



CITY OF BIRMINGHAM
DEPARTMENT OF PLANNING, ENGINEERING & PERMITS
710 North 20th Street
ROOM 202, CITY HALL
BIRMINGHAM, ALABAMA 35203

Randall L. Woodfin
Mayor

Edwin Revell
Director

January 31, 2019

Alabama Department of Environmental Management
Attention: Ms. Marla Smith
1400 Coliseum Blvd.
Montgomery, AL 36110-2400

RE: 2017-2018 MS4 Annual Report
NPDES PERMIT #ALS000032

Dear Ms. Smith,

Please find enclosed the 2017-2018 Annual Report for the City of Birmingham, required under the February 26th, 2018, NPDES Permit #ALS000032.

It is with great pleasure to submit this report for your review. Please let us know if you see anything that we can strive to do better at, or any areas where it may seem that we are missing any requirements. While I didn't start working with the City of Birmingham until after the reporting year cycle, the team here did an amazing job highlighting their progress throughout the permit year. Our future outlook is bright, with several talented staff being added to the team, and a new insight into identifying and solving several of Birmingham's stormwater issues.

For any questions, comments, or feedback, please let me know at (205)714-8644 or via email at Joshua.Yates@BirminghamAL.gov. Thank you for working with us as we strive to be the most effective and efficient stormwater management operation in the state.

Sincerely,

Joshua D. Yates
Stormwater Administrator

Cc. Director Edwin Revell
Deputy Director Chris Hatcher



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MUNICIPAL SEPARATE STORM SEWER SYSTEM

NPDES PERMIT NUMBER: ALS000032

FISCAL YEAR 2017-2018

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) 2018 ANNUAL REPORT

PERMIT YEAR (ADMINISTRATIVE EXTENSION)

OCTOBER 1, 2017-SEPTEMBER 30, 2018

JANUARY 31, 2019

**City of Birmingham
Stormwater Management**





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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:

Joshua D. Yates

Name:

Joshua Yates

Title:

Stormwater Administrator

Date:

January 31, 2019

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LIST OF CONTACTS & RESPONSIBLE CONTRIBUTORS

AGENCY	NAME	TELEPHONE NO.	RESPONSIBILITY
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	COOPER, DIRECUS	(205) 254-7771	STORMWATER SPECIALIST
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	EDDINGTON, MIKE	(205) 254-2354	CHIEF CIVIL ENGINEER
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	FLOODPLAIN SECTION	(205) 254-2479	FLOODPLAIN
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	GAMBREL, TIM	(205) 297-8059	PRINCIPAL PLANNER
CITY OF BIRMINGHAM PUBLIC WORKS	GIBBINS, WALT	(205) 254-6500	DIRECTOR OF PUBLIC WORKS
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	GOSS, TOMMY	(205) 254-4920	SEC CONSTRUCTION INSPECTOR
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	HATCHER, CHRISTOPHER	(205) 254-2558	DEPUTY DIRECTOR
CITY OF BIRMINGHAM PUBLIC WORKS	HICKMAN, ALISTER	(205) 254-6302	DEPUTY DIRECTOR
CITY OF BIRMINGHAM PUBLIC WORKS	KAPER, TEDDY	(205) 714-8676	HORTICULTURE OPERATIONS
CITY OF BIRMINGHAM PUBLIC WORKS	McCLANEY, SADE	(205) 254-6335	KEEP BIRMINGHAM BRAUTIFUL
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	MOORE, ALEXCIA	(205) 297-8301	STORMWATER SPECIALIST
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	MOSS, ANGELA	(205) 297-8300	STORMWATER SPECIALIST
CITY OF BIRMINGHAM BIRMINGHAM FIRE DEPT.	MUNNERLYN, E.J.	(205) 250-7540	FIRE INSPECTOR I
VILLAGE CREEK HUMAN & ENVIRONMENTAL JUSTICE SOCIETY, INC	OWENS, YOHANCE	205-907-0355	EXECUTIVE DIRECTOR
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	PERRY, TROY	(205) 254-2499	WATER POLLUTION CONTROL TECHNICIAN

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AGENCY	NAME	TELEPHONE NO.	RESPONSIBILITY
UNIVERSITY OF ALABAMA AT BIRMINGHAM	PILLAY, BRIAN	(205)996-5797	PROFESSOR AND CHAIR, DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	PUTMAN, GEORGE	(205) 254-2822	CHIEF WATERSHED ENGINEER
ADEM	RECORDS MANAGEMENT	(334) 271-7712	
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	REVELL, EDWIN	(205) 254-2470	DIRECTOR
JEFFERSON COUNTY ENVIRONMENTAL SERVICE DEPARTMENT	ROHLING, BRIAN	(205) 521-7512	CHIEF CIVIL ENGINEER
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	SPEORI, KIMBERLY	(205) 254-7712	SENIOR PLANNER
JEFFERSON COUNTY COMMISSION	STORMWATER STAFF	(205) 325-8741	STORMWATER PROGRAM
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	THOMAS, KATRINA	(205) 254-2288	ZONING ADMINISTRATOR
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	WILBORN, DONALD	(205) 254-2730	SENIOR PLANNER
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	WILLIAMS, BARRY	(205) 254-2345	SENIOR SYSTEM ANALYST
CITY OF BIRMINGHAM PLANNING, ENGINEERING, & PERMITS	YATES, JOSHUA	(205) 714-8644	STORMWATER ADMINISTRATOR



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. ALS000032), dated March 1, 2018, for the operation of its MS4. That permit, which became effective on March 1, 2018, 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:

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. *Reduce discharge weighted total suspended solids concentration during a 5-year permit cycle.*
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.*
6. *Implement Stormwater Protection Ordinance to control discharges to and from the City's MS4 by the establishment of a stormwater protection ordinance.*
7. *Develop and implement Post Construction Program to control water quality/quantity in stormwater runoff from new development and re-development.*



MAJOR FINDINGS



During the NPDES Stormwater Permit reporting year 2017-2018, the City of Birmingham identified several 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.

STREAM SEDIMENTATION: Sedimentation throughout City streams is a concern to City maintenance crews and to the public, as shown above in a picture of Village Creek taken in July 2017 by the Village Creek Human & Environmental Justice Society, Inc.

Stormwater Management staff and the Public Works Department are working to address sediment loading in portions of the Village Creek Watershed and with the U.S. Army Corps of Engineers to develop flood control alternatives in the Valley Creek Watershed that could potentially address stream sedimentation.

EASTLAKE PARK DUCK & GOOSE INVESTIGATION: On July 16, 2018 Stormwater Management became aware of citizen complaints

of dead animals (ducks and geese) in and around East Lake Park. Starting on July 17, 2018, Stormwater Management staff conducted inspections in and around the park to determine if there was a reason for the citizen's concern about dead ducks and geese. Limited water quality monitoring was conducted in the lake with no parameters exceeding or below normal levels. Stormwater staff observed a large population of ducks, geese, ducklings, fish and other aquatic wildlife that appeared to not have health issues. Two dead ducks were collected by Park and Recreation staff and transported to State of Alabama agriculture lab in Decatur for a necropsy evaluation. Results for the necropsy were inconclusive. Ducks and geese are not limited to staying within the Eastlake Park boundaries, and local home-owners were observed feeding the ducks and geese outside the park. Staff observed one duck and one goose that had been run over by local traffic. Observations continued throughout August 2018 with very few dead animals observed. No definitive reason for concern over water quality could be determined. The few dead animals observed over a period of time did not indicate that there was some type of environmental, or other factor killing any wildlife in the area. Park and Recreation staff have been instructed to properly dispose of any dead animals found in and around the lake. If an unusual increase of aquatic wildlife deaths is observed, Park and Recreation staff should notify Stormwater Management staff for further investigation.

WATER QUALITY MONITORING: This reporting period now includes five-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 a direct



influence from rainfall, as well as, other dissimilar water sources, whether from an incoming tributary, an outfall discharge, or from a groundwater seepage influence.

Many Major Findings points were listed in the **Highlights** section of *Water Quality*. Rainfall played an important role this year, due to heavy short-term rainfall events during water quality monitoring. Heavy rainfall during the August 1, 2018 sampling event along Village Creek resulted in high turbidity readings at VIC14, VIC13 and VIC09.4 of 86.5 NTU's, 81.4 NTU's, and 68 NTU's respectively. These higher turbidity readings subsided within the hour as the rain event stopped and the next site VIC8.1 resulted in a turbidity reading of 32.7 NTU's. As the day's sampling continued, results reflected a continuous lowering of the Turbidity and TSS levels. To demonstrate this the City compared each Birmingham watershed for particular parameters in the form of "Bar-Whisker" charts. The comparison was made for a five-year period. This is found in the **Results and Discussion** section of *Water Quality*. **Anti-degradation Analysis** is also depicted and reviewed in the *Water Quality* section for each watershed with the parameters selected from state law. Additional evaluations on the Village Creek watershed, such as the *Village Creek Loading Analysis* and the *Village Creek TMDL analysis* can be also found in the *Water Quality* section.

The pH of surface water generally ranged from 6 to 9 over the entire study period. 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. The pH levels in all Birmingham Creeks did not exceed 8.5 during the 2017-2018 fiscal year at all monitoring sites. USGS studies of ground water in the area indicate pH levels of 7.9 in the ground water at subsurface.

Village, Shades, Five Mile Creek and Cahaba River have either had improvement or no change in any the State's Anti-degradation level requirements when comparing historical data over the sampling period to the most recent sampling results for FY 2017-2018. However, Valley Creek showed an increase in turbidity and e-Coli levels as compared to FY 2016-2017. This was the result of an illicit discharge observed during two separate sampling events in October 2017 and again in April 2018. The event in October 2017 at VC0.1s yielded a turbidity reading of 66.8 NTU's and an e-Coli reading of 2419.6 mpn/100ml. The event in April 2018 at VC0.7 yielded a turbidity of 83.5 NTU's. This has been investigated by stormwater staff and it is suspected to be associated with a possible sanitary sewer leak in the general area of VC0.1s. Jefferson County Environmental Services has been notified and is working with Stormwater's IDD&E staff to use a camera to determine if indeed the sanitary sewer in this area has been breached during periods of heavy discharge. The dissolved oxygen and temperature levels did not exceed state anti-degradation policy at any time during the past four reporting cycles for any stream within Birmingham.

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 and given the preponderance of established BMP controls. Compared with last year's data, the flow-weighted data for TSS was considerably lower for both the City and for Industry. Furthermore, flow weighted TSS concentration for the City was higher this year when compared with industry due to periods of heavy rainfall during sampling periods.

The considerable changes observed during this reporting period by the City seem implicated to the considerable differences in the water quality and flow response to a significant drought condition unlike any previous reporting year.

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MAJOR ACCOMPLISHMENTS

ADMINISTRATION:

During the NPDES Stormwater Permit reporting year 2017-2018, personnel changes occurred. Edwin Revell was appointed as the Director of Planning, Engineering, and Permits. Christopher Hatcher took over the position of Deputy Director of Planning, Engineering, and Permits previously held by Mr. Revell.

On May 31, 2018, Mr. Thomas Miller, Stormwater Administrator, retired after serving the Citizens of Birmingham for over 6 years. His 37 years of Stormwater Management knowledge and expertise will be missed, but his teachings and guidance will forever be imbedded within the program.



Mr. George W. Putman was promoted from Senior Civil Engineer to Chief Civil Watershed Engineer in July of 2018. Mr. Putman is in charge of the Post Construction and Stormwater Construction programs.

The Stormwater Management Department was rewarded a VISTA intern for the 2017 – 2018 permit year. Whitney Jackson serves as an AmeriCorps VISTA City of Birmingham intern for a year. She will be used to fill in any capacity that the department needs from data processing to in the field tasks. Ms. Jackson is a Miles College alumni. She received her



Bachelor of Arts, in Political Science with a focus in Government. She has strong clerical background, as well as, that of qualitative research, sales, and customer service.

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KEEP AMERICA BEAUTIFUL AFFILIATE



During this reporting period Stormwater Management has started the process to add Keep Birmingham Beautiful (KBB) to the Stormwater Management section of Planning, Engineering Permits. This organization previously resided within the City's Public Works Department. The mission of "Keep Birmingham Beautiful" is to serve the citizens of Birmingham and all 99 neighborhoods 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 KBB is to affect positive change in attitude and behavior regarding natural conservation, littering, recycling and beautification which is a perfect partnership with Stormwater Management.



Development Controls:

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

- ◆ **Planning Controls**
- ◆ **Regulatory/Policy Controls**
- ◆ **Structural Controls**

The Federal Water Pollution Control Act P.L. 107-303, 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.¹ Consistent with then 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.²

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 stormwater protection ordinance. 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.

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PLANNING CONTROLS

THE WOODFIN WAY

Since the start of the Woodfin Administration on Nov. 28, 2017, Mayor Randall L. Woodfin and his team has dedicated staff to **"Putting People First"** across all of Birmingham's 99 neighborhoods and 23 communities. The implementation of our mission – **building community through servant leadership** – is a central focal point and motivating factor for all members of the Mayor's Office and City of Birmingham employees. The Mayor and his team have developed a strategic plan.

The plan focuses on six goals:

- **Safe, secure, and sustainable communities**
- **Healthy, thriving and diverse neighborhoods.**
- **High-performing "21st Century" education and workforce development systems.**
- **Innovative and inclusive economy supported, shared, and served by all.**
- **Highly effective, people first, smart government.**
- **Global, legacy leadership partner for equity and social justice.**

For more information on the Woodfin Way visit:

<https://www.birminghamal.gov/strategy>

SUSTAINABILITY PROGRAM/PLAN

The City of Birmingham Planning, Engineering, and Permits (P.E.P.) Department has decided to focus on developing a sustainability program/plan during this reporting period. Please see below some of the steps taken to achieve a more sustainable environment for our citizens:

Southeast Sustainability Directors Network

The City applied for a \$300,000 grant from the Southeast Sustainability Directors Network to construct a bio-retention cell and outdoor classroom along Village Creek in Ensley that will provide volume and water quality benefit, and serve as an educational and demonstration project for local high school students and design professionals.

The Southeast Sustainability Directors Network is a professional network of local government sustainability officials in the southeast. They collaborate to share best practices and developed knowledge of sustainability practices in the southeast. The City is a member of this organization.

ICLEI Local Governments for Sustainability

Through the City's membership with ICLEI, we have access to Clear Path, and plan to utilize to complete a greenhouse gas inventory. Local Governments for Sustainability is the leading global network of more than 1,500 cities, towns and regions committed to building a sustainable future. ICLEI also has created what is known as the Clear Path tool which is the leading online software platform for completing greenhouse gas inventories, forecasts, climate action plans, and monitoring at the community-wide or government-operations scales. This tool can help set a baseline for data for any forthcoming Sustainability Plan and efforts.

UAB Sustainable Smart Cities

The City and UAB signed a Memorandum of Understanding, and they city continues to collaborate with the UAB Sustainable Smart Cities to educate staff and the public about concepts to improve sustainability within the City. City Staff and UAB Staff have developed a schedule to meet quarterly to collaborate on citywide sustainability goals. Discussion of collaboration on a Greenhouse Gas Inventory (GGI) for the City will be on the next

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agenda. Planning staff is hopeful that the City can engage subject matter experts and interns from UAB to facilitate the development of a GGI utilizing Clear Path.

Clean Industry Initiative

PEP Staff recognizes that any attempt to revitalize the community must be coupled with opportunities for sustainable growth by utilizing the innovations of green infrastructure, energy efficiency, resource conservation and environmental protection to create a cleaner and resilient community. One area of opportunity is industrial sustainability. The iron and steel industry sector helped to shape and grow Birmingham and was a significant economic driver for the region; however, the challenges associated with the industry's environmental impact was arguably even more significant. Although significant progress has been made to date, the City continues to face the challenge of remediating the air, soil, and water quality issues the iron and steel industries left behind.

In addition, because of national policy trends, the city anticipates a resurgence of industrial activity in the coming years due to rising demand for domestic iron and steel. However, to avoid duplicating the mistakes of the past while capitalizing on the potential economic benefits of this resurgence, the City of Birmingham seeks to incentivize investment and the use of green and cleaner technologies by heavy industry that encourages green/sustainable buildings and operations. Promoting clean technology practices (the use of less material and/or energy, generates less waste, and causes less environmental damage than alternative technologies), will not only reduce the unintended adverse impacts on environmental quality and public health, but will also fully support the goals of the City's Sustainability Program. Sustainability was identified in the City's Comprehensive Plan as a key short-term goal to be attained within the next 10 years accomplished by

providing a blueprint for residents, businesses, and governmental entities to implement sustainability strategies focused on the reduction of greenhouse gas emissions, the development of more energy efficient processes and the improved utilization of water resources.

The expectation is that these strategies will in turn promote the development of Cleaner Industry that will generate community revitalization and economic growth within Birmingham.

The City of Birmingham has partnered with Thriving Earth Exchange to develop more energy efficient processes in the iron and steel industry. Thriving Earth Exchange (<https://thrivingearthexchange.org/>) helps volunteer scientists and community leaders' work together to use science, especially Earth and space science, to tackle community issues and advance local priorities related to natural hazards, natural resources, and climate change. By 2019, Thriving Earth Exchange will launch 100 partnerships, engage over 100 AGU members, catalyze 100 shareable solutions, and improve the lives of 10 million people. Through the Thriving Earth Exchange, local leaders and Earth and space scientists will create resilient communities that enrich the Earth. Working together, we will create solutions for the planet, one community at a time.

SOLSMART

The City of Birmingham is currently in the process of pursuing SolSmart designation. SolSmart (<https://www.solsmart.org/>) is led by the International City/County Management Association and The Solar Foundation, along with a team of partners with deep expertise in solar energy and local governments.

Local governments have tremendous influence over the prospects for solar energy growth. Unnecessary paperwork, red tape, and other burdensome requirements increase costs and discourage solar

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companies from moving to the area. By streamlining these requirements and taking other steps to encourage solar development, communities become “open for solar business.” And since the solar industry is a leading source of American job creation, attracting solar investment is a great way to promote economic development and new jobs.

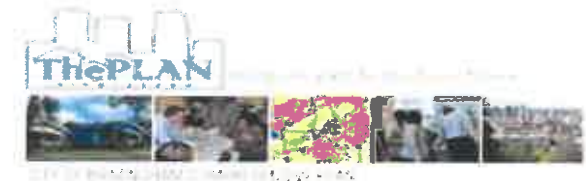
SolSmart uses objective criteria to designate communities that have successfully met these goals. These communities receive designations of SolSmart Gold, Silver, and Bronze. Since the program launched in 2016, more than 200 municipalities nationwide have achieved SolSmart designation.

To help communities achieve designation, SolSmart provides no-cost technical assistance from a team of national experts who work with local governments to evaluate programs and practices that impact solar markets, and identify high-prospect opportunities for improvement.

LEED for Cities and Communities (formerly the STAR Community Rating System)

The City of Birmingham is currently a 3 STAR community under the STAR Community Rating System. In 2018, STAR Communities officially merged with the U.S. Green Building Council. The USGBC is launching a new rating system called LEED for Cities and Communities. The new program is data-driven and performance based, but will include those critical best practices needed to move the needle on local sustainability conditions.

The City of Birmingham is pursuing the LEED for Cities designation. This designation will allow the City of Birmingham to track and report progress towards meeting the City’s emissions targets and adopt LEED-based strategies that help to reduce energy, water, waste, pollution and CO2 at the city scale, and in turn improve air and water quality.



CITY COMPREHENSIVE PLAN

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 continuation of Framework Plans, which are intended to encourage wiser patterns of real estate development and City growth while reducing the demand on existing infrastructure. 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. This latter effort also requires funding for implementation. The fact that funding has been elusive has contributed to project delay. Finally, the City has fully completed final development of the Village Creek Watershed Improvement Strategy and has begun similar development of a Valley Creek Flood Management and Water Quality Master Plan.

FRAMEWORK PLANS

The Framework Plans for the City of Birmingham were initiated after the adoption of the 2013 City Comprehensive Plan. The Framework Plans were established as a means to:

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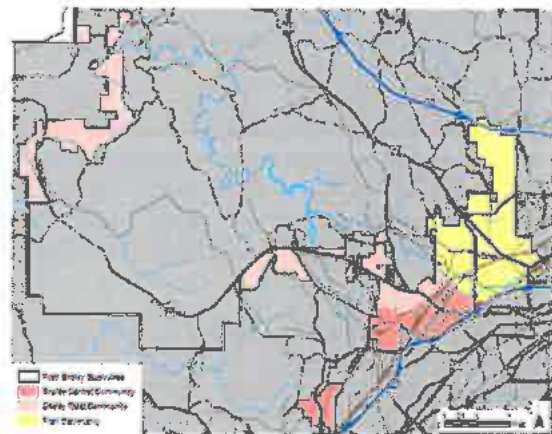
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- ❖ Identify areas of substandard housing and urban decline that would require City intervention;
- ❖ Examine existing land uses and propose revisions that would align with the new Future Land Use Map from the Comprehensive Plan;
- ❖ Register deficient quality of life issues (public safety, sanitation, recreation, commerce) that were identified by local stakeholders and provide possible solutions to bring about civic improvement; and
- ❖ Create an implementation committee that would drive continued public involvement in making positive change within their communities.

Working in concert with the Regional Planning Commission of Greater Birmingham, five framework plans have been completed: North Birmingham Community (2015), Titusville Community (2015), Western Area Communities [Smithfield, West End, Five Points West] (2015), Southwest Communities [Southwest, Grasselli, Brownville] (2016), Northeast Communities [Cahaba, Roebuck-South East Lake, Huffman, East Pinson Valley] (2016) and Pratt/Ensley Communities (2018).

These six Framework Plans have been annually reported and currently have progressed to the establishment of Implementation Committees that meet on a regular basis to discuss with City officials, local businesses and other stakeholders how they can best work together on the actions and strategies that have been developed within the existing framework plans. By the fall of 2018, two Framework Plans are in the process of being completed: Eastern Communities [Woodlawn, East Birmingham, East Lake, Airport Hills] and Northside/Southside Communities Framework Plans. These Framework Plans are currently receiving input from Stakeholder Committees, which are comprised of neighborhood leaders, local

entrepreneurs, religious leaders and concerned residents, which will in time become established as the Implementation Committees that will act as the driving force for these plans when adopted in 2018/2019.



Pratt/Ensley Communities Framework Plan: The Pratt/Ensley Communities area (See Figure above) consists of intermittent creeks, which are tributaries to Village Creek and Locust Fork. These creeks often cause flash-flooding during heavy rains. The areas that are prone to inundation by 1% annual-chance flood hazard are referred to as 100-year flood zones and are so designated by the Federal Emergency Management Agency (FEMA). Lands susceptible to inundation by 0.2% annual-chance flood hazard are referred to as 500-year flood zones.

Residential areas along Village Creek, particularly in the Ensley and South Pratt neighborhoods, have been identified as areas containing clusters of hotspots with repetitive loss of properties. With funding support from the U.S. Army Corps of Engineers and the Federal Emergency Management Agency (FEMA), many flood prone properties were purchased and the flood plain area restored. However, not all flood prone properties have been purchased and as a result have been abandoned, which has encouraged the area to be used as a

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dumping ground for debris and waste continuously creating a challenge to keep the floodplain clean and clear.

