| 4B   | Nonsupport segment with an approved alternative pollution control plan (e.g. BMP) stringent enough to meet full support level of all uses within a specified time.                           |
| 4C   | Segment is not meeting full support of assessed use(s), but this is not attributable to a pollutant or combination of pollutants.  |
| 5  | TMDL is required.  |
| 5B   | Segment does not support designated uses based on evaluated data, but based on Kentucky listing methodology insufficient data are available to make a listing determination. No TMDL needed. |
| Definitions                                    |  |
| WAH  | Warm Aquatic Habitat (fish and aquatic creatures)  |
| PCR  | Primary Contact Recreation (swimming )   |
| SCR  | Secondary Contact Recreation (wading or boating)   |
| DWS  | Drinking Water Standard (does not apply to local streams except at the Ohio River intake)  |
| FS   | Fully Supports the Use   |
| PS   | Partially Supports the Use   |
| NS   | Non-Support of the use   |
| Source: KDOW 2012 IR Executive Summary Table 1 |  |

Documented improvements in stream water quality through water quality sampling can result in streams being removed from the 303(d) list where water quality standards are being met. Table 4.2.3 shows waterbodies removed (i.e., delisted) from the 303(d) list in Jefferson County. This list was derived from KDOW's TMDL program delisted streams, available on the following website: <http://water.ky.gov/waterquality/Pages/DelistedStreams.aspx>.

MSD developed a de-listing strategy in 2014. The strategy focuses on removing impaired waterbodies from the 303(d) list (i.e. de-listing) if current monitoring data are sufficient and document that applicable surface water standards are met. The following factors are considered: the listed impairment, the data supporting the listed impairment, monitoring data, and the land uses upstream and near the listed impairment. Implementation of the de-listing



strategy is ongoing. In 2015, MSD submitted a de-listing proposal for two stream segments in the Pond Creek watershed for un-ionized ammonia. Finalization of the 303(d) list and de-listed streams for 2014 is expected in the next reporting period. Continued collaboration with KDOW on future stream de-listings is ongoing.

**TABLE 4.2.3 WATERBODIES DELISTED IN 303(D)**

| Waterbody & Segment         | River Miles    | Impairment                | Approval Date |
|-----------------------------|----------------|---------------------------|---------------|
| (Blue) Spring Ditch         | 0.0 to 2.1     | Metals (Cadmium)          | Jul-07        |
| (Blue) Spring Ditch         | 0.0 to 2.1     | Metals (Zinc)             | Jul-07        |
| Beargrass Creek             | 0.5 to 1.8     | Cadmium                   | Sep-11        |
| Cane Run                    | 0.0 to 7.6     | Organic Enrichment/Low DO | Jun-98        |
| Cedar Creek                 | 0.0 to 15.3    | Pathogens                 | Apr-03        |
| Fern Creek                  | 1.3 to 4.4     | Metals (Cadmium)          | Jul-07        |
| Fern Creek                  | 4.4 to 5.9     | Metals                    | Jul-07        |
| Fishpool Creek              | 0.0 to 5.4     | Organic Enrichment/Low DO | Jun-98        |
| Fishpool Creek              | 0.0 to 5.4     | Metals                    | Jun-98        |
| Fishpool Creek              | 0.0 to 5.4     | Pathogens                 | Jun-98        |
| Goose Creek                 | 4.5 to 11.7    | Metals                    | Jun-98        |
| Goose Creek                 | 0.0 to 4.5     | Metals                    | Jun-98        |
| Goose Creek                 | 0.3 to 3.6     | Cadmium                   | Sep-11        |
| Goose Creek                 | 3.6 to 13.0    | Cadmium                   | Sep-11        |
| Harrods Creek               | 3.2 to 4.0     | Organic Enrichment/Low DO | Apr-03        |
| Harrods Creek               | 3.2 – 33.3     | Fecal Coliform            | Jul-14        |
| Little Goose Creek          | 0.0 to 8.7     | Metals                    | Jun-98        |
| Little Goose Creek          | 0.0 to 8.7     | Organic Enrichment/Low DO | Apr-03        |
| McNeely Lake                | 53 ac          | Nutrients                 | Jul-07        |
| Middle Fork Beargrass Creek | 2.3 to 15.2    | Organic Enrichment/Low DO | Apr-03        |
| Middle Fork Beargrass Creek | 0.0 to 2.0     | Cadmium                   | Sep-11        |
| Middle Fork Beargrass Creek | 2.0 to 2.9     | Cadmium                   | Sep-11        |
| Middle Fork Beargrass Creek | 2.9 to 15.3    | Cadmium                   | Sep-11        |
| Mill Creek                  | 0.0 to 4.4     | Turbidity                 | Jun-98        |
| Muddy Fork Beargrass Creek  | 0.0 to 6.9     | Metals                    | Jun-98        |
| Muddy Fork Beargrass Creek  | 0.0 to 6.9     | Organic Enrichment/Low DO | Jun-98        |
| Muddy Fork Beargrass Creek  | 0.0 to 6.9     | Unknown Toxicity          | Jun-98        |
| Ohio River                  | 609.7 to 617.6 | Pathogens                 | May-05        |
| Ohio River                  | 606.8 to 629.9 | Chlordane                 | Apr-03        |
| Ohio River                  | 593.0 to 603.3 | Fecal Coliform            | Sep-11        |
| Pennsylvania Run            | 0.0 to 3.35    | Nutrients                 | Jul-07        |



| Waterbody & Segment        | River Miles                         | Impairment                | Approval Date |
|----------------------------|-------------------------------------|---------------------------|---------------|
| Pond Creek/Southern Ditch  | 14.7 to 16.1                        | Metals                    | May-05        |
| Pond Creek/Southern Ditch  | 14.7 to 16.1                        | Organic Enrichment/Low DO | May-05        |
| South Fork Beargrass Creek | 0.0 to 14.6                         | Metals                    | Jun-98        |
| South Fork Beargrass Creek | 0.0 to 2.7                          | Cadmium                   | Sep-11        |
| Southern Ditch             | 0.0 to 5.5                          | Organic Enrichment/Low DO | Apr-03        |
| <b>Total</b>               | <b>215.35 miles + 53 lake acres</b> |                           |               |

KDOW assesses waterbodies for supporting one or more designated uses. Table 4.2.4 lists waterbodies that were assessed and were found to be supporting one or more designated uses and were not impaired for any assessed uses. Please note that not all designated uses were assessed.

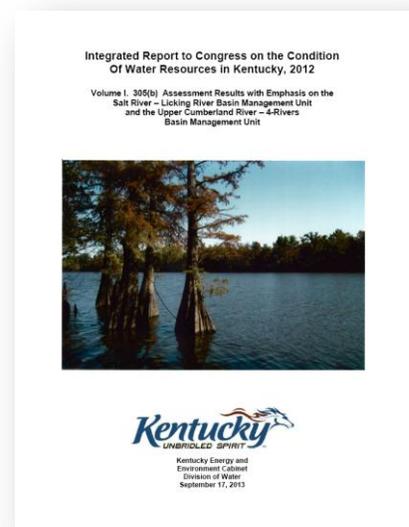
**TABLE 4.2.4 WATERBODIES SUPPORTING ONE OR MORE DESIGNATED USES**

| Waterbody & Segment       | WAH/CAH | PCR  | SCR  | Fish Consumption | DWS | Assessment Date     |
|---------------------------|---------|------|------|------------------|-----|---------------------|
| Fishpool Creek 0.0 to 1.9 | 2-FS    | 2-FS | 3    | 3                | 3   | 3/22/2001           |
| Long Run Lake             | 2-FS    | 3    | 2-FS | 2-FS             | 3   | 8/26/2005-3/29/2011 |
| Miles Park Pond #4        | 3       | 3    | 3    | 2-FS             | 3   | 1/31/2008           |
| Tom Wallace Lake          | 3       | 3    | 3    | 2-FS             | 3   | 9/25/2007           |
| Watterson Lake            | 3       | 3    | 3    | 2-FS             | 3   | 3/4/2009            |
| Willow Pond               | 3       | 3    | 3    | 2-FS             | 3   | 10/7/2005           |

### 4.3 Special Program Efforts

KDOW developed the series of activities identified in the MS4 permit with knowledge of the TMDLs and 303(d) listed waterbodies, which had been finalized at the time the permit was developed. The activities were designed to improve stormwater quality throughout the MS4 area. Progress to implement MS4 program activities is reported throughout this Annual Report.

Additionally, a final TMDL for fecal coliform in Beargrass Creek was issued in 2012 and a final TMDL for fecal coliform and e. coli in Floyds Fork was issued in 2014. MSD will work





with the KDOW to implement the MS4 wasteload allocations in this TMDL to the Maximum Extent Practicable.

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## **CHAPTER 5 MONITORING**

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### **Supporting Information**

Appendix 5 Analyzed Monitoring Data



## **CHAPTER 5 MONITORING**

### **5.1 Introduction**

Chapter 5 provides an overview of MSD's monitoring program and the most recent final monitoring data. A description of the analysis of monitoring data is provided. Results, including comparison to applicable water quality criteria and characterization of water quality under wet and dry conditions, are presented as summaries and on a watershed basis. MSD collects and analyzes monitoring data based on its draft Quality Assurance Project Plan (QAPP) for which review is underway for planned updates.

Pursuant to MS4 Permit Activity 2.7.3, in PY 5, a five-year trend analysis of the pollutants was completed. For fecal coliform and dissolved oxygen, five-year trend graphics are presented in the watershed sections for all sampling locations. For the metals and the parameters without numeric water quality criteria, not all analytes were graphed for all monitoring locations. A screening tool was used to identify a relevant statistical threshold for each analyte. For those locations and analytes where at least one value exceeded the screening criteria statistical threshold, a graphic is presented in the appropriate watershed section.

### **5.2 Monitoring Program Description**

MSD maintains a Long Term Monitoring Network (LTMN), shown on Figure 5.2.1 and Table 5.2.1. It is designed around 27 sites purposefully distributed through the 11 watersheds that flow in or through Jefferson County.

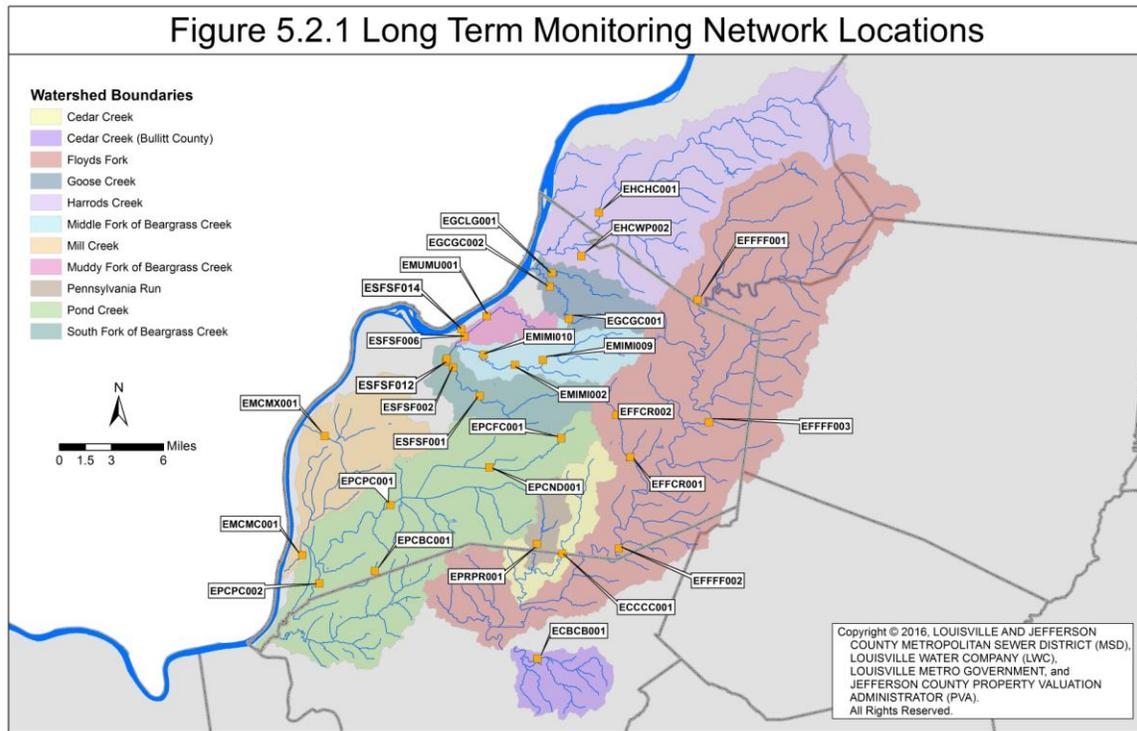


Figure 5.2.1 and Table 5.2.1 list 30 individual sites based on the 27 original monitoring locations. The specific details about what is monitored in each location is described here. Monitoring data collection includes continuous monitoring for temperature, dissolved oxygen, pH and specific conductance at 27 locations and data from 23 of these locations are sent via telemetry to the USGS. Stream flow is monitored at 24 locations. Flow data are not collected at three locations: Wolf Pen Branch at 8200 Wolf Pen Branch Road (EHCWP002), Middle Fork of Beargrass Creek at Browns Lane (EMIMI009) and South Fork of Beargrass Creek at Brownsboro Road (ESFSF006). The flow gage on Beargrass Creek at River Road (ESFSF014) is downstream of Brownsboro Road, and also downstream of the confluence with Muddy Fork of Beargrass Creek. Sonde data are not collected at Mill Creek Cutoff at Cane Run Road (EMCMX001). Because of construction near the South Fork of Beargrass Creek at Schiller Avenue Ramp during the reporting period, the sonde and water quality monitoring site was moved to the South Fork of Beargrass Creek at Breckinridge Street (ESFSF012) and the flow gage was moved to South Fork of Beargrass Creek at Mason Ave (no MSD location code assigned). Data from this location is planned to be transferred to USGS while construction continues. Quarterly water quality and recreational season bacteria monitoring is performed at 27 locations. Biological monitoring of fish, benthic macroinvertebrate, algal communities, and habitat quality is performed every two (2) years at 27 locations.



**TABLE 5.2.1 LONG TERM MONITORING NETWORK LOCATIONS**

| MSD Site #      | USGS Gage # | LTMN Location  | Telemetered Sonde |
|-----------------|-------------|--|-------------------|
| EHCHC001        | 03292470    | Harrods Creek at Covered Bridge Road                     | Yes               |
| EHCWP002        | No Gage     | Wolf Pen Branch at 8200 Wolf Pen Branch Road             | No                |
| EGCGC001        | 03292474    | Goose Creek at Old Westport Road                         | Yes               |
| EGCGC002        | 03292475    | Goose Creek at US 42                                     | Yes               |
| EGCLG001        | 03292480    | Little Goose Creek at US 42                              | Yes               |
| EMUMU001        | 03293530    | Muddy Fork of Beargrass Creek at Mockingbird Valley Road | Yes               |
| EMIMI009        | No Gage     | Middle Fork of Beargrass Creek at Browns Lane            | No                |
| EMIMI002        | 03293000    | Middle Fork of Beargrass Creek at Old Cannons Lane       | Yes               |
| EMIMI010        | 03293500    | Middle Fork of Beargrass Creek at Lexington Road         | Yes               |
| ESFSF001        | 03292500    | South Fork of Beargrass Creek at Trevilian Way           | Yes               |
| ESFSF002        | 03292550    | South Fork of Beargrass Creek at Schiller Avenue Ramp    | No                |
| ESFSF012        |             | South Fork of Beargrass Creek at Breckinridge Street     | No                |
| (no MSD site #) | 03292557    | South Fork of Beargrass Creek at Mason Ave               | No                |
| ESFSF006        | No Gage     | South Fork of Beargrass Creek at Brownsboro Road         | No                |
| ESFSF014        | 03293510    | Beargrass Creek at River Road                            | Yes               |
| EFFFF001        | 03297900    | Floyds Fork at Ash Avenue                                | Yes               |
| EFFFF003        | 03298000    | Floyds Fork at Old Taylorsville Road                     | Yes               |
| EFFFF002        | 03298200    | Floyds Fork at Bardstown Road                            | Yes               |
| EFFCR002        | 03298135    | Chenoweth Run #1 at Ruckriegel Parkway                   | Yes               |
| EFFCR001        | 03298150    | Chenoweth Run #1 at Gelhaus Lane                         | Yes               |
| ECCCC001        | 03298250    | Cedar Creek at Thixton Road                              | Yes               |
| EPRPR001        | 03298300    | Pennsylvania Run at Mount Washington Road                | Yes               |
| EPCFC001        | 03301900    | Fern Creek at Bardstown Road                             | Yes               |
| EPCND001        | 03301940    | Northern Ditch at Preston Highway                        | Yes               |
| EPCPC001        | 03302000    | Pond Creek at Manslick Road                              | Yes               |
| EPCPC002        | 03302030    | Pond Creek at Pendleton Road                             | Yes               |
| EPCBC001        | 03302050    | Brier Creek at Bear Camp Road                            | Yes               |
| EMCMX001        | 03294550    | Mill Creek Cutoff at Cane Run Road                       | NA (1)            |
| EMCMC001        | 03294570    | Mill Creek at Orell Road                                 | Yes               |
| ECBCB001        | 03297800    | Cedar Creek at State Highway 1442                        | Yes               |

**Notes:** Mill Creek Cutoff at Cane Run Road has a flow gage but not a water quality sonde.  
\*MSD maintains three sondes that are not on the USGS telemetered network



**Continuous Monitoring:** Temperature, dissolved oxygen, pH and specific conductance data are collected by MSD and USGS at 23 cooperatively operated monitoring locations using probes called sondes. Every 15 minutes water quality data is sent via telemetry to a USGS National Water Information System (NWIS) database. In addition, MSD operates sondes at four additional sites, and data from these sondes is downloaded manually and housed at MSD. Up to 35,040 records per year were collected for each parameter at each station. Sondes are cleaned, calibrated and maintained on a regular basis by MSD staff who are trained annually by USGS. Increased communication between the USGS and MSD personnel has improved the quality of the continuous monitoring data.

At the end of each water year (October 1 - September 30), USGS performs a quality assurance (QA) review of data collected during the past water year and finalizes the data for the 25 sondes operated cooperatively by MSD and USGS. Based on this review, some records may be adjusted or deleted due to issues with the monitoring probes such as fouling, sedimentation and probe drift. With the cooperative agreement effective June 17, 2016, an MOU is currently being developed between MSD and USGS where final data deliverables will be scheduled. After the 2015 water year yielded a lower than average number of final values for sonde data, MSD and the USGS improved their data collection and QA through enhanced cooperation and communication between the two agencies. The enhancements will be evident in the monitoring data collection for the 2017 MS4 Annual Report.

Independent review of continuous temperature and dissolved oxygen data collected between October 1, 2014, and September 30, 2015, was completed by USGS during this MS4 reporting period. For this Annual Report, the finalized continuous monitoring data were compared to water quality criteria for temperature and dissolved oxygen. Final data are provided in Appendix 5 Analyzed Monitoring Data of this report.

Provisional continuous monitoring data for temperature and dissolved oxygen collected between October 1, 2015, and June 30, 2016, are summarized in Appendix 2.7.1 of this report. The number of records and average concentration were calculated, but comparison to water quality criteria for dissolved oxygen and temperature is not performed until final data is available. Final data collected between October 1, 2015, and June 30, 2016, will be incorporated into the 2017 MS4 Annual Report.

USGS is working to make sonde data more accessible. Recently, NWIS has been modified to support downloading final temperature and dissolved oxygen data as well as provisional data collected for all four sonde parameters within the past 120 days. Data are available from the USGS website: <http://waterdata.usgs.gov/ky/nwis>.

In addition, percent dissolved oxygen saturation was calculated using water temperature data collected via sonde readings and barometric pressure data collected by the National Weather Service at Louisville International Airport.



**Flow:** USGS collects stream flow measurements every 15 minutes from 25 gages and provides provisional and final data on this website: <http://waterdata.usgs.gov/ky/nwis>. In addition to daily flow data, USGS provides a variety of flow statistics such as long term daily and monthly mean flow, which are computed for the duration for which the gage has been active. For this MS4 Annual Report, daily flow data and long term monthly mean data were analyzed to characterize flow on the day of sample collection as wet or dry. Final daily mean flow data were available between July 1, 2015, and September 30, 2015. Provisional daily mean flow data were used to evaluate wet and dry conditions between October 1, 2015, and June 30, 2016. Final flow data used in this MS4 Annual Report are provided in Appendix 5 Analyzed Monitoring Data of this report.

**Quarterly Monitoring:** Between July 1, 2015, and June 30, 2016, MSD collected quarterly water quality samples in July and October 2015 and January and April 2016. The 27 LTMN sites were sampled over a consecutive four-day period during each quarterly sampling event. Samples are collected by trained MSD staff and analyzed by MSD's laboratory using EPA approved methods.

The following results are summarized in this report: biological oxygen demand (BOD), chemical oxygen demand (COD), oil and grease, pH, total dissolved solids (TDS), total suspended solids (TSS), dissolved (i.e., soluble) phosphorus, total phosphorus, total Kjeldahl nitrogen (TKN), and nitrate (NO<sub>3</sub>). For this Annual Report, the finalized quarterly monitoring data were compared to water quality criteria for pH, un-ionized ammonia (NH<sub>3</sub>), cadmium (Cd), copper (Cu), lead (Pb) and zinc (Zn). The analysis for comparing water quality criteria is discussed in section 5.3. Quarterly monitoring data and analytical method information are provided in Appendix 5 Analyzed Monitoring Data of this report.

Quarterly data quality meetings with the MSD sampling staff, the laboratory, and the data analysis section has improved the timeliness and quality of the sample data.

**Bacteria Monitoring:** Trained MSD staff collected and analyzed five fecal coliform samples within a 30-day period during the six-month recreational season in 2015 (July to October) and 2016 (May and June). The sample period coincides with the MS4 reporting period. *E. coli* bacteria samples were collected on a quarterly basis and once per month during the recreational season. Fecal coliform and *E. coli* samples were analyzed in MSD's laboratory using EPA approved methods. Bacteria monitoring data and analytical method information are provided in Appendix 5 Analyzed Monitoring Data of this report.

**Biological Monitoring:** MSD collected biological community samples using protocols developed by EPA and the KDOW. Benthic macroinvertebrate communities and habitat were sampled in May, 2015. Benthic data from both sampling events are included in the database in Appendix 5 of this report. Concurrent data for stream temperature, dissolved oxygen, pH and conductivity were also collected. Fish communities and aquatic habitat data were collected in September and October, 2015. MSD collected algal samples in September and October, 2015



using KDOW protocols. Algal communities were collected on tiles to provide a consistent way to collect samples at each site. Communities were evaluated on tiles collected at least 15 days after the tiles were placed at each site. Benthic macroinvertebrate, algae, fish, and habitat results are provided in Appendix 5 Analyzed Monitoring Data of this report.

### 5.3 Data Analysis

Final water quality data collected via continuous monitoring, quarterly monitoring and recreational season bacteria monitoring were compared to the applicable numeric water quality criteria shown in Table 5.3.1. This table is consistent with water quality criteria in Kentucky Surface Water Standards regulations found in 401 KAR 10:031 and available at: <http://lrc.ky.gov/kar/401/010/031.htm>.

**TABLE 5.3.1 WATER QUALITY CRITERIA**

| Parameter          | Units      | Water Quality Criteria  |
|--------------------|------------|---|
| Temperature        | C          | 31.7 C (instantaneous maximum)  |
| Dissolved Oxygen   | mg/l       | 4.0 mg/l (instantaneous minimum), 5.0 mg/l (24-hour average)  |
| pH                 | Std. units | 6.0 to 9.0  |
| Fecal Coliform     | CFU/100 ml | Geometric mean of 5 samples collected within 30 day period does not exceed 200 CFU and less than 20% of samples exceed 400 CFU/100 ml |
| Un-ionized Ammonia | mg/l       | Shall not exceed 0.05 mg/l: calculated per equations in 401 KAR 10:031  |
| Cadmium            | ug/l       | Acute and Chronic Aquatic Life: calculated per equations in 401 KAR 10:031  |
| Copper             | ug/l       | Acute and Chronic Aquatic Life: calculated per equations in 401 KAR 10:031  |
| Lead               | ug/l       | Acute and Chronic Aquatic Life: calculated per equations in 401 KAR 10:031  |
| Zinc               | ug/l       | Acute and Chronic Aquatic Life: calculated per equations in 401 KAR 10:031  |

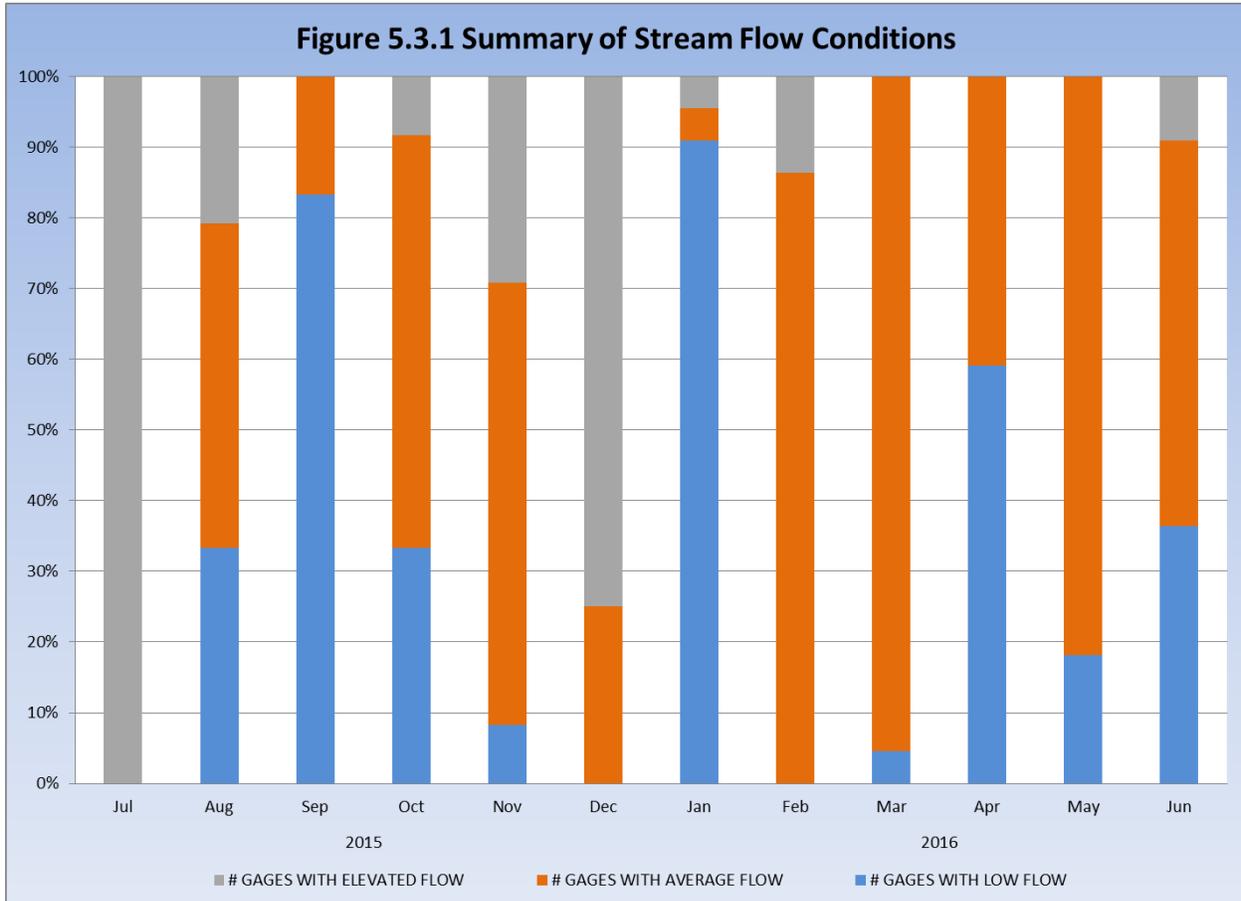
The remaining water quality parameters specified in the permit do not have a numeric water quality criterion and are instead managed through a narrative criterion or are monitored to provide a more thorough characterization of water quality. For parameters that do not have a numeric water quality criterion, the data are summarized in terms of range and average conditions.

**Flow Characterization:** Final daily average flow data collected between July 1, 2015, and September 30, 2015, and provisional daily average flow data collected between October 1, 2015, and June 30, 2016, were used to characterize stream flow on the day of sample collection for this report. If the average stream flow on the day of sample collection was at least 50% greater than the long term monthly average stream flow, the sample was characterized as being collected under wet conditions; all other samples were characterized as being collected under dry conditions. For three locations, adjacent flow gages were used to characterize flow on the day of sample collection.



Three LTMN stations do not have flow gages: Wolf Pen Branch at 8200 Wolf Pen Branch Road (LTMN Site EHCWP002), Middle Fork of Beargrass Creek at Browns Lane (LTMN Site EMIMI009), and South Fork of Beargrass Creek at Brownsboro Road (ESFSF006). The flow gage on South Fork of Beargrass Creek at River Road (ESFSF014) is downstream of Brownsboro Road, and also downstream of the confluence with Muddy Fork of Beargrass Creek. Wolf Pen Branch (LTMN Site EHCWP002) and Middle Fork of Beargrass Creek at Browns Lane (LTMN Site EMIMI009) were deemed by the USGS to not have appropriate site conditions to reliably collect stream flow data. Samples collected at Wolf Pen Branch (LTMN Site EHCWP002) and Middle Fork of Beargrass Creek (LTMN Site EMIMI009) were characterized as being collected under wet or dry conditions based on final and provisional stream flow data from Little Goose Creek at US 42 (LTMN Site EGCLG001, USGS Gage 03292480) and Middle Fork of Beargrass Creek at Old Cannons Lane (LTMN Site EMIMI002, USGS Gage 03293000), respectively. Provisional stream flow data from Beargrass Creek at River Road (USGS Gage # 03293510) were considered to be insufficient for this purpose and was excluded from the analysis. This stream flow gage is strongly influenced by backwater from the Ohio River. Water quality samples collected from this location were characterized as collected under wet or non-wet conditions using stream flows from Middle Fork of Beargrass Creek at Lexington Road (LTMN Site EMIMI010, USGS Gage 03293500).

Monthly stream flow was characterized to provide an overview of stream flow conditions for the report period. For 24 sites with sufficient flow data, the number of months during which stream flow was classified as low, average and elevated was characterized by comparing average monthly stream flows during the report year with the long term monthly average stream flow. Stream flow was classified as “low” for months in which average stream flow was more than 50% below average monthly stream flow. Stream flow was characterized as “elevated” for months in which average stream flow was more than 50% higher than average monthly stream flow. Remaining stream flows were characterized as “average”. Results shown on Figure 5.3.1 highlight the drier conditions during September, 2015 and January, 2015 and the wetter conditions prevalent in July and December, 2015, and average conditions prevalent for the remainder of the report year.



**Continuous Monitoring:** Final dissolved oxygen data collected between July 1, 2015, and September 30, 2015, were compared to water quality criteria shown in Figure 5.4.1. Dissolved oxygen data were aggregated on a daily basis for days that had at least 88 of a possible 96 records. USGS utilizes at least 88 records per day to classify a daily record as “complete”. For this time period, a complete record contains 8,832 readings per parameter. Low water levels, ice, probe drift, fouling and sedimentation, as well as mechanical issues, can reduce the number of days with a complete record.

For each day with at least 88 records, the number of values less than 4.0 milligrams per liter (mg/l) dissolved oxygen and the daily average dissolved oxygen concentration were computed. Analyzed data are provided in Appendix 5 Analyzed Monitoring Data.

Comparison of provisional continuous monitoring data collected between October 1, 2015, and June 30, 2016, was considered to be premature because the USGS data review process has not yet been completed. During the review process, USGS may adjust or delete records to



address drift, fouling, sedimentation or other issues that affect data quality. Therefore, for provisional data, the total number of records and average value for temperature and dissolved oxygen for each sonde are presented. Final data for October 1, 2015, and June 30, 2016, is scheduled to become available by June 30, 2017, and will be analyzed and presented in the 2017 MS4 Annual Report. For this time period, a complete record contains 26,208 readings per parameter. Provisional monitoring data for the previous 120 days is available from USGS via the NWIS website: <http://waterdata.usgs.gov/ky/nwis>.

In addition, percent dissolved oxygen saturation was calculated for July 1, 2015, through September 30, 2015, using water temperature data collected via sonde readings and hourly barometric pressure data collected by the National Weather Service at the Louisville International Airport. Barometric pressure readings collected at the airport were adjusted for the elevation of each monitoring site using an equation published by the Wisconsin Department of Natural Resources (<http://dnr.wi.gov/regulations/labcert/BODCalibration2.html>). Monitoring station elevations were provided by USGS. The adjusted barometric pressure and water temperature readings were used to calculate the theoretical dissolved oxygen saturation using an equation available at <http://www.waterontheweb.org/under/waterquality/oxygen.html>. The percent dissolved oxygen saturation was calculated from available dissolved oxygen data and theoretical dissolved oxygen saturation for each telemetered sonde in the LTMN.

**Quarterly Monitoring:** Data were reviewed for quality assurance purposes, and final data from quarterly samples collected at 27 LTMN sites were compared to numeric criteria for pH, un-ionized ammonia, cadmium, copper, lead, and zinc. The concentration of un-ionized ammonia was calculated from ammonia, pH and temperature data using equations in the Kentucky Surface Water Standards. Per the Standards, concentrations of un-ionized ammonia above 0.05 mg/l are considered harmful to aquatic life. For metals samples, hardness at the time of sample collection was used to calculate hardness-dependent criteria using equations in the Kentucky Surface Water Standards. If hardness data were not available, hardness from a nearby LTMN site was used to calculate hardness-dependent criteria. Sample concentrations were compared to the chronic aquatic life criterion, which in all cases was the most stringent (i.e., lowest) criterion for metals. MSD has shifted quarterly sample collection to the first month of the quarter, so sample analysis was complete for all parameters during this report period.

**Bacteria Monitoring:** Data were reviewed for quality assurance, and final data were compared to applicable criteria for fecal coliform bacteria during the May 1 to October 31 recreational season. *E. coli* bacteria results are reported on a monthly basis during the recreational season and on a quarterly basis for the remainder of the year.

**Biological Monitoring:** Narrative ratings that include “excellent”, “good”, “fair”, “poor” and “very poor” were developed by KDOW to characterize fish, benthic macroinvertebrate, algal communities as well as habitat quality. The standard operating procedures (SOPs) documenting the rating system are available from KDOW at this website: <http://water.ky.gov/Pages/SurfaceWaterSOP.aspx>. The narrative ratings are tailored to



watershed size and ecological region of the state. LTMN sites were classified as “headwaters”, “wadeable” or “boatable” using these protocols. All LTMN sites except Brier Creek at Bear Camp Road and Pond Creek at Manslick Road are located in the Bluegrass ecological region. Brier Creek at Bear Camp Road and Pond Creek at Manslick Road are located in the Pennyroyal ecological region.

MSD collected biological community samples using protocols developed by EPA and KDOW. Benthic macroinvertebrate samples and habitat quality data were collected in September and October, 2015. Concurrent data for stream temperature, dissolved oxygen, pH and conductivity were also collected. MSD collected benthic macroinvertebrate community and aquatic habitat data in May and June 2015. MSD collected algal samples in September and October, 2015 using KDOW protocols. Algal communities were collected on tiles to provide a consistent way to collect samples at each site. Communities were evaluated on tiles collected at least 15 days after the tiles were placed at each site. Fish communities and aquatic habitat were sampled in September and October 2015, using KDOW protocols. Benthic macroinvertebrate, algae, fish, and habitat results are all summarized by watershed in Section 5.5 and provided in full in Appendix 2.7.1 of this report. All biological community sample results referenced were derived from the 2016 Synthesis Report, which is in progress. Additional wet weather sampling has been collected at several LTMN and other sampling locations, and those data will be represented in the 2016 Synthesis Report.

#### 5.4 Water Quality Summary

**Temperature:** Water temperature is an important parameter for the overall health of a stream, since hot water can stress fish and other forms of aquatic life. Final continuous monitoring data collected between October 1, 2014, and September 30, 2015, were analyzed for temperature. The final temperature records ranged from 8% complete (2,801 records) to 79% complete (27,527 records) at 24 sites with continuous monitoring sondes, and most were above 40%. The temperature criterion of 31.7 degrees C was met 100% of the time in available data.

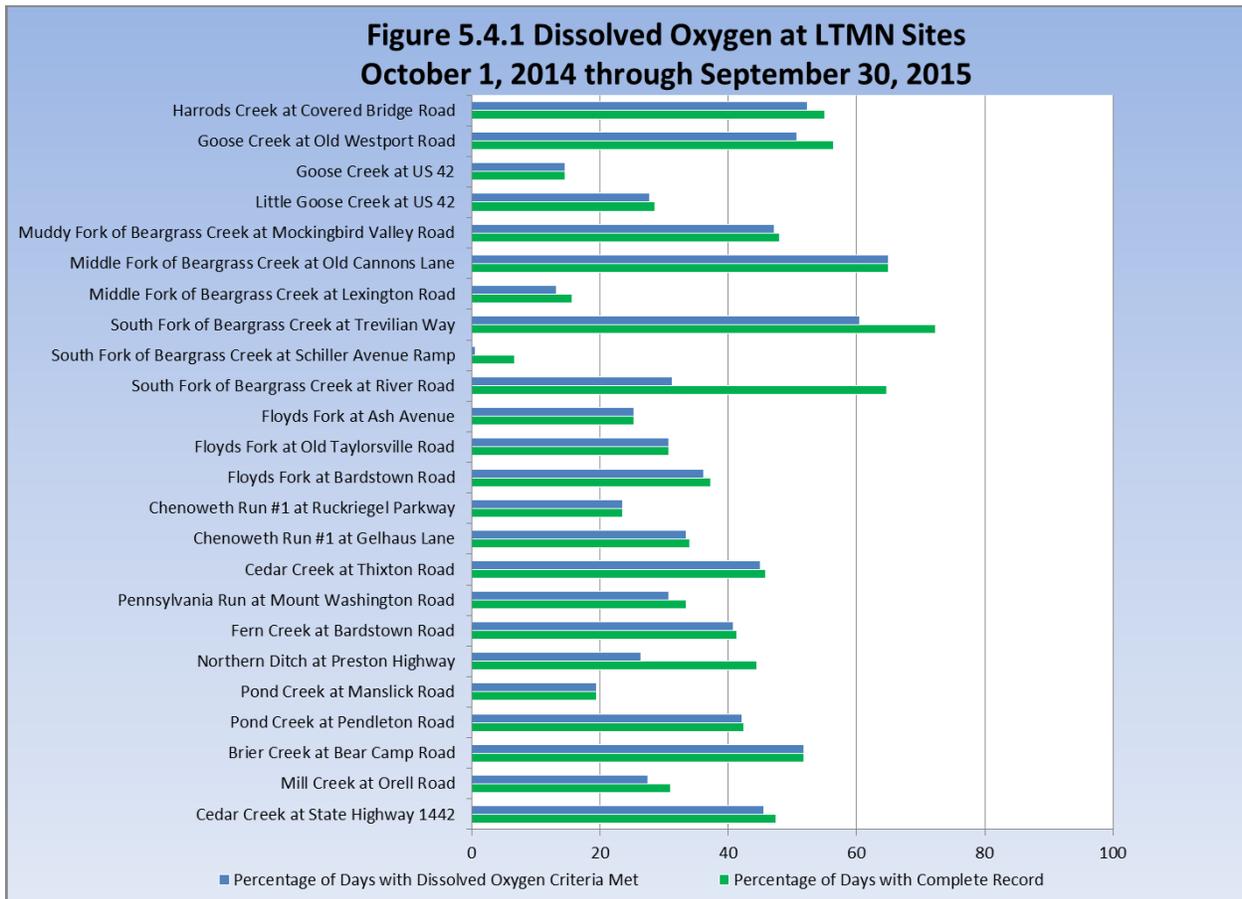
Provisional continuous monitoring data collected between October 1, 2015 and June 30, 2016 (i.e., 274 days) were summarized in terms of number of available records out of a possible 26,208 records, and average temperature per sonde. During this time period, temperature records ranged from 90% complete (23,611 out of a possible 26,304 records) to 100% complete. Average temperatures ranged between 0 degrees Celsius and 31.6 degrees Celsius. Note that USGS review of these provisional data is scheduled to be completed in 2017 and comparison of these data to temperature criteria will be presented in the 2017 MS4 Annual Report.

**Dissolved Oxygen:** Dissolved oxygen is an important parameter for the overall health of a stream. Water with low dissolved oxygen can stress fish and other forms of aquatic life. Final continuous monitoring data collected between October 1, 2014, and September 30, 2015, were



analyzed for dissolved oxygen by compiling the 15-minute data to a daily record. A daily record was considered complete if at least 88 of a possible 96 records per day were available.

The final dissolved oxygen record ranged from 15% complete (5,194 records) to 72% complete (25,754 records) at 24 sites with continuous monitoring sondes. Average concentrations of dissolved oxygen at the 24 sites with sondes ranged between 7.04 mg/l and 10.31 mg/l. However, low and high readings were also observed, ranging from 0 mg/l to 22.9 mg/l. The number of days with complete records that met the criteria (i.e., no dissolved oxygen readings below 4 mg/l and average concentration above 5 mg/l) ranged between 13% and 64%. Results are shown in Figure 5.4.1. South Fork of Beargrass Creek at Schiller Avenue was taken off-line during this period; therefore, it was not included in these statistics.



