Office of the Chief Executive Officer

Zachary L. Williams
Executive Assistant, Chief Operating Officer

Via Electronic Mail and U.S. Mail
March 1, 2018

Chief, Clean Water Branch
ATTN: Ms. Sara Janovitz
Water Protection Division
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, S.W.
Atlanta, GA 30303

RE: Clean Water Act Consent Decree 1:10cv 4039-WSD
March 1, 2018-Annual Report #6 Submittal

Dear Ms. Janovitz:

As required by §IX. Reporting Requirement of the Consent Decree associated with the above referenced civil action, we are submitting the following document for your review and comment:

- **March 1, 2018 – Annual Report #6**

I certify under penalty of law that these documents 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 such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations pursuant to CWA Section 309(c)(4).

If you have questions or comments regarding this submittal, please call me at 404 371-2174.

Respectfully,

Zachary L. Williams,
Chief Operating Officer /Executive Assistant
DeKalb County, Georgia

cc: Georgia EPD
Viviane Ernstes, Interim County Attorney
William "Ted" Rhinehart, Deputy COO
Scott Towler, P.E., Director, DWM
Margaret A. Tanner, P.E., Deputy Director, DWM
Reginald D. Wells, P.E., Deputy Director, DWM
Darren Eastall, Consent Decree Administrator
E. Fitzgerald Veira, Troutman Sanders
Matthew C. Welch, Esquire

Annual Report #6

January 1, 2017, to December 31, 2017
Civil Action No. 1:10cv4039 - WSD

DeKalb County
Department of Watershed Management

March 1, 2018

Table of Contents

Acronyms

ARV	air release valve
CCTV	closed circuit television
CD	Consent Decree
CERP	contingency and emergency response plan
CIP	capital improvement program
CM	corrective maintenance
CMMS	computerized maintenance management system
CMOM	capacity, management, operations, and maintenance
DWM	Department of Watershed Management (DeKalb County)
FOG	Fats, Oils, and Grease
FSE	food service establishment
GAEPD	Georgia Environmental Protection Division
GIS	geographic information system
I/I	infiltration/inflow
KPI	key performance indicator
LF	linear feet
MCA	manhole condition assessment
MMADF	maximum month average daily flow
MMS	maintenance management system
O&M	operation and maintenance
OSARP	Ongoing Sewer Assessment and Rehabilitation Program
PASARP	Priority Areas Sewer Assessment and Rehabilitation Program
PM	preventive maintenance
QA/QC	quality assurance and quality control
SSO	sanitary sewer overflow
TISCIT	Totally Integrated Sonar and Camera Inspection Technology
USEPA	U.S. Environmental Protection Agency
WAM	work and asset management
WCTS	wastewater collection and transmission system

Introduction

DeKalb County (the "County") Department of Watershed Management (DWM) submits this 6th Annual Report in accordance with Section IX, Paragraph 58 of the Consent Decree (CD) (Civil Action 1:10cv4039-WSD) to provide:

a) "A narrative summary of progress made, including key accomplishments and significant activities, under the Capacity, Management, Operations, and Maintenance (CMOM) programs implemented or modified pursuant to this Consent Decree for the most recent twelve (12) month period."

b) "A trends analysis of the number, volume, average duration, and cause of the County's Sanitary Sewer Overflows (SSOs) for the previous twenty-four (24) month period."

Executive Summary

The report that follows is divided into two sections as required by the CD. Part I reports on the CMOM Programs' Implementation Activities. Part II, the Sanitary Sewer Overflow (SSO) Trends Analysis, is intended to meet the County's reporting obligations as referenced above. This document details, in narrative form, progress made in the 2017 timeframe as well as significant program accomplishments and SSO Trends Analysis. Any revised milestones and the associated corrective implementation plans are noted in the previously submitted Semi-Annual Report.

During the period from January 1, 2017, to December 31, 2017, the following DWM CMOM implementation programs, reports, and deliverables were approved by or submitted to the U.S. Environmental Protection Agency (USEPA) and Georgia Department Environmental Protection Division (GAEPD), as noted in Table ES-1.

Table ES-1 Consent Decree Submittals – Schedule and Status

Consent Decree #	Title	DWM Final Submittal
IX.(56)	4th Quarterly Report 2016	1/30/17
IX.(57)	10th Semi-Annual Report	1/30/17
IX.(58)	Annual Report #5	3/1/17
IX.(56)	1st Quarterly Report 2017	5/1/16
IX.(57)	11th Semi-Annual Report	7/31/17
IX.(56)	2nd Quarterly Report 2017	7/31/17
IX.(56)	3rd Quarterly Report 2017	10/31/17

During 2017, the County continued asset assessment throughout the County with specific focus on completing the assessment of assets in the priority areas. As assessment of the wastewater collection and transmission system (WCTS) progressed, the County evaluated data obtained from smoke testing, manhole inspection, dye testing, closed-circuit television (CCTV), visual inspections, model usage, Totally Integrated Sonar and Camera Inspection Technology (TISCIT), and ranked all inspected assets based on the risk and probability of failure. Certain assets in immediate need of attention were sent for repairs under emergency contracts. Other assets were included in a series of multi-million-dollar capital improvement packages for remedial action. Finally, specific assets, in satisfactory condition and not in immediate need of remedial action, were tagged in the County's work management system to be monitored and re-assessed as appropriate during the next 10 years. It is the County's intent to assess each asset in the County's system and to have a corresponding plan for that asset recorded for execution in the County's work management system as detailed in the Priority Areas Sewer Assessment and Rehab Program (PASARP), Ongoing Sewer Assessment and Rehabilitation Program (OSARP), and Maintenance Management System (MMS) CMOM Programs. The referenced plans could include a schedule for periodic monitoring and reassessment of the asset as well as schedules for cleaning, maintaining, or potentially replacing the asset.

In addition to the assessment and ranking of assets executed in 2017, the County also continued and initiated several preventive maintenance programs. For example, large-diameter pipe cleaning was begun this year. The creek crossings investigation program was re-initiated with attention focused on easement clearing and bank restoration. Pipe support structures were evaluated under the preventive maintenance program to identify and prevent potential weakening in the supports that could eventually impact the pipes. Lift station preventive maintenance work orders were initialized and completed as well as force main air relief valve (ARV) inspections.

The County also completed the expansion and complete rehabilitation of five lift stations, increasing the transmission capacity by 1.2 million gallons per day (mgd).