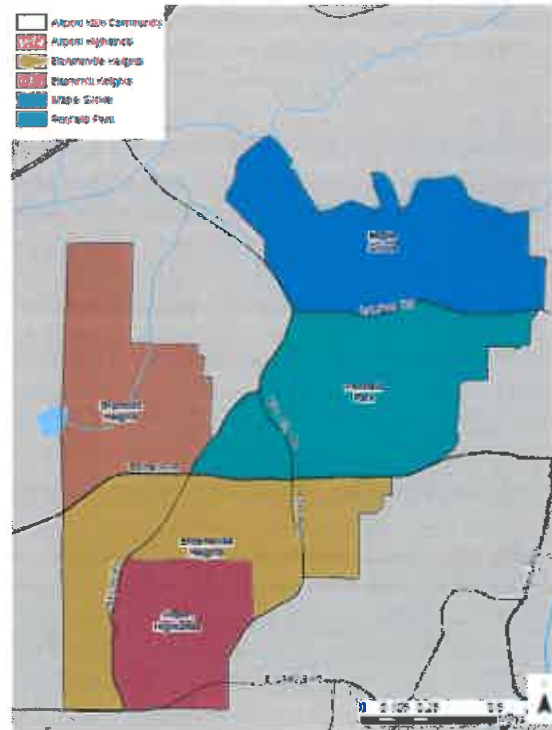
The results of Framework Planning for the Pratt/Ensley Area has established three goals, including:

- ❖ Establish more recreational opportunities
- ❖ Ensure natural water systems are valued and restored to improve habitat watershed health, especially near Village Creek
- ❖ Establishment of a flood recovery and long-term resiliency plan

The following key stormwater related actions were recommended by community leaders:

- ❖ Acquire blighted and flood-prone properties to expand recreational opportunities for residents
- ❖ Continue working with the Village Creek Society to increase access to recreational facilities for residents
- ❖ Provide incentives and education to homeowners for green design
- ❖ Encourage the use of Best Management Practices (BMPs) on all new developments during post-construction to control soil erosion and minimize sediment run off.
- ❖ Install green systems on blighted or vacant properties to reduce stormwater run-off and flooding in flood prone areas.

Eastern Communities Framework Plan: The Eastern Area Framework Plan includes 19 neighborhoods, and more specifically includes the communities of Airport Hills, East Birmingham, East Lake and Woodlawn. See the figure on the top right. The geographic area encompassed by this Framework Plan is 14.6 square miles and includes nearly 14,000 land parcels. The same three goals established for the Pratt/Ensley Framework Planning area were also identified for the Eastern Communities Framework Planning area. Currently, this plan is complete and being prepared for adoption.



The following key stormwater related actions were recommended by community leaders:

- ❖ Install green systems on blighted or vacant properties to reduce stormwater run-off and flooding in flood prone areas
- ❖ Develop a system of green systems
- ❖ Consider the feasibility of using large blocks of vacant land in Airport Hills, Brummit Heights, and Zion City to plant pine trees to replenish the City of Birmingham's urban forest
- ❖ Address issues at East Lake Park
- ❖ Prioritize the construction of pocket parks and other green spaces in Woodlawn, Airport Highlands, Zion City, Brownsville Heights, Penfield Park, and Maple Grove

Many of the planning elements related to stormwater management recommended or



proposed by these communities were included in and validated through the watershed management planning effort by City staff for Village Creek. That includes also for the previously completed framework plans. Therefore, community action has been verified to provide a measure of improvement in flood protection and water quality improvement in Village Creek, reinforcing the community's recommendations and leading to the incorporation into the final frameworks plans, implementation.

Northside/Southside Communities Framework Plan: This plan area consists of two communities and eight different neighborhoods. The first community to highlight within the Northside Southside Area is the Northside Community which consists of five neighborhoods (Norwood, Evergreen, Druid Hills, Fountain Heights, and Central City); while the second community is known as the Southside community which is made up of three neighborhoods (Southside, Five Points South, and Glen Iris). This Framework Plan area spans over 6.5 square miles and includes over 8,386 parcels.



WATERSHED MANAGEMENT PLANS

Village Creek Watershed Improvement Strategy: Building upon existing plans and framework plan development throughout the City in Village Creek, the City completed its first *Village Creek Watershed Improvement Strategy* in August 2017. The objectives of the strategy were to improve and

protect water quality so that standards for designated uses would be attained, as well as to reduce flooding impacts within Village Creek through implementation of all strategy recommendations. The approach used was to develop an analysis of existing conditions in the watershed using available models (i.e. HEC-RAS, SWMM) that could be modified to give an analysis of a future condition with improvement strategies in place. The project delivery team also worked with many stakeholders in the development of the final plan. The report further identified key areas within the Village Creek Watershed where water quality problems would be expected and project controls to address contributing pollutant loads would be needed. See the Figure, to the left. This figure depicts the area upstream and to the southeast of the stream contributes to the TSS, TN, and E.coli pollutant loadings at a comparatively high level in the watershed. The area immediately west of I-65 contributes to the TSS and E.coli pollutant loads, also at a comparatively high level in the watershed. Generally, per acre loading for all pollutants, except TP is higher in the middle and upper sections of the watershed where there is a significant, obvious development. The area downstream and south of the stream contributes to the TP and E.coli pollutant loads at a comparatively high level. Each of these identified areas are also subject to localized and flash flooding.

Furthermore, the stream channel itself represents an area of concern for zinc. Zinc in the stream segment is more of a concern in the bed sediments than it otherwise might be in the water column. As discussed in the *Water Quality* section of this report, Zinc levels for the last two reporting periods did not exceed 5.0µg/L.

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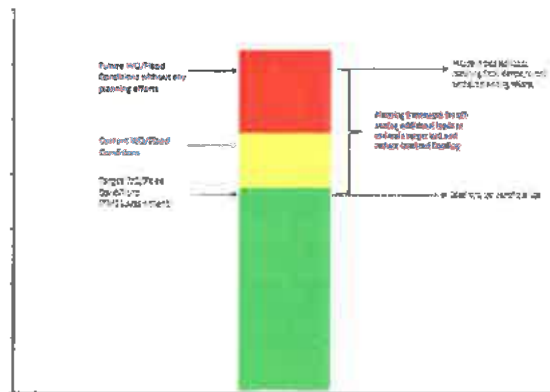
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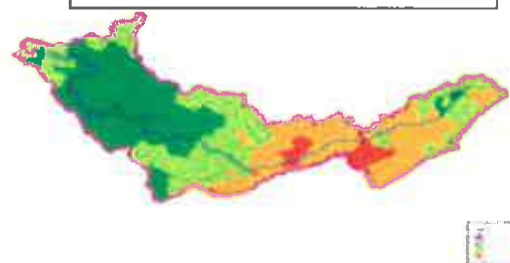


As was stated earlier in this section, the primary objective of the *Village Creek Watershed Improvement Strategy* was to develop projects and other management control strategies to assist the City in attaining reasonable beneficial use in Village Creek. This would be reflective of the green bar depicted in the figure above. One of the ways to measure this is by reducing the pollutant loads that have been identified to cause this water body to be on the non-attainment list for the State of Alabama, as represented by the yellow bar in the same figure. Up to this point, ADEM has focused on addressing point source pollutant loadings through industrial permits. Now it is up to the City to focus more on the non-point controls needed to achieve attainment. Obviously and given the current level of nonattainment in Village Creek, which is based on the current land-use, for the City to do nothing it could be expected to see continuous impairment from yellow to red, as future land use conditions would be anticipated. This report therefore, when fully implemented will offset the additional pollutant loadings and help the City to achieve the target water quality conditions for attainment while also reducing localized flooding. The report addressed the following controls to achieving attainment:

- ★ Development of a more robust asset management system

- ★ Development of an LID policy and ordinance
- ★ Continued maintenance dredging in accordance with ADEM requirements and turbidity BMP controls in place, in conjunction with sediment monitoring of zinc.
- ★ Continued implementation of trash controls and a more aggressive campaign to eliminate littering throughout the City.
- ★ Mitigation of Repetitive Losses
- ★ Encourage partnerships with other entities to reduce pollutant loading in key sub-basins
- ★ Consider modified riverine flood condition strategies like the reestablishment of bank full benches to better contain flood flows
- ★ Implement key capital improvement project controls to address flooding and water quality
- ★ Develop an Adaptive Management Plan to continuously evaluate the effectiveness of plans, policies, projects, and regulations to make necessary improvements and adjust capital and operating budgets accordingly.
- ★ Develop a SMART storm drainage maintenance program through collaboration with DWP and PEP, including the adjustment in street sweeping frequency.

Sub basin TSS Loading (lbs./ac-yr.)



A real-time example of the use of this planning strategy effort is depicted in the figure above. The figure depicts the heat map of total suspended solids (TSS) loading throughout the Village Creek Watershed. The red/orange highlighted areas are expected to have higher TSS pollutant loadings than other areas of the watershed depicted in green.



The watershed management plan for Village Creek therefore predicts where supplemental project investments might be considered to further address elevated TSS concentrations. A portion of the red area in the north central portion of the area is in Ensley where it was earlier described erosion at Avenue W has been identified. The City is considering a new technology to address this through the incorporation of a "Living Wall" bank stabilization system similar to that established by Filtrexx®. See figure below.

Valley Creek Watershed Management Planning:

The City of Birmingham retained the services of ARCADIS-US on September 27, 2016 to develop and implement refinement of its non-regulatory stormwater management program through the development of a new watershed management plan for *Valley Creek*. The effort will focus on project management, data collection, surveying, data processing, hydrology and hydraulic modeling for FEMA floodplain mapping, water quality modeling, and preparation of an existing conditions watershed management report. The work scope is broken down into 2-phases, with phase I being completed by May 2019. In association with this added watershed planning effort the City added two new U.S. Geological Survey discharge and flow recorders and water quality monitoring stations in Valley Creek at Avenue W (USGS 02461192) and at Center Street (USGS 02461130).



FLOODPLAIN MANAGEMENT

Floodplain Management continues to be a 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 (Locust Fork Risk Map Effort:

The City received D-FIRM data for the Locust Fork Watershed Risk Map which will take effort in March 2019. As a result of this restudy and remapping effort, a total of 454 structures were removed from the Special Flood Hazard Area of the Locust Fork Watershed which includes all of Village Creek, a very small portion of Valley and all of Five Mile Creek within the City's Corporate Limits. With this reduction of properties in the floodplain, property owners will potentially be able to benefit from eliminated or reduced cost in flood insurance premiums and will potentially be able to complete renovation or construction projects without the additional time and costs associated with developing in a floodplain. More specifically, these property owners will reap an estimated combined annual savings in flood insurance premiums of approximately \$50,000 to \$100,000 which over the life of a typical 30-year mortgage equates to an estimated \$1.5 to \$3 million in flood insurance premiums savings.

FEMA's Community Rating System (Class 5 Designation):

The City is a Community Rating System's Class 5 Community. The City is the only Class 5 Community in the State of Alabama; ranks in the top 8% of CRS Communities in Region 4; and ranks in the top 7% of CRS Communities in the nation. Being the highest rated Community in Alabama, our flood policyholders will now see a total savings of \$15,000 per property over a 30-year mortgage regardless of their individual risk. The City has been a participant in this program since 1993. This program rewards communities for going above and beyond the National Flood Insurance Program's minimum standards. These rewards are provided in the form of a 25% flood insurance premium discounts.



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 aid 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 by Summer 2019.

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.

Valley Creek Inundation Mapping: The Inundation Mapping efforts for Valley 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. Through this team effort, the City of Birmingham will use existing flood warning system to construct a rainfall runoff forecasting model. The model developed through this effort will be used to generate inundation mapping to provide a visual aid for making flood emergency response decisions during flood events. The funding appropriated for this project is \$100,000 and the benefits of protecting life and property by preparing residents for a flood far outweigh the costs. The flood inundation mapping should be available to the public early 2019.

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) was created to continuously inform Birmingham residents about flooding and ways to address potential flood damage to their property. This plan included map information, tailored outreach projects including website changes and information distribution practices the City utilized for floodplain properties. The ultimate goal is to continue 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. This PPI plan helped increase our community class rating in the CRS, which will yield greater savings to flood insurance policyholders.

Repetitive Loss Area Analysis: Late 2016, City Council adopted the Repetitive Loss Area Analysis which is a City performed detailed analysis centered on the Insurance Service Office identified repetitive loss properties. The process included analyzing repetitive loss properties, topographic features, existing drainage projects, and other efforts across the City near repetitive loss structures to determine the root cause of flooding for these properties. This analysis resulted in the City designated a total of 32 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. The City is now considering up to 3 permanent Risk Reduction grant projects for Village Creek and Five Mile Creek as a result of this effort.

REGULATORY/POLICY CONTROLS

During this calendar year Stormwater Management either initiated or continued the development of the following ordinances:

- Illicit Discharge Ordinance
- Erosion Control Ordinance
- Post-Construction Ordinance

More information about each ordinance can be located within its respective Stormwater Program Element.

During this year we also established a Stormwater Appeals Board. (*See IDDE Section*).

STRUCTURAL CONTROLS

BERTRAM A. HUDSON K-8 SCHOOL BIO-RETENTION SYSTEM PROJECT



As stated in last year's report, 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, Birmingham Department of Public Works, and Belgard Hardcastle, Inc.

The project is expected to be completed in two phases. The first phase will consist of the construction of the bio-retention basin and it began on April 11, 2018. The second phase will consist of

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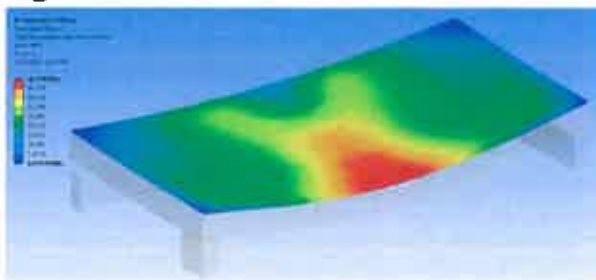
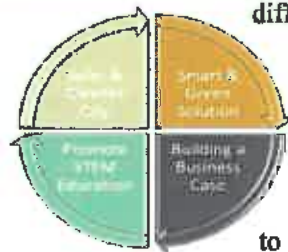
the installation of pervious pavers in a section of the parking area of the project site. Due to funding, the anticipated start date for phase II was pushed back. This phase is expected to commence in the summer of 2019.

As discussed in last year's report, the total project cost is estimated to be \$84,548; the federal match, including funds from the Southern Company, total \$36,781 but due to the lack of personnel and time, Stormwater Management applied and was granted a year extension to finish the project. Initially the City's Department of Public Work would have been performing the work for phase II but now we will have to contract out the work which will cost an additional \$50,000 to finish phase II of the project. This now brings the final cost of the project to approximately \$134,548.

PUT A LID ON IT

As part of a structural control project the City of Birmingham has partnered with UAB to develop and produce an inlet top redesign. During this reporting period UAB has studied and tested many

different composite material combinations and designs to be considered as the final product. There was also a study done on the current material and process used to make the standard concrete tops used today. Initiation of the video study in four frequently damaged areas process has begun.



Staff has worked through a preliminary portion of the pilot project and is close to completing the pilot project. The 3-year pilot project is scheduled for completion in March of 2019. UAB has requested that the project be extended for one additional year.

During this reporting period this project has been presented in many different arenas throughout the City and Country. This project has received great public response. Please see below some of the presentation opportunities that occurred during the reporting period:

- Forging University-Municipality Partnerships Toward Urban Sustainability (Yale University)-October 2017
- CAMX (The Composites and Advanced Materials Expo (Orlando, FL.)- December 2017
- City of Birmingham "Core Leadership" Training- March 2018
- 43rd Annual NUSA Conference (Birmingham) -May 2018
- Mayor Woodfin's inaugural Birmingham Resiliency Stakeholder Summit- August 2018

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STORMWATER PROGRAM ELEMENTS



STRUCTURAL CONTROLS



The City of Birmingham maintains 15 facilities with wet ponds. These ponds are depicted on maps, which can be found in the *Structural Control Appendix*. These ponds were constructed primarily for flood control and are not designed to achieve maximum pollutant removal efficiencies. However, the ponds are expected to provide pollutant reduction to an extent based on unit process and operational principles. Load reduction estimates presented herein are based on the assumption that the City owned wet ponds resemble the design appropriate for stormwater quality control and how each would be expected to respond to the environmental conditions present during each reporting year. New inspection sheets were developed and all known City of Birmingham Structural Controls for 2017 –2018 were inspected semi-annually by Stormwater Management personnel. No reported maintenance except for removal and treatment of woody vegetation at the Greenwood Park site. Additional record keeping on maintenance and sediment removal will be implemented by Parks and Recreation and Department of Public Works (DPW) after personnel training is complete.

STRUCTURAL CONTROL SUMMARY

Wet ponds are developed to serve two functions in Birmingham, flood control and pollutant removal thereby bringing both stormwater quantity and quality benefits. These ponds fill with stormwater and release most of it over a period of a few days, slowly returning to its normal depth of water. Some stormwater infiltrates into underlying soils. Some is evaporated back into the atmosphere. These latter processes mark a reduction in stormwater quantity to the City's MS4. Wet ponds provide stormwater quality benefits through several mechanisms, including:

- ✓ Gravitational settling of suspended particulates
- ✓ Biological uptake of pollutants by plants, algae, and bacteria
- ✓ Pollutant decomposition

When pollutants enter the pond during a rain event, the pond slows the water movement, allowing heavier pollutants such as suspended solids, sediments, and metals to settle out of the water column and come to rest at the bottom of the pond. This greatly improves overall turbidity, or water clarity. Many of the nutrients are also removed from the water by plant growth. Bacteria can also be depleted within the ponds biological processes. The Structural Controls will be inspected semi-annually by Stormwater Management personnel and the dates can be found on page 29 of this report.

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The wet ponds owned and maintained by the City of Birmingham includes:



1801 14th Street, SW (Lat. 33.47795N, Long. - 86.84743W): This facility is located in the Southwest portion of Birmingham adjacent to a residential area behind a church with a large impermeable parking lot. This was designed as a detention pond but has become a retention area due to accumulation of organic matter over a period of time. Birmingham Public Work Department is responsible for the maintenance of this site. The structure accepts drainage from approximately 0.005 square miles and discharges into an old abandoned commercial site that has become a wetland. The wetland discharges through a culvert into Valley Creek.

Avondale Springs (Lat. 33.43352N, Long. - 86.77222W): This facility is located at 5th Avenue South and 41st Street. The City of Birmingham Park and Recreation is tasked with the maintenance responsibilities at this location. The lake is approximately 1.5 acres and is stocked with fish and provides an environment for water fowl and various aquatic species. Avondale Lake is feed by a natural spring and has been sampled for water quality. The overflow of Avondale Lake feeds into Cotton Mill Branch a tributary to Village Creek.

Birmingham Botanical Gardens (Lat. 33.48661N, Long. -86.77519W): This facility is located at 2612 Lane Park Road in Birmingham and

has multiple small retention ponds incorporated into the landscape as small water features. Botanical Garden staff maintains these water features and is responsible for upkeep and repairs. The Water features drains approximately 0.3 square miles' upland from the Gardens. The majority of the drainage basin is considered residential and open space. The drainage in this area drains through a system of culverts and open ditches to Shades Creek.

Birmingham Zoo (Lat. 33.48492N, Long. - 86.78181W): This facility is located at 2630 Cahaba Road, Birmingham and has numerous small water features along with open space and permeable areas for rain water absorption. The property drains to a large retention pond south of the Zoo and collects surface drainage from surrounding neighborhoods as well. The retention pond, during heavy rainfall events, discharges into Shades Creek. Animal waste is collected in a separate area and is not allowed to discharge into the watershed. The facility is maintained by Zoo personnel and Public Works.



Tom Bradford Park (Lat. 33.66180N, Long. - 86.65486W): This facility is located at 1701 Edwards Lake Road, Birmingham. The park has a large retention pond, approximately 1.0 acre, at the south end of the park that accepts surface drainage



from the open area of the park and the surrounding forested area that is approximately 0.001 square miles. The City of Birmingham Park and Recreation staff is responsible for maintenance on the park structures. The retention pond discharges through a gated spillway into a tributary that feeds the Cahaba River.

CrossPlex (Lat. 33.49647N, Long. -86.86900W): This facility is located at 2331 Bessemer Road, Birmingham. This area has a large retention pond that was under construction during the time of inspection on July 27, 2017 and April 10, 2018. This new retention pond replaces an older retention structure and will discharge into Valley Creek when completed. Large amounts of concrete surface area have been removed from this facility in order to promote pervious areas for rain water to infiltrate. Approximately 0.43 square miles of residential, commercial and open area will drain to this retention pond. Birmingham Park and Recreation staff is responsible for maintaining this structure once the contractor is completed and all contractual obligations have been met. Follow up inspection will be conducted by Stormwater Management staff.



Eastern Area Landfill (Lat. 33.59426N, Long. -86.63446W): This facility has four separate retention ponds located south and south-west of the landfill and one detention pond on the northern section of the landfill that drains to a fifth large

retention pond. The drainage from the landfill moves in two different directions, with the retention ponds to the south and west draining into the Stinking Creek water shed. The remaining northern most retention and detention area releases water into the Pinchgut Creek watershed. The western most retention pond is equipped with a sand filter system that is replaced when necessary (approximately every 5 years). Maintenance at this facility is the responsibility of City of Birmingham Public Works Department. This facility drains approximately 3.9 square miles total of open area consisting of reclaimed landfill. The two aforementioned watersheds were combined for calculation purposes. Stormwater Management staff conducted inspections on all structures on a semi-annual basis. For the purpose of calculation and areas of retention were combined into two smaller drainage basins and area were calculated on that basis.

Eastlake Park (Lat 33.57050N, Long. -86.72592W): This facility is a 27-acre retention lake created by damming part of the tributary to Village Creek at Roebuck Springs. Eastlake Park is located at 4th Avenue North and 82nd Street North, Birmingham. Eastlake Park is maintained by Birmingham Park and Recreation and is home to numerous aquatic species along with an island that is a protected nesting site water fowl. The water collected in the pond discharges directly into Village Creek. This facility accepts drainage from an area dominated by residential, commercial and open space approximately 6.0 square miles in area.

Greenwood Park (Lat. 33.55037N, Long. -86.78373W): The facility was designed to control local area flooding and along Village Creek directly west-southwest of the Birmingham International Airport at 1632 Tallapoosa Street, Birmingham. The area consists of a large detention/retention area with gates that will automatically lift or close based on the water level flowing into the structure. When

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the water level reaches a high level, pumps are used to pump the excess water into pre-detention which then flows into three separate bio-swale structures that discharge into Village Creek (please see operational information in the Structural Control Appendix). Birmingham Park and Recreation staff is responsible for maintenance of the structural controls.



Highland Golf Facility (Lat. 33.51141N, Long. -86.77778W): This facility has a retention pond associated as a water feature (water hazard) approaching the green on the 10th hole of Highland Golf Course at 3300 Highland Avenue, Birmingham. The Lake is approximately 3 acres in size and accepts drainage from approximately 0.3 square miles from the golf course and surrounding residential neighborhoods. The pond discharges into the City of Birmingham's MS4 and finds its way to Village Creek. Highland Golf Course is maintained by City of Birmingham Park and Recreation staff.