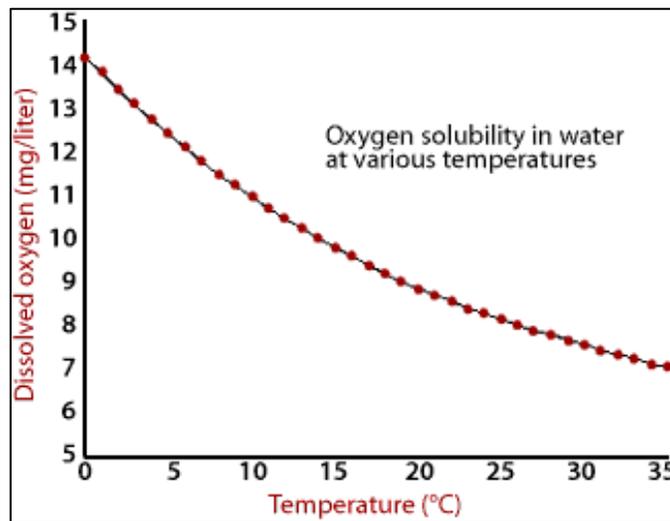
Provisional continuous dissolved oxygen monitoring data collected between October 1, 2015, and June 30, 2016, (i.e., 274 days) were summarized in terms of number of available records and average dissolved oxygen per sonde for this report. During this time period, dissolved



oxygen records ranged from 91% complete to 100% complete. Average dissolved oxygen ranged between 6.65 mg/l and 11.31 mg/l. Note that USGS review of these provisional data is scheduled to be completed by April 2017, and comparison of these data to dissolved oxygen criteria will be presented in the 2017 MS4 Annual Report.

**Percent Dissolved Oxygen Saturation:** The amount of oxygen that theoretically can be dissolved in water is affected by water temperature and the barometric pressure of air. Colder water can hold more oxygen than warmer water, and more oxygen will dissolve into water during periods of high barometric pressure. Figure 5.4.2 below highlights the effects of water temperature on the amount of oxygen dissolved in water.

**FIGURE 5.4.2. DISSOLVED OXYGEN SOLUBILITY IN WATER**

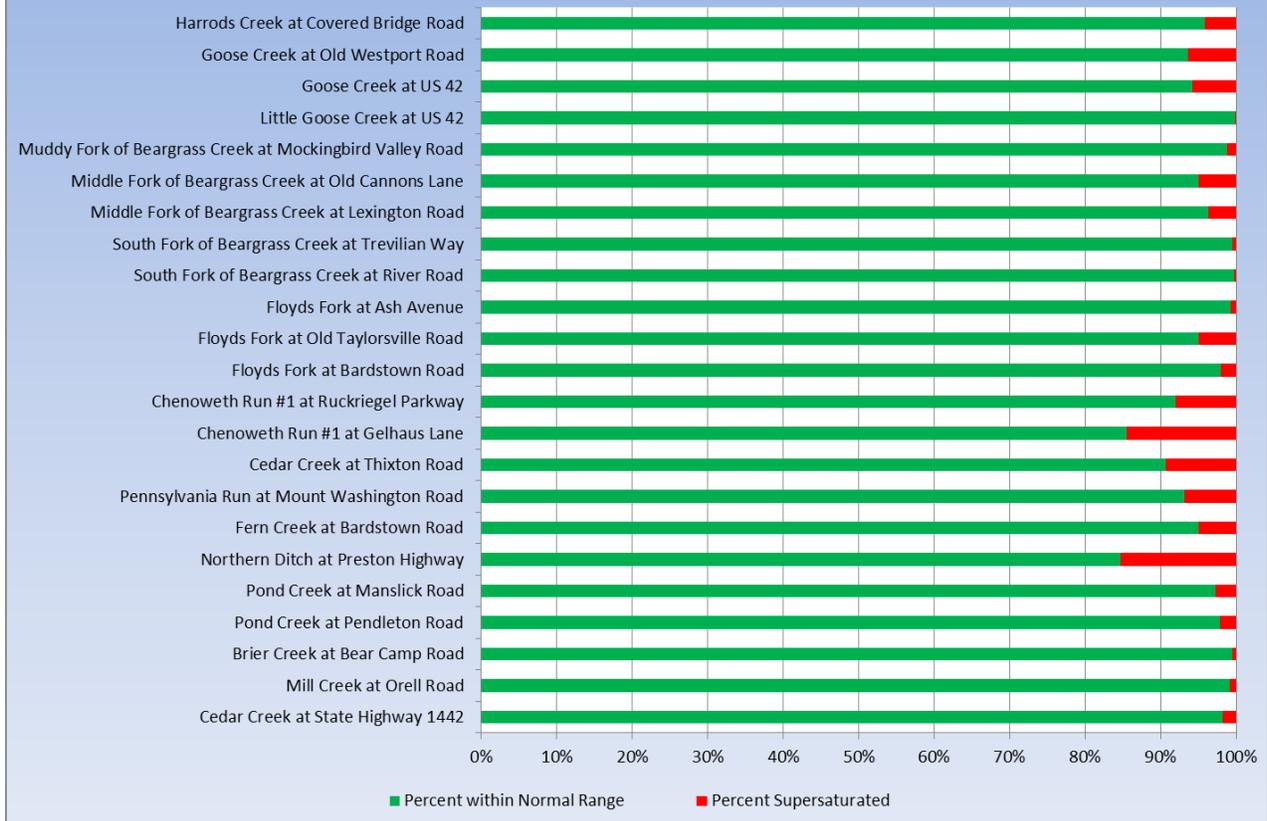


Percent dissolved oxygen saturation results provide a way to compare the amount of dissolved oxygen found in water across a range of temperature and barometric pressure conditions and also provides an indication of whether a waterbody is affected by excessive algal growth. Excessive algal growth can cause dissolved oxygen supersaturation since the algae give off oxygen faster than it can diffuse out of the water. Percent dissolved oxygen saturation of 120% or higher is generally considered “supersaturated”.

For this MS4 Annual Report, the percentage of time that dissolved oxygen was supersaturated is shown on Figure 5.4.3.



**Figure 5.4.3 Dissolved Oxygen Percent Saturation at LTMN Sites  
 October 1, 2014 through September 30, 2015**



Of the available final dissolved oxygen during the period of October, 2014, through September, 2015, the percent of time that supersaturated conditions existed ranged from 15.4% to 0.2%, and 21 sites exhibited supersaturated conditions in 10% or less of the samples. Two sites exhibited supersaturated conditions in more than 10% of the final dissolved oxygen samples: Northern Ditch at Preston Highway and Chenoweth Run #1 at Gelhaus Lane.

**pH:** All 108 field pH records collected during quarterly sampling between July 1, 2015, and June 30, 2016, met the water quality criteria for pH. Values for pH ranged between 6.87 and 8.82, and pH was similar under wet and dry conditions, as shown in Table 5.4.1.



TABLE 5.4.1 LTMN RESULTS FOR pH

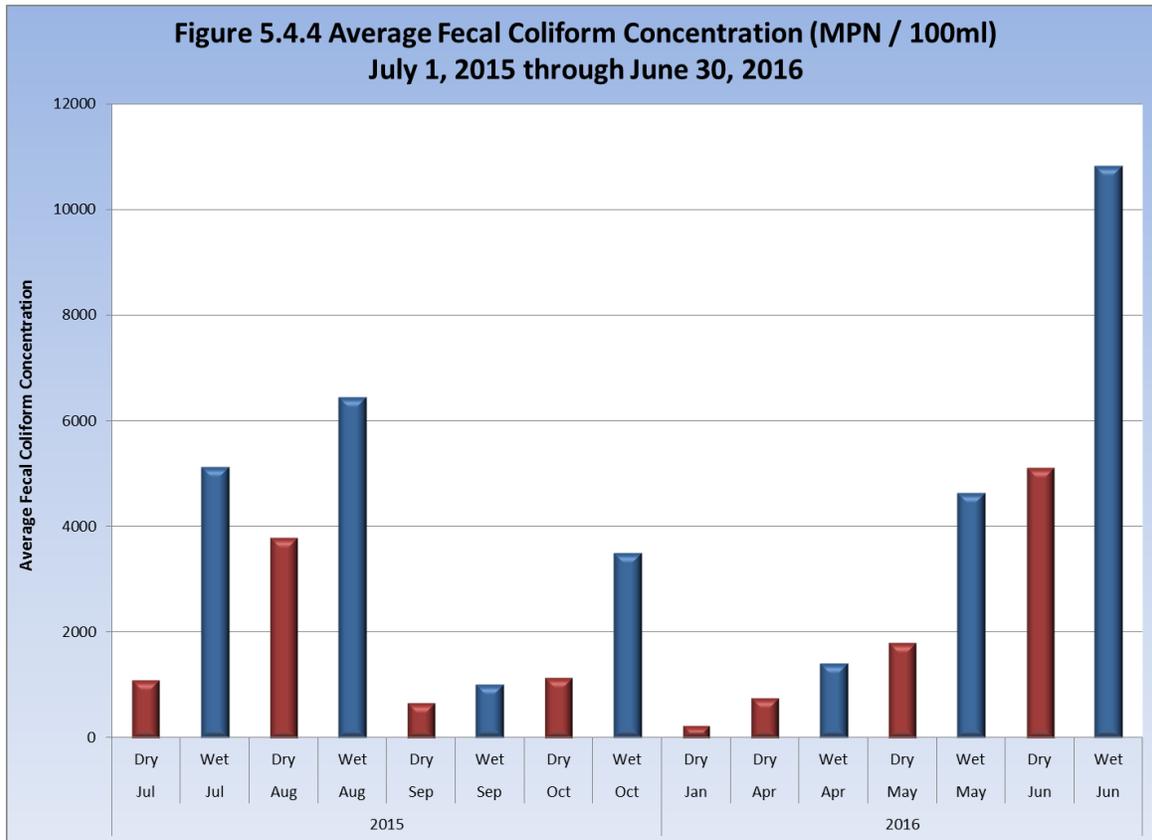
| Parameter    | Wet / Dry | Sample Count<br>(7/1/2015-<br>6/30/2016) | Minimum pH<br>(SI Units) | Maximum pH<br>(SI Units) |
|--------------|-----------|--|--------------------------|--------------------------|
| Field pH     | Dry       | 80                                       | 6.87                     | 8.82                     |
|              | Wet       | 28                                       | 6.96                     | 8.10                     |
| <b>Total</b> |           | 108                                      |                          |                          |

**Bacteria:** Both fecal coliform and *E. coli* bacteria occur in the digestive tracts of humans and warm-blooded animals. Fecal coliform can also survive and reproduce in wet soil and in sediment in streams and storm drains. In contrast, *E. coli* bacteria do not reproduce outside the bodies of humans and animals. Thus, *E. coli* bacteria provide a complimentary indicator of fecal pollution that is not complicated by reproduction outside the hosts' digestive tract. Fecal coliform and *E. coli* bacteria concentrations are measured as "Most Probable Number" (MPN) of bacteria in a 100 milliliter (ml) sample. As a reference, 100 ml is about 3.4 ounces.

Trained MSD staff collected and analyzed five fecal coliform samples within a 30-day period during the six-month recreational season in 2015 (July to October) and in 2016 (May and June). The sample period coincides with the MS4 reporting period. *E. coli* bacteria samples were collected on a quarterly basis during the non-recreational contact season and once per month during the recreational season. Fecal coliform and *E. coli* samples were analyzed in MSD's laboratory using EPA approved methods. Bacteria monitoring data and analytical method information are provided in Appendix 5 Analyzed Monitoring Data of this report.

During the six-month recreational season (July to October 2015 and May to June 2016), MSD monitored fecal coliform bacteria five times per month and *E. coli* bacteria monthly. The sample period coincides with the MS4 reporting period. During the remainder of the year, one sample per quarter was collected in October 2015, January and April 2016.

Data were reviewed for quality assurance and final data were analyzed for this report. During the reporting period, 901 fecal coliform bacteria samples were collected at the 27 LTMN monitoring sites, including 722 samples collected under dry conditions and 179 collected under wet conditions. Fecal coliform bacteria concentrations ranged from one MPN/100 ml to 120,000 MPN/100 ml and average concentrations are summarized on Figure 5.4.4. This graph highlights the highly variable nature of bacteria concentrations and the tendency for concentrations to be higher when stream flows were higher.



Comparison to the water quality criteria for *E. coli* requires at least five samples per month, whereas the permit specifies one sample per month during the recreational season. For *E. coli*, monthly samples were collected during the recreational season and quarterly samples were collected in October, 2015 and in January and April, 2016. Therefore, *E. coli* comparison to the water quality criteria could not be performed. During the MS4 annual report period, 216 E Coli samples were collected, and the samples ranged from 100 MPN/100 ml to 990 MPN/100 ml.

**Un-ionized Ammonia:** Between July 1, 2015, and June 30, 2016, 108 analyses for total ammonia were performed. Field pH and temperature data were also collected at these sites, which are needed to calculate the concentration of un-ionized ammonia. Concentrations of un-ionized ammonia ranged from 0.089 micrograms per liter (ug/l) to 54.46 ug/l. 28 out of the 108 samples were collected under wet conditions. The maximum un-ionized ammonia was 17.29 ug/l under wet conditions, well below the water quality criterion of 50 ug/l. There was one sample collected under dry conditions at 54.46 ug/l, exceeding the water quality criterion of 50 ug/l.



**Cadmium:** Between July 1, 2015, and June 30, 2016, 108 quarterly samples were analyzed for total recoverable cadmium, including 80 under dry conditions, and 28 under wet conditions. Concentrations ranged from less than the Minimum Detection Limit to 19.9 parts per billion. Average and maximum concentrations were higher under wet conditions. Acute and chronic aquatic life criteria were met in 99% of the cadmium samples. One sample collected under dry conditions in the South Fork of Beargrass Creek at Breckinridge Street (ESFSF012) in Spring 2016 had an elevated cadmium concentration (19.9 ug/l) that exceeded both acute and chronic aquatic life criterion of 7.36 ug/l and 0.67 ug/l respectively.

**Copper:** Between July 1, 2015, and June 30, 2016, 108 quarterly samples were analyzed for total recoverable copper, including 80 under dry conditions, and 28 under wet conditions. Concentrations were all less than the Minimum Detection Limit. Acute and chronic aquatic life criteria were met in 100% of the copper samples.

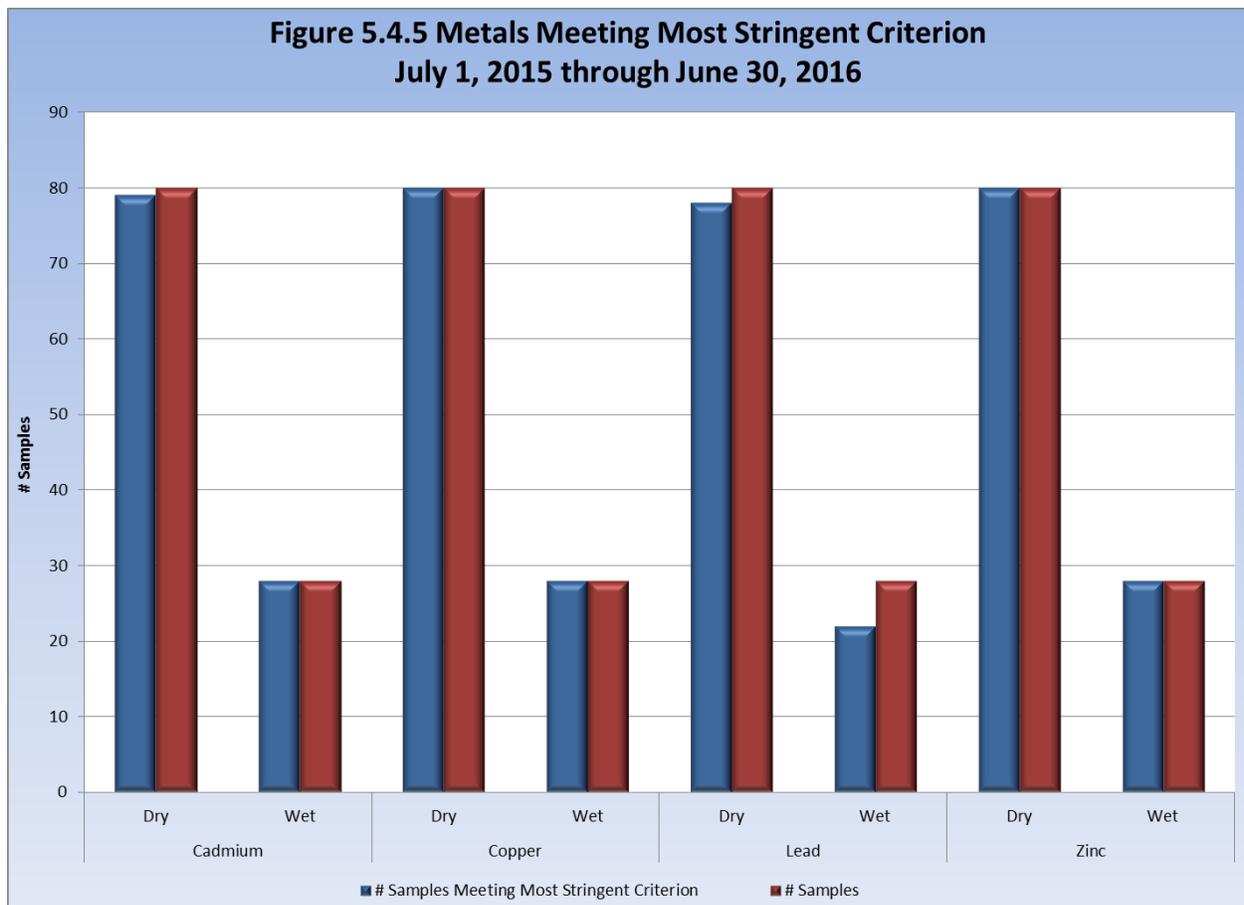
**Lead:** Between July 1, 2015, and June 30, 2016, 108 quarterly samples were analyzed for total recoverable lead, including 80 under dry conditions, and 28 under wet conditions. Concentrations ranged from less than the Minimum Detection Limit to 22 parts per billion. Acute and chronic aquatic life criteria were met in 93% of lead samples. One sample collected under dry conditions in Mill Creek at Orell Road (EMCMC001) in January 2016 had an elevated lead concentration (5.48 ug/l) that exceeded the chronic aquatic life criterion of 3.18 ug/l. One sample collected under dry conditions in the Muddy Fork of Beargrass Creek at Mockingbird Valley Road (EMUMU001) in July 2015 had an elevated lead concentration (9.41 ug/l) that exceeded the chronic aquatic life criterion of 6.39 ug/l. One sample collected under wet conditions in Goose Creek at US Highway 42 (EGCGC002) in July 2015 had an elevated lead concentration (12.0 ug/l) that exceeded the chronic aquatic life criterion of 3.06 ug/l. One sample collected under wet conditions in Goose Creek at Old Westport Road (EGCGC001) in July 2015 had an elevated lead concentration (13.4 ug/l) that exceeded the chronic aquatic life criterion of 2.47 ug/l. One sample collected under wet conditions in Cedar Creek at State Road 1442 (ECBCB001) in July 2015 had an elevated lead concentration (15.2 ug/l) that exceeded the chronic aquatic life criterion of 7.79 ug/l. One sample collected under wet conditions in Floyd's Fork at Ash Avenue (EFFFF001) in July 2015 had an elevated lead concentration (15.9 ug/l) that exceeded the chronic aquatic life criterion of 3.72 ug/l. One sample collected under wet conditions in Little Goose Creek at US Highway 42 (EGCLG001) in July 2015 had an elevated lead concentration (19.6 ug/l) that exceeded the chronic aquatic life criterion of 6.11 ug/l. One sample collected under wet conditions in Harrod's Creek at Covered Bridge Road (EHCHC001) in July 2015 had an elevated lead concentration (22 ug/l) that exceeded the chronic aquatic life criterion of 9.54 ug/l. The aquatic life criteria are calculated based on the hardness of the water and are therefore different for each sample. Concentrations of lead in all other samples were below the acute and chronic aquatic life criteria.

**Zinc:** Between July 1, 2015, and June 30, 2016, 108 quarterly samples were analyzed for total recoverable zinc, including 80 under dry conditions, and 28 under wet conditions.



Concentrations ranged from below the minimum detection limit to 34 ug/l. The hardness dependent acute and chronic aquatic life criteria were met in 100% of samples.

It is important to note that the water quality criteria for these metals are dependent upon the hardness of the water at the time the sample was collected. The water quality criteria are lower when water hardness is lower, which occurred during wet conditions. Under dry conditions, hardness ranged from 67 mg/l to 437 mg/l and under wet conditions, the hardness ranged from 72 mg/l to 300 mg/l. Metals results are summarized in Figure 5.4.5, which highlights the high rate of compliance with stringent metals criteria.



Monitoring results for parameters that do not have numeric water quality criteria are summarized in Table 5.4.3. In general, concentrations under wet and dry conditions were similar. The concentrations documented on the following table are not unusual for streams in developed areas.

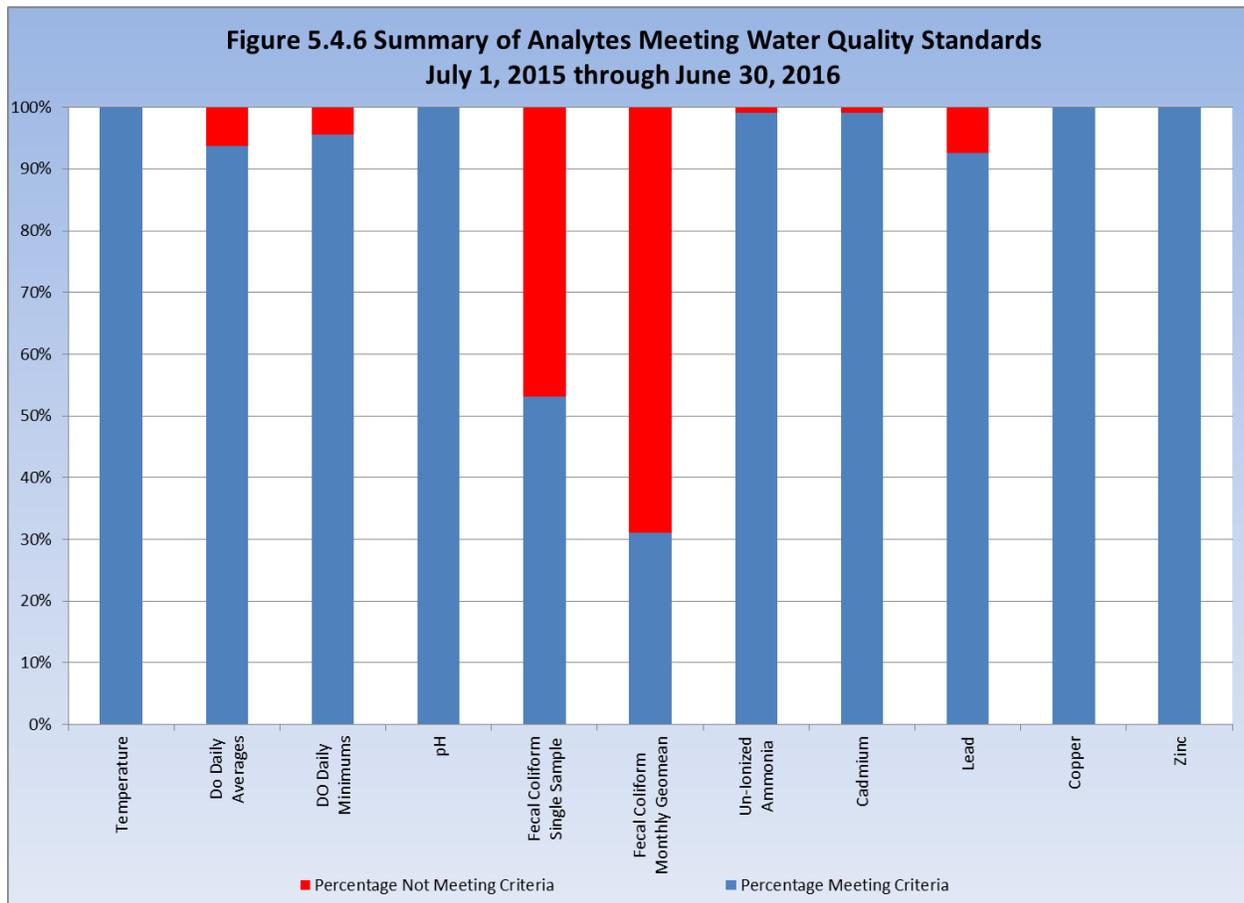


**TABLE 5.4.3 SUMMARY FOR PARAMETERS WITHOUT NUMERIC WATER QUALITY CRITERIA**

| Parameter                       | Wet / Dry | Sample Count (7/1/2015 - 6/30/2016) | Minimum Concentration (mg/l) | Average Concentration (mg/l) | Maximum Concentration (mg/l) |
|---------------------------------|-----------|-------------------------------------|------------------------------|------------------------------|------------------------------|
| Biochemical Oxygen Demand (BOD) | Dry       | 80                                  | 1                            | 2.01                         | 22                           |
|                                 | Wet       | 28                                  | 1                            | 1.93                         | 5                            |
| Chemical Oxygen Demand (COD)    | Dry       | 80                                  | 10                           | 14.83                        | 79                           |
|                                 | Wet       | 28                                  | 0.5                          | 21.41                        | 52                           |
| Oil and Grease (Total)          | Dry       | 80                                  | 1                            | 1.68                         | 10                           |
|                                 | Wet       | 28                                  | 0.5                          | 1.27                         | 3                            |
| Field pH                        | Dry       | 80                                  | 6.87                         | 7.61                         | 8.82                         |
|                                 | Wet       | 28                                  | 6.96                         | 7.61                         | 8.1                          |
| Total nitrogen(TKN)             | Dry       | 80                                  | 0.13                         | 0.58                         | 1.3                          |
|                                 | Wet       | 28                                  | 0.22                         | 0.85                         | 2.3                          |
| Nitrate (NO3-N)                 | Dry       | 80                                  | 0.02                         | 1.28                         | 7.83                         |
|                                 | Wet       | 28                                  | 0.275                        | 1.31                         | 3.35                         |
| Total Phosphorus                | Dry       | 80                                  | 0.0065                       | 0.05                         | 1.11                         |
|                                 | Wet       | 28                                  | 0.01                         | 0.14                         | 0.734                        |
| Soluble Phosphorus              | Dry       | 80                                  | 0.0065                       | 0.04                         | 1.06                         |
|                                 | Wet       | 28                                  | 0.0065                       | 0.04                         | 0.101                        |
| Total Dissolved Solids          | Dry       | 80                                  | 80                           | 457.11                       | 1660                         |
|                                 | Wet       | 28                                  | 88                           | 255.43                       | 411                          |
| Total Suspended Solids          | Dry       | 80                                  | 1.5                          | 13.00                        | 158                          |
|                                 | Wet       | 28                                  | 6                            | 104.11                       | 640                          |



Overall, the majority of water quality parameters analyzed and documented in this report met water quality standards over 90% of the time. The exception is fecal coliform bacteria. Across all LTMN locations, during the reporting period, fecal coliform values met the single sample water quality standard of 400 MPN/100 ml in 53% of the samples. During the same period, monthly geometric means for fecal coliform values met the monthly water quality standard of 200 MPN/100 ml in 31% of the samples.





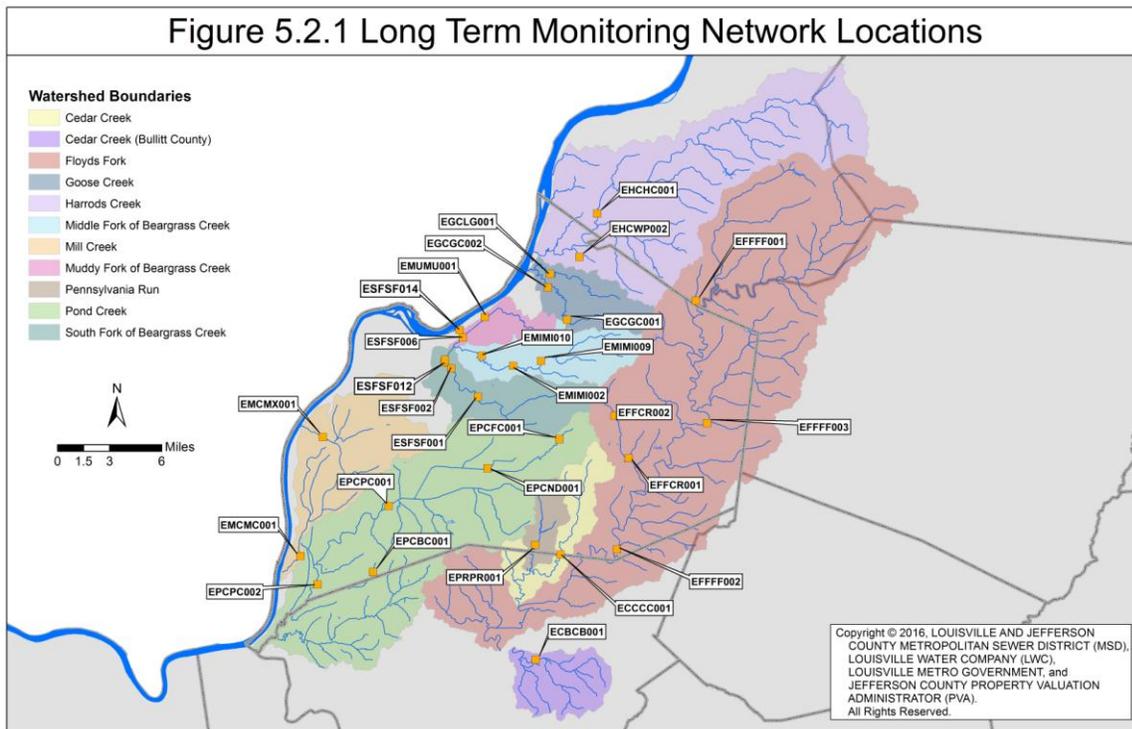
**Five-Year Trend Analysis:** As directed by the current MS4 Permit, in PY 5, a five-year trend analysis of all parameters has been completed. For fecal coliform and Dissolved Oxygen, five-year trend graphics are presented in the following watershed sections for all sampling locations. For the metals and the parameters without numeric water quality criteria, not all analytes were graphed for all monitoring locations. A screening tool was used to identify a statistical threshold value for each analyte equaling two times the arithmetic average of all the values for that analyte. For those locations and analytes where at least one value exceeded the screening criteria statistical threshold, a graphic is presented in Appendix 5. Table 5.4.4 lists the 11 values that exceeded the statistical threshold values. There was no discernible trend showing a parameter or location with consistently elevated levels.

**TABLE 5.4.4 SCREENING EVALUATION FOR ELEVATED VALUES**

| Parameter                       | Location | Maximum of Sample Values | Statistical Threshold Value |
|---------------------------------|----------|--------------------------|-----------------------------|
| Biochemical Oxygen Demand (BOD) | EHCWP002 | 19 (mg/l)                | 15.1 (mg/l)                 |
| Biochemical Oxygen Demand (BOD) | EPCPC002 | 22 (mg/l)                | 15.1 (mg/l)                 |
| Total Dissolved Solids (TDS)    | EFFCR002 | 1660 (mg/l)              | 1489 (mg/l)                 |
| Total Dissolved Solids (TDS)    | EGCGC001 | 2104 (mg/l)              | 1489 (mg/l)                 |
| Total Suspended Solids (TSS)    | EFFFF001 | 628 (mg/l)               | 309 (mg/l)                  |
| Total Suspended Solids (TSS)    | EGCLG001 | 607 (mg/l)               | 309 (mg/l)                  |
| Total Suspended Solids (TSS)    | EHCHC001 | 640 (mg/l)               | 309 (mg/l)                  |
| Cadmium                         | EGCGC001 | 29.1 (ug/l)              | 22.9 (ug/l)                 |
| Copper                          | EGCGC001 | 68 (ug/l)                | 35.5 (ug/l)                 |
| Lead                            | EHCHC001 | 22 (ug/l)                | 21.0 (ug/l)                 |
| Lead                            | ESFSF002 | 55.6 (ug/l)              | 21.0 (ug/l)                 |

## 5.5 Watershed Summaries and Five-Year Trend Analyses

The following section provides a summary of water quality data for watersheds draining MSD's service area. A county-wide watershed map is shown again here as Figure 5.5.

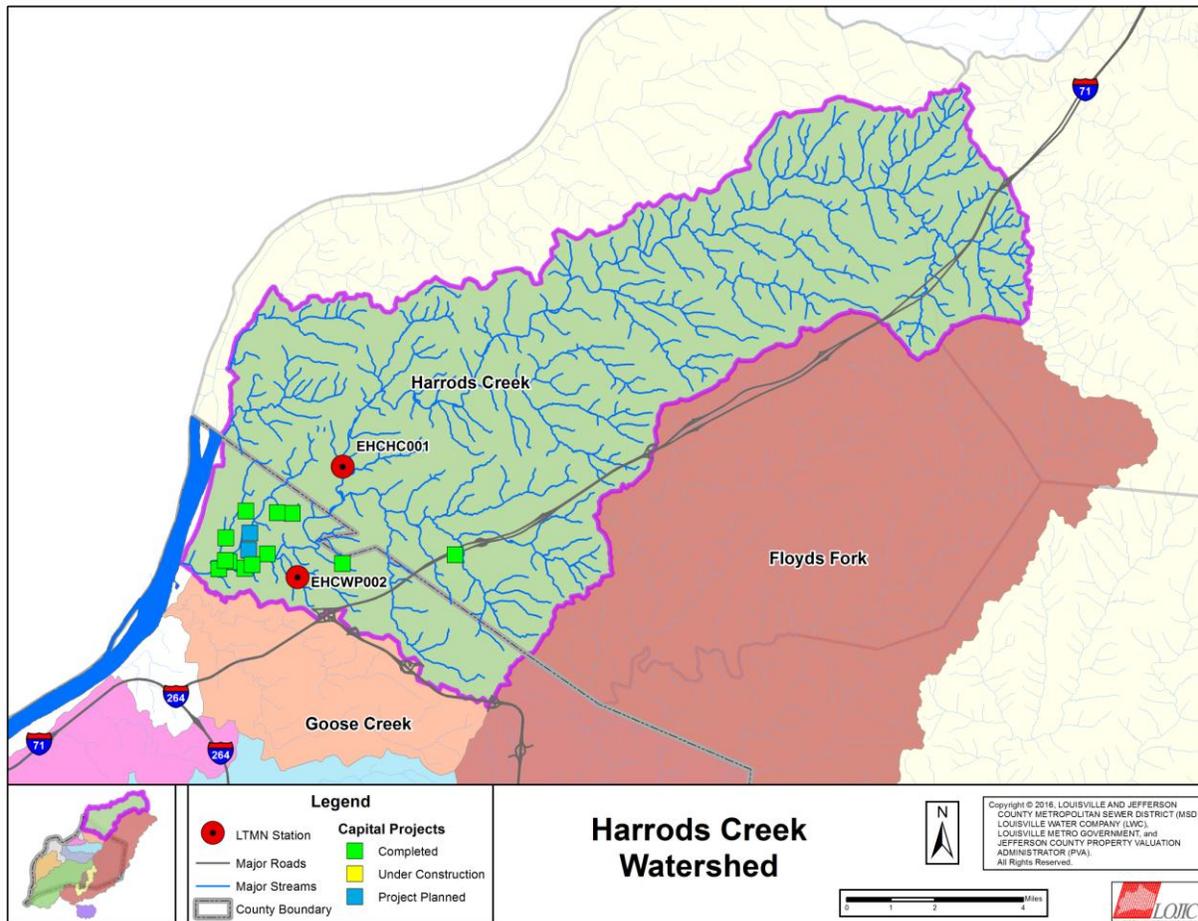


As part of the 5-year trend analysis described in Section 5.1, each watershed summary contains additional features in this annual report.

- Each watershed map contains a point for each capital project (existing or proposed) constructed for the IOAP program.
- Each watershed section contains a section listing the capital projects for the watershed.
- Each watershed section contains a 5-year trend graph for monthly fecal coliform geometric means.
- Where appropriate, each watershed section contains graphs of the analytes that exceed the criteria set forth in the screening tool described in Table 5.4.4.
- A long-term historical trend of the same parameters are available in the 2014 Water Quality Synthesis Report.

### 5.5.1 Harrods Creek Watershed

Figure 5.5.1 Harrods Creek Watershed



**Watershed Description:** The small streams that eventually form Harrods Creek originate in Trimble County. Harrods Creek flows southwest through Oldham County and drains into the Ohio River in northern Jefferson County near Prospect. The Harrods Creek watershed drains approximately 92 square miles.

MSD has been monitoring water quality in Harrods Creek at Covered Bridge Road (EHCHC001) since 1999. There are 70.3 square miles of land draining to this site. This land is mostly



agricultural and forest, with about 9% developed for urban and suburban uses. Approximately 1.3% of the land is covered by impervious surfaces.

MSD has been monitoring water quality in the Wolf Pen Branch (EHCWP001) tributary since 2002. Stream flow and continuous monitoring data are not collected at this location. There are 2.08 square miles of land draining to the monitoring site on Wolf Pen Branch. This land is a mix of agricultural, forest and 24% developed for urban and suburban uses. Approximately 7% of the land is covered by impervious surfaces.

Capital projects in the Harrods Creek Watershed include Harrods Creek Pump Station and Force Main, Meadow Stream Pump Station and Force Main, River Road Interceptor, Harrods Creek Interceptor, Harrods Creek Interceptor Phase 2, North Hunting Creek Pump Station and Force Main, Harrods Creek Interceptor Phase 3, Fairway View Pump Station Improvements, Riding Ridge Pump Station Improvements, Timberlake and Hunting Creek South Water Quality Treatment Center Elimination, Shadow Wood Waste Water Treatment Plant Elimination, Ken Carla Water Quality Treatment Center Elimination, Fox Harbor In Line Storage, and Gunpowder Pump Station Inline Storage.

**Continuous Monitoring Results:** Final continuous monitoring data was available between October 1, 2014, and September 30, 2015, in Harrods Creek at Covered Bridge Road. During this time period in Harrods Creek at Covered Bridge Road, the temperature data set was 75.7% complete, average dissolved oxygen was 10.1 mg/l, and 100% of available values met the temperature criterion. The dissolved oxygen data set was 55.1% complete, and 95.0% of available values met the water quality criteria.

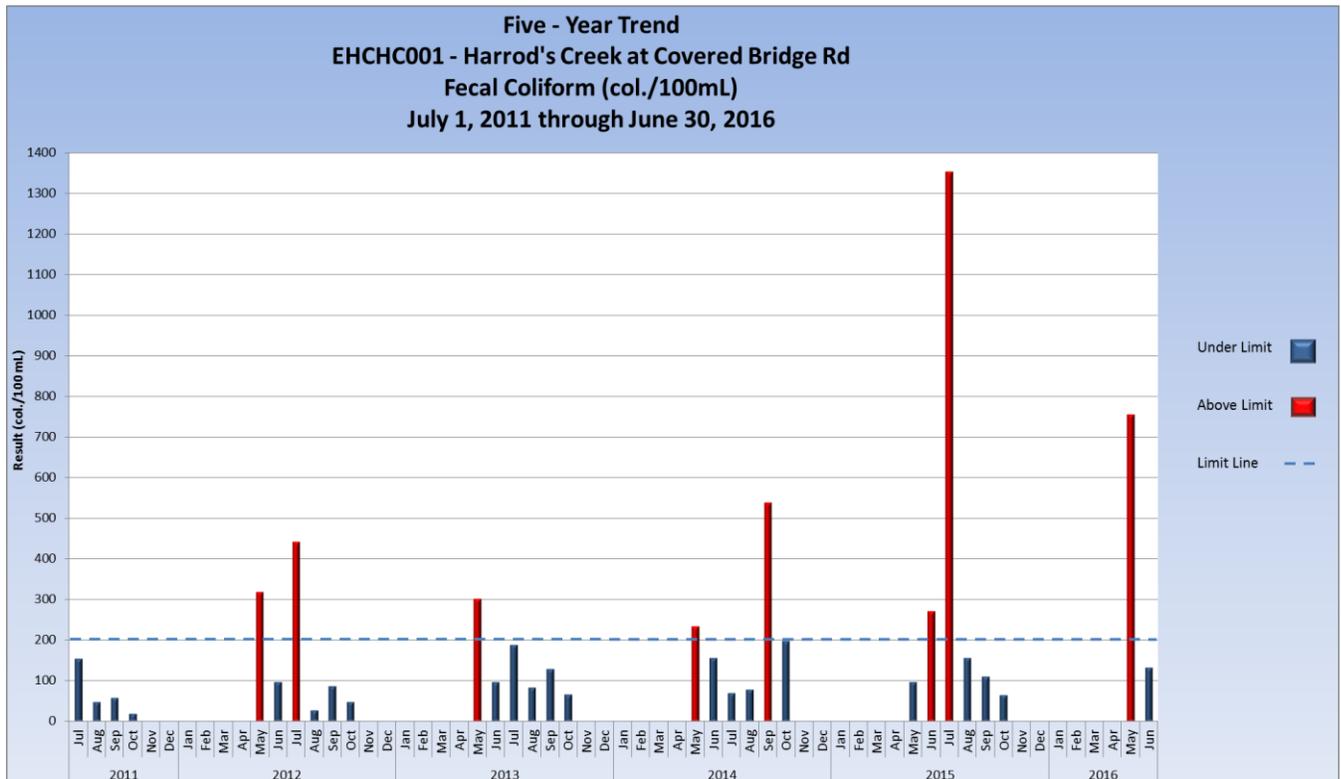
**Quarterly Monitoring Results:** At Harrods Creek at Covered Bridge Road, three samples were collected under dry conditions while one sample was collected under wet conditions. At Wolf Pen Branch three samples were collected under dry conditions while one sample was collected under wet conditions. Average concentrations of total phosphorus samples collected at Harrods Creek were 0.199 mg/l, while samples from Wolf Pen Branch were 0.0145 mg/l. Average concentrations of soluble phosphorus were 0.031 mg/l and 0.011 mg/l respectively in both Harrods Creek and Wolf Pen Branch. Average concentrations of nitrate were 0.961 mg/l, and 0.999 mg/l, respectively, in both Harrods Creek and Wolf Pen Branch. Average concentrations of total dissolved solids were 270.5 mg/l and 449.75 mg/l, respectively, in both Harrods Creek and Wolf Pen Branch. Average TSS concentrations were 162.75 mg/l and 17.25 mg/l, respectively, in Harrods Creek and Wolf Pen Branch.