Table ES-2 summarizes the major activities and key milestones completed in 2017.

Table ES-2 2017 Major Consent Decree Milestones and Accomplishment Summary

Program or Project	Milestones and Accomplishments
Contingency and Emergency Response Plan (CERP)	✓ Trained DWM personnel and CD contractors in Contingency and Emergency Response Plan (CERP) definitions, responses, and reporting. ✓ Performed follow-up actions, even after the initial response, for all SSOs including CCTV, FOG education, root control, system cleaning, etc.
Fats, Oils, and Grease (FOG) Management Program	✓ Increased FOG enforcement for unregistered food service establishments (FSE) and public education of areas around grease-related spills. ✓ Performed FOG inspections, evaluations, and tracked data: – Total number of FOG inspections: 9,504 – Total number of FOG evaluations: 1,562 ✓ 2017 monthly average permitted active FSEs: 2,717
Sewer Mapping Program	✓ Continued developing a private sewer lateral geographic information system (GIS) shapefile from CCTV data. ✓ Identified and mapped 1,606 easements to GIS layer. ✓ Conducted major update to sanitary sewer GIS layer.
MMS Program	✓ Performed 2,179 sewer creek crossing inspections. ✓ Procured a contract for root control application in the system and treated 8,800 feet of sewer for roots. ✓ Began the process for procuring an easement clearing contract. ✓ Substantially completed renovations at five lift stations.
Collection and Transmission Systems Training Program	✓ Provided technical and skills training to DWM personnel related to their job responsibilities. ✓ Completed 9,891 hours of training in 2017. ✓ Generated training reports for superintendents and managers, and reports for executive management staff.
System-Wide Flow and Rainfall Monitoring Program	✓ Initiated a thorough inventory and deployment effort to establish a flow monitor network throughout the County at strategic points in the system and main trunk lines to support development of a dynamic hydraulic model. ✓ Placed temporary monitors in the system, as needed, to assist in determining available sewer capacity for specific projects.
System-Wide Hydraulic Model	✓ Conducted a quality assurance/quality control (QA/QC) review of the preliminary hydraulic models. ✓ Completed the System-Wide Hydraulic Model and supporting documentation, which was accepted by the County as fully developed. ✓ Performed hydraulic debottleneck evaluations (hydraulically restricted sewer segments).

Table ES-2 2017 Major Consent Decree Milestones and Accomplishment Summary

Program or Project	Milestones and Accomplishments
Financial Analysis Program	✓ Tracked expenditures for both the operations and maintenance (O&M) budgets and capital improvement projects (CIP) budgets. DWM is on track to meet its revenue target and is expected to fall within its expenditure budget. ✓ Coordinated with the implementation of work order management system (see MMS section) to track costs of emergency, corrective, and preventive work by asset.
Infrastructure Acquisitions Program	✓ Evaluated and/or acquired 33,458 linear feet (LF) of pipe. ✓ Developed interim protocols allowing limited use of the preliminary hydraulic models for capacity request determinations prior to 12/20/17. ✓ Developed revised interim protocols for capacity request determinations governing the use of the fully developed model.
PASARP	✓ Performed work in the PASARP areas to identify and expedite delivery of rehabilitation recommendations while making urgent point repairs and raising buried manholes to allow for asset access and maintenance. ✓ Implemented and tracked assessment projects including 6,136 manhole condition assessments (MCA), 652,655 LF (124 miles) of acoustic inspection, 730,527 LF (138 miles) of smoke testing, 874,464 LF (166 miles) of CCTV and associated cleaning, 167,145 LF (32 miles) of TISCIT inspection, and 47,360 LF (9 miles) of heavy cleaning identified during CCTV and TISCIT inspections. ✓ Procured contract for first rehabilitation package, initiated two additional packages.
OSARP	✓ Completed CCTV and associated pipeline cleaning and MCA in the OSARP areas including 353,320 LF (67 miles) of acoustic inspection, 112,064 LF (21 miles) of smoke testing, 14,750 LF (2.8 miles) of CCTV, 180,775 LF (34.2 miles) of TISCIT surveys, 23,620 LF (4.5 miles) of cleaning, and 309 MCAs.
Supplemental Environmental Project	✓ Completed program in 2014.
SSO Trend Analysis	✓ Completed a detailed SSO trends analysis and major spill analysis for the period from 2012–2017.

Part I – Capacity, Management, Operations and Maintenance (CMOM) Programs' Implementation Activities Completed

1. CERP (CD VI.B.i)

DWM continued to implement the CERP in 2017 using the approved plan to mobilize labor, materials, tools, and equipment to respond to and appropriately remedy conditions that may cause or contribute to an SSO. Considerable effort was made in 2017 to train DWM personnel in the CERP CMOM document and to verify that personnel were consistently and accurately applying the policies and procedures of the document. The document has been under internal review and it is anticipated that an updated document will be submitted in 2018.

Key Accomplishments and Significant Activities:

1. Completed the following activities related to SSOs:
   a. Cleaning total 1,225,033 LF
      i. First response and follow up 67,804 LF
      ii. Contractor cleaning 1,157,229 LF
   b. Point repairs 42
   c. CCTV 34,666 LF[1]
2. Responded to 186 reportable spill events and performed after spill follow-up actions.
3. Conducted monthly SSO meetings with program area managers.
4. Distributed more than 68,000 FOG education flyers in areas where grease was identified as the cause of the spill.
5. Implemented in-stream monitoring which resulted in the discovery and elimination of five major spills (one private) and a minor spill.

2. FOG Management Program (CD VI.B.ii)

The DeKalb County FOG Management Program has met all major program milestones. However, to support the County's ongoing implementation of the CD, the FOG program has taken on greater significance in the ongoing trends analysis efforts and in developing cleaning protocols pursuant to the MMS program. While the FOG program is designed to reduce the amount of FOG that enters the WCTS, the cleaning instituted under the MMS program is designed to remove FOG from the system. Together, these programs represent a fully integrated FOG prevention and elimination program.

In 2017, DWM continued its enforcement of the FOG ordinance and unregistered FSEs, as described below. DWM also increased the amount of public education about FOG and the effects of FOG on the sewer system through social media, media advertisements, and press releases. DWM successfully continued efforts to engage the municipalities within the County to ensure implementation of the FOG Management Program throughout the County.

Key Accomplishments and Significant Activities:

1. Distributed educational materials at multi-family apartment complexes and residential neighborhoods that have been identified as located near sewer spills and investigated nearby FSEs for grease violations.