New Georgia Landfill (Lat. 33.59399N, Long. -86.81027W): This facility is the primary solid waste disposal site for the City of Birmingham and is located at 47th Avenue and Lewisburg Road, directly north of Birmingham. The facility uses a 0.5-acre retention pond to control drainage from the landfill on the north end of the facility. The

retention pond then discharges into a smaller approximately 0.1-acre retention pond before entering Five Mile Creek. Heavy siltation in the first retention area occurs because of the lack of vegetation due to active landfill operations. The silt is continually removed from the retention pond to increase capacity and the material is hauled away for approved disposal. The retention pond accepts approximately 0.1 square miles of runoff from the landfill. City of Birmingham Public Works staff is responsible for Maintenance and siltation removal.



Oxmoor Community Center: (Lat. 33.42220N, Long. -86.85373W): This facility is located at 1992 Wenonah Oxmoor Road, Birmingham. The Community Center sits on a hill above a large retention pond that accepts water from surrounding commercial properties and forested areas with some open space. The drainage sub-basin has an area of approximately 0.1 miles and the lake outfalls towards Shades Creek. The lake is approximately 1.0 and is maintained by City of Birmingham Public Works staff.

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Patton Park Lake (Lat. 33.54505N, Long. - 86.78214W): This facility is located at 3969 14th Avenue North, Birmingham. A large 7.1-acre retention lake is used to maintain water quality at this location. The lake discharges into the City of Birmingham MS4 close to Village Creek and accepts storm runoff from surrounding areas including residential, commercial, industrial and open space. The facility is maintained by Birmingham Park and Recreation staff.

Railroad Park (Lat. 33.51017N, Long. - 86.80895): This facility is located at 1700 1st Avenue South, Birmingham. Railroad Park is a 19-acre park with several water features scatter across the area flowing to the west at 14th street was a pump system recirculates the water back to the east of the park. Irrigation is also used to maintain plants through dry periods. The water features discharge into the City of Birmingham's MS4 at the 14th street point and continues to Valley Creek. The facility is maintained by Birmingham Park and Recreation staff along with Railroad Park organization that manages events at this location.

Roebuck Springs (Lat. 33.58378 N, Long. - 86.71044 W): This location is perhaps most notably known as the location where the endangered Darter species are located in the City limits of Birmingham. This facility is located at 8920 Roebuck Boulevard, Birmingham, and is next to the parking area for the Roebuck Recreation Center and Don Hawkins Golf Course. This location is part of the headwaters for Village Creek and is spring feed into a retention area approximately 1.0 acre in area. City of Birmingham Park and Recreation staff maintain the area. The surface drainage in this area is .037 square miles comes from commercial, institutional, residential and open space surrounding land use categories.

The City of Birmingham maintains all Structural Controls and has no maintenance agreements with outside or private contractor.

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Semi-Annual Inspection Schedule for 2017-2018

<i>Facility</i>	<i>DATES</i>		
Avondale Park	7/19/2017	5/4/2018	
Birmingham Botanical Gardens	7/27/2017	5/2/2018	
Birmingham Zoo	7/27/2017	5/7/2018	
Bradford Park	7/27/2017	5/3/2018	
Fair Park/CrossPlex	7/27/2017	4/10/2018	
Eastern Area Land Fill	7/28/2017	5/8/2018	
East Lake Park	7/19/2017	4/5/2018	
Greenwood Park	8/31/2017	5/3/2018	8/22/2018
Highland/Boswell Golf Course	9/15/2017	5/7/2018	
New Georgia Landfill	12/7/2017	5/8/2018	
Oxmoor Community Center	7/27/2017	4/11/2018	
Patton Park Lake	9/15/2017	5/3/2018	
Railroad Park	8/31/2017	5/1/2018	
Roebuck Springs	9/15/2017	4/5/2018	
1801 14TH ST. S.W.	9/15/2017	4/9/2018	



31 inspections were conducted on City Controlled Structural Controls for 2017-2018 period for permit ALS000032.

Inspection times began during the previous year in anticipation of new permit requirements. These dates were also used as training for the purpose of gearing up for the new bimonthly inspection requirements under permit ALS000032.

Additional Inspections may be warranted as necessary

GREENWOOD PARK STRUCTURAL CONTROLS: As reported in 2017 Annual Report Stormwater Management staff inspected the structural controls at Greenwood Park on September 1, 2017. Follow up inspections on May 3, 2018 and August 22, 2018, as a part of the City's routine, biannual structural controls inspection program were conducted to try and resolve structural components issues. This park maintains a sophisticated complex of structural and non-structural flood control and water quality components before discharging directly into Village Creek. The structural flood control component includes diversion weirs and electric pumps to divert water to adjacent bioswales before discharging directly into Village Creek. At the time of inspection however, the structural flood control components (i.e. weirs, pumps, electrical component main board, etc.) was not functioning at all. Attempts to locate repair parts, so that the components may be repaired has led to incomplete repairs. Research by Park and Recreation has indicated that the company that was responsible for maintaining repair components has gone out of business. To this date Parks and Recreation have not been able to locate the parts needed to properly operate the control components. Parks and Recreation will continue to address facility

maintenance requirements with resources available. All bioswales have been cleared of all noxious, non-native plant species and all woody plant materials have been removed and the stumps treated to prevent regrowth. All sedimentation will also be removed and properly disposed of in a City landfill. A copy of the maintenance and operations manual for the gate and pumps for the structural Control is available upon request.

MAJOR FINDINGS: Overall impact of structural controls predominately using wet ponds for water quality purposes, that are on properties controlled or owned by the City of Birmingham, have had a positive effect to reduce the overall annual levels of total suspended solids by 191 tons, Total Nitrogen by 1.2 tons and total phosphorus by 0.2 tons. No sediment or floatable material removal was recorded by Public Works or Parks and Recreation during the 2017 – 2018 fiscal year. DPW recorded maintenance on a spread sheet with the location and type of work done by DPW for 2018, which did not include any maintenance on structural controls for this reporting period.

MAJOR ACCOMPLISHMENTS: Providing semi-annual inspections on all structural controls at City of Birmingham facilities has allowed for another layer of oversight at facilities that are sometimes the responsibilities of more than one City Department. This oversight helps to foster communication between Departments and allows the City to coordinate and utilize resources to better maintain these control structures. Inspections allow the City of Birmingham to better meet Permit conditions related to the MS4 and stormwater management. The City of Birmingham has included requirements during the permitting process to recognize and identify structural controls on all privately owned properties. This tracking will help identify locations



of such controls, so a follow-up inspection program may be implemented in the future.

PROGRAM STRENGTHS/WEAKNESSES: The strengths of providing these annual inspections allows the City of Birmingham to estimate the reduction of pollutant loads by using properly designed Structural Controls. The pollutant load reduction in the overall watersheds may not be as significant as the overall pollutant load, but it does help to see the need for more structural controls to reduce the pollutant load on the various Creeks and Rivers in the City of Birmingham's watersheds. Additional Structural Controls whenever possible should be utilized more frequently. The amount of actual sediment and floatables removed from City owned structural controls was not tracked to determine the actual effectiveness of structural controls and a record of maintenance activities did not indicate that any work was done on any structural control during FY 2017-2018.

FUTURE DIRECTION: A significant amount of pollutant load from respective drainage basins was estimated to be reduced by the City owned wet ponds, assuming the ponds resemble a wet pond design. Literature has published a wide range of performance levels for pollutants controlled by wet ponds; literature published median performance levels were employed in estimating pollutant load reduction by City owned wet ponds. The amount of actual sediment and floatables removed from City owned structural controls will be tracked to determine the actual effectiveness of structural controls and a record of maintenance for structural control activities will be maintained to help Department of Public Works, as well as, Parks and Recreation in scheduling regular maintenance.



PUBLIC EDUCATION AND PUBLIC INVOLVEMENT



CREEK AND NEIGHBORHOOD CLEANUPS:

The objective of the Clean Neighborhood Initiative Program is to remove blight, trash, litter, from every area of the City, as well as educate and promote behavior changes for all citizens to practice good stewardship and sustainability within their community and City.

There are twenty-three communities throughout Birmingham, which represent ninety-nine neighborhoods. As of October 3, 2017, under the "Operation Green Wave" project the City removed a total of 144,743 tons of trash and debris,

issued 301 citations, removed 19 abandoned and nonfunctioning automobiles, captured 22,454 stray animals, cleaned 2,122 blocks of ditches, removed litter from 3,847 blocks of neighborhoods, demolished 45 homes, cut 21,566 overgrown lots, cleaned 3,377 blocks of alleyways, and cut 40,084 blocks of street rights-of-way.

On November 28, 2017 a new initiative began called, "**Putting People First**". A lot of progress has been made under the new initiative whose emphasis has not been on recording data but to "**Building Communities through Servant Leadership**" and to focus on "**Putting People First**"

Through Keep America Beautiful and Keep Birmingham Beautiful program provided us with resources such as, "The Great America Clean Up" campaign. The Great American Cleanup prompts individuals to take greater responsibility for their local environment by conducting grassroots community service projects that engage volunteers, local businesses and civic leaders.

This reporting period under the "Great American Cleanup" Campaign computed 70 neighborhood cleanups collecting over 4,000 bags of trash and 200 bags of recyclables utilizing around 400 volunteers.

This program and many other partnerships will continue throughout the city until all community areas have been properly cleaned. The City is anticipated to overcome much of the trash and floatable materials that make way to the streams

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and rivers throughout the City. A total of 7 cleanups have taken place along Village Creek this reporting period. The cleanups resulted in 664 volunteers removing 35.47 tons of debris and tires. All cleanups were held in partnership with the Village Creek Human and Environmental Justice Society, City of Birmingham, and Jefferson County Commission. Items collected were removed by the City of Birmingham's Public Works Department or the County's Roads & Transportation Department (R&TD). The County provided funding and materials for each Village creek cleanup. Details from each has been listed below.



Starting January 18, 2018 Stormwater Management participated in Hands on Birmingham's Martin Luther King Day of Service Litter Cleanup Project. 358 people volunteered and removed a total of 8.5 tons. The items collected were picked up and disposed of by the City of Adamsville and the County's Roads and Transportation Department. The project consisted of 18 supporting organizations, 4 volunteer registration locations (Minor High School, Docena, McDonald Chapel, and Edgewater A), 4 communities (Adamsville, Docena, McDonald Chapel, and Edgewater B), 3 municipalities (City of Adamsville, City of Birmingham, and Jefferson County Commission) and 2 local schools (Minor High and Middle Schools), that came together to pick up litter along the roadside. On March 24th, UAB's *Into the Streets*

partnered with the Village Creek Human and Environmental Justice Society, Jefferson County Commission, Jefferson County Department of Health Watershed Protection Program, unincorporated areas of Mulga Mines, Minor Heights, and the Town of Mulga. The project consisted of 1 volunteer registration location, 2 communities (Minor Heights and Mulga) and 3 jurisdictions (City of Birmingham, Town of Mulga, and Jefferson County) collaborating to cleanup Mulga Loop Road, as well as, alongside Village Creek. 98 volunteers removed 3.12 tons of debris. On April 7th, 21 volunteers removed 2.76 tons of debris. May 19th, 52 volunteers from local schools removed 1.90 tons of debris during Village Creek Human and Environmental Justice Society's spring cleanup. The partnerships included City of Birmingham and Jefferson County Commission. 135 volunteers supported Village Creeks Fall Cleanup. The cleanup lasted from September 13th to September 18th. Various organization contributed to the event including Vulcan Materials, City of Birmingham, Birmingham Fire and Rescue, and a host of others. A total of 19.19 tons of debris and trash were collected.



There was a total of 11 cleanups, held along Valley Creek, in conjunction with the Renew Our Rivers Program. The Valley Creek Cleanups that were led

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by volunteers occurred on March 10 and March 17, 2018 with one prior work days to remove the heavier items. 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 **10** volunteer site registration locations for the volunteers this year. A total of **479** volunteers removed **15.165** tons of debris.

Church of the Highlands, located along Grants Mill Road, held three roadside cleanups, one as part of its Day of Service project, to prevent litter and trash from entering the Cahaba River. On March 24, 2018, **10** volunteers participated with no tonnage reports. On July 15, **30** volunteers picked up **2.48** tons of trash and September 1, **3** volunteers picked up a total of **0.52** tons of debris and tires.

A total of **2** creek cleanups were held along Shades Creek during this reporting period. One June 28th as a part of Schaeffer Eye Center's 'Community Give Back Day', **21** volunteers removed **0.52** tons of debris and tires. September 29th, 2018 **65** volunteers removed **4.125** tons during the '20th Annual Shades Creek Cleanup'. Jefferson County

Stormwater program provided trash bags, gloves, and backpacks for this event.

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

WATERSHED	DATE OF CLEANUP	TONS	VOLUNTEERS
CAHABA RIVER	3/24/2018	n/a	10
	7/15/2018	2.48	30
	9/1/18	.52	3
	6/28/2018	.52	21
SHADES CREEK	9/29/2018	4.125	65
VALLEY CREEK	3/10/18-3/17/18	15.165	479
VILLAGE CREEK	1/18/18	8.5	358
	3/24/18	3.12	98
	4/7/18	2.76	21
	5/19/18	1.9	52
	9/18/18	19.19	135
TOTAL		58.28	1272



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EDUCATION OPPORTUNITIES:



Family Fishing Rodeo:

On June 9, 2018, the Clean Water Awareness Campaign posters were displayed at a booth along with a fun interactive activity for the kids at an event that was free and open to the public. A visual display showcased how used motor oil and used cooking oil and grease can impact the environment when not disposed of properly along with a glass jar that patrons could shake that contained various common pollutants rain water carries to the local waterways during rain events. Cooking oil and grease recycling containers were distributed along with other printed materials on Jefferson County's Household Oil and Grease Recycling Program along with a current list of all the local Recycling Centers. Stormwater Program staff and the Jefferson County Stormwater Program staff shared this booth and assisted in the kid's water blot painting activity, which while pretty, also educated about the properties of oil and water which reinforced the visual display showing that oil and water do not mix. It was reported that close to **2,000 people attended** this annual event held at the East Lake Park.



Homebuilders of Alabama Association bi-Annual Workshop:



The City of Birmingham Stormwater Management assumes responsibility for hosting and coordinating an Erosion and Sedimentation Control (ESC) workshop on an alternating basis with Jefferson County Department of Health, Jefferson County Stormwater Program, and the City of Bessemer Stormwater Program. Jurisdictions 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 **60 people attended** the HBAAESC Workshops held on April 26, 2018. The purpose of these workshops was to provide appropriate education and training measures for

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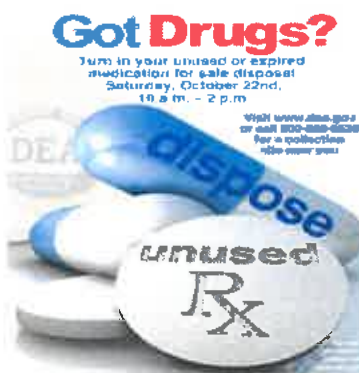
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construction site operators and municipal staff as required in AL5000001 and to reduce the impact of erosion and sedimentation in waterways. Educational materials were distributed at the workshops. The Field Guide for Erosion and Sediment Control on Construction Sites in Alabama is distributed to attendees of the Erosion and Sediment Control Workshops for single family homebuilders. Field Guides in Spanish are available and will be distributed to Spanish speaking attendees as needed.

Prescription Drug Take-Back Events:



Stormwater Management staff promoted 2 National Prescription Drug Take-Back Events held in the Jefferson County area on October 28, 2017 and April 29, 2018. These

events are designed to promote safe and proper disposal of unwanted or expired medications, and to prevent drugs from being flushed down toilets and ending up in waterways. Over 456 tons of medication were collected during these events according to the Drug Enforcement Administration. Materials to promote this program were available in both English and Spanish and in various formats (posters, handouts, etc.). The Drug Enforcement Administration (DEA) published its Notice of Proposed Rulemaking for the Disposal of Controlled Substances in the Federal Register Dec 21, 2012. The proposed regulations seek to implement the Secure and Responsible Drug Disposal Act of 2010.

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. In a previous reporting period, in effort to promote the proper disposal of cigarette butts, the Stormwater Program in partnership with Keep Birmingham Beautiful Commission (KBB) and City Action Partnership (CAP) created a sticker which was placed on 59 cigarette receptacles.

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 is 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. This year was used for planning this event and will reconvene next reporting period.

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Brown Bag Lunch and Learn Seminars:

Stormwater Program staff, in partnership with the Friends of the Birmingham Botanical Garden, Alabama Cooperative Extension System, Alabama Green Industry Training Center, and Jefferson County Stormwater Management, created a series of free informational seminars called *The Brown Bag Series*, 14 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 and City of Birmingham PEP Facebook page. 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 497 participants during this reporting period. The topics were: "Shop the Fall Plant Sale", October 11; "Pre-Shop the Spring Plant Sale", April 4; "All the Dirt on Chert", April 28; "Creating a successful Organic Veggie Garden", May 2; "Invasive Plants", May 16; "DIY Landscape Planning Design With Water in Mind", May 30; "Repel and Trap Pests", June 13; "Everything I Plant Dies!", June 27; "Snip, Cut, Whack", July 18; "Keep Out Home Invaders",

August 1; "Should you say NO to GMO?", August 15; "Handbook of Nature Study", August 29; "Grain to Glass", September 12; and "What's Bugging You", September 26.

Jefferson County Water Festival:



Stormwater Program staff serve on the festival committee that planned and implemented the fourteenth Annual Jefferson County Water Festival held on May 3, 2018, at University of Alabama Birmingham (UAB). The Water Festival educated 673 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, "It's a Waterful Life", 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.

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The festival committee selected the design winner from Adamsville Elementary School whose artwork was used as the Water Festival logo on the t-shirts.

Rain Barrel Workshop:



During this reporting period 2 Rain Barrel Workshops were held, totaling 75 attendees at the Birmingham Botanical

Gardens. Through a working Rain Barrel Workshop Committee, the Alabama Cooperative Extension System (ACES), Alabama Environmental Council (AEC), Friends of Birmingham Botanical Gardens, City of Birmingham, City of Bessemer, Clean Water Partnership, Jefferson County Department of Health, Jefferson County Soil and Water Conservation District, Jefferson county Storm Water Management, Keep Birmingham Beautiful and Storm Water Management Authority hosted the event and provided instruction, materials, and rain barrel assembly assistance for participants. Participants learned the benefits of capturing and storing rain water from their roof and how best to reapply the water in their yard. *Fight the Bite* mosquito prevention kits were distributed to all class participants and door prizes were awarded. The Committee publicized this event through flyers and social media. The Committee members plan to offer more frequent Rain Barrel Workshops to the public in 2018 at various venues.

Electronic and Battery Free Drop-Off Day:

A combined total of more than 4 tons of electronics and 0.197 tons of batteries were collected from 2

Electronic and Battery Takeback day events held for Birmingham residents and the unincorporated areas of Jefferson County. These events were sponsored by the Alabama Environmental Council in partnership with the Jefferson County Commission and neighboring cities. These events were held in areas prone to illegal dumping as way to proactively deal with the improper disposal of electronic and batteries. Details from each event are listed below

On June 28, 2018 an event was held at the Adamsville Walmart Parking lot. Additional partners with this event include the Jefferson County Stormwater, City of Graysville and Keep Birmingham Beautiful. A total of 1,804 pounds of electronics and 153 pounds of batteries were collected.

On August 11, 2018 an event was held at the Jefferson County Center Point Satellite Courthouse. A total of 75 households participated in the event. Additional partners with this event include the City of Birmingham, City of Center Point, City of Pinson, and Keep Birmingham Beautiful. A total of 6,174 pounds of electronics and 241 pounds of batteries were collected.

Citizens of Birmingham, CenterPoint, various unincorporated Jefferson County communities, and the Pinson area were invited to recycle their old household electronics. The following were accepted at the drop off: audio equipment, batteries, cable boxes, cell phones, computers, projectors, chargers, GPS units, fitness trackers, scanners, security, and small appliances. Cassette tapes, CDs, DVDs, large appliances VHS tapes, and wooden speakers were not allowed. Ant materials donated were not to be stored in unidentified containers. 62 intake forms were turned in and from that information the chart below was created:

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Total Types of Items

Audio equipment, speakers, cable	17
Batteries, rechargeable batteries	16
Cable box, cable	13
Cell phone, charger	1
Computer, hardware, accessories	29
Fitness tracker	0
GPS unit	1
Printer, copier, fax, scanner	14
Projector	2
Security equipment	2
Small appliance	29
Television, monitor	27

Total Items Recycled 151

Alabama Environmental Council:

To promote proper disposal of various household items, the City of Birmingham partnered with Alabama Environmental Council (AEC) on its recycling program, Recycle Alabama. The Stormwater Program staff promotes Recycle Alabama through its Jefferson County Clean Water Awareness Campaign posters, newsletters, presentations and events. The AEC runs a nonprofit recycling center in downtown Birmingham which accepts textiles, plastics, glass, metal, cardboard, paper and other items. AEC

created and promotes Recycle Alabama through its website (www.recycAL.com) and printed materials. Under the Recycle Alabama campaign, AEC in partnership with Jefferson County Department of Health, the University of Alabama at Birmingham, Jefferson County Commission and several municipalities organized the purchase and distribution of recycling drop-off trailers. There were 10 trailers distributed to various outlying communities in Jefferson County that do not have recycling opportunities. The recycling trailers have a modified version of the *Trash Blows! Tarp and Tie Your Load* poster prominently displayed to remind those dropping off materials that even recycled materials can become litter that can pollute our waterways of stormwater pollution.



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Urban Forestry Fair/Seedlings Give-a-way:



On February 21, 2018, Stormwater Management staff provided an educational game for 410 fifth 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 resources and improving water quality. Ninety-five volunteers provided 570 hours of service to the event worth \$14,000. Funding was provided by the Jefferson County Conservation District and the Jefferson County Farmers Federation. The total value of the project, considering donations, volunteer time, administration, and in-kind support was over \$21,700. The partners who helped make this event successful were: Alabama Forestry Commission, Alabama Master Gardeners & Friends of Birmingham Botanical Gardens, Alabama Cooperative Extension, Camp Fletcher (Camp Fire USA), Custom Sawing, Jefferson County Stormwater Management, McAdory High School FFA, McWane Science Center, Society of American Foresters (Cahaba Chapter), Red Mountain Park, Regions Bank, Ruffner Mountain, and Tallapoosa County Conservation District. Classroom guides were provided by Birmingham Engaging in STEM through AmeriCorps, Kappa Alpha Sorority, and Wenonah High School's Gentlemen of Distinction. Both Arbor-Gen Nursery

and White City Nursery committed trees to the Fair while administrative support was provided by the staff of Boutwell Auditorium, the City of Birmingham's Department of Planning, Engineering, and Permits, Jefferson County Conservation District, and the USDA Natural Resource Conservation Service. The activities presented were: Tree Cookies, Skins and Skulls. Build-a-Habitat, Tree ID, Owl Pellets, From Mines to Meadows, The Wheel of Ag, Soil Babies, Wood or Not, Build-a-Tree, Birds and Worms, Deadly Links, Know Where It Goes, Oh Deer!, and The Portable Saw Mill. Two hundred and sixty tree seedlings were donated by White City Nursery, at the Tree Adoption station, to celebrate Alabama Arbor Week. 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 21, 2018 as a means to distribute free tree seedlings to the public.