Quarterly metals samples were compared to hardness dependent chronic aquatic life criteria for cadmium, copper, lead, and zinc. Concentrations of these metals were below the water quality criteria, with the exception of one sample collected under wet conditions in Harrod's Creek at Covered Bridge in July 2015, which had an elevated lead concentration (22 ug/l) that exceeded the chronic aquatic life criterion of 9.54 ug/l.



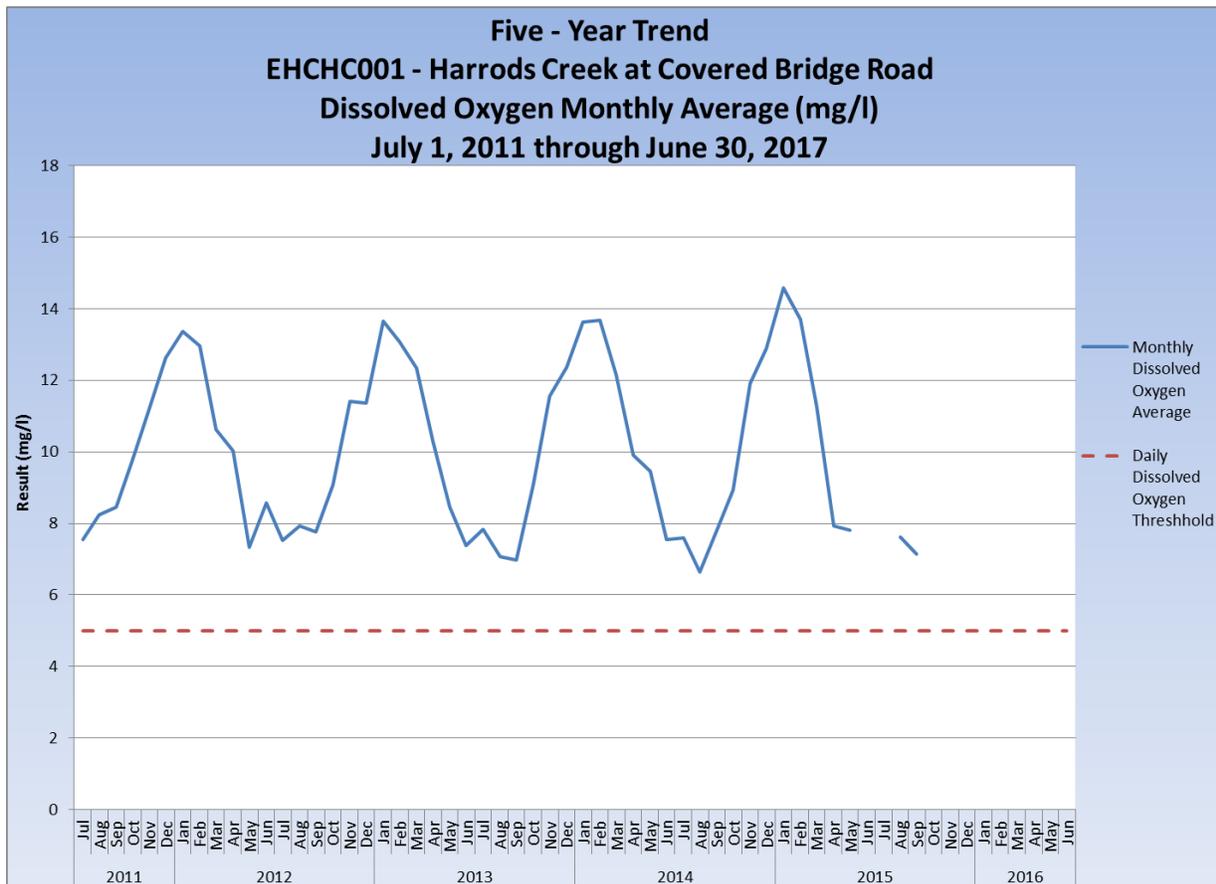
**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 51 MPN/100 ml to 1,353 MPN/100 ml in samples collected at two monitoring locations in the Harrods Creek watershed. The water quality criteria for fecal coliform were met in four of six months during the recreational season in Harrods Creek and two of six months in Wolf Pen Branch.

**Five-Year Trend Analysis:** In the five-year trend analysis for Harrods Creek, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 17 MPN/100 ml to 1,353 MPN/100 ml in samples collected at Harrod Creek at Covered Bridge Road. The water quality criteria for fecal coliform were met in 22 of 30 months during the recreational seasons in Harrods Creek at Covered Bridge Road.



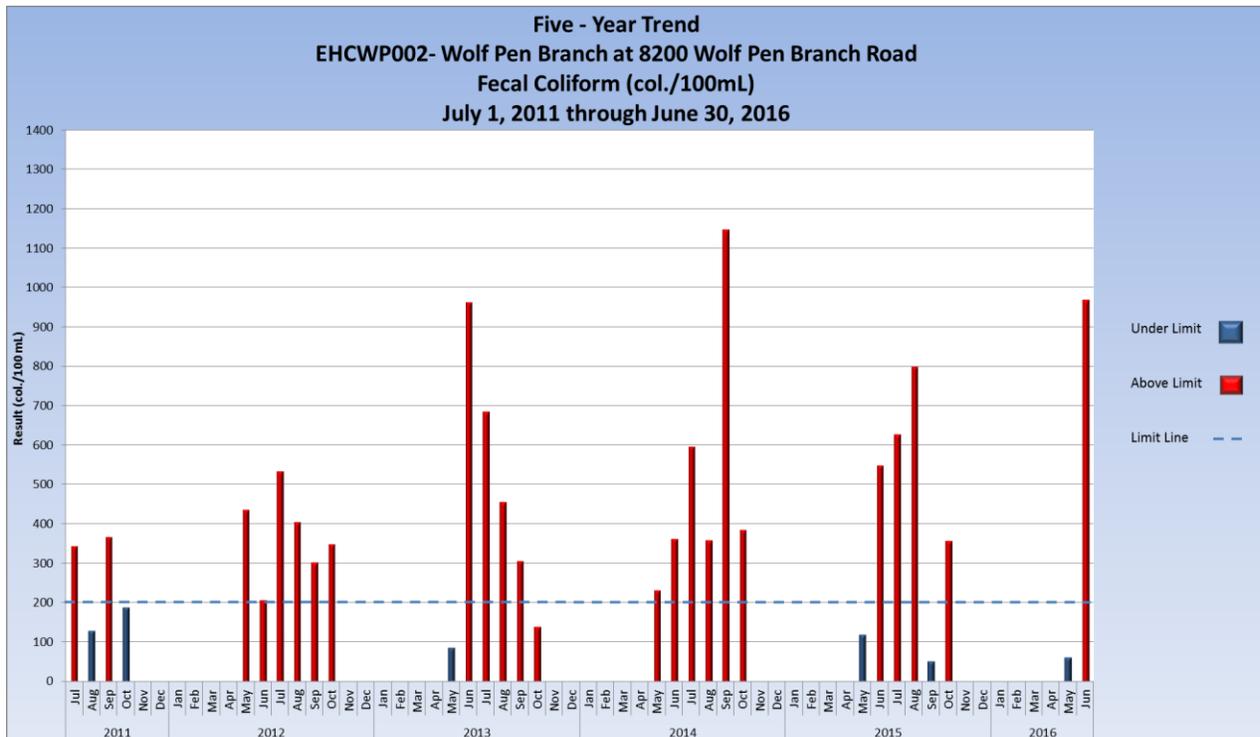


In the five-year trend for final dissolved oxygen in Harrods Creek at Covered Bridge Road, monthly average concentrations of dissolved oxygen ranged from 6.6 to 14.6 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.





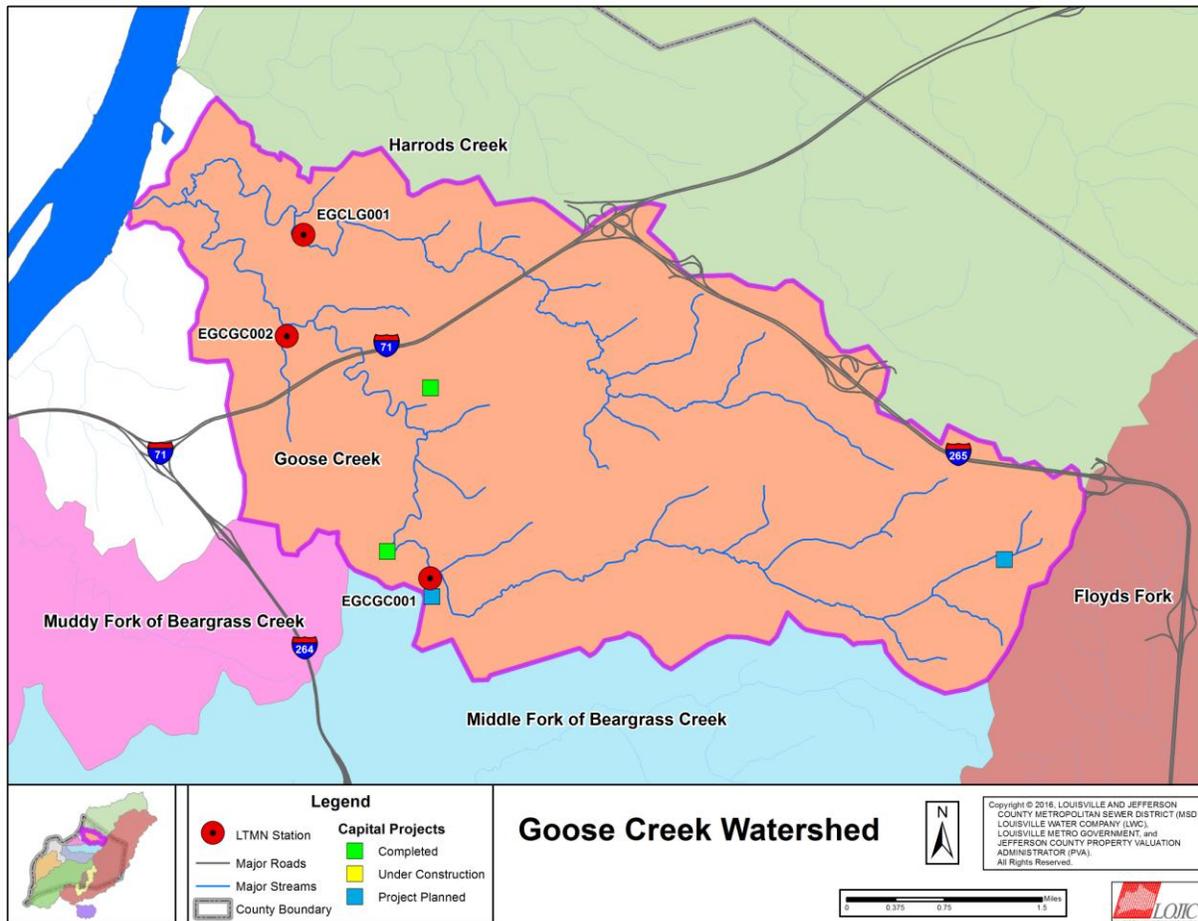
During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 51 MPN/100 ml to 1,148 MPN/100 ml in samples collected at Wolf Pen Branch at 8200 Wolf Pen Branch Road. The water quality criteria for fecal coliform were met in 7 of 30 months during the recreational seasons in Wolf Pen Branch at 8200 Wolf Pen Branch Road.



**Biological Monitoring Results:** Benthic communities were rated as “good” in Harrods Creek at Covered Bridge Road and “poor” in Wolf Pen Branch at 8200 Wolf Pen Branch Road, based on data collected in Spring 2015. Fish communities were rated as “fair” in Harrods Creek and “fair” in Wolf Pen Branch, based on data collected in Fall 2015. Aquatic habitat quality was rated as “excellent” in both Harrods Creek at Covered Bridge Road and Wolf Pen Branch at 8200 Wolf Pen Branch Road in 2013, and 2015. Algal communities were rated as “good” in 2011, and “fair” in 2013, in Wolf Pen Branch at 8200 Wolf Pen Branch Road. Algal communities were rated as “excellent” in both 2011, and 2013, in Harrods Creek at Covered Bridge Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

## 5.5.2 Goose Creek Watershed

Figure 5.5.2 Goose Creek Watershed



**Watershed Description:** The streams that form Goose Creek watershed, Little Goose Creek and Goose Creek, flow northwest from Anchorage to Glenview Acres. Goose Creek enters the Ohio River near Lime Kiln Lane and River Road. The Goose Creek watershed drains approximately 19 square miles.

MSD has been monitoring water quality in Goose Creek watershed at three sites since 2000: Goose Creek at Old Westport Road (EGCGC001), Goose Creek at US 42 (EGCGC002) and Little Goose Creek at US 42 (EGCLG001). There are 6.0 square miles of land draining to Goose Creek at Old Westport Road with 10% impervious surfaces. There are 10.1 square



miles of land draining to Goose Creek at US 42 with 11% impervious surfaces. There are 5.8 square miles of land draining to the Little Goose Creek at US 42 with 18% impervious surfaces.

Capital projects in the Goose Creek Watershed include Derington Court Pump Station Inflow and Infiltration Investigation & Rehabilitation, Goose Creek Pump Station Phase 1 - Devondale Pump Station Wet Weather Storage, Goose Creek Pump Station Phase 2 - Pump Station & Wet Weather Storage, and Lucas Lane Pump Station In Line Storage.

**Continuous Monitoring Results:** Final continuous monitoring data was available between October 1, 2014, and September 30, 2015, for three sondes in the Goose Creek watershed. During this time period, the temperature data was 65.8% complete in Goose Creek at Old Westport Road, 14.8% complete in Goose Creek at US 42, and 32.0% complete in Little Goose Creek at US 42 with 100% of available values meeting the temperature criterion. The dissolved oxygen data was 56.4% complete in Goose Creek at Old Westport Road, average dissolved oxygen was 9.8 mg/l, and 89.8% of available values met the water quality criteria. The dissolved oxygen data was 14.5% complete in Goose Creek at US 42, average dissolved oxygen was 9.8 mg/l, and 100.0% of available values met the water quality criteria. The dissolved oxygen data was 28.5% complete in Little Goose Creek at US 42, average dissolved oxygen was 10.0 mg/l, and 97.1% of available values met the water quality criteria.

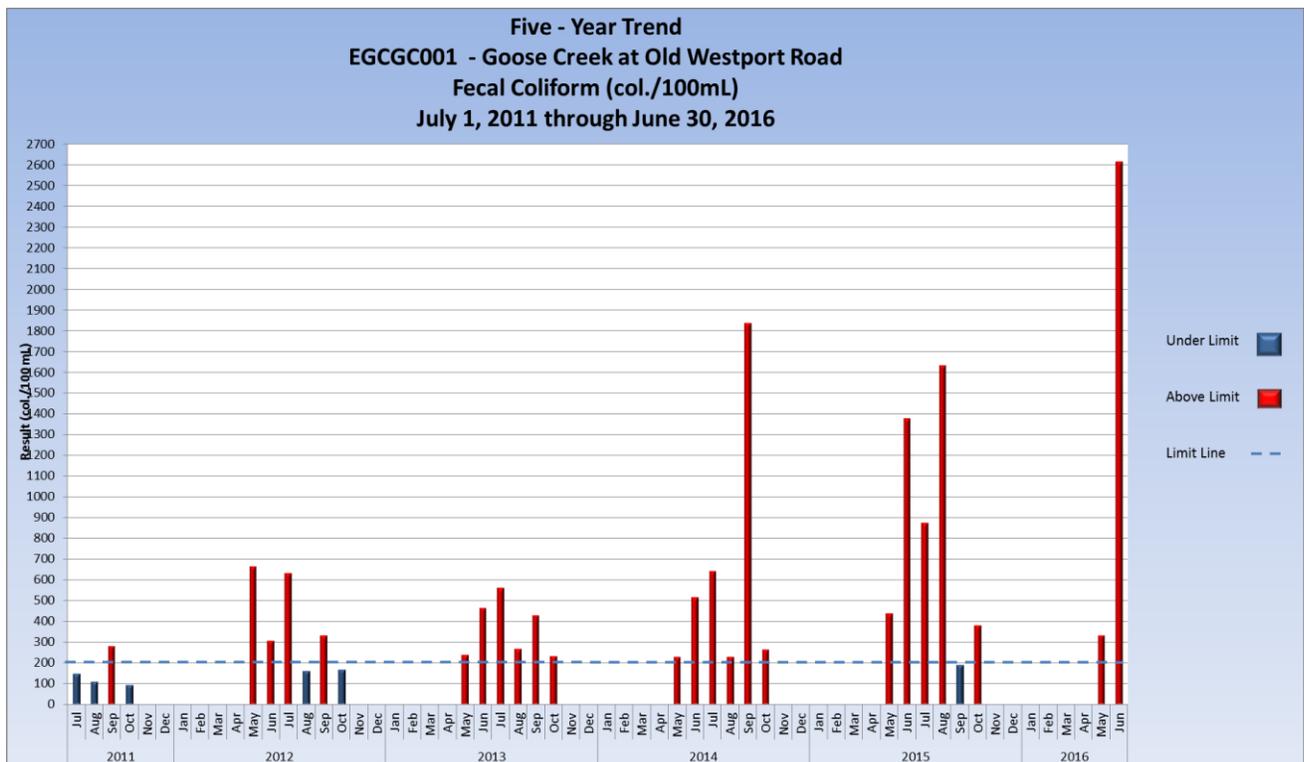
**Quarterly Monitoring Results:** At all sites, three samples were collected under dry conditions while one sample was collected under wet conditions. Average concentrations of total phosphorus samples collected at Goose Creek at Old Westport Road were 0.055 mg/l, while samples from Goose Creek at US Highway 42 were 0.036 mg/l and Little Goose Creek at US Highway 42 were 0.243 mg/l. Average concentrations of soluble phosphorus were 0.023 mg/l, 0.036 mg/l and 0.048 mg/l respectively in Goose Creek at Old Westport Road, Goose Creek at US Highway 42, and Little Goose Creek at US Highway 42. Concentrations of nitrate ranged between 0.275 mg/l and 7.83 mg/l. Total dissolved solids were between 104 mg/l and 464 mg/l at three sites in the Goose Creek watershed. TSS concentrations were between 1.5 mg/l and 607 mg/l in the Goose Creek watershed. All quarterly samples for metals were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc, with the exception of one sample collected under wet conditions in Goose Creek at Old Westport Road in July 2015, which had an elevated lead concentration (13.4 ug/l) that exceeded the chronic aquatic life criterion of 2.47 ug/l, one sample collected under wet conditions in Goose Creek at US Highway 42 in July 2015, which had an elevated lead concentration (12 ug/l) that exceeded the chronic aquatic life criterion of 3.06 ug/l and one sample collected under wet conditions in Little Goose Creek at US Highway 42 in July 2015, which had an elevated lead concentration (19.6 ug/l) that exceeded the chronic aquatic life criterion of 6.11 ug/l.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 187 MPN/100 ml to 2,617 MPN/100 ml in samples collected from Goose Creek at Old Westport Rd. The fecal coliform criteria was met one out of six months during the recreational season at this location. For the other two monitoring locations, average (geometric



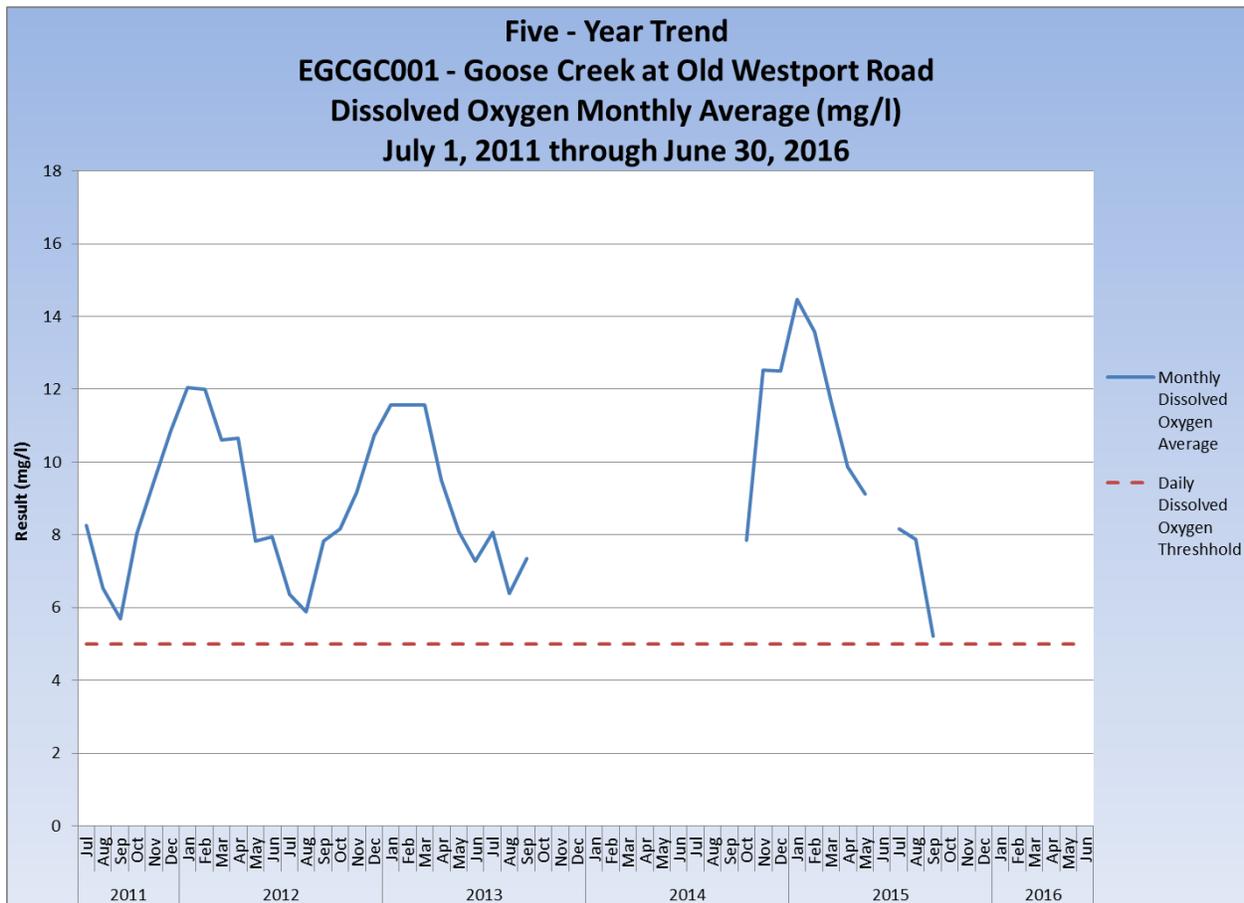
mean) concentrations of fecal coliform ranged from 27 MPN/100 ml to 1,397 MPN/100 ml. The criteria were met in three out of six months for Little Goose Creek at Highway 42 and one out of six months for Goose Creek at Highway 42 during the recreational season.

**Five-Year Trend Analysis:** In the five-year trend analysis for Goose Creek, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 93 MPN/100 ml to 2,617 MPN/100 ml in samples collected at Goose Creek at Old Westport Road. The water quality criteria for fecal coliform were met in 6 of 30 months during the recreational seasons in Goose Creek at Old Westport Road.



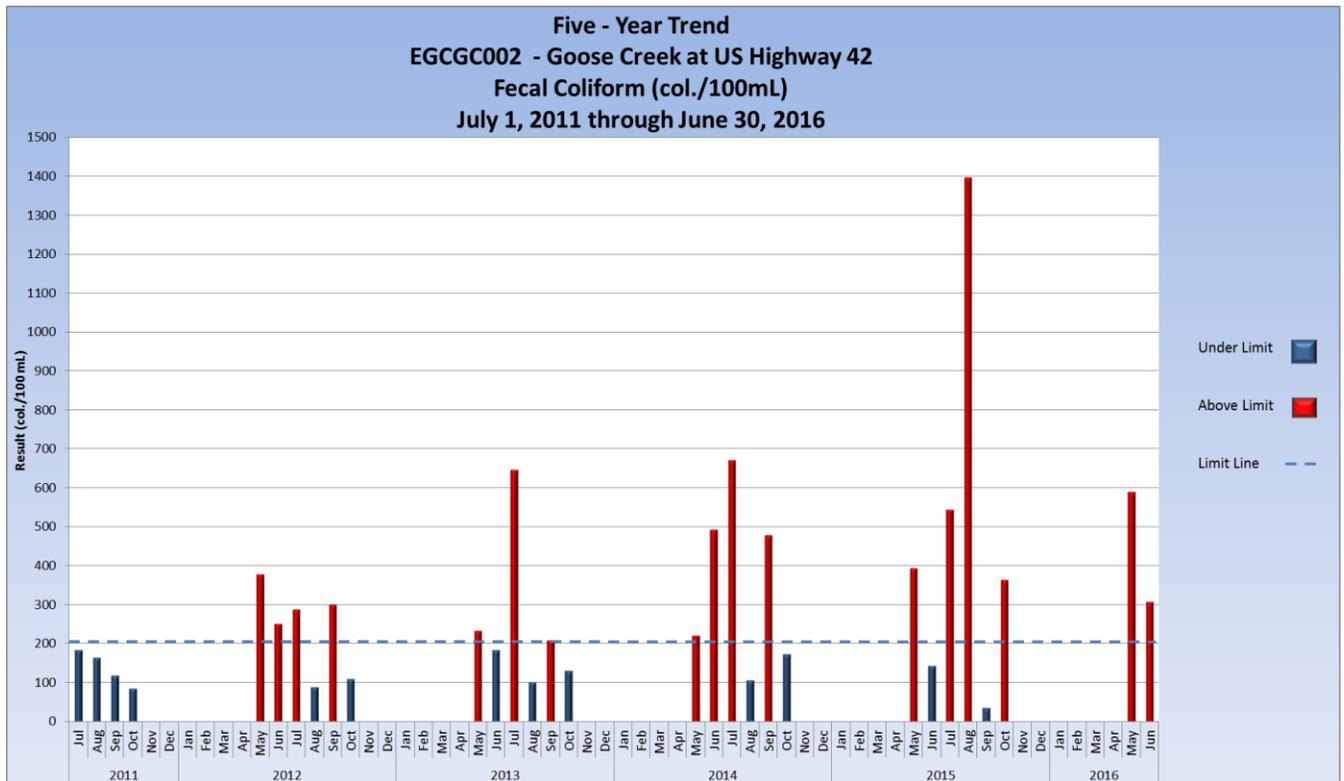


In the five-year trend for final dissolved oxygen in Goose Creek at Old Westport Road, monthly average concentrations of dissolved oxygen ranged from 5.2 to 14.5 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



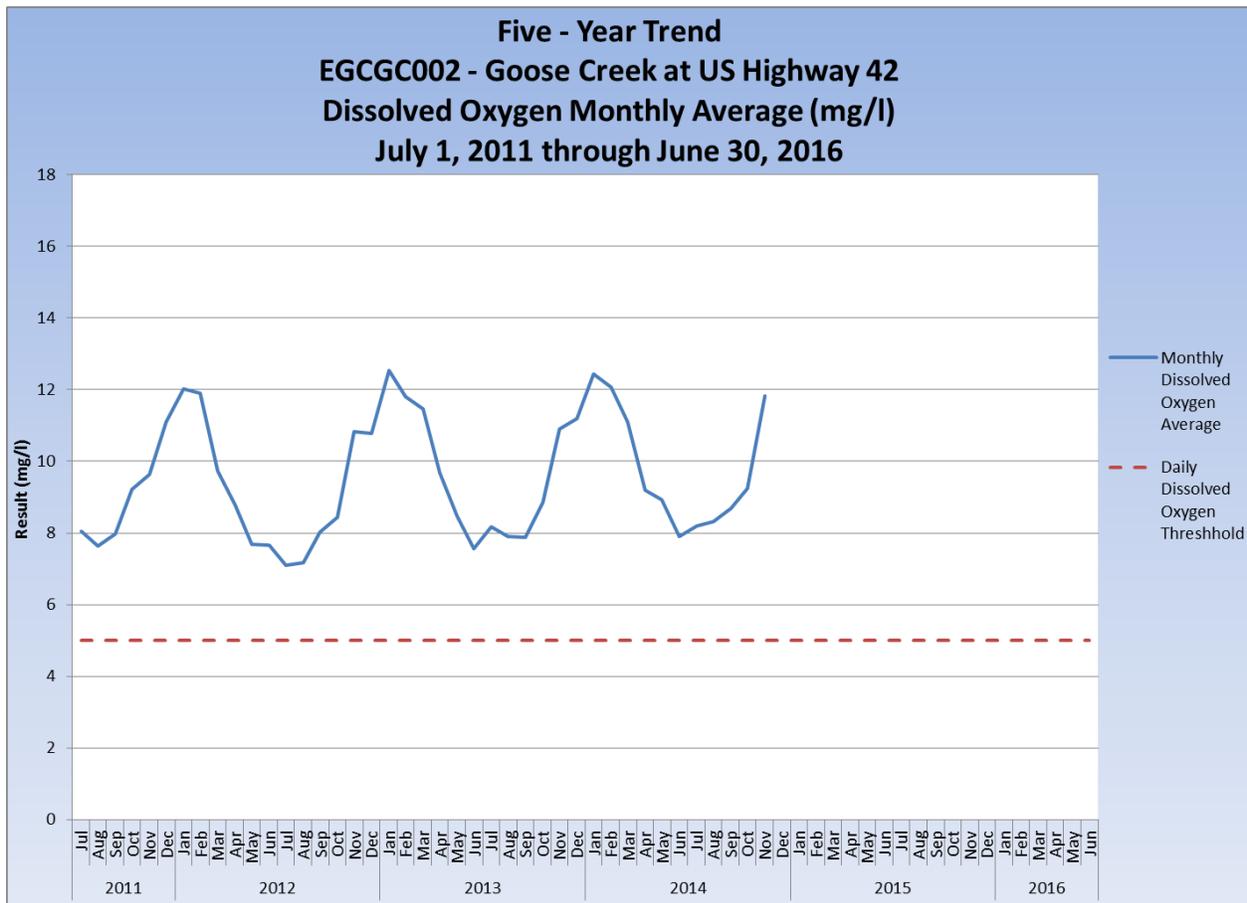


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 34 MPN/100 ml to 1,397 MPN/100 ml in samples collected at Goose Creek at US Highway 42. The water quality criteria for fecal coliform were met in 13 of 30 months during the recreational seasons in Goose Creek at US Highway 42.



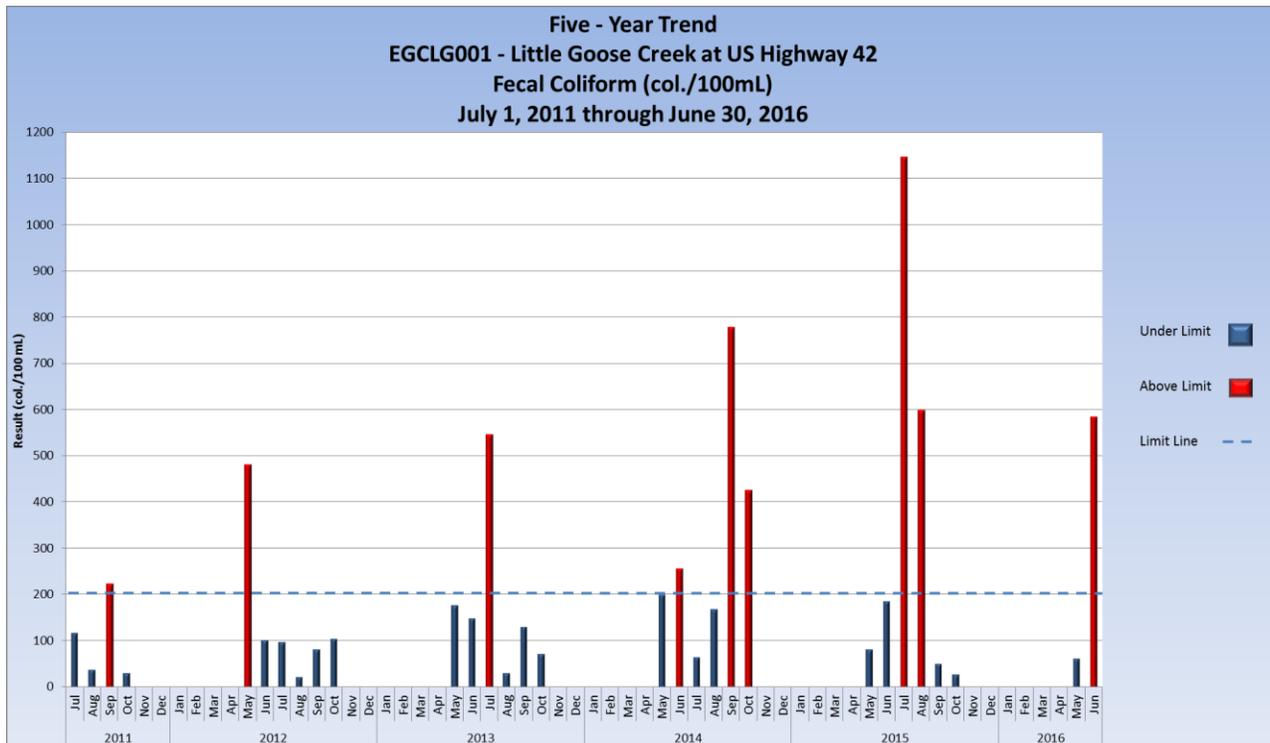


In the five-year trend for final dissolved oxygen in Goose Creek at US Highway 42, monthly average concentrations of dissolved oxygen ranged from 7.1 to 12.5 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



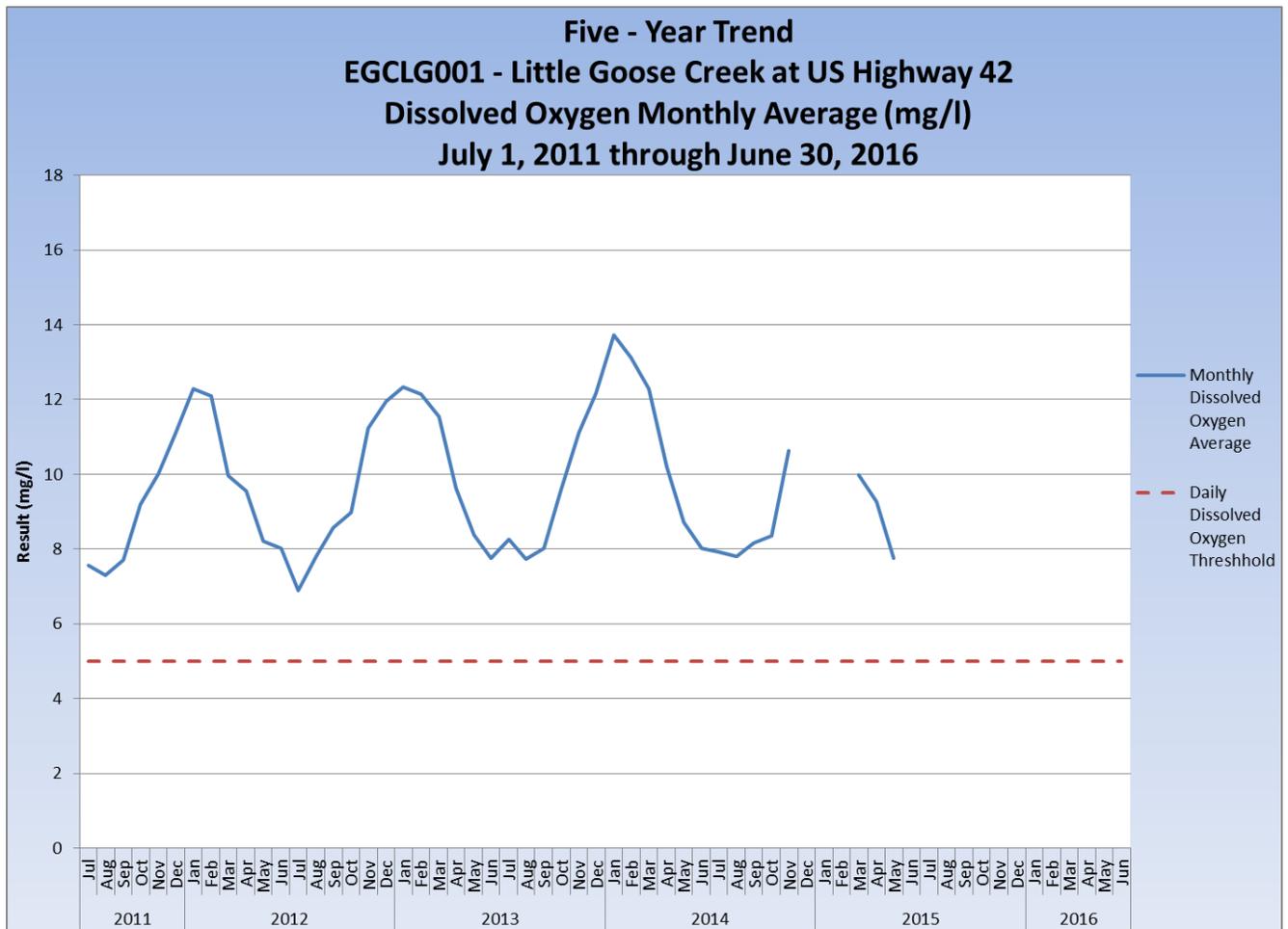


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 23 MPN/100 ml to 1,148 MPN/100 ml in samples collected at Little Goose Creek at US Highway 42. The water quality criteria for fecal coliform were met in 21 of 30 months during the recreational seasons in Little Goose Creek at US Highway 42.





In the five-year trend for final dissolved oxygen in Little Goose Creek at US 42, monthly average concentrations of dissolved oxygen ranged from 6.9 to 13.7 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.

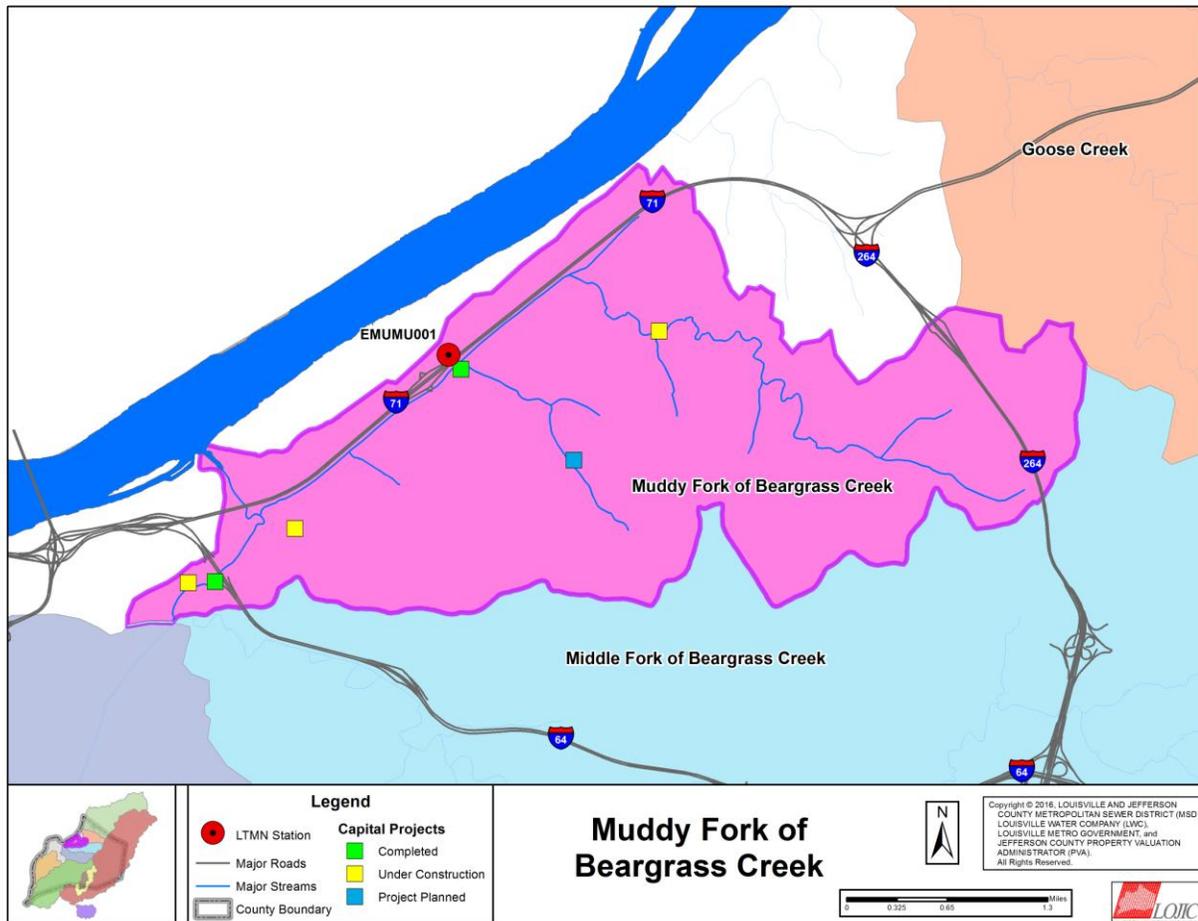




**Biological Monitoring Results:** Benthic communities were rated as “fair” at Goose Creek at Old Westport Road (EGCGC001) and Little Goose Creek at US Highway 42 (LTMN Site EGCLG001) and “fair” at Goose Creek at US Highway 42 (EGCGC002), based on data collected in Spring 2015. Fish communities were rated as “good” at Goose Creek at Old Westport Road and at Little Goose Creek at US Highway 42 and “good” at Goose Creek at US Highway 42, based on data collected in Fall 2015. Habitat quality was rated as “excellent” at all three locations, based on data collected in 2013, and 2015. Algal communities were rated as “good” in 2011, and “excellent” in 2013, at Old Westport Road; “fair” in 2011, and “good” in 2013, at Goose Creek at US 42 and “fair” in 2011, and “excellent” in 2013, at Little Goose Creek at US Highway 42. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

### 5.5.3 Muddy Fork of Beargrass Creek Watershed

Figure 5.5.3 Muddy Fork of Beargrass Creek Watershed



**Watershed Description:** The Muddy Fork is one of three streams that join to form the larger Beargrass Creek watershed. The Muddy Fork flows west from Windy Hills toward the Ohio River, then southwest along Interstate 71 before joining with the South Fork to become Beargrass Creek near Mellwood Avenue and Story Avenue. The Muddy Fork of Beargrass Creek drains nine square miles.

