City of Birmingham, Alabama
710 North Twentieth Street ▌
500 City Hall ▌Birmingham, AL 35203

2016

MUNICIPAL SEPARATE STORM SEWER SYSTEM

NPDES PERMIT NUMBER: AL000001

FISCAL YEAR 2015-2016

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) 2016 ANNUAL REPORT

PERMIT YEAR (ADMINISTRATIVE EXTENSION)
OCTOBER 1, 2015-SEPTEMBER 30, 2016

DECEMBER 2016

TABLE OF CONTENTS

Appendices (See attached disc)

CERTIFICATION STATEMENT

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 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.

Signature:	
Name:	Thomas H. Miller
Title:	Stormwater Administrator
Date:	December 15, 2016

LIST OF CONTACTS & RESPONSIBLE CONTRIBUTORS

AGENCY	NAME	TELEPHONE NO.	RESPONSIBILITY
CITY OF BIRMINGHAM COMMUNITY DEVELOPMENT	AMTHOR, PHIL	(205) 254-2275	MAYOR ASSISTANT
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	BELL, DENISE	(205) 254-2022	FLOODPLAIN ADMINISTRATOR
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	COOPER, DIRECUS	(205) 254-7771	STORMWATER SPECIALIST; WATER QUALITY
CITY OF BIRMINGHAM PUBLIC WORKS	DENT, BRENDA	(205) 254-2798	KEEP BIRMINGHAM BEAUTIFUL COMMISSION
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	EDDINGTON, MIKE	(205) 254-2354	SENIOR CIVIL ENGINEER
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	GAMBREL, TIM	(205) 297-8059	PRINCIPAL PLANNER
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	GOSS, TOMMY	(205) 254-4920	SEC CONSTRUCTION INSPECTOR
CITY OF BIRMINGHAM PUBLIC WORKS	KAPERA, TEDDY	(205) 714-8676	HORTICULTURE OPERATIONS
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	MAGEE, TOM	(205) 254-2932	CHIEF PLANNER
CITY OF BIRMINGHAM ECONOMIC DEVELOPMENT	MAYO, ANDY	(205) 254-2774	ECONOMIC DEVELOPMENT SPECIALIST
CITY OF BIRMINGHAM PUBLIC WORKS	MENIFIELD, ALFRED	(205) 254-6302	SENIOR DEPUTY DIRECTOR
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	MILLER, THOMAS	(205) 714-8644	STORMWATER ADMINISTRATOR
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	MOORE, ALEXCIA	(205) 297-8301	WATER POLLUTION CONTROL TECHNICIAN
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	MOSS, ANGELA	(205) 297-8300	WATER POLLUTION CONTROL TECHNICIAN
CITY OF BIRMINGHAM BIRMINGHAM FIRE DEPT	MUNNERLYN, E.J.	(205) 250-7540	FIRE INSPECTOR I

Agency	Name	Telephone No.	Responsibility
Village Creek Human & Environmental Justice Society, INC	Owens, Yohance	205-798-0087	Executive Director
City of Birmingham Planning, Engineering, & Permits	Perry, Troy	(205) 254-2499	Water Pollution Control Technician
City of Birmingham Planning, Engineering, & Permits	Putman, George	(205) 254-2822	Senior Civil Engineer
ADEM	Records Management	(334) 271-7712	
Jefferson County Environmental Service Department	Rohling, Brian	(205) 521-7512	Chief Civil Engineer
Jefferson County Stormwater Management	Stormwater Staff	(205) 325-8741	Stormwater Management
City of Birmingham Planning, Engineering, & Permits	Thomas, Katrina	(205) 254-2288	Zoning Administrator
City of Birmingham Public Works	Ward, Paul	(205) 655-3391	Solid Waste Administrator
City of Birmingham Planning, Engineering, & Permits	Wilborn, Donald	(205) 254-2730	Senior Planner
City of Birmingham Public Works	Wilhite, Herman	(205) 254-2631	Deputy Director/Streets and Sanitation
City of Birmingham Planning, Engineering, & Permits	Williams, Barry	(205) 254-2345	Senior System Analyst

STORMWATER MANAGEMENT PROGRAM EVALUATION

PROGRAM OBJECTIVE: The Clean Water Act is a comprehensive set of programs and requirements designed to address the complex problems caused by a wide variety of pollution sources. A cornerstone of the Act is the National Pollutant Discharge Elimination System (NPDES), regulating the discharge of pollutants into waters of the U.S. The City of Birmingham has been issued a NPDES Phase I Municipal Separate Storm Sewer System (MS4) Permit (No. ALS000001), dated October 12, 2001, for the operation of its MS4. That permit, which became effective on November 1, 2001, outlines a number of controls and activities to effectively prohibit the discharge of non-stormwater into the MS4 and reduce the discharge of pollutants from the MS4 to the maximum extent practicable. Today within the City of Birmingham are several water resource segments that presently do not meet beneficial use requirements. As a result, they have been placed on the State's Section 303(d) list of impaired water bodies and either have or are scheduled to have total maximum daily loads (TMDLs) established to further control pollutants from being discharged into City waterbodies. To achieve overall water quality improvement for those water resources within watersheds of the City of Birmingham, the following objectives are foundational (**Please note that Objective #3 is changed to reflect the recommended new performance measure**):

1. *Development of a strong partnership with the State of Alabama, Department of Environmental Management.*
2. *Facilitate achievement of established TMDLs for streams and creeks within the jurisdictional purview of the City of Birmingham that will ultimately lead to removal of these resources from the impaired waters list.*
3. *By 2017, reduce discharge weighted total suspended solids concentration from each of the City's major streams by a minimum of 10% from levels established in 2016, commencing in Village Creek.*
4. *By combination of both pollution control and preventative approaches, reduce or remove pollutants to the maximum extent practicable from both the MS4 and Birmingham's creeks and streams.*
5. *Development and implementation of watershed basin-wide strategies to address water quality and quantity problems in City of Birmingham watersheds, initiating a watershed management plan for Village Creek in 2014 and Valley Creek by 2017.*
6. *Ensure legal authority exists to control discharges to and from the City's MS4 by the establishment of a stormwater protection ordinance.*

MAJOR FINDINGS

During NPDES Stormwater Permit reporting year 2015-2016, the City of Birmingham identified numerous major findings, which either did or could have far reaching implications on the City's Stormwater Management programs, which are described below. Some of the below listed items may be further discussed in later sections of this report if so noted.

DIELDRIN: Subsequent to an accidental spill of the pesticide Dursban® that washed into Village Creek many years ago, extensive water quality study of Village Creek by the U.S. Geological Survey in early 2000-2001 led ADEM to list Village Creek as impaired for Dieldrin. After years of sampling though, both the City and ADEM has reported no significant findings of Dieldrin in Village Creek and requested consideration for its delisting. However, the USEPA did not concur. Subsequently, ADEM released its final §303(d) list in 2016 noting only that Dieldrin remains on that impaired waters list in two assessment units of Village Creek (AL03160111-0408-102 and AL03160111-0408-103).

The only pathway to human health concerns related to the ingestion of Dieldrin from Village Creek or the adjacent East Lake area where annually the City holds its fish rodeo is through consumption of fish contaminated with Dieldrin. The City worked with ADEM during this annual report period to collected fish samples for further contaminant testing. Based on the results of that collection and testing by ADEM, no Dieldrin was found in the collected fish tissue and as a result, ADEM released its final Fish Consumption Advisory on June 17, 2016 documenting no fish impairment in either East Lake or in Village Creek. See Appendix C. ADEM has recently related to Stormwater Management that the State plans to again seek the delisting of Village Creek for Dieldrin in 2018. The City of Birmingham has offered assistance as ADEM may need.

EASTERN AREA LANDFILL: On May 3, 2016 the City entered into a consent order with stipulated fines and penalties of $33,000. (See Appendix A) The City Department of Public Works/Landfill is required to provide monthly discharge monitoring reports (DMRs) to ADEM in compliance with its Permit No. AL0055247. Between May 2013 and November 2015 the City submitted DMRs indicating a discharge of pollutants in violation of the imposed permit limits had occurred and some DMRs were late. Additionally, no receiving stream monitoring ever occurred in response to the exceedence and no corrective measures were ever identified or implemented to address these violations.

Furthermore, the City had apparently done some earthwork without a NPDES permit, which arguably had caused certain storm water discharges to occur without implementation of a best management practices plan to prevent or minimize the potential for the release of pollutants to waters of the State. The City has established a consent order work schedule for the completion of an engineering report to address the requirements of the consent order. The report is anticipated to be completed in November 2016 and with ADEM's acceptance in January 2017 the project will commence by April 2017. See Appendix A for a copy of the Eastern Area Consent Order Work Schedule.

NEW GEORGIA LANDFILL: The City of Birmingham Department of Public Works/Landfill received several warning letters in 2016 with the most recent being in May for the operation and maintenance of the New Georgia Landfill (Permit No. 37-11). The warning letters were related to a finding that the constructed sediment basin did not have adequate freeboard to withhold a 24-hour, 25-year storm event from the active and/or closed portions of the landfill. There was also found deep-rooted vegetation growing that needed to be removed and associated "rills and gully" erosion needing also to be corrected. In response to ADEM's warning letter the City completed the removal of all vegetation as of July 15, 2016 and eliminated all erosion rills and seeded the areas disturbed on July 18, 2016. Maintenance of the sedimentation pond was addressed on September 10, 2016.

SHADES CREEK MAINENANCE: Stormwater Management and SEC Program staff worked towards resolving long-standing erosion and sediment control concerns for stream operation and maintenance dredging. This became an issue for the City during this reporting period when the City received a Notice of Violation from ADEM.

COURT ORDER, March 13, 2003 the City of Birmingham entered into a Settlement and Release Agreement to settle a court case in the Circuit Court of Jefferson County by Robert S. Vance, Jr, Circuit Judge. As part of the settlement the City agreed to pay cash settlement and perform the acts outlined in Exhibit A. A copy of Exhibit A is in Appendix A.

The City Public Works Department has been performing the action outlined in Exhibit A to the best of their ability since 2003. Exhibit A requires the city to maintain the drainage system by clearing vegetation, trees, dirt and other blockage of obstruction form the City's drainage system.

It further outlines using herbicide application along the banks of Upper Shades Creek and the "Slash Buster" machine to cut and clean the banks as necessary in the Upper Shades Creek.

A "Long Reach Excavator" in Upper Shades Creek to remove silt, sand bars, and dirt blocking bridges or otherwise impeding the flow of Upper Shades Creek.

ADEM NOTICE OF VIOLATION, On December 16, 2015 the City of Birmingham received a Notice of Violation (NOV) for their maintenance of Upper Shades Creek near Elder Street. A copy of the NOV is in Appendix A. Since the work in the streams was considered maintenance and not new construction, the City had not pursued coverage under the General Permit.

In the NOV they indicate two violations. One Best Management Practice (BMP's) had not been implemented or maintained to the maximum extent practicable resulting in uncontrolled discharges of sediment and other pollutants to a water of the State. Secondly, dredged material was placed on the stream bank without effective BMP's controls in place. The NOV required that a written report be prepared by a Qualified Credentialed Professional and submitted within 10 days outlining the steps taken to correct the violations. It also required the submittal of a Notice of Intend and a CBMPP plan be prepared and submitted.

CORRECTIVE ACTIONS, Upon receiving the NOV the City of Birmingham Public Works Department engaged Volkert Engineering to prepare a response to the NOV and began upgrading the implementation of BMP's. Work was ceased on the banks and site stabilized.

A meeting was held with the Army Corp of Engineers to discuss the need for 404 wetlands and stream permits and it was concluded that the dredging operations did not required by the Nationwide Permits.

A meeting was held June 24, 2016 with ADEM Stormwater Construction Staff, and Staff from the City of Birmingham Stormwater Section and the Public Works Department. A Memorandum prepared after the meeting is in Appendix A. In the meeting it was discussed that the removal of vegetation does not require NPDES coverage as long as the soils or plant roots were not disturbed. It was also discussed that removing debris or sediment form culverts or from under bridges did not require NPDES Permit Coverage.

A "Notice of Intent" and a Construction Best Management Practice Plan was prepared and submitted to ADEM by the City of Birmingham Planning and Engineering Department with the CBMPP by Volkert Engineering. After ADEM review and revisions the final Permit Coverage became effective on September 23, 2016. A copy of the ADEM permit coverage letter, General Permit, NOI, and CBMPP is in Appendix A.

FUTURE ACTIONS, It is felt that the removal of vegetation from the stream banks may be causing a negative impact on the streams by allowing erosion and sediment uncontrolled discharge. The City is now maintaining vegetation at greater heights, but reserves the option to revisit and revise the Court Order to allow more flexibility in the vegetation maintenance.

Currently the Department of Public Works is notifying the Stormwater Engineer section prior to completing stream maintenance work. The Stormwater Engineer is determining if the work is impeding flows and is warranted. If work is warranted a BMP plan is recommended.

WATER QUALITY MONITORING: This reporting period now includes three-full years of water quality monitoring in Birmingham's creeks. The foundation of the City's instream water quality monitoring program has been to identify instream peak concentrations of specific conductivity that would lead one to conclude that at least in that flowing stream segment(s) there is an influence from another dissimilar water source, whether from an incoming tributary, an outfall discharge, or from a groundwater seepage influence.

Average annual rainfall between November 2013 and 2015, inclusive, was 55.3-in. By comparison between August 2015 and August 2016, average annual rainfall was 54.7-in. Rainfall periods are demonstrably similar and were an important factor in the Creek's overall water quality this year. This reporting year can be considered slightly dryer than previous years, although that difference is negligible.

With this data Stormwater Management has determined that there is a strong Pearson product moment coefficient of correlation (r = 0.95) between stream flow and Total Suspended Solids at Station VIC14.0 where stormwater exits the City of Birmingham. Furthermore, flow and specific conductance also demonstrated a high degree of an inverse correlation with an R^2 value of 0.1059.

The Birmingham flow-weighted concentration for TSS remains approximately 7.3 mg/L, as it did last year, even with the most current year being added; the TSS flow-weighted concentration represented for industry is 3.2 mg/L. City is considering modifying its pollutant load objective in favor of flow-weighted concentration derivation of TSS pollutant loading as described earlier in the ***Stormwater Management Program Evaluation Section***.

The pH of surface water generally ranged from 6 to 9. ADEM established a pH range of 6 to 8.5 to reduce the effects of highly acidic or highly basic water on fish and wildlife. Shades Creek pH levels are reportedly improved from last year. However, it is worthy of note that hardness, pH, and recoverable zinc were not dissimilar to the findings reported by the USGS in 2000-2001 study.[i] Higher pH levels studied during 2000 - 2001 along Village Creek by the USGS (USGS 2002) noted that higher pH was indicative of carbonate-based geology in the area. Valley, Village, and Five Mile Creeks originate from limestone and dolomite karst springs, which could explain some higher pH readings when the City of Birmingham conducts its water quality analysis.

Shades, Valley, Five Mile Creek and Cahaba River took an apparent down turn relative to State Anti-degradation level requirements when compared to last year's report for *E. coli*. Village Creek remained the same for *E. coli*. Dissolved oxygen and temperature levels did not exceed state anti-degradation policy at any time during the past two reporting cycles for any stream within Birmingham. Turbidity levels also demonstrated improvement since last reporting cycle.

Overall, the intent of changes to the City's water quality monitoring program was to broadly determine if a given stream was improving, remaining constant or becoming more polluted with respect to TSS over time given the

preponderance of established BMP controls. Compared with last year's data, the flow-weighted data with TSS remained constant this year, demonstrating no apparent change in water quality conditions in Village Creek.

MS4 MAPPING AND MAINTENANCE: Recent past annual report cycles have led the City to report as a weakness mapping of the City's municipal separate storm sewer system (MS4). Although the City retained professional services to assist in determining and mapping certain flood prone areas, mapping the full extent of the City's MS4 continues to be an elusive objective. More than 800 outfalls have been identified and mapped within the City's major stream basins; however, ownership of those outfalls, whether City MS4 or privately owned, is not yet determined. Stormwater Staff did investigate ownership of several pipe systems on private property in the Village Creek Watershed, as time permitted, and were able to identify non-MS4 drainage features belonging to the airport, NUCOR Steel, Wade Sand and Gravel, Estes, and ACIPCO. Associated with that exercise, the City was able to identify numerous other drainage features which appear to be in public ownership. See Map #1 in Appendix C. This effort though has proven onerous with limited staff and still does not address the primary drainage network upstream from the identified and mapped outfalls.

Since the City has been unable to broadly document ownership and given Stormwater Management's need to understand the source of dry weather flows when discovered, it was determined this year to address this issue through a more direct, focused approach. When an outfall >36" in diameter is discovered discharging, particularly after 72-hours without prior rainfall, that outfall and associated catchment area is selected for more intense investigation to determine the source of water draining through the system to the outfall structure.

On May 27, 2016 the City received a complaint about, "…blue-green appearance and smelling like sewage…" apparently originating from an outfall to Shades Creek near Elder Street (Water Quality Station SC05.5s). See Section header picture. A sample for *Escherichia coli (E. coli)* was collected, which exceeded 2,419.6 colonies per 100mls of water. As a result of this finding the City has determined to use this outfall and creek segment in Shades Creek as a pilot project to identify and map all drainage features within the drainage catchment area of tributary SC05.5s. It is believed this outfall structure is in public ownership. In August the City prepared a white-paper report to the Department Director requesting approval to proceed with the pilot project to Shades Creek. The pilot project requested approval to dedicate one survey crew from Engineering, the GIS Section to provide mapping services, and Engineering/Land Management to assist with ownership. Along with Stormwater Management, all primary and secondary stormwater assets within the Crestwood Area, which drains about 451-acres of a mix of commercial and residential uses, was to be identified that make up the skeleton MS4 that outfalls to Shades Creek at Station SC05.5s. The total cost of the project for FY2017 was estimated to be approximately $66,800. The Project was approved by the Department Director in August

and is expected to be implemented early in the next report year.

UTILITY FEE: In response to Alabama Act 2014-439, the City passed Ordinance No. 15-95 (See Appendix A) and retained the services of a consultant to prepare the necessary stormwater utility fee billing structure and fee table for the Jefferson and Shelby County's Tax Authority's to be included in the 2016 tax bills when mailed on October 1, 2016. Furthermore, the project was intended to evaluate the impacts of the new law on the City's Stormwater Management Programs and recommend changes to remain compliant with all state and federal NPDES requirements.

Presently services to address all permitted stormwater controls are provided by three departments; Fire, Public Works (DPW), and the Planning, Engineering, and Permits (PEP) Departments. The Law Department also provides a measure of service, which to date has not been accounted for stormwater billing purposes. None of these departments with the exception of PEP receives any stormwater utility fee revenues to address ongoing stormwater related operations and services except for Stormwater Management within PEP. Although the City already had the authority to collect stormwater utility fees and had begun many of the activities to define and implement programs to comply with its existing NPDES MS4 Permit, the new law changed the previous funding structure and further defined limitations on the City's local program. As a result of those changes the City of Birmingham entered into a contract with ARCADIS-US, Inc. to re-examine the City's current stormwater utility fee process with requirements to:

- Determine the feasibility of creating a stormwater utility as allowed by law
- Determine the impact on the City's stormwater management program plan
- Develop a defensible and sustainable rate policy and structure
- Establish a City ordinance to implement the City's stormwater management program

From the last annual report submitted to ADEM, the City generated approximately $850,000 in stormwater utility revenues. With enactment of the new stormwater utility fee law and redefining the City's fee structure to be consistent with the new law, it is anticipated that new revenues to support the stormwater management program will generate more than $1.6M. These fees will begin to be collected on October 1, 2016. The table below summarizes those minimum control measures contained within the City's NPDES Phase I Permit. This status generally remains unchanged for Annual Report Year 2016. With

NPDES Permit Minimum Required Control Measures	Purpose	Unit	Fully Achieved	Substantially Achieved	Not Substantially Achieved
Structural Controls & Stormwater Operations	Reduce pollutants	DPW		X	
New/Significant Redevelopment	Limit or reduce pollutants permitted from new or significant redevelopment discharges	PEP	X		
Roadways	Minimize pollutant discharge	DPW			X
Flood Control Projects	Retro-fit existing structural flood management projects	PEP		X	
PHF Application	Reduce the discharge of pollutants through operator training & equipment calibration	DPW	X		
IDDE	Detect & eliminate MS4 illicit discharges	PEP	X		
Spill Prevention & Response	Prevent, contain, & respond to spills	FIRE DPW PEP		X	
Industrial & High Risk Runoff	Control pollutants from landfills & other similar facilities	FIRE DPW PEP		X	
Construction Site Runoff	Reduce pollutants from construction sites	PEP	X		
Public Education	Promote, publiciza, & facilitate reporting	PEP	X		
Monitoring Program	Improve water quality	PEP	X		

Based on 2015 Stat's

the anticipated FY2016 funding reported last year all minimum control measures have been substantially achieved except roadway street sweeping, which was largely not achieved due to the loss of multiple street sweepers that were out of commission for an extended period of time, including through this year due to a lack of funding to repair or replace that equipment. Additionally, the City has continued a number of enhanced program controls into FY2016, which have included:

- Planning & Policy Controls (e.g. Framework Plans, Watershed Plans, Floodplain Projects, etc.)
- Regulatory Controls (e.g. New LID/GI Ordinance, Zoning Ordinance, etc.)
- Project Controls (e.g. New Catch Basin Technology
- Public Education & Outreach
- Stream Flow & Water Quality Gaging
- Renewal of the City's current NPDES MS4 Permit is anticipated to further impact the current City Stormwater Management Program budget.