Do Dah Day:

On May 19, 2018, Stormwater Management staff partnered with Jefferson County Stormwater Management to display Clean Water Awareness Campaign posters at a booth during the event, as well distributed materials during the event. In

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In addition, Jefferson County 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. 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 20 *Fight the Bite* mosquito prevention dunks 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 1000 pet waste bags and flyers were distributed. The Do Dah Day Board estimated between 20,000 and 25,000 people attended this event.



Earth Day at the Garden:

In partnership with Jefferson County's Stormwater Management Department, Keeping Birmingham Beautiful, and Jefferson County Conservation, the City of Birmingham's Stormwater Management educated 450 visitors on the 'One Drop' campaign. The event was held at the Birmingham Botanical Gardens, April 21, 2018. **150 children**, 17 and under, were in attendance.

Cooking Grease Campaign:

The County's Environmental Services Department (ESD) administers a county-wide household cooking oil and grease recycling program to reduce the amount of cooking oil that enters the sanitary sewer system, thereby reducing sewer overflows. This is a free service to all of the citizens of Jefferson County. Collection bins are located



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at several sites around the county with free plastic containers for residents to take home. Once a container is filled, it can be returned to the collection bin and exchanged for a clean container. The containers are collected weekly by the Grease Control Program inspectors and the oil is picked up at the Shades Valley Wastewater Treatment Plant by local rendering companies. Grease and oil accumulate in the sewer system and require diligent maintenance to prevent sanitary sewer overflows. ESD developed this program in the ongoing effort to the prevent overflows and protect the water resources. The bins were constructed by the County's General Services shop and are 4' wide by 4' tall and 2' deep and sit on legs 6" off the ground. The bins sit in a hard, durable plastic tray which provides a liquid retention barrier should a container leak or spill. There are currently 20 drop-off points within Jefferson County and 4 in the City of Birmingham that accept filled containers for recycling, which is an increase of one new site from last year.

Stormwater Calendar:

A 12-month printed 2018 calendar was created in partnership with Jefferson County Stormwater Program, Keeping Birmingham Beautiful, Alabama Environmental Council, Alabama Rain Barrel Project, and Alabama Water Watch 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. The graphic chosen for the 2018 Stormwater Calendar promotes



sustainable stormwater friendly practices such as capturing and storing rainwater from the roof to reapply in the yard while illustrating some of Alabama's most beautiful watersheds. Each month the calendar highlights a pollutant and the negative effects that pollutant has on local water quality along with simple prevention strategies people can incorporate in their everyday life. The helpful tips will assist people to become better stewards of their communities and watersheds. The calendar also featured Alabama Water Watch's new infographic, *America's Amazon*, which promotes Alabama's aquatic biodiversity. A total of 3000 calendars were printed and distributed, with 1500 of those distributed in unincorporated Jefferson County communities.



Stormwater 101: Only Rain Down the Drain Presentations:

During the last two reporting period City of Birmingham Stormwater Management Staff Presented "Only Rain Down the Drain" to over 336 Birmingham City Students ranging from k-12th graders over several different events. Staff also presented "Only Rain Down the Drain" to over 413 adults at several different events during this reporting period. "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

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children will help to guide the next generation of Birmingham residents with the need to continue to improve City water resources into the future.



Stormwater 102: Field Water Quality Analysis: During the reporting period City of Birmingham Stormwater Management Staff developed "Stormwater 102." We use this program to teach and train citizens about the importance of clean water. We allow them to use our equipment to perform water quality analysis in the field. We use this technique to encourage scientific reasoning as well as teach basic stormwater management techniques.

Public Outreach Materials: The 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:

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. 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.

Litter Quitters – Video Competition

A litter abatement/prevention video competition was held among public high school in the Valley Creek Watershed from April 12-22, 2018. The schools competed for cash prizes and a chance to have their video on local television stations. The competition was to expand the education and outreach efforts with the Valley Creek Cleanup.



Prizes
1st Place: \$1,000.00
2nd Place: \$500.00

ABC 33/40 promoted the video competition on their 'Good Day Alabama' morning show and announced the winner on April 24, 2018. The winning video was displayed throughout Jefferson County to educate citizens about the littering problems in our county watersheds. The high

schools who entered were: Bessemer High School, Fairfield High School, Midfield High School, Hueytown High School, McAdory High School, Oak Grove High School, Pleasant Grove High School, and Wenonah High School. The winner of the competition was, Birmingham City School's very own, Wenonah High School, with a total of 426 votes.

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Alabama Wildlife Federation's Youth Conservationist of the Year:

Wenonah High School students was selected by the Board of Directors of the wildlife confederation as Youth Conservationist of the Year. Wenonah High was the 1st place winning school in the 1st Annual Litter Quitters 'Competition.



Birmingham Stormwater Facebook Page:

During this reporting period we open our Facebook page to the whole PEP department and changed our Facebook address to <https://www.facebook.com/COBPEP>.

This Facebook page will allow us to gain easy access to citizens, publicize upcoming events, and help educate citizens in environmental stewardship and stormwater management, as well if be a location for other department wide information.

Only Rain Down the Drain Street Signs:

During the summer of 2016, The City of Birmingham Stormwater



Management, in collaboration with KBB, designed and placed 21 "Do Not Litter" and "Only Rain Down the Drain" signs around high traffic areas with Birmingham city limits. In addition, on the "Only Rain Down the Drain" message, the signs included the individual watersheds for sign locations,

making the public aware of the impacts of littering in the affected watersheds.

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Stormwater 101 Surveys:



During this reporting period Stormwater Management Staff survey to go along with the “Stormwater 101” education to quantify knowledge and information retained. The figure below shows the responses from three events with adults and students that were asked, “What are some of the items we discussed today that are not allowed in the storm drain?”

PROGRAM OVERVIEW

Please see the chart below to demonstrate the education program pollution control measures verses each education program element. The goal is to maximize each opportunity we have to educate.

Major Accomplishments:

- Stormwater Website and Facebook page
- Village Creek Watershed Management Plan
- Partnering with KBB

Program Strengths:

- Stormwater 101
- Partnerships
- Webpage & Facebook
- Stormwater Calendar

Program Weaknesses:

- Participation in Roadside Cleanups to 100% (all 99 neighborhoods)

- Stormwater Signage
- Trash

Future Direction:

- Put a Lid on It Project
- HHW (Household Hazardous Waste)
- KBB School Ambassador Program
- Educate every Birmingham student before they Graduate High School
- Citywide Cleanups
- Extend Partnership Opportunities

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2018

Education Opportunities		15	14	14	20	22	16	22	16	22	16	22	14	14	10	17	19	6	9	19	22	22	15	22
Control Measures																								
Air/Water		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Automobile Fuel																								
Automobile Washing																								
Conservation																								
Cooling Green																								
Fooding																								
Green Infrastructure																								
Household Waste																								
Industrial Waste																								
Leaves and Grass Clippings																								
Low Impact Development																								
Pesticides/Herbicides																								
Recycling																								
Safety																								
Soil Erosion Control																								
Water Quality																								
Total Pollution Control Measures																								
Brown Bag Lunch and Learn		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calendar		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Centennial Tree Program																								
Cooking Grease Campaign																								
Do Dah Day		X																						
Drug Take Back																								
Earth Day At The Gardens																								
Electronic Take Back																								
EMA Be Ready Day		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Facebook Page		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fishing Rodeo		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Friends of Birmingham Botanical Gardens		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Jefferson Cour Water Festival		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Plant Dig																								
Seedling Give Away																								
Stormwater 101		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stormwater 102 Water Quality Testing		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stormwater 103 Water Quality Drainage-Flooding		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stormwater Signs		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Urban Forestry Fair		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Video Competition(Liter Quitters)		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
We bolle		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TOTAL EDUCATION ELEMENT COUNT		15	14	14	20	22	16	22	16	22	16	22	14	14	10	17	19	6	9	19	22	22	15	22



ILLCIT DISCHARGE DETECTION AND ELIMINATION (IDD&E)



The City of Birmingham is required by the Federal Clean Water Act (section 402(p)) through the National Pollutant Discharge Elimination System (NPDES), Municipal Separate Storm Sewer System (MS4) Phase I permit to implement an ongoing program to detect and eliminate illicit discharges into the MS4, to the maximum extent practicable (MEP). This program, at a minimum, consists of procedures for: (1) dry weather screening to identify IDD&E sources, (2) tracing and eliminating the suspected source of illicit discharge, (3) notifying the Alabama Department of Environmental Management (ADEM) of suspicious discharges

from permitted facilities and/or other MS4 facilities, (4) public notification mechanism for reporting illicit discharges and (5) a training program for training city staff in the administration of the program element.

During this year's reporting period, city staff addressed a total of 23-illicit discharges: 9-were on-going; 12-were detected and eliminated, and 1 was referred to another Agency. (*Table 1-1*)



TABLE 1-1 ILLICIT DISCHARGES/FACILITIES OBSERVED DURING 2017-18

DISCHARGE/FACILITY TO MS4	NON-COMPLIANCE NOTICE	NOTICE OF VIOLATION	ON-GOING/RESOLVED
DIRECT DISCHARGE			
• VALLEY CREEK (VC-0.15)			On-going
• MULGA LOOP RD/PLEASANT GROVE RD			Resolved
• ELDER'S STREET			On-going
• VALLEY CREEK (VC-0.7)			On-going
INDIRECT DISCHARGE			
• CITY FEDERAL		•	Resolved
• BROTHER'S CARWASH			On-going
• STAY FRESH MOBILE CARWASH			On-going
• ELITE CARWASH			On-going
• BIRMINGHAM BOARD OF EDUCATION			Resolved
• EL GIRASOL (EASTLAKE PARK)			Resolved
• 237 GADSDEN HWY			Resolved
• 4725 AVENUE W			Resolved
• BUCC MEDICAL FORUM	•		Resolved
• CARWASH (900 PINE ROAD)			On-going
• MOBILE CARWASH (18 OPORTO MADRID BLVD)			On-going
• 4101 HIGHLANDS CIRCLE			
• MIKI'S RESTAURANT	•		Resolved
•			
• GOOD PEOPLE BREWING	•		Resolved
• 8238 DIVISION AVE			On-going
• ROBERT JEMISON RD			Resolved
• AVONDALE BREWERY	•		Resolved
• SAW'S SOUL FOOD			Resolved
• PARKING DECK RENOVATIONS (19 th STREET N)			Resolved

Stormwater Management addressed numerous complaints (several ongoing) this reporting year

and partnered with a City-wide Coordinated Code Enforcement team that deals with various



violations pertaining to property, vehicles, zoning/use of property, licensing, animal control, condemnable structures and other public nuisances. The goal is to implement better processes and business practices that allow code enforcement efforts across the city to be better coordinated and compliance driven from the point of violation assessment through notification of violation to final resolution of violation via compliance through an appeals board, city council, and/or municipal court. A summary of each ongoing investigation is listed below:

- 1225 Warrior Road (Brother's Carwash) – Stormwater staff received a citizen's complaint of a carwash operating without a business license and wash water entering the City's MS4. At the time of inspection, there was no activity taking place and no visible signs of wash water runoff entering the City's MS4. Staff and Zoning spoke with the business owner and gave copies of the Zoning/Stormwater Protection Ordinance requiring connection to a sanitary sewer system or ADEM NPDES permit.
- 3020 12th Ave N (Stay Fresh Mobile Carwash) – City employee informed Stormwater of an illegal carwash operating behind a local gas station. At time of inspection, staff observed activity but no visible wash water runoff entering the City's MS4. The Property Owner and Business Owner were given copies of the Zoning/Stormwater Ordinance requiring connection to the sanitary sewer system.
- 1000 Vinesville Road (Elite Carwash) – City staff informed Stormwater staff of an illegal carwash operation. At time of inspection, staff observed no activity.
- 960 Pike Road – A citizen's complaint to the Mayor's office concerning an illegal carwash operation over the weekend.

Stormwater staff performed an investigation and discovered no activity or signs of wash water runoff entering the City's MS4.

- 18 Oporto Madrid Blvd – A staff member of City Council contacted staff concerning an illegal mobile carwash operating on a vacant lot. There was no visible signs of wash water runoff entering the City's MS4 and no activity was observed at the time of inspection.
- Elder Street – Stormwater staff continued to receive complaints of discoloration in Shades Creek after bringing local business into compliance. Staff performed a site investigation and took field measurements using a Stormwater kit whereas the results were within normal range.
- Valley Creek 0.1s – A citizen's complaint, along with Stormwater staff observed discoloration to the Creek. IDDE staff coordinated with Public Works to lift manholes in an effort to locate the source with no luck. Staff also contacted Jefferson County Environmental Services in an effort to possibly use a camera for this area.
- Valley Creek 0.7 – Stormwater staff observed discoloration to the Creek due to elevated turbidity levels from VC0.1s.

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. 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. Because efforts made to establish an Appeals Board were unsuccessful during the last report year due to



insufficient number of volunteers to serve on the appeals board, the City did not yet have a required appeals board in place by ordinance. On August 1, 2017, Council adopted *Ordinance No. 17-100* (an amendment to *Ordinance No. 14-198*) to reduce the number of members of the board from seven to five to further provide operation of the board. (See *IDD&E Appendix*)

In the adoption of the Storm Water Protection Ordinance, the Council authorized a Storm Water Appeals Board as part of the enforcement process. The Board provides a forum for a person notified of a stormwater violation to appeal a notice of violation. On June 19, 2018, *Resolution No. 1384-18* electing four (4) of five (5) members to the Stormwater Appeals Board was adopted by the Council of the City of Birmingham with said terms expiring July 1, 2020 and July 1, 2021.

MAPPING OF OUTFALLS

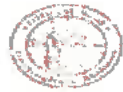
Stormwater Management continues its ongoing efforts to update and maintain the data contained in the City's GIS system to map major outfalls in the City, however, there were no new outfalls identified during this year's reporting period.

PUBLIC NOTIFICATION MECHANISM (3-1-1)

The City has a complaint system to which citizens can make a phone call regarding stormwater related issues (See Table Below). The 3-1-1 call center serves as the liaison with the City departments by routing and tracking citizens' non-emergency related requests and concerns for follow-up.

3-1-1 COMPLAINT SYSTEM

CATCH BASIN CLEANED	11
CATCH BASIN CLOGGED	33
CATCH BASIN REPAIRED	150
FLOODING	84
MISSING/BROKEN INLET	114
RESET INLETS	175
STORM SEWER CLEANED	522
STREET SWEEPING	392



CONSTRUCTION SITE STORM WATER RUNOFF CONTROL



Stormwater Construction Program (SEC)

The management of the Construction Stormwater management program is within the Planning, Engineering and Permit Department, Watershed Division. The soil erosion program is mandated by the NPDES MS4 Permit issued by the State of Alabama and City Ordinance number 99-131. Permit applications, plans reviews and site inspections are tracked using the Tidemark permitting system. The ordinance is posted to the following link:

https://www.birminghamal.gov/wpcontent/uploads/2018/11/PEPSWINF_SwmpEspecAppDCobSoilErosionSedimentControlOrdinance1118.pdf

The review of the soil erosion control best management construction plans (BMP) and the inspection of the construction sites for erosion control are under the supervision of 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 peak construction periods. All site inspection reviews are performed in accordance with the "Alabama Manual for Soil Erosion and Sediment Controls". Site inspections and Enforcements standards are in accordance with the City of Birmingham "Construction Stormwater Inspection and Enforcement Standard Operating Procedures Manual"

During this reporting year FY18, the staff training remained a priority. Between October 1, 2017 and September 30, 2018 most of the Construction Stormwater staff received erosion control continuing education training. Three renewed certifications as qualified credentialed inspectors (QCI). Other Stormwater staff have also received erosion and sediment control training to provide cross-training and backup as may be needed.

During 2018, there have been 184 Land Disturbance Permits issued by the City of Birmingham and 25 cases were closed. 1180 site inspections were conducted of which 312 were in on qualifying sites. One hundred and eight (108) site inspections failed and corrective actions taken by the permittees to bring the site into compliance. All failed site inspections were given verbal warnings and all site were brought into compliance.

All stormwater personnel routinely follow up on complaints through the City 311 complaint reporting system. This year six (6) soil erosion citizen complaints were received. All sites were brought into compliance and the citizens notified.

A list of Projects and number of inspections following:

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2018 SEC INSPECTIONS-PROJECTS 1 ACRE OR GREATER

Project	Address	SEC #	Inspections
1	1503 50th St. N.	2017-00201	27
2	2200 Magnolia Ave	2017-00202	22
3	516 31st Street	2017-00203	23
4	1101 5th Ave S	2017-00218	8
5	101 London Pkwy	2017-00242	25
6	2200 Wenonah-Oxmoor Rd	2017-00247	26
7	420 20th St S	2017-00248	10
8	1620 4th Ave S	2017-00252	12
9	320 Commons Dr	2018-00006	23
10	265 Roebuck Dr	2018-00014	17
11	5015 69th St N	2018-00016	20
12	1110 7th Ave N	2018-00026	Inactive - 1
13	5955 Barber Motorsports Hwy	2018-00060	10
14	305 Pratt Highway	2018-00065	7
15	2151 Lakeshore Pkwy	2018-00070	8
16	901 11th St S	2018-00093	16
17	230 Frankfurt Cir	2018-00101	4
18	1928 17th St N	2018-00105	3
19	1041 Five Mile Rd	2018-00114	8
20	151 Republic St	2018-00115	14
21	2301 Venice Rd	2018-00170	5
22	1004 Huffman Rd	2018-00191	Inactive - 1
23	3301 3rd Ave S	2018-00201	3
24	2601 Inglenook Lane	2018-00206	6
25	1100 Caffen Ave	2018-00207	5
26	351 6th St S	2018-00208	4
27	4801 Alfamont Rd	2018-00253	Inactive - 1
28	1101 Detroit St	2018-00267	3
29	5000 Clairmont Ave	2018-00268	3
30	636 2nd Ave N	2018-00273	Inactive - 1
1 AC OR GREATER ONLY		TOTAL INSPECTIONS	312



POST-CONSTRUCTION STORMWATER MANAGEMENT IN QUALIFYING NEW AND RE-DEVELOPMENT



Post-Development Stormwater Ordinance

The City retained the services of Wood Environmental and Infrastructure to develop a comprehensive post-construction Stormwater Ordinance, Birmingham Storm Water Design Manual, and a BMP Maintenance Manual. The Ordinance and manual address both NPDES MS4 permit requirements and flood control and drainage needs.

The program includes developing the post-construction storm water ordinance and related policies, processes, and procedures with integration of watershed master planning and GI/LID program strategies. Development of post-construction storm water design criteria and specifications, focusing first on GI/LID, then on traditional storm water treatment methods, and including supporting design and plan submittal/site inspection tools.

The Draft Post-Construction Stormwater Design Manual, Ordinance and Stakeholder Comments and City Responses are available on the City Web Site. The Post Construction Maintenance Manual will be available for review on the City Web Site in January 2019.

The development has included an extensive stakeholder's involvement program including city staff, the development community, and the citizens of Birmingham and neighboring MS4 partners. The ordinance and manual are to be submitted to the City Council in January/February of 2019.



SPILL PREVENTION AND RESPONSE

The primary purpose of this program is to prevent, contain, and respond to spill occurrences that have the potential to discharge into the City's MS4. The City has implemented this program in compliance with the requirements of its National Pollutant Discharge Elimination System (NPDES) permit, including development of a hotline for reporting spills, identifying response staff roles and responsibilities and providing spill reporting information on the City's Stormwater Management website. This document summarizes the City's spill response for this reporting year.



SPILLS/HAZMAT INCIDENTS OBSERVED

AGENCY	Number of Incidents
<i>Jefferson County EMA</i>	35
<i>Alabama Department of Environmental Management</i>	5
<i>City of Birmingham Stormwater</i>	3
<i>Birmingham Fire & Rescue (HazMat Related)</i>	170
<i>Birmingham Fire & Rescue (Stormwater Related)</i>	21

Spills are reported in various ways and because of such there is a need to document how various spill types are handled. In all cases, the Birmingham Fire and Rescue Department (BFD) has primary responsibility for responding to spills that occur in the City limits. The Birmingham Fire Department is dispatched to contain the spill in order to prevent any threats to human health and life. As necessary, the BFD coordinates its efforts with the Jefferson County Emergency Management Agency

(JCEMA) as well as with pertinent city staff for both hazardous and non-hazardous spills. When spills that may directly or indirectly impact the receiving waters occur, the staff responsible for the management of the stormwater program is alerted to direct any and all necessary stormwater related field response work. When a spill is reported, the City staff will assess the situation with concern to the City's MS4 and receiving water pollution. The

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Fire Department prepares incident reports and those reports are forwarded to the JCEMA.

TRAINING PROGRAM ELEMENT:

The Birmingham Fire Department maintains a comprehensive program of ongoing training for HazMat team members. In order to maintain this level of training, HazMat team members are required to obtain training (along with drill exercises) that covers the following topics:

- ✦ HazMat Readiness Drill/Deployment Exercise
- ✦ HZ 16 HazMat Incident Commander
- ✦ HZ 15 – How to Use The ERG
- ✦ HZ 02 – HazMat Multi Company Training
- ✦ HZ 03 – Hazardous Materials Technician

- ✦ HZ 04 – Sampling/Collections Techniques
- ✦ HZ 05 – Hazardous Materials Chemistry
- ✦ HZ 06 – Decon Procedures
- ✦ HZ 07 – Chemical of the Month – Ethanol
- ✦ HZ 09 – Tanker Transport (Tanker Transport Safety)
- ✦ HZ 10 – HazMat Apparatus Day
- ✦ HZ 12 – Hydrogen Response

During this year's reporting period a total of 66 HazMat team members (*See Spill Prevention and Response Appendix*) received weekly training using a computer-based software requiring login credentials and a number of training hours. Upon completion, each team member received a certificate of completion.



POLLUTION PREVENTION/ GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

In accordance with the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, issued on March 1, 2018, the City shall further develop or revise, implement, and maintain a program that will prevent or reduce the discharge of pollutants in storm water run-off from municipal operations to the MEP. The program shall include at a minimum, the following elements:

- ✓ Inventory all municipal facilities having the potential to discharge pollutants via stormwater runoff
- ✓ Develop and implement a short and long-term strategy and program for the removal of trash from the waterways and tributaries in the permitted area in such a manner to quantify the removal of trash per year, which shall be included in the annual report and SWMPP
- ✓ Require certain measures to be implemented in the public ROW for any event or wherever it is anticipated that substantial quantities of trash or litter may be generated
- ✓ Ensure that trash receptacles or similar trash capturing devices are provided and maintained in areas identified as high trash generated areas
- ✓ Provide standard operating procedures detailing good housekeeping practices to be employed at appropriate municipal facilities and during municipal operations that may include, but not limited to:
 - Equipment washing
 - Street sweeping
 - Municipal road maintenance
 - Chemical and waste storage and disposal
 - Vegetation control, cutting, removal, and disposal
 - Vehicle fleet/equipment maintenance and repair
 - External building maintenance
 - Materials storage facilities and yards
- ✓ Program for inspecting municipal facilities to include municipal maintenance shops and equipment yards for good housekeeping practices, including BMPs. The program shall include checklists and procedures for correcting deficiencies
- ✓ A training program for municipality staff in good housekeeping practices
- ✓ Assess water quality impacts for those flood management projects owned, operated or the responsibility of the City. Feasibility of retro-fitting existing structural control devised to provide additional pollutant removal from the stormwater shall be evaluated.