MSD has been monitoring water quality since 2002 in this watershed. The MSD monitoring station located at Muddy Fork at Mockingbird Valley Road (EMUMU001) drains 6.2 square miles. Approximately 9% of this watershed is covered by impervious surfaces.



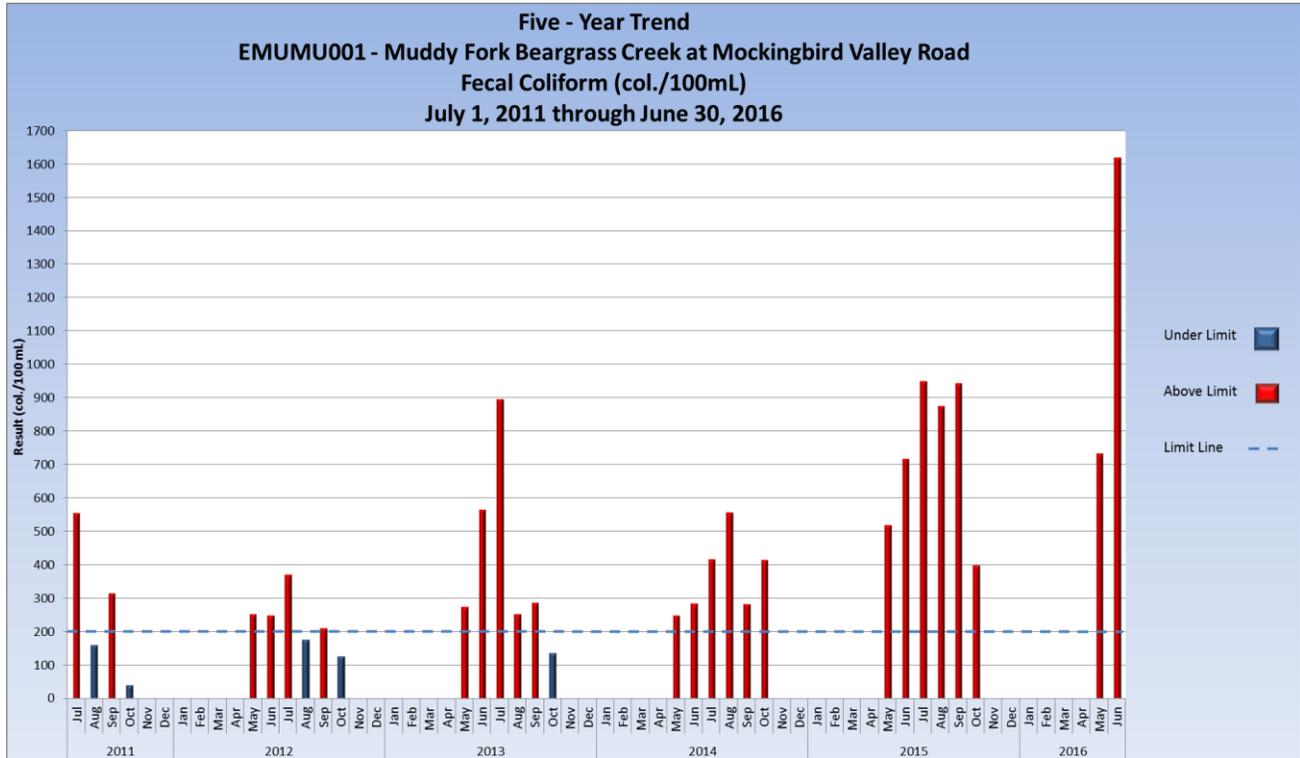
Capital projects in the Muddy Fork of Beargrass Creek Watershed include Mellwood System 1 - Mellwood Pump Station and Force Main, CSO 093 Structural Modifications and Green Infrastructure, Mellwood System 2 - Winton & Mockingbird Pump Station Elimination and Pipe Upgrades, Muddy Fork Pump Station Force Main, Clifton Heights Storage Basin, and Story Avenue and Spring Street Green Infrastructure Controls.

**Continuous Monitoring Results:** Final continuous monitoring data was available between October 1, 2014, and September 30, 2015, at Muddy Fork at Mockingbird Valley Road. During this time period, the temperature data set were 51.9% complete and 100.0% of available values met the temperature criterion. Dissolved oxygen data set were 47.9% complete, average dissolved oxygen was 9.2 mg/l, and 98.3% of available values met the water quality criteria.

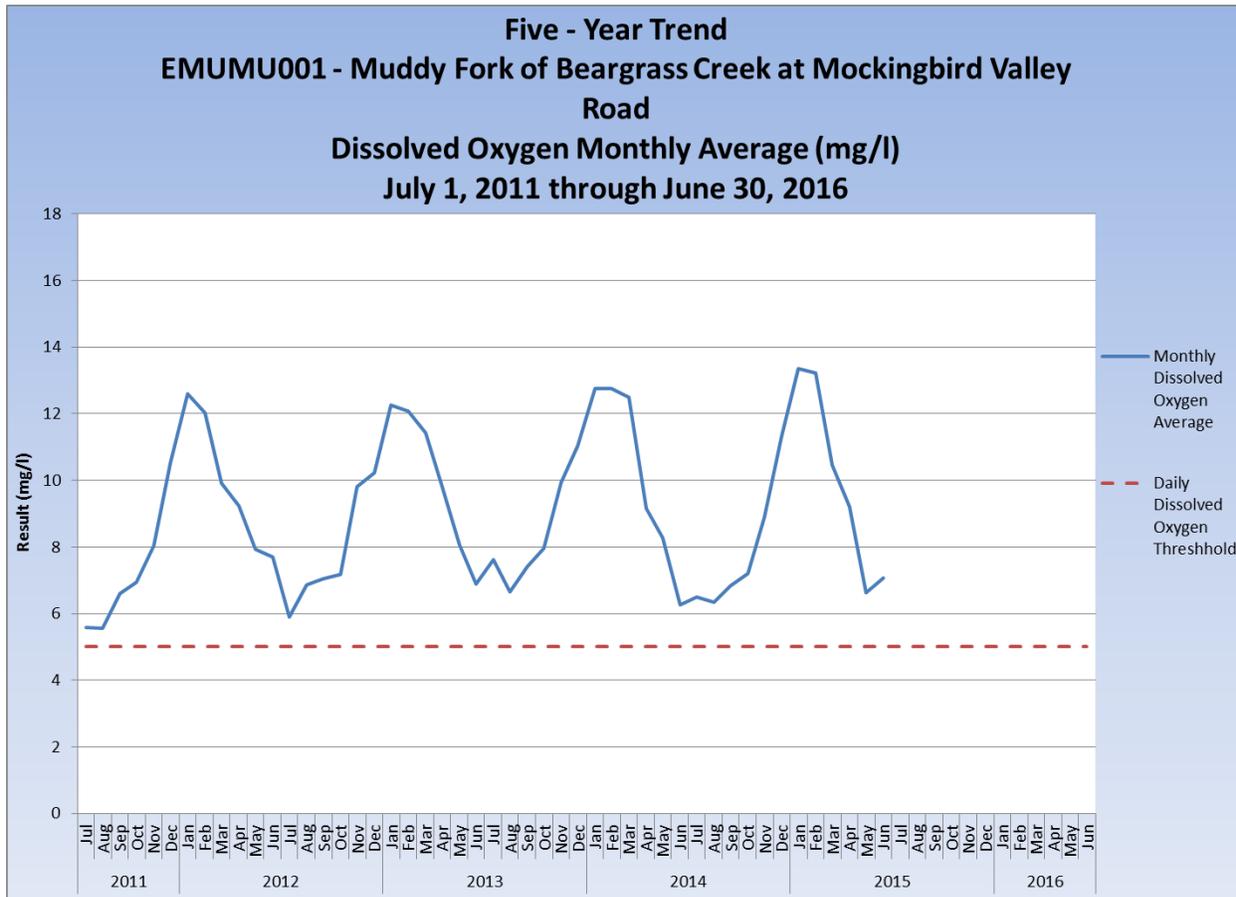
**Quarterly Monitoring Results:** At Muddy Fork of Beargrass Creek at Mockingbird Valley Road four samples were collected under dry conditions. The average concentration of total phosphorus collected at Muddy Fork of Beargrass Creek at Mockingbird Valley Road was 0.087 mg/l. The average concentration of dissolved phosphorus was 0.0445 mg/l. Concentrations of nitrate were between 0.905 mg/l and 2.68 mg/l during this report period. Total dissolved solids concentrations ranged between 290 mg/l and 702 mg/l in quarterly samples. TSS concentrations ranged between 1.5 mg/l and 158 mg/l. All quarterly samples for metals were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc, with the exception of one sample collected under dry conditions in in Muddy Fork of Beargrass Creek at Mockingbird Valley Road in July 2015, which had an elevated lead concentration (9.41 ug/l) that exceeded the chronic aquatic life criterion of 6.39 ug/l.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 400 MPN/100 ml to 1,621 MPN/100 ml in samples collected in Muddy Fork at Mockingbird Valley Road. The water quality criteria for fecal coliform were met in zero of six months during the recreational season.

**Five-Year Trend Analysis:** In the five-year trend analysis for the Muddy Fork of Beargrass Creek at Mockingbird Valley Road, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 40 MPN/100 ml to 1,621 MPN/100 ml in samples collected at Muddy Fork of Beargrass Creek. The water quality criteria for fecal coliform were met in 5 of 30 months during the recreational seasons in the Muddy Fork of Beargrass Creek at Mockingbird Valley Road.



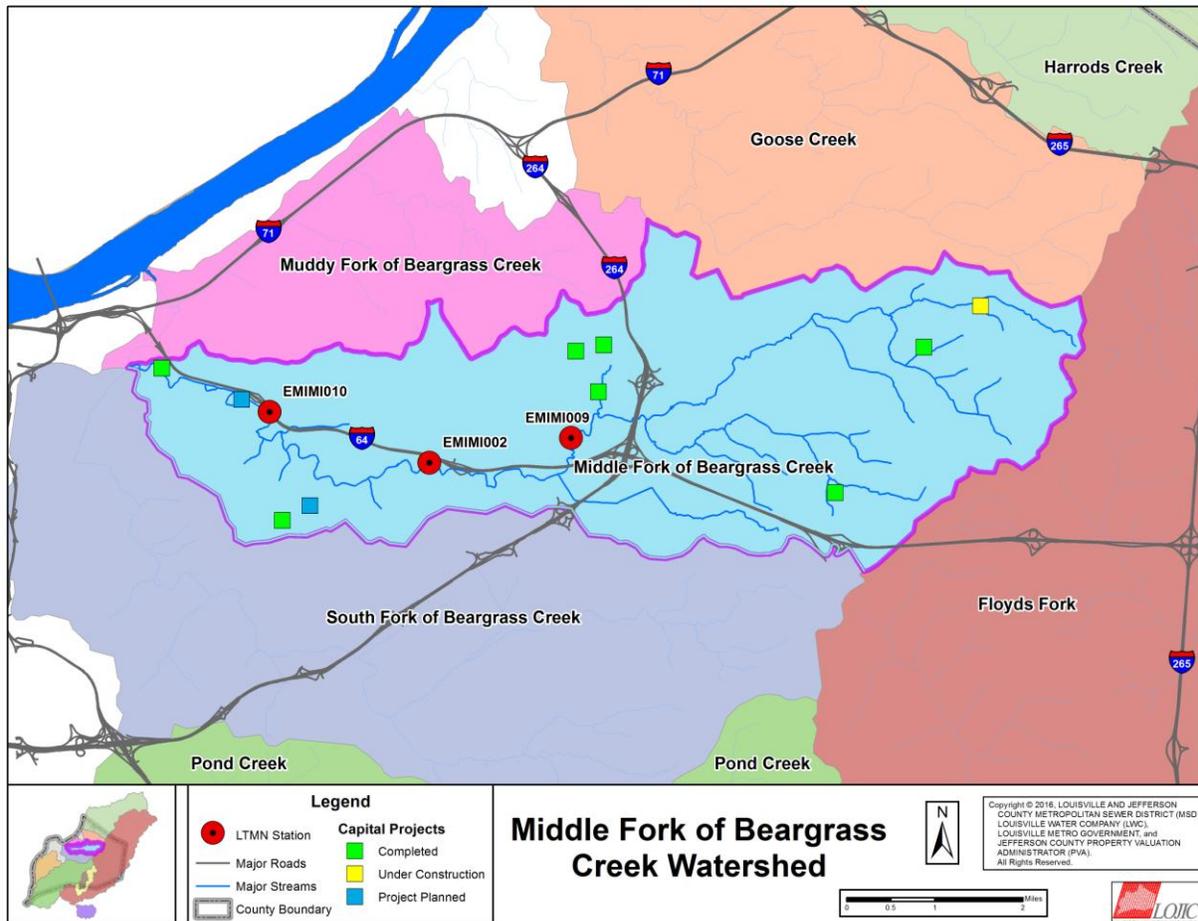
In the five-year trend for final dissolved oxygen in Muddy Fork of Beargrass Creek at Mockingbird Valley Road, monthly average concentrations of dissolved oxygen ranged from 5.6 to 13.3 mg/l. Data gaps in the period from July 2011, through September, 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



**Biological Monitoring Results:** Benthic communities were rated as “poor,” based on data collected in Spring 2015. Fish communities were rated as “fair,” based on data collected in Fall 2015. Habitat quality was rated as “poor,” based on data collected in 2013, and 2015. Algal communities were rated as “fair” in both 2011, and 2013, in the Muddy Fork of Beargrass Creek at Mockingbird Valley Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

5.5.4. Middle Fork of Beargrass Creek Watershed

Figure 5.5.4 Middle Fork of Beargrass Creek Watershed



**Watershed Description:** The Middle Fork of Beargrass Creek is one of three streams that join to form the larger Beargrass Creek watershed. The small streams that eventually form the Middle Fork of Beargrass Creek originate in Middletown and Douglas Hills. The Middle Fork of Beargrass Creek flows west across St. Matthews before joining the South Fork of Beargrass Creek near Irish Hill. There are just over 25 square miles of land in the Middle Fork of Beargrass Creek. Prominent features of this watershed include Cherokee Park, Seneca Park and Cave Hill Cemetery. Combined sewers currently serve a portion of this part of Louisville.



Water quality data are collected at three locations in this watershed, listed from upstream to downstream: Browns Lane (EMIMI009), Old Cannons Lane (EMIMI002) and Lexington Road (EMIMI010). There are 15.2 square miles of land draining to the Browns Lane site; 18.9 square miles to the Old Cannons Lane site and 24.8 square miles to the Lexington Road site. Continuous monitoring data are collected at Old Cannons Lane and Lexington Road. Impervious surfaces cover about 23% of this watershed.

Capital projects in the Middle Fork of Beargrass Creek Watershed include Hurstbourne Inflow and Infiltration Investigation and Rehabilitation, CSO 206 Sewer Separation, Beechwood Village Sanitary Sewer Replacement - East, Sinking Fork Relief Interceptor, Beechwood Village Sanitary Sewer Replacement - West, Anchor Estates - Vannah Pump Station Eliminations, CSO 140 Increased Pipe Conveyance, CSO 123 Downspout Disconnection, I-64 And Grinstead Drive Storage Basin, and Anchor Estates - Anchor Estates Pump Station 1 and 2 Pump Station Eliminations.

**Continuous Monitoring Results:** Final continuous monitoring data was available between October 1, 2014, and September 30, 2015, in the Middle Fork of Beargrass Creek at Old Cannons Lane and Lexington Road. During this time period, the temperature data set was 64.2% complete at Middle Fork of Beargrass Creek at Old Cannons Lane and 16.2% complete at Middle Fork of Beargrass Creek at Lexington Road. At Old Cannons Lane, the dissolved oxygen record was 64.9% complete, average dissolved oxygen was 9.2 mg/l, and the dissolved oxygen criteria were met 100.0% of the days with a complete record. At Lexington Road, the dissolved oxygen record was 15.6% complete, average dissolved oxygen was 8.2 mg/l, and the dissolved oxygen criteria were met 84.2% of the days with a complete record.

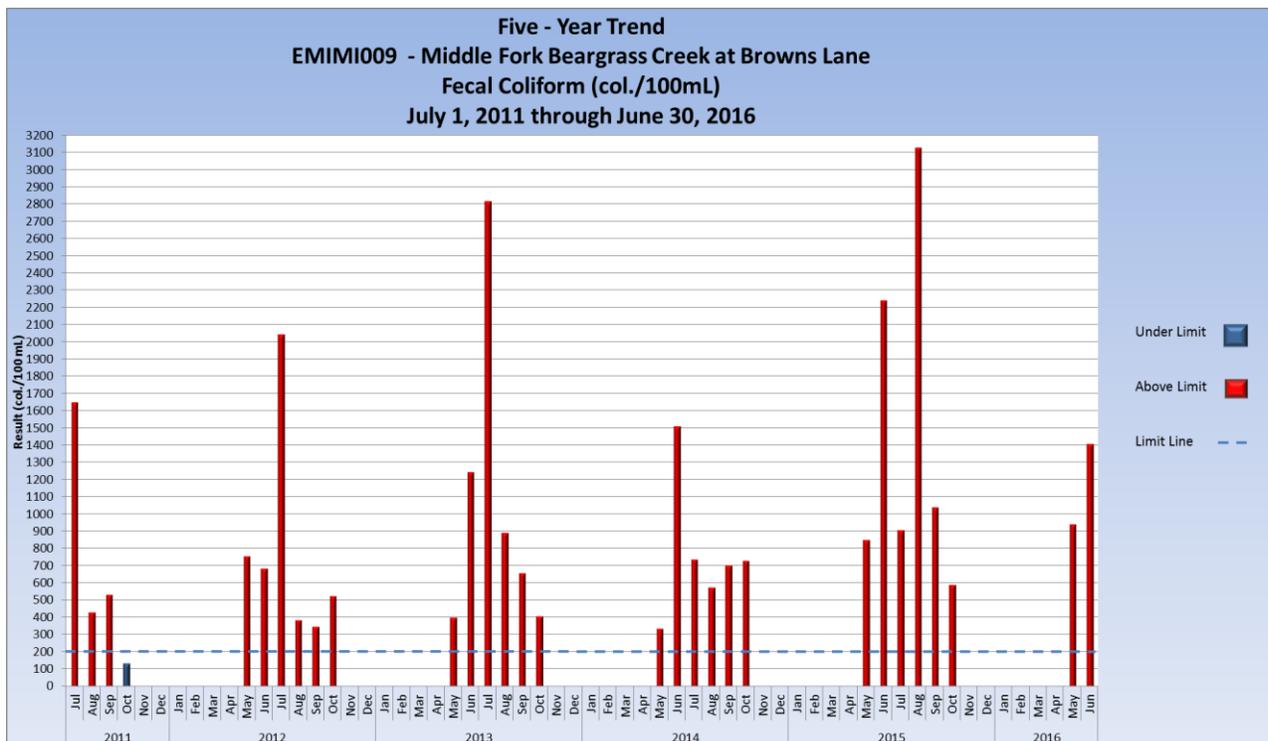
**Quarterly Monitoring Results:** At all sites, three samples were collected under dry conditions while one sample was collected under wet conditions. Average concentrations of total phosphorus samples collected at Middle Fork of Beargrass Creek at Old Cannons Lane were 0.03 mg/l, while those from Browns Lane were below detection and those from Lexington Road were 0.046 mg/l. Average concentrations of soluble phosphorus were 0.025 mg/l, 0.023 mg/l and 0.04 mg/l respectively in Middle Fork of Beargrass Creek at Old Cannons Lane, Browns Lane and Lexington Road. Nitrate concentrations ranged from 0.616 mg/l to 3.35 mg/l. Total dissolved solids ranged between 327.5 mg/l and 838.5 mg/l in samples collected from the Middle Fork Beargrass Creek watershed. TSS concentrations were between 1.5 mg/l and 24 mg/l. Chronic aquatic life criteria were met in all quarterly samples for cadmium, copper, lead, and zinc in all three monitoring locations in the Middle Fork of Beargrass Creek.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 225 MPN/100 ml to 3,873 MPN/100 ml in samples collected in two monitoring locations along the Middle Fork of Beargrass Creek. The water quality criteria for fecal coliform were not met during the recreational season at these two monitoring sites in the Middle Fork of Beargrass Creek. Average (geometric mean) concentrations of fecal coliform bacteria ranged from 197 MPN/100 ml to 1,448 MPN/100 ml in samples collected from Middle



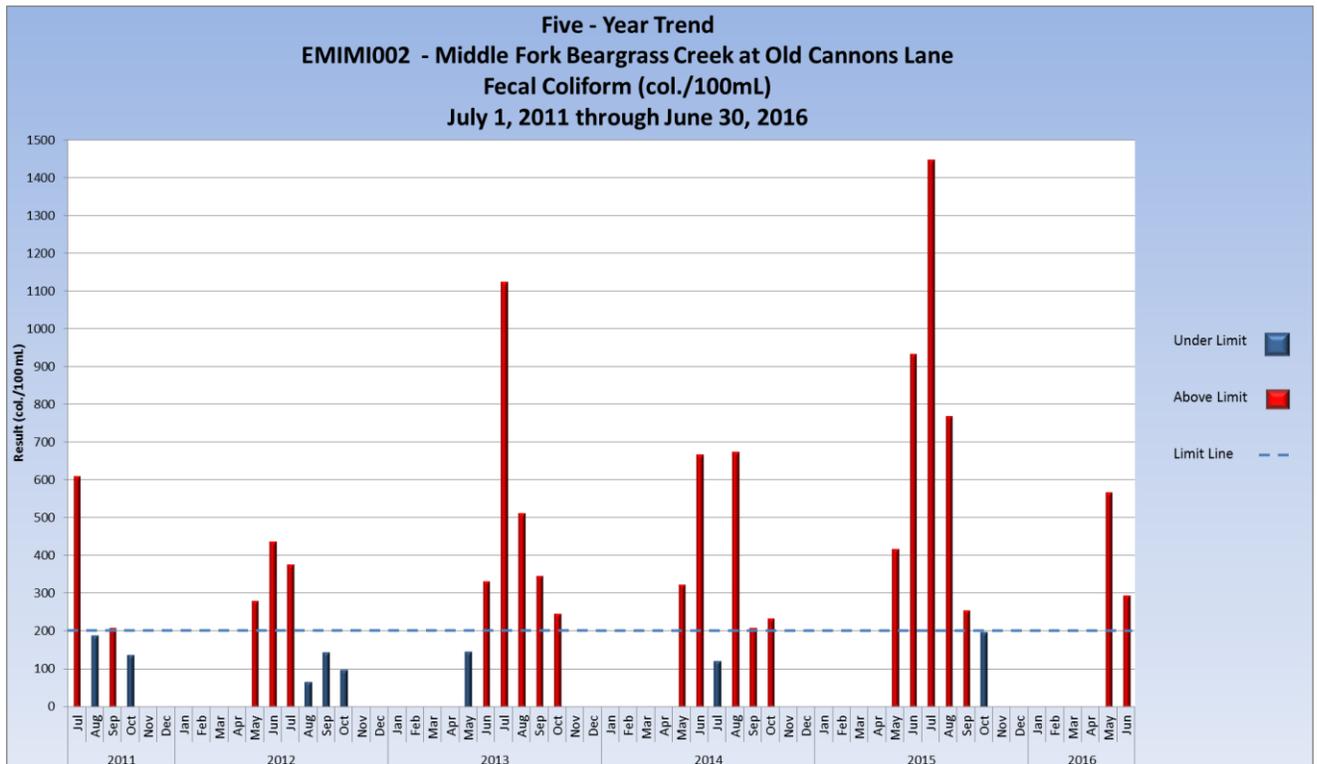
Fork of Beargrass Creek at Old Cannons Lane and met water quality criteria for fecal coliform during one of six months of the recreational season. Elevated fecal coliform bacteria concentrations are common in urban streams.

**Five-Year Trend Analysis:** In the five-year trend analysis for the Middle Fork of Beargrass Creek, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 133 MPN/100 ml to 3,126 MPN/100 ml in samples collected at the Middle Fork of Beargrass Creek at Browns Lane. The water quality criteria for fecal coliform were met in 1 of 30 months during the recreational seasons at the Middle Fork of Beargrass Creek at Browns Lane.



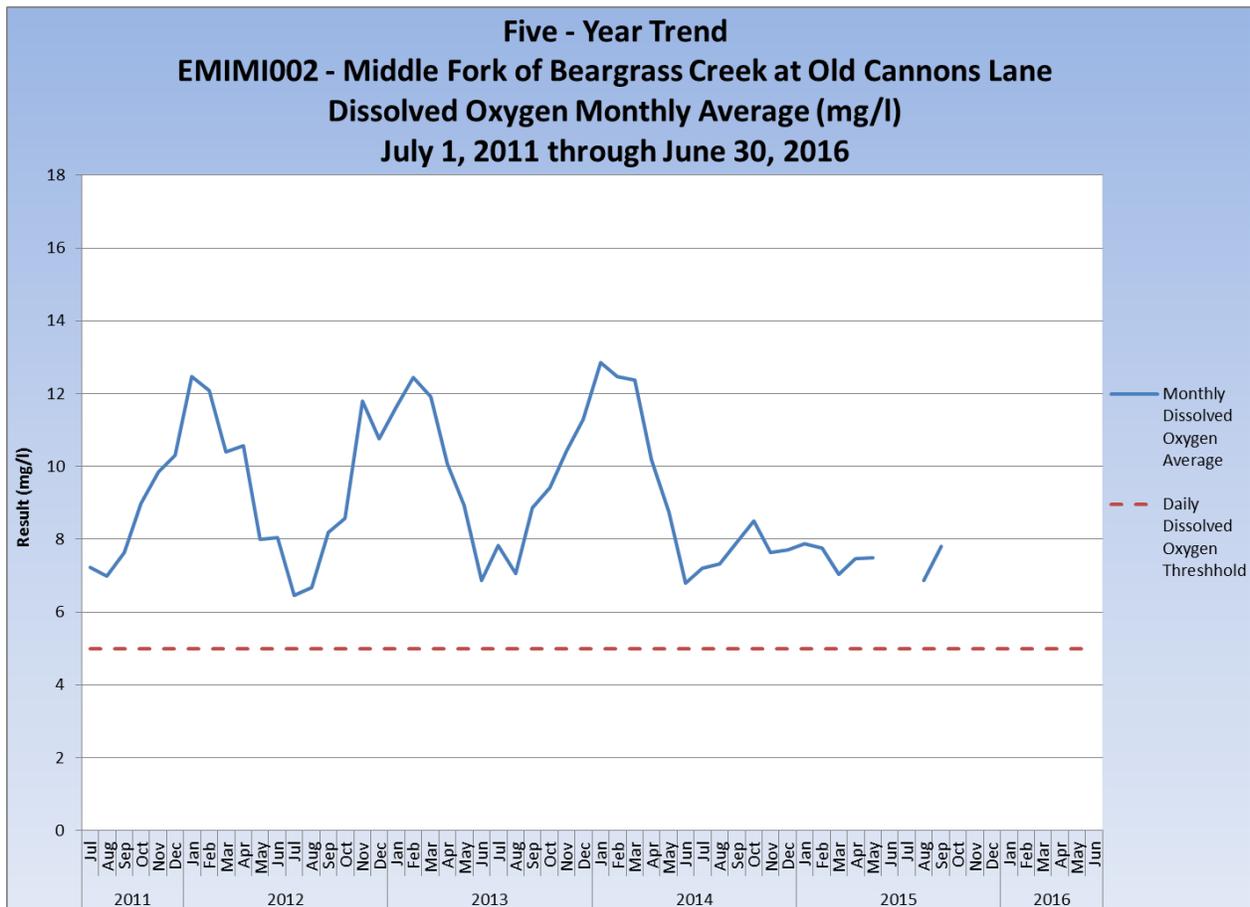


**Five-Year Trend Analysis:** During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 67 MPN/100 ml to 1,448 MPN/100 ml in samples collected at Middle Fork of Beargrass Creek at Old Cannons Lane. The water quality criteria for fecal coliform were met in 8 of 30 months during the recreational seasons in Middle Fork of Beargrass Creek at Old Cannons Lane.



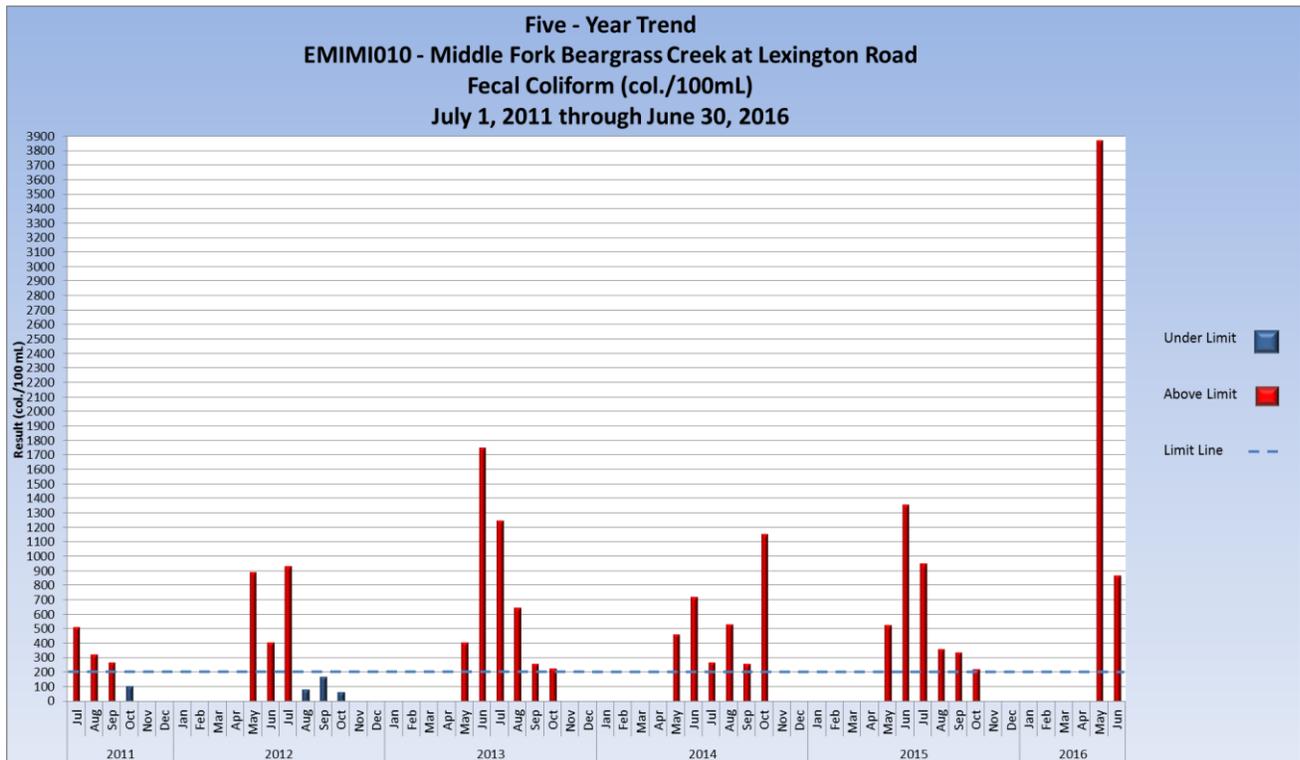


In the five-year trend for final dissolved oxygen in Middle Fork of Beargrass Creek at Old Cannons Lane, monthly average concentrations of dissolved oxygen ranged from 6.4 to 12.9 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



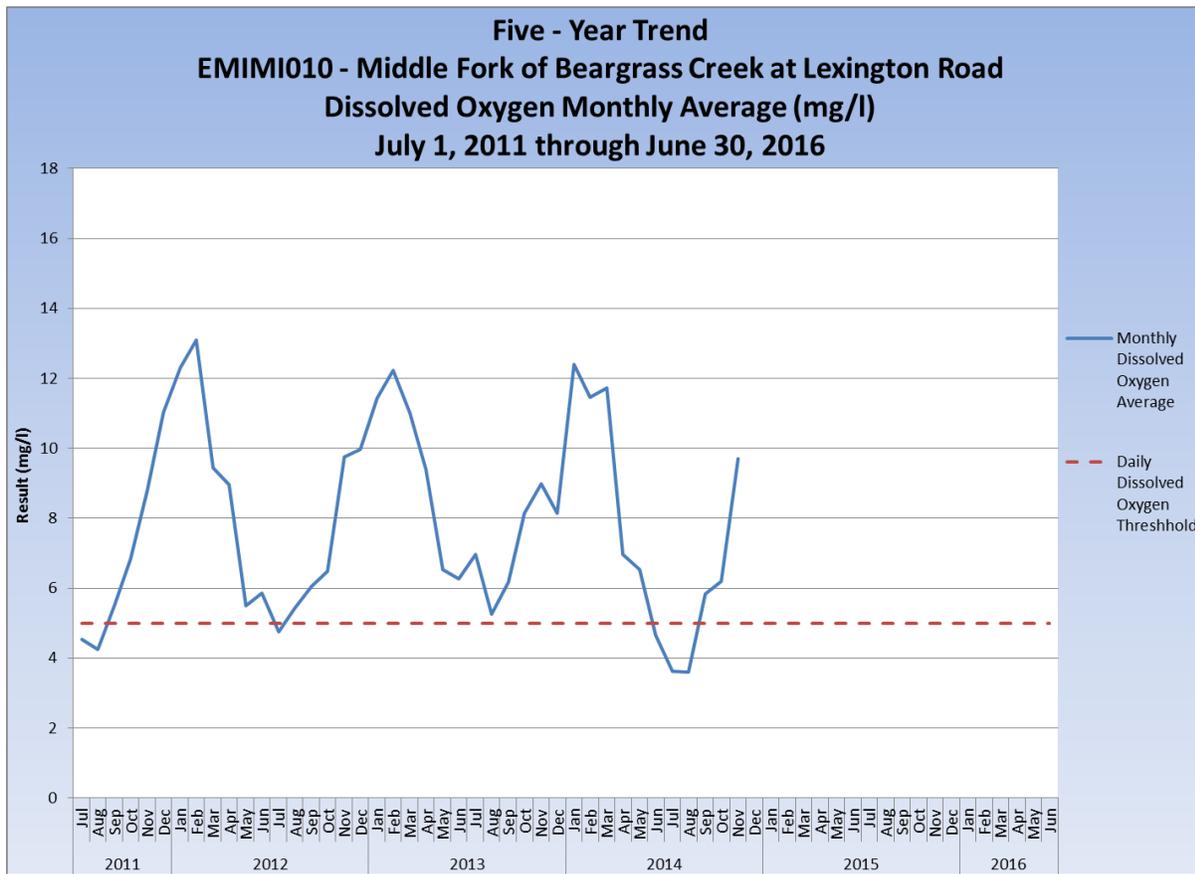


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 63 MPN/100 ml to 3,873 MPN/100 ml in samples collected at the Middle Fork of Beargrass Creek at Lexington Road. The water quality criteria for fecal coliform were met in 4 of 30 months during the recreational seasons at the Middle Fork of Beargrass Creek at Lexington Road.





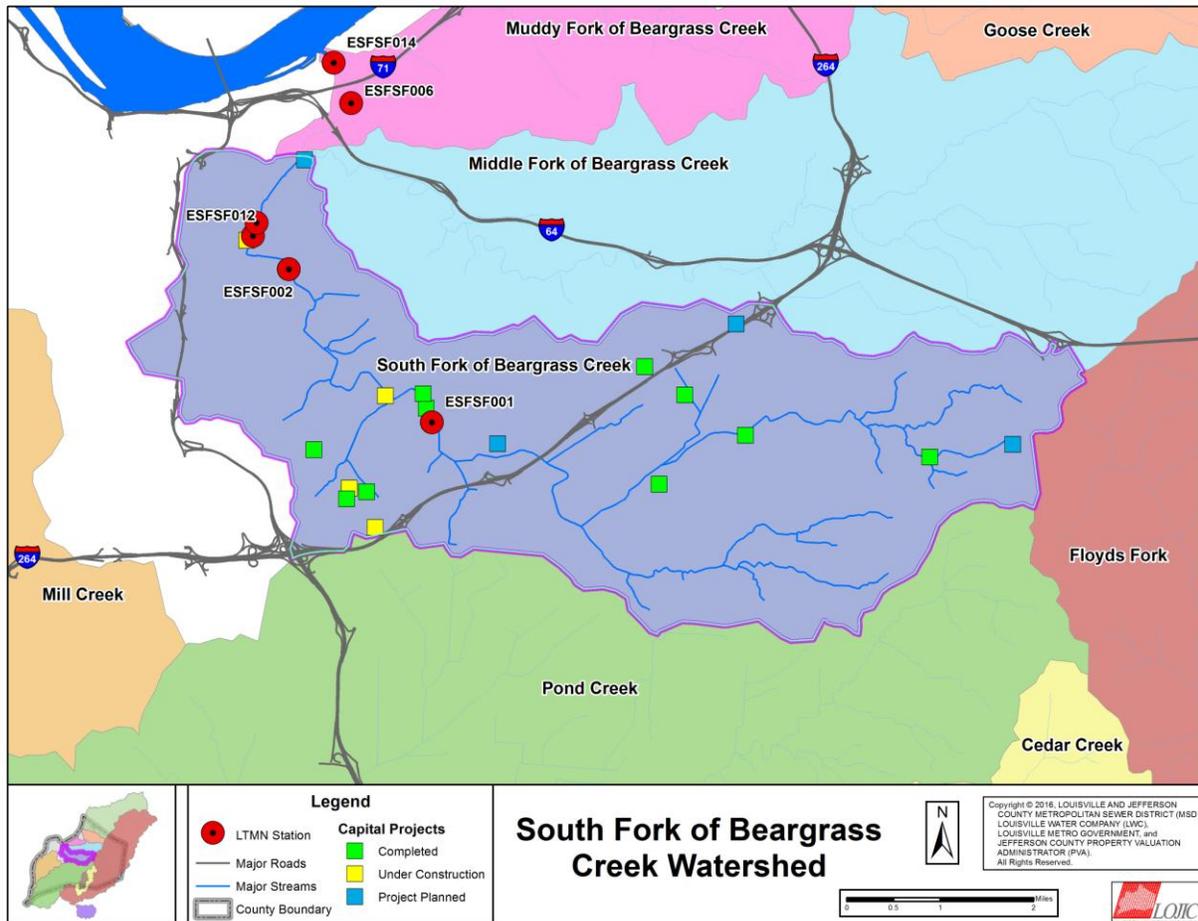
In the five-year trend for final dissolved oxygen in Middle Fork of Beargrass Creek at Lexington Road, monthly average concentrations of dissolved oxygen ranged from 3.6 to 13.1 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



**Biological Monitoring Results:** Benthic communities were rated as “fair” at Browns Lane, at Old Cannons Lane and at Lexington Road, based on data collected in Spring 2015. Fish communities were rated as “fair” at Browns Lane, at Old Cannons Lane and at Lexington Road, based on data collected in Fall 2015. Habitat quality was rated as “average” at Browns Lane, “excellent” at Old Cannons Lane, and “average” at Lexington Road, based on data collected in 2013, and 2015. Algal communities were rated as “good” in 2011, and “fair” in 2013, at Brown’s Lane, “good” in both 2011, and 2013, at Old Cannons Lane and “good” in 2011, and “excellent” in 2013, at Lexington Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

### 5.5.5 South Fork of Beargrass Creek Watershed

Figure 5.5.5 South Fork of Beargrass Creek Watershed



**Watershed Description:** The South Fork of Beargrass Creek is one of three streams that join to form the Beargrass Creek watershed. The small streams that eventually form the South Fork of Beargrass Creek originate in Jeffersontown and Hurstbourne Acres. The South Fork of Beargrass Creek flows west across Buechel before joining the Middle Fork of Beargrass Creek near Irish Hill. The South Fork then joins the Muddy Fork to become Beargrass Creek near the intersection of Interstates 71 and 64. There are about 25 square miles of land in the South Fork



of Beargrass Creek watershed. Some streams in this watershed were straightened and several miles were enclosed in concrete channels in the past to reduce flooding.

MSD monitors water quality at five locations in this watershed, listed from upstream to downstream: Trevilian Way (ESFSF001), Schiller Avenue Ramp (ESFSF002), Breckinridge Street (ESFSF012), Brownsboro Road (ESFSF006), and River Road (ESFSF014).

There are 17.2 square miles of land draining to the Trevilian Way site. At the lower end, 22.8 square miles of land are draining to the Schiller Avenue site. There are 51.5 square miles of land draining to the Brownsboro Road site, which is below the confluence with the Middle Fork of Beargrass Creek. Impervious surfaces range from 28% to 32% at these monitoring sites.

Capital projects in the South Fork of Beargrass Creek Watershed include Camp Taylor SSES, Jeffersontown Force Main, Camp Taylor #2 - Replace Sewers, Hikes Point Interceptor Phase 2, Hikes Point Interceptor Phase 1, Camp Taylor Sanitary Sewer Phase 1, Camp Taylor Sanitary Sewer #1A, Beargrass Interceptor Rehabilitation Phase 2, Hikes Point Relief Effort, Klondike Interceptor, Carson and Ribble Relief, CSO 108 Dam Modification, Middle Fork Relief Interceptor, Wet Weather Storage, And Upper Middle Fork Pump Station Diversion 2 Pump Station and Wet Weather Storage, Camp Taylor #4 - Sewer Rehabilitation and Replacement, Raintree and Marian Court Phase 1 - Pump Station Elimination, Sutherland Interceptor, Lexington Road and Payne Street Storage Basin, Camp Taylor Sanitary Sewer #2, Camp Taylor #3 - Sewer Rehabilitation, Logan Street And Breckinridge Street Storage Basin, Camp Taylor Sanitary Sewer #1B, and Nightingale Pump Station Replacement and Storage.