Many of the minimum and enhanced program controls have been funded by ad valorem taxes, bond proceeds, grants, and other non-stormwater related revenue sources.

ROADWAY MAINTENANCE: During the 2016 Annual Report period Stormwater Management became aware of changes to the Roadway Maintenance program. The changes included a reduction in the number of assigned crews to address transportation maintenance controls and a slight reduction in overall program costs, which are depicted in the table below.

Control	FY2009	FY2016
Street Sweeping	**$1,593,200**	**$1,204,848**
Structural Controls & System Maintenance	**$ 958,019**	**$ 983,356**
Total	**$2,551,219**	**$2,188,201**

Changes to the overall management of the Roadway Maintenance program, between 2014 and 2016, included prolonged equipment failure, departmental downsizing, and reassignment of street sweeping crews to other functional areas. For example, in 2014 a total pollutant load reduction from street sweeping was 1,696.02 tons, not the 6,479 tons, which was reported in error. That figure was greatly reduced in 2015, down to 339.80 and only up slightly more in 2016 to 731.57 tons. Stormwater Management is working with the Department of Public Works to improve street sweeping collection throughout the City.

PESTICIDE, HERBICIDE, & FERTILIZER (PHF): During the 2016 Annual Report period Stormwater Management noted changes in how the City elected to perform operational controls to maintain vegetation on public and private properties under City control. In essence, it appeared to Stormwater Management that the City had changed its approach to vegetation management by reducing the use of mechanical methods of vegetation removal (e.g. mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers, etc.) and replacing it with the use of biocide treatment control methods. Mechanical methods of vegetation control have now been replaced by new, site specific application of herbicides and fertilizers designed to eliminate weeds and encourage the natural succession of desirable, native vegetation, which when mature would significantly minimize ongoing vegetation controls except on a periodic basis. This decision was made primarily due to cost and given the significant number of tax delinquent and dilapidated private properties not being maintained to the extent that they had become a public health, welfare and nuisance concern, and requiring City intervention.

Throughout the City of Birmingham there are approximately 16,000 tax delinquent properties with nearly 10,000 having been tax delinquent for 5-years or more. For the past 5-years, approximately 1,500 properties have been added to the tax delinquent roles on an annual basis and that is not expected to decline in the foreseeable future.

In an attempt to address this continuing and growing problem the City created the RISE Initiative, a multifaceted neighborhood stabilization strategy that stands for:

- **REMOVING BLIGHT**
- **INCREASING VALUES**
- **STRENGTHENING NEIGHBORHOODS**
- **EMPOWERING RESIDENTS**

The **RISE** Initiative toolkit consists of:

- ✓ Increased funding for blight removal
- ✓ Birmingham Land Bank Authority
- ✓ New property maintenance code and a more streamlined, targeted, and efficient code enforcement process
- ✓ Public education and assistance campaign called *Preserving the Wealth of our Communities*

All of the RISE Toolkit programs will be implemented in order to rehabilitate many of Birmingham's blighted and under-populated communities through a strategic approach that will ensure the eradication of abandoned homes, increasing property values, and restore resident interest in their neighborhoods.

Important to stormwater management and to address resolution of the blighted housing stock, the City of Birmingham created the Birmingham Land Bank Authority (BLBA), which was briefly mentioned in last year's annual report. The mission of the BLBA is to serve the citizens of Birmingham by working collaboratively and transparently with Community stakeholders and the City of Birmingham to steward vacant, abandoned, and tax delinquent properties and dispose of them to the best use as defined by the needs of the community to reduce community blight, stabilize neighborhoods, facilitate community, civic, and commercial redevelopment, and to increase community and overall City of Birmingham property values while returning such properties back to the tax rolls. This year the BLBA has received approximately 1,800 applications from citizens, non-profits, individual investors and developers to acquire tax delinquent properties. The requests range from taking ownership of overgrown lots by neighbors through the BLBA's Side-Lot program, turning vacant lots into community gardens through the Adopt-a-Lot program used by both neighborhood residents and non-profits, and rehabilitation of dilapidated structures by individuals and investors through the General Request program. Currently the BLBA has 144 active Side-Lot agreements with neighbors caring for vacant lots, 108 Adopt-a-Lot agreements with citizens or non-profits caring for blighted lots in their neighborhood, and 148 General Request agreements for individuals, non-profits, and for-profits reinvesting in lots through rehabilitation or new construction. In conjunction with the BLBA's efforts, 388 dilapidated and abandoned properties in the City have been razed between October 1, 2015 and September 2, 2016, inclusively. Removal of these properties has also included the removal of associated impervious area along with the shift away from mechanical maintenance operations of all City holdings in favor of chemical treatment, which has direct application for stormwater.

Currently, the PHF Program is administered by the Horticulture Operations Manager having certification in aquatic, ground, rights-of-way and ornamental turf applications, as well as being a licensed arborist. The PHF Manager manages a staff of 10-certified pesticide applicators and provides 2-in house classroom training exercises and 2-field training classes each year, in addition to the outside training classes approved by the Alabama Department of Agriculture and Industries needed to maintain their applicator credentials.

Included in Appendix A is a copy of the most currently modified PHF Section Seven (7) of the City's Comprehensive Stormwater Program Plan and includes also a copy of the PHF Program Pesticide Discharge Management Plan, a Sample Spray Record Log, a Spill Response Plan as of August 30, 2016, and maps showing where the endangered and threatened species areas are located and where spray application of controlled biocides is prohibited. These PHF materials are being provided to the Department as updates also to the City's Comprehensive Stormwater Program Plan.

MAJOR ACCOMPLISHMENTS

ADMINISTRATION:

During NPDES Stormwater Permit reporting year 2015-2016, two administrative changes occurred. Mr. Direcus Cooper was promoted from Water Pollution Control Technician to Storm Water Specialist. Mr. Direcus Cooper has A.S. and B.S. degrees in Environmental Science of Engineering, M.S. in Occupational Health and Safety/ Environmental Management, and is currently working on a dual master's Engineering degree in Sustainable Smart Cities. Mr. Cooper directs the instream water quality and stormwater education programs.

Additionally, the position of Water Pollution Control Technician, previously vacated in 2015, was filled on June 27, 2016 with Mr. Troy Perry bringing the full complement of staffing back to Stormwater Management's "In-Stream Team". Mr. Perry comes to the City from the Jefferson County Community and Environmental Protection Program, having a Bachelor of Science degree in Geology with particular interest in hydraulic conductivity from Auburn University. He is also a licensed geologist in the State of Alabama (License #379) and will bring considerable breadth to the City's Stormwater Program.

Stormwater Management obtained supportive services from Samford University as it does annually from Ms. Kate Cosnahan, a graduate student intern to the City during the summer months. She provided considerable support and upon her departure on August 12, 2016 provided a copy of her experience in the form of a summary paper, which was a requirement of her major professor. A copy of that paper is included in Appendix D, which gives an objective summary of her experience in Stormwater Management for ADEM's consideration.

Since staffing Stormwater Management one principal concern has been over-arching; that concern has been and continues to be employee safety. An omission from the job classifications is a requirement that prospective applicants are able to swim. While City streams are not physically swimmable given their normal shallow depths, there have been occasions where employees have lost their footing while wading a stream and have fallen into shallow, flooded holes in the rocky stream bottoms. Discussion with City Risk-Safety officials led this year to a "Drown-Proofing" workshop opportunity at the CrossPlex in Birmingham. The Olympic size swimming pool averages about seven feet in depth, well over the head of all Stormwater Management employees.

The training was simple. Each field employee was required to enter the water wearing complete field sampling uniform attire, including chest waders. The intent was to place them into an uncomfortable yet safe situation, giving them the experience of being in water over their head, in a situation that required them to overcome any strong desire to panic, and to experience how their field attire would respond in deep water. All Stormwater Management Staff participated, even those that could not swim. Two people were in the pool at all times to be of assistance should someone have gotten into

trouble. All were also within reach of the pool edge and lane floats as they may have needed. All staff successfully completed the training and discovered that their chest waders actually floated, even when filled with water. The event was considered by all to be a success and an event that will likely continue into the future, particularly as new field sampling staff may need to be hired from time to time. One staff member even commented, "Gosh – I love my job"! I'm sure it had nothing to do with swimming while supposedly working.

DEVELOPMENT CONTROLS:

The City of Birmingham continues to accomplish significant programmatic efforts related to development controls. These include efforts associated with:

- **Planning Controls**
- **Policy Controls**
- **Project Controls**
- **Regulatory Controls**

The federal Water Pollution Control Act P.L. 107-303, November 27, 2002 established requirements to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.[ii] Consistent with the provision of federal law the Storm Water Regulations (40 CFR Part 122.26) further delineated the need for large municipal separate storm sewer system dischargers to have a comprehensive planning process, which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using appropriate and delineated controls.[iii]

The original NPDES MS4 Permit (ALS000001), effective November 1, 2001, required in Part II.A.2. that for areas of new development and significant redevelopment a comprehensive master planning process (or equivalent) to develop, implement, and enforce controls to minimize the discharge of pollutants from areas of new development and significant redevelopment after construction be completed. In order to accomplish the permitted development objectives four development controls are used by the City for new development and significant redevelopment. These controls span *planning*, *project*, *policy*, and *regulatory controls* and are applied to the aforementioned areas based on environmental classification.

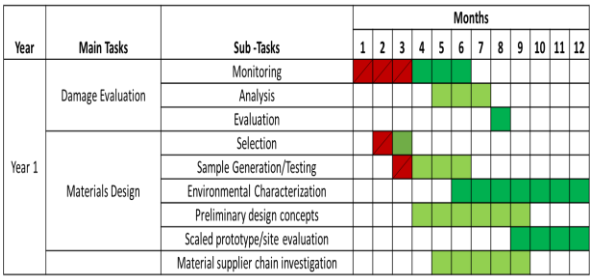
Planning controls for example are employed in Birmingham through implementation of comprehensive planning policies and objectives that are consistent with the goals of the Phase I NPDES MS4 program. Generally, they are applied to all areas regardless of environmental classification. Project controls are generally corrective as well as restorative in application, and are primarily applied to environmentally impaired and sensitive areas. Primary project controls include brownfields reclamation, floodplain property acquisition, parkland and open space creation, environmental/stream restoration, and drainage infrastructure repair and replacement projects. Policy controls are generally preventive in intent and are primarily applied to environmentally sensitive and impaired areas. An example of a City policy control is best represented by the City's Engineering Design Guidelines for Subdivisions or Commercial Developments. Regulatory controls used by the City include subdivision regulations, sediment and soil erosion control regulations, the zoning ordinance, and the City's new stormwater protection ordinance, which was approved by the City Council in December 2014. Regulatory

controls are applied across all environmental classifications (i.e. in all areas of new development or significant redevelopment) and will be discussed in more detail later in this report.

PUT A LID ON IT:

During last reporting period, the City identified more than 1,000 inlet tops being manufactured and replaced annually by our Department of Public Works at an estimated cost of more than $576,000 per year. Continuous disrepair of inlet tops and blocked drains do not allow stormwater to flow properly, resulting in flooding issues and standing waters. Drains without the proper covering are a public safety concern that is hazardous to the communities and can contribute to neighborhood neglect. The City identified a possible solution to these issues in a partnership with University of Alabama at Birmingham (UAB) to redesign an innovative, state of the art pilot project with the potential to develop an incubator business opportunity with the City of Birmingham. This proposal will improve drainage, enhance public and worker's safety, and reduce long term operating and maintenance (O&M) costs. During this reporting period staff has worked through a preliminary portion of the pilot project and has completed a draft pilot project scoping document and a draft interlocal agreement for final execution. The City has also budgeted approximately $600,000 over the next three-years until pilot project completion. City staff anticipates execution of the final agreements and pilot project execution in early 2016.

Future Direction: The City has completed a work scope and draft interlocal agreement, which was acceptable to City and UAB Attorneys. The agreement was approved by the Alabama Attorney General's Office, a requirement of State Law when universities are involved with municipal governments. Upon approval the City will completed the interlocal agreement for subsequent board/council approvals to proceed to implement the project. Funds were budgeted and the project Phase I begun in 2016.



Please see phase schedule below:

Phase I

- Collect data on loading and operational conditions experienced by storm inlets
- Develop a process for the recycled composite materials

Phase II

- Redesign the storm sewer inlet cover to provide superior durability
- Design an attachment to limit trash and debris entering the storm drain system
- Create a prototype for a QR reader code

Phase III

- Finalize the material development and redesign of the inlet cover and attachment system in a cost effective manner
- Complete a business plan

PLANNING CONTROLS:

Last year, Stormwater Management reported on the status of previous efforts to complete and implement the City's first Comprehensive Plan in more than 50-years. Since then, the City has taken significant steps going forward to capitalize on that effort in further significant planning refinements that will prove to be equally foundational in making Birmingham a more sustainable metropolis.

During this annual report year, four significant efforts continued in the development of Citywide planning controls. Those included the continuation of the Framework Planning, which is intended to encourage wiser patterns of real estate development and City growth while reducing the demand for growth on existing infrastructure, including storm sewers. Secondly, Planning Staff is continuing to develop a "sustainable plan" scope-of-work to assist in preparing development guidelines and standards that will assist the City in its efforts to become more sustainable. As this latter effort also requires funding for implementation, this has contributed to a source of project delay. Thirdly, the City has nearly completed final development of the Village Creek Watershed Management Plan and begun development similarly of a Valley Creek Flood Management and Water Quality Master Plan. These will be discussed in more detail in this section of the annual report. Finally, the City has begun consideration for development of a sustainability plan, which will also be discussed in more detail herein.

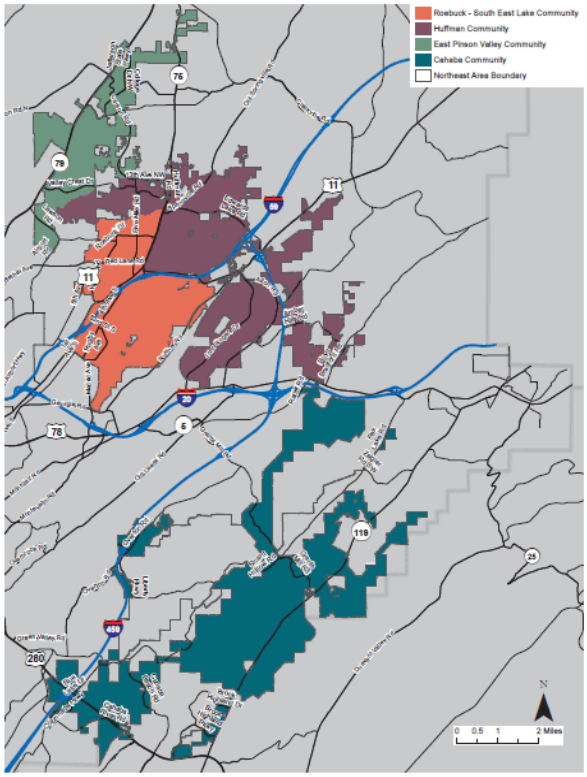
FRAMEWORK PLANS:

The goal of framework plans, working closely with and in conjunction with individual community areas, is to establish a guide and set of policies to better align resources and improve the quality of life for residents and businesses residing within the framework planning areas. Frameworks plans update land use plans and regulations to provide area specific development controls and include several categories ranging from high intensity development like industrial to parks and open space and similar low intensity uses.

Please recall that last year three framework plans were developed and adopted in the City of Birmingham. These included North Birmingham (Adopted February 18, 2015), Titusville (Adopted February 4, 2015) and the Western Area (Adopted may 6, 2015). This reporting year, two final Framework Planning areas have been developed and are completed in draft. The two include the Northeast Framework Plan and the Southwest Framework Plan. A City website has been created to track the progress of all City Framework Plans at www.ImagineBHam.com. At this time public review has been completed. Approval of the Planning Commission and City Council remains to be done and is expected to occur in the fall of 2016. A summary of the plans follow below.

Northeast Framework Plan: The Northeast Area Framework Plan includes the communities of Roebuck, South East Lake, Huffman, East Pinson Valley, and the thirteen neighborhoods of Cahaba; an area of 43-square miles. See the figure below for the area encompassed by this Framework Planning Area. A copy of the Framework Plan may be found in Appendix B.

FIGURE 1.1: Northeast Area Communities Map



The plan established within four "Community Chapters", 106-goals; 16 of those goals are important BMPs to facilitate stormwater quality improvements and are summarized in the table at right and on the following page.

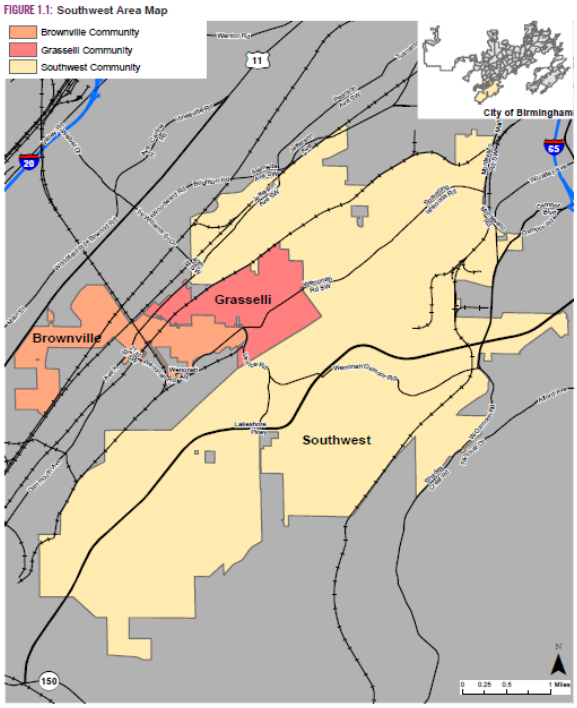
Actions	***Plan Priority***
Increase frequency & reliability of garbage & trash collection	Top
Encourage neighborhoods to adopt City ROW's	High
Acquire & dispose of blighted & flood prone properties for recreation	Medium
Create a darter habitat park & recreation corridor next to Hawkins Park Recreation Center	Top
Support the Cahaba Blueway Project	Medium
Develop a system of green streets	Low
Provide incentives & education to developers & homeowners for green design	Medium
Explore feasibility of implementing stormwater fee system & offer discounts to property owners who reduce runoff	Medium
Modify subdivision regulations & engineering guidelines or create new green infrastructure/low impact development ordinance to require use of LID or GI techniques in new development to mitigate stormwater runoff impacts citywide.	Medium
Encourage use of BMPs on all new development during post-construction to control soil erosion & minimize sediment runoff	Medium
Modify subdivision ordinance to reduce excessive cut/fill grading & destruction of significant trees, vegetation, & wildlife habitats during new construction	Medium
Acquire, designate, & remediate flood prone areas into productive & environmentally safe uses	Medium

ACTIONS	PLAN PRIORITY
Pursue opportunities for acquisition, conservation, & restoration of open space along year-round streams & rivers & actively protect these resources through land use management & flexible zoning	Medium
Adopt an ordinance to allow for transfer of development rights along the Cahaba River & other environmentally sensitive areas	Low
Install green systems on blighted or vacant properties to reduce stormwater run-off & flooding in flood prone areas	Low

Southwest Framework Plan: The Southwest Framework Plan includes the communities of Grasselli, Brownville, and Southwest Birmingham; an area of approximately 18-square miles. A copy of the framework plan may be found in Appendix B and an area map is shown at right. The plan established 150-goals; 21-goals are important BMPs to facilitate stormwater quality improvement in area streams and are summarized here and continued in the table located on the following page.