MUNICIPAL FACILITIES:

The City of Birmingham provides a wide range of services to its citizens by various City Departments and facilities located throughout the City. The City maintains approximately 125 facilities that consists of parks, ball fields and building grounds. A list of the facilities including the watershed the facility fall into and the type of facility can be found in the *Good Housekeeping Appendix*. There are no new updates to the list of City facilities.

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Facility	Location	Dates
Hawkins Recreation Center	Hawkins Park	7/24/2018
Roebuck Golf Course	Hawkins Park	7/24/2018
Grayson Pool	Grayson Park	7/24/2018
Lewis Pool	Lewis Park	7/24/2018
Memorial Pool	Memorial Park	7/23/2018
Memorial Recreation Center	Memorial Park	7/23/2018
Eastlake Pool	Eastlake Park	7/23/2018
Legion Field	McClendon Park	7/19/2018
Fleet Management	6 th Ave. South	7/17/2018
Crestwood Pool	Crestwood Park	7/26/2018
Underwood Pool	Underwood Park	7/26/2018
East Thomas Pool	East Thomas Park	7/27/2018
Maclin Pool	Maclin Park	7/27/2018
M.L. King Pool	M. L. King Park	7/27/2018
M. L. King Recreation Center	M. L. King Park	7/27/2018
Harris Pool	Harris Park	7/27/2018
McAlpine Recreation Center	McAlpine Park	7/27/2018
McAlpine Pool	McAlpine Park	7/27/2018
DEP Construction Facility	Golden Flake Drive	8/28/2018
East Ensley Library	Ave. I Ensley	9/12/2018
Springville Library	Old Springville Rd.	9/13/2018
DPW Ensley District Facility	Ave. W Ensley	9/20/2018



STANDARD OPERATING PROCEDURES AND SCHEDULE FOR REPLACEMENT AS NEEDED:

The City of Birmingham has developed Standard Operating Procedures (SOPs) for various activities requires for implementing Pollution Prevention and Good Housekeeping Program. SOPs may include but not limited to the following:

- ✓ Equipment washing
- ✓ Street sweeping
- ✓ Maintenance of municipal roads owned, operated, or under the responsibility of the Permittee
- ✓ Storage and disposal of chemicals and waste materials
- ✓ Vegetation control, cutting, removal, and disposal of cuttings
- ✓ Vehicle fleets/equipment maintenance and repair
- ✓ External Building maintenance
- ✓ Materials storage facilities and storage yards (see *Good Housekeeping Appendix*)

FACILITY INSPECTION PLAN AND PROCEDURE:

The City of Birmingham Stormwater Management has implemented a Municipal Facility inspection program for all City of Birmingham facilities. A Municipal Facility Inspection form has been developed and 125 facilities owned or operated by the City have been identified to this date. Stormwater Management inspected **22 facilities** during 2017-2018 reporting period. The inspection of all facilities within this permit period will continue by Stormwater Management staff, and employee training will be reviewed during facility inspections. These inspections include the identification of facilities that are more likely to

have the potential to discharge into the watershed and storage of chemicals or operational procedures that could adversely impact surrounding water bodies or any particular watershed. Any inspected facility that has the potential to impact the surrounding watershed will be inspected on a more frequent basis. A Municipal Facility Inspection form can be found in the *Good Housekeeping Appendix*.

- a) Qualified personnel shall conduct periodic routine facility inspections to determine the effectiveness of the Pollution Prevention Measures and Controls.
- b) All City facilities inspections will be performed at least once throughout a permit cycle, if deficiencies are observed additional inspections may be performed.
- c) Municipal facilities that include maintenance shops, equipment yards, and/or storage facilities will be inspected annually for good housekeeping practices including BMPs
- d) The inspector shall document the findings of each routine facility inspections performed and the facility should be informed via verbal and/or electronic communication about any deficiencies.
- e) The inspections must be documented through the use of a checklist that is developed to include each of the controls and measures that are evaluated.
- f) When deficiencies are noted the operator of the facility will be notified, a



cased opened and followed-up
correspondence until corrected

A sign-in sheet shall be used to document City
employees that have received training. All training
material is available upon request.

TRAINING PROGRAM ELEMENT:

The City of Birmingham Stormwater Management Program has developed a Quarterly Leadership Meeting with City staff that work with stormwater related issues, such as Department of Public Work, Park and Recreation, and Fire. The purpose of the meetings is to discuss recent or ongoing stormwater issues and collectively coming up with ideas to resolve stormwater issues and tailor them to fit each facility, department, or operation. Training is performed four times a year and may include discussions of the following topics:

- ✓ Stormwater Management Plan (SWMP)
- ✓ Structural Controls
- ✓ Good Housekeeping and Spill Prevention
- ✓ Spill Control and Response
- ✓ Equipment washing
- ✓ Street sweeping
- ✓ Maintenance of municipal roads owned, operated, or under the responsibility of the Permittee
- ✓ Storage and disposal of chemicals and waste materials
- ✓ Vegetation control, cutting, removal, and disposal of cuttings
- ✓ Vehicle fleets/equipment maintenance and repair
- ✓ External Building maintenance
- ✓ Materials storage facilities and storage yards

As part of the training program, City staff will review existing SOPs and are informed about any changes or updates to the SOPs. By participating in the training, City staff acknowledges that they have read and will implement SOPs.



APPLICATION OF PESTICIDES, HERBICIDES, AND FERTILIZERS (PHF'S)

In accordance with the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, issued on March 1, 2018 the City is required to implement controls to reduce, to the MEP, the discharge of pollutants related to the storage and application of PHFs applied by employees or contractors, to public rights of way, parks, and other public property. The City shall implement programs to encourage the reduction of the discharge of pollutants related to application and distribution of PHFs. For those controls implemented, the City will obtain coverage and maintain compliance with ADEM NPDES Pesticide General Permit ALG870000, if applicable, or other applicable NPDES permits.

The City of Birmingham shall address priorities to include the following elements:

- Identify all areas known to receive high applications of PHFs; develop a program to detect improper usage, and prioritize problem areas
- Require evidence of proper certification and licensing of all applicators contracted to apply pesticides and/or herbicides on municipal property; require that applicators contracted to apply fertilizer are qualified in utilizing proper nutrient management practices. Furthermore, applicator contracts are required to include a copy of this Stormwater Management Program Plan and all contractors are to be made aware of its provisions as a condition of contract acceptance and work at all designated City venues
- Maintain an inventory of on-hand PHFs with information about the formulations of

various products, including how to recognize the chemical constituents from the label, their respective uses, directions and precautions for applicators that explain if products should be diluted, mixed or only used alone, and, proper storage of products

- Equipment use and maintenance
- Training in safe use, storage and disposal of PHFs
- Inspection and monitoring of facilities where PHFs are stored
- Record keeping

The U.S. Environmental Protection Agency (EPA) regulates the sale, distribution and use of pesticides in the USA under the statutory framework of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to ensure that when used in conformance with FIFRA labeling directions, pesticides will not pose unreasonable risks to human health and the environment. When EPA approves a pesticide for a particular use, the Agency imposes restrictions through labeling requirements governing such use. The restrictions are intended to ensure that the pesticide serves an intended purpose and avoids unreasonable adverse effect. It is illegal under Section 12)(a)(2)(G) FIFRA to use a registered pesticide in a manner inconsistent with its labeling.¹

Application and use of pesticides, herbicides, and fertilizers are within the purview of the City of Birmingham Departments of Public Works and Parks and Recreation. The goal of the City's Pesticide, Herbicide, and Fertilizer Program is to:

- Provide for safe public use surfaces throughout the City
- Ensure compliance with all federal and state applicators laws and requirements

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- Ensure employees quarterly attend Core Leadership meetings and annually attend stormwater pollution prevention training
- Employees performing the procedures in the standard operating procedure manual should read and refer to the materials in the SWMPP
- Use the least amount of product(s) necessary
- Reduce or eliminate species resistance to the application of targeted products
- Pesticide application must be done only under the supervision of a Certified Pesticide Applicator or qualified Supervisor.

- All employees who handle or apply pesticides, herbicides or pesticides should be trained on the most recent Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS).

The discharge of pesticides (both Biological and Chemical) by the City of Birmingham is limited primarily to mosquito and other flying insect pest controls, weed and algae controls as described below. The City does not operate any treatment controls for animal pests or forest canopy pests in any general sense. All PHF documents are available upon request.



OILS, TOXICS, AND HOUSEHOLD HAZARDOUS WASTE CONTROL

The City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System required in the City prohibit to the maximum extent practicable (MEP) the discharge or disposal of used motor vehicle fluids and household hazardous wastes into the MS4

OILS, TOXICS, & HOUSEHOLD HAZARDOUS WASTE CONTROL PROGRAM SUMMARY:

The U.S. Environmental Protection Agency considers some leftover household products that can catch fire, react, or explode under certain circumstances, or that are corrosive or toxic as household hazardous waste. Many common household products such as paints, cleaners, oils, batteries, and pesticides can contain hazardous ingredients and must be disposed of carefully. These products can become hazardous wastes when for some reason they no longer serve the useful purpose intended and the consumer decides to dispose of them. Some household hazardous wastes (HHW) can pose risks to people and the environment if not used, stored carefully, and disposed of properly. Accordingly, the City is required to complete the following activities under the terms of its NPDES MS4 Permit, including the following elements:

- ❖ Make available material educating the public about used oil facility locations, hotline numbers, and alternatives to toxic materials
- ❖ Provide acceptable alternate recycling or recovery options for HHW to the general public.
- ❖ Advertise the location of used oil collection facilities
- ❖ Provide employee training on spill prevention at all municipal facilities where oils or toxic materials are used

Included within the [Stormwater Management Program Plan](#) (SWMPP) are procedures being used by the City of Birmingham to develop, implement, and enforce a program for oils, toxics, and household hazardous waste control, which also includes educational information and employee training.

HHW programs can benefit communities in several important ways. They can reduce the risks to health and the environment resulting from improper storage and disposal of HHWs. The program can reduce a community's liability for the cleanup of contamination resulting from improper HHW disposal. Finally, HHW programs can increase community awareness of the potential risks associated with HHW and promote a better understanding of waste issues in general.

Hazardous Household Waste Events:

Stormwater Management participated in two electronic take back recycling events for the citizens of the City of Birmingham and residents of Jefferson County. Along with the Jefferson County Stormwater Program, Stormwater Management collected computers, TVs, batteries, and other electronic devices at two locations on July 28, 2018 and again on August 11, 2018. The July 28 event collected 1454 lbs. of electronic equipment while the August 11 event collected 6174 lbs. of electronic equipment. 3.81 tons of material were recycled, preventing the materials from being disposed of in landfills. Other organizations participating included KBB, Alabama Environmental Council (AEC), Village Creek Society, and Protech Recycling. Metrics and information were collected from participants including types of items and information for the future planning of other HHW events.



**EDUCATION AND TRAINING PROGRAM
ELEMENT:**

The City has updated its website with a list of local businesses that conduct the recycling, reuse or collection of HHW materials. Information to the general public is also provided regarding the proper disposal of HHW products. Also, the City maintains and updates this content from time to time as new information related to the proper handling and disposal of hazardous household waste is discovered. In addition, the City has partnered with Jefferson County Environmental Services and added four new locations within the City limits that accept used edible grease at recycling stations. These Grease recycling stations provide empty edible grease containers that can be filled with grease and returned by the public to the stations. The City will from time to time partner with other agencies to conduct HHW Day recycling and disposal events.

- ✓ Continue to collaborate and develop new partnerships with partners that recycle and reuse various household waste products.
- ✓ Identify and increase the number of household grease container collection sites within the City of Birmingham municipal limits. Identify surrounding collection sites convenient to City of Birmingham residents. Provide this information to the public.
- ✓ Develop a matrix of free disposal locations of HHW materials for the public and provide this information to the public.
 - ✧ Quantities of HHW and used oil collected will be tracked for the annual report
- ✓ Develop a summary of all materials able to be recycled throughout existing Birmingham industries at no cost to the Public and advertise on social media, the Stormwater Web-site and PIO.

- ✓ Continue Core Leadership training to all employees on the proper way to handle spills of oils, toxics and other Hazardous Waste. (Please see **Pollution Prevention/Good House Keeping for Municipal Operations** section of this report)
 - ✧ Meetings will be recorded with dated attendance sheets, and titles of presentations.



Cooking Grease Campaign:



Jefferson County's Environmental Services Department (ESD) administers a county-wide household cooking oil and grease recycling program to reduce the amount of cooking oil that enters the sanitary sewer system, thereby reducing sewer overflows. This is a free service to all of the citizens of Jefferson County. Collection bins are located at several sites around the county with free plastic containers for residents to take home. Once a container is filled, it can be returned to the collection bin and exchanged for a clean container. The containers are collected weekly by the Grease Control Program inspectors and the oil is picked up at the Shades Valley Wastewater Treatment Plant by local rendering companies. Grease and oil accumulate in the sewer system and require diligent maintenance to prevent sanitary sewer overflows.

ESD developed this program in the ongoing effort to the prevent overflows and protect the water resources.

The bins were constructed by the County's General Services shop and are 4' wide by 4' tall and 2' deep and sit on legs 6" off the ground. The bins sit in a hard, durable plastic tray which provides a liquid retention barrier should a container leak or spill. There are currently 21 drop-off points that accept filled containers for recycling, which is an increase of one new site from last year in May 2018, at the CrossPlex KBB headquarters. There was also a temporary grease collection site at Birmingham's Legion Field during large sporting events for grease collection from tailgaters.

A total of 3,694 gallons was collected between October 1, 2017, and September 30, 2018 in Jefferson County. In the City limits of Birmingham 5 sites collected 711 gallons. The County's Environmental Services Department (ESD) distributed 2,500 flyers within apartment complexes, and provided bilingual program materials that were both displayed throughout the complexes and distributed to residents. In addition, a form letter which can be sent to the residents as a reminder of the cooking Oil and Grease Recycling Program was made available to the apartment complex management. The Stormwater Program staff promotes this program and distributes materials, containers and



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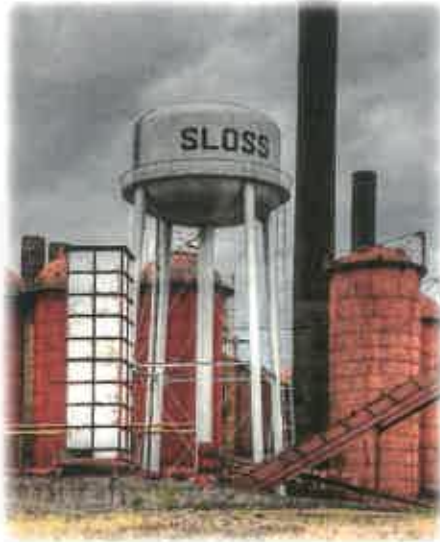
scrapers at various events.

Household Hazardous Waste can be removed from the waste stream for the City of Birmingham, if efforts from Stormwater Management and its partners can give residents alternative methods of disposal through recycling or reusing these materials. Increasing opportunities for residents to take ownership in their community and by providing more convenient locations for these

disposal sites allow the City of Birmingham to reduce the handling of HHW and reduce the need for expensive solutions such as HHW disposal events. Eventually, the City of Birmingham, with leadership for Stormwater Management, hopes to reduce HHW levels to near zero through partnership, education and alternate opportunities for disposal.



INDUSTRIAL STORM WATER RUNOFF



The City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) requires that the City implement a program to inspect, monitor and control pollutants in storm water runoff to the MS4 from municipal waste landfills, hazardous waste treatment, storage, disposal and recovery facilities, and industrial facilities and high-risk commercial facilities. Facilities to be addressed under this program include facilities that have reported under the requirements of the Emergency Planning and Community Right to Know Act (EPCRA) Title III, Section 313 and any other industrial or commercial discharge that the City determines is contributing substantial pollutants loading to the MS4 ("high risk facilities").

INDUSTRIAL STORM WATER RUNOFF PROGRAM SUMMARY

Industrial & High Risk Facility/Runoff Inspections & Enforcement Actions (Available Upon Request)	
<i>Tier II Reporting Facilities</i>	265
<i>Tier II Pre-Incident Plans</i>	37
<i>PIP Inspections</i>	1154
<i>HazMat/Industrial Inspections</i>	58
<i>Haz/Mat/Industrial Inspection Rechecks</i>	32
<i>Enforcements</i>	4
<i>Corrective Actions</i>	4

The City's Industrial and High Risk Runoff Program, per the requirements of the NPDES Permit, identifies industries and high risk runoff facilities within the City political boundaries not already subject to State NPDES regulations and State NPDES regulations with appropriate Standard Industrial Classification (SIC) or the North

American Industry Classification System (NAICS) codes. The City is currently inspecting selected industrial sites for stormwater pollution. These have been isolated as needed to illicit discharge inspection efforts by the IDD&E inspection team.



WATER QUALITY MONITORING AND REPORTING

Highlights: This reporting year represents the fifth 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 sources, 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 *Water Quality SWMPP*. During this period several overarching activities have dominated Stormwater Management's water quality monitoring program, including:

- ★ During this reporting period, Stormwater Management contracted with Birmingham Water Works Board (BWVB) EnviroLab to continue to provide analytical services.
- ★ BOD analytical measurements were missing from the BWVB lab reports due to laboratory data analysis issues. This occurred during June 2018 sampling period for all samples for the three-day collection period.
- ★ BWVB lab results created discrepancies for e-Coli samples during July 31, through August 2018. BWVB used a more in-depth dilution factoring method that was not consistent with previous *E coli* methods reported to Stormwater Management. The

data reported from BWVB was determined to be not applicable. BWVB has resumed the previous method of dilution in their laboratory analysis.

- ★ USGS stream gaging stations have been installed in Village Creek and Valley Creek, which include variable combinations of stream elevation discharge water quality and rainfall. These stations can be found on the USGS Website as:
 - ✓ Station 02458148; Village Creek @ 86th Street
 - ✓ Station 02458502; Village Creek Near Pratt City
 - ✓ Station 02458190; Village Creek @ 50th Street
 - ✓ Station 02458350; Village Creek @ 24th Street
 - ✓ Station 02458450; Village Creek @ Avenue W, Ensley
 - ✓ Station 02461130; Valley Creek @ Center Street
 - ✓ Station 02461192; Valley Creek @ Avenue W, Ensley
 - ✓ Station 02423571, Shades Creek @ Elder Street Bridge
- ★ Field reconnaissance of the Valley Creek outfall during this period at VC0.1s with the help of Jefferson County Environmental Services as an IDDE evaluation and mapping continues (*see Major Findings* section)
- ★ Continuing with the new screening site for Cotton Mill Branch on Village Creek at VIC07.0s. This screening site headwater is located at Avondale Lake. Stormwater



Management suspects this location as the source of elevated TSS readings based on dry weather screening at that instream peaking location within the receiving stream segment. This site will continue to be monitored into the future.

- ★ 2017-2018 *Summary of Unpermitted Discharges* report prepared by Jefferson County Environmental Services for Birmingham (*Water Quality Appendix*), approximately 1.1 million gallons of sanitary waste was discharged into Birmingham creeks and streams. The City continues to work with Jefferson County Environmental Services to address sanitary sewer overflows when discovered.

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 previous year's data and compare it to the current permit year's data for individual streams, as has been done before. Therefore, whenever possible, a longer period of water quality analysis is provided along with water quality data observed during this reporting year. Overarching data review and reporting will be done for all streams, excluding screening sites, for all dates.

The City of Birmingham is located in the lower Appalachian Mountains in Jefferson County in central Alabama. Its corporate limits are bisected by 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 picture, left of Village Creek at VIC01.6s (Roebuck Golf Course) for examples of the sedimentation occurring as a result of erosive velocities in association with rainfall.

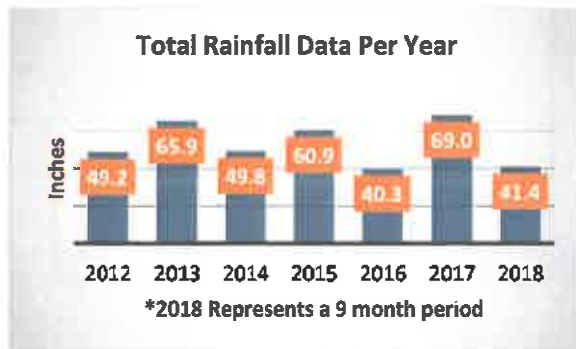
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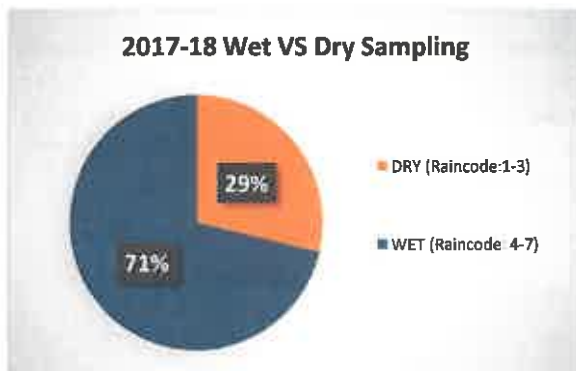
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Even though carbonate soils of this nature can be found throughout the Greater Birmingham area they are more prevalent in the eastern part of Birmingham.



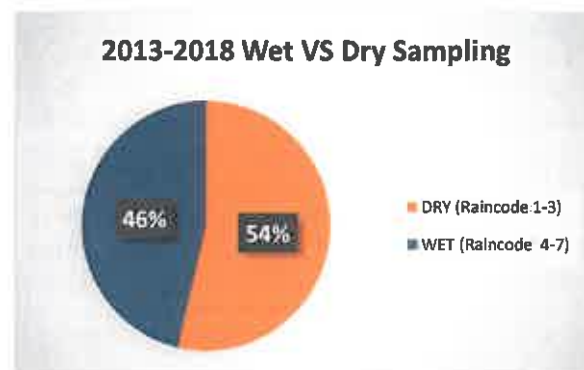
Rainfall: Rainfall ranged between an annual low of 40.3" in 2016 to a high of 69.0" in 2017. The average annual rainfall during the 7-year period was 53.8" with 2018 data only representing a 9-month period. Within the past 3 years we have data to represent a drought conditions in 2016 and years with heavy rainfall in 2017 and 2018. Which will be demonstrated more in the upcoming report.



During this reporting period (2017-2018) the rainfall was 52.47", with the highest rainfall being during the month of April 2018 at 8.25". Alabama had no serious drought issues. However, as it is depicted in the above cart sampling occurred during wet periods 71% of the reporting year.

Recalling the *City of Birmingham Water Quality Monitoring Strategy for Alabama Department of Environmental Management* (October 4, 2013; Pg. 14)^{vi} the sampling focus was intended to be during periods of dry weather flow, especially where stream segments had known impairments and outfalls greater than 36". For the purpose of water quality monitoring by the Stormwater Management instream team, dry weather reporting is represented as less than 0.10" of rainfall preceded by 72 hours of antecedent dry conditions. All other rainfall conditions greater than 0.10" by definition are considered wet. Classifying: rain codes: 1-3(dry) and 4-7 (wet). This rain code is also described on our field sheet within the SWMPP.^v

By contrast rainfall during the entire 5-year study period more often represented sampling during dry conditions than wet conditions. Within the 5-year period sampling practically represents a predominantly dry sampling with dry and wet sampling events being almost equal.