**Continuous Monitoring Results:** Final continuous monitoring data was available between October 1, 2014, and September 30, 2015, at three sites in the South Fork Beargrass Creek watershed. During this time period, the temperature data set at Trevilian Way was 78.6% complete and River Road was 66.9% complete and 100% of available values met the temperature water quality criterion for both sites. At Schiller Avenue Ramp, the temperature record was 9.42% complete and 100% of available records met the temperature criterion. Because of construction near the South Fork of Beargrass Creek at Schiller Avenue Ramp during the reporting period, the sonde and water quality monitoring site was moved to the South Fork of Beargrass Creek at Breckinridge Street (ESFSF012). No final data was available for the South Fork of Beargrass Creek at Breckinridge Street during this time period. At Trevilian Way, the dissolved oxygen data set was 72.3% complete, average dissolved oxygen was 8.8 mg/l, and the dissolved oxygen criteria were met 83.7% of the days with a complete record. At the River Road station (ESFSF014) in the downstream portion of the watershed, the dissolved oxygen data set was 64.6% complete, 7.0 mg/l, and the dissolved oxygen criteria were met 48.3% of the days with a complete record. The River Road station is influenced by backwater from the Ohio River, which may contribute to frequent stagnant conditions and low dissolved oxygen at this monitoring site. The dissolved oxygen data set at Schiller Avenue Ramp was 6.57% complete, 8.5 mg/l, and the dissolved oxygen criteria were met 8.33% of the days with a complete record.

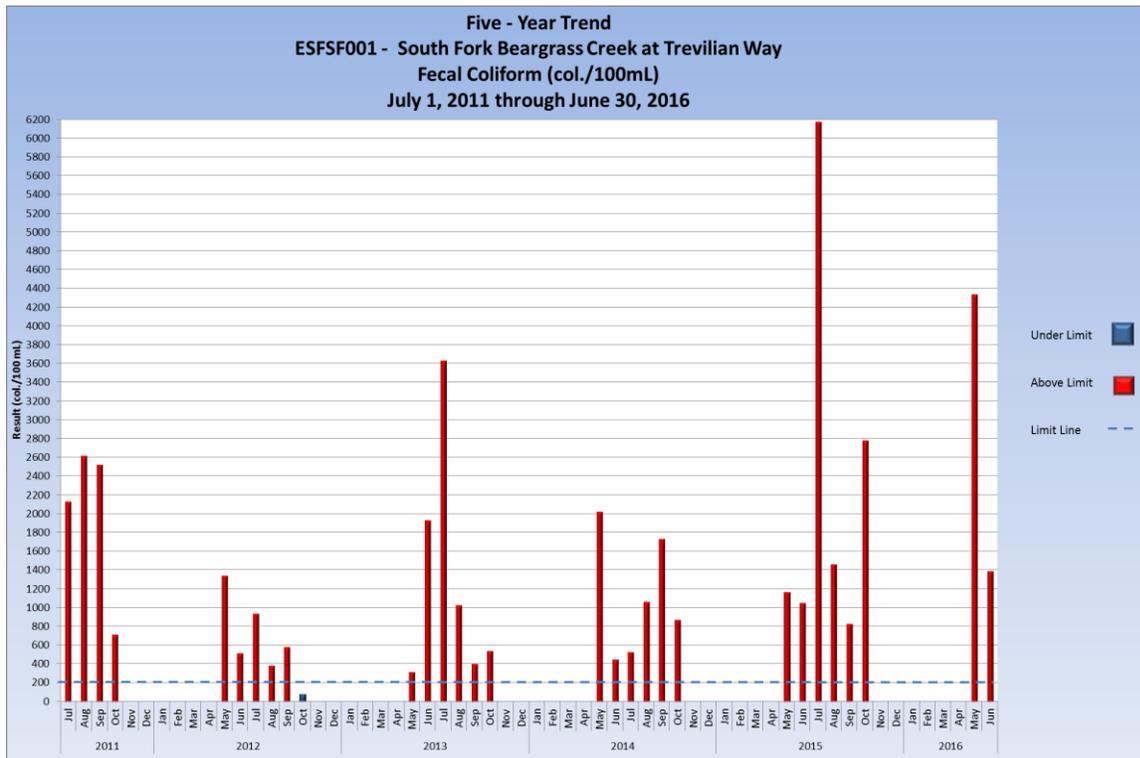


**Quarterly Monitoring Results:** At all sites, three samples were collected under dry conditions while one sample was collected under wet conditions. Average concentrations of total phosphorus samples collected at the South Fork of Beargrass Creek at Trevillian Way were 0.022 mg/l, while samples from Brownsboro Road were 0.043 mg/l and Breckinridge Street were 0.092 mg/l. Average concentrations of soluble phosphorus were 0.03 mg/l, 0.028 mg/l and 0.021 mg/l respectively in the South Fork of Beargrass Creek at Trevillian Way, Brownsboro Road and at Breckinridge Street. The concentrations of nitrate ranged from 0.923 mg/l to 3.275 mg/l in quarterly samples. Total dissolved solids concentration ranged between 250 mg/l and 911 mg/l in samples collected from the South Fork of Beargrass Creek watershed. TSS concentrations were between 4 mg/l and 99 mg/l. All quarterly samples for metals were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc, with the exception one sample collected under dry conditions in the South Fork Beargrass Creek at Breckinridge Street in April 2016, which had an elevated cadmium concentration (19.9 ug/l) that exceeded both acute and chronic aquatic life criterion of 0.74 ug/l and 0.67 ug/l respectively.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 684 MPN/100 ml to 10,175 MPN/100 ml in samples collected at three monitoring sites in the South Fork of Beargrass Creek. The water quality criteria for fecal coliform were not met for data available during the recreational season at any of the three monitoring locations along the South Fork of Beargrass Creek.

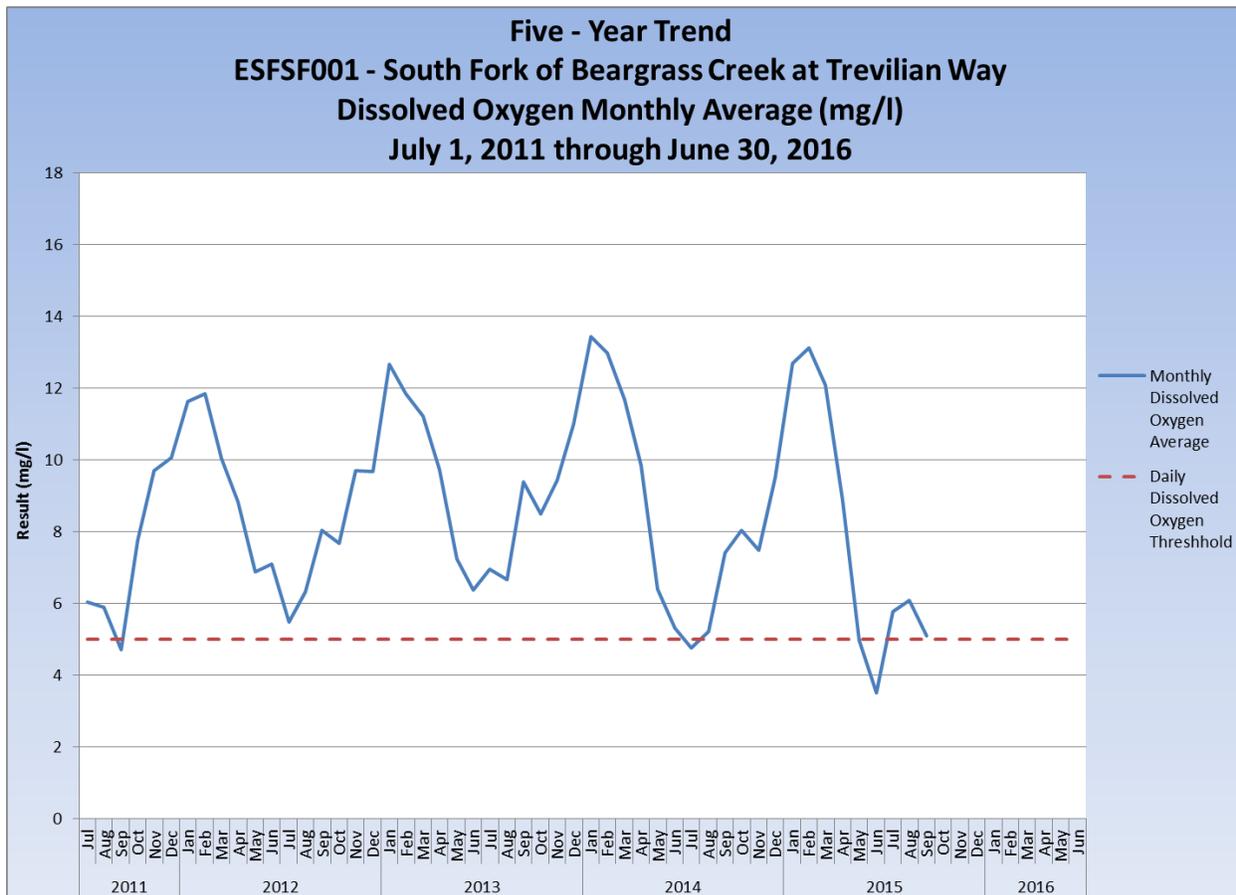


**Five-Year Trend Analysis:** In the five-year trend analysis for the South Fork, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 77 MPN/100 ml to 6,176 MPN/100 ml in samples collected at the South Fork Beargrass Creek at Trevilian Way. The water quality criteria for fecal coliform were met in 1 of 30 months during the recreational seasons in the South Fork of Beargrass Creek at Trevilian Way.



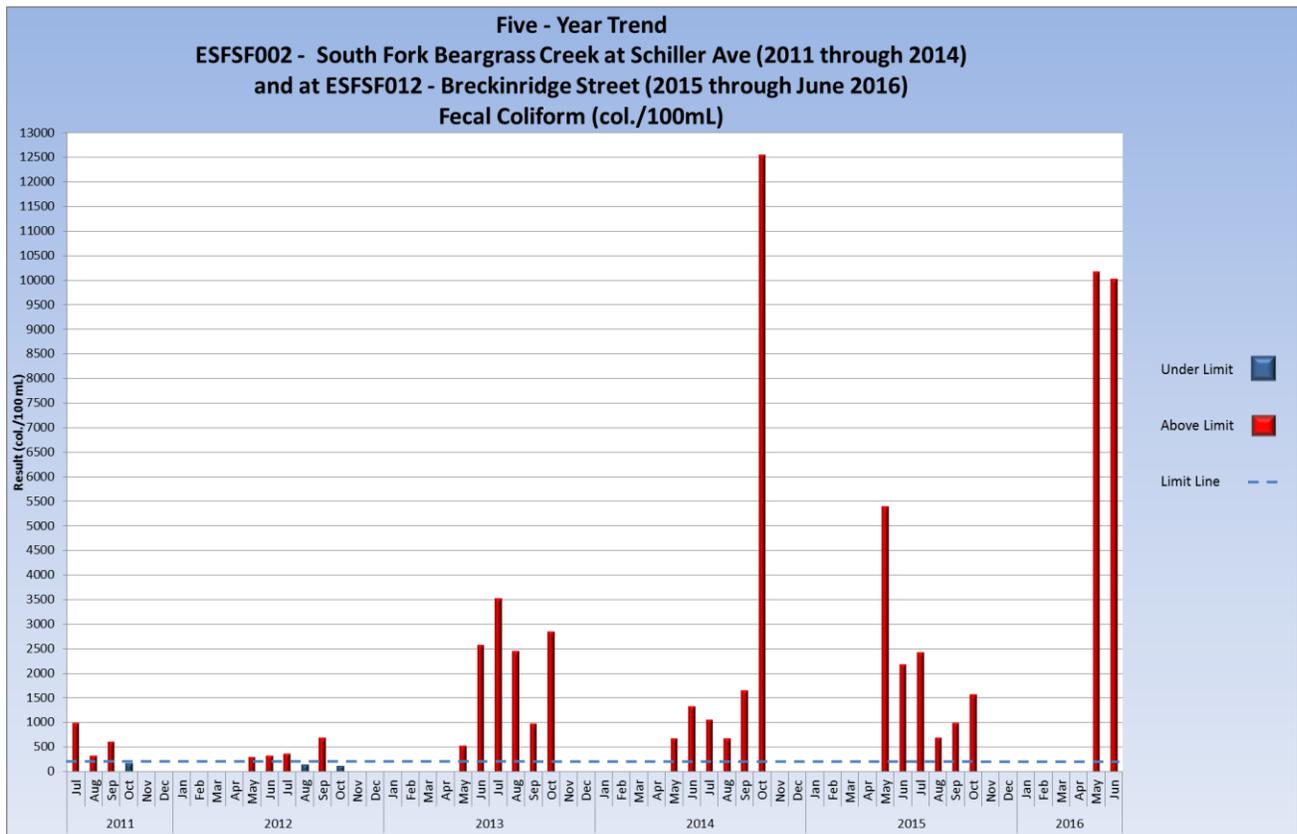


In the five-year trend for final dissolved oxygen in South Fork of Beargrass Creek at Trevilian Way, monthly average concentrations of dissolved oxygen ranged from 3.5 to 13.4 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



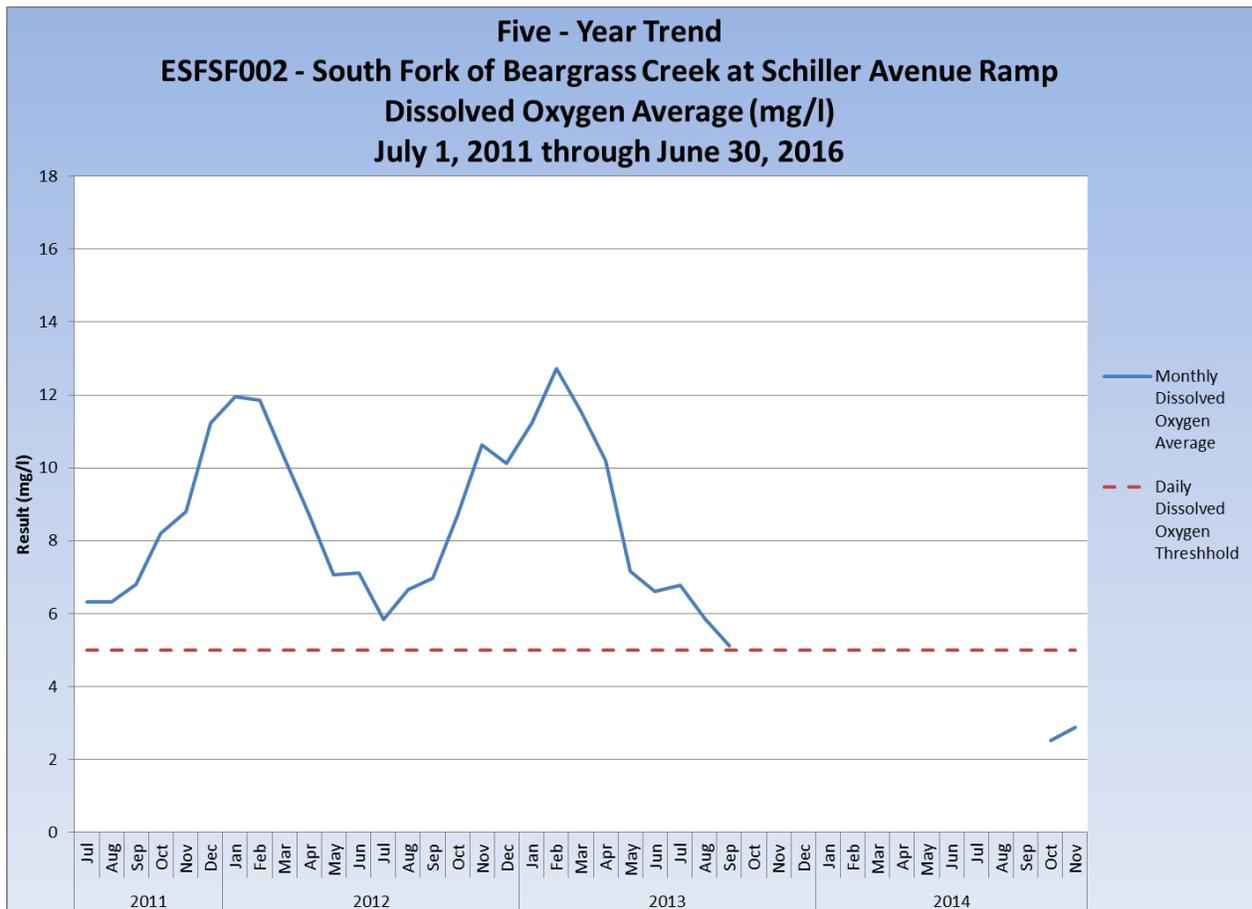


During the period from July 1, 2011, through October, 2014, at the South Fork Beargrass Creek at Schiller Avenue and from May 1, 2015, through June 30, 2016, at Breckinridge Street, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 111 MPN/100 ml to 12,548 MPN/100 ml in samples collected at those sites. The water quality criteria for fecal coliform were met in 3 of 22 months during the recreational seasons in Schiller Avenue and 0 of 8 in Breckinridge Street.



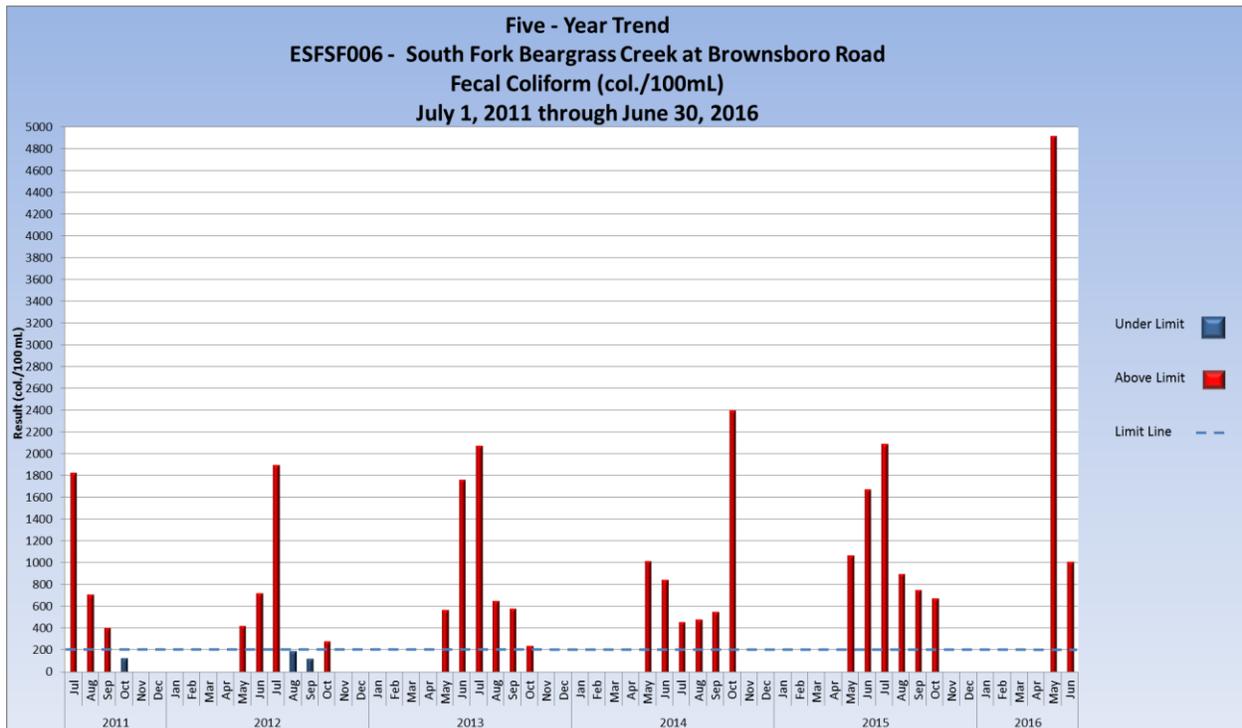


In the five-year trend for final dissolved oxygen in South Fork of Beargrass Creek at Schiller Avenue Ramp, monthly average concentrations of dissolved oxygen ranged from 2.5 to 12.7 mg/l. Data gaps in the period from July 2011, through November 2014, are due to meter impairments or QA review. No data is shown for the period of November 2014, through June 2016, because the site was moved to the South Fork of Beargrass Creek at Breckinridge Street due to construction.



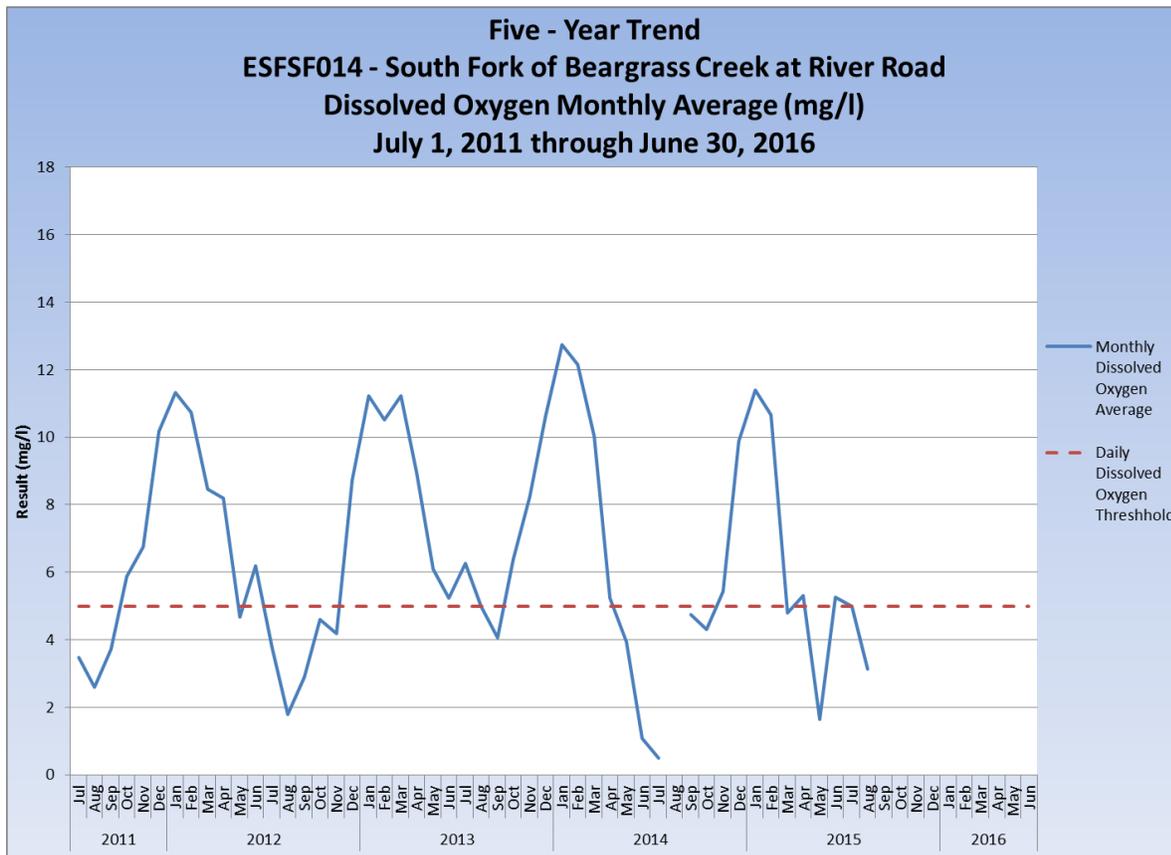


During the period from July 1, 2011, through June 30, 2016, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 125 MPN/100 ml to 4,916 MPN/100 ml in samples collected at the South Fork Beargrass Creek at Brownsboro Road. The water quality criteria for fecal coliform were met in 3 of 30 months during the recreational seasons in the South fork of Beargrass Creek at Brownsboro Road.





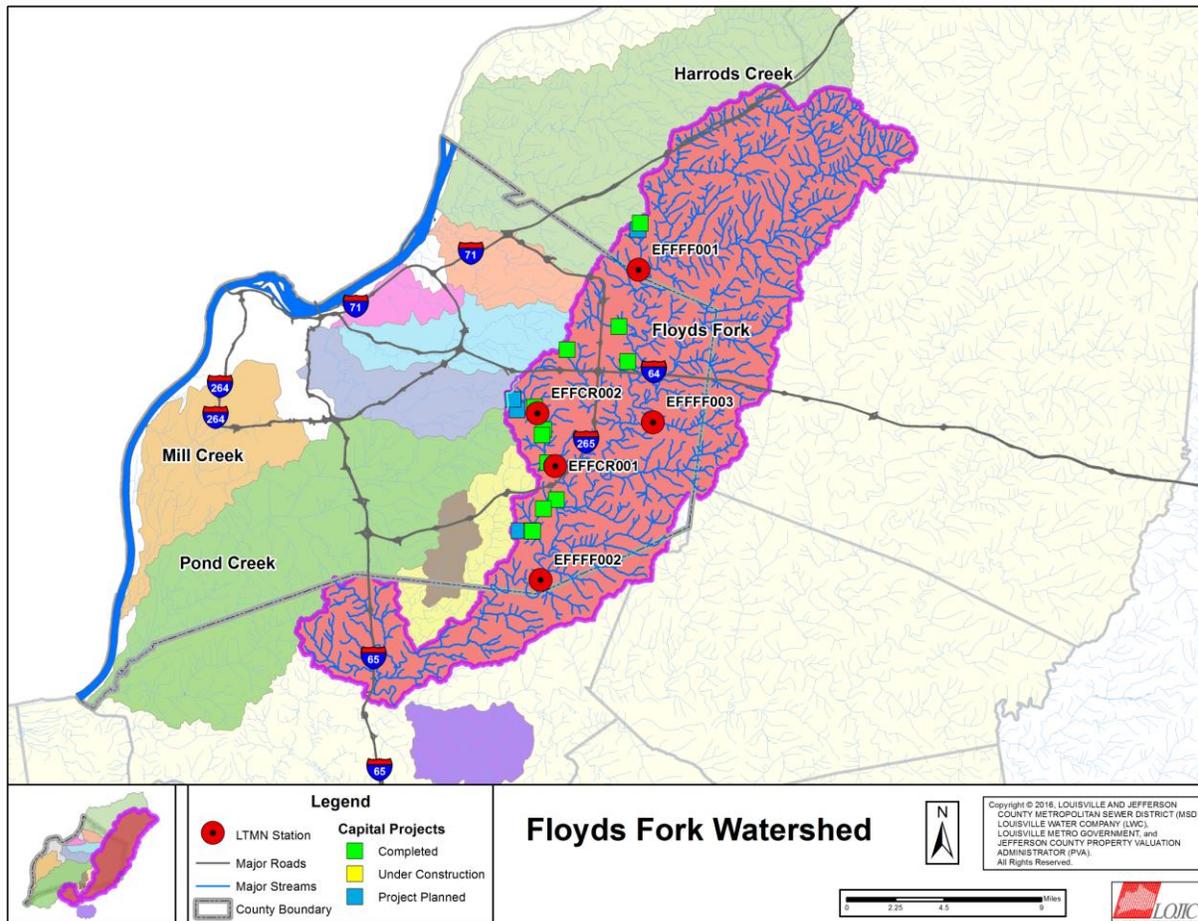
In the five-year trend for final dissolved oxygen in South Fork of Beargrass Creek at River Road, monthly average concentrations of dissolved oxygen ranged from 0.5 to 12.7 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



**Biological Monitoring Results:** Benthic communities were rated as “poor” at all sites in the South Fork of Beargrass Creek, based on data collected in Spring 2015. Fish communities were rated as “fair” at Trevilian Way, “poor” at Brownsboro Road and “no data collected” at Schiller Avenue Ramp, based on data collected in Fall 2015. Habitat quality was rated as “poor” at Trevilian Way and Schiller Avenue Ramp and “excellent” at Brownsboro Road, based on data collected in 2013, and 2015. Algal communities were rated as “good” in 2011, and “excellent” in 2013, at Trevilian Way, “fair” in both 2011, and 2013, at Schiller Avenue Ramp and “poor” in 2011, and “good” in 2013, at Brownsboro Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

### 5.5.6 Floyds Fork Watershed

Figure 5.5.6 Floyds Fork Watershed



**Watershed Description:** The small streams that form Floyds Fork originate in Oldham, Henry, and Shelby counties. Floyds Fork flows south through Oldham County, eastern Jefferson County and northern Bullitt County where it drains into the Salt River near Shepherdsville. This watershed drains 257 square miles, and is the largest metro area watershed. Approximately 104 square miles of the Floyds Fork watershed lie within Jefferson County.

MSD monitors water quality at five locations in the Floyds Fork watershed. Along the main stem of Floyds Fork, monitoring stations are located at Ash Avenue (EFFFF001), Old Taylorsville Road (EFFFF003), and Bardstown Road (EFFFF002). The Ash Avenue site drains 80 square



miles mostly in Henry and Oldham Counties. This monitoring location is downstream of the Ash Avenue wastewater treatment plant, which is operated by Oldham County. There are 138 square miles draining to the Old Taylorsville Road monitoring site (EFFFF003). This monitoring site is located downstream of the Floyds Fork Water Quality Treatment Center. There are 213 square miles draining to the Bardstown Road monitoring site (EFFFF002), near the border of Jefferson and Bullitt Counties. There are two monitoring sites on Chenoweth Run, at Ruckriegel Parkway (EFFCR002) and Gelhaus Lane (EFFCR001), which drain 5.5 and 11.6 square miles, respectively. The Gelhaus Lane monitoring site is located downstream of the Jeffersontown Water Quality Treatment Center (WQTC), which was taken off line in January, 2016.

Capital projects in the Floyds Fork Watershed include Jeffersontown Water Quality Treatment Center Elimination, Lake Forest SSES, Billtown Road Interceptor SS, Chenoweth Hills Water Quality Treatment Center Elimination and Pump Station Elimination, Billtown Road Pump Station, Force Main and Interceptor, Upper Billtown Road Interceptor, Grand Avenue Pump Station, Floydsburg Road Sanitary Sewer Evaluation Study, Rehab and Pump Station Upgrade, St. Rene Road Pump Station Inline Storage, Woodland Hill Pump Station Diversion, Ashburton Pump Station Improvements and Diversion, Fairmount Road Pump Station Improvements, Fairmount Road Pump Station Offline Storage Basin, Dell Road and Charlane Pkwy Interceptor Improvements, Bardstown Road Pump Station Improvements, Raintree and Marian Court System Upgrades, and Kavanaugh Road Pump Station Improvements.

**Continuous Monitoring Results:** Final continuous monitoring data were available between October 1, 2014, and September 30, 2015, at five sites in the Floyds Fork watershed. During this time period, the temperature data set was 33.7% complete at Ash Avenue, 30.7% at Old Taylorsville Road, 44.2% at Bardstown Road, 27.4% at Chenoweth Run at Ruckriegel Parkway, and 41.8% at Chenoweth Run at Gelhaus Lane. For all five sites 100% of available values met the temperature criterion. In Floyds Fork at Ash Avenue, the dissolved oxygen record was 25.5% complete, average dissolved oxygen was 9.5 mg/l, and the dissolved oxygen criteria was met 100.0% of the days with a complete record. In Floyds Fork at Old Taylorsville Road, the dissolved oxygen data set was 30.7% complete, average dissolved oxygen was 10.3 mg/l, and the dissolved oxygen criteria was met 100.0% of the days with a complete record. In Floyds Fork at Bardstown Road, the dissolved oxygen data set was 37.3% complete, average dissolved oxygen was 9.9, and the dissolved oxygen criteria was met 97.1% of the days with a complete record. In Chenoweth Run at Ruckriegel Parkway, the dissolved oxygen data set was 23.6% complete, average dissolved oxygen was 9.1 mg/l, and the dissolved oxygen criteria was met 100.0% of the days with a complete record. In Chenoweth Run at Gelhaus Lane, the dissolved oxygen data set was 34.0% complete, average dissolved oxygen was 10.3 mg/l, and the dissolved oxygen criteria was met 98.4% of the days with a complete record.

**Quarterly Monitoring Results:** During the report period, three quarterly samples were collected under dry and one sample under wet conditions at Chenoweth Run at Ruckriegel Parkway and at Gelhaus Lane, Floyds Fork at Ash Avenue, at Bardstown Road and at Old Taylorsville Road. Average concentration of total phosphorus for Chenoweth Run at Ruckriegel

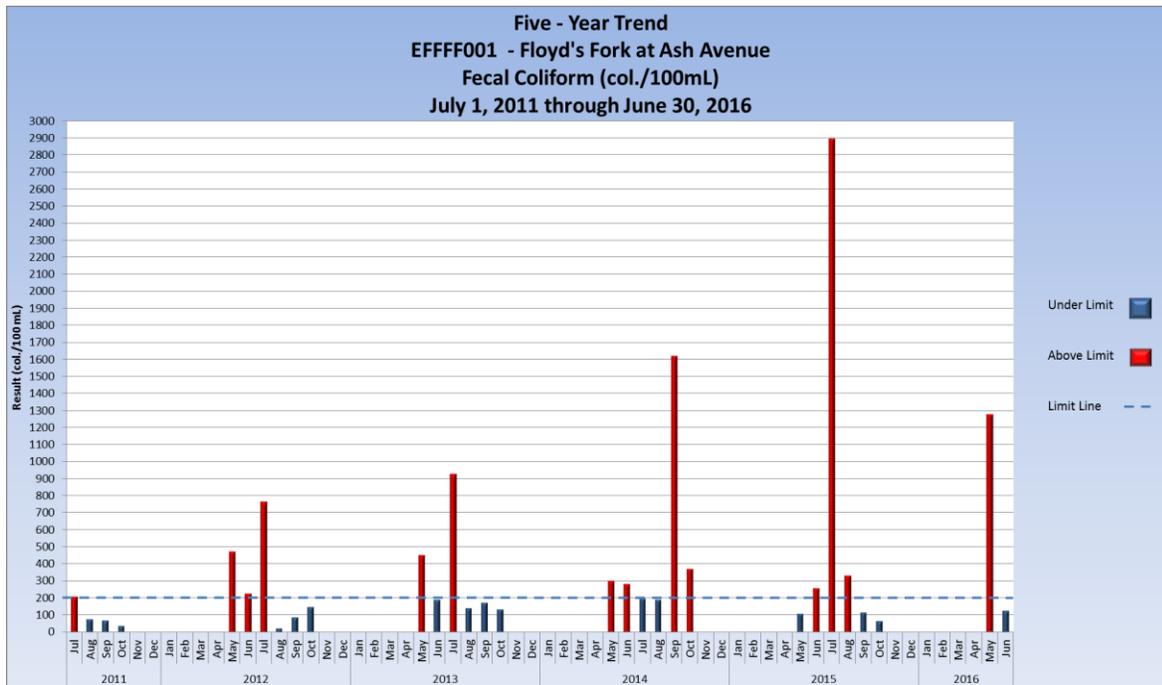


Parkway was below the detection limit. Average concentrations of total and soluble phosphorus were between 0.025 mg/l and 0.192 mg/l in quarterly samples collected from monitoring sites with data above the detection limit in the Floyds Fork watershed. Average concentrations of nitrate ranged from 0.825 mg/l to 2.193 mg/l. Average total dissolved solids concentrations ranged from 229.25 mg/l to 726.50 mg/l. Average TSS concentrations were between 7 mg/l and 159.94 mg/l at the five monitoring locations in the Floyds Fork watershed. One sample collected under wet conditions in the Floyd's Fork watershed at Ash Avenue in July 2015 had an elevated lead concentration (15.9 ug/l) that exceeded the chronic aquatic life criterion of 3.72 ug/l.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 67 MPN/100 ml to 2,895 MPN/100 ml in samples collected at five monitoring sites in Floyds Fork. During the recreational season, water quality criteria for fecal coliform were met in three of six months in Floyds Fork at Ash Avenue, two of six months at Old Taylorsville Road, four of six months at Chenoweth Run at Gellhaus Lane, zero of six months at Ruckriegel Parkway, and zero of six months at Bardstown Road. Elevated fecal coliform bacteria concentrations are common in both urban and rural streams.

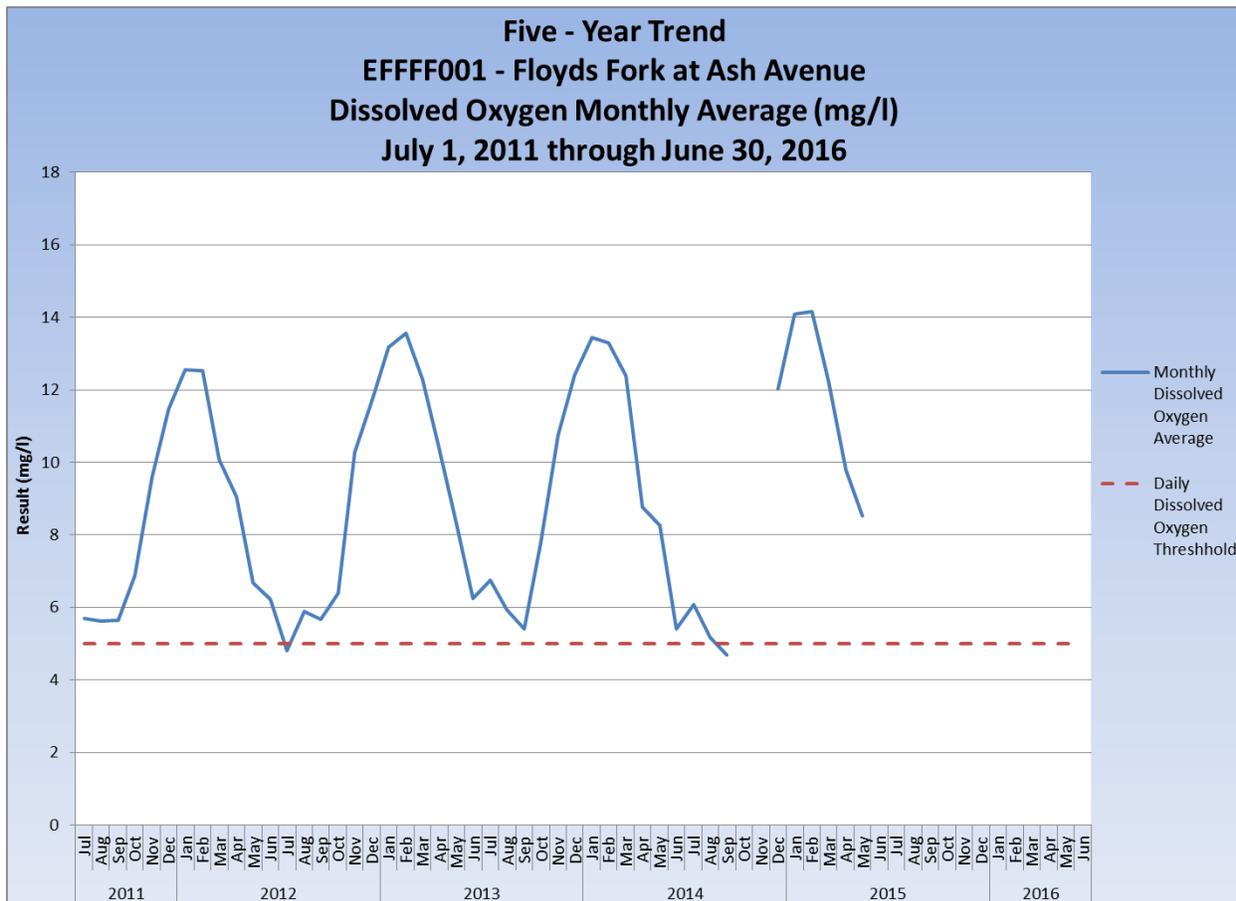


**Five-Year Trend Analysis:** In the five-year trend analysis for Floyds Fork, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 23 MPN/100 ml to 2,895 MPN/100 ml in samples collected at Floyd’s Fork at Ash Avenue. The water quality criteria for fecal coliform were met in 16 of 30 months during the recreational seasons in Ash Avenue.