ACTIONS	PLAN PRIORITY
Increase frequency & reliability of trash pickup	Low
Develop activities & programs to minimize illegal dumping	Low
Create promotional materials to educate on harmful impacts of illegal dumping on water quality	Medium

FIGURE 1.1: Southwest Area Map



ACTIONS	PLAN PRIORITY
Use phytoremediation to mitigate effects of harmful contaminates on sites	Low
Encourage green, sustainable, & healthy homes	Medium
Incentivize green design	Medium
Acquire blighted & flood-prone properties to expand recreational opportunities for residents	High
Develop a system of green streets	Low
Provide incentives & education to developers for green design	Medium
Provide incentives & education to homeowners for green design	Low
Adopt a riparian buffer ordinance	Low

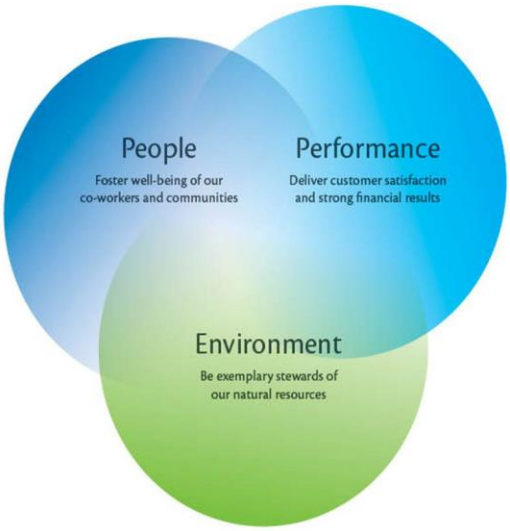
ACTIONS	*PLAN PRIORITY*
Explore feasibility of implementing a stormwater fee system & offer discounts to property owners who reduce runoff into City MS4	Low
Require in City subdivision regulations & engineering guidelines that new development use LID & other GI techniques	Low
Encourage use of BMPs on all new developments, post construction to control soil erosion & minimize runoff	Low
Modify subdivision ordinance to reduce excessive cut & fill grading & destruction of significant vegetation & habitats during the construction of new development	Low
Pursue opportunities for acquisition, conservation, & restoration of open space along streams & rivers thru land use mngmt. & flexible zoning	Medium
Acquire blighted & flood-prone properties for recreation	High
Install green systems on blighted properties to reduce stormwater runoff & flooding in flood-prone areas	High
Partner with willing landowners & the Freshwater Land Trust to purchase properties repeatedly flooded	Medium
Integrate hazard mitigation plans with the Comprehensive Plan's implementation	Low
Amend zoning, subdivision, & stormwater policies & regulations to promote environmental goals	Low

In both of these new framework plans two areas or concerns have been expressed by the public, which were designated as either high or a top priority to resolve. Those two areas included an element for better trash management or better blighted property management. While the City leaders recognize that any large City has trash and blight problems[iv], particularly given difficult economic times, it also recognizes that these issues are important to resolve and is taking steps to address them. For example, the City has:

- Established routine garbage, trash & brush pickup schedules Citywide (See Appendix B)
- Created a litter patrol using community service workers
- Initiated neighborhood and creek clean up days
- Produced educational materials for distribution to schools, neighborhood groups, and the public at large
- Begun research to develop a plastic bag recycling ordinance for the City
- Initiated the "Put-A-Lid-On-It" Project with UAB to address broken storm sewer infrastructure, which exacerbates the trash dumping problems throughout the City

Birmingham has received national attention for its booming downtown revitalization and new development projects. But with more than 16,000 deserted and/or tax-delinquent properties, the problem in Birmingham is unique by its sheer magnitude. As a result, Mayor Bell launched the "RISE" Program in 2013 and the major technical component of the

Program, a new Land Bank Authority in 2014. Today, in 2016 that program is now fully established and has begun to eliminate hazardous, dilapidated houses from the inventory stock.

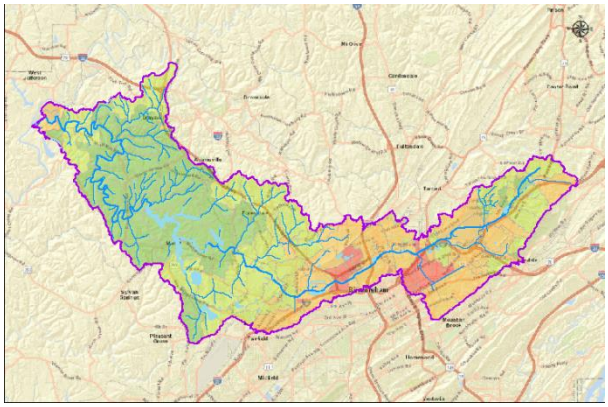


Sustainability Planning: In 2010 Mayor William A. Bell stated that,

"Having a Green reputation would give us more opportunities to showcase Birmingham as a city that takes sustainability and the environment seriously. My goal is to look for and apply exceptional green programs with proven success rates. Birmingham can benefit by the transformation of a city into a leader in sustainability and green initiatives, attracting more business, residents and maybe even ecotourists to the region."[v]

During this annual report year, the City of Birmingham became aware of a grant opportunity being offered by the Community Foundation of Greater Birmingham. The Community Foundation of Greater Birmingham is a public endowment whose mission is to drive positive change in the community through leadership and philanthropy. The community is defined as being the 5-county area of greater Birmingham, including Blount, Jefferson, St. Clair, Shelby, and Walker Counties.

The Community Foundation of Greater Birmingham opened applications for brief proposals on August 8, 2016 for consideration in Cycle 2 with their Community Funds. The City submitted its application on August 26th (See Appendix B) and anticipated a final award decision by the end of September 2016, which unfortunately was not awarded to the City in this round. In keeping with the Mayor's Vision for Birmingham and the requirement of the City Comprehensive Plan that the City prepares a Sustainability Plan[vi], the City Planning staff has prepared a request for proposals (RFP) to retain the services of a consultant firm to develop and prepare a sustainability plan for the City of Birmingham upon acceptance of the grant application by the Community Foundation of Greater Birmingham. A copy of that RFP is also included in Appendix B. City Planning Staff has been directed to look for other funding opportunities and intends to move sustainability solutions forward in Birmingham.



Watershed Management Planning (Village Creek): During this Annual Reporting Period, the City of Birmingham Stormwater Management Unit, in conjunction with Jefferson County Stormwater Management completed all technical

and model peer group technical team review and collaboration meetings. These meetings were held on December 17, 2015, February 12, 2016, and the final meeting on August 11, 2016. The technical review meetings included many individuals from:

- County agencies (i.e. SWMA, JCDH, JCSWM)
- City of Birmingham staff
- Alabama Water Policy & Law Institute
- Industry
- Community Leaders & Residents
- Audubon Society
- Universities
- Friends of East Lake Park
- Alabama Department of Environmental Management
- U.S. Environmental Protection Agency
- Alabama DOT
- U.S. Army Corps of Engineers
- Nature Conservancy
- Regional Planning Council of Greater Birmingham
- Birmingham International Airport
- Warrior Clean Water Partnership
- Freshwater Land Trust
- Village Creek Society
- Engineering Consultants
- Black Warrior Riverkeeper

These meetings were intended to share the results of continuing efforts to develop the watershed management plan for Village Creek, to solicit opinions and insights into opportunities for improvements to Village Creek, and to share significant results and receive agency, entity, and public comment. Ultimately the City's watershed management plan for Village Creek has been designed and developed to maximize long-term funding potential for improvements.

The USEPA requires that a minimum of nine elements be included into a watershed management plan for eligibility in impaired waters funding using incremental Section 319 Funds.[vii] These nine elements include:

- Identification of the causes of impairment & pollutant sources, which need controlling
- Estimation of load reductions expected from management measures
- Description of nonpoint source management measures for implementation to achieve load reductions
- Estimation of technical & financial assistance needed
- Public information & education outreach
- Schedule for implementation of nonpoint source management controls
- Description of interim measureable milestones to determine implementation of actionable measures
- Criteria to be used to determine successful implementation of the plan in achieving water quality improvement
- Monitoring component

Each primary topic is being included into the final watershed management plan for Village Creek, which as of September 30, 2016 was approximately 85%-complete. Full completion of the annual report is expected before the end of the calendar year and its details will be included in the 2017 Annual Report. The final report for this project has been delayed by the volume of effort required to complete the report and the volume of work, which has been assigned to this consultant by the City's Stormwater Management Program. Given the successful development of the Village Creek Watershed Management Plan, Stormwater Management has taken steps to retain this consultant to perform also a watershed management plan for Valley Creek in FY2017. That contract has been endorsed by the City Economic Development, Budget & Finance

Committee on May 23, 2016. Contract endorsement by the Mayor is pending.

POLICY CONTROLS:

During this calendar year no existing policy control issues became evident and no new policy controls were either initiated or implemented. For example, the stream maintenance policy controls anticipated for the City last year, while discussions with the ACOE and ADEM were implemented during this reporting year as regulatory controls. No progress toward new policy controls in this area was implemented.

REGULATORY CONTROLS:

Zoning Ordinance: The City of Birmingham's Zoning Ordinance, a requirement of the City's Comprehensive Plan, was completed and approved by the Birmingham City Council on September 15, 2015. That accomplishment was included in last year's annual report. A copy of the new City Zoning Ordinance is included in this year's report and may be found in Appendix B.

The Zoning Ordinance created a diverse range of zoning districts, which established appropriate land uses and associated standards for development needed to implement the land use policies of the Comprehensive Plan. In conjunction with the Ordinance an official zoning map assigned an appropriate zoning classification to all properties to which the Ordinance is applicable. The ordinance also established special overlay districts, including Flood Plain Overlay, U.S. Highway 280 Overlay District and Highland Park Neighborhood Form Based District, which are intended to address specific aspects of land use control or design not easily accomplished by conventional zoning techniques. The Ordinance further established land use standards designed to protect the value and integrity of neighboring properties, enhance the general character and appearance of the community, reinforce the central business district, lessen congestion, provide adequate privacy, light and air, protect landowners from adverse impacts of adjoining developments, and provide a reasonable balance between efficient utilization of land and protection of public interest and environmental resources.

Over the course of this annual report year the City has been involved in the implementation of the new City Zoning Ordinance. One particular aspect of the new ordinance raised considerable concern from the development community. That concern was related to the new Zoning Ordinance's parking standards.

In August the City received a letter from Walter Schoel Engineering Company, Inc. regarding "Top Golf Development: Low Impact Development". The letter requested that the parking lots associated with the development of "Top Golf" be constructed with typical, non-pervious paving with the understanding that the drainage system would incorporate stormwater management ponds that would include normal pool infiltration areas to serve as an onsite low impact development feature to promote water quality improvement. (See Appendix B) In a follow up letter from Mr. Walter Schoel on July 6, 2016, he would outline further his thoughts related to a technical discussion of pervious parking. (See Appendix B)

The letter correctly identified the City's position related to new zoning requirements for parking as the need to provide stormwater benefits and to reduce excess parking. The letter further provided recommendations for stormwater control related to parking, wherein he recommended that runoff volume increases generated by excess parking be controlled by low impact development, including pervious pavement, where each development situation was considered. He also suggested that the volume to be controlled be based on one-inch of rainfall (85th percentile event) and the City continue to require detention/retention ponds to

control peak runoff rates. Related to excess parking, Mr. Schoel provided suggested rewording for further City consideration. These recommendations are undergoing further consideration and zoning amendment approval at this time.

Post-Development Water Quality Treatment Controls Ordinance: City Stormwater Management has long recognized that management of stormwater citywide is moving towards greater development controls being provided. All new NPDES permits being issued to MS4 agencies are including a requirement that within 1-year from effective permit date the permitee develop/revise and implement a program to address the discharge of pollutants in post-construction water runoff to the MS4 from new development and re-development.[viii] Given this understanding in January 2016, after working with the American Society of Civil Engineers (ASCE), Birmingham Branch, the U.S. Environmental Protection Agency's consultant, working on behalf of the City of Birmingham, prepared a final report, entitled, **"Technical Memorandum 3 – Review of Guidance Documentation for Implementing Runoff Controls (Revision 1)".** (See appendix B) That report culminated several months of issue framing with a technical advisory subcommittee of the ASCE and was presented to the full ASCE on January 7, 2016. The ASCE recommended that the City consider the development of a new, post-construction water quality treatment control program to meet its pending NPDES Permit requirements using a public stakeholder process. They further recommended that the City include in the new program control requirements, which:

- Applies to disturbance of one-acre or more
- Address the first 1-inch volume of runoff (85th percentile)
- Flexibility, allowing for various methods of compliance for new and redevelopment, particularly in TMDL watersheds and karst areas

As a result of this preliminary effort to define planned direction to establish a new post-development water quality treatment control ordinance, the City retained the services of AMEC Foster Wheeler (May 31, 2016) to begin the process of developing a new ordinance. The first phase of the project commenced shortly thereafter to frame a new post-construction ordinance for the City using City Staff to guide the next steps of ordinance development. Those meetings were held during the summer of 2016 and culminated in a final report dated September 12, 2016, which is also included in Appendix B. The final report for Phase I and summary of next steps, which included also a draft ordinance outline for City consideration, recommended in Phase II that the City:

- Implement a program development stakeholder engagement process
- Develop several ordinances drafts & a final ordinance
- Develop a draft & final stormwater management manual
- Develop & implement appropriate manual's & program supporting tools

- Develop & implement a long-term stakeholder engagement plan
- Develop & implement a stormwater facility management & tracking process

The City anticipates entering into a new contract with AMEC Foster Wheeler early in the new 2017 reporting year and to commence the final phase to develop a new Post-Construction Water Quality Treatment Control Ordinance and Program for the City.

Stormwater Construction Program: The management of the Construction Stormwater management program was transferred within the Planning, Engineering and Permit Department from the Engineering Department to the Stormwater Management Department. A professional engineer and a senior inspector were added to the erosion sediment prevention and control staff.

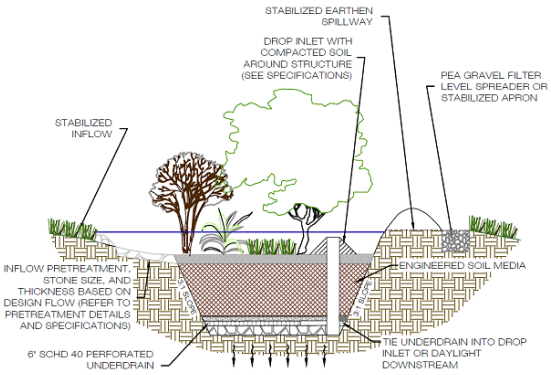
The review of the Soil Erosion Control plans and the inspection of the sites are under the supervision of Mr. George Putman, a professional engineer. Mr. Tommy Goss, QCI assists in the applications, BMP Construction Plan reviews, and the scheduling of site inspections. Mr. Chris Clayton, QCI and Eddie Fowler, QCI provide plan review support and the site inspections for the larger sites and for priority sites throughout the City of Birmingham. Other Engineering Inspectors assist with residential project inspections during peck construction periods. All site inspection reviews are performed in accordance with the "Alabama Manual".

During this report year erosion control and inspection service training and accreditation of staff has been a priority. Since October 1, 2015 and through to September 30, 2016 all of the Construction Stormwater staff have received erosion control continuing education training. Three have become qualified credentialed inspectors (QCI). Other Stormwater staff have also receive erosion and sediment control training to provide cross-training and backup as may be needed.

During this period there have been 213 Land Disturbance Permits issued by the City of Birmingham and 623 site inspections were conducted. Corrective actions were required on many of these sites, but formal enforcement actions were avoided with all contractors bringing their sites into compliance. All stormwater personnel routinely follow up on complaints. This year, six citizen complaints were received and all sites were brought into compliance.

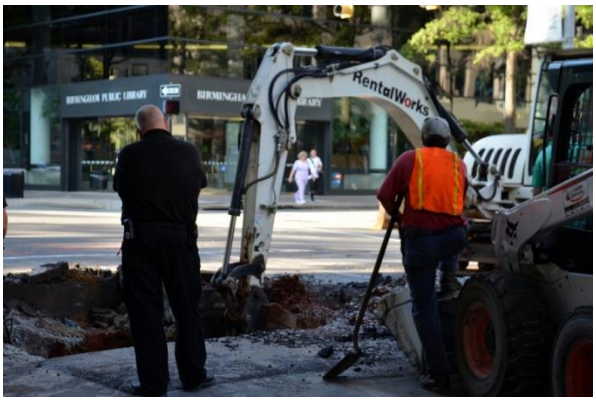
STRUCTURAL CONTROLS:

Bertram A. Hudson K-8 School Bio-Retention System Project: The City of Birmingham Stormwater Management Unit applied for and was awarded a Five Star and Urban Waters Program *National Fish and Wildlife Foundation Grant* during this reporting cycle.



The Five Star and Urban Waters Program seeks to develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local partnerships focused on improving water quality, watersheds and the species and habitats they support. The City of Birmingham and partners submitted a project grant application to retrofit a portion of Bertram A. Hudson K-8 School with a bio-retention basin and pervious pavers in an associated parking area. Project activities include restoration planning and design, site maintenance, monitoring, outdoor learning, and community outreach. The project will provide a reduction in pollution to Village Creek, help control the volume runoff exiting the site, and create learning opportunities for the Birmingham City School System about stormwater management. The Project partners include Bertram A. Hudson K-8 School, UAB School of Engineering, George Washington Carver High School, Birmingham Department of Public Works, and Belgard Hardcastle, Inc.

The total project cost is estimated to be $84,548; the federal match, including funds from the Southern Company, total $36,781. See Appendix B for more details about this project. The project is expected to commence during the 2017 annual reporting cycle.



Drainage Improvement Projects: The City of Birmingham Engineering Department is responsible for the budgeting, design, engineering, and construction of the MS4 system. During this reporting period the City was responsible for the implementation of 43 drainage improvements projects, Citywide. Project details are provided in Appendix B. The projects range in scope but are limited to within City rights-of-way and typically include curb and gutter work or associated storm sewer piping or ditch work as may be required. None of these projects were being constructed to address a water quality problem within the City.

City of Birmingham Brownfields Program: Brownfields are properties that are either contaminated or perceived to be contaminated and are often underutilized or abandoned. The City of Birmingham's Comprehensive Plan, discussed earlier in the ***Planning Controls Section,*** expressed a goal of reinvesting in existing communities to conserve resources and protect sensitive environments by supporting clean-up and adaptive reuse of brownfields areas because the community asked for that to occur.[ix] The Comprehensive Plan also forwarded the need for the City to create an entity to work with property owners and/or community and economic development agencies to obtain brownfields assessment funding, development incentives, and appropriately respond to specific development opportunities. The City's Economic and Community Development Departments were tasked with implementation of the City Brownfields Program.

In last year's annual report, the City provided documentation of the North Birmingham Framework Area Plan. One of the plan recommendations for action was that the City would designate, remediate, acquire and/or convert properties in environmentally contaminated and flood prone areas into productive and environmentally safe uses. This objective stemmed from the community's recognition it was collocated within an industrial center and having with a significant number of abandoned and industrial properties that are likely brownfields with some level of environmental contamination. This was further evidenced by the fact that this area has also been designated by the U.S. Environmental Protection Agency as a superfund area with known contamination.

With this understanding the City of Birmingham, in collaboration with the North Birmingham Community and its federal and state partners is making an impact through the collaboration and partnership of the North Birmingham Interagency Working Group for Environmental Justice (EJIWG). The Federal Interagency Working Group on Environmental Justice was established in 1994, under Executive Order 12898. The role of the EJIWG is to guide, support and enhances federal environmental justice and community-based activities. EPA Region 4, along with other federal agencies in the Atlanta region, began a Regional EJIWG focused on North Birmingham in August 2014. The goal of the Regional EJIWG is to work with other federal agencies to assist with revitalization efforts towards making a visible difference in the communities impacted by potential environmental concerns, blight and degradation. Stormwater and Floodplain

Management in Birmingham met with the North Birmingham EJIWG in February 2016 to discuss flooding, flood protection and polluted stormwater concerns of the Working Group. During that meeting the Programs shared the status of the Village Creek Watershed Management Plan and development status of new watershed protection ordinances being considered by Stormwater Management. The City also reviewed current efforts related to ongoing efforts with the U.S. Army Corps of Engineers to complete the feasibility study and nonstructural evaluation efforts that were and continue to be underway at this time. Also discussed were ongoing efforts to complete the City's floodplain mapping, warning, and risk assessment efforts. These efforts were all discussed in joint meetings of the Infrastructure, Parks, and Recreation Subgroup. Added efforts of the EJIWG include "Making a Visible Difference". The flyer may be found in Appendix B. Finally, in December 2015 the City applied for and in May 2016 received a Brownfields grant from the USEPA to commence the assessment of 20 properties in North Birmingham having the perception of contamination, which has hindered any development consideration.