Flow: The Alabama Department of Environmental Management, Water Quality Branch, published in 2005 its Final Total Maximum Daily Loads (TMDL) for Village Creekⁱⁱⁱ. That document reported Maximum Daily average flows at Avenue W to be 3,040 cfs. Minimum daily flows were 9.3 cfs and average daily flows were 79.2 cfs. These measurements were taken during the period between 1988 and 2001.

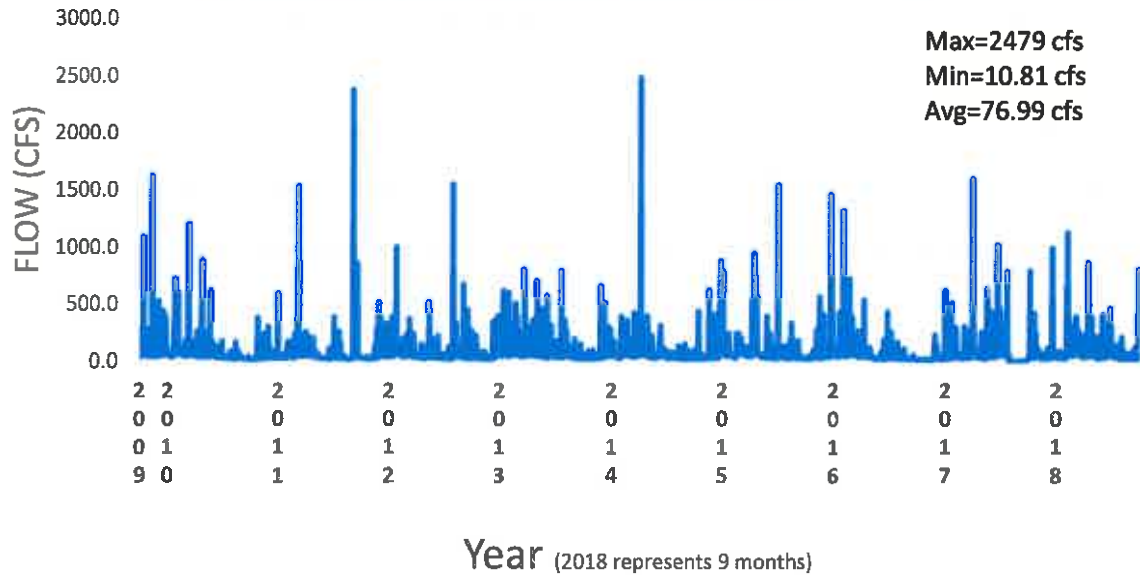
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Daily Average Flow @ 02458450 (Ave W, Village Creek)



Please note the figure above. During the period between 2012 and 2018 daily average flow measurements reported by the USGS at Avenue W, Ensley were strikingly similar to the daily average flow data earlier reported by ADEM. Referencing the figure above from data provided by the USGS for the same location, maximum daily flows averaged 2,479 cfs. Minimum flows were 10.81 cfs

and the average daily flow measurement was 76.99 cfs. The minimum daily average flow of 10.8 cfs occurred on October 4, 2010 and the maximum flow of 2,479 cfs occurred on April 8, 2014. As can be seen, Village Creek flows continue to be mostly consistent with other observations by ADEM and by the USGS.

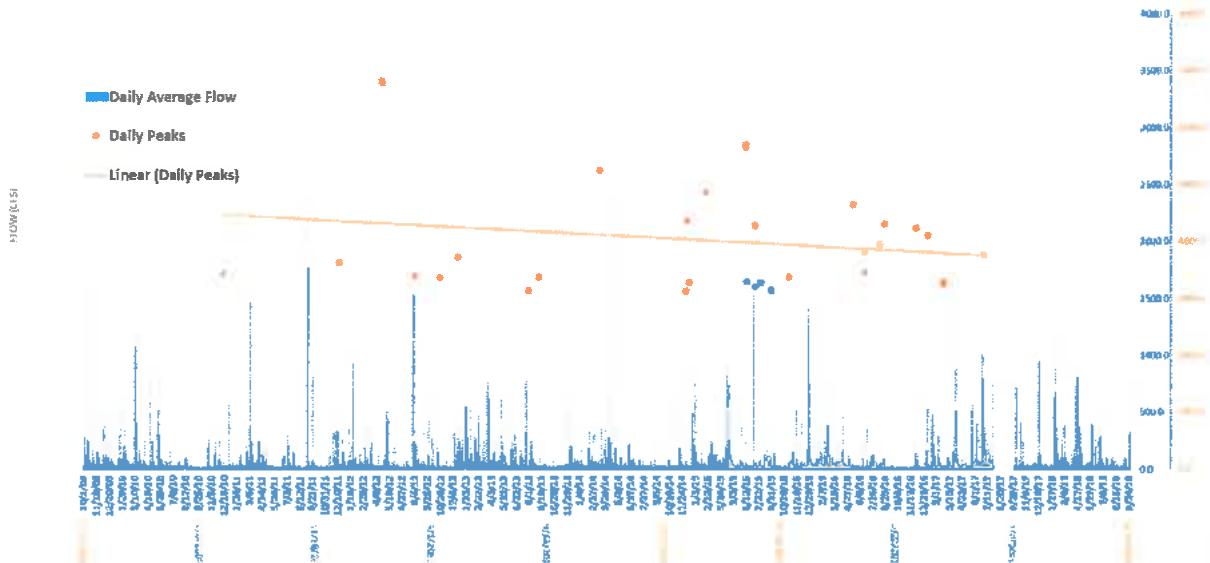
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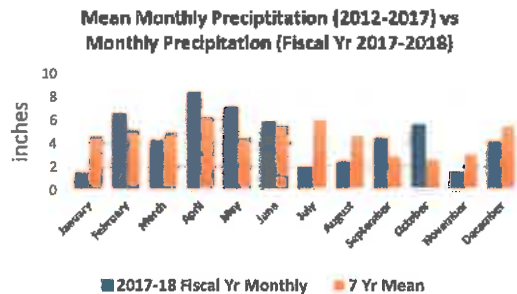
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Peak (> 3,120 cfs) and Daily Average Flow @ 02458450 (Ave W, Village Creek)



Depicted in the chart above is daily average flow data provided by the USGS at gage #02458450 – Village Creek @ Avenue W, Ensley. The flow record begins approximately on October 1, 2009 and ends on September 30, 2018. Included on this chart in Orange dots are peak flows greater than 3,120 cfs, which in reference to the TMDL for siltation (ADEM, 2005) represents the 8-year period for peak discharge.^{iv} All recurrent flow events that exceeded a peak discharge of 3,120 cfs are also included in the chart above along with its associated trend line. The downward trend line depicts a reduction in extreme flows during the period 2010-2018. This reduction in the peak flows during this study period is in response to the lower rainfall conditions throughout much of 2017 and into early 2018. This reduction in flow is created by frequently but less intense rainfall events. The mean monthly precipitation (2012-17) verses monthly precipitation (fiscal year 2017-18) the following chart depicts relatively minor change in inches

throughout the years. However, there is some variability per month.



Water Quality: Data collection methods used during this study for water quality were based on the approved 2013 Water Quality Monitoring Strategy^{vi}. Surface-Water samples have been collected since 2013 bimonthly (i.e. 2-month intervals) at water quality monitoring stations, VIC07.0s (Cotton Mill Branch) continues to be



monitored bimonthly due to instream peaking conditions observed at VIC07.0 and VIC08.1 during periods of dry weather screening. All water quality stations conform to a nomenclature requirement with screening sites adding an “s” to the mileage destination with upstream being the smallest number and downstream being the largest. Each surface-water grab sample was measured in the field by either a Hydrolab® or YSI Multimeter, which measured: Temperature, pH, Dissolved Oxygen, Barometric pressure, conductivity, and ORP. All other parameters were measured by the Birmingham Water Works Board or other field devices (e.g. turbidity meter, Stormwater Test Kit, and test strips) see *Water Quality SWMP* for more detailed information’.

This section also includes data analysis and review for water quality found in Results and Discussion. Specific methods used to interpret the data include graphical tools and statistical methods. Graphical tools include bar, scatter, and line charts, which depict the total analytical period of history since 2013 and the most recent data period (i.e. 2017-2018) in contrast. Bar-whisker plots are used to display the variability of select constituents over time. Included on each bar-whisker plot is a median line, X indicates the mean, the 1st and 3rd quartile data range, and a maximum and minimum reasonable value. Reasonable values are generally accepted as the statistical 50% of the data set when the 3rd quartile is subtracted from the 1st quartile and the difference is multiplied by 1.5 to establish the upper and lower reasonable value fencesvi for considered stream constituents. The data includes both instream and ORI data collected during the study. This data does not include outlier data beyond the statistical data fence boundaries. The data also does not reflect discrete flow or rainfall conditions.

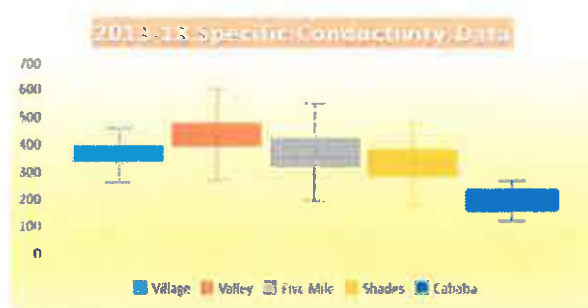
The chemistry of surface waters is based on the interactions between rainfalls, groundwater, rock and soil conditions within each watershed. For the

most part concentrations are reported in mg/L. Stream water chemistry varies with flow and rainfall conditions, which can vary in each watershed and under differing stream flow conditions. Stream water base flow is predominately from ground water flows and active industrial process water during low flow periods. During and after a storm event stream water is a mixture of rain water and nonpoint source surface runoff, shallow subsurface flow, industrial discharge water, and groundwater discharge. Precipitation tends to dilute the major ion composition while human activity can further alter a stream’s water chemistry, including elevated levels above background.

Results and Discussion: The entire certified data record of Birmingham’s Monitoring program is included in the *Water Quality Appendix*. This section will describe the overarching water quality in all City watersheds, followed by individual creek analysis.

During the nearly five-year study the City of Birmingham Stormwater Management Section has relied upon specific conductivity as a measure of stream variability and potential sources for impact.

The figure above depicts individual stream



variability, which includes the maximum reasonable value, median, mean, minimum reasonable value, and the 1st and 3rd quartile data. The overall specific conductivity mean concentration for all five creeks is within the range

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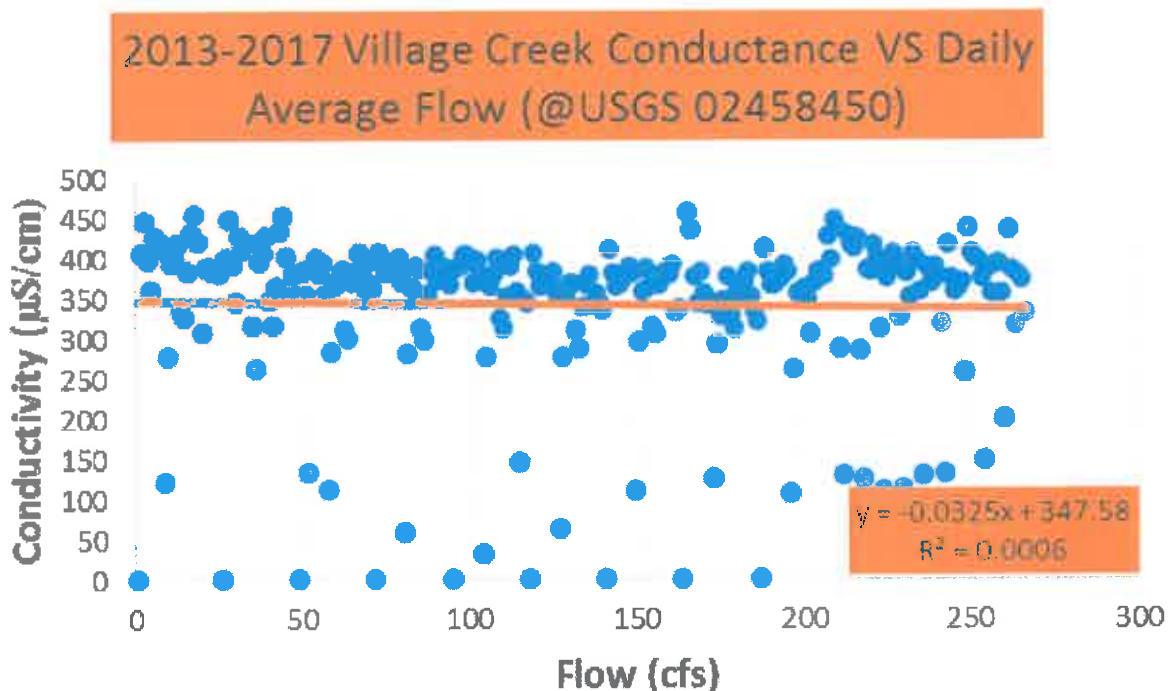
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of 200 to 600 ($\mu\text{S}/\text{cm}$), with the Cahaba River having lower specific conductivity than the other four creeks. Valley Creek appeared to have the greatest mean concentration. Village Creek appeared to have the least data variability among all City watersheds.

Based on the figure below, the overall specific conductivity dataset demonstrated a slight inverse correlation and having an R^2 value of 0.0006. Even though this is a slight correlation it is not dissimilar to last year's findings. The data included here represents flow collected at USGS 02458450 (Ave W), and specific conductivity throughout the watershed. The water quality data includes only the instream water quality data at VIC13.0 during the five-years since 2013. This graph represents both instream and screening sites for specific conductivity.

From the rainfall data presented earlier, during the 5-year dry period, which is represented as rain codes 1-3 in the City's data record, the mean specific conductance at Village Creek during those low rainfall conditions was higher at 391.2 $\mu\text{S}/\text{cm}$ than during wet periods, which is represented by rain codes 4-7 and was 335.5 $\mu\text{S}/\text{cm}$. The maximum conductivity recorded during the dry period was 455.6 $\mu\text{S}/\text{cm}$, which was only approximately 1 $\mu\text{S}/\text{cm}$ higher than the maximum specific conductivity measured during the wet period (456.9 $\mu\text{S}/\text{cm}$).

Therefore, and based on the period of record since 2013, instream specific conductivity at Village Creek appears stable and only slightly lower as flow conditions increase due largely to rainfall conditions. Therefore, inflow deviations from the instream condition should be considered as an illicit



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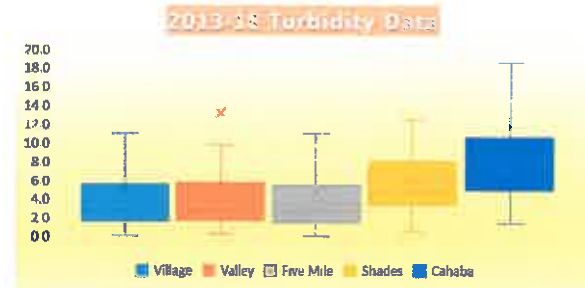
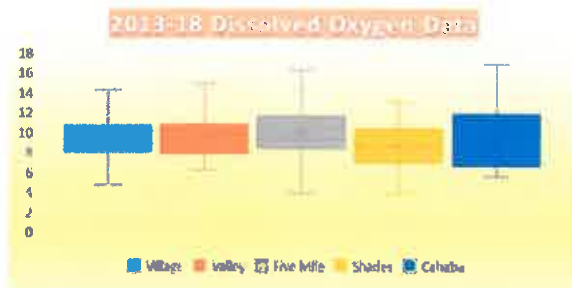


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discharge when concentrations of specific conductivity in the illicit discharge are increased or decreased beyond background levels in each creek.

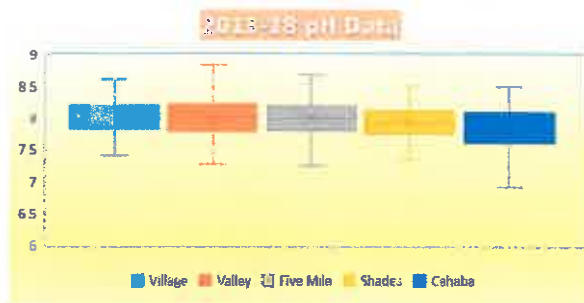
other streams in this study, as it did in last year's study.

For the five-year study, as will be discussed later in



The following bar-whisker graphs represent field parameter conditions for each watershed within the City of Birmingham. box plot represents the median of each box plot while the "X" represents the mean. This figure documents that the Dissolved Oxygen concentrations for each watershed tended to be elevated. With the exception of the Cahaba River, the difference between the 1st and 3rd quartile appeared similar and tightly grouped around the median, whereas the Cahaba River demonstrated a greater variability.

The first chart depicts dissolved oxygen for each



the anti-degradation section, all pH concentrations did at some point exceed the state standard of 8.5 units. However, this year's data did not exceed the state standard of 8.5 pH units. The pH concentrations tend to be higher in the area watersheds because of higher concentrations of calcium carbonate associated with karst topography in the Birmingham region.

Consistently through this sampling period mean concentrations of Turbidity (NTU) exceeded median concentrations and in 1 case even exceeded the third quartile. In the case of Valley Creek, the mean concentration even exceeded the maximum reasonable value fence, which indicates a considerable number of turbidity values exceeded the statistical 50% of the data.

creek since 2013. As was described earlier in this section each line within the box plot represents the median, while the "X" represents the mean. This figure documents that the Dissolved Oxygen concentrations for each watershed were similar but the Cahaba had a greater variability compared to

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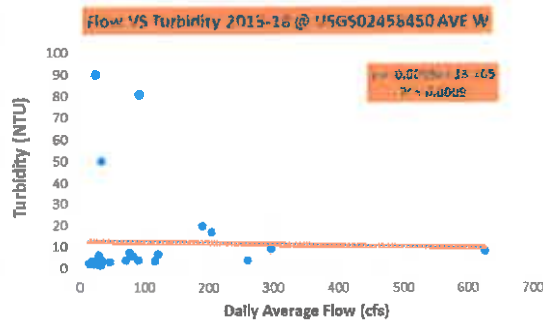
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The chart above reflects mean daily flow obtained from the USGS at dates concurrent with stream sampling dates in Village Creek. Turbidity data is measured in the field with an Oakton Turbidity Meter. The period of record shown above represents 23 data points. For this study duration turbidity was weakly correlated with daily average flow. Most of the data fell within a range bounded by < 100 cfs flow and < 10 NTU turbidity. This trend though has not been observed in the field as the picture below of high flows in Valley Creek at station VC04.9 documents. This suggests that insufficient data presently exists to adequately describe what is being observed in the field under high flow conditions.



The Birmingham Water Works Board (BWVB), Envirolab reports high E. coli concentrations as >2,419.6 mpn/100ml under the current analytical methodology. The reader is reminded that high values greater than the maximum reasonable fence are not shown on this chart when E. coli values exceeded the statistical 50% of the data.



Overall E. coli data shows a greater range of values and high concentrations in Valley and Shades Creeks and the lowest in Village Creek and Cahaba River. The values reported are in mpn/100mL units, which changed due to lab criteria changes from cfu/100mL. The average concentrations for each stream are reported as greater than the median concentration suggesting that each stream has generally high E. coli concentrations. It is important to note that information from Jefferson County Environmental services would indicate that approximately 682,747 gallons of sewage was discharged into Valley Creek during 2017-2018. This is roughly 62.6% of the total reported discharges in Jefferson County for the same period of time.

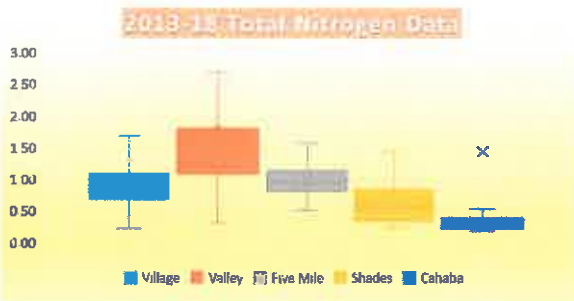
The reader is reminded that Total Nitrogen includes both inorganic and organic constituents. Inorganic Nitrogen is the sum of Ammonia, Nitrite, and Nitrate concentrations. Organic Nitrogen is the difference between Total Nitrogen and Ammonia concentrations. From the figures above, it appears that all watershed streams throughout Birmingham can be considered largely inorganic.

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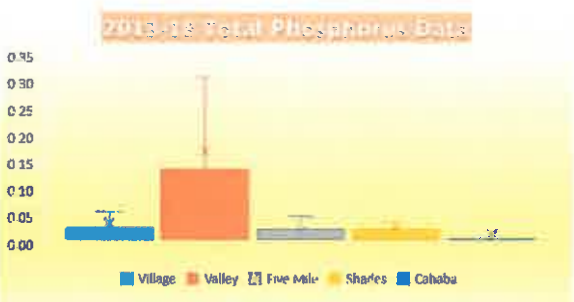
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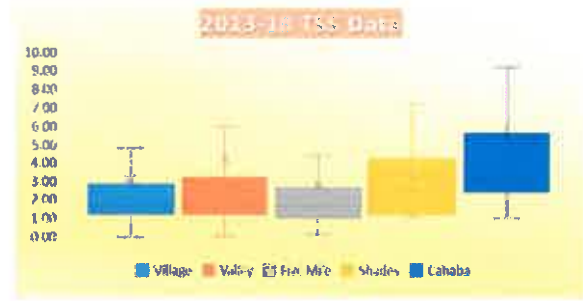
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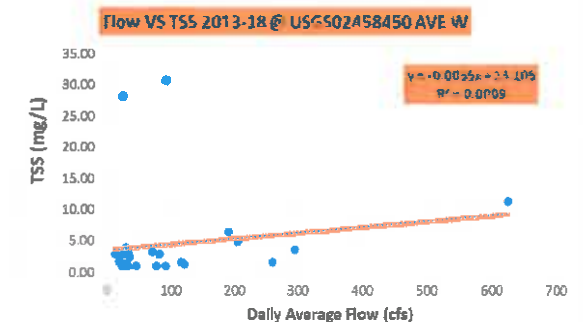
Valley Creek has the greatest Total Nitrogen variability while the Cahaba not only has the least variability but also has the lowest Total Nitrogen concentrations. Sanitary sewer discharges in areas around Valley Creek from 2017-2018 could explain some elevated Nitrogen levels compared to other watersheds. This may also explain increased phosphorus levels for data collected from 2013-2018 indicated on the Phosphorus Data bar-whisker chart. This issue is being evaluated as an IDDE issue.



With respect to Total Phosphorus in Valley Creek, the figure above demonstrates the greatest variability and highest concentrations reported. of Total Phosphorus than Village, Shades, and the Cahaba River, it has low variability; of all watershed streams in Birmingham its Total Phosphorus average concentration was less than the mean, suggesting either many low phosphorus concentrations or very few high concentrations but sufficient to increase the median phosphorus concentrations.



The figure above documents Total Suspended Solids concentrations (TSS) (mg/L) for all streams in Birmingham. Interestingly, the Cahaba River shows the highest reasonable value fence. It is particularly notable that the TSS concentration at the upper end of the reasonable value fence was still < 10.0 mg/L with all City streams having low TSS levels. Again, as was seen earlier with Turbidity, TSS was poorly correlated with daily average flow. This similarly suggests that insufficient data exists to document a stronger correlation.