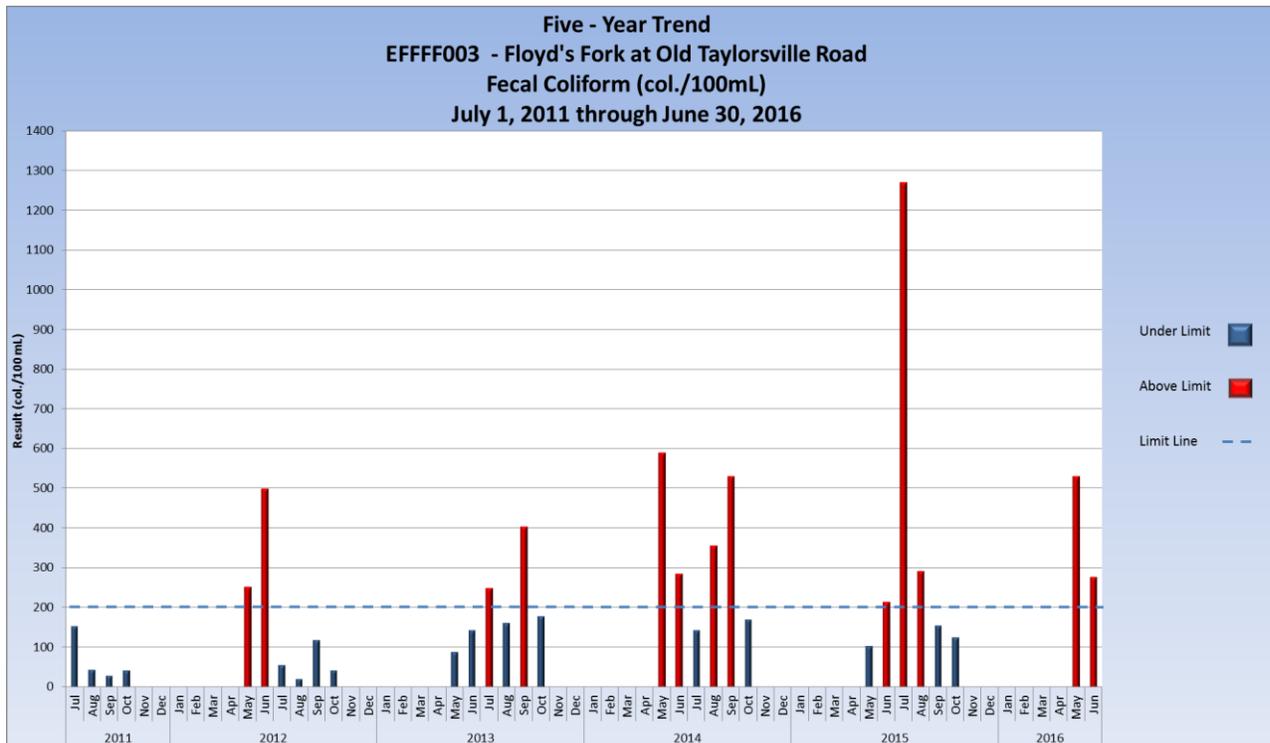


In the five-year trend for final dissolved oxygen in Floyds Fork at Ash Avenue, monthly average concentrations of dissolved oxygen ranged from 4.7 to 14.2 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



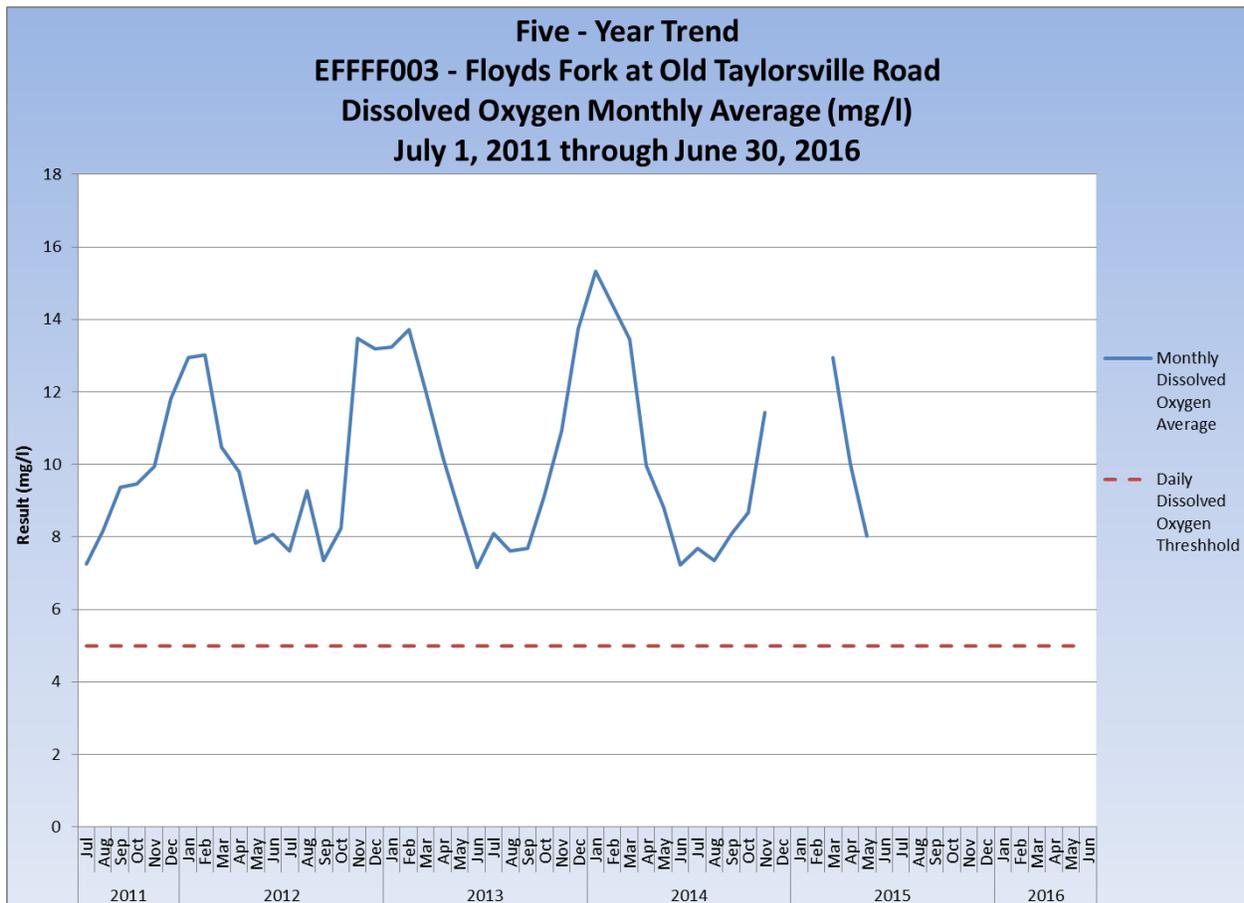


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 20 MPN/100 ml to 1,271 MPN/100 ml in samples collected at Floyds Fork at Old Taylorsville Road. The water quality criteria for fecal coliform were met in 17 of 30 months during the recreational seasons in Taylorsville Road.





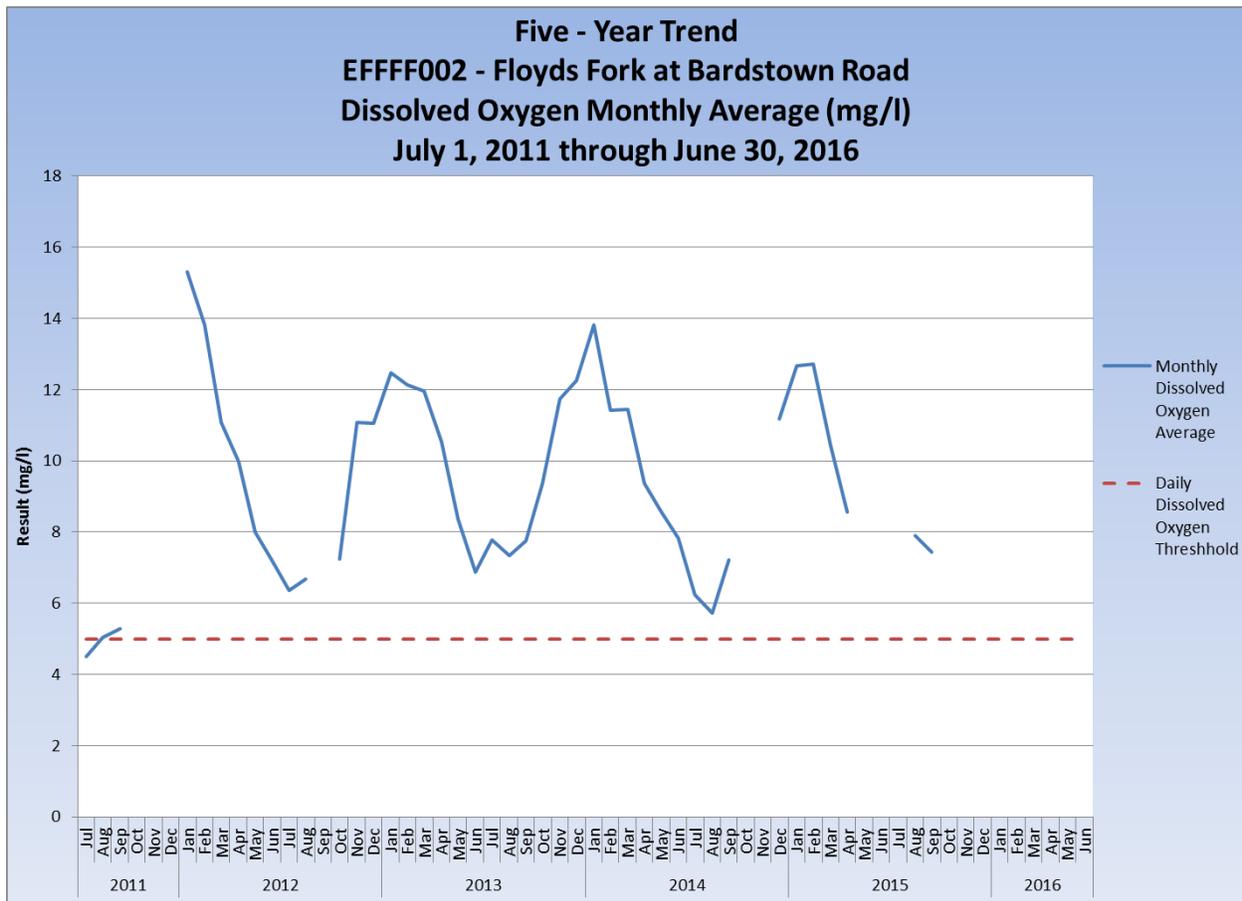
In the five-year trend for final dissolved oxygen in Floyds Fork at Old Taylorsville Road, monthly average concentrations of dissolved oxygen ranged from 7.2 to 15.3 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.





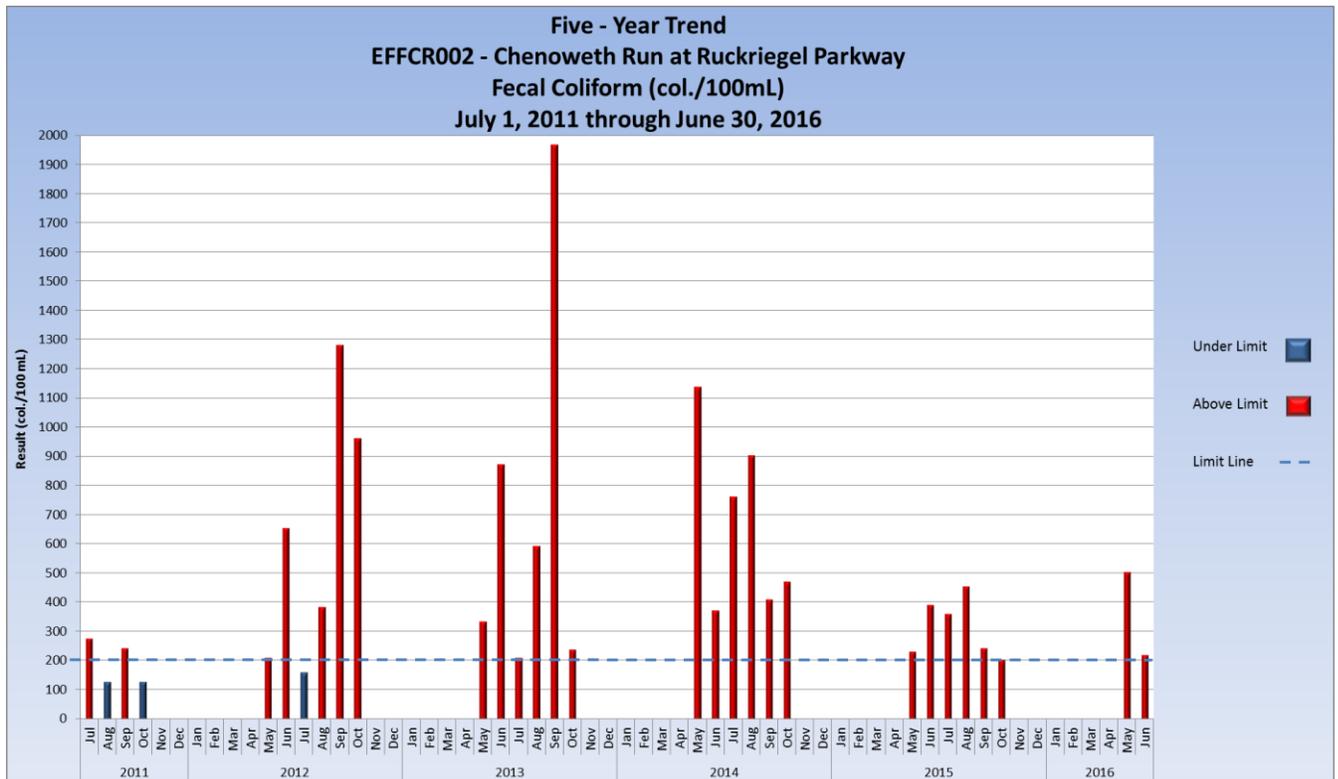


In the five-year trend for final dissolved oxygen in Floyds Fork at Bardstown Road, monthly average concentrations of dissolved oxygen ranged from 4.5 to 15.3 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



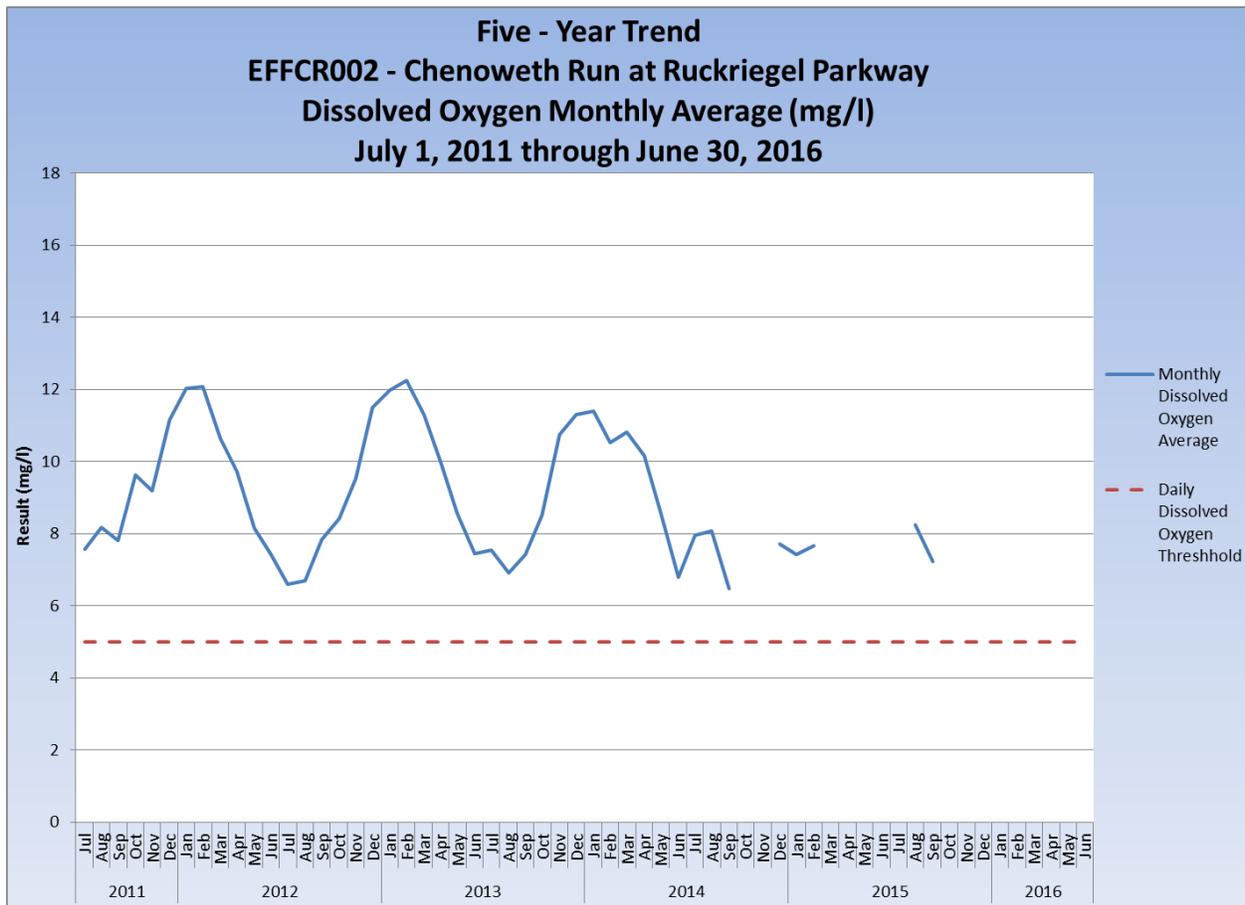


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 126 MPN/100 ml to 1,970 MPN/100 ml in samples collected at Chenoweth Run at Ruckriegel Parkway. The water quality criteria for fecal coliform were met in 3 of 30 months during the recreational seasons in Chenoweth Run at Ruckriegel Parkway.



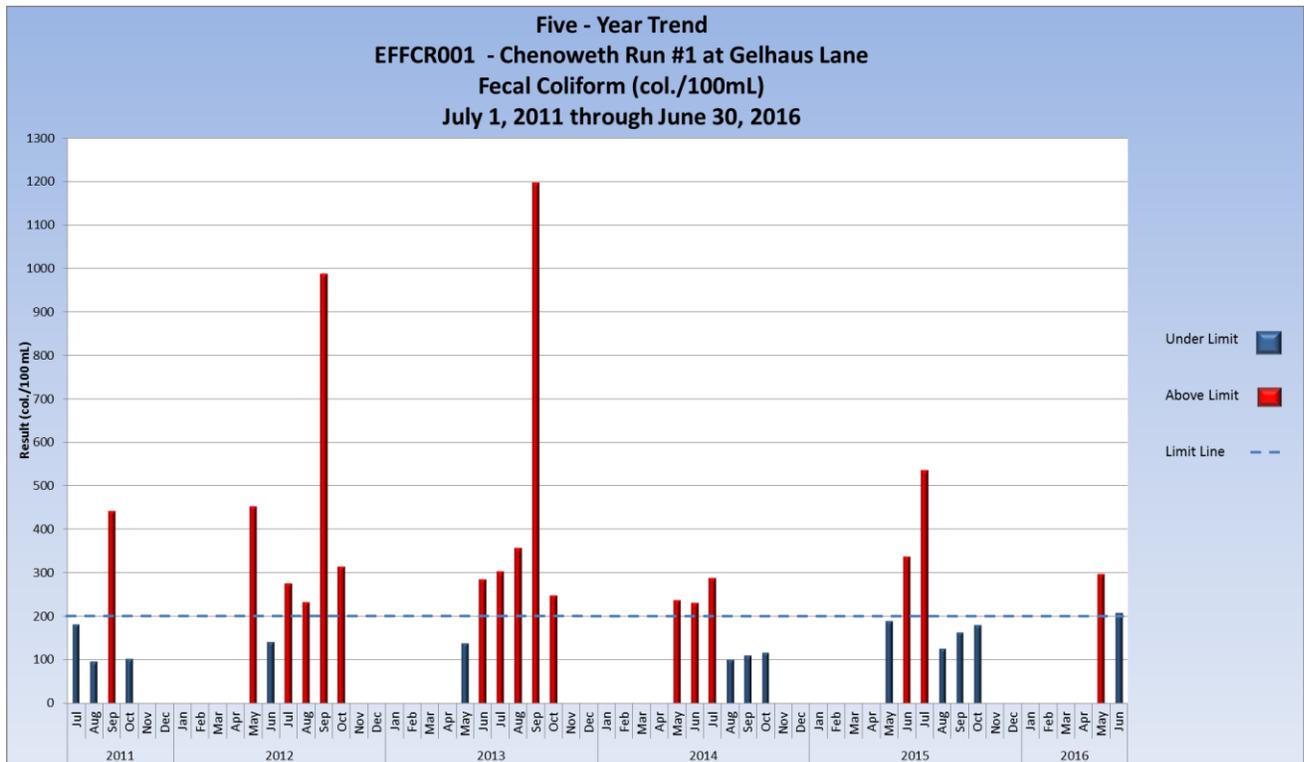


In the five-year trend for final dissolved oxygen in Chenoweth Run at Ruckriegel Parkway, monthly average concentrations of dissolved oxygen ranged from 6.5 to 12.2 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



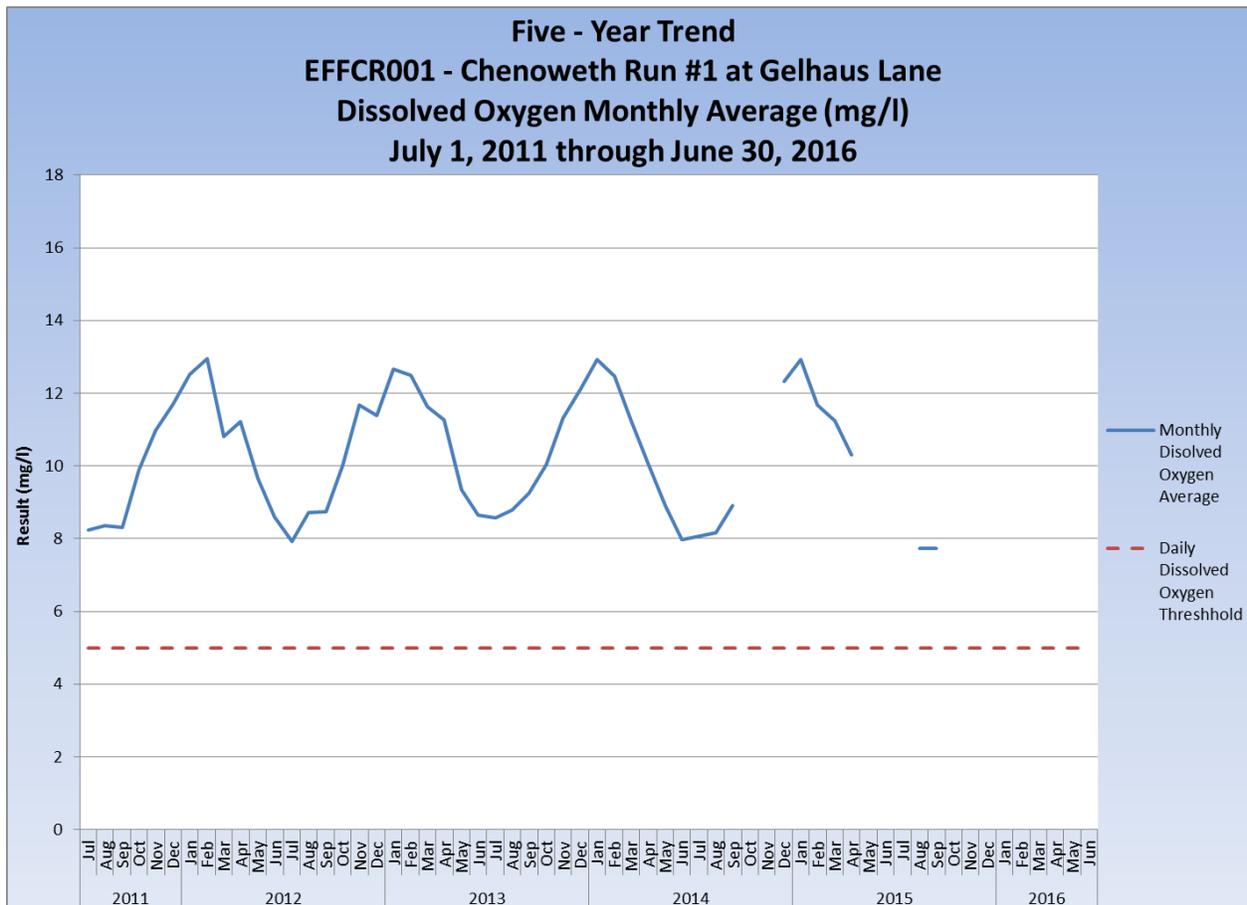


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 97 MPN/100 ml to 1,197 MPN/100 ml in samples collected at Chenoweth Run at Gelhaus Lane. The water quality criteria for fecal coliform were met in 13 of 30 months during the recreational seasons in Chenoweth Run at Gelhaus Lane.





In the five-year trend for final dissolved oxygen in Chenoweth Run #1 at Gelhaus Lane, monthly average concentrations of dissolved oxygen ranged from 7.7 to 12.9 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



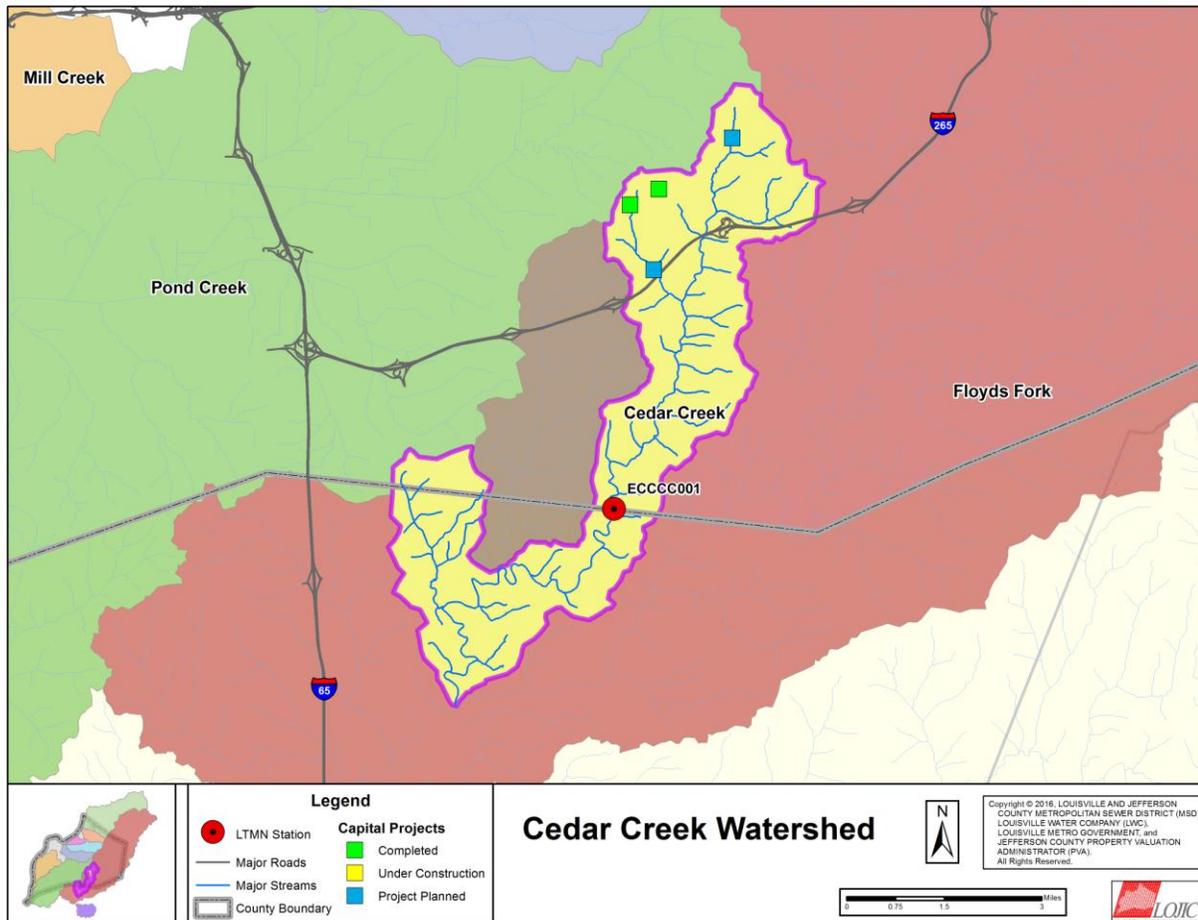


**Biological Monitoring Results:** Benthic communities were rated as “fair” in Floyds Fork at Ash Avenue, “good” at Bardstown Road, and “excellent” at Old Taylorsville Road based on data collected in Spring 2015. Fish communities were rated as “fair” in Floyds Fork at Ash Avenue and Bardstown Road and “good” at Old Taylorsville Road, based on data collected in Fall 2015. Habitat quality was rated as “excellent” at all three sites, based on data collected in 2013, and 2015. Algal communities were rated as “fair” in 2011, and “good” in 2013, in Floyds Fork at Ash Avenue and Old Taylorsville Road. Algal communities were rated as “good” in 2011, and “fair” in 2013, in Floyds Fork at Bardstown Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

Benthic communities were rated as “fair” at Chenoweth Run at Gelhaus Lane, based on data collected in Spring 2015. At Chenoweth Run at Ruckriegel Parkway, benthic communities were rated as “fair” based on data collected in Spring 2015. Fish communities were rated as “fair” at both sites on Chenoweth Run, based on data collected in Fall 2015. Habitat quality was rated as “excellent” in Chenoweth Run at Ruckriegel Parkway and at Gelhaus Lane, based on data collected in 2013, and 2015. In Chenoweth Run, algal communities were rated as “fair” in 2011, and “good” in 2013, at Ruckriegel Parkway and “poor” in 2011, and “fair” in 2013, at Gelhaus Lane. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

### 5.5.7 Cedar Creek Watershed

Figure 5.5.7 Cedar Creek Watershed



**Watershed Description:** The small streams that eventually form Cedar Creek in Jefferson County originate in the Fern Creek area and flow south. Cedar Creek empties into Floyds Fork in Bullitt County east of Shepherdsville. There are 11.1 square miles of land draining to the Cedar Creek monitoring site at Thixton Road (ECCCC001). About 10% of this watershed is covered by impervious surfaces. This monitoring site is located downstream of the Cedar Creek WQTC.



Capital projects in the Cedar Creek Watershed include Running Fox Pump Station Elimination, Avanti Pump Station Elimination, Little Cedar Creek Interceptor Improvements, and Idlewood Inline Storage.

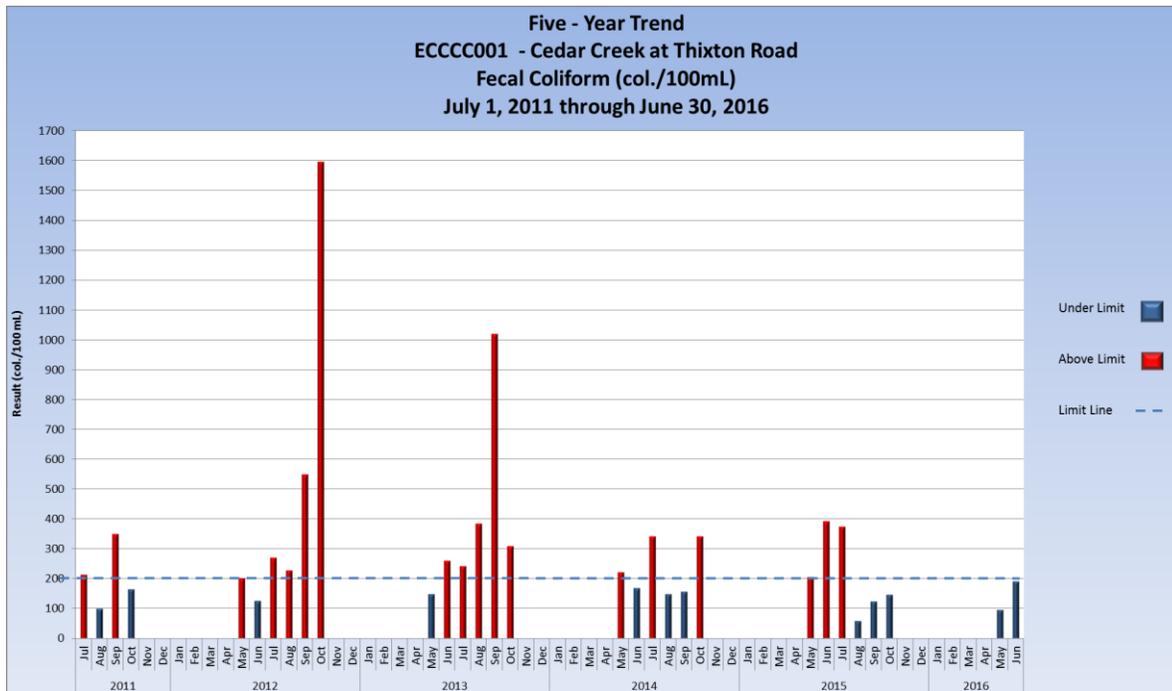
**Continuous Monitoring Results:** Final continuous monitoring data were available between October 1, 2014, and September 30, 2015, in Harrods Creek at Covered Bridge. During this time period in Cedar Creek at Thixton Road, the temperature data set was 50.8% complete and 100% of available values met the temperature criterion. The dissolved oxygen data set was 45.8% complete, average dissolved oxygen was 10.1 mg/l, and 98.2% of available values met the water quality criteria.

**Quarterly Monitoring Results:** Two Quarterly samples during the report period were collected under dry conditions and two under wet conditions. Average concentrations of soluble phosphorus were above the detection limit and total phosphorus was .0539 mg/l in quarterly samples collected from Cedar Creek at Thixton Road. Concentrations of nitrate were between 0.81 mg/l and 4.4 mg/l. Total dissolved solids concentrations were between 258 mg/l and 513 mg/l. TSS concentrations were between 1.5 mg/l and 13 mg/l. All quarterly samples for metals were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 59 MPN/100 ml to 375 MPN/100 ml in samples collected in Cedar Creek at Thixton Road. The water quality criteria for fecal coliform were met in four of six months during the recreational season. Elevated fecal coliform bacteria concentrations are common in both urban and rural streams.

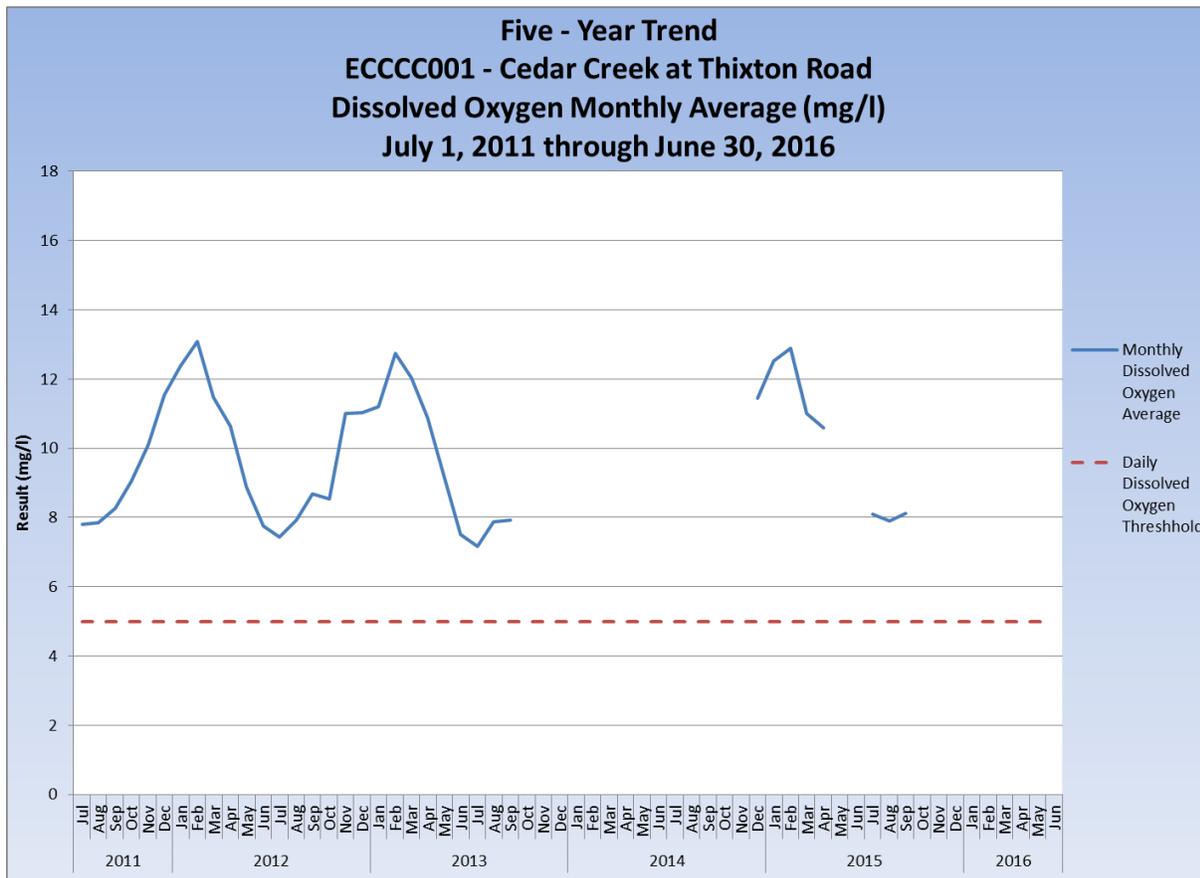


**Five-Year Trend Analysis:** In the five-year trend analysis for Cedar Creek, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 89 MPN/100 ml to 1,597 MPN/100 ml in samples collected in Cedar Creek at Thixton Road. The water quality criteria for fecal coliform were met in 12 of 30 months during the recreational seasons at Thixton Road.





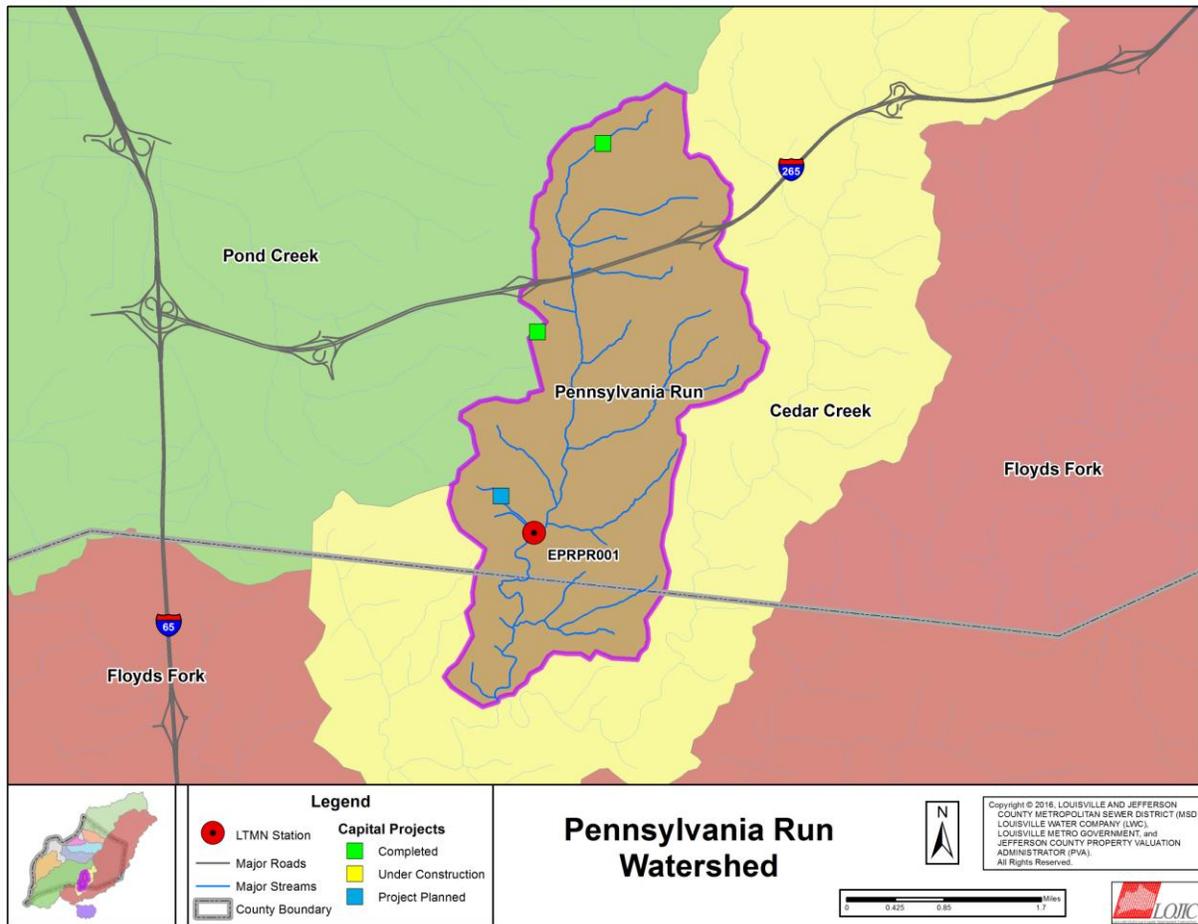
In the five-year trend for final dissolved oxygen in Cedar Creek at Thixton Road, monthly average concentrations of dissolved oxygen ranged from 7.2 to 13.1 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



**Biological Monitoring Results:** Benthic communities were rated as “fair,” based on data collected in May 2015. Fish communities were rated as “excellent” based on data collected in Fall 2015. Habitat quality was rated as “excellent” at Thixton Road, based on data collected in 2013, and 2015. Algal communities were rated as “fair” in both 2011, and 2013, in Cedar Creek at Thixton Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

### 5.5.8 Pennsylvania Run Watershed

Figure 5.5.8 Pennsylvania Run Watershed



**Watershed Description:** The small streams that eventually form Pennsylvania Run originate in the Highview area and flow south into McNeely Lake. Pennsylvania Run empties into Cedar Creek in Bullitt County east of Zoneton. MSD monitors water quality in Pennsylvania Run at Mount Washington Road. This site drains 6.4 square miles of land and is located below McNeely Lake. Almost 9% of this watershed is covered by impervious surfaces.

Capital projects in the Pennsylvania Run Watershed include Lantana Pump Station I/I Investigation & Rehabilitation, Government Center Pump Station Elimination, and Leven Pump Station Elimination.