Along with implementation of the City's Brownfields Program, the City currently also uses tax abatements as incentives for desired private investment likely to produce sales tax revenues or immediate jobs. In addition, limited property tax abatements to help provide incentives for renovating historic buildings can help revitalize neighborhoods and downtown without an excessive impact on revenues. Participation in these programs is strictly voluntary with tax abatements available to qualifying applicants for up to 20-years.

WATER QUALITY MONITORING:

This reporting year represents the third full year of monitoring water quality using the new water quality monitoring strategy that was implemented by Stormwater Management on November 20, 2013. That water quality monitoring strategy was intended to identify existing pollution source controls, the variability of the pollutant or pollutants being discharged into waters of the state, and where appropriate, the effect of effluent on receiving waters that may have an opportunity to cause there to be an exceedance of a narrative or numerical water quality standard as defined in Alabama code. The location of the City's monitoring stations in each watershed, both instream and screening sites, outfall locations, and the certified data collected to date since ADEM approved the new water quality monitoring strategy is provided with this report in Appendix B. During this period several overarching activities have dominated Stormwater Management's water quality monitoring program, including:

- Identification of the ownership status of jurisdictional outfalls in Village Creek and Shades Creek
- Field reconnaissance of Shades Creek discharges in the area of Shades Creek at SC05.5s as IDDE evaluation (***see Major Findings*** section)
- Continued operation of 5-USGS data collection stations in Village Creek, including 2-gage height/discharge/water quality stations and 3-rainfall gage stations. These stations can be found on the USGS Website as:
  - ✓ Station 02458148
  - ✓ Station 02458502
  - ✓ Station 02458190
  - ✓ Station 02458350
  - ✓ Station 02458450
- Approval for 2 additional USGS data collection stations on Valley Creek will be installed in late 2016. These locations will record: stage, rainfall, water temperature,

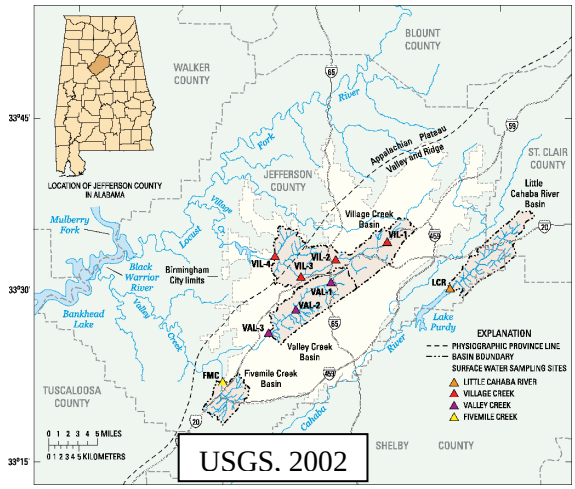
specific conductance, and development of a stage to discharge relationship to compute flow. These stations can be soon found on the USGS Website as:

- ✓ Station 02461130
- ✓ Station 02461192

- During this reporting period, Stormwater Management Staff had Internal Contractual issues as well as contract issues with Birmingham Water Works Board causing a one-month delay in the by-monthly sample routine.
- During this reporting period, Stormwater Management Staff made the decision to purchase and use the Hydrolab® as the primary field multi-parameter device and use the YSI® only as backup.
- Stormwater Staff continues to inspect lab equipment monthly to maintain a high level of quality control; ensure lab chemicals are not expired; consistent with the City's SOP.

Finally, for purposes of reporting water quality data in this year's report, a longer period than what is required annually by the permit is included to provide a better understanding of trends and water quality developments being observed. A decision has been made by Stormwater Management to average the two previous year's data and compare it to the current permit year's data. Therefore, whenever possible, a longer period of water quality analysis is provided along with water quality data observed during this reporting year.

During this reporting period interesting trends in water quality were obvious and similar to that identified in previous studies wherein, "precipitation produces an overall dilution of the major ion composition" and "under low-flow conditions, stream water is predominantly ground-water discharge.[i]



The City of Birmingham is located in the lower Appalachian Mountains in Jefferson County in central Alabama. Its corporate limits are bisected the Appalachian Plateau (Cumberland Plateau) and the Valley and Ridge. The Valley and Ridge province in this area is characterized by limestone valleys and resistant sandstone ridges that run parallel from northeast to southwest. Birmingham is located in Jones Valley, which is dominated by limestone derived carboniferous soils and karst topography having numerous natural springs. Village Creek, as well as other creeks and tributaries, originate from naturally occurring springs. Village Creek originates in the Roebuck area of Birmingham. The western part of Birmingham is partially located in the Appalachian Plateau and is characterized by hard sandstone shale and limestone at depth.

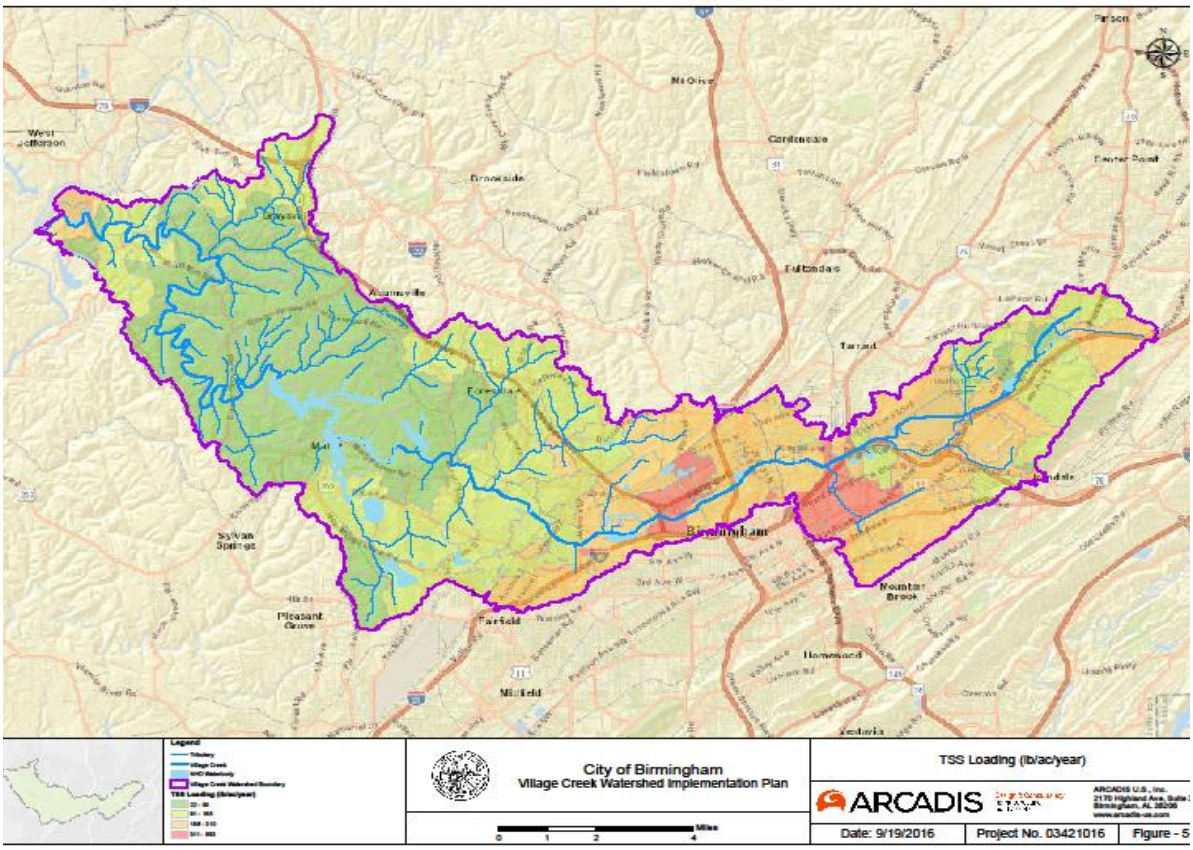
Soils in the Valley and Village Creek drainage basins in Jones Valley are in large part associated with limestone derived soils. Many of these carbonate soils have higher percentages of chert such as Bodine and Fullerton type soils (See USDA, NRCS. Web Soil Survey). The carbonate soils of this type have a higher percentage of chert and the soils lack structure and are not very well consolidated.

Erodible soils such as these wash more readily during a rain event and are more difficult for vegetation to become established on hard siliceous cherty soils.

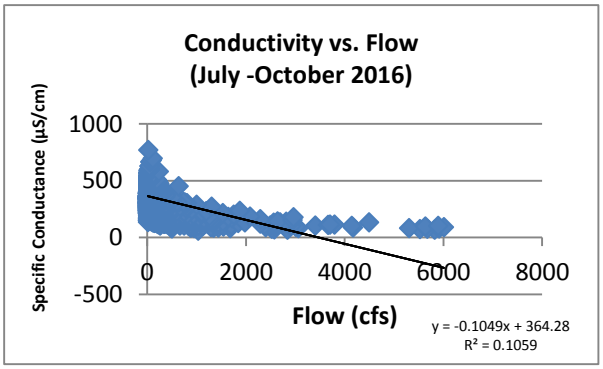
On slopes, these soils wash down into the tributaries, drainage-ways and creeks to deposit silt and chert into the MS4 and on, into the creeks. See the pictures above of Village Creek and at VIC01.6s at Roebuck Golf Course for examples of the sedimentation occurring as a result of erosive velocities in association with rainfall.

Sullivan, Ketona, and State are some of the soils associated with the Creeks in Jones Valley (See USDA, NRCS. Web Soil Survey). These are related to depositional areas associated with erosion of the surrounding higher elevations and drainage ways. The erosion of creek banks also contributes to the siltation and chert deposition in the Village and Valley Creeks. During periods of heavy rainfall these depositional materials can move into drainage-ways reducing capacity in the creeks adding to the flooding of surrounding areas. For example, an erosion sink, pictured on left associated with a storm pipe that had a grout failure with the surrounding soil being washed into the storm pipe. There is no evidence of surface drainage associated with this erosion sink but rather is the result of erodible unconsolidated carbonate soil becoming suspended during rain events and washed into the pipe under the surface leaving a void and resulting in a collapse.

Even though carbonate soils of this nature can be found throughout the Greater Birmingham area they are more prevalent in the eastern part of Birmingham. Total suspended solids models, as in the figure on the next page depicts, show elevated TSS levels in the eastern part of the City compared to the soils on the western side of Birmingham (ARCADIS-US, Inc.).

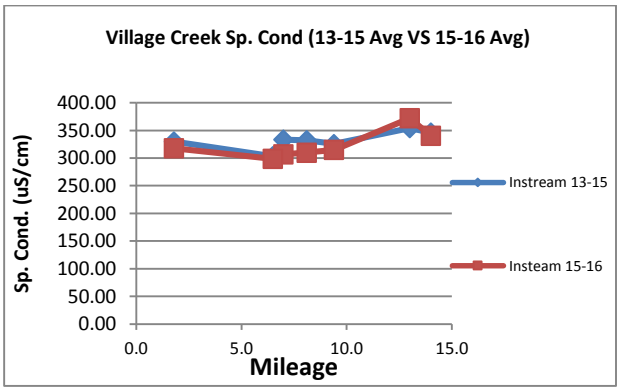


Village Creek*:* This reporting period now provides the opportunity to consider three-full years of water quality monitoring in Birmingham's creeks, starting specifically in Village Creek. The foundation of the City's instream water quality monitoring program has been to identify instream peak concentrations of specific conductivity that would lead one to conclude that at least in that flowing stream segment(s) there is an influence from another dissimilar water source, whether from an incoming tributary, an outfall discharge, or from a groundwater seepage influence. The reason for that continues to be foundational to the program because flow and specific conductance have a high degree of an inverse correlation, as evident by the figure below, left and having an R2 value of 0.1059.



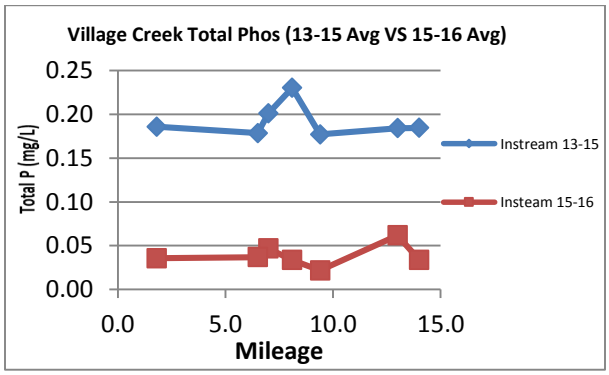
Over the last three years of sampling it was observed that there was not much change in the overall water quality average between the first two years when compared to year three. See the figure below.

During this three-year period, specific conductivity has consistently averaged 318 µS/cm. The highest specific conductance recorded to date was 428.4 µS/cm and was recorded on August 3, 2016 at station VIC13.0 during a relatively low rainfall period. Average annual rainfall between November 2013 and 2015, inclusive was 55.3-in. By comparison between August 2015 and August 2016, average annual rainfall was 54.7-in. Rainfall periods are demonstrably similar and this year was an important factor in the Creek's overall water quality.



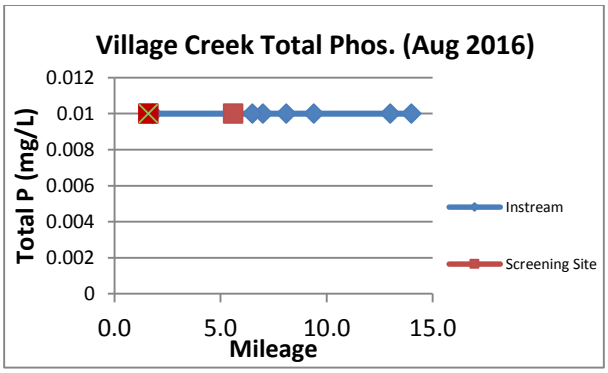
With exception of two sampling dates which exceeded 0.5 in. within 72-hours of sampling, all other sampling dates were <0.05-in. The two sampling events having heavier rainfall that occurred this recording year, however, both high rain events yielded dissimilar results. November sampling event was at the beginning of a heavy rainfall with amounts >5.0-in. of rain, which resulted in a low conductivity reading of 32.8 µS/cm at station VIC07.0. During January however, Specific Conductivity demonstrated a low of 262.9 µS/cm., seven times greater than the low reading in November during a heavy rainfall event. Heavy rainfall amounts were recorded over a 72-hour period in January but no rainfall occurred during the actual sampling event as it did in November. The yearly conductivity average was 319 µS/cm. Therefore, as stated earlier, precipitation during this reporting year appears to have documented lower specific conductivity, a measure of diluted major ion composition as the result of significant rainfall.

During this data assessment staff noticed that the rain fall codes appear skewed towards lower rainfall events and therefore needs to be re-evaluated for better statistical distribution of events representative of Birmingham's historical record in future reports.

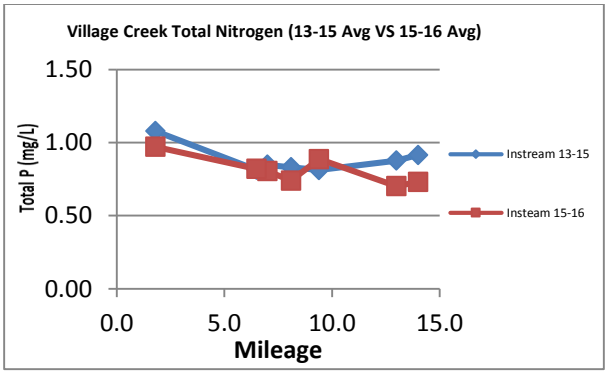


Total average annual Phosphorus was considerably lower this year than the previous two-year average. See figure above.

For the current year with the exception of November 2015 and January 2016 the total phosphorus mass concentrations equaled 0.01 mg/L system wide. See the example below.



As discussed earlier it appears that rainfall has a direct impact on the concentrations of total phosphorus in Village Creek.



Total average annual Nitrogen was slightly lower this year than the previous two-year average. See figure above. Analysis of the three-year sampling program shows the three-year average annual Total Nitrogen was largely inorganic (1.26mg/L). The organic fraction was equal to 0.41 mg/L.

Village Creek Loading Analysis*:* Total suspended solids (TSS) mass concentrations were measured from grab samples within Village Creek, placed on ice, and returned to the Birmingham Water Works Board laboratory for analysis. No flow measurements were made during this reporting period in the field; rather City Stormwater Management staff relied on continuous flow measurements afforded by two U.S. Geological Survey gages. One gage is located at 86th Street (USGS #02458148) near Roebuck Springs, the headwaters of Village Creek in Birmingham. The other is located at a railroad trestle near Pratt City (USGS #02458502). The real-time USGS data can be found on the USGS website; USGS Water Watch using the station ID's provided above. The difference between the load analyses from the two sites represents the net TSS load generated by the City's MS4 and contribution from private point source contributions.

Industrial point source information is included in this report only to illustrate better the contribution of the City's MS4 on the water quality in Village Creek. Therefore, industry loadings are combined into one measure. Industrial nonpoint stormwater sources have not been included this year as they were last year to better delineate point and nonpoint sources of water since not all industries document their nonpoint stormwater sources in their DMRs. Therefore, those industries nonpoint stormwater sources that may exist are also represented in the public MS4 system data. This then may represent some measure of difference between this year's data and last year's data; however, that difference is probably very small by comparison.

Among the numerous NPDES permitted facilities in the Village Creek watershed only those listed earlier in this report were considered for further loading consideration. Industry loading analysis was obtained from the monthly discharge monitoring reports provided to ADEM and assembled from the ADEM e-file website. Those industries included:

- Nucor (Permit #AL0003735)
- ACIPCO (Permit #AL0029378)

- SMI (Permit #AL0001554)
- Wade Sand & Gravel (Permit #AL0025194)
- Birmingham Airport (Permit #ALG140453)

Industries such as McWane, Industrial Chemicals, and Sloss Industries are not included because their discharge either no longer exists or they discharge to a different watershed.

In the City of Birmingham's Water Quality Monitoring Strategy for ADEM, October 2013, the City established a strategy to measure performance. That strategy had its basis in the ability of the City to demonstrate the reduction of annual total suspended solids loadings.[x] The total suspended solids constituent was selected as the measure of performance due to the fact that sediment loading in Birmingham is a particular stream impairment problem. To focus on reducing instream peak concentrations of total suspended solids was anticipated to result in a load reduction of solids leaving the City of Birmingham and an overall improvement of stream water quality.

Similarly to last year, the following equation represents the formula used to compute the annual load this year:

$$Li = Qi \times Ci \times K$$

Where:

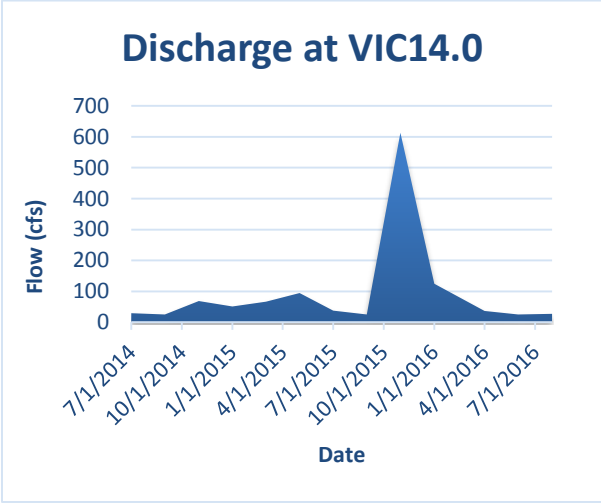
Li = Instantaneous load in metric Tonnes per year based on USGS reported daily discharge (cfs) and average mass concentration (mg/L) of measured total suspended solids.