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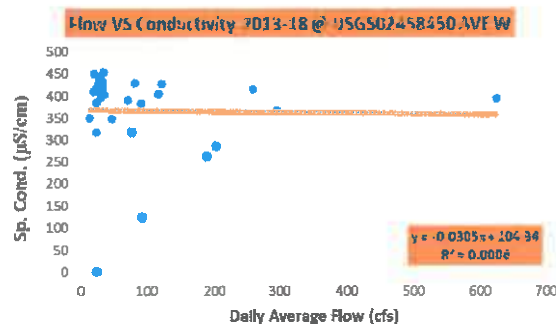
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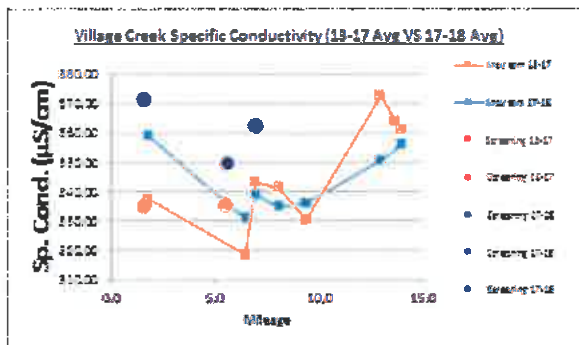
Village Creek: This reporting period now provides the opportunity to consider five-full years of water quality monitoring in Birmingham's creeks, starting specifically in Village Creek. The foundation of the City's instream water quality monitoring program has been to identify instream peak concentrations 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 since flow and specific conductance are inversely correlated, although weakly so, as evident by the figure below (R^2 value of 0.0006).



During this five-year period, specific conductivity has consistently averaged 343.2 $\mu\text{S}/\text{cm}$. The highest specific conductance recorded to date was 457 $\mu\text{S}/\text{cm}$ and was recorded on July 22, 2014 at station VIC05.6s during a moderately high rainfall period. Average annual rainfall between November-2013 and September-2018, inclusive was 53.8". By comparison, during this study period, average annual rainfall was 49.4".

Specific Conductivity during the current period of this study had a low of 111 $\mu\text{S}/\text{cm}$ on August 1, 2018 at VIC09.4. The highest Specific Conductivity during the same reporting year was 449.6 $\mu\text{S}/\text{cm}$ recorded on February 14, 2018 also at

VIC14.0. However, unlike last year report wherein it appeared as though lower Specific Conductivity indicated, "A measure of diluted major ion composition as a result of significant rainfall."



During this reporting period, Specific Conductivity was essentially the same as has been since monitoring in accordance with the new methods begun in 2013. That is not only true relative to time but also for each in stream station along Village Creek from the headwaters to the downstream most station in the City of Birmingham. That same trend was also similar for two of the three screening sites in the first six miles of stream inflows. Only at a new screening site (VIC7.0s) at the confluence of Cotton Mill Branch with Village Creek has the inflow to Village Creek displayed lower Specific Conductivity levels.

This decrease in inflow of Specific Conductivity appears to have led to the slightly reduced Specific Conductivity level at stream segment VIC7.0 and immediately downstream. As a result of this inflow, which continues even during dry weather conditions, the City continues to monitor at station (VIC7.0s). However, with time and continued monitoring, that may change, particularly for zinc as this sub-basin has an electro-plating industry within the sub-basin and another electro-plating company around VIC5.6s. It is important to note that for the last two years zinc has not been found at elevated levels in Village Creek with all readings being $<05.0\mu\text{g}/\text{L}$.

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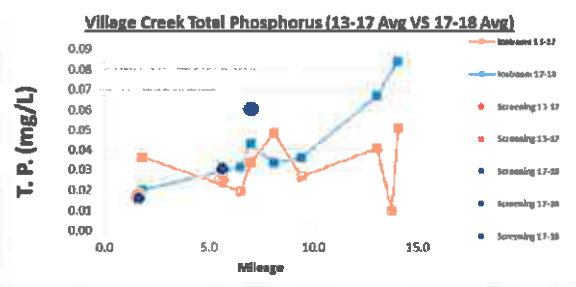
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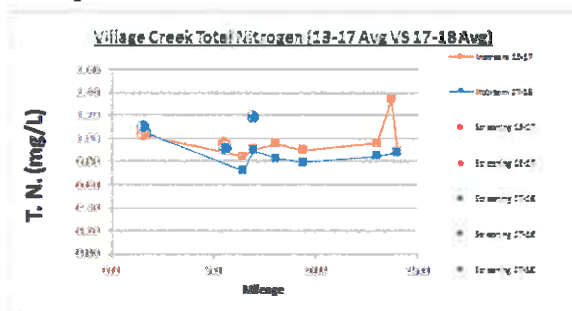


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Average annual Total Phosphorus (T.P.) for 2017 - 2018 (In **ORANGE**) and for 2013-2017 (In **BLUE**) is shown in the figure above. During the period 2013 to 2017 the average annual phosphorus was 0.03 mg/L, including Screening Sites. During the period 2013-2017 and even during the period 2017-2018 the stream tended to increase in total phosphorus midway between flow into and out of the city apparently. To date, Cotton Mill Branch has slight increase in the T.P. concentrations recorded.

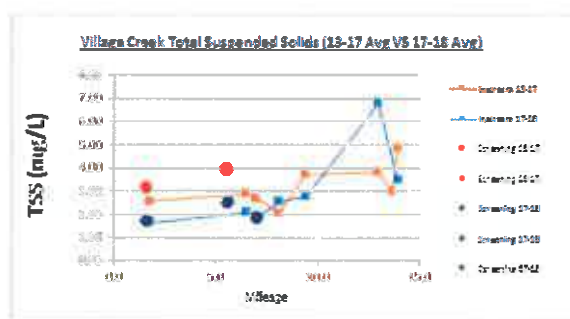


Annual average Nitrogen was essentially the same leaving the city this year as the combined four-year averages.



Total Suspended Solids (TSS) in Village Creek this year were lower in concentration than the previous four-year average of monitoring despite VIC13.0 which resulted in a peak that appear to be a result of sampling during heavy rain events and higher velocities. TSS levels settled out below the four-year average at VIC14.0. Interestingly enough, TSS levels at Cotton Mill Branch (VIC07.0s) also appears to be approximately equal to its

downstream station (VIC07.0). During 2017-2018 VIC07.0 had an average TSS concentration of 1.8 mg/L. Flowing into Village Creek at this intersection with the creek was Cotton Mill Branch having an average TSS concentration of 1.8 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

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sources may have been included this year as a point source and is delineated also as a point source of water for this report. Otherwise, those industries nonpoint stormwater sources, which may otherwise not be reported would be represented in the public MS4 system data.

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.^{vii} 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 daily load this year:

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

Where for the MS4:

Li = Average load in metric Tonnes per day based on USGS reported average daily discharge (cfs) and average daily mass concentration (mg/L) of a measured constituent.

Qi = Average discharge in Cubic Feet per Second (cfs) for discharges occurring concurrent with all sampling dates

Ci = Average TSS mass concentration in mg/L for all sampling dates

K = 0.002 correction factor for unit conversion from (ft³ - mg)/ (sec - L) to metric Tonnes per day

Given the period of record now extends well beyond one-year, the decision was made to report the data as it was captured, as daily data to improve the accuracy of reporting. Furthermore, data collected from State DMR results, when reported by industry in some cases reported their flow in million gallons per day (MGD) and constituent concentrations in pounds per day. In those cases, flow was converted to cfs and constituent concentrations to mg/L and the MS4 loading formula was used.

During this monitoring period flow increased substantially in late 2015 and early 2016 as a result of two large rainfall events. As was earlier discussed the period of drought is also noticeable throughout 2016-2017 See figure below.

As a result, this year it has been determined that there is not a strong correlation using either the

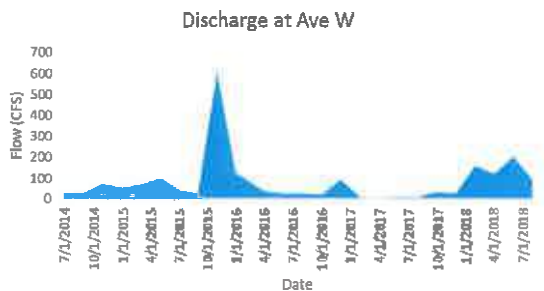
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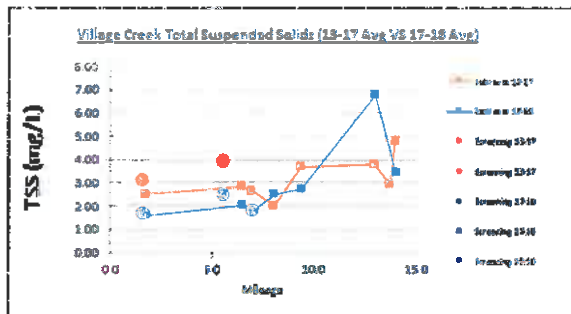
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Pearson product moment ($r=0.13$) or the coefficient of correlation ($r^2 = 0.13$) between stream flow and Total Suspended Solids at Station Ave W where stormwater exits the City of Birmingham.

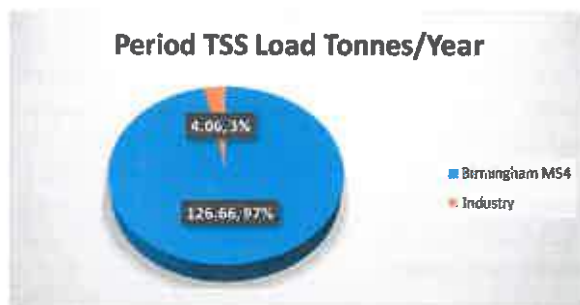


This reporting year's TSS concentrations, demonstrated peak in VIC13.0 in the figure above, were greater than the previous four-year average. This reporting year for TSS was higher due to higher velocities in Village Creek during heavy rainfall events while sampling.

USGS thirty-year discharge average is roughly 17 billion gallons per year at Ave W. The water entering the City from the headwaters at station VIC01.8 and the remainder of the nonpoint sources generated by the very large watershed from Birmingham covering around 30,292 acres.

Instream pollutant loadings were computed based on daily flow data collected at Stations VIC01.8 and VIC13.0 by the USGS during the same time period as water quality samples were collected. Water quality mass concentration data was also collected at the same sites every other month (i.e.

once every two months). As can be seen in the figure below the City's Industry point source contribution to the average daily TSS load into Village Creek is comparatively less than the nonpoint source contribution.



Different from last year the net load of TSS, the difference between the load at VIC13.0 and VIC1.8, was approximately 0.358 Tonnes/day. 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 load difference represented by this figure, when compared with last year's load is more than that of industry. The contribution from those industries considered in this report, which also provided discharge monitoring reports to ADEM, were combined together for the same time period to represent the total industry load.

Individual contributions from industry are reported herein as the calculation of either average daily flow reported or calculated, and average daily TSS concentrations either reported or calculated from available DMR data. The represented industry contribution contained in this report does not presume these to be the only industries discharging into Village Creek. The contribution from the MS4 was considerably higher than last year while the Industry contribution was lower. Again, it is believed the additional rainfall contribution played a considerable role in these differences, among other observations.

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TSS TMDL Comparision



Considering the difference from last year's report wherein it was demonstrated that the MS4 was significantly different and greater than industry, the difference this year may be due to the following suggested reasons:

- ★ Industry calculations had reported unit differences, which were carefully incorporated in this year's report.
- ★ Additional data was added to last year's data set and the final units were reported as daily average rather than the annual average, which would necessarily require that data to otherwise be normalized as annual data.
- ★ Total flow from the MS4 during this reporting period was 72.3 cfs while industry was comparatively low at 3.0 cfs. However, the TSS average concentration for the Industry was 4.06 tonnes/year while the concentration of TSS contributed by Birmingham's MS4 was reportedly higher at 126.6 tonnes/year.
- ★ Another way to consider comparative impacts on TSS load is to consider the discharge weighted load. It was demonstrated earlier that there is a relationship, now with five years of data, between TSS and flow. The figure on top right represents a comparison of flow-weighted TSS concentrations between Birmingham's MS4 and industry.
- ★ Overall, the City flow weighted concertation is considerably greater than that of industry.

Flow Weighted TSS Concentration



Similarly, the City of Birmingham has also found a relationship, although weak with this year's additional data, 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. The City attempted on one occasion to do this although the rainfall event failed to adequately meet sampling protocols for sampling. In the five 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.

Village Creek TMDL Analysis: ADEM has established a TMDL for siltation in Village Creek. That document reported the allowable loading for Village Creek by NPDES regulated stormwater discharges, including MS4 discharges, to not exceed 8.3 lbs./acre/hr. This was recorded for Village Creek at Avenue "W" and was based on an area found within the ADEM TMDL of 21,440 acres. During this full period of study, The City observed a stormwater load allocation near Avenue "W": at the Pratt City Railroad Trestle (VIC14.0), just one-mile away from VIC13.0, of 0.0329 lbs./acre/hr. or nearly 38 times less than the state's allocation allowance. This figure is based on the same area as was computed for ADEM's TMDL allocation allowance. For comparison sake, the City also compared the observed waste load allocation



to that reported in the City's Village Creek Watershed Improvement Strategy for the Village Creek Watershed data reported near Ensley. Please recall that data was generated by a calibrated and verified SWMM Model. That data was more than 500 times less than ADEM's TMDL waste load allocation at approximately $2.3E-5$ lbs./acre/hr. See results in the figure on the top right. 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 from 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.^{viii}

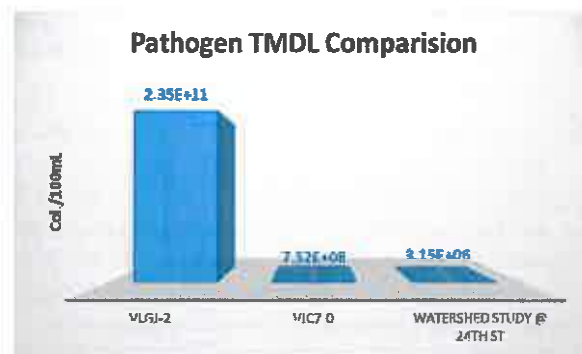
In ADEM's "Final Total Maximum Daily Loads (TMDL) For Metals (Zinc), pH, and Siltation in the Village Creek Watershed" report, ADEM reported a waste load allocation (WLA) requirement for Village Creek to not exceed 8.3 lbs. /acre/hr.^{ix} During this annual report period, the WLA demonstrated by Birmingham was approximately 0.026 lbs./acre/hr., which is considerably lower than the WLA requirement established by ADEM.

In August 2015 ADEM established a total maximum daily load for pathogens in Village Creek. The load allocation for MS4s was identified a $2.35E+11$ colonies per day and a reduction requirement of 26%. The single mass loading was established from measurements taken at VLGI-2, which coincidentally is the same location that the City samples in Village Creek at VIC07.0.

The City computed the geometric mean concentration of E. coli at VIC07.0. The City does not collect flow data from VIC07.0 but does collect

flow data near Pratt City at VIC14.0. See figure above. Therefore, to compute the load for TMDL for comparative purposes, the flow was taken from VIC14.0 and multiplied by the area behind VIC07.0, which was computed by GIS to be 54.7%, and is assumed for this measure to be a draining basin to VIC07.0. Again, for comparison, the numbers used were discrete and not the difference between the tail water flows and the headwater flows thereby matching how the TMDL was prepared by ADEM.

The TMDL number of $2.35E+11$ was not to be exceeded. The City waste load for E. coli. was computed to be $7.5E+8$ and the results of the City's Watershed Management Plan computed the pathogen load at 24th Street (Approximately 1-Mile Downstream of VIC07.0) to be $3.1E+6$. Again, as with the TSS TMDL, the City appears to also be meeting the TMDL requirements for pathogens in Village Creek.



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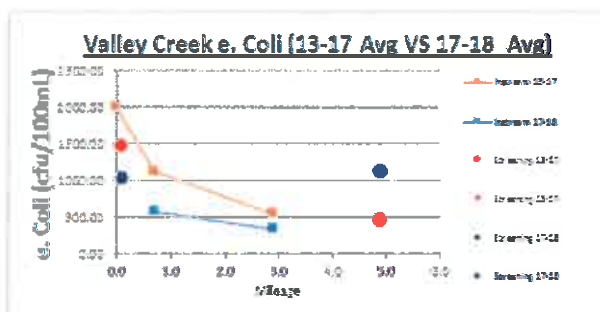
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Valley Creek: Valley Creek extends a distance of approximately 8.8 miles from the City of Birmingham through another jurisdiction until the Bessemer Super Highway, just outside of the City of Bessemer. The City now monitors between stream segments 0.7 and 2.9. With the exception of the screening sites at station 0.1s and 4.9s the remainder of the creek is monitored by the Stormwater Management Authority, Inc. in the downstream portions of Valley Creek.

Valley Creek Average Concentrations				
Year	Mileage	Specific Conductivity	TSS	E. coli
13-14	4.9s	400.4	1.4	361
	0.1s	521	3.3	1076
	2.9	479.8	1.5	159
	0	445.1	1.3	2098
14-15	4.9s	395	2.4	280
	0.1s	502.2	15.3	1433
	2.9	450	1.9	666
	0	434	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
	0.7	529.5	2.8	778
	0	405.1	0.8	1937
16-17	4.9s	310.4	6.3	854.2
	0.1s	352.3	10.1	1873.1
	2.9	333.2	4.7	794.6
	0.7	364.1	4.3	1119.4
17-18	4.9s	391.5	1.5	1123.4
	0.1s	453.5	9.4	1016.5
	2.9	435.1	1.5	329.1
	0.7	468.3	6.7	568.2

Monitoring results for select key parameters in Valley Creek, both instream and screening sites, are depicted in the table above for each of the last five-years.

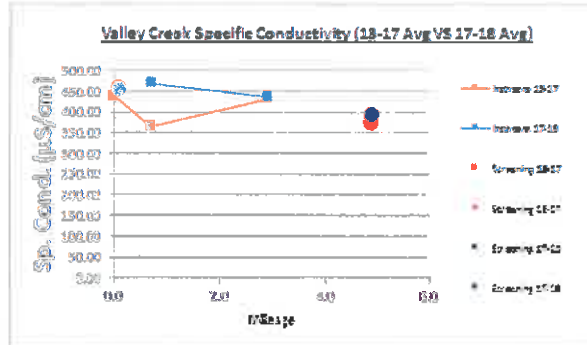
The parameters of much concern for Stormwater Management in Valley Creek continues to be *Escherichia coli* (*E. coli*) and higher Turbidity readings. The highest levels of *E. coli* were frequently measured at Station VC0.1s (Jail Branch), and the headwaters VC0.0 monitoring station in Valley Creek at the point where the Creek daylight's out from under the downtown City of Birmingham. However, the City has discontinued sampling at VC0.0 due to concerns related to mixing and to improve data consistency and has relocated the headwater station to VC0.7 at Center Street, which is downstream from the 1st tributary inflow at VC0.1s.



VC0.1s was usually the highest concentration of *E. coli*, averaging 1386.7 mpn/100mL. In 2017-2018 VC0.1s averaged 1016.5 mpn/100mL. Discharges from VC0.1s continue to have high concentrations of *E. coli* discharging to Valley Creek without a specific known source. The City has also had an increase in the average *E. coli* at VC4.9s during this reporting period. The City has attempted to address the illicit discharge impacts of the homeless population and animal shelters as waste contributors to certain areas of City's MS4 in the Valley Creek watershed. The City has also worked with Jefferson County Environmental Services to address sanitary sewer overflows and will continue to work with Jefferson County to identify



opportunities to further reduce E. coli when discovered.



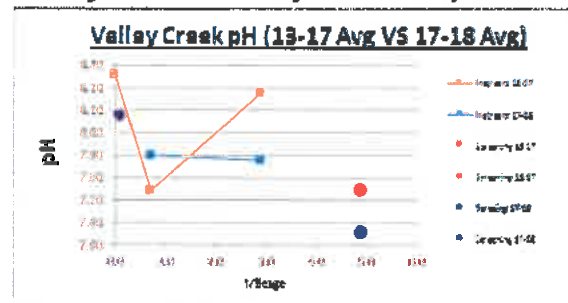
The figure above demonstrates that during the previous sampling years average Specific Conductivity demonstrated a slight increase although this reporting year it yielded a decreasing trend across the watershed within the City of Birmingham. The City is aware of a discontinuous dry weather flow at VC0.1s associated with an Illicit Discharge and is working to identify and map the MS4 in that specific drainage basin.



Average Total Suspended Solids concentrations, in Valley Creek have been higher at VC0.1s for the past 5 years, averaging 8.66 mg/L. The other stations in Valley Creek over the five-year period yields an average concentration lower than 5.0 mg/L.

During this study period the average pH levels remained below 8.1 units both instream and screening sites. In the previous 5-year study

average pH levels peaked around 8.3 units. Comparatively, the USGS found pH in surface waters at VAL-1 to have a median value of 7.9 units.^x Analysis of groundwater wells in Jefferson County identified pH as having a median value of 6.8 units in the more westerly portions of Jefferson County and from the Pottsville Formation, which tends to be more acidic due to mining activity. However, samples taken from the Bangor Formation (Limestone) would tend to have more basic groundwater pH levels reflective of the eastern portions of the City and in Valley Creek.^{xi}



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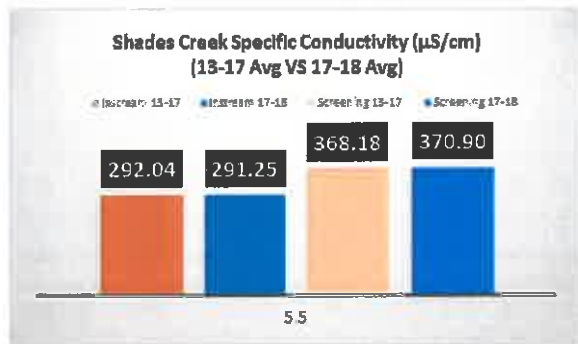
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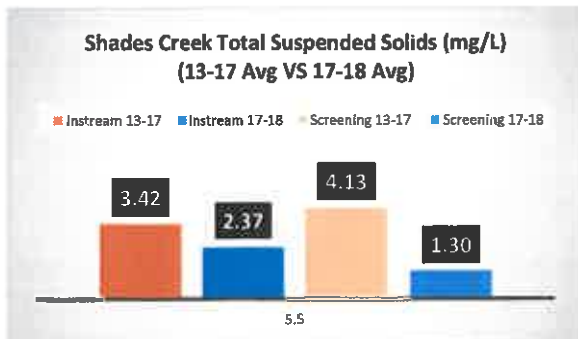
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Shades Creek: Shades Creek within the City of Birmingham extends approximately 4.5 miles. Shades Creek enters the City of Birmingham at mile 5.0 from Irondale, becoming a shared stream with the Stormwater Management Authority by mile 5.8. Ultimately,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

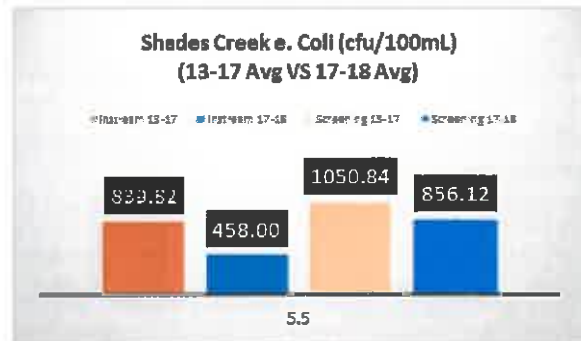
The City of Birmingham only samples Shades Creek at instream mile 5.5 and at a screening site at the same location (5.5s). Average specific conductance at this monitoring site during the past five years is shown below. The four-year average of Specific Conductance is 368.18 $\mu\text{S}/\text{cm}$ at screening site SC05.5s and 292.04 $\mu\text{S}/\text{cm}$ at instream site SC05.5. This year the average specific conductance was 370.90 $\mu\text{S}/\text{cm}$ at screening site SC05.5s and 291.25 $\mu\text{S}/\text{cm}$ at instream site SC05.5.