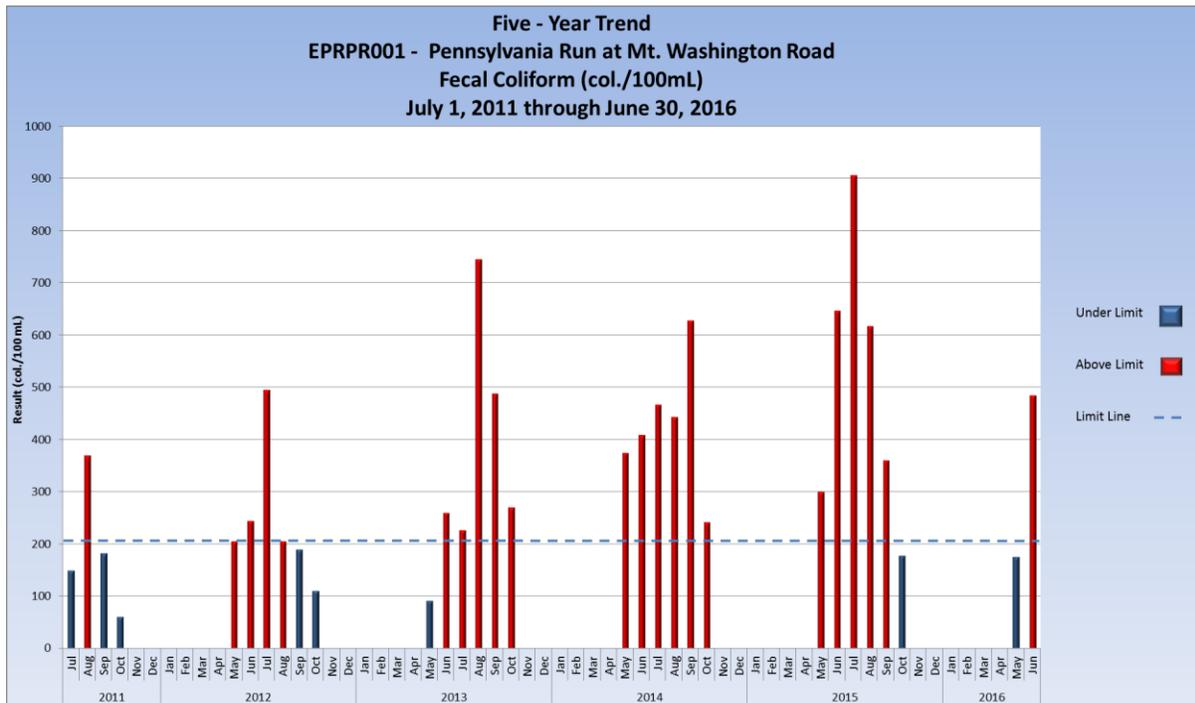
**Continuous Monitoring Results:** Final continuous monitoring data were available between October 1, 2014, and September 30, 2015, in Pennsylvania Run at Mount Washington Road. During this period, the temperature data set were 50.2% complete and 100% of available values met the temperature criterion. The dissolved oxygen data set were 33.4% complete, average dissolved oxygen was 9.2 mg/l and the dissolved oxygen criteria was met 91.8% of the days with a complete record.

**Quarterly Monitoring Results:** Two quarterly samples during the report period were collected under dry conditions and two were collected under wet conditions. Average concentrations of total and soluble phosphorus were 0.280 mg/l and 0.3215 mg/l, respectively in all samples collected during this report period from Pennsylvania Run at Mount Washington Road. Concentrations of nitrate were between 0.275 mg/l and 6.48 mg/l during the report year. Total dissolved solids concentrations were between 218 mg/l and 461 mg/l. TSS concentrations were between 4 mg/l and 11 mg/l. All quarterly samples for metals were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 175 MPN/100 ml to 906 MPN/100 ml in samples collected in Pennsylvania Run at Mount Washington Road. The water quality criteria for fecal coliform were met in two of six months during the recreational season. Elevated fecal coliform bacteria concentrations are common in both urban and rural streams.

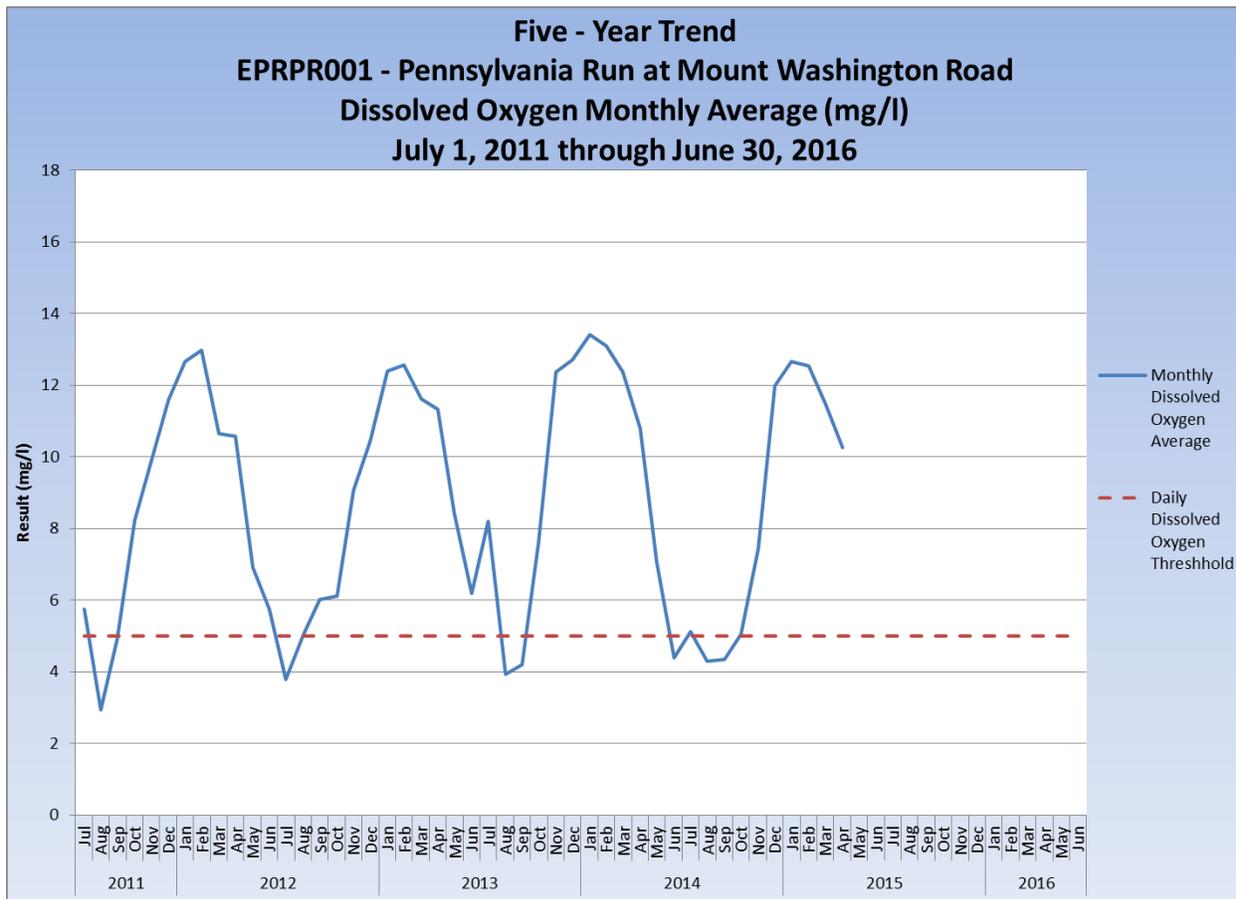


**Five-Year Trend Analysis:** In the five-year trend analysis for Pennsylvania, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 60 MPN/100 ml to 906 MPN/100 ml in samples collected in Pennsylvania Run at Mount Washington Road. The water quality criteria for fecal coliform were met in 8 of 30 months during the recreational seasons at Mount Washington Road.



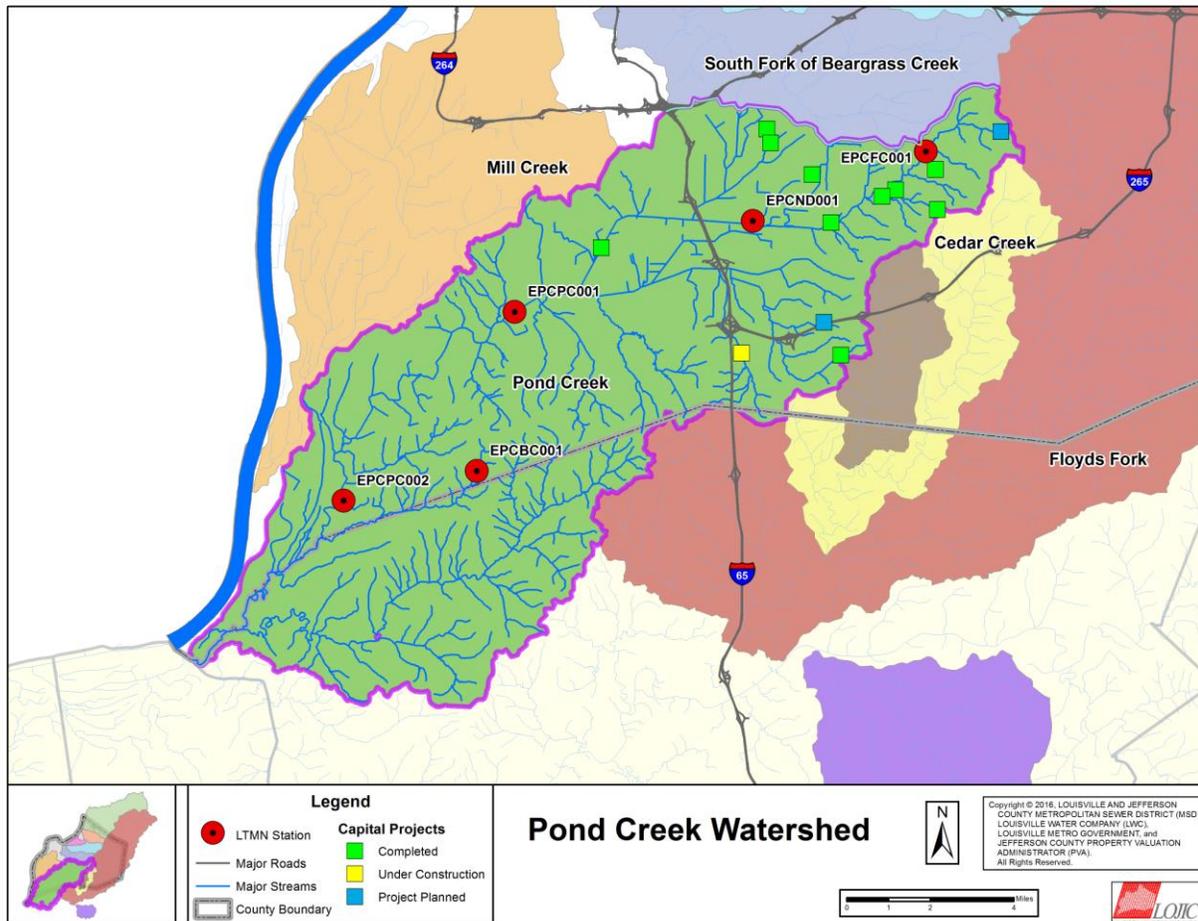


In the five-year trend for final dissolved oxygen in Pennsylvania Run at Mount Washington Road, monthly average concentrations of dissolved oxygen ranged from 2.9 to 13.4 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



### 5.5.9 Pond Creek Watershed

Figure 5.5.9 Pond Creek Watershed



**Watershed Description:** The Pond Creek watershed drains about 126 square miles in southwestern Louisville, where it flows into the Salt River near West Point. Approximately 89 square miles are located in Jefferson County and 37 square miles are located in Bullitt County. Small streams in Jeffersontown and Fern Creek join to form Northern Ditch and small streams in Highview and Okolona join to form Southern Ditch. Northern Ditch and Southern Ditch join to form Pond Creek near Outer Loop. The Louisville International Airport, the Outer Loop Landfill, large industrial complexes, and Jefferson Memorial Forest are prominent features in this watershed.



The relatively flat portion of the Pond Creek watershed was once a pond, which gradually filled with silt and debris to form a flat plain with standing water and dense swamp vegetation. Parts of this area were known as “wet woods” in the past. Starting in the 1850s, a system of man-made ditches was developed to reduce flooding and to increase the amount of land suitable for development, which continued to expand rapidly before and after World War II. Many of the streams in Pond Creek watershed have been extensively channelized, and large flat areas are now drained by Northern Ditch and Southern Ditch.

Capital projects in the Pond Creek Watershed include Lea Ann Way Pump Station System Sanitary Sewer Evaluation Study, Lea Ann Way Sanitary Sewer Inflow and Infiltration Rehab, Lea Ann Way Sanitary Sewer Phase 1, Lea Ann Way Sanitary Sewer Phase 2, Lea Ann Way Interceptor Inflow and Infiltration Rehab, Northern Ditch Diversion Interceptor Phase 1, Northern Ditch Diversion Interceptor Phase 2, Southeast Diversion Structure and Interceptor, Edsel Pump Station Inflow and Infiltration Investigation and Rehabilitation, Parkview Estates Inflow and Infiltration Investigation and Rehabilitation, Middle Fork Relief Interceptor, Wet Weather Storage, and Upper Middle Fork Lift Station Diversion 1 - Buechel Basin, Charleswood Interceptor Extension, Cinderella Pump Station Elimination, Monticello Pump Station Elimination, and Caven Avenue Pump Station Elimination.

MSD monitors water quality in this large watershed at five locations, listed from upstream to downstream: Fern Creek at Bardstown Road (EPCFC001), Northern Ditch at Preston Highway (EPCND001), Pond Creek at Manslick Road (EPCPC001), Pond Creek at Pendleton Road (EPCPC002) and Brier Creek at Bear Camp Road (EPCBC001). The amount of land draining to each site in square miles, respectively, is 3.5, 11.1, 64.0, 80.3 and 4.1. The amount of land area draining to the monitoring sites on Fern Creek, Northern Ditch and Pond Creek that is covered by impervious surfaces ranges from 16% to 24%. The land draining to Brier Creek at Bear Camp Road is quite different from the other four sites. This small tributary drains steep, wooded areas southwest of Jefferson Memorial Forest, and land use consists mostly of forest and agriculture, and less than 1% is impervious surfaces.

**Continuous Monitoring Results:** Final continuous monitoring data were available between October 1, 2014, and September 30, 2015, at five monitoring sites in the Pond Creek watershed. During this time period, the temperature data set was 34.0% at Pond Creek at Manslick Road, 41.4% at Fern Creek at Bardstown Road, 45.8% at Northern Ditch at Preston Highway, 50.4% at Pond Creek at Pendleton Road, and 51.4% at Brier Creek at Bear Camp Road. At all sites 100.0% of available values met the temperature criterion at these five sites. In Fern Creek, the dissolved oxygen data set were 41.4% complete, average dissolved oxygen was 9.7 mg/l and the dissolved oxygen criteria was met 98.7% of the days with a complete record. In Northern Ditch, the dissolved oxygen data set were 44.4% complete, average dissolved oxygen was 9.3 mg/l and the dissolved oxygen criteria was met 59.3% of the days with a complete record. In Pond Creek at Manslick Road, the dissolved oxygen data set were 19.5% complete, average dissolved oxygen was 9.6 mg/l and the dissolved oxygen criteria was met 100.0% of the days with a complete record. Further downstream, in Pond Creek at



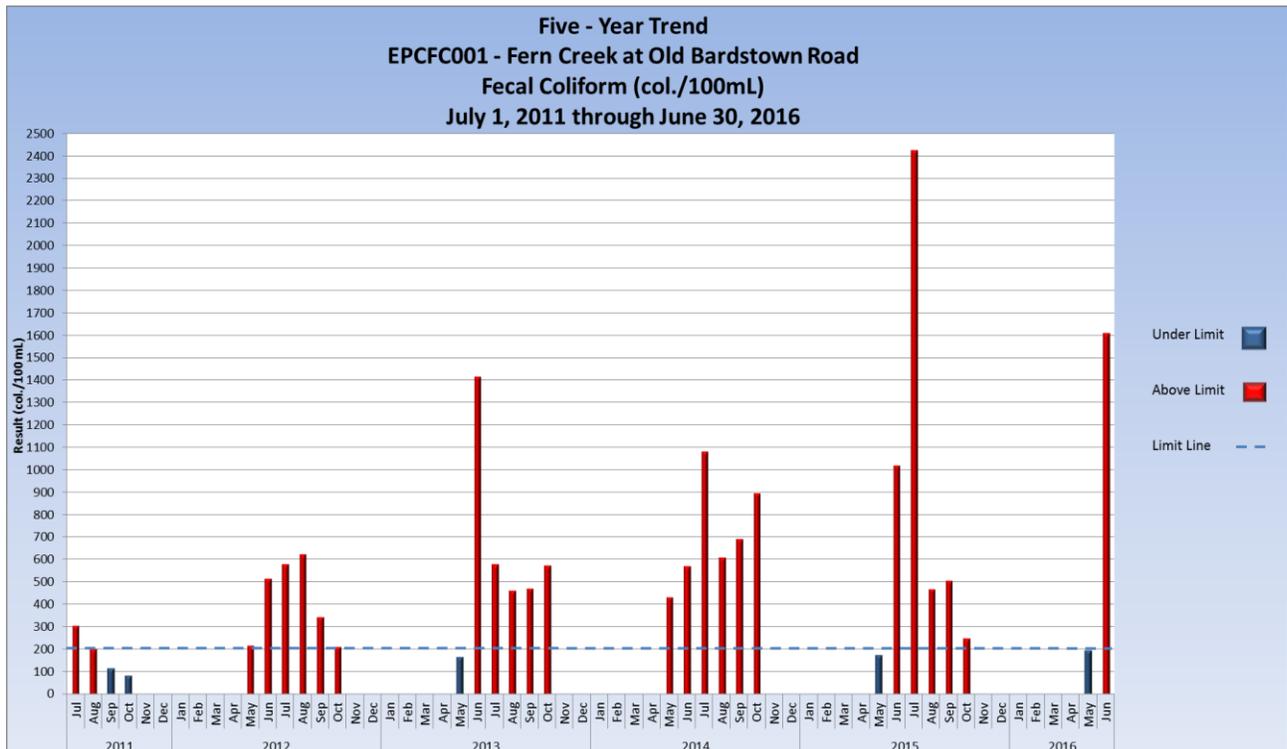
Pendleton Road, the dissolved oxygen data set were 42.5% complete, average dissolved oxygen was 9.0 mg/l and the dissolved oxygen criteria was met 99.4% of the days with a complete record. In Brier Creek at Bear Camp Road, the dissolved oxygen data set was 51.8% complete, average dissolved oxygen was 9.4 mg/l and the dissolved oxygen criteria was met 100.0% of the days with a complete record.

**Quarterly Monitoring Results:** Quarterly samples during the report period were collected from Brier Creek at Bear Camp Road under dry conditions. At Northern Ditch at Preston Highway, Fern Creek at Old Bardstown Road, and Pond Creek at Pendleton Road and at Manslick Road three samples were collected under dry and one under wet conditions. Average concentrations of soluble and total phosphorus were all below minimum detection limits in quarterly samples collected from Brier Creek at Bear Camp Road and Fern Creek at Old Bardstown Road. The average concentration of total phosphorus was below the minimum detection level at Northern Ditch at Preston Highway. Average concentrations of total and soluble phosphorus were between 0.0154 mg/l and 0.0438 mg/l in quarterly samples collected from monitoring sites with data above the detection limit in the Pond Creek watershed. Average concentrations of nitrate were highest in Fern Creek at Old Bardstown Road ranging between 0.643 mg/l and 1.59 mg/l. The other four sites ranged from below minimum detection limit to 1.4 mg/l. Average total dissolved solids concentrations ranged from 202.4 mg/l to 463.8 mg/l in the five sites in the Pond Creek watershed. Average TSS samples ranged from 2.81 mg/l to 27.8 mg/l. All quarterly samples were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc in the Pond Creek watershed.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 23 MPN/100 ml to 2,425 MPN/100 ml in samples collected in the Pond Creek watershed. The water quality criteria for fecal coliform were met in one of six months in Fern Creek at Old Bardstown Road and Pond Creek at Manslick Road, three of six months in Brier Creek at Bear Camp Road and two of six months in Northern Ditch at Preston Highway and in Pond Creek at Pendleton Road. Elevated fecal coliform bacteria concentrations are common in both urban and rural streams.

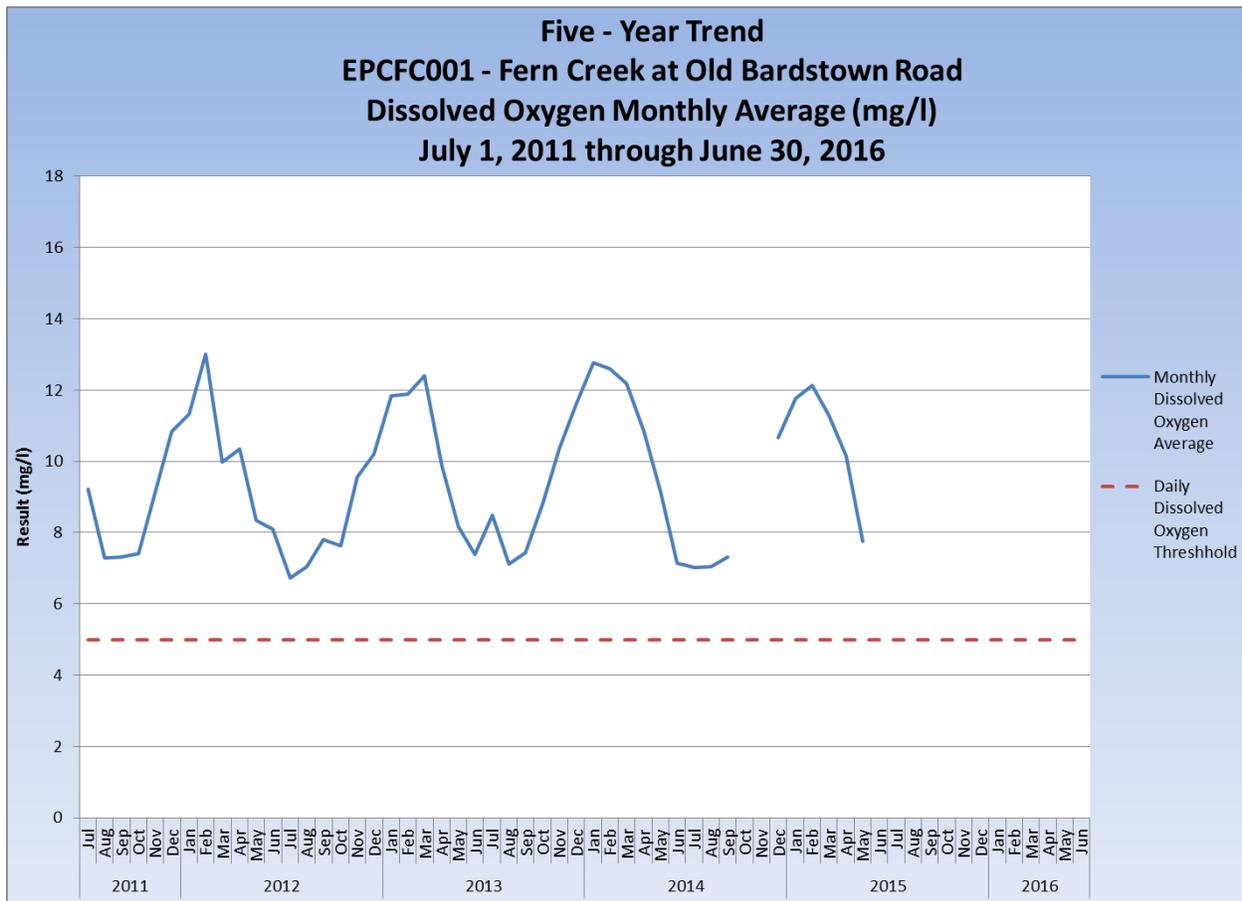


**Five-Year Trend Analysis:** In the five-year trend analysis for Pond Creek, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 82 MPN/100 ml to 2,425 MPN/100 ml in samples collected in the Fern Creek at Old Bardstown Road. The water quality criteria for fecal coliform were met in 5 of 30 months during the recreational seasons in Fern Creek at Old Bardstown Road.



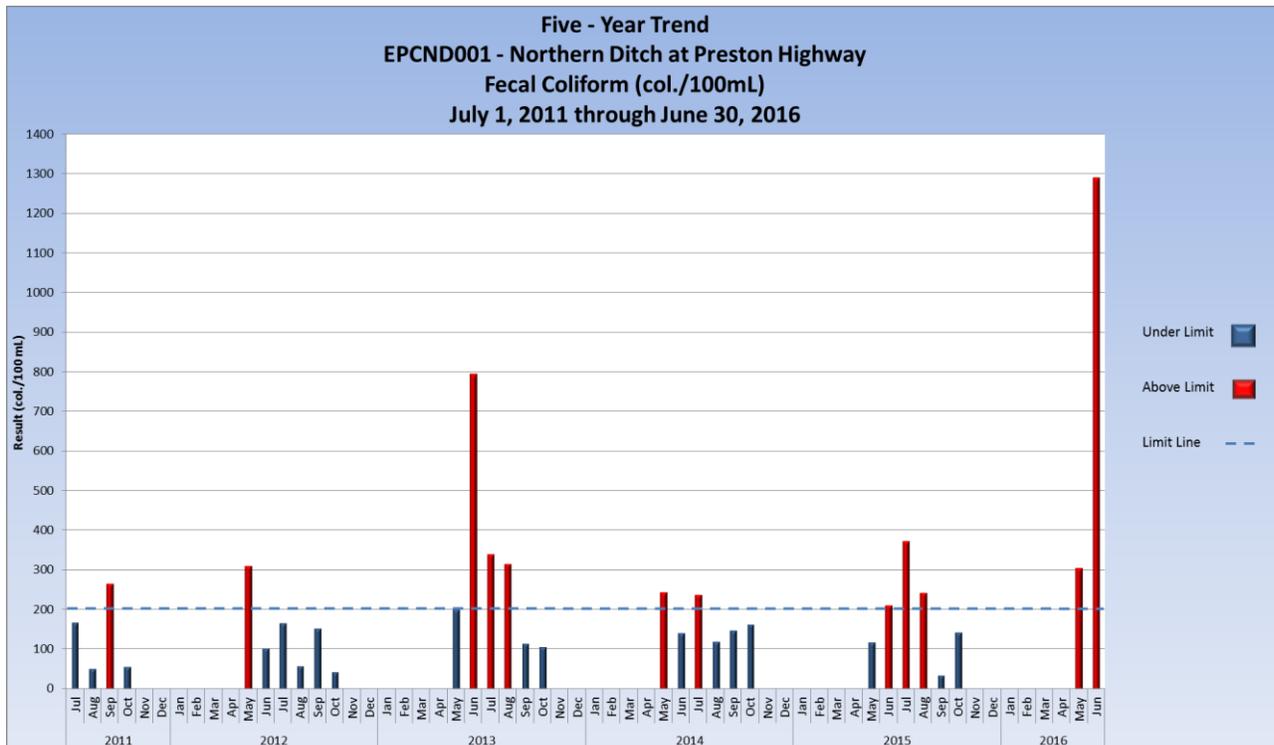


In the five-year trend for final dissolved oxygen in Fern Creek at Old Bardstown Road, monthly average concentrations of dissolved oxygen ranged from 6.7 to 13.0 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



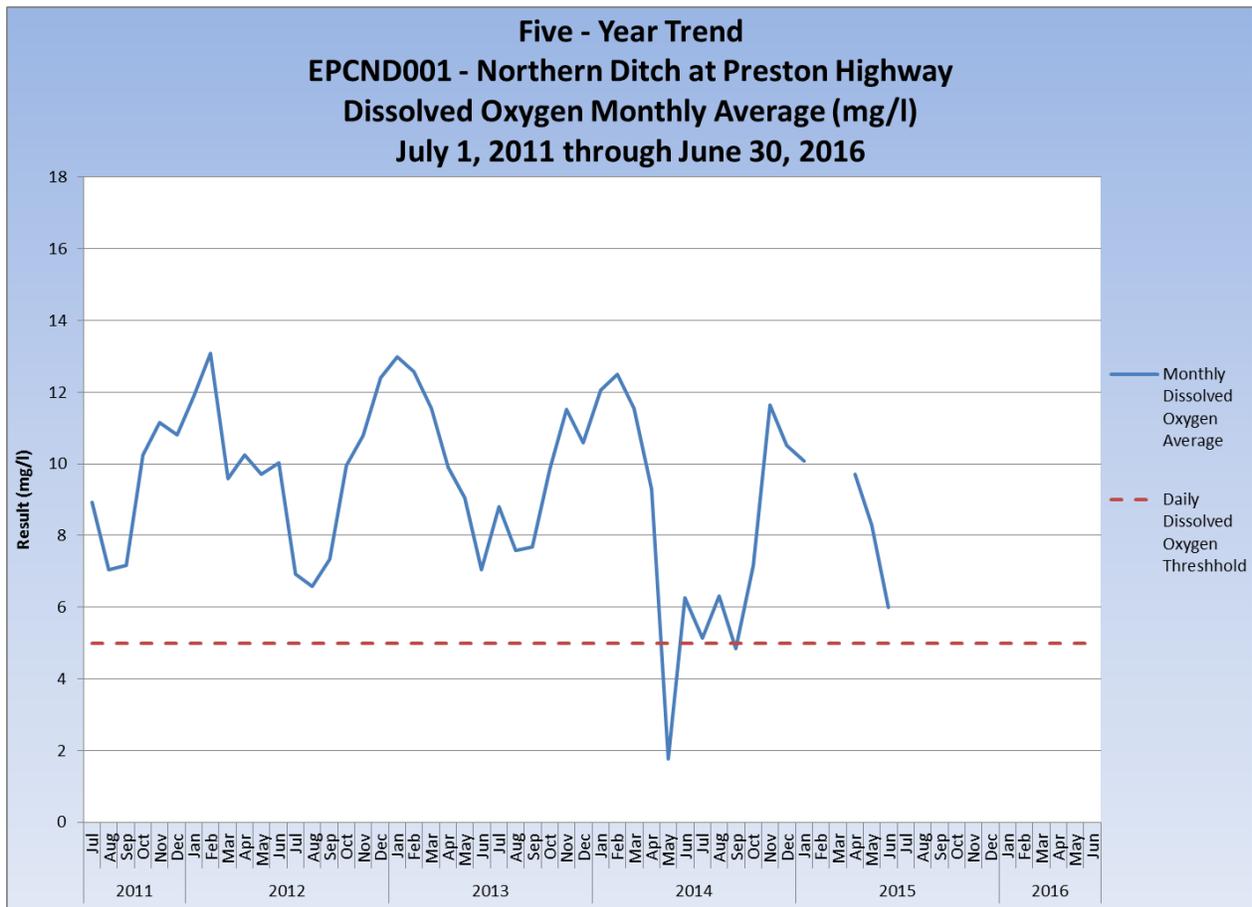


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 35 MPN/100 ml to 1,290 MPN/100 ml in samples collected in Northern Ditch at Preston Highway. The water quality criteria for fecal coliform were met in 18 of 30 months during the recreational seasons in Northern Ditch at Preston Highway.



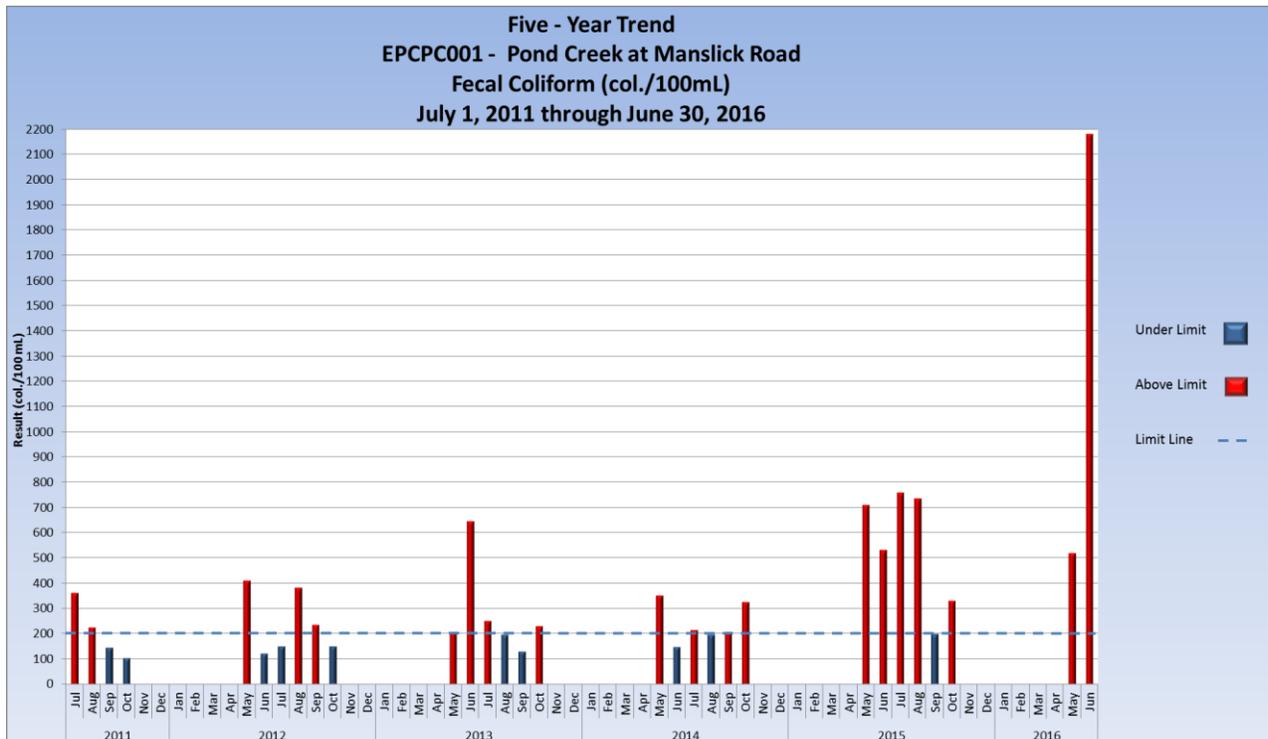


In the five-year trend for final dissolved oxygen in Northern Ditch at Preston Highway, monthly average concentrations of dissolved oxygen ranged from 1.8 to 13.1 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



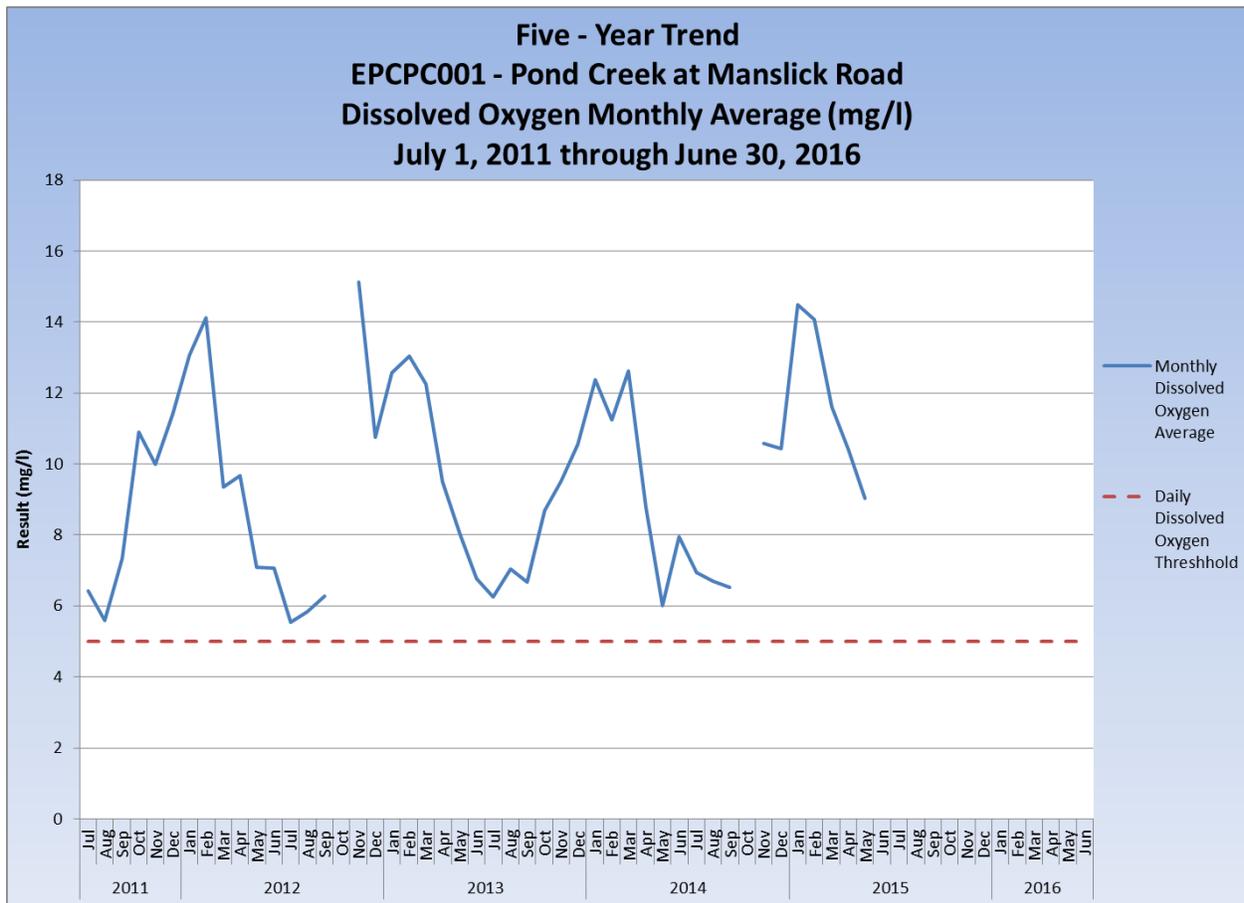


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 104 MPN/100 ml to 2,181 MPN/100 ml in samples collected at Pond Creek at Manslick Road. The water quality criteria for fecal coliform were met in 10 of 30 months during the recreational seasons in Pond Creek at Manslick Road.



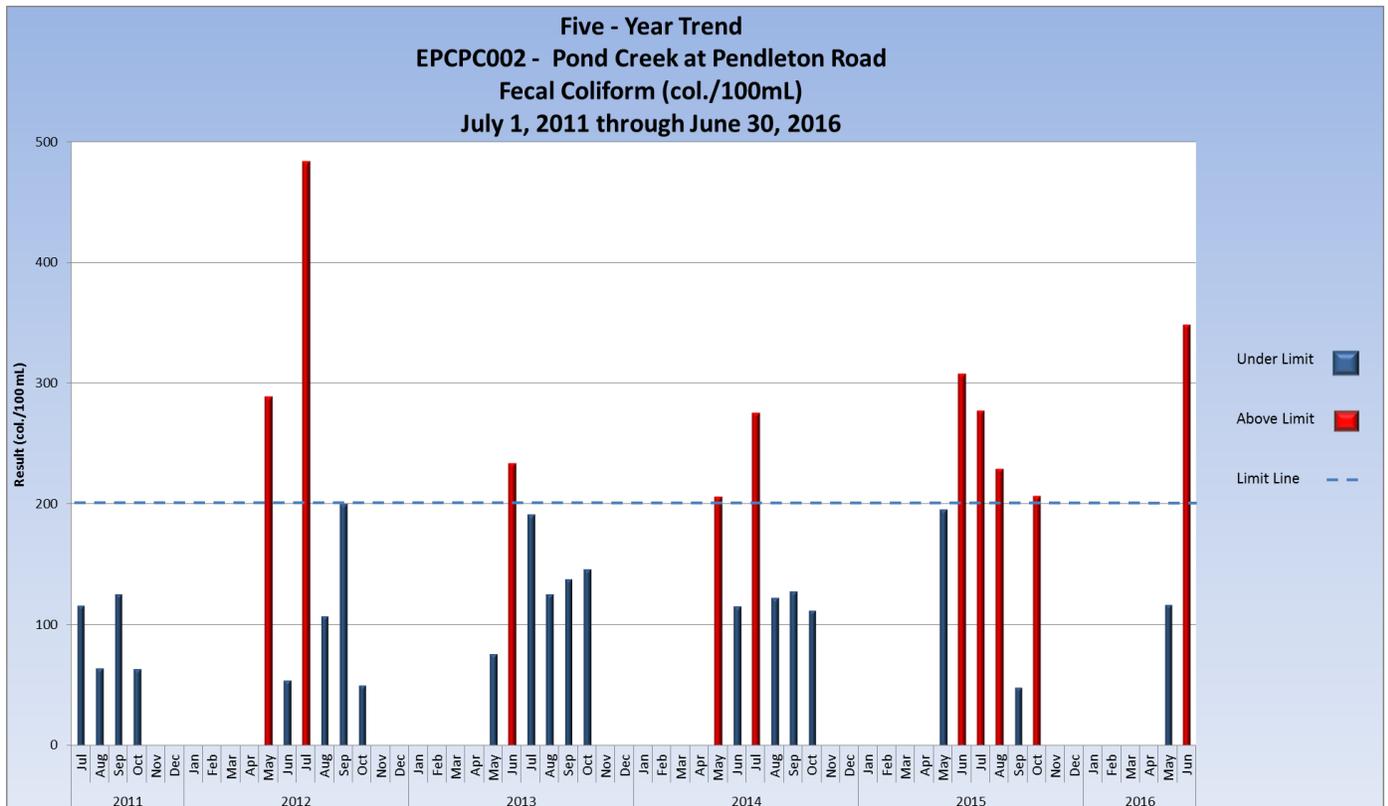


In the five-year trend for final dissolved oxygen in Pond Creek at Manslick Road, monthly average concentrations of dissolved oxygen ranged from 5.5 to 15.1 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



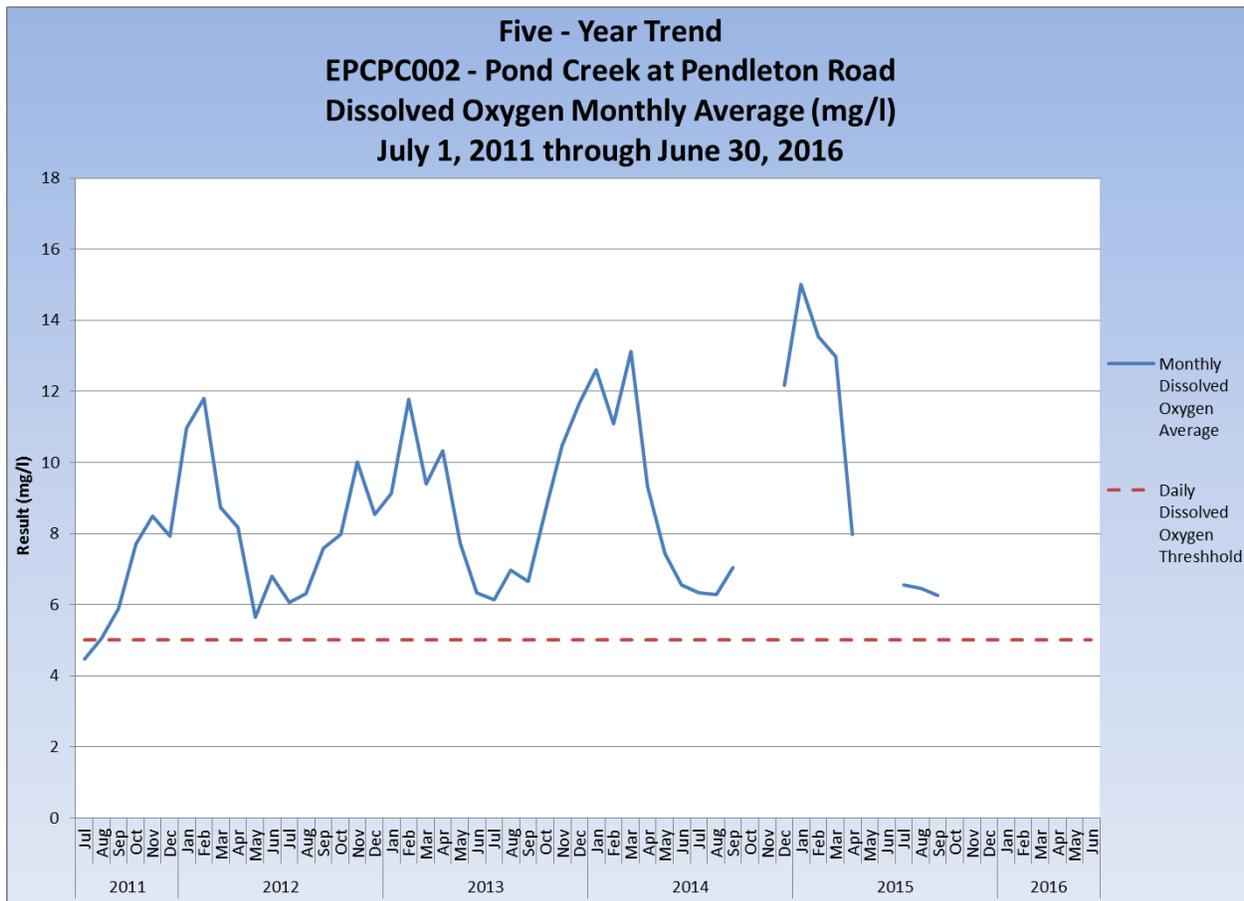


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 48 MPN/100 ml to 484 MPN/100 ml in samples collected in Pond Creek at Pendleton Road. The water quality criteria for fecal coliform were met in 18 of 30 months during the recreational seasons in Pond Creek at Pendleton Road.