Qi = Total period discharge in cubic feet per second

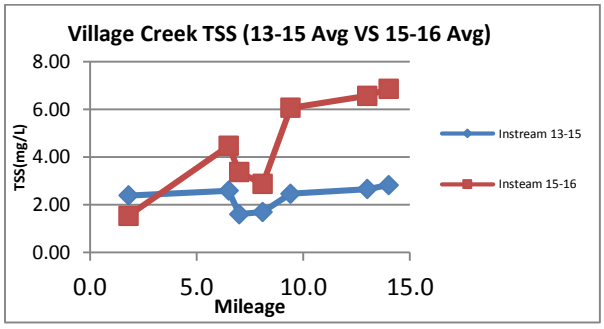
Ci = Average TSS mass concentration in mg/L for the period of record

K = 0.00278 Correction factor for unit conversion from (ft^3 – mg)/ (sec – L) to metric tonnes per year

During this monitoring period flow increased substantially in late 2015 and early 2016 as a result of two large rainfall events, which has been discussed previously and is evident by the following chart below. One occurred in late 2015 and the other in early 2016.



With this data Stormwater Management has determined that there is a strong Pearson product moment coefficient of correlation (r = 0.95) between stream flow and Total Suspended Solids at Station VIC14.0 where stormwater exits the City of Birmingham. This was also discussed earlier in this section.



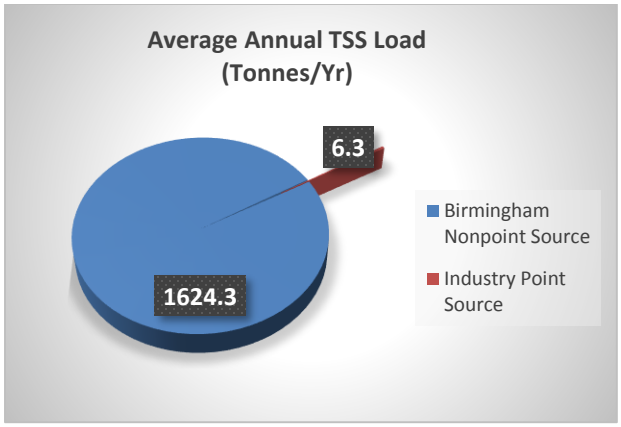
The previous year's TSS concentrations, demonstrated in the figure above, were reflective of the relatively low flows in Village Creek at

station VIC14.0. The higher average annual concentrations of TSS in Village Creek during this reporting year are evident with the increased flows in November 2015 and January 2016.

Recalling from earlier in this section, the average annual rainfall between November 2013 and 2015, inclusive was 55.3-in. By comparison between August 2015 and August 2016, average annual rainfall was 54.7-in. Therefore, this reporting year can be considered slightly dryer than previous years, although that difference is negligible.

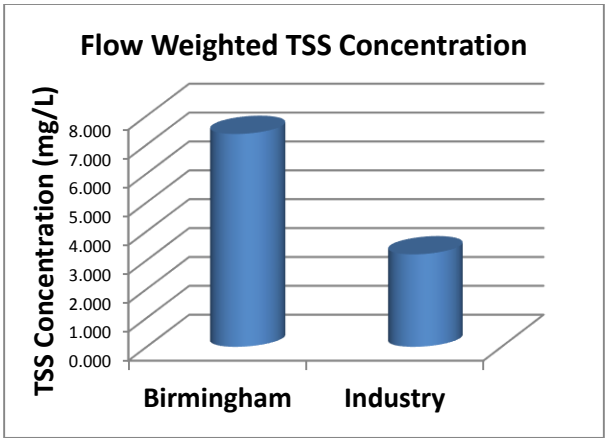
The total volume of water leaving the City at Station VIC 14.0 during the year, between September 23, 2015 and September 2, 2016, inclusive, was 0.55 billion gallons. This is the combination of water entering the City from the headwaters (0.046 billion gallons) of Village Creek at station VIC01.8 and the remainder of the nonpoint sources generated by the very large area of the watershed from Birmingham (30,292 acres). Overall, the TSS data ranged from a low of 1.0 mg/L (VIC14.0/April 27, 2016) to a high of 30 mg/L (VIC14.0/November 18, 2015) during this reporting year.

Instream pollutant loadings were computed based on daily flow data collected at Stations VIC01.8 and VIC14.0 by the USGS during the same time period. Water quality mass concentration data was also collected at the same sites bi-monthly (i.e. every two months). As can be seen in the figure below, industries point source contribution to the average annual TSS load into Village Creek is negligible by comparison to the City's nonpoint source contribution.



The net load of TSS leaving Birmingham at Station VIC 14.0, after being reduced by the TSS load entering the City at Station VIC01.8 since July 22, 2014, was 1,624.3 tonnes. The net TSS load is the contribution from the 30,292 acre drainage basin representing the City of Birmingham's nonpoint source contribution area within Village Creek. The contribution from those industries considered in this report, which also provided discharge monitoring reports to ADEM, were combined together to represent the industry load. Individual contributions were calculated based on total flow and average TSS concentrations when reported. The represented industry contribution contained in this report does not presume these to be the only industries discharging into Village Creek.

Another way to consider comparative impacts on TSS load is to consider the weighted load based on flow. It was demonstrated earlier that there is a strong relationship, now with three years of data, between TSS and flow. The figure on next page represents a comparison of flow-weighted TSS concentrations between Birmingham and industry.



Evident by this figure depicts the flow-weighted TSS concentration for Birmingham, being greater than the flow-weighted concentration for industry during the same period (3-year). The Birmingham flow-weighted concentration for TSS remains approximately 7.3 mg/L, as it did last year, even with the most current year being added; the TSS flow-weighted concentration represented for industry is 3.2 mg/L. Recall from last year the TSS flow weighted concentration for industry was 0.9 mg/L. The reason for this difference was an inaccurate calculation last year, which was caught this year and included multiple data points having misplaced decimals. That resulted in lower flow weighted concentrations for industry last year. This has been rectified this year.

ADEM has established a TMDL for siltation in Village Creek. Decidedly though, ADEM recognizes the difficulty in coming up with one relationship of flow and TSS for Village Creek. The TMDL report contends that the events are so dynamic that it would entail wet weather sampling through an entire hydrograph period to make any defensible correlation. ADEM recognized that there was evidence by a few samples, which exhibited high TSS concentrations during high peak flow. For the TMDL analysis and in the absence of TSS at peak flows, there was an attempt made to use the available data and derive a relationship between daily average and peak flow.[xi]

Similarly, the City of Birmingham has also found a relationship between flow and TSS and agrees with ADEM that monitoring over the course of a significant rainfall event would produce useful results, if not also a demonstrable improvement in a better understanding of TSS loadings for Village Creek. In the three years that the City has been sampling for TSS, Stormwater Management staff has not seen the high levels of TSS similar to those levels reported earlier by ADEM. The highest level of TSS recorded by the City had been 30 mg/L. Note that high and low levels of TSS were reported by ADEM when flows were mostly less than 100 cfs.

In ADEM's "*Final Total Maximum Daily Loads (TMDL) For Metals (Zinc), pH, and Siltation in the Village Creek Watershed*" report, ADEM reported a waste load allocation (WLA) requirement for Village Creek to not exceed 8.3 lbs/acre/hr.xii During this annual report period, the WLA demonstrated by Birmingham was approximately 0.146 lbs/acre/hr, which is considerably lower than the WLA requirement established by ADEM. This is probably more of an artifact of low flow conditions during this reporting period as compared to the extreme flow conditions represented by the State's TMDL condition for Village Creek and the lower acreage estimation used to generate the areal load estimate for the TMDL. The TMDL was intended to address stormwater discharges from all MS4's, among other activities. As more wet weather data is collected by Birmingham over time, this relationship between flow and rainfall is expected to become more readily apparent. Until then though, the City is considering modifying its pollutant load objective in favor of flow-weighted concentration derivation of TSS pollutant loading.

Over time, that measure may be more important in demonstrating improved water quality in Village Creek from its overall MS4-BMP program than pollutant loadings alone.

Overall, the intent of changes to the City's water quality monitoring program was to broadly determine if a given stream was improving, remaining constant or becoming more polluted with respect to TSS with time based on the city's established BMP controls. Comparison with last year's data, the flow-weighted data with TSS remained constant this year. No change.

Valley Creek: Valley Creek extends a distance of approximately 8.8 miles from the City of Birmingham through another jurisdiction until the Bessemer Super Highway, just outside of the City of Bessemer. The City now monitors between stream segments 0.07 and 2.9. With the exception of the screening site at station 4.9 the remainder of the creek is monitored by the Stormwater Management Authority, Inc. in the downstream portions of Valley Creek.

May 23, 2016 City of Birmingham Stormwater Management submitted a location change request memorandum to ADEM for approval. Please see Appendix C for more details. The change requested a location monitoring modification to discontinue monitoring at site VC0.0 to VC0.07. This change became effective on June 21, 2016, concurrent with the existing sampling program. In general, the reason for the change was due to the way the current structure at VC0.0 was constructed.

The existing double barrel box culvert drains approximately 3,600 acres of downtown Birmingham. The west side the box culvert drains the City west of the 5th Avenue North. The other side of the box culvert drains the area between 5th Avenue North and the northeast/southwest traversing railroad lines coursing through the downtown area. The remaining area of Downtown Birmingham, between Red Mountain westerly to the railroad lines, drains to the City's screening site at Station VC 0.1s, downstream of the aforementioned culvert system. Under low flow conditions, Valley Creek station VC0.0 has two separate flows, which are not sampled. Under high flow conditions flow from the culvert system is premixed before it day lights by pressure equalizer within the culvert box designed to prevent culvert failure. Sampling this system with either two samples during low flow or one sample during high flow cannot provide constant results. As a result, Stormwater Staff made the decision made the decision to sample downstream. However, that location did not appear to allow for complete mixing under low flow and was unsafe to monitor under high flow conditions; hence the relocation to Center Street (VC0.07).

Monitoring results for Valley Creeks select key parameters, both instream and screening sites, are depicted in the table below for each of the last three years.

YEAR	Mileage	Sp. Cond.	TSS	E. coli
13-14	4.9s	400.4	1.4	361
	0.1s	521.0	3.3	1076
	2.9	479.8	1.5	159
	0	445.1	1.3	2098
14-15	4.9s	395.0	2.4	280
	0.1s	502.2	15.3	1433
	2.9	450.0	1.9	666
	0	434.0	4.2	2333
15-16	4.9s	389.6	1.2	289
	0.1s	502.1	5.2	1535
	2.9	469.6	1.4	556
	0	405.1	0.8	1937
	0.07	529.5	2.6	778

The parameter of much concern for Stormwater Management in Valley Creek continues to be *Escherichia coli* (*E.coli*) levels. The highest levels of *E.coli* were frequently measured at Station VC 0.0, the headwaters monitoring station in Valley Creek at the point where the Creek daylights out

from under the downtown City of Birmingham. During the past three years the average *E.coli* has been >1,000 cfu/100mL with approximately 42% of the total *E.coli* entering the Valley Creek system from Birmingham. The three-year *E. coli* averaged 2,123 cfu/100mL at VC0.0. This instream monitoring station day lights from under the City of Birmingham at the intersection of 5th Avenue and 7th Street North.

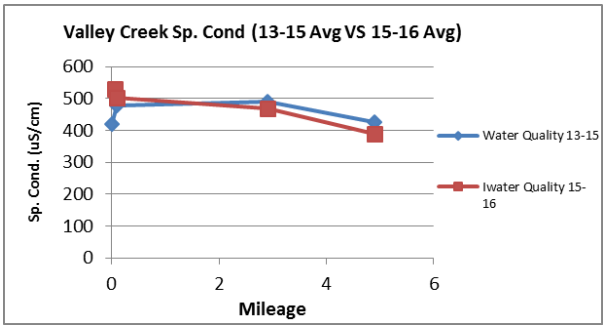
In consideration of the decision to relocate the monitoring station to improve data consistency, Stormwater Management reviewed the data mixing for the last three years, understanding that only two data points were reflective of conditions at VC0.7. E. coli for this location in the current sample period averaged 778 cfs/100mL for a limited data set with only two data points.

VC0.0 and VC0.1s averaged for the two previous data periods was 1,735 cfs/100mL. This reporting period the average at the same locations equals 1,736 cfs/100mL. This observation demonstrated practically no change in *E. coli* measurements over the past three years.

In last years' annual report, the city noted working with Jefferson County Environmental Services to address the apparent presence of "sewage" in Valley Creek. This project remains to be implemented pending completion of system mapping and determination of monitoring locations. This project anticipates future implementation in the upcoming year and will be included in the ***Future Program Direction*** section.

The City of Birmingham has made a decision to address the apparent persistent *E.coli.* problem more directly and to do so city-wide. Based on the 2015-2016 *Summary of Unpermitted Discharges* report prepared by Jefferson County Environmental Services for Birmingham (See Appendix C), more than 17.2 million gallons of sanitary waste was discharged into Valley Creek. Given the significant unpermitted sanitary flows into Valley Creek and its effects on the Creek water quality, the City is in the process of developing a water quality monitoring strategy of the MS4 portions of Valley Creek, under the City of Birmingham. Working with Jefferson County Environmental Services, a complete map of the sanitary sewer collection system is being completed.

The figure below demonstrates that during the two prior sampling years average Specific Conductivity demonstrated little or no change. The trend does not illustrate a major difference from the previous two years. Graph does show an apparent decreasing trend through the system.



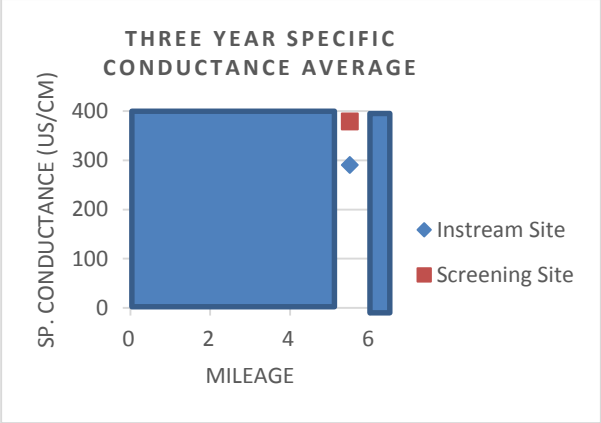
E.Coli in Valley Creek continues this year to be elevated instream (two-year average 1,298.4 cfu/100mL) when computed with associated screening site data (two-year average 781.1 cfu/100mL). The highest level of *E.Coli* was evident in both in-stream and screening site locations although the higher *E.Coli* concentrations (>2,419.6 cfu/100mL) at a screening station was recorded at station VCS0.1s. *E.coli* collected this year was lower in-stream (1,052.9 cfu/100mL) while *E.coli* levels from the screening sites averaged higher this year (911.9 cfu/100mL) then it did last year. On average, last year *E.Coli* exceeded the state anti-degradation threshold with a geometric mean of 548.0

cfu/100mL on 7/12 occasions in streams and 6/12 occasions of the screening sites. The highest concentration of *E.Coli* was consistently measured at station VC0.0 and VC0.1s.

Shades Creek: Shades Creek within the City of Birmingham extends approximately 4.5 miles. Shades Creek enters the City of Birmingham at mile 5.0 from Irondale, becoming a shared stream with the Stormwater Management Authority by mile 5.8. Ultimately, Shades Creek leaves the City of Birmingham at mile 7.2.

The City of Birmingham only samples Shades Creek at instream mile 5.5 and at a screening site at the same location (5.5s).

Average specific conductance at this monitoring site during the past three years is shown above. The two-year average of Specific Conductance is 367.6 µS/cm at screening site SC05.5s and 288.7 µS/cm at instream site SC05.5. This year the average specific conductance was 379.2 µS/cm at screening site SC05.5s and 291.1 µS/cm at instream site SC05.5.

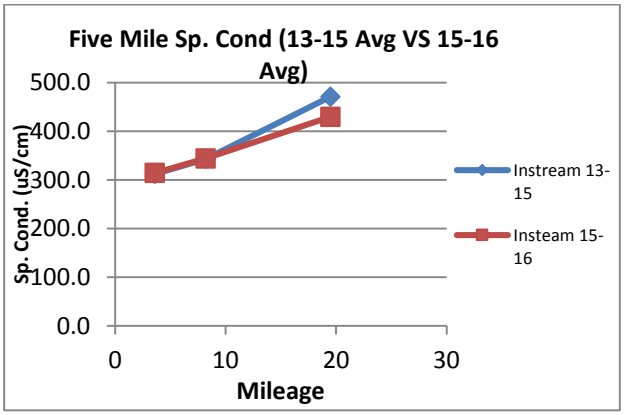


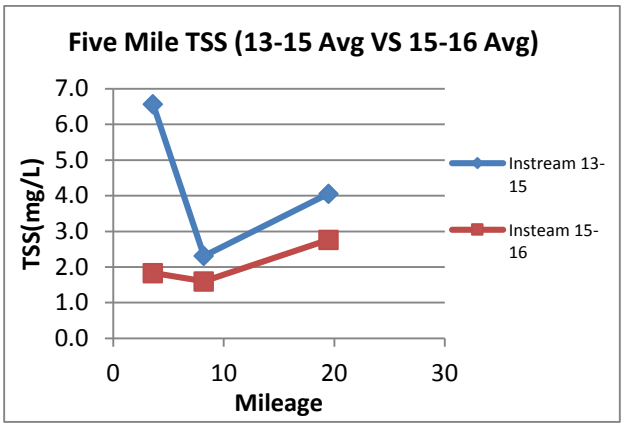
Total suspended solids at both instream and screening site did not exceed 5.6 mg/L. *E.coli* was also high on several occasions during this reporting year. The anti-degradation administrative code threshold for Shades Creek is 548 cfs/100mL. *E.coli* for Shades Creek at SC05.5 geometric mean for the past three years records 329.3 cfs/100mL. *E.coli* for Shades Creek SC105.5s geometric mean for the past three years records 399.8 cfs/100mL. *E.coli* values never reach the maximum reporting threshold of 2507 colonies/100mL in any sample.

Enters City (Mile Mark)	Exits City (Mile Mark)	Sample Station
3.02	3.32	-
3.59	3.85	3.60
3.91	4.83	-
5.12	5.18	-
5.26	5.29	-
5.73	5.77	-
6.03	8.44	8.20
13.46	14.01	-
14.25	15.13	-
17.21	17.43	-
17.50	19.28	-
19.30	20.64	19.50
21.14	21.19	-

Five Mile Creek: Five Mile Creek runs discontinuously through Birmingham's city limits over the course of 8.4 miles. Monitoring Five Mile Creek is difficult due to the creek locations within the City of Birmingham relative to the points of safe access. The table above relates those entrance and exit points. This table shows that most of the stream segments within the City of Birmingham are less than one mile in length and of the two that are greater than one mile in length, Birmingham Stormwater Management samples one of them at station 8.2 miles. As a result, there are perhaps multiple opportunities for the water quality in Five Mile Creek to be influenced by other jurisdictional inflows into the creek but cannot be safely accessed for monitoring purposes.

Figure below demonstrates the three year reporting period. The average conductivity in Five Mile Creek is consistent with the two years prior, in the current reporting period. The trend displayed a slightly less specific conductivity as it exits City of Birmingham during this reporting period.





Overall during this reporting period, TSS levels were low on average and similar to the previous two-year study. The only apparent deviation from previous years was at station FM03.6. The historic TSS level at station FM03.6 appears elevated but is largely an artifact of a comparatively high TSS concentration of 46.4 mg/L, which was recorded on 7/23/14. This he highest the City has recorded in Five Mile Creek.

Cahaba River: The City of Birmingham only samples the Cahaba River just downstream of the confluence of the Cahaba and Little Cahaba Rivers at County Road 280. The rationale for this was reported in the Water Quality Monitoring Strategy report submitted in October 2013. In that report was mentioned that former City monitoring stations in the Little Cahaba River and Lake Purdy were being monitored by the Birmingham Water Works Board (BWWB). The table below provides a summary of that data, provided to the City by the BWWB, comparing the average concentrations of select parameters shared in common during the 2015 reporting period.

Parameter	Geometric Mean Concentration	
	City of Birmingham	Birmingham Water Works Board
Nitrate (mg/L – N)	0.30	0.40
Nitrite (mg/L – N)	0.28	<0.30
Orthophosphate (mg.L – P)	<0.01	<0.66
TSS (mg/L)	2.6	2.3
E.coli (CFU/100mls)	389.6	197.9

For the most part, concentrations of representative data being collected by the City at CR.280 is similar to that being collected by the BWWB at 6-sites located throughout the Cahaba and Little Cahaba River systems. The BWWB monitoring locations contained herein include:

- CR 280

- Cahaba Beach Road
- I-20 East
- Shepherds Branch
- Sunshine Creek
- Watson's Branch

The average concentration of orthophosphate reported by BWWB was <0.66 while the City measured during this same period <0.01 mg/L. Otherwise, the other parameters measured were similar with the exception of *E. coli* concentrations, which was less on average as collected by the BWWB by nearly half. However *E.coli.* was collected by the BWWB on June 21, 2016 and was >2,419.6 cfu/100mL at monitoring stations I-20 East and Cahaba Beach Road. According to the State of Alabama's Antidegradation Policy for outstanding Alabama waters, *E. coli.* levels should not exceed a geometric mean of 126 colonies/100 mLs nor exceed a maximum of 235 colonies/100 mLs. Coliform levels did exceed the geometric mean, both in the City data and BWWB data. It is not readily apparent the cause for the higher coliform levels aside from the fact that the City's site represents a location having considerable public access and sampling is not being conducted in mid-stream but from a distinct public access structure on the north embankment of the Cahaba River.