[1]The total reported for CCTV activities in this section is limited to CCTV work performed as a follow up to an identified SSO and does not include CCTV work performed as a part of the assessment of the WCTS.

2. Reviewed pump-out manifests as part of the Hauler Company Assessment program to ensure that haulers are properly disposing of FOG. A total of 11,761,129 gallons of FOG was removed from system through program.

3. Delivered 785 warning notices (decrease of 28 percent) and 110 court summonses to non-compliant FSEs (increase of 100 percent).

4. Performance Measures:
   a. Total number of FOG inspections: 9,504
   b. Total number of FOG evaluations: 1,562
   c. 2017 monthly average permitted active FSEs: 2,717

5. Issued 2,003 permits.

6. Held 280 public events in 2017 where FOG information was distributed. The estimated attendance for these events is 22,700 people (increase of 250 percent). These events included community events, town hall meetings, city-sponsored events, and DeKalb County sponsored events.

7. Partnered with Georgia Tech Masters of Business Administration candidates for study of FOG education efforts in DeKalb County. This included a study of existing education methods and recommendations for additional enhanced methods. A FOG awareness survey was performed and report delivered for DWM review.

8. Increased FOG education efforts through social media which resulted in reaching 1,426 people on Facebook and 4,541 impressions on Twitter.

9. Ran two newspaper articles about proper disposal of FOG to an audience of more than 19,500 residents.

10. Featured a television news story regarding proper disposal of FOG on local news during the year.

11. Posted presentations and meetings about FOG on the DeKalb County website to further the dissemination of education materials about FOG disposal in the sewer system.

3. Sewer Mapping Program (CD VI.B.iii)

The purpose of the Sewer Mapping Program is to provide an integrated system capable of mapping, inventorying, and depicting system assets. In 2015, the Sewer Mapping Program enhancements and milestones were substantially completed, thus allowing the County in 2017 1) to produce certain maps using GIS technology, 2) to integrate sewer system locations and attribute data with the hydraulic model and the computerized maintenance management systems (CMMS), 3) to reproduce maps in a manner that will allow use by O&M crew leaders in the field, and 4) to identify and track problems geographically.

Though the County has achieved completion of the major components of the program, data updates to the GIS system continue for new developments or system changes that have been reported by DeKalb County personnel in the regular course of business or by non-DeKalb County personnel engaged in assessment and rehabilitation projects. Moreover, the information from the Sewer Mapping Program is being used in other CD-related programs including the hydraulic model, flow and rainfall monitoring, PASARP, OSARP, CERP, FOG, Infrastructure Acquisitions, and MMS programs.

Key Accomplishments and Significant Activities:

1. Created and populated a GIS layer for sanitary sewer easements in the County. A total of 1,606 easements were identified and added to the GIS layer.

2. Continued updating the private sewer lateral GIS features from CCTV data.

3. Conducted major update of sanitary sewer GIS data based on field verification of existing GIS data, newly acquired assets, and system improvements and expansions.

4. Provided ongoing verification of GIS data in the field and provide corrections to improve GIS data quality.

4. Maintenance Management System Program (CD VI.B.iv)

The County's MMS Program involves a combination of preventive, corrective, and predictive inspection and maintenance activities to maintain the WCTS. The Program is divided into two key areas: 1) tools that support the maintenance activities and 2) specific maintenance activities performed for the County's gravity system, lift stations, and force mains. Communication systems, physical inspection and testing, information management systems, and inventory management are tools used to support maintenance activities. Gravity system maintenance and lift stations, force mains, and ARV maintenance describe the County's maintenance activities established under the MMS Program. Finally, the MMS provides key performance indicators (KPIs) that will enable the County to measure its performance.

Key Accomplishments and Significant Activities:

1. Inventory Management

   a. Successfully performed physical inventory at each warehouse location. The DWM Operations warehouse location achieved outstanding audit results of 102 percent for 2017.

   b. DWM warehouse inventory value was $5,698,817 for 2017.

2. Gravity System Maintenance

   a. Performed 662 sewer creek crossing inspections for pipes previously identified as needing revisit within a year. The 662 inspected crossings were the full list of pipes identified.

   b. Performed an additional 1,517 sewer creek crossing inspections to reevaluate scores from initial inventory and scoring. Deficiencies requiring immediate remediation were repaired using DWM personnel or contractors.

   c. Developed a re-inspection schedule for creek crossings based on the initial inspections completed in 2016 and re-inspections performed in 2017. Table 4-1 summarizes the plan.

Table 4-1 Re-inspection Schedule for Creek Crossings

Priority	Count	Percent	Re-Inspection Frequency	Year Next Inspection Due
High	513	15%	1 year	2018
Med	861	24%	2 years	2019
Low	2,136	61%	5 years	2022
Grand Total	**3,510**	100%		

   d. Procured a contract for chemical root control application in the system. A total of 8,800 feet of sewer mains were treated for roots during 2017.

   e. Began the process for procuring an easement clearing contract. The awarding of the contract is scheduled for first quarter 2018.

   f. Reviewed and revised maintenance procedures for gravity system.

   g. Continued to input repair and maintenance data into CMMS.

3. Lift Station, Force Main, and ARV Maintenance

   a. Substantially completed renovations at five lift stations (the status of the MMS Lift Station projects is shown in Attachment A).

   b. Working statistics:
      i. Completed 4,852 preventive maintenance work orders (404/month).
      ii. Maintained a back log of four or less work orders per month over 30 days.
      iii. Averaged 1 lift station per month with one pump out for service.
      iv. Inspected 38 force main easements.
      v. Inspected 38 discharge manholes.
      vi. Performed force main pressure testing at 26 stations.
      vii. Inspected 36 ARVs.
      viii. Completed lift station work orders:
         1. 57 percent preventive maintenance
         2. 38 percent corrective maintenance
         3. 5 percent emergencies

   c. Continued activity to have bypass connections installed for each station needing bypass pumping connections.
      i. A bypass pump connection is located on the effluent side of the station where a bypass pump can be connected to allow wastewater to be pumped using the existing wet well and force main.
      ii. This capability is helpful for both maintenance and operations and in the event of catastrophic failure at the lift station.

   d. Reviewed and revised maintenance procedures for lift stations.

   e. Performed electrical ground testing (amp and volt readings) and thermal scans of 65 lift stations.