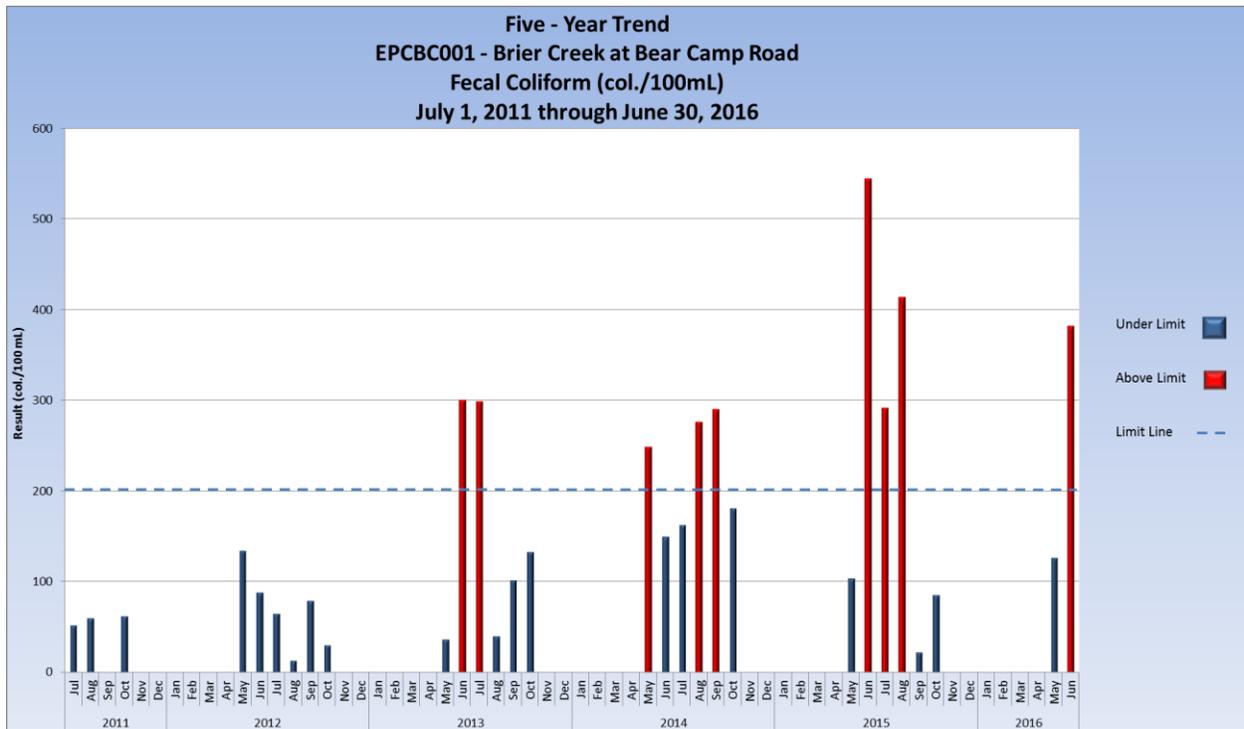


In the five-year trend for final dissolved oxygen in Pond Creek at Pendleton Road, monthly average concentrations of dissolved oxygen ranged from 4.5 to 15.0 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



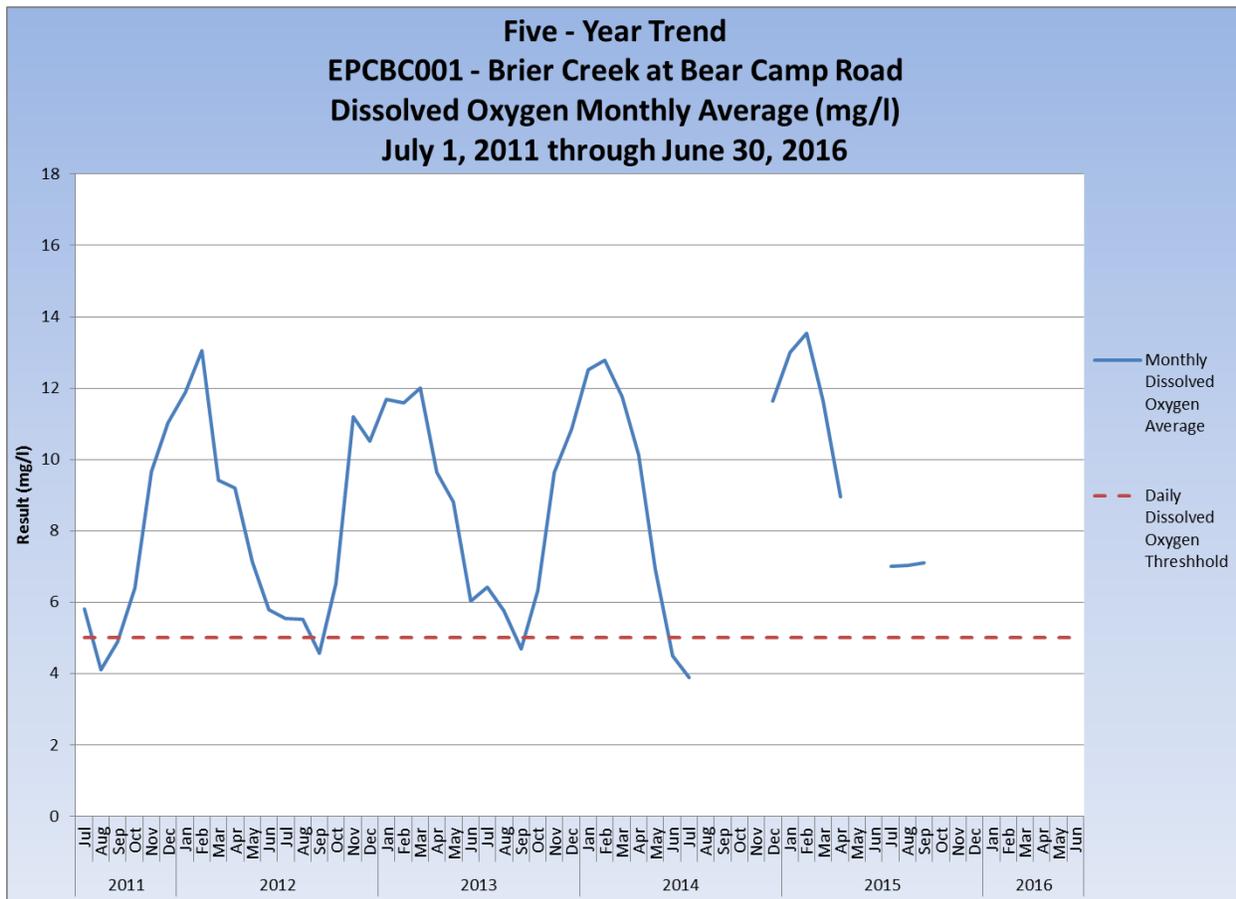


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 13 MPN/100 ml to 545 MPN/100 ml in samples collected in Brier Creek at Bear Camp Road. The water quality criteria for fecal coliform were met in 20 of 30 months during the recreational seasons in Brier Creek at Bear Camp Road.





In the five-year trend for final dissolved oxygen in Brier Creek at Bear Camp Road, monthly average concentrations of dissolved oxygen ranged from 3.9 to 13.5 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.

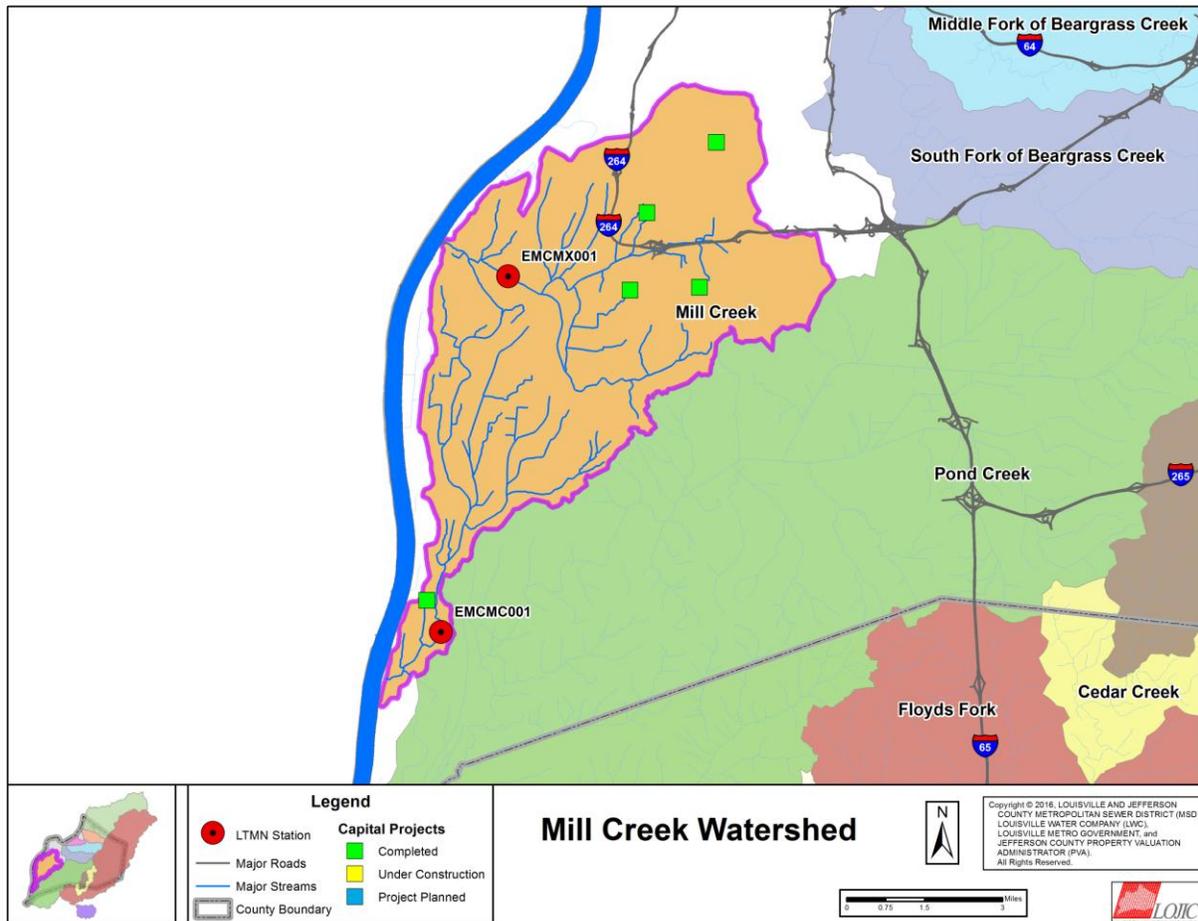




2013, and “poor” in 2015, at Northern Ditch at Preston Highway, “poor” at Pond Creek at Manslick Road in 2013, and 2015, and “poor” at Pond Creek at Pendleton Road in 2013, and 2015. Algal communities were rated as “good” in 2011, and “excellent” in 2013, in Fern Creek at Old Bardstown Road, “fair” in 2011, and “poor” in 2013, in Northern Ditch at Preston Highway and in Pond Creek at Manslick Road, “poor” in both 2011, and 2013, in Pond Creek at Pendleton Road and “good” in both 2011, and 2013, in Brier Creek at Bear Camp Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

### 5.5.10 Mill Creek Watershed

Figure 5.5.10 Mill Creek Watershed



**Watershed Description:** The Mill Creek watershed drains about 34 square miles in western Louisville, near the Ohio River. The northern part of the watershed includes streams that drain to the Mill Creek Cutoff, which flows directly into the Ohio River near Shively. The southern part of the watershed flows south through Pleasure Ridge Park and then into the Ohio River near Watson Lane. Many of the streams in this watershed have been straightened or channelized in the past to reduce flooding and to increase the amount of land suitable for development.

MSD monitors water quality continuously in Mill Creek at Orell Road (EMCMC001) and collects quarterly and biological samples in Mill Creek Cutoff at Cane Run Road (EMCMX001). There



are 13.5 square miles draining to Mill Creek at Orell Road and about 21% of the land in this subwatershed is covered by impervious surfaces. There are 24.4 square miles draining to Mill Creek Cutoff at Cane Run Road and about 38% of the land in this subwatershed is covered by impervious surfaces.

Capital projects in the Mill Creek Watershed include Shively Interceptor, Hazelwood Pump Station I&I Investigation and Rehabilitation, Derek R. Guthrie Water Quality Treatment Center: Blower Package, Derek R. Guthrie Water Quality Treatment Center: Wet Weather Flow Equalization & Treatment, Derek R. Guthrie Water Quality Treatment Center: Wet Weather Equalization Basin, Derek R. Guthrie Water Quality Treatment Center Wet Weather Treatment Facility, Sonne Pump Station I&I Investigation and Rehabilitation, and East Rockford Lane Pump Station Relocation.

**Continuous Monitoring Results:** Final continuous monitoring data were available between October 1, 2014, and September 30, 2015, in Mill Creek at Orell Road. During this time period, the temperature data set were 41.0% complete and 100% of available values met the temperature criterion. In Mill Creek at Orell Road, the dissolved oxygen data set were 31.0% complete, average dissolved oxygen was 9.0 mg/l and the dissolved oxygen criteria was met 88.5% of the days with a complete record.

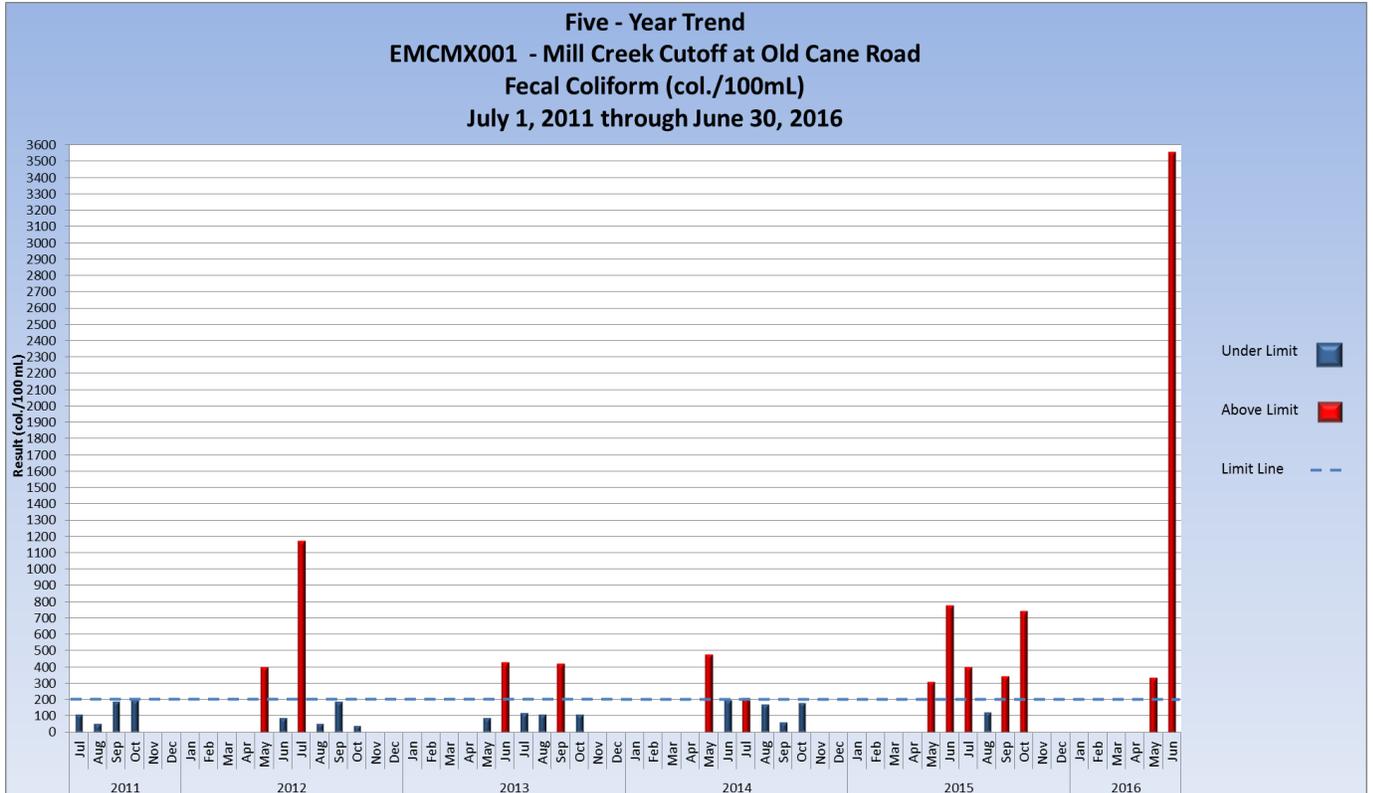
**Quarterly Monitoring Results:** Three samples were collected under dry conditions, and one sample was collected under wet conditions at both Mill Creek locations. Concentrations of soluble phosphorus ranged from 0.022 mg/l to 0.101 mg/l in Mill Creek watershed. Concentration of total phosphorus ranged from 0.01 mg/l to 0.107 mg/l in Mill Creek watershed. Nitrate concentrations ranged from 0.055 mg/l to 1.06 mg/l in Mill Creek at Orell Road, while the nitrate concentrations ranged from 0.27 mg/l to 0.75 mg/l at the Old Cane Run Road location. Total dissolved solids concentrations ranged from 138 mg/l to 300 mg/l at Orell Road and ranged from 241 mg/l to 1060 mg/l at Cane Run Road TSS concentrations ranged from 1.5 mg/l to 32 mg/l at Orell Road and ranged from 4 mg/l to 20 mg/l at Old Cane Run Road. All quarterly samples were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc in the Mill Creek watershed with the exception of one sample collected under dry conditions in Mill Creek at Orell Road in January 2016, which had an elevated lead concentration (5.48 ug/l) that exceeded the chronic aquatic life criterion of 3.18 ug/l.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 11 MPN/100 ml to 1,198 MPN/100 ml in samples collected in Mill Creek at Orell Road, and water quality criteria were met in three out of six months. Average (geometric mean) concentrations of fecal coliform bacteria ranged from 123 MPN/100 ml to 3,560 MPN/100 ml in samples collected in Mill Creek Cutoff at Cane Run Road, and water quality criteria were met in one out of six months.

**Five-Year Trend Analysis:** In the five-year trend analysis for Mill Creek, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 39 MPN/100 ml to 3560

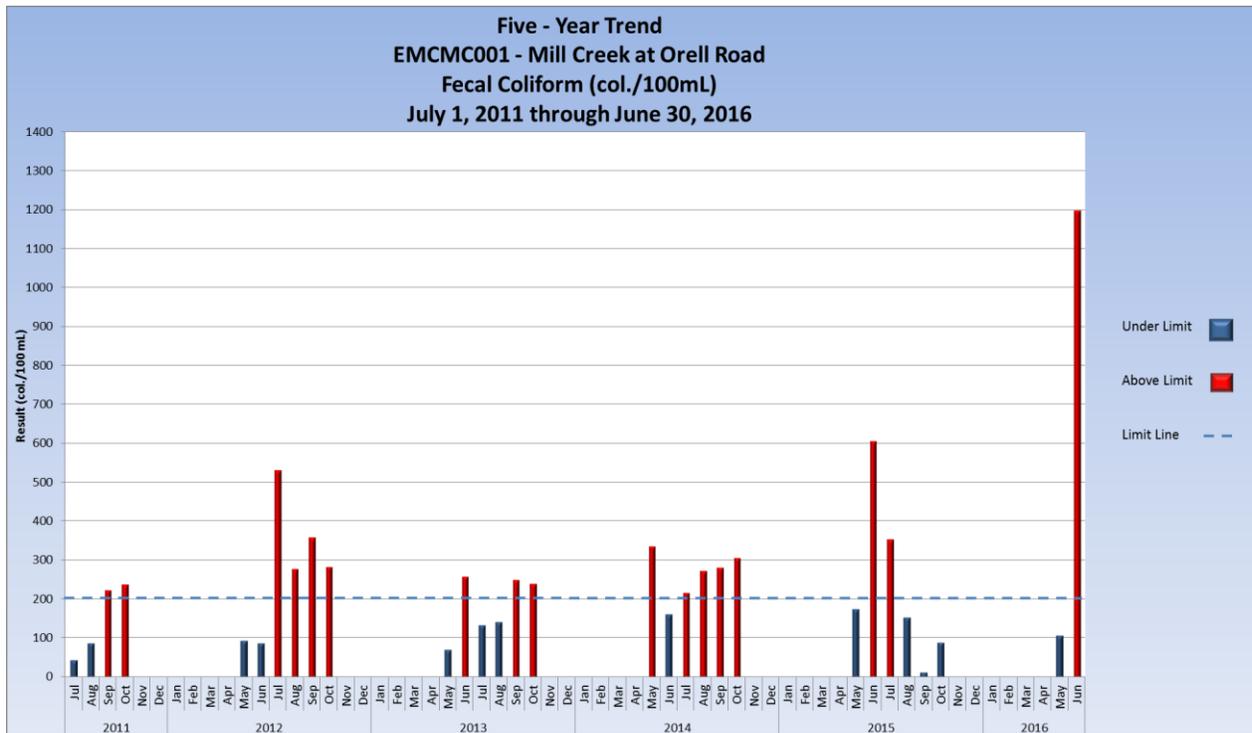


MPN/100 ml in samples collected in Mill Creek Cutoff at Old Cane Run Road, and water quality criteria were met in 17 out of 30 months during the recreational seasons in the Mill Creek Cutoff at Old Cane Run Road.



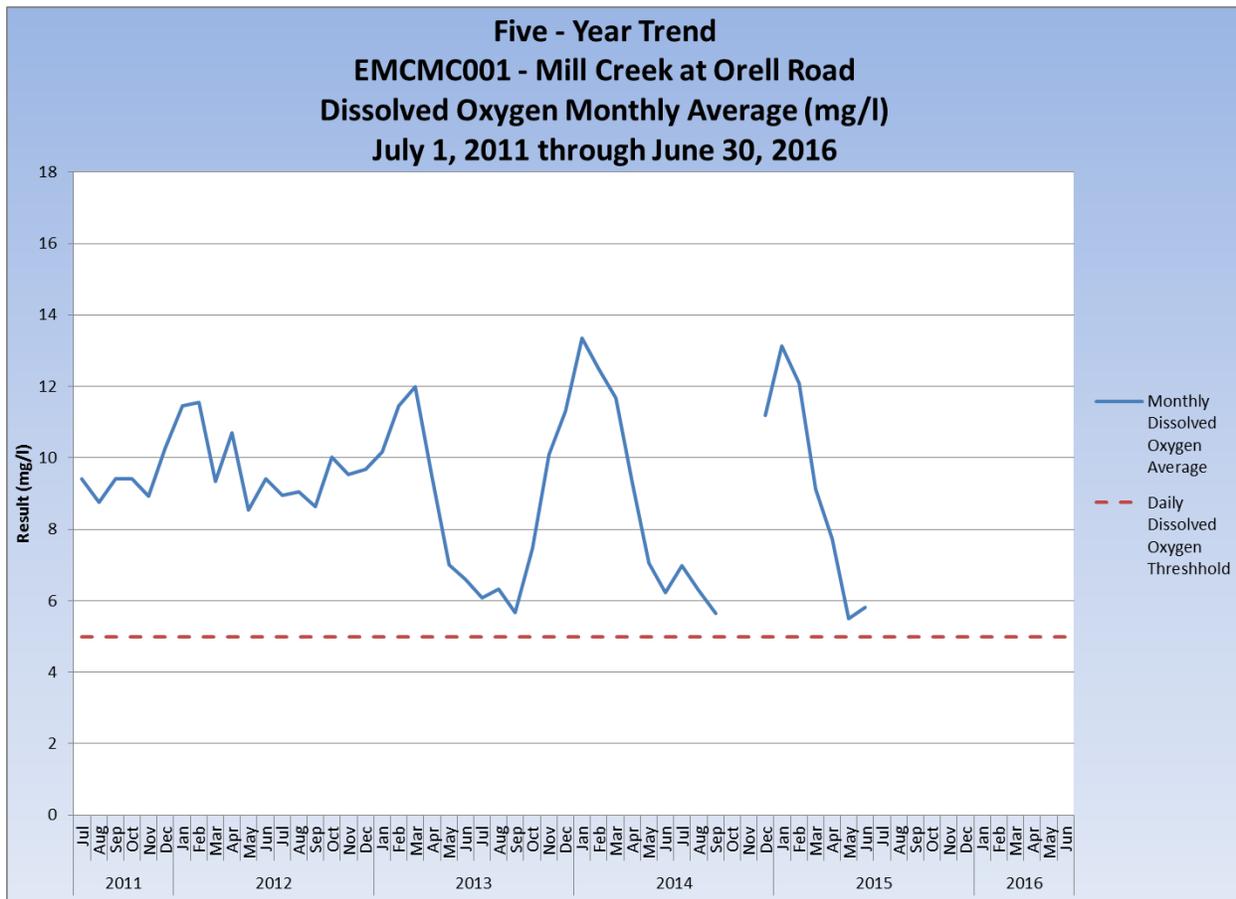


During the same period, the average (geometric mean) concentrations of fecal coliform bacteria ranged from 11 MPN/100 ml to 1,198 MPN/100 ml in samples collected at Mill Creek at Orell Road. The water quality criteria for fecal coliform were met in 13 of 30 months during the recreational seasons in Mill Creek at Orell Road.





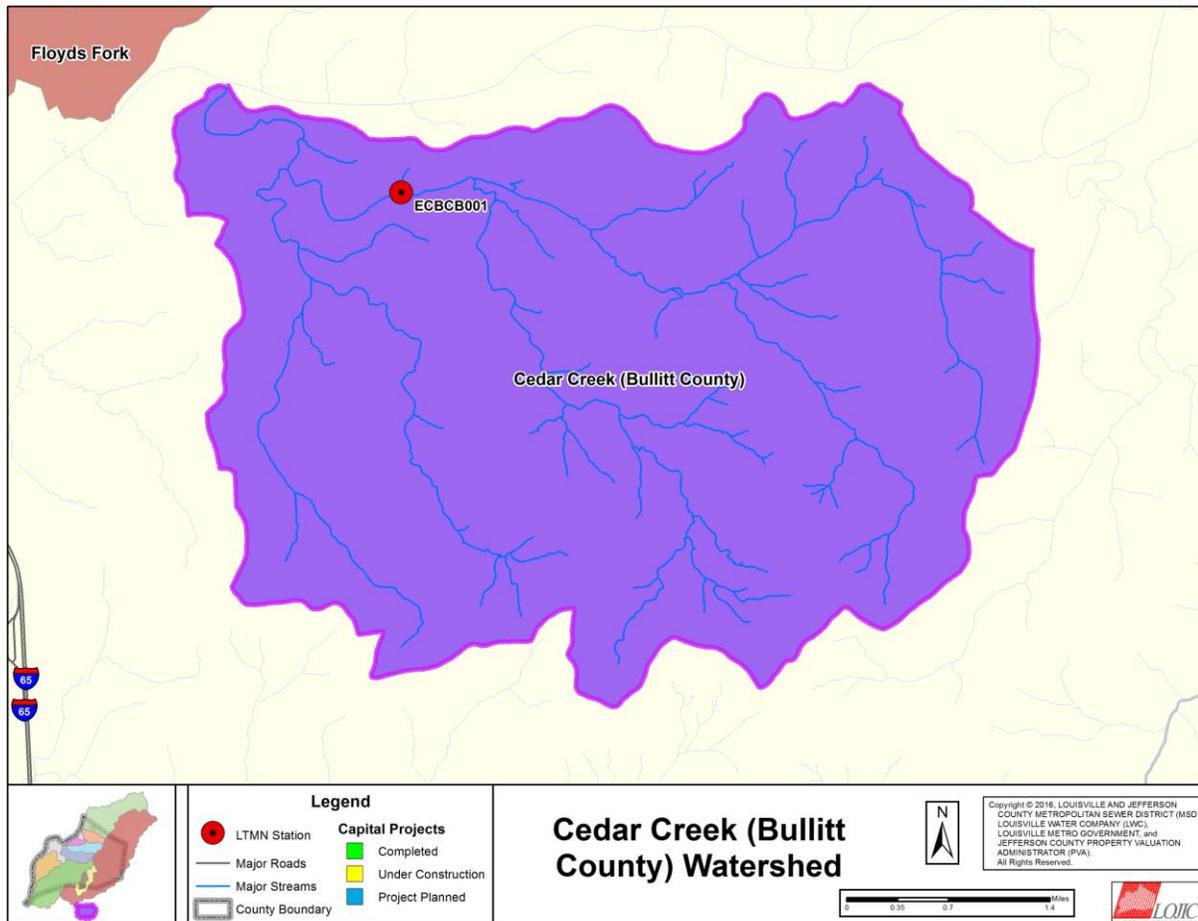
In the five-year trend for final dissolved oxygen in Mill Creek at Orell Road, monthly average concentrations of dissolved oxygen ranged from 5.5 to 13.3 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



**Biological Monitoring Results:** Benthic communities were rated as “poor” in the Mill Creek Cutoff at Cane Run Road and “poor” in Mill Creek at Orell Road, based on data collected in Spring 2015. Fish communities were rated as “poor” in the Mill Creek Cutoff at Cane Run Road and in Mill Creek at Orell Road, based on data collected in Fall 2015. Habitat quality at both locations was rated as “poor,” based on data collected in 2013, and 2015. Algal communities were rated as “fair” in 2011, and “good” in 2013, in the Mill Creek Cutoff and at Mill Creek at Orell Road. Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.

5.5.11 Cedar Creek Watershed (Bullitt County)

Figure 5.5.11 Cedar Creek (Bullitt County) Watershed



**Watershed Description:** The small streams that eventually form Cedar Creek originate in the Cedar Grove area in Bullitt County. Cedar Creek flows north and empties into the Salt River east of Shepherdsville.

MSD monitors water quality in Cedar Creek at State Highway 1442 (ECBCB001). This site drains 12.1 square miles of land. This watershed is mostly forested and impervious area covers only 0.2% of the watershed.



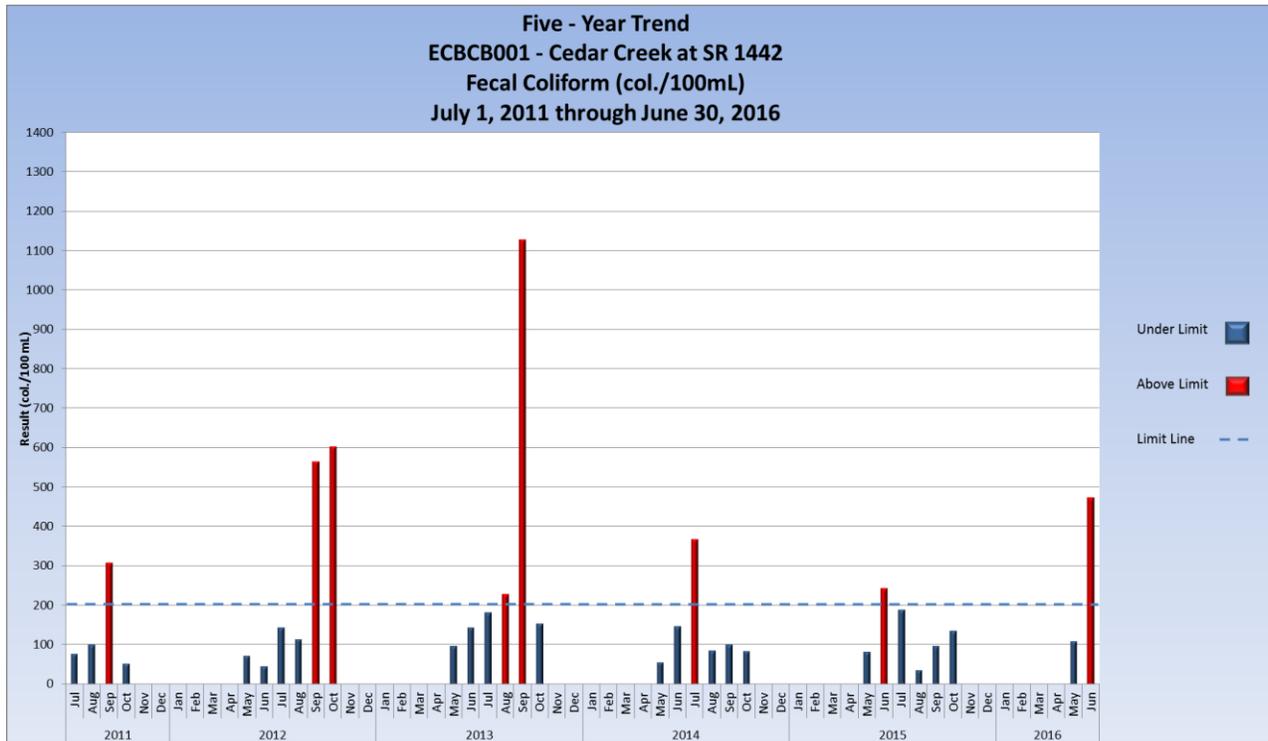
There are no capital projects in the Cedar Creek (Bullitt County) Watershed.

**Continuous Monitoring Results:** Final continuous monitoring data were available between October 1, 2014, and September 30, 2015, in Cedar Creek at State Highway 1442. During this time period, the temperature data set were 47.5% complete and 100% of available values met the temperature criterion. The dissolved oxygen data set were 47.4% complete, average dissolved oxygen was 10.2 mg/l, and the dissolved oxygen criteria was met 96.0% of the days with a complete record.

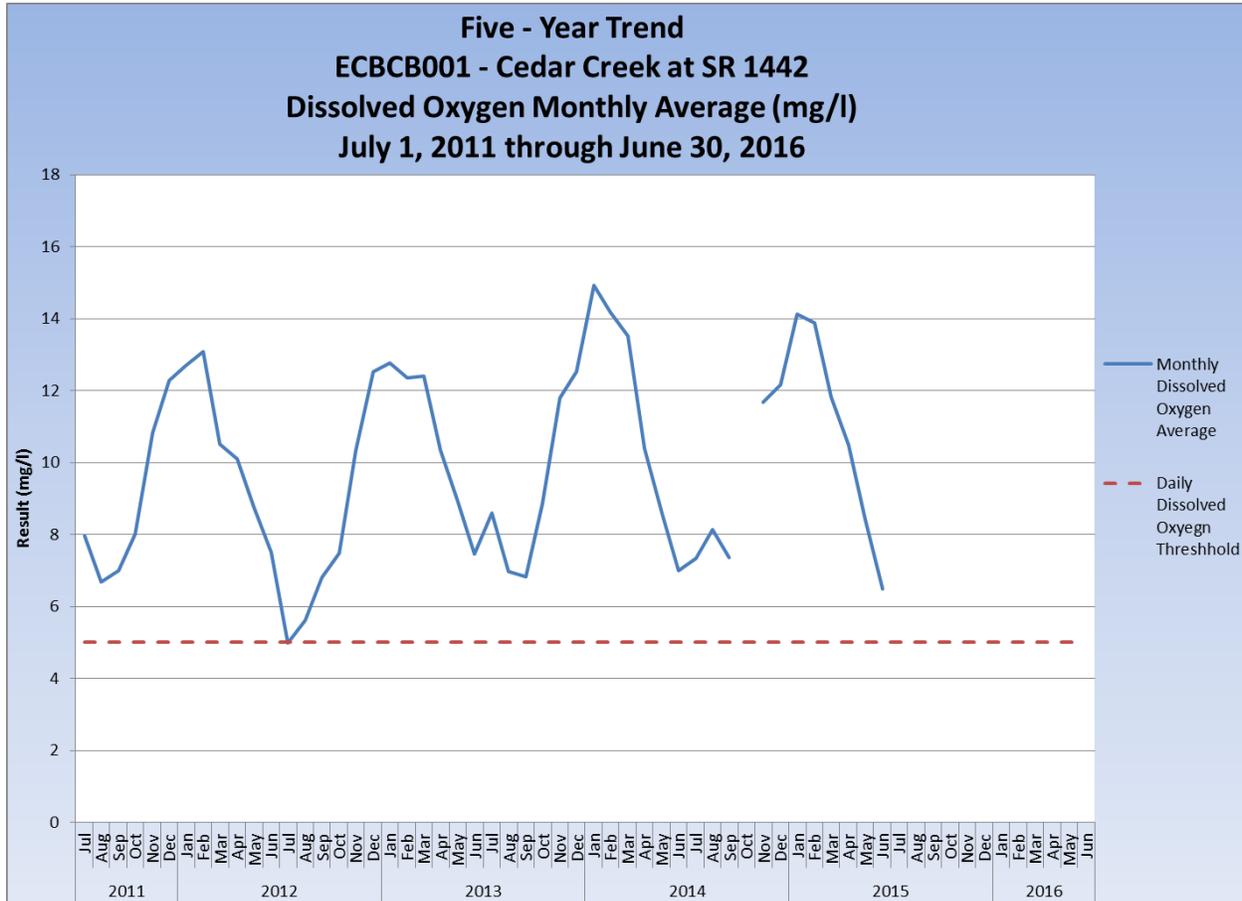
**Quarterly Monitoring Results:** Three samples were collected under dry conditions, and one sample was collected under wet conditions. All concentrations of total and soluble phosphorus were below the minimum detection limit for the analytical method during this report period. Concentrations of nitrate were between 0.02 mg/l and 0.85 mg/l. Total dissolved solids concentrations were between 246 mg/l and 295 mg/l. TSS concentrations were between 1.5 mg/l and 17 mg/l during this report year. All quarterly samples were less than chronic aquatic life criteria for cadmium, copper, lead, and zinc in the Cedar Creek watershed with the exception of one sample collected under wet conditions in Cedar Creek at State Highway 1442 in July 2015, which had an elevated lead concentration (15.2 ug/l) that exceeded the chronic aquatic life criterion of 7.79 ug/l.

**Bacteria Monitoring Results:** Average (geometric mean) concentrations of fecal coliform bacteria ranged from 36 MPN/100 ml to 473 MPN/100 ml in samples collected in Cedar Creek at State Highway 1442 and the water quality criteria for fecal coliform were met in five of six months with available data.

**Five-Year Trend Analysis:** In the five-year trend analysis for Cedar Creek (Bullitt County), the average (geometric mean) concentrations of fecal coliform bacteria ranged from 36 MPN/100 ml to 1,127 MPN/100 ml in samples collected at Cedar Creek at State Highway 1442. The water quality criteria for fecal coliform were met in 22 of 30 months during the recreational seasons in State Highway 1442.



In the five-year trend for final dissolved oxygen in Cedar Creek at SR 1442, monthly average concentrations of dissolved oxygen ranged from 5.0 to 14.9 mg/l. Data gaps in the period from July 2011, through September 2015, are due to meter impairments or QA review. No data is shown for the period of October 2015, through June 2016, because the data provided by the USGS for that period is provisional (not final data). Final data for this period will be available from USGS in the next reporting period.



**Biological Monitoring Results:** In Cedar Creek at State Highway 1442 the benthic community was rated as “fair,” based on data collected in Spring 2015. Fish communities were rated as “excellent,” based on data collected in Fall 2015. Habitat quality was rated as “excellent” in 2013, and 2015. Algal communities were rated as “excellent” in 2011, and 2013, in Cedar Creek at State Highway 1442 (Bullitt County). Algal communities were sampled in September and October of 2015, and those results will be available in the next MS4 Annual Report.