Antidegradation Analysis: The State of Alabama has established use classifications throughout many of the City of Birmingham's stream segments. According to the EPA, a key concept in assigning designated uses is "attainability," or the ability to achieve water quality goals under a given set of natural, anthropogenic, and economic conditions with the overall success of pollution control efforts being dependent on the reliability of the underlying designated uses in water quality standards.[xiii] The table on the following page provides the results of Birmingham's sampling efforts this year for five key state Antidegradation parameters and for zinc in Village Creek alone, including:

- Dissolved Oxygen (D.O.; mg/L)
- pH (Units)
- Temperature (F^0)
- *Escherichia coli (E. coli; CFU/100mL)*
- Turbidity (NTU)
- Zinc (mg/L) – Village Creek Only

The table on the next page represents compliance with the State's Antidegradation Policy for all streams within the City of Birmingham. The chart has been color coded to represent stream designated use. In blue represents a designated use as an Outstanding Alabama Water; the tan shaded stream represents a swimming/bodily contact use; in green, those streams represent limited warm water fishery use; Valley Creek is not shaded, which is indicative of a stream with no defined designated use (e.g. §303(d) list or in Chapter 335-6-11). However, for reporting purposes the agriculture and industrial water supply designation is used to document compliance with state law. Where two numbers are shown, the first number is the geometric mean concentration of all instream and screening site values while the second number the highest concentration reported during the bimonthly (every two months) this year.

Stream	D.O. (mg/L) Min/Max	pH Units Min/Max	Temp. F^0 Geomean/Max	*E. coli* *CFU/100 mls Geomean*/Max	Turbidity NTU Geomean/Max	Zinc µg/L Geomean/Max
Cahaba	5.86/16.65	6.44/8.38	66.0/80.9	390/1553	5.75/10.15	
Five Mile	6.94/25.03	7.44/8.68	64.8/79.9	174.5/1986	2.7/19.65	
Village	6.58/18.88	6.2/9.36	68.0/78.2	283/>2419	2.82/20.6	8.25/<19.2
Valley	6.46/19.9	7.55/8.83	64.1/79.2	610.5/>2419	2.3/43.6	
Shades	5.11/19.66	6.75/8.48	61.8/75.6	557.9/>2419	5.04/15.05	

For each stream red, green, and yellow color coded boxes have been added. The color coded boxes represent the status of adherence to select parameters defined in Chapter 335-6-10, which represents the regulatory standard condition for each stream use. For example, if a green box has been added the regulatory standard condition for that parameter was completely met for that stream designated use. A yellow box means that at least a portion of the standard condition was not met for that stream designation. A red box added means the standard condition for that parameter was not met at all during the course of this reporting period for which monitoring was done. The mean for each parameter represents the geometric mean as required by the Antidegradation Policy. Zinc levels in Village Creek are represented as the geometric mean and maximum concentration during 2015-2016. For comparative purposes, antidegradation policy equation #14 is used to define the freshwater acute aquatic life criteria in Village Creek with hardness represented by that equation. For Village Creek the geometric mean for hardness this year was 233.4 mg/L, as $CaCo_3$ measured by HACH® Aquacheck test strips.

The maximum hardness concentration in 2015-2016 was 425.0 mg/L, as $CaCO_3$. The State antidegradation criterion is represented by a calculation, which in this report is represented as the calculation for freshwater acute aquatic life. That calculated criterion, when factored for hardness (i.e. geometric mean) shall not exceed 100.13µgms/L, which represents the freshwater acute aquatic life criteria for Village Creek. Last year the total zinc geometric mean concentration

was 16.4 µg/L and had a maximum concentration of <313.0 µg/L. This year the geometric mean concentration of total zinc (8.25 µg/L) and the maximum (<19.2 µg/L) were both less than the maximum acute aquatic life criteria of 165.8 µg/L, which is represented by State Administrative Code as recoverable zinc, a measurable subcomponent of total zinc, not as total zinc.

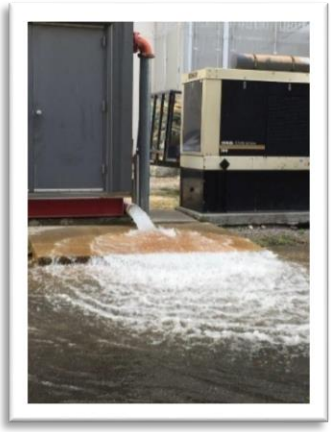
This year that the City has attempted to compare and contrast zinc with the pre-established Administrative Code in Village Creek; other obvious concerns appear needing further discussion. For example:

- City zinc data is collected and reported as total zinc, not recoverable as further defined in Section 335-6-x.xx
- Hardness is routinely analyzed by the City using test strips, which have obvious sensitivity limitations
- Hardness data reported by the City using test strips appears considerably higher on average then that reported in literature for Village Creek. On average City hardness is about ≥ 240 mg/L. According to USGS report for Village Creek (WRI02-4182) their reported hardness levels were ≤290.0 mg/L.
- City is unaware whether or not Equation #14 of the State Antidegradation Code, which is reported as recoverable, can even be used for total zinc.
- There appears to be a need for further refinement of City zinc and hardness monitoring to better estimate mass concentration when comparing with the State's Anti-Degradation Administrative Code.

Overall the pH of surface water generally ranges from 6 to 9. ADEM established a pH range of 6 to 8.5 to reduce the effects of highly acidic or highly basic water on fish and wildlife. Shades Creek's pH improved during this reporting period. Shades, Valley, Five Mile Creek and Cahaba River took an apparent down turn relative to State Antidegradation level requirements when compared to last year's report for *E. coli*. Village Creek remained the same for *E. coli*. Dissolved oxygen and temperature levels did not exceed state antidegradation policy at any time during the past two reporting cycles for any stream within Birmingham. Turbidity levels also demonstrated improvement since last reporting cycle.

It is worthy of note that hardness, pH, and recoverable zinc were not dissimilar to the findings reported by the USGS in 2000-2001 study.[i] Higher pH levels studied during 2000 - 2001 along Village Creek by the USGS (USGS 2002) noted that higher pH was indicative of carbonate-based geology in the area. Valley, Village, and Five Mile Creeks originate from limestone and dolomite karst springs, which could explain some higher pH readings when the City of Birmingham conducts its water quality analysis. Sampling at the creek sources should be conducted to determine pH of the karst springs to set a bench mark to determine the amount of pH change as the creeks mix with rain, industrial sources, various soils and other conditions that effect pH.

Many natural conditions including the karst geology and carboniferous soils can affect the surface water parameters such as TSS, pH, and zinc and have a major influence on such parameters in the Valley, Village and Five Mile Creeks drainage basins. Studies on how much influence erosion and karst ground water have on TSS, pH, and zinc and the effect on the drainage basins in the Birmingham area is needed.



IDD&E Stormwater Protection Ordinance:

The process of the City's Stormwater Protection Ordinance (Ordinance No. 14-198) is to focus on preventing, locating, and correcting illicit discharges on Non-NPDES facilities while working alongside ADEM and the USEPA for NPDES permitted facilities, which can be detected in several ways: citizens' complaints, routine stream sampling with observed dry weather discharges, and observing various discharge locations throughout the day. During this reporting period, Stormwater staff continued implementation of its Illicit Discharge Detection & Elimination (IDDE) program.

City field investigation teams consist of: 2 members for instream water quality and 2 members for out of creek/ IDDE. In November 2013, the City implemented its Water Quality Monitoring Strategy to bimonthly (every 2 months) and sampling significant outfalls (36" or greater and box culverts) that might contribute to peak concentrations within monitored watersheds. Whenever an illicit discharge is suspected, regardless of how identified, an IDDE Incident Tracking Sheet (See Appendix B) is completed and a preliminary desktop assessment is prepared to identify a possible source of discharge. A preliminary desktop assessment can consist of but is not necessarily limited to obtaining/reviewing drainage maps of the area, parcel ID verification, Business License verification, SIC/NAICS Code verification, and NPDES Permit verification. Upon receiving a complaint, a preliminary desktop assessment is performed. In the event that the illicit discharge is from a facility without an NPDES permit discharging into the City's MS4, the facility Owner/Operator will receive a verbal and written warning followed by a notice of Violation (NOV) if levels of compliance are not achieved. Any person receiving a NOV may appeal to the Appeal's Board within ten (10) days of receiving the violation to the City clerk's office. The Appeals Board will hold a hearing and issue a decision in writing no later than thirty (30) days following the close of the hearing. If the Owner/Operator continues to remain non-compliant, the City may seek to recover in a civil suit authorized by State law. In the event that the illicit discharge is from a facility with an NPDES permit discharging into a Water of the State, the City will notify and work with ADEM to achieve compliance. (See Appendix B) It is the City's goal to work more collaboratively with ADEM. However, on occasions the City has observed that ADEM is not forthcoming with NPDES actions being taken within Birmingham city limits as it relates to IDDE. Examples include:

- NOI's – ADEM should seek verification from the Municipality upon receipt of an NOI from all applicants
- Enforcement Actions – ADEM should contact/inform the Municipality if there is a known non-compliance issue/illicit discharge within its jurisdiction so that both parties can collaborate using all available resources

Please recall that last year, staff began presenting violators with a copy of the Ordinance. In addition to receiving the Ordinance, staff notified the owner/operator of the deficiencies verbally and in writing which allows the owner/operator to submit a written corrective action plan. While some

deficiencies required an extended amount of time, others were corrected within 30-60 days.

The City has observed 2-types of IDDE issues:

- Dry weather/intermediate discharges into state waters of unknown origins
- Direct discharges into a City MS4

With respect to dry weather/intermediate discharges into State waters, the City is currently addressing a total of four (4): Shades Creek/ Elder Street, Valley Creek/ Avenue "W", Shades Creek/ Goo-Goo Carwash, and Valley Creek Headwaters. The City is working alongside Jefferson County Environmental Services to resolve e-coli issues, the primary problem at two of the three locations.

Direct discharges entering into the City's MS4 are considerably easier to address because the direct source is known. Currently, there are a total of 13 direct discharges with one being a sanitary/storm cross connect. The City performs visual inspections of the drainage area to identify possible locations for follow-up inspections. Once a basin has been pinpointed to a particular property that may be contributing to the discharge, staff notifies the Owner/Operator that an illicit discharge has been identified. However, if staff is unable to identify a possible source, visual inspection of the storm drainage area begins, working from the outfall source to upstream areas, lifting manhole covers until source water no longer exists. If not successful during manhole inspections a dye test may be performed to trace flow back to the original source location. Potential sources are identified and the inspector determines whether the facility has floor drains or other possible locations (plumbing) that may connect to the storm drainage system. If the dye test proves not to be successful a smoke test may also be performed and the local Fire Department notified of its location, date and time. Also if the known source is from a facility with a NPDES permit, ADEM is also notified in advance of any actions being taken. The most common issues addressed have been: hand car wash discharges, pet grooming facilities, and businesses with poor housekeeping/best management practices (BMPs).

In summary, the City addressed a total of 19 illicit discharges during this reporting period: 8-have been detected and eliminated; 11-are on-going and 2-were turned over to the Alabama Department of Environmental Management (ADEM).

Because efforts made to establish an Appeals Board were unsuccessful this report year due to insufficient number of volunteers to serve on the appeals board, the City does not yet have a required appeals board in place by ordinance. The Law Department has begun to modify/amend Ordinance No. 14-198 and until the Stormwater Appeals Board has been created, they have advised staff to not process any further actions beyond a warning letter. That is anticipated to happen in 2017.

CREEK AND NEIGHBORHOOD CLEANUPS:

During this annual reporting period the City received many public comments from numerous "Town-Hall" meetings held around the City by Mayor Bell, which as a result the Mayor created the City's "**Operation Green Wave**" Program and assigned it to the Department of Public Works.

The objective of the Program is to remove blight from every area of the City where it can be found starting in the western areas of the City and migrating throughout to the eastern areas. (See Public Newsletter in Appendix B) Program implementation begun on September 12, 2016 with the Department of Public Works cutting and removing deposited trash and abandoned materials from rights-of-ways, paved alleyways, vacant lots, abandoned properties, and even from roadside ditches. All large ditches and creeks are assigned to the Creek maintenance crew for cleanup and is further discussed in the ***Major Findings*** section related to stream maintenance.

There are twenty-three communities throughout Birmingham, which represent ninety-nine neighborhoods. A list of the communities and neighborhoods, and the most current report of daily and total activity can be found in Appendix B. As of October 5, 2016 the City has removed a total of **8,969 tons of trash and debris**, issued **301 citations**, removed **19 abandoned and nonfunctioning automobiles**, captured **247 stray animals**, **cleaned 237 blocks of ditches**, **removed litter from 3,847 blocks of neighborhoods**, **cut 1,878 overgrown lots**, **cleaned 497 blocks of alleyways**, and **cut 2,303 blocks of street rights-of-way**. See example before/after pictures below and top right.

This program will continue until all community areas of the City have been cleaned up, after which this program's cost effectiveness will be reassessed to determine whether or not the program will continue. Concurrent with this effort, the City of Birmingham Stormwater Management continues to reach out to elementary, middle school, and high school students with a message that focuses on trash and why it is important to dispose of trash in more appropriate ways than into the environment. More about this program can be found in ***Public Education*** section.

In addition to this Program the Mayor of Birmingham has invited all City Departments to "Adopt-a-Neighborhood" to implement services specific to those adopted areas. The Mayor's staffs have adopted the North Birmingham area of the City and are monthly volunteering their time for a day to pick up trash in the North Birmingham

Community. Together these programs are anticipated to overcome much of the trash and floatable materials that make way to the streams and rivers throughout the City.

The **2nd annual Dr. Martin Luther King Jr. Day of Service** was a huge success for 2016. There were over **350** volunteers. This project consisted of **35 hosting / supporting organizations**, **8 volunteer registration locations**, **6 communities**, **4 jurisdictions**, and **1 High School** coming together to pick up **over 7.75 tons** of litter along roadways and ditches in the Village Creek Watershed preventing these items from becoming water pollution.

The City of Birmingham Stormwater Management Program, Public Works, and the Departments of Fire and Police actively planned, trained, facilitated, and participated in three **Village Creek Cleanup** events. Together **5.22** tons of materials were removed from Village Creek, their banks, and surrounding neighborhoods with roughly **320** volunteers.

Spearheaded by a working committee, **4** roadside cleanups were held along **Grants Mill Road** on November 15, 2015; February 23, 2016; and March 18, 2016. Tom Williams Automotive Group paid for the volunteer safety t-shirts and the City of Irondale Public works and the Jefferson County Roads and Transportation Department picked up and properly disposed of items collected.

The **Grants Mill Road Cleanup** Committee was made up of staff from Alabama Clean Water Partnership, Cahaba River Society, City of Birmingham Stormwater Program, City of Irondale, Jefferson County Stormwater Program, Jefferson County Department of Health Watershed Division, Keep Birmingham Beautiful and St. Vincent's Orthopedic Cycling team. The cleanups totaled **75 volunteers** and cleaned up roughly **7 tons** of trash and debris.

The **Valley Creek Cleanup** was held on August 20, 2016 with two prior work days to remove the

heavier items on August 18 and 19, 2016. This cleanup focused on public awareness and trash removal throughout the Valley Creek Watershed. The cleanup was coordinated by the municipalities throughout the watershed, various agencies, and a coalition of local citizens and businesses. There were **6 volunteer site registration** locations for the volunteers this year. More than **172 volunteers** removed **31.9 tons** of debris.

All cleanups within the City of Birmingham for this reporting period is listed on the chart on right with volunteer and tonnage totals.

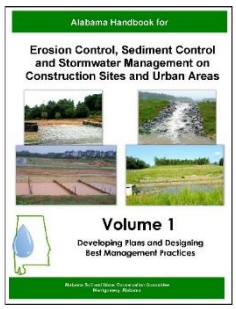
NEIGHBORHOOD	DATE OF CLEANUP	TONS	VOLUNTEERS
MLK DAY – VILLAGE CREEK WATERSHED	1/18/2016	4.46	222
GRANTS MILL ROAD	2/23/2016 - 3/18/2016 - 6/16/2016 - 11/15/2016	7.445	87
AVONDALE	4/9/2016	0.15	6
KILLOUGH SPRINGS	4/16/2016	0.375	15
SHERMAN HEIGHTS NORTH	4/30/2016	Items placed in dumpster	17
ENSLEY	5/7/2016	0.32	52
EAST LAKE	5/14/2016	Items placed in dumpster	14
VALLEY CREEK WATERSHED CLEANUP	8/18/2016 – 8/20/2016	31.54	158
ENSLEY / VILLAGE CREEK	9/15/2016 - 9/17/2016	3.22	100
ROEBUCK SPRINGS	9/17/2016	.58	15
TOTAL		**48.09**	**686**

PUBLIC EDUCATION:

Jefferson County EMA "Be Ready Day": On September 29, 2016 an estimated **1,000 people attended** this event, including approximately **700 students**, from various area schools, attended this event as a field day trip. This annual event allows the City of Birmingham Stormwater Management and Floodplain Management and Disaster Mitigation Services staff along with other municipalities within Jefferson County, emergency workers, volunteers and faith-based organizations to share and distribute information to youths and adults on how to prepare for disasters and other environmentally related issues.

Fishing Rodeo: The **19th Annual Fishing Rodeo** is an Annual Event held on the 1st Saturday in June at Eastlake Park. Due to Dieldrin investigation, which were pending in Village Creek (See ***Major Findings Section***), this event was delayed at the discretion of the City Parks & Recreation Board. Every year the City stocks East Lake with over **5,000 fish** and expects over **4,000 fishers** to indulge in the festivities. This event allows citizens of Birmingham to enjoy a day of fishing and fun. It also provides the City of Birmingham staff along with other companies, municipalities, industries, residents, and others from across the State of Alabama and surrounding States to share and distribute information to thousands of people on how to prepare for disasters, developing in environmentally sensitive areas, and the importance of water resources and its protection.

Homebuilders of Alabama Association bi-Annual Workshop: The County's Storm Water Management Department assumes responsibility for hosting and coordinating an Erosion and Sedimentation Control (ESC) workshop on an alternating basis with the Jefferson County Department of Health, the City of Birmingham, and the City of Bessemer. The County's Storm Water Management Department staff entered into a preliminary partnership with the Homebuilders Association of Alabama (HBAA) to provide its ESC workshops and maintain a database of attendees. A total of **47 people attended** the 2 HBAA ESC Workshops were held on October 7, 2015 and May 5, 2016. The purpose of these workshops was to provide appropriate education and training measures for construction site operators and municipal staff as required in ALS000001 and to reduce the impact of erosion and sedimentation in waterways. Educational materials were distributed at the workshops. The *Field Guide for Erosion and Sediment Control on Construction Sites in Alabama* are distributed to attendees of the Erosion and Sediment Control Workshops for single family homebuilders.



Keep Birmingham Beautiful Commission: The mission of the Keep Birmingham Beautiful Commission is to serve the citizens of Birmingham by developing and implementing effective public education and community involvement programs, which enhance the quality of life in beautification and environmental concerns. The objective of the Commission is to affect positive change in attitude and behavior regarding natural conservation, littering, recycling and beautification. KBBC and the City of Birmingham collaborated in numerous events within this reporting period. On May 5, 2016 KBBC hosted a Clean Campus Awards Day at Patton Park with about **200 people in attendance** including: contest winners, chaperones, and other presenters from the environmental, safety community. City of Birmingham Stormwater Management entertained the students with Stormwater Jeopardy, as well as handed out stormwater information materials.