4. Tracked KPIs (see Attachment B).

5. Collection and Transmission Systems Training Program (CD VI.B.v)

In 2017, the County continued to deliver technical and skills training to DWM personnel related to applicable job responsibilities. CERP training was a major focus of the year and included coordination with New Employee Orientation classes to train all new DWM personnel on CD responsibilities (in previous years, only new Operations personnel received CERP training).

Key Accomplishments and Significant Activities:

1. Completed 9,891 hours of training in 2017 for 624 different staff members.
2. Developed training reports for superintendents and managers, and reports for executive management staff.

6. System-Wide Flow and Rainfall Monitoring Program (CD VI.B.vi)

The Program's goal is to provide an efficient and effective data monitoring network to assess capacity and infiltration/inflow (I/I) issues within the WCTS. All major milestones for this program have been completed. As a result, flow and rainfall data have been incorporated into the hydraulic model. With the delivery of the hydraulic model, the program's focus was shifted from data collection for input into the

hydraulic model to data collection for analysis of capacity requests and I/I reduction efforts. Moreover, the County continues to use the program for SSO reduction efforts and identification of areas that could possibly lead to an SSO.

Key Accomplishments and Significant Activities:

1. Initiated a thorough inventory and deployment effort to establish a flow monitoring network throughout the County at strategic points in the system and main trunk lines to support development of a dynamic hydraulic model.
2. Placed temporary monitors in the system, as needed, to assist in determining available sewer capacity for specific projects.
3. Maintained monitors (battery changes, modem service) and calibrated as needed per site.
4. Deployed monitors to collect data to support multiple CMOM programs.
5. Initiated a purchase of manhole overflow monitoring equipment.
6. Purchased new flow monitors and rain gauges to augment existing equipment.

7. System-Wide Hydraulic Model (CD VI.B.vii)

Fully developed, computer-based, steady-state hydraulic models were finalized for the County's WCTS sewersheds and basins in 2017. Since the initial model development in 2015, the hydraulic model network and part of the flow distributions have been updated twice: once to incorporate changes identified in the November 2016 County GIS database, and subsequently to incorporate GIS updates and field verification results provided in August 2017. The maximum month average daily flow (MMADF) condition, as calculated from the 2015 flow study, was input into the steady-state model for capacity request evaluations.

The individual sewershed and basin models are intended to be sequentially upgraded to dynamic models starting in 2018 once more current flow monitoring and rainfall data are recorded and analyzed.

Key Accomplishments and Significant Activities:

1. Conducted a QA/QC review of the preliminary hydraulic models.
2. Completed the System-Wide Hydraulic Model and supporting documentation, which was accepted by the County as fully developed:
    a. Completed model updates to reflect changes identified in the November 2016 County GIS database, and subsequently the GIS updates and field verification results from August 2017. Included significant hydraulic model network changes related to critical field surveys that resolved hydraulic connectivity issues and missing or questionable attribute information significantly impacting the model's determination of capacity.
    b. Revised hydraulic model with information from recently completed lift station upgrade projects.
    c. Updated hydraulic model network attributes to manholes and gravity pipes.
    d. Developed hydraulic model scenario for MMADF as well as protocols and procedures for use of the scenario in evaluating adequate capacity for new capacity requests.
    e. Completed update of modeling reports that included incorporation of the County's comments for the three sewer basins.
    f. Developed hydraulic model for Intrenchment Creek Sewershed.
    g. Prepared modeling report for Intrenchment Creek Sewershed.

3. Performed hydraulic debottleneck evaluations (hydraulically restricted sewer segments).

8. Financial Analysis Program (CD VI.B.viii)

The Financial Analysis Program incorporates aspects of revenue estimating, budgeting, costs analysis, and customer rate setting such that DWM provides the desired level of service to its customers while meeting its regulatory requirements. DWM continues to monitor its revenue and expenditure budgets.

Key Accomplishments and Significant Activities:

1. Implemented the tracking of costs associated with work done on assets through the implementation of a new work-order-based CMMS software in the Operations Division. The software tracks equipment, labor, and material costs, and classifies work order type as corrective, preventive, or emergency maintenance.
2. Table 8-1 lists the costs associated with work orders and maintenance type.

Table 8-1 2017 Water System and Sewer System Costs by Work Order Type

Work Order Type	Water System Costs (dollars)	Water System Costs (percent)	Sewer System Costs (dollars)	Sewer System Costs (percent)
Corrective Maintenance	$4,543,959	59.9%	$1,450,045	34.2%
Preventive Maintenance	$1,298,841	17.1%	$1,841,706	43.5%
Emergency Maintenance	$1,744,818	23.0%	$946,552	22.3%
Total	**$7,587,618**	**100%**	**$4,238,303**	**100%**

9. Infrastructure Acquisitions Program (CD VI.B.ix)

The goals of the Infrastructure Acquisitions Program are to acquire infrastructure that meets County standards for design, construction, capacity, and efficiency, and to maintain a program that properly monitors the acquisition process, encourages input, and is efficient for contractors, developers, property owners, and the County. In 2016 and 2017, DWM saw large increases in the number of development applications in the County. Additional resources were added to the program to handle the increased workload and to coordinate with the municipalities within the County. The process to verify capacity in the WCTS was modified near the end of 2017 to incorporate use of the fully developed hydraulic model. Capacity allotment and certification will continue to be one of the main focuses of the program going forward.

Key Accomplishments and Significant Activities:

1. Evaluated and/or acquired 33,458 LF of pipe.
2. Reviewed 1,712 plans (a 43-percent increase from 2016 and a 185-percent increase from 2015).
3. Reviewed 51 plats (a 55-percent increase from 2016).
4. Received 490 sewer capacity requests.
5. Issued 475 sewer capacity letters.
6. Developed interim protocols allowing limited use of the preliminary hydraulic models. The interim protocols were used for capacity request determinations prior to 12/20/17.
7. Developed revised interim protocols for capacity request determinations governing the use of the fully developed model.

10. Priority Areas Sewer Assessment and Rehab Program (CD VI.B.x)

The main purpose of the PASARP is to provide for the identification, delineation, assessment, prioritization, and rehabilitation of Priority Areas (both Initial Priority Areas and Additional Priority Areas) as explained in the CD within the County WCTS. The Initial and Additional Priority Areas total approximately 838 miles of sewers (approximately 31 percent of the WCTS).[2] In implementing the PASARP, the County is undertaking certain condition, structural, and hydraulic assessments within the Priority Areas to identify, prioritize, and complete appropriate rehabilitation measures within those areas. As part of the implementation process, the County is tracking rehabilitation measures completed within the Priority Areas and will determine the effectiveness of those measures, using selected KPIs.