Average total suspended solids at both instream and screening sites did not exceed 5.0 mg/L.



Average E. coli levels yielded a decrease at SC05.5s due to what we consider as an IDDE Resolution. The *Illicit Discharge* section of last year's report, discusses discharges from screening site SC05.5s which had elevated pathogens that was a result of Goo-Goo Car Wash which was discharging into the MS4. This condition was contributing to the E.coli levels and has been eliminated and continuous reduction in pathogens at this site is expected.



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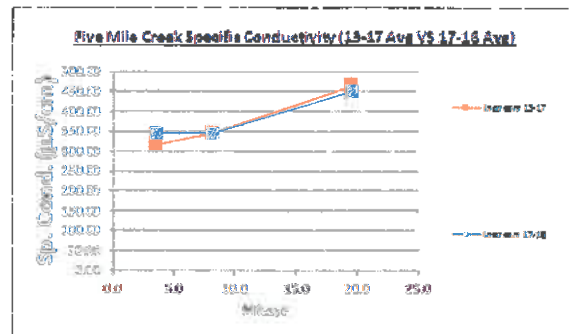


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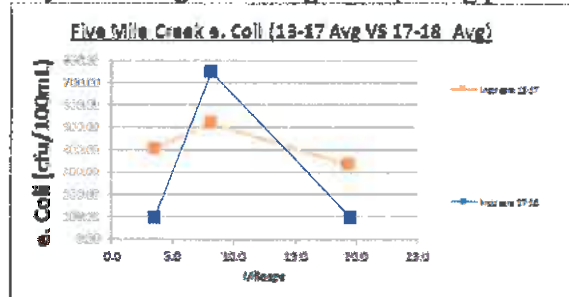
Five Mile Creek: Five Mile Creek runs discontinuously through Birmingham's city limits over the course of 8.4 miles. Monitoring Five Mile Creek is difficult due to the creek locations within the City of Birmingham relative to the points of safe access. The table below identifies those entrance and exit 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.

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	-

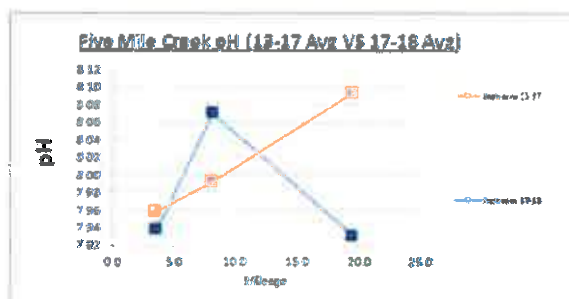
The figure above right demonstrates the five-year reporting period for average Specific Conductivity. The average specific conductivity during the current reporting period in Five Mile Creek is



consistent with the prior four-years prior. The trend displayed a greater specific conductivity as it exits City of Birmingham during this reporting period.



Monitoring for pathogens this year demonstrated a considerable increase at FMC08.2 over the preceding five-year period. Reductions in E. coli levels are shown at sampling sites FMC03.6 and FMC19.5 below the previous four-year average.



The Birmingham Water Works Board (CCR) report pH ranged in 2016 between 7.52 and 8.06 units. According to the figure above, average pH levels in 2017-2018 demonstrated similar results. As well as the previous reporting years combined averages.

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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 (BWVB). The table below provides a summary of that data, provided to the City by the BWVB, comparing the average concentrations of select parameters shared in common during the 2015 reporting period.

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

- ◆ CR 280
- ◆ Cahaba Beach Road
- ◆ I-20 East
- ◆ Shepherds Branch
- ◆ Sunshine Creek
- ◆ Watson Branch

For as City of Birmingham and BWVB selected water quality sampling location for the Cahaba River it appears that for Nitrate, Nitrite, and Orthophosphate they are comparably the same. As seen in the table below. During this same period TSS concentrations collected by the City of Birmingham was more than 10 times lower than BWVB. Recent discussion with the Cahaba River

Society noted significant erosion in portions of the Cahaba River which, could be responsible for the higher TSS levels. E. coli, although measured higher by the City than from corresponding sites measured by BWVB, the levels are not excessive and is suggestive of site conditions; developed City versus rural areas.

Parameter	2017-2018 Geometric Mean Concentration	
	City of Birmingham	Birmingham Water Works Board
Nitrate (mg/L -N)	<0.3	<0.3
Nitrite (mg/L - N)	<0.3	<0.3
Total Phosphorous (mg/L - P)	<0.02	<0.30
TSS (mg/L)	4.0	3.8
E. coli (mpn/100mL)	120.8	93.2

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Stream	D.O. (mg/L) Min/Max	pH Units Min/Max	Temp. F° Geo- mean/Max	<i>E. coli</i> mpn/100 mL/s Geo- mean/Max	Turbidity NTU Geo- mean/Max	Zinc µg/L Geo- mean/Max
Cahaba	6.5/9.7	6.9/8.0	62.6/77.6	120.8/248	10.8/31	
Five Mile	3.89/12.57	7.68/8.45	62.1/74.4	134.5/2419.6	2.09/7.4	
Village	4.8/13.06	7.6/8.4	63.2/75.4	208.1/2420	5.19/86.5	<5.0-5.0
Valley	6.7/13	7.46/8.21	64.5/75.4	473/2419.6	5.6/83.5	
Shades	3.84/13.0	7.68/8.41	62.4/78.0	437/2419.6	4.3/15.3	

Above Anti-degradation Table reflects study period 2013-2018 and 2017-2018 annual period.

Anti-degradation 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 above provides the results of Birmingham's sampling efforts this year for five key state Anti-degradation parameters and for zinc in Village Creek alone, including:

- ◆ Dissolved Oxygen (D.O.; mg/L)
- ◆ pH (Units)

- ◆ Temperature (F°)
- ◆ *Escherichia coli* (*E. coli*; mpn/100mL)
- ◆ Turbidity (NTU)
- ◆ Zinc (µg/L) – Village Creek Only

This table represents the level of compliance with the State's Anti-degradation Policy for all streams within the City of Birmingham. The chart has been color coded to represent stream designated uses. 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

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compliance with state law. Where two numbers are shown, the first number is the geometric mean concentration of all instream site values while the second number represents the highest concentration reported during the bimonthly (every two months) sampling period this year.

For each stream: red, green, and yellow color-coded boxes and circles have been added. The color-coded boxes represent the results of sampling during 2017-2018, inclusive. The color-coded circles represent the results of sampling during the period 2013-2018, inclusive. The circles and squares are colored to represent the status of adherence to select parameters defined in Chapter 335-6-10, which represents the regulatory standard condition for each stream use classification. For example, if a green box has been added the regulatory standard condition for that parameter, for that time period, was completely met for that stream designated use. A yellow box or circle means that at least a portion of the standard condition was not met for that stream designation and during that representative time period. A red box or circle added means the standard condition for that parameter was not met during the course of the reporting period for which monitoring was done. The mean for each parameter represents the geometric mean as required by the Anti-degradation Policy. Zinc levels in Village Creek are represented as the geometric mean and maximum concentration. A green box or circle represents that zinc concentrations did not exceed either the chronic or acute aquatic life criteria during that period. A yellow box or circle represents a chronic aquatic life exceedance; the red box or circle represents an acute aquatic life criteria exceedance.

This year 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 335-6-10
- ◆ 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 higher on average than that reported in literature for Village Creek. For example, the Geo-mean for City hardness was 295.8mg/L for the period between 2013 –2018, inclusive. According to the Water-Resources Investigations Report 02-4182 for Village Creek, the Geo-mean for hardness was calculated as being 149.8mg/L.
- ◆ City is unaware if whether or not Equation #14 of the State Anti-degradation Code, which is reported as recoverable, can even be used for total zinc.

For comparative purposes, Anti-degradation policy equation #14 is used to define the freshwater acute aquatic life criteria and equation #15 is used to define the freshwater chronic aquatic life criteria in Village Creek. As these equations are hardness dependent, a geometric mean for hardness of 295.8 mg/L was used to represent the data collected between 2013 and 2018, inclusive. The geometric mean for hardness representing the period between 2017 and 2018, inclusive was 226 mg/L.

Zinc was detected in 100% of the study samples, albeit the majority <5.0µg/L for the period 2013 – 2018. It is important to note that all zinc samples for the last two years, 2016-2017 and 2017-2018 have remained consistent at <5.0µg/L. The maximum concentration of zinc was 52.9 µg/L at VIC13.0 on November 18, 2014. Concentrations of zinc exceeded the acute and chronic aquatic life criteria in 23 of 256 samples (8.9%), which was less than the percentage exceeding acute and chronic



aquatic life criteria reported by the USGS in 2001 (17%).

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. With the exception of the Cahaba River all other streams in Birmingham had exceedances on pH greater than 8.5 units at sometime between 2013 and 2015. There were no pH values less than 6.0 units at any time in any creek. However, the 2016 to 2018 data demonstrated no exceedances for any creek.

Escherichia coli (*E. coli*) in the Cahaba River and Five Mile Creek, both geometric mean and the maximum concentration, were exceeded during the study period between 2013 and 2018. Valley Creek did exceed the geometric mean on one occasion during this year's 2017-2018 reporting year, due to the illicit discharge previously discussed in the Water Quality summary for its reasonable use classification.

Overall, Jefferson County Environmental Services for this year's reporting period, estimated that 1,084,949 gallons of untreated sewage made it into the four creeks and Cahaba River around and in the Birmingham metropolitan area. This information excludes estimated ground absorbed quantities.

Village Creek and Shades Creek remained similar to last year's reported geometric mean or the maximum concentration at some time during the period 2013-2015.

Temperature levels for all creeks, at all locations in Birmingham, did not exceed state Anti-degradation regulations at any time during the study period from 2013 to 2018.

Dissolved Oxygen levels met or exceeded all minimum concentrations during reporting cycles from 2013 to 2018 for all streams within Birmingham, with the exception of Shades Creek which during the October 2016 sampling event

exhibited a low dissolved oxygen reading of 4.1mg/L. This low dissolved oxygen level was recorded during extreme drought conditions and low flow conditions, as well as, a contributing illicit discharge, that has since been eliminated, emanating in close proximity to the instream sampling site.

Turbidity levels also demonstrated improvement during the entire 2013 to 2018 reporting cycle with Cahaba River and Shades Creek showing no high turbidity readings. Five Mile, Village and Valley Creeks all exhibited high turbidity readings during the 2013 to 2017 study period. With Village and Valley Creeks displaying a high turbidity reading during a substantial rainfall event with high velocity flow for the more recent 2017 to 2018 period. Valley Creek also exhibited high turbidity readings during an illicit discharge occurring twice during sampling events for the most recent recording period 2017-2018.

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.¹ 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

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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.

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STORMWATER OPERATING BUDGET	
FISCAL YEAR 2017-2018	
Stormwater Management	
Fund 048	
<u>Estimated Revenues</u>	
Total Estimated Revenues	<u>\$1,466,820.65</u>
<u>Appropriations</u>	
Planning, Engineering & Permits:	
Stormwater Staff (General, not exact)	\$616,910.65
Projects (Budgeted, not depicting fully spent)	\$754,910.00
General & Administrative Expenses (Basic expenditures to run the division)	\$95,000
Total Appropriations	<u>\$1,466,820.65</u>

The table above depicts the FY 2017-2018 budget for Stormwater Management. The Fiscal cycle for the City of Birmingham runs July 1 – June 30 annually. This graph represents the 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. These numbers are general figures and not exact. The amount of money it takes to run the division is closely matched with the revenues generated. Any revenue collected in excess of expenditures is rolled into the next fiscal year's budget.

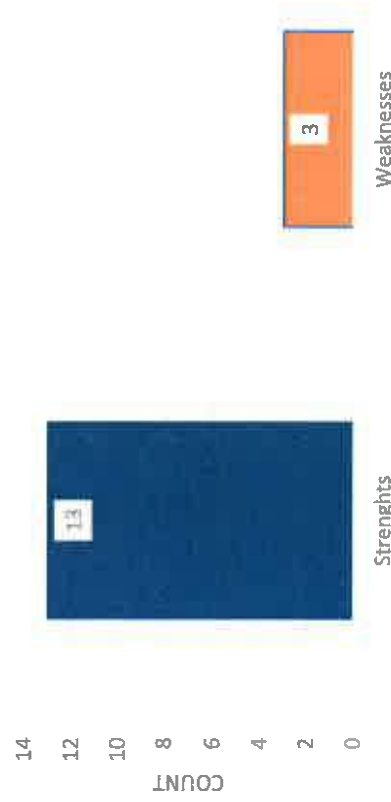
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Strengths & Weaknesses Summary 2018



Comparative Summary of Strengths and Weaknesses			
BMP Controls	Strength	Weakness	Future Direction
Structural Maintenance		X	Perform monthly inspections of installed systems and meet quarterly with Leadership to address problems and better coordinate resolution. The City is also considering a SMART Maintenance System through Asset Management.

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Comparative Summary of Strengths and Weaknesses

BMP Controls	Strength	Weakness	Why a Weakness?	Future Direction
Development Planning	X			
Roadway Maintenance		X	Truck wash storm drain pollutant inserts have been designed and are awaiting funding approvals.	Use Public Works crews to limit project costs. Engineering has completed a design. Funding approval by Fleet is anticipated. Eastern Landfill truck wash is still being further considered.
Flood Management	X			
Municipal Facilities	X			
PHF	X			
IDDE	X			
Spill	X			
Oil & Hazardous Waste	X			
Sanitary Sewer Seepage		X	Although the City does not have a sanitary sewer system, coordination with Jefferson County to obtain annual reports has been	Continue to seek better collaboration with Jefferson County Environmental Services.

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Comparative Summary of Strengths and Weaknesses				
BMP Controls	Strength	Weakness	Why a Weakness?	Future Direction
			difficult although support with IDD&E requests have been good.	
Industrial Inspection	X			
Construction Planning	X			
Construction Inspection	X			
Education	X			
Monitoring & Screening	X			
TMDL Response	X			



PROGRAM ACTIVITIES SUMMARY TABLES



PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
(1) Structural Controls	Storm Drain Inlets Cleaned (#)	3,500 annually	Yes	5,998 inlets	6260 inlets	
	Storm Sewer Lines Cleaned (Lin Ft)	90,000 annually	Yes	305,223 LF	554,684 LF	
	Litter Cleared (Blocks)	30,000 annually	Yes	92,465 blocks	483,267 blocks	
	Pipe Repaired / Replaced (Lin Ft)	1,000 annually	No	371 ft	532 ft	
	Inlet Const (#)	100 annually	No	23 inlets	47 inlets	Spent time researching and studying new design concept
	Curb & Gutter Const (Lin Ft)	900 annually	No	1,673 ft	640 ft	
	Storm Sewer Tops Made (#)	350 annually	Yes	654 made	937 made	
	Storm Sewer Tops Set (#)	4,000 annually	Yes	5,065 set	6,260 set	

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
(2) Areas of New Development / Redevelopment	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	
	Review Subdivision Ordinance and Update	Complete by Sept 2012	Yes			
	Review and Revise the City's Engineering Guidelines for Stormwater Management	Complete by Sept 2017	Yes			Included in the Post Construction Stormwater Manual
	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. Similarly, Valley Creek is being investigated.
(3) Roadway Maintenance	Streets Swept (Curb miles)	100,000 annually	Yes	158,407 curb miles	165,817 curb miles	
	Estimate Pollutant Load Reduction from Street Sweeping Practice	Complete by Sept 2014	Yes	8,171.8 tons	8,290.85 tons	



PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
(5) Pesticide, Herbicide, and Fertilizer Application	Inventory the City PHF Storage Facilities	Complete by Sept 2010	Yes			Available Upon Request
	Map the City PHF Storage Facilities	Complete by Sept 2010	Yes			Available Upon Request
	Develop PHF Program Documentation to Include Chemical Application Protocols	Complete by Sept 2013	Yes			Available Upon Request
	Track Inventory of PHF Materials	Monthly	Yes			Available Upon Request
	Track Quantity of PHF Materials Applied	Annually	Yes			Available Upon Request

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
	Document Training for Staff	Annually	Yes	Yes	Yes	Available Upon Request
	Develop and distribute public education materials	Annually	Yes	See <i>Public Education & Outreach Future Program Direction</i>	See <i>Public Education & Outreach Future Program Direction</i>	

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Completed With	Activities Accomplished		
				2017	2018	
(6) Illicit Discharge Detection and Elimination	Map the City Outfalls	Complete by Sept 2010	Yes		See IDDE Section	
	Develop IDD&E Program Documentation	Complete by Sept 2010	Yes	<ul style="list-style-type: none">City staff is preparing draft IDDE-SWMPPCity staff began development of a tracking systemAnticipate staffing of SPO Appeals Board	See IDDE Section	
	Track Public Complaints	Annually	Yes	1,800	See IDDE Section	

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
	Track Illicit Discharge Investigations and Resolution	Annually	Yes	25 illicit discharges were reported	See IDDE Section	
	Update the City Outfall Inventory	Annually	Yes	No new outfalls added	No new outfalls added	
	Inspect Instream Peak Outfalls Bimonthly		Yes	Yes	Yes	
	Maintain Hotline	Annually	Yes	Street sweeping: 425 MS4 cleaned: 686 Reset inlet covers: 215 Street flooding: 126 Missing/broken inlet covers: 155 Catch basins repair: 165	See IDDE section	

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
				Catch basin clogged: 28		
	Track Reported Spills and Investigate Findings	Annually	Yes	EMA: 40 reported spills ADEM: 7 reported spills SWM: 7 reported spills	See Spill Prevention and Response section	
	Maintain Stormwater Webpage for Existing City Website	Annually	Yes			

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
	Map the City Storm Sewer System	Complete by Sept 2015		This is now being done in concurrence with IDD&E inspections	This is now being done in concurrence with IDD&E inspections	
(8) Industrial and High Risk Runoff	Review SWPPP for Landfills	Complete by Sept 2013	Yes			Both the New Georgia and Eastern Area Landfill SWPPPs/SPOCs have been updated. Documents available upon request
	Continue Inventory and Map ADEM Permitted Sites	Annually	Yes	No new facilities mapped		
	Maintain Map of SARA Title III Sites and Update New Sites	Annually	Yes	237 facilities	See Industrial Stormwater Runoff Section	Available upon request



PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complled With	Activities Accomplished		
				2017	2018	
	Implement/continue BFD PIP Inspections of Tier II Sites	Annually	Yes	Pre-incident inspections: 121	See Industrial Stormwater Runoff Section	Available upon request
	Train Municipal Staff	Annually	No	135 City staff trained		
	Stormwater Monitoring at City Landfills	Annually	Yes	Eastern Area & New Georgia Landfill DMR's		
	Create Inventory of Municipal Facilities and Review Stormwater Management at the facilities	Complete by Sept 2015	Yes (Ongoing)	List of City facilities & properties complete		
	Industrial & High-Risk Facilities & Runoff Inspections & Enforcement Activities	Annually	Yes	Inspections: 84 Rechecks: 122 Enforcement: 12 Corrective actions: 6	See Industrial Stormwater Runoff Section	

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
	Review ESC Ordinance	Complete by Sept 2015	Yes	Ongoing	Ongoing	Staff is considering further changes in 2018 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: 1146 Inspected in impaired watershed: 312 Checked job sites: 1146 Final inspection: 43 Inspections passed: 1038 Inspections failed:108 Violation notices: 1	See Construction Site Runoff section	

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE			COMMENTS
		Measurable Goal	Complied With	Activities Accomplished	
				2017	
				Formal Enforcement Action: 0 Compliance orders: 1 Contractor in Default: 0 Bonds collected: 0 Bonds released: 43 Permits issued: 219 Permits closed: 43	
	Land Disturbance Permits Issued in Impaired Watersheds	Annually	Yes	Permits issued in impaired watersheds: 110 Permits closed in impaired watersheds: 21	See Construction Site Runoff section
	Conduct at least one Erosion and Sediment Control	Annually	Yes	Fall 2016 & Spring 2017: 60	See Education Section

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
	Workshop for Developers, Builders and Engineers					
(10) Public Education	Develop and Distribute Public Education Brochures	Annually	Yes			Distributed 1600 calendars. Available upon request
	Participate in Creek & Neighborhood Clean Up	Annually	Yes	SWM staff planned, trained, supported and participated in 8 cleanups	SWM staff planned, trained, supported and participated in 81 cleanups	City removed & disposed of ~60 tons of debris during cleanups
	Public Education Program Documentation	Complete by June 2013	Yes	During this reporting year, the City published and distributed 1,600 stormwater calendars.	During this reporting year, the City published and distributed 3,000 stormwater calendars.	Available upon request

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PROGRAM ELEMENT	Description of BMP	ACTIVITY SCHEDULE				COMMENTS
		Measurable Goal	Complied With	Activities Accomplished		
				2017	2018	
	Bimonthly Instream & Screening Site Monitoring	20 Sites Bimonthly	Yes	100%	100%	
(11) Monitoring	Bimonthly Instream & Screening Site Monitoring	20 Sites bimonthly	Yes	100%	100%	
	Outfall Reconnaissance when Instream Peak Segments are identified	Many as Necessary	Yes	1	4	
	Develop Inter-Jurisdictional Agreement for Monitoring	Complete by Sept 2014	No			



ANNUAL REPORT REFERENCE NOTES

ⁱ *Federal Water Pollution Control Act, Sect. 402. (p)(3)(B)(iii).* 2002. Page 195

ⁱⁱ 40 CFR Part 122.26(d)(2)(iv). Page 217

ⁱⁱⁱ [Final Village Creek, Zinc, pH, and Siltation TMDL](#)

^{iv} IBID. Page 81.

^v <https://www.birminghamal.gov/storm-water-management/stormwater-management-plan/>

^{vi} www.dummies.com/software/microsoft-office/excel/how-to-highlight-statistical-outlier-in-excel

^{vii} City of Birmingham. October 4, 2013. *Water Quality Monitoring Strategy for Alabama Department of Environmental Management*. Pg. 13.

^{viii} [Final Village Creek, Zinc, pH, and Siltation TMDL, Page 18](#)

^{ix} IBID, Page 38

^x [U.S.G.S. Water Resources Investigations Report 02-4182, 2002, Pg. 101-102](#)

^{xi} [Geological Survey - Ground Water Availability, Jefferson County, 1990.](#) Page 14-15

^{xii} [Basic Information: Introduction to UAAs | Use Attainability Analysis | US EPA](#)