Household Hazardous Waste Recycle: This event allowed residents of Jefferson County to safely dispose of electronics, appliances, motor oil, small engines, batteries, CFC container devices, paint, ammunition and paper for shredding free of charge. This event was coordinated by the Jefferson County Household Hazardous Waste Day Committee made up of several local agencies to include the Alabama Cooperative Extension System, Alabama Environmental Council, City of Bessemer, City of Birmingham, Jefferson County Commission, Jefferson County Department of Health, Keep Birmingham Beautiful, and the Storm Water Management Authority, Inc. All event volunteers were required to attend one of the two Household Hazardous Waste Day Trainings held on March 2 and March 4, 2016. According to the participant intake survey and vendor summary reports, **58,500 pounds** of paint (latex and oil), **2,700 pounds** of paper to shred, **10-15 gallons** of used household cooking oil, **1,076 pounds** of batteries, **15** gallons of used antifreeze, and **75 gallons** of used motor oil was brought by the **366 respondents** to the survey. White goods and electronics were accepted but no total was reported by the vendor.

Brown Bag Lunch and Learn Seminars: Stormwater Program staff, in partnership with the Friends of the Birmingham Botanical Garden and Jefferson County Storm Water, created a series of **12 free informational seminars** called ***The Brown Bag Series***, **12** of

which were **held during this reporting period**. The seminars were held at the Birmingham Botanical Gardens; were open to all residents of Jefferson County; were promoted in the JeffCo H2O Newsletters, blogs and partner's websites; and flyers were distributed at community events and meetings. Instructors from varying organizations were chosen for each topic. The topics, intended to be of practical application to homeowners, included the stormwater benefits to low impact landscape designs, proper planting and gardening techniques, and prudent use of fertilizers and pesticides. There were **485 participants** in the last 2 seminars of the 2015 series and the first 10 seminars of the 2016 series which consisted of Overgrown and outta control, October 7; Let there be light!, October 21; That WOW factor, May 11; Fronds with benefits, May 25; Native flower arranging, June 8; Aquatic gardens, June 22; Oh deer…, July 13; Better veggies, July 27; How succulent, August 10; Yard art, August 24; All about bulbs, September 14; and Transplanting and care, September 28.

Jefferson County Water Festival: Stormwater Program staff are on the festival committee that planned and implemented the twelfth Annual Jefferson County Water Festival held on March 24, 2016, at University of Alabama Birmingham (UAB). The Water Festival educated **600 fourth grade students**, teachers and parents from various schools from across Jefferson County. The purpose of the Water Festival is to educate students about where drinking water comes from and how to protect and keep it clean for themselves and future generations. Students participate in three hands-on activities and experiments and attended the Fishing Magicians magic show. All the hands-on activities directly correlate with the Alabama Course of Study Science and SAT Objectives for fourth grade. Prior to the festival, students from participating schools submitted artwork depicting the Water Festival theme, *Slow the Flow of H2O*, chosen for this year. The festival committee selected one winner whose artwork was used as the Water Festival logo on t-shirts distributed free to participating students, teachers and volunteers.

Rain Barrel Workshop: The Alabama Cooperative Extension System (ACES), in partnership with the Birmingham Botanical Gardens, City of Birmingham, Keep Birmingham Beautiful Commission, Jefferson County Soil and Water Conservation District, Jefferson County Commission, Jefferson County Department Of Health, Storm Water Management Authority, Inc., City of Bessemer, Alabama Environmental Council, and Alabama Clean Water Partnership hosted a Rain Barrel Workshop for the Jefferson County area that provided instructions, materials,

and assembly assistance. The workshop was held on June 18, 2016 at the Birmingham Botanical Gardens with a total of 28 participants. Participants were able to tour the Botanical Gardens and learn the benefits of capturing and storing rain water from their roof. They also learned how best to reapply the water in their yard.

Urban Forestry Fair: On February 25, 2016, Stormwater Program staff provided an educational game for **460 5th grade students** from various schools within Jefferson County at the annual Urban Forestry Fair. The interactive and engaging game is designed to reinforce the idea of conserving natural recourse and improving water quality.

Do Dah Day: On May 14, 2016, Stormwater Program staff displayed Clean Water Awareness Campaign posters at a booth during the event. In addition, Stormwater Program staff reached out to residents from the surrounding community to assist with placing *In a Perfect World* and *It's Your "Doody"* posters on over **40 port-a-potties** set up for the event. Stormwater staff from the City of Birmingham, with which Jefferson County Commission has a memorandum of understanding (MOU), assisted in distributing materials during the event. The *It's Your "Doody"* flyer along with free pet waste bags were distributed to attendees. The purpose of Stormwater Program staff participation in this event was to bring about awareness of the impacts of pet waste on local water quality and the benefits of pet friendly landscaping to reduce PHF as well as erosion and sedimentation. A fun and interactive poo toss game was offered to teach people the proper behavior for pet waste disposal. In addition, approximately **100 *Fight the Bite* mosquito prevention kits** with information about the proper use, storage and disposal of yard chemicals and other household products as well as information regarding other resources available to residents were distributed. Approximately **350 pet waste bags** and flyers were distributed. The Do Dah Day Board estimated that **10,000 people** attended this event.

Stormwater Calendar: A 12 month printed 2016 calendar was created in partnership with the Jefferson County Storm Water and Friends of Birmingham Botanical Gardens to provide a cost

effective way to support the Clean Water Awareness posters and related components of the Clean Water Awareness Campaign. Complaint reporting of pollution and sanitary sewer overflow reporting information was made available along with other local information. Each month the calendar highlights the winning artwork produced by students participating in the Birmingham Cultural Alliance after-school program during their two weeks of study at the Birmingham Botanical Gardens. The students were instructed to recreate each month's posters using reusable, recyclable or botanical materials. Judges from various organizations were asked to choose the best artwork for that respective month / topic. Artwork winners received a scholarship from Fresh Air Family to attend a free week of Gross Out Camp at the Birmingham Botanical Gardens during the week of July 20-24, 2015. The students that participated in this project learned the importance of being positive environmental stewards at school and in their communities through presentations and projects centered around storm water management as well as learning how a facility such as Birmingham Botanical Gardens manages stormwater onsite. The posters that the students used for their artwork addressed the proper use of yard chemicals, proper disposal of pet waste and used cooking oil, proper care and maintenance of vehicles and other machinery, and the impacts litter and trash have on our waterways. A total of **1500 calendars** were printed and distributed, with **750** of those distributed in unincorporated Jefferson County communities.

Only Rain Down the Drain Presentations: During the reporting period City of Birmingham Stormwater Management Staff Presented "Only Rain Down the Drain" to over 250 Birmingham City Students ranging from k-9th graders over several different events.

"Only Rain Down the Drain" presentation concept was developed by staff to explain Stormwater Management to all ages. Instilling and providing City residents with good environmental qualities and stewardship will help to keep Birmingham beautiful, reaching out to our children will help to guide the next generation of Birmingham residents with the need to continue to improve City water resources into the future.

As part of an public outreach program partnering with Village Creek Society and Keep Birmingham

Beautiful. Staff orchistrated and presented "Only Rain Down the Drain!" presentations for Ensley and Pratt City neighborhoods. Staff also presented "Only Rain Down the Drain" presentation at South Hamptons K-8 "Parents Day."

Plant Dig: This event is hosted by the Keep Birmingham Beautiful Commission, the Birmingham Department of Public Works, and Alabama Forestry Commission, was held on February 27, 2016. This event was free to the public allowing citizens to dig up trees and shrubs at a Birmingham facility and replant them in their own yards. On February 21, 2016, **20 people attended** a free orientation workshop held at the Birmingham Botanical Gardens lead by local Master Gardeners. Information on species identification, the proper harvesting of plants and re-planting procedures were discussed and materials were distributed.

The City of Birmingham Urban Forestry Division in conjunction with the Alabama Forestry Commission and the Jefferson County Conservation District conducted an **Arbor Day program** in Linn Park on February 25, 2016 as a means to distribute free tree seedlings to the public. It was reported that **3,600 tree** seedlings were given away during this event.

Centennial Tree Program: This event was founded at the Birmingham Botanical Gardens has planted more than **2,500** native trees throughout the Birmingham area since 2009. More than **100** of these trees were planted in North Smithfield Greenleaf Heights, a Jefferson County Community that took a direct hit from the April 2011 tornado outbreak.

"Only Rain Down the Drain Street Signs"

During the summer of 2016, The City of Birmingham Stormwater Management, in collaboration with Keep Birmingham Beautiful Commission design twenty-one City of Birmingham Stormwater Management partnered together with Keep Birmingham Beautiful and Birmingham Public Works Department to place 21 **"Do Not Litter" and "Only Rain Down the Drain!"** signs around high traffic areas within the Birmingham city limits. In addition to the **"Only Rain Down the Drain"**

message, the signs included the individual watersheds for sign locations, making the public aware of the impact of littering in the affected watersheds. This program was indorsed and supported by Birmingham City Council and Mayor William A. Bell Sr., who is seen in the photo at the sign unveiling. Plans are in progress to place 21 more signs in the upcoming reporting period.

"Public Outreach Materials": The of Birmingham Stormwater Management program developed and distributed many Educational Items to help get the message out to our citizens. The goal was to make a brand for Stormwater Management. "Only Rain Down the Drain" pencils, cups, frisbees, bumper stickers and wristbands were distributed throughout the City with the message, as well as, Stormwater Calendars. A City of Birmingham Stormwater Banner was also purchased to advertise the message. Plans to increase the stormwater awareness and advocacy through public education are expected to expand throughout upcoming years.

Stormwater Management Website: Presently during the annual report year, Stormwater Management has a fully functional working website for stormwater in place. The website can be found at:

www.birminghamal.gov/stormwatermanagement.

The website contains a Home, Public Education, Annual Report, FAQs, Contact, and Related Link sections. The Home Page gives a brief description about stormwater and how citizens can help reduce pollution in their community. The Public Education section goes into more detail about stormwater and how it operates within the City of Birmingham. It also helps inform the citizens about watersheds in Birmingham, native plants for stormwater management practices, recreational uses, the City of Birmingham Soil Erosion Control Program, & etc.

STRENGTHS, WEAKNESSES, AND FUTURE PROGRAM DIRECTION:

During NPDES Stormwater Permit reporting year 2015-2016 the City of Birmingham's Stormwater Administrator has identified strengths and weaknesses. Some have already contributed to significant program changes. Others will follow in future years, which have been included this year in this section to maintain context as a ***Future Program Direction***.

STRENGTHS

In addition to the strengths reported last year, which included the City's Watershed Management Planning Program and Floodplain Management and Disaster Mitigation Services Program, these continue to be strengths and are updated in this report. The following Stormwater Management Program components are further discussed and include:

WATERSHED MANAGEMENT PLANNING: In the City's Annual Report (2015), it was mentioned that the City had begun to institutionalize goals to preserve natural and environmentally sensitive areas and to consistently meet water quality standards through implementation of its first City Comprehensive Plan. In Chapter 13 of that Plan, the City for the first time recognized that in order for stormwater and floodplain management systems to incorporate best management practices, the City needed to pursue comprehensive watershed management planning. Watershed management planning was encouraged to develop best management practices in stormwater runoff treatment, including the use of non-structural solutions where feasible. As a result, the Village Creek Watershed Management Plan was approved by the City Council in October 2013, a significant strengthening of the City's Stormwater Management Program.

At the time of this writing, the final Village Creek Watershed Management Planning report is only 80% complete and is expected to be completed early in the next reporting year; beyond that though the City has begun planning development of a new Watershed Management Plan for Valley Creek.

Included in Appendix E please find the new scope of work planned for the Valley Creek Watershed. This work scope anticipates development of a watershed management plan similar in design to that developed for Village Creek. The scope includes elements of:

Phase I:

- ***Data Collection***
- ***Survey***
- ***Data Development***
- ***Hydrology Modeling***

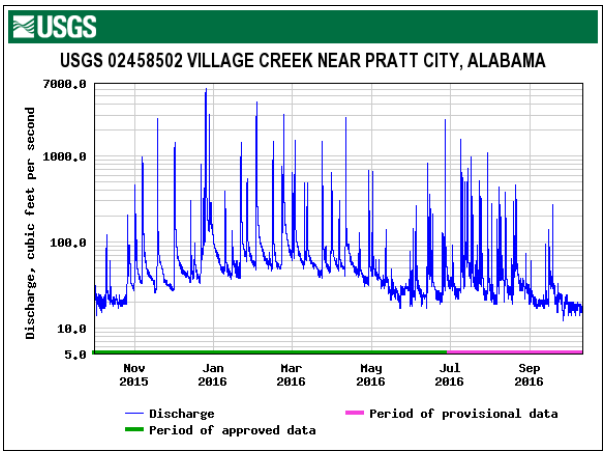
Phase II:

- ***Hydraulic Modeling***
- ***Mapping & Reporting***
- ***Future Conditions Approach Modeling***
- ***Final Watershed Plan Development***
- ***Final Reporting***

The Valley Creek Watershed Plan will assist the City to develop management practices to mitigate flood and water quality issues due to storm water runoff while meeting state and federal requirements for capital improvement funding. The scope is intended to identify problem sources, develop potential solutions, and prepare a final watershed management plan for City implementation based on prioritized solutions. The contract will be signed in October 2016. The cost to implement watershed planning in Valley Creek will be $298,999 in Phase I and $308,552 to complete Phase II.

While at the same time the City Stormwater Management Program is completing the Village Creek Watershed Management Plan, the City has also entered into a contract with the U.S. Army Corps of Engineers (ACOE) on June 9, 2016 to resume the March 29, 1999 Feasibility Phase Study for Village Creek. The amendment incorporates those policy changes necessary for the ACOE to complete the Feasibility Study pursuant to the recently implemented SMART planning process. Because the former feasibility study did not achieve formal adoption of a tentatively selected plan, the resumption study is now being required to meet these new constraints. At a recent meeting the ACOE "Vertical Team" approved continuation of this project to advance and the City and the ACOE are in the process now of considering the final alternatives, which were generated by the earlier ACOE Feasibility Study for Village Creek, along with any new or revisions to those already anticipated alternatives for further study implications. Presently, the Alternatives being considered include:

- **Alternative #2** – Channel enlargement at Ensley from 500 feet downstream of Avenue F to Avenue W with a 180-foot wide channel bottom and 1V:3H side slopes. Being further considered is change from the work anticipated at the Birmingham International Airport to complete relocation of Village Creek to south of the Airport to address Federal Aviation Authority air safety requirements at the airport as currently configured.
- **Alternative #5** – Would include an upstream retention basin within the confines of the Roebuck-Hawkins Golf Course. The City is also suggesting the addition of changes to the West Blvd. Bridge downstream to alleviate that flow pinch-point.
- **Alternative #6** – Modify selected bridges and fill to improve hydraulic efficiency of Village Creek. Selected bridges and culverts would be modified to resolve channel constrictions that are implicated in the long-standing drainage problems within Village Creek.
- **New Alternative -** Finally, the City is proposing a new project for consideration as a non-structural solution in North Birmingham. The project, the F.L. Shuttlesworth Memorial Park project, is intended to incorporate a "Green-Streets" component into the Park design to address water quality and flooding. Furthermore, the park design is also anticipated to incorporate drainage improvements beyond those being added within the street improvement rights-of-way. Remaining properties within the floodplain are also being considered for future purchase. The entire project will be linked to the Civil Rights Heritage Trail system in the City and is being considered for USEPA Technical Assistance. It is anticipated that this project will be submitted for Section 319 funding after completion of the final Village Creek Watershed Management Plan later this calendar year.



In addition to that the City also anticipates entering into a contract again this year with the U.S. Geological Survey to not only continue funding the stream gauges in Village Creek for flow, discharge, rainfall, and water quality but to also add two new U.S. Geological Survey Station in Valley Creek as well. The two new stations will also monitor stream flow, discharge, rainfall, and water quality. The two new stations will be located at Valley Creek and Center Street (USGS Gage #02461130) and Valley Creek and Avenue W (USGS Gage #02461192). These gaging stations are anticipated to be installed by the USGS by November 2016.

The total City cost to continue to operate and maintain all USGS gaging stations in Village and Valley Creeks is $93,272 annually.

ADOPT-A-NEIGHBORHOOD: During this reporting period the Mayor began a new program citywide for all Departments. The program, "Adopt-A-Neighborhood", was intended to allow City Departments to work together to overcome neighborhood issues and to demonstrate positive City – Public interaction to build community unity. Within the Planning, Engineering, and Permits Department (PEP), the Division of Planning, Urban Design, and Watershed Management (PUWM) was tasked with program implementation. Since PEP and PUWM have long been engaged in the North Birmingham Interagency Working Group for Environmental Justice (EJIWG), PEP selected the North Birmingham Community to adopt as a focus of PEP's ongoing planning efforts. A copy of the Short and Long Term Projects ongoing in North Birmingham through this program may be found in Appendix E. A copy of the status of all PEP efforts is also included in Appendix E.

FLOODPLAIN MANAGEMENT: Floodplain Management continues to be City strength with numerous ongoing projects during this reporting year, as follows:

VILLAGE CREEK FEMA ASSESSMENT STUDY– ROEBUCK TO PLEASANT HILL ROAD – COLLEGEVILLE NEIGHBORHOOD BENEFITS

Studies by the Corps of Engineers have suggested that the effective flood elevations for Village Creek may be too high in some areas, especially in the Collegeville Area. On behalf of the neighborhoods, the City of Birmingham tasked a consulting group to evaluate the effective FEMA Flood Insurance Study (FIS) for Village Creek within the residential neighborhoods to determine if benefits may be achieved through revisions to the effective study. As a result, the corrected effective model demonstrates reductions in the base flood elevations through the Collegeville area and indicates that an estimated 100 structures will

benefit from updating the study through the existing Alabama State Office of Water Resources Locust Fork RISK Map process. A large number of properties will be removed from the Special Flood Hazard Area (SFHA) within the Collegeville Neighborhood- saving residents the increasing cost of flood insurance and property protection; and for those that remain in the SFHA, the reduction in the base flood elevations may provide some reduction to the flood insurance policy rates and flood protection related costs. The estimated community savings is massive.

VILLAGE CREEK STREAM MONITORING SYSTEM ASSESSMENT & FLOOD FORECAST IMPLEMENTATION SYSTEM

The Stream Monitoring System Assessment and Flood Forecast Implementation System for Village Creek Project is currently underway as part of the Silver Jackets Pilot Project in cooperation with the State Office of Water Resources, US Army Corps of Engineers, USGS, and the National Weather Service. "Silver Jackets teams in states across the United States bring together multiple state, federal, and sometimes tribal and local agencies to learn from one another in reducing flood risk and other natural disasters". Through this team effort, the City of Birmingham is currently in the process of evaluating its existing stream monitoring system along Village Creek throughout Jefferson County and implementing a Flood Forecast System for Village Creek. This assessment will aide in the development and evaluation of the City's water quality monitoring needs and in the development of a plan for the repair, rehabilitation, and addition of new equipment to make the system fully operational and beneficial to the communities it serves along Village Creek. The funding appropriated for this project is $33,500 and the benefits of protecting life and property by preparing residents for a flood far outweigh the costs. The flood inundation mapping will be available to the public early in 2017.

POST DISASTER RECOVERY PLAN

The Post Disaster Recovery Plan will fulfill the City of Birmingham's commitment to effectively and efficiently implement recovery programs while maximizing Federal financial participation. It will incorporate the National Disaster Response Framework (NDRF) as the City standard for emergency recovery operations and establish the overall roles and responsibilities for emergency recovery operations, as well as the concept of operations for the City. The Plan is intended to be used in conjunction with established operational procedures, plans, protocols and planning processes that will allow the City to implement a more efficient recovery program while maximizing federal financial participation for future events. The funding obligation for this project is $95,000; however, our Post Disaster Recovery Plan gives us an opportunity to achieve a more sustainable and resilient community after a disaster, a benefit which can save millions of dollars in long term recovery efforts.

PROGRAM FOR PUBLIC INFORMATION

The City of Birmingham participates in the National Flood Insurance Program (NFIP) Community Rating System which allows development of a floodplain management program tailored to hazards, character, and goals. Under the CRS, a Program for Public Information (PPI) is a plan created to continuously inform Birmingham residents about flooding and ways to address potential flood damage to their property. This plan will include map information, tailored outreach projects including website changes and information distribution practices for the City's floodplain properties. The ultimate goal is to educate and promote community resilience which is necessary to minimize flood damage. We

understand that well-informed people make better decisions and will take steps to protect themselves and their property and are more likely to support local floodplain management efforts to protect the natural functions of their Birmingham's floodplain. Having a PPI plan will increase our community class rating in the CRS, which will in turn, provide greater savings to flood insurance policyholders.