In 2017, the County substantially completed the 2-year condition assessment phase of the PASARP using a wide range of evaluative tools and programs including private lateral investigations, corrosion defect identifications, MCA, flow monitoring, CCTV inspection, gravity sewer line defect analysis, TISCIT, acoustical testing, and smoke testing. The data obtained thus far during this sewer system condition assessment process have been documented and archived in the County's mapping system and are being evaluated bi-weekly to identify and analyze defects. Defects identified during the assessment phase, which potentially posed an immediate risk of structural failure or which could contribute to an SSO occurrence, were scheduled for immediate rehabilitation. Examples of immediate rehabilitation measures already undertaken by the County include making urgent point repairs and raising buried manholes to allow for asset access. In addition to identifying and analyzing defects from the assessment data, the County continues to package and prioritize cost-effective rehabilitation recommendations. The first of many prioritized rehabilitation contracts resulting from the assessment phase began in 2017.

Key Accomplishments and Significant Activities:

1. Performed assessments and cleaning that included approximately:
    a. 6,136 manhole condition assessments
    b. 652,655 LF (124 miles) of acoustic inspection
    c. 730,527 LF (138 miles) of smoke testing
    d. 874,464 LF (166 miles) of CCTV inspection and associated cleaning
    e. 167,145 LF (32 miles) of TISCIT inspection
    f. 47,360 LF (9 miles) of heavy cleaning because of CCTV and TISCIT inspection
2. Performed 32 urgent/emergency point repairs.
3. Performed 259 manhole raising for access and urgent manhole repairs.
4. Replaced 1,541 vented manhole lids with solid covers.
5. Performed 2 manhole replacements.
6. Improved access to assets within Priority Areas to facilitate inspection and future maintenance as needed.
7. Procured a contract for $28.2 million for the first rehabilitation package resulting from the PASARP tiered assessment, and initiated the procurement of two additional rehabilitation packages estimated at a combined amount of $50 million.
8. Continued execution of project communications and community outreach for ongoing projects.
9. Tracked KPIs as shown in Table 10-1.

[2]Updated mileage based on DWM's February 2017 GIS database.

Table 10-1 2017 PASARP KPIs

KPI	2017 Performance
SSOs per 100 miles of WCTS within the Priority Areas per year	13.7 per 100 miles within the Priority Areas per year
SSOs per 100 miles of WCTS within the Priority Areas per year per inch of rain within the Priority Areas	0.26 per 100 miles per year per inch of rain within the Priority Areas
Total volume[a] of spills per 100 miles of WCTS within the Priority Areas	598,628 gallons per 100 miles within the Priority Areas
Total volume[b] of spills per 100 miles per inch of rain within the Priority Areas	11,402 gallons per 100 miles per inch of rain within the Priority Areas
Number of dry weather SSOs[b] within the Priority Areas	89 dry weather SSOs[b] within the Priority Areas

[a] For the year 2017, volume was recorded for 100 percent of the spills.

[b] Dry weather SSO KPI, removed the SSOs with cause listed as STORM (assumed others were dry weather SSOs).

11. Ongoing Sewer Assessment and Rehabilitation Program (CD X 38.)

The main purpose of the OSARP is to ensure continuous assessment and rehabilitation of the County's WCTS. The OSARP governs assessment and rehabilitation of those areas outside the Priority Areas while the CD is in effect, and will continue to exist after the CD expires. This program enables the County to continuously and proactively identify, delineate, and prioritize areas or sewer segments in the WCTS for condition assessment and rehabilitation, as appropriate, starting with areas not being addressed under the PASARP. The implementation of the OSARP takes into consideration data obtained through other ongoing County programs and operations including:

- CMOM programs, information obtained from customers and the public
- Assessment and rehabilitation work performed under the PASARP
- Hydraulic modeling results
- Knowledge and experience of County personnel
- Best engineering practices and/or best management practices

Key Accomplishments and Significant Activities:

1. Completed CCTV and associated pipeline cleaning and MCA in the OSARP areas:
   a. 353,320 LF (67 miles) of acoustic inspection
   b. 112,064 LF (21 miles) of smoke testing
   c. 14,750 LF (2.8 miles) of CCTV
   d. 180,775 LF (34.2 miles) of TISCIT assessments
   e. 23,620 LF (4.5 miles) of cleaning
   f. 309 manhole condition assessments
2. Performed 1 urgent/emergency point repair.
3. Performed 130 manhole raising for access and urgent manhole repairs.
4. Performed 2 manhole replacements.
5. Replaced 744 vented manhole lids with solid covers.
6. Tracked KPIs as shown in Table 11-1.

Table 11-1 2017 OSARP KPIs

KPI	2017 Performance
SSO per 100 miles of WCTS per year within the OSARP areas	10.7 per 100 miles per year
SSO per 100 miles of WCTS per year per inch of rain within the OSARP areas	0.20 per 100 miles per year per inch of rain
Total volume[a] of spills per 100 miles of WCTS within the OSARP areas	496,430 gallons per 100 miles
Total volume[a] of spills per 100 miles per inch of rain in the OSARP areas	9,448 gallons per 100 miles per inch of rain
Number of dry weather SSOs[b] in the OSARP areas	180 dry weather SSOs[b]

[a] For the year 2017, volume was recorded for 100 percent of the spills.
[b] Dry weather SSO KPI, removed the SSOs with cause listed as STORM (assumed others were dry weather SSOs).

12. Supplemental Environmental Project (CD VIII)

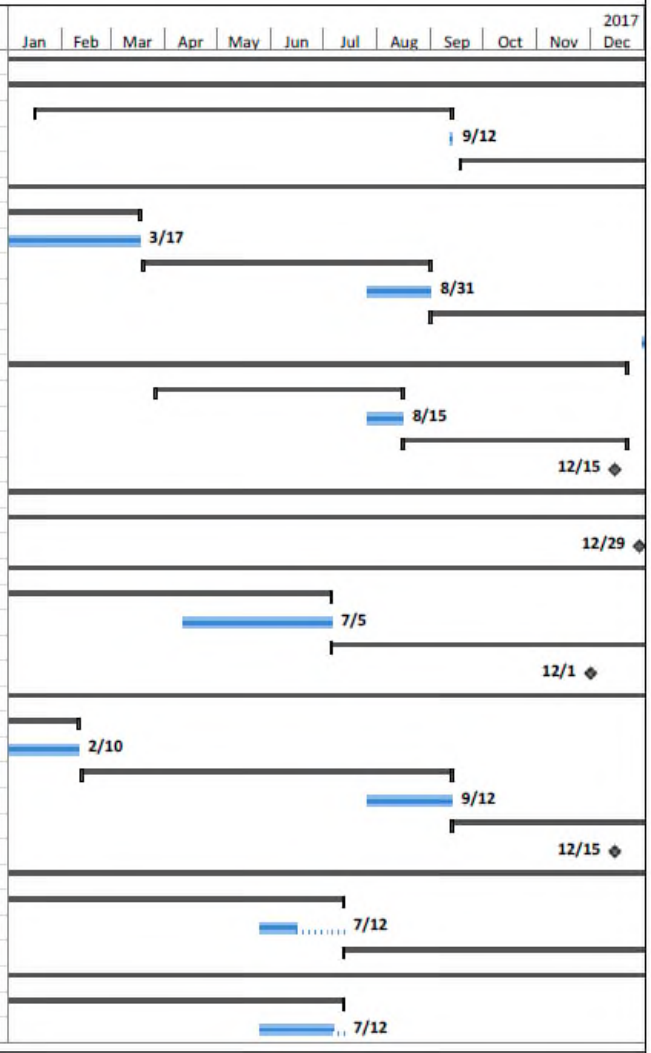
The Supplemental Environment Project was completed in 2014.

Attachment A
Lift Stations and Other CIP Projects' Schedule

DeKalb County Department of Watershed Management

CDPMT Master Schedule
Annual Report - Consent Decree
CIP PROJECTS

ID	Task Name	Start	Finish	CD/CMOM Date	% Complete.
1628	**CIP Rehab/Construction Projects**	**4/1/14**	**3/6/19**	**NA**	
1674	**Caladium Drive {D/B} {12/31/15}**	**2/13/15**	**3/6/19**	**NA**	**10**
1680	**Design/Build Procurement**	**1/17/17**	**9/12/17**	**NA**	**100**
1684	Procurement and Contracting Issuance NTP	9/12/17	9/12/17	NA	100
1685	**Design/Build**	**9/18/17**	**3/6/19**	**NA**	**5**
2076	**Hammer Mill I LS {D/B/B} {12/31/17}**	**1/21/16**	**1/31/18**	**NA**	**95**
2079	**Design**	**9/1/16**	**3/17/17**	**NA**	**100**
2080	Design Complete	9/1/16	3/17/17	NA	100
2115	**Procurement**	**3/20/17**	**8/31/17**	**NA**	**100**
2129	Procurement and Contracting Issuance NTP	7/26/17	8/31/17	NA	100
2130	**Construction**	**9/1/17**	**1/12/18**	**NA**	**100**
2132	Substantial Completion	12/31/17	12/31/17	12/31/17	100
2139	**Royal Atlanta III LS {D/B/B} {12/31/17}**	**9/1/16**	**12/22/17**	**NA**	**95**
2176	**Procurement**	**3/27/17**	**8/15/17**	**NA**	**100**
2190	Procurement and Contracting Issuance NTP	7/26/17	8/15/17	NA	100
2191	**Construction**	**8/16/17**	**12/22/17**	**NA**	**100**
2193	Substantial Completion	12/15/17	12/15/17	12/31/17	100
2200	**Johnson Creek LS {D/B} {12/31/17}**	**4/14/16**	**6/30/18**	**NA**	**95**
2218	**Design/Build**	**12/5/16**	**6/30/18**	**NA**	**90**
2220	Substantial Completion	12/29/17	12/29/17	12/31/17	100
2227	**Hearn Road LS {D/B} {12/31/17}**	**2/25/16**	**5/10/18**	**NA**	**95**
2230	**Design/Build Procurement**	**12/1/16**	**7/5/17**	**NA**	**100**
2244	Procurement and Contracting Issuance NTP	4/12/17	7/5/17	NA	100
2279	**Design/Build**	**7/6/17**	**4/30/18**	**NA**	**90**
2281	Substantial Completion	12/1/17	12/1/17	12/31/17	100
2288	**American Fare LS {D/B/B} {12/31/17}**	**4/18/16**	**2/9/18**	**NA**	**95**
2291	**Design**	**10/12/16**	**2/10/17**	**NA**	**100**
2292	Design Complete	10/12/16	2/10/17	NA	100
2327	**Procurement**	**2/13/17**	**9/12/17**	**NA**	**100**
2341	Procurement and Contracting Issuance NTP	7/26/17	9/12/17	NA	100
2342	**Construction**	**9/13/17**	**2/9/18**	**NA**	**90**
2344	Substantial Completion	12/15/17	12/15/17	12/31/17	100
2352	**Lewis Way LS {D/B} {12/31/18}**	**9/15/15**	**1/30/19**	**NA**	**11**
2353	**Design/Build Procurement**	**10/3/16**	**7/12/17**	**NA**	**100**
2367	Procurement and Contracting Issuance NTP	5/26/17	7/12/17	NA	100
2370	**Design/Build**	**7/13/17**	**1/30/19**	**NA**	**10**
2379	**Stone Mill I LS {D/B} {12/31/18}**	**10/3/16**	**1/30/19**	**NA**	**11**
2380	**Design/Build Procurement**	**10/3/16**	**7/12/17**	**NA**	**100**
2394	Procurement and Contracting Issuance NTP	5/26/17	7/12/17	NA	100