VILLAGE CREEK PROPERTY FLOOD RISK REDUCTION ASSESSMENT

The City is funding through the US Army Corps of Engineers Silver Jackets Program. The Silver Jackets program has been a key component to accomplishing the USACE Flood Risk Management Program mission, which emphasizes integration and synchronization of flood risk programs, projects and authorities, internally and in partnership with all flood risk management stakeholders. Responsibility for flood risk management in the United States is a shared responsibility among multiple federal, state and local government agencies, each with a complex set of programs and authorities. These agencies have many programs to assist states and communities in reducing flood damages and promoting sound flood risk management. Silver Jackets teams have demonstrated the effectiveness of a shared responsibility partnership for managing the flood risk life cycle and leveraging available resources at the state level.

The USACE proposes to collect structure inventory data to update the City's existing structure inventory for the Village Creek Watershed Master Planning and modeling efforts and for floodplain non-structural mitigation solutions and alternatives and for regulatory purposes.

Each property in the Village Creek Watershed will be characterized and categorized based structure characteristics and structure flood risk information.

FLOODPLAIN OVERLAY DISTRICT

The City's Higher Standards Floodplain Provisions were updated and adopted recently to what is now referenced as "Floodplain Overlay District". The City continues to regulate all development in Special Flood Hazard Areas and employ FEMA acceptable provisions to encourage compliance and minimize the impact of new development or redevelopment in a floodplain. With the new provisions, the City took a few steps forward by adding enclosure regulations and minor 500-year floodplain regulations while focusing on minimizing blight in some of the City's low lying areas. The City is continuously reviewing and receiving feedback on all new and potential changes to its floodplains.

FLOODPLAIN MANAGEMENT WEBSITE

Recently, the Floodplain Management and Disaster Mitigation Services staff updated its webpage to better cater to property owners currently located in or near the 100-year floodplain. The webpage focuses on many floodplain management related topics such as natural and beneficial functions of floodplains, flooding history, flood insurance, flooding preparedness and planning, mitigation measures, permitting requirements and many more topics.

REPETITIVE LOSS AREA ANALYSIS

In 2016, City staff performed a detailed analysis centered on the Insurance Service Office identified repetitive loss properties. From this information, City staff performed a detailed analysis inclusive of repetitive loss properties, topographic features, existing drainage projects, and other efforts across the City near repetitive loss structures. This analysis birthed over 30 repetitive loss areas. The

identification and designation of repetitive loss areas will provide the source of flooding and possible techniques to reduce future flood damage on an area wide basis.

WEAKNESSES

In addition to the weaknesses reported last year, which included MS4 Mapping & Maintenance, the City Website, Core Leadership Training, and "Put-A-Lid-On-It programs, only the MS4 Mapping & Maintenance program and Core Leadership Training remain as weaknesses this year. The MS4 Mapping and Maintenance Program is discussed in detail in the ***Major Findings*** Section of this annual report. For more detail about why the City Website and "Put-A-Lid-On-It" Project have been removed, please see the ***Public Education*** and ***Structural Controls*** Sections of this annual report.

MS4 MAPPING & MAINTENANCE: See ***Major Findings*** section.

CORE LEADERSHIP TRAINING: In last year's report Stormwater Management had received approval from the Department of Planning and Engineering, and Permits (PEP) to work with Jefferson County Personnel Board to define the parameters of the new training program. Stormwater Management met with supervisors from several divisions within the Department of Public Works to discuss the aspects of the training program and begin develop of revised performance measures for inclusion into this year's report; however, subsequent meetings to develop revised performance measures were discontinued for lack of participation by DPW. As a result, Stormwater Management and the PEP Department met with the Mayor and provided a status report on Good Housekeeping Training in Birmingham and the need to require attendance at all Stormwater Management held training exercises with City Departments. At that meeting the Mayor authorized a memorandum for his signature to require attendance at all future Good Housekeeping Training Sessions. All agreed that the Core Leadership Training, envisioned for City employees would not succeed without the support of departmental supervisors. Therefore, the program was refocused on Supervisor Training initially.

Stormwater Management has determined to hold quarterly meetings with all DPW and FIRE Supervisor's, which will commence in January 2017. Training will not only include Good Housekeeping Practices to avoid introducing pollutants into the City's MS4, but will also address existing performance measures going forward. The Mayor also asked that DPW be noticed that any equipment failure or staffing needs to ensure that the City's NPDES Permit is effectively being maintained be provided to his office for further consideration and replacement, as needed and justifiable.

STORMWATER OPERATING BUDGET FISCAL YEAR 2017	
Stormwater Management **Fund 048**	
Estimated Revenues	
Stormwater Fees	**$1,251,135**
Funds Available	**$480,078**
Total Estimated Revenues	**$1,251,673**
Appropriations	
Planning, Engineering & Permits:	
Stormwater Administrator	**$137,367**
Water Pollution Control Technician (3)	**$222,415**
Storm Water Specialist	**$60,382**
Senior Civil Engineer	**$80,373**
General & Administrative Expenses	**$751,135**
Total Appropriations	**$1,251,673**

The table above depicts the Mayor's FY 2017 budget for Stormwater Management. This represents the total cost for maintenance of the NPDES Phase I MS4 Permit. All remaining basic levels of service for the routine operation and maintenance of the City's separate storm sewer system are funded by the general fund and have not been itemized.

.

FUTURE PROGRAM DIRECTION:

During NPDES Stormwater Permit reporting year 2015-2016, the City of Birmingham completed a number of items, which were identified to be done in the previous year's report as a future effort. Below are previous and new program elements that Stormwater Management is considering in FY2016-2017.

Future Program Direction Program Element	Description of Project	Program Element Addressed in FY2016 Why/Why Not?	Anticipated FY 2017 Future Direction
Planning Control: Map revision for properties within the Village Creek flood plain	City working with FEMA to identify floodplain properties inappropriately listed.	**In Progress** • *Completed all repetitive loss studies in all City watersheds* • *Initiated "Silver Jackets" program for Village Creek with ACOE.*	• *Complete Silver Jackets for Village Creek* • *Updating flood prone properties in Valley Creek*
Project Control: Fleet Maintenance Truck Wash	Construct an oil/grease separator and reconnect system to the sanitary collection system	**Not Completed** • *Survey completed* • *Project in drafting*	• *Finalize design* • *Approve general obligation bond funding request* • *City obtain all project permits* • *Commence construction*
Project Control: "Put-A-Lid-On-It" Project	Develop a new technology that provides innovative design to reduce breakage and O&M costs.	**In Progress** • *Interlocal agreement with UAB approved* • *Phase I of the pilot project has begun and is anticipated to be completed in Spring of 2017*	• *Install video monitoring devices* • *Research materials* • *Define technology requirements* • *Researching grant funding opportunities*
Structural Control: Mapping and Maintenance of the MS4		**In Progress** • *PEP approved IDDE Control Strategy*	• *Purchase new survey equipment* • *Commence mapping in*

Future Program Direction Program Element	Description of Project	Program Element Addressed in FY2016 Why/Why Not?	Anticipated FY 2017 Future Direction
		• *Survey Crew assigned*	*Shades Creek.*
<u>Administration:</u> City Public Education/ Outreach	Educate the public about Stormwater Management within the City of Birmingham	**In Progress** • *See **Major Accomplishments Section***	• *City continues to seek opportunity to advance public education; this year anticipate greater connection to trash & debris in neighborhoods* • *Creating stronger partnerships with other organizations.* • *Repeat the successful stormwater calendar again in 2017*
<u>Policy Control:</u> City of Birmingham Stream/ Lake Maintenance BMP	Compose BMP plan that utilizes chemicals and application procedures with the least amount of environmental impact	**Completed** • *The new City BMP Plan was introduced to ADEM and the ACOE.*	• *See Appendix B*
<u>Regulatory Control:</u> City of Birmingham new Zoning Ordinance	Create new City ordinance	**Completed**	• *See Appendix B*
<u>Administration:</u> Stormwater/ GIS Data Integration	Merge all water quality and quantity paper files into GIS for laptop field use to prevent data transcription errors	**Not Completed** • *New ipads were obtained in 2016*	• *Program ipads for improved documentation control*

Future Program Direction Program Element	Description of Project	Program Element Addressed in FY2016 Why/Why Not?	Anticipated FY 2017 Future Direction
<u>Administration:</u> Stormwater Website[xiv]	Create stormwater website for public outreach	**Completed** • *Stormwater staff now has editorial rights to maintain the stormwater website* • *Significant updates undertaken*	• *Continue maintenance updating.*
<u>Administration:</u> Stormwater "Core Leadership" Program	Improve City staff understanding of stormwater aspects of their positions	**Not Completed** *Training has been refocused on departmental supervisors and not general staff.*	• *Stormwater staff prepared a memo for the Mayo's signature making supervisor training mandatory* • *Anticipate Supervisor Training to commence after the first of the calendar year*
<u>Monitoring:</u> Instream/Outfall Reconnaissance (ORI)	Monitor instream peak areas for outfall dry weather discharge, between sampling events	**In Progress** • *Have identified 4-ORI areas being monitored as dry weather/intermediate discharges.*	• *ORI monitoring combined now with IDDE & MS4 Mapping* • *Continue to work with ADEM & JeffCo Env. Svcs.*
<u>Development Control:</u> Regional Sustainability & Environmental Sciences Research Program **(RESES)**	EPA Office of Research & Development pilot project in Village Creek to supplement data for the National Stormwater Calculator (Appendix B)	**Not Completed** • *City was unable to identify available funding data in Alabama to provide any meaningful support.*	
<u>Development Control:</u> Develop	Project will review	**Complete**	

Future Program Direction Program Element	Description of Project	Program Element Addressed in FY2016 Why/Why Not?	Anticipated FY 2017 Future Direction
basis for Post-Development control to support new LID ordinance in Birmingham in coordination with the American Society of Civil Engineers, Birmingham Branch and the USEPA.	relevant requirements and implementation approaches nationwide, update the City's long-term rainfall analysis, review guidance documentation for implementing runoff controls and provide the City with a recommendation for a select method of post-development controls.	• *Final Report from Black & Veatch received. (See Appendix B)*	

PROGRAM ACTIVITIES SUMMARY TABLES

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
(1) Structural Controls	Storm Drain Inlets Cleaned (#)	3,500 annually	Yes	**2,881** inlets	**3,386** inlets	
	Storm Sewer Lines Cleaned (Lin Ft)	90,000 annually	Yes	**109,531** ft	**109, 197 ft**	During this period only two trucks were operational due to equipment failure
	Litter Cleared (Blks)	30,000 annually	Yes	**373,970** blocks	**492,672** blocks	
	Pipe Repaired / Replaced (Lin Ft)	1,000 annually	No	**1,212** ft	**950 ft**	During this period DPW staff was reassigned and this area of operation no longer exists. City considering privatizing this service
	Inlet Const (#)	100 annually	Yes	**16** inlets	**121** inlets	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Curb & Gutter Const (Lin Ft)	900 annually	Yes	**347** ft	**472** ft	
	Storm Sewer Tops Made (#)	350 annually	Yes	**665** made	**1,171** made	
	Storm Sewer Tops Set (#)	4, 000 annually	Yes	**5,559** set	**4,894 set**	City DPW equipment out of commission
	Inventory of Storm Sewer System	Complete by Sept 2015	Yes	**806** outfalls total. No new outfalls have been discovered	**806** outfalls total. No new outfalls have been discovered	
(2) Areas of New Development /	Review Subdivision Ordinance and Update	Complete by Sept 2012	Yes			

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
Redevelopment	Review and Revise the City's Engineering Guidelines for Stormwater Management	Complete by Sept 2017	No			City has engaged the services of AMEC Foster Wheeler & anticipates this being completed in FY 2017
	Continued Implementation of City Flood Mitigation/ SWM Plan, adopted October 2004.	Annually	Yes	Yes	Yes	Silver Jacket's project underway and remapping of Village Creek floodplain areas will occur by FY2017
(3) Roadway Maintenance	Streets Swept (Curb miles)	100,000 annually	Yes	**78,511** curb miles	**33,816 curb miles**	City DPW is short-staffed and much of the equipment is out-of-service
	Track Litter Index	Annually	Yes	Litter index score: **1.0**	Litter index score: **2.0**	Litter index score represents slightly greater litter in selected high traffic areas of the City this year, as compared to last year

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Estimate Pollutant Load Reduction from Street Sweeping Practice	Complete by Sept 2014	Yes	**339.80** tons	**731.57** tons	See ***Major Findings Section***
(5) Pesticide, Herbicide, and Fertilizer Application	Inventory the City PHF Storage Facilities	Complete by Sept 2010	Yes			
	Map the City PHF Storage Facilities	Complete by Sept 2010	Yes			
	Develop PHF Program Documentation to Include Chemical Application Protocols	Complete by Sept 2013	Yes			
	Track Inventory of PHF Materials	Monthly	Yes			Available Upon Request
	Track Quantity of PHF Materials Applied	Annually	Yes			Available Upon Request

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Document Training for Staff	Annually	Yes	• ATA Turf Grass Road Show • Birmingham Landscape Expo • Alabama Green Industry Training Center Continuing Education Classes • Alabama Vegetation Management Conference	See ***PHF Section in Major Findings Section of Report***	
	Develop and distribute public education materials	Annually	Yes	See ***Public Education & Outreach Future Program***	See ***Public Education & Outreach Future Program Direction***	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
				Direction		
(6) Illicit Discharge Detection and Elimination	Map the City Outfalls	Complete by Sept 2010	Yes			Appendix B
	Develop IDD&E Program Documentation	Complete by Sept 2010	Yes	• City staff is preparing draft IDDE-SOP • City staff have begun investigations for non-compliance • City staff began development of a tracking system • Anticipate staffing of SPO Appeals Board	• Continues in preparation	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Track Public Complaints	Annually	Yes	**1,173**	**1,708**	
	Track Illicit Discharge Investigations and Resolution	Annually	Yes	**19** illicit discharges were reported	**19** illicit discharges were reported	See ***IDDE Section of the Major Accomplishments Section***
	Update the City Outfall Inventory	Annually	Yes	No new outfalls added	No new outfalls added	
	Inspect Instream Peak Outfalls Bimonthly		Yes	Yes	Yes	See ***Major Accomplishments***

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Maintain Hotline	Annually	Yes	Street sweeping: **282** MS4 cleaned:**496** Reset inlet covers: **179** Street flooding: **68** Missing/broken inlet covers: **106** Catch basins repair: **32** Catch basin clogged: **10**	Street sweeping: **367** MS4 cleaned:**563** Reset inlet covers: **279** Street flooding: **72** Missing/broken inlet covers: **177** Catch basins repair: **187** Catch basin clogged: **63**	
	Track Reported Spills and Investigate Findings	Annually	Yes	EMA: **40** reported spills ADEM: **20** reported spills SWM: **1** reported spills	EMA: **58** reported spills ADEM: **22** reported spills SWM: **13** reported spills	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Maintain Stormwater Webpage for Existing City Website	Annually	Yes			
	Map the City Storm Sewer System	Complete by Sept 2015		No additional storm sewer infrastructure was surveyed or added to the existing maps during this reporting period	No additional storm sewer infrastructure was surveyed or added to the existing maps during this reporting period	
(8) Industrial and High Risk Runoff	Review SWPPP for Landfills	Complete by Sept 2013	Yes			Both the New Georgia and Eastern Area Landfill SWPPPs/SPCCs have been updated. Documents available upon request

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Continue Inventory and Map ADEM Permitted Sites	Annually	Yes	No new facilities mapped	No new facilities mapped	
	Maintain Map of SARA Title III Sites and Update New Sites	Annually	Yes	**173** facilities	**144** facilities turned in	Available upon request
	Implement/continue BFD PIP Inspections of Tier II Sites	Annually	Yes	Pre-incident inspections: **88**	Pre-incident inspections: **94**	Available upon request
	Train Municipal Staff	Annually	No	No training provided this year	No training provided this year	Training will commence in 2017

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Stormwater Monitoring at City Landfills	Annually	Yes	Eastern Area & New Georgia Landfill DMR's	Eastern Area & New Georgia Landfill DMR's	DMR's available upon request
	Create Inventory of Municipal Facilities and Review Stormwater Management at the facilities	Complete by Sept 2015	Yes (Ongoing)	List of City facilities & properties complete	List of City facilities & properties complete	
	Industrial & High Risk Facilities & Runoff Inspections & Enforcement Activities	Annually	Yes	Inspections: **34** Rechecks: **189** Enforcement: **2** Corrective actions: **16**	Inspections: **24** Rechecks: **164** Enforcement: **4** Corrective actions: **12**	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Review ESC Ordinance	Complete by Sept 2015	Yes	Ongoing	Ongoing	Staff is considering further changes in 2017 to establish a permit deadline for completion and assignment of long-term O&M of detention/retention facilities
	Modify Tidemark to Track All Construction Runoff Permitting Activities (Permits Issued; Permits Closed; Site Inspections; Non-Compliance Incidents; Enforcement Actions; Complaints; Bonds and Letters of Credit Received)	Annually	Yes	Inspected: **159** Checked job sites: **159** Final inspection: **0** Inspections passed: **671** Inspections failed: **0** Violation notices: **0** Compliance orders: **0** Contractor in Default: **0** Bonds collected:	Inspected: **623** Checked job sites: **623** Final inspection: **50** Inspections passed: **623** Inspections failed:**0** Violation notices: **0** Compliance orders: **0** Contractor in Default: **0** Bonds collected: **0** Bonds released: **12**	This program has been redirected to Stormwater Management.

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
				0 Bonds released: **3** Permits issued: **159** Permits closed: **0**	Permits issued: **213** Permits closed: **0**	
	Land Disturbance Permits Issued in Impaired Watersheds	Annually	Yes	Permits issued in impaired watersheds: **83** Permits closed in impaired watersheds: **0**	Permits issued in impaired watersheds: **153** Permits closed in impaired watersheds: **12**	
	Conduct at least one Erosion and Sediment Control Workshop for Developers, Builders and Engineers	Annually	Yes	Fall 2014 & Spring 2015: **50**	Fall 2014 & Spring 2015: **55**	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Develop and Distribute Public Education Brochures	Annually	Yes	Floodplain & SWM brochures distributed at Jefferson County Annual Community Awareness Day: **3,298**		
(10) Public Education	Participate in Creek & Neighborhood Clean Up	Annually	Yes	SWM staff planned, trained, supported and participated in **13** cleanups	SWM staff planned, trained, supported and participated in **15** cleanups	City removed & disposed of more than 48 tons of debris during the cleanup
	Public Education Program Documentation	Complete by June 2013	No	During this reporting year, the City published and distributed 500 stormwater calendars.	During this reporting year, the City published and distributed 1,500 stormwater calendars.	Calendar is done in partnership with Jefferson County Stormwater and Keep Birmingham Beautiful Commission and will distribute more than 1,500 new calendars

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
					(Appendix D)	in 2017. Calendars incorporate artwork from Birmingham City School students (BCAP) and the Botanical Garden.
	Bimonthly Instream & Screening Site Monitoring	19 Sites Bimonthly	Yes	100%	100%	
(11) Monitoring	Bimonthly Instream & Screening Site Monitoring	19 Sites bimonthly	Yes	100%	100%	
	Outfall Reconnaissance when Instream Peak Segments are identified	6-Outfall reconnaissance per year	No	18	2	

PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2015	2016	
	Develop Inter-Jurisdictional Agreement for Monitoring	Complete by Sept 2014	No			

ANNUAL REPORT END NOTES

[i] U.S.G.S. Water Resources Investigations Report 02-4182. 2002
[ii] *Federal Water Pollution Control Act. Sect.* 402.(p)(3)(B)(iii).2002. Page 195
[iii] 40 CFR Part 122.26(d)(2)(iv). Page 217
[iv] Birmingham City Council Video | AL.com
[v] Mayor William Bell Thoughts On Birminghams Green Future.html
[vi] City Comprehensive Plan, Chapter 6; Sustainability. Page 6.11
[vii] Handbook for Developing Watershed Plans. Page 2-14
[viii] Shelby County NPDES-MS4 Final Permit
[ix] City of Birmingham Comprehensive Plan. 2014. Chapter 6, Page 6.2 (Among other Chapters)
[x] City of Birmingham. October 4, 2013. *Water Quality Monitoring Strategy for Alabama Department of Environmental Management*. Pg. 13.
[xi] Final Village Creek, Zinc, pH, and Siltation TMDL, Page 18
[xii] IBID, Page 38
[xiii] Basic Information: Introduction to UAAs | Use Attainability Analysis | US EPA