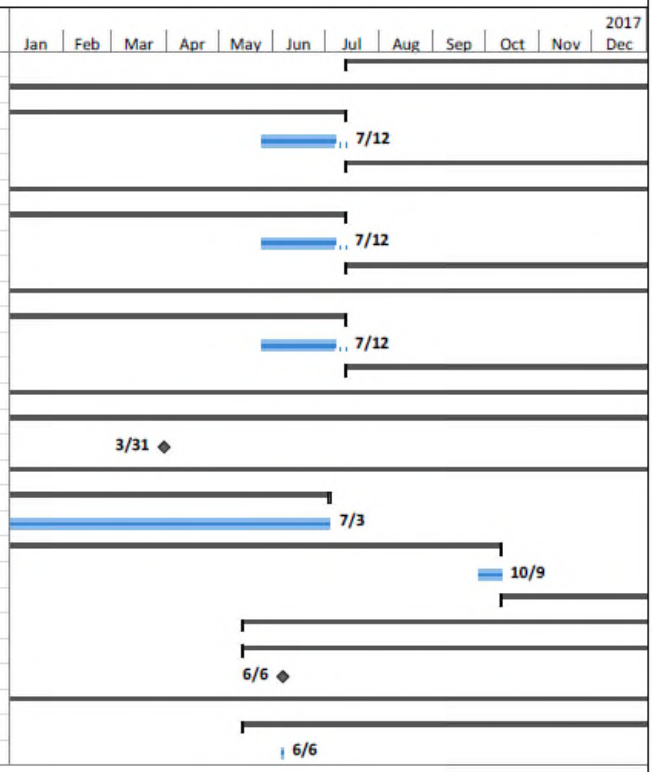
Statused thru 1/26/18

Page 1

DeKalb County Department of Watershed Management

CDPMT Master Schedule
Annual Report - Consent Decree
CIP PROJECTS

ID	Task Name	Start	Finish	CD/CMOM Date	% Complete.
2395	**Design/Build**	**7/13/17**	**1/30/19**	**NA**	**10**
2406	**Stone Mill II LS {D/B} {12/31/18}**	**1/21/16**	**1/30/19**	**NA**	**11**
2407	**Design/Build Procurement**	**10/3/16**	**7/12/17**	**NA**	**100**
2421	Procurement and Contracting Issuance NTP	5/26/17	7/12/17	NA	100
2422	**Design/Build**	**7/13/17**	**1/30/19**	**NA**	**10**
2433	**Pennybrook LS {D/B} {12/31/18}**	**8/3/16**	**1/30/19**	**NA**	**11**
2434	**Design/Build Procurement**	**10/3/16**	**7/12/17**	**NA**	**100**
2448	Procurement and Contracting Issuance NTP	5/26/17	7/12/17	NA	100
2449	**Design/Build**	**7/13/17**	**1/30/19**	**NA**	**10**
2460	**Fourth St LS {D/B} {12/31/18}**	**2/24/16**	**1/30/19**	**NA**	**11**
2461	**Design/Build Procurement**	**10/3/16**	**7/12/17**	**NA**	**100**
2475	Procurement and Contracting Issuance NTP	5/26/17	7/12/17	NA	100
2476	**Design/Build**	**7/13/17**	**1/30/19**	**NA**	**10**
2487	**Heritage Heights {D/B} {12/31/18}**	**10/3/15**	**3/1/18**	**NA**	**15**
2505	**Design/Build**	**10/11/16**	**3/1/18**	**NA**	**15**
2507	Design Completion	3/31/17	3/31/17	NA	100
2515	**I85 / Oakcliff Rd {D/B/B} {12/31/18}**	**5/20/16**	**4/30/18**	**NA**	**15**
2518	**Design**	**9/19/16**	**7/3/17**	**NA**	**100**
2519	Design Complete	9/19/16	7/3/17	NA	100
2554	**Procurement**	**1/1/17**	**10/9/17**	**NA**	**100**
2568	Procurement and Contracting Issuance NTP	9/27/17	10/9/17	NA	100
2569	**Construction**	**10/10/17**	**4/30/18**	**NA**	**5**
2717	**New Gibraltar LS {D/B/B} {12/31/19}**	**5/15/17**	**2/14/19**	**NA**	**11**
2718	**Design Procurement**	**5/15/17**	**1/31/18**	**NA**	**10**
2721	P&C Issue Bid Package	6/6/17	6/6/17	NA	100
2793	**Kings Way LS {D/B/B} {12/31/19}**	**5/2/16**	**2/14/19**	**NA**	**11**
2794	**Design Procurement**	**5/15/17**	**1/31/18**	**NA**	**10**
2797	P&C Issue Bid Package	6/6/17	6/6/17	NA	100



Statused thru 1/26/18

Page 2

Attachment B
MMS KPIs

KPI	Formula	2017 Results
Communication System Program		
Landline abandoned calls—no reason available for why caller abandoned call	Number of dropped calls	Average of 173 abandoned calls per month
Call Duration	Duration of calls in minutes divided by the number of calls	Average duration of call: 2 minutes 3 seconds Total number of calls in 2017: 43,211[a]
Information Management		
Active SSO-Driven Sewer Work Order Percentage	Number of active SSO-driven sewer work orders ÷ number of completed sewer work orders in the reporting period x 100	<1% SSO-driven sewer work orders
Inventory Management		
Percentage of out-of-stock items	For the reporting period, the number of parts out of stock when requested ÷ total number of parts requested x 100	5% of out-of-stock items
Percentage of Physical Inventory Performance	The percentage of items whose quantity on hand does match the quantity in Oracle Work and Asset Management (WAM)	102% of items match the quantity in Oracle WAM (found additional items)
Percentage of Physical Inventory Audit	The net cost difference in the value of the physical count vs. the value of inventory shown in Oracle WAM	+1.4% net cost difference
Gravity System		
Percentage of Preventive Maintenance (PM): CCTV Inspection of Sewer Lines, Operations and Contractors	Number of miles inspected ÷ total miles of sewer line x 100	5.2% sewer lines CCTV'd
PM: Percentage of Sewer Lines Cleaned	Number of miles cleaned ÷ total miles x 100	15% sewer lines cleaned
PM: Linear feet of Root Treatment per year	Number of feet of roots removed ÷ number of linear feet of sewer system x 100 Conversion factor: 5,280 feet/mile	<1% of system (8,800 LF of root treatment)
PM: Percentage of manholes inspected per year	Number manholes inspected ÷ total number of manholes in system x 100	8.6% manholes inspected
Percentage of Emergency Maintenance (EM): Number of SSOs per mile of gravity sewer line	Number of SSOs ÷ WCTS total miles of gravity lines x 100	12 SSOs per 100 miles of gravity sewer line

KPI	Formula	2017 Results
Lift Stations, Force Mains, and Appurtenances		
PM: Percentage of PM Hours Worked versus Corrective Maintenance (CM) and EM Hours Worked	Oracle WAM Value: PM hours total ÷ total hours worked CM and EM hours total ÷ total hours worked. Each Number x 100 to show percentage. Display as ratio.	Preventive Maintenance: 57% Corrective Maintenance: 43%
PM: Percentage of Backlogged PM Work Orders	Number of work order not completed ÷ total number of work orders (x 100)	4% backlogged PM work orders
PM: Percentage of completed PM Work Orders (based on timeframe specified)	Number of work orders completed by timeframe	>60 days – 10
CM: Percentage of lift stations with pumps out of service	Percent Value. number of stations with pumps out of service ÷ total number of stations (x 100)	1% lift stations with pumps out of service
PM: Percent of ARVs inspected, flushed, and serviced	Number of ARVs inspected, flushed, and serviced per year ÷ total number of ARVs (x 100)	58% ARVs inspected, flushed, and serviced

[a] Total number of calls in 2016 was reported as 5,306 calls. However, due to software error the total number of calls in 2016 was not captured.

Part II Sanitary Sewer Overflow Trends Analysis

Executive Summary

As required by Section IX, Reporting Requirements 58(b) of the CD, a trends analysis is to be submitted on an annual basis, as follows:

> *"A trends analysis of the number, volume, average duration, and cause of the County's Sanitary Sewer Overflows (SSOs) for the previous twenty-four (24) month period."*

This Trends Analysis includes the 24-month period of 2016 and 2017, and includes data from 2012, 2013, 2014 and 2015 for reference. As required by the CD, the report addresses SSO types (spills, overflows, and building backups) as applied to the various data and trends. This analysis consists of the following sections:

- Section 1 – Classification of SSO Types and Causes
- Section 2 – Number and Volume of SSOs
- Section 3 – Average Duration of SSOs
- Section 4 – Causes of SSOs
- Section 5 – Other Trends

The number of SSOs per year has decreased by 39 percent since 2012, with the greatest annual reduction occurring from 2015 to 2016 (see Figure ES-1). SSOs increased from 2016 to 2017, which can be partially attributed to the increase in rainfall from 2016 to 2017 as well as the County's increased accuracy in identifying SSOs. Overall, the trend for SSOs from 2012 to 2017 continues to decrease, which can be attributed to the County's MMS program including sewer cleaning, the FOG program, and extensive public education campaigns.

Figure ES-1 Reported SSOs per Year (2012–2017)

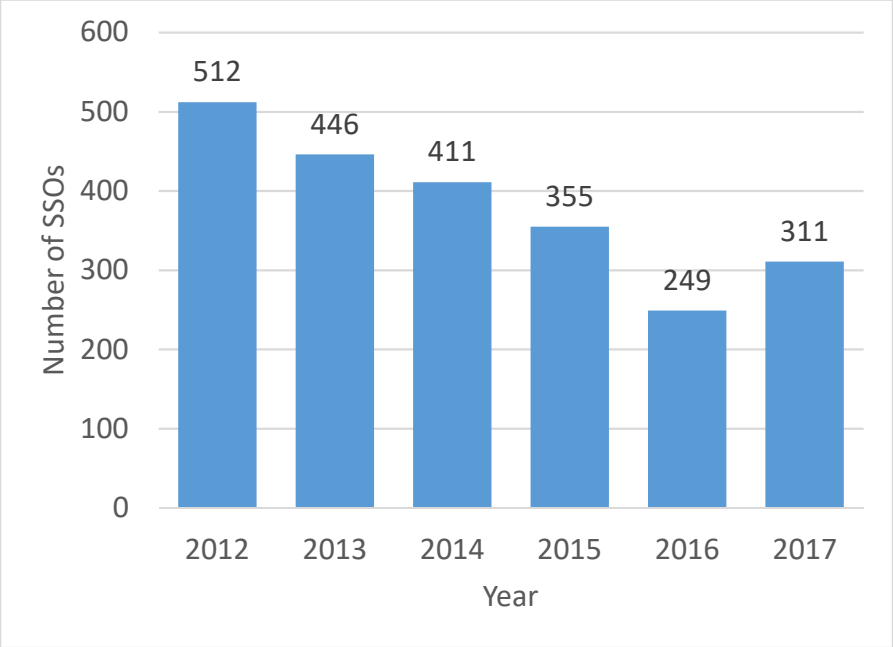
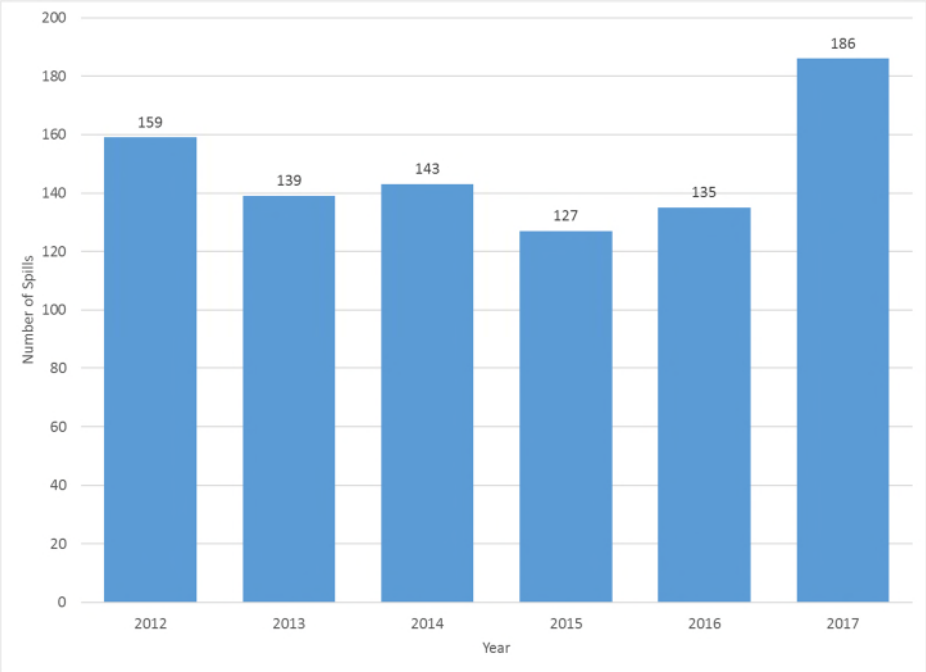


Figure ES-2 shows the number of spills, or discharges of wastewater which reach waters of the United States or the State. The number of spills has increased 38 percent from 2016 to 2017. This increased number of annual spills can be partially attributed to the County's increased identification of SSOs. The County also had a significant number of large rainfall events in 2017, which also contributed to the increase in the number of spills. During 2017, the County encountered four (4) storm events with intensities greater than 1 inch of rain per hour that resulted in 21 spills.

Figure ES-2 Total Spills by Year (2012–2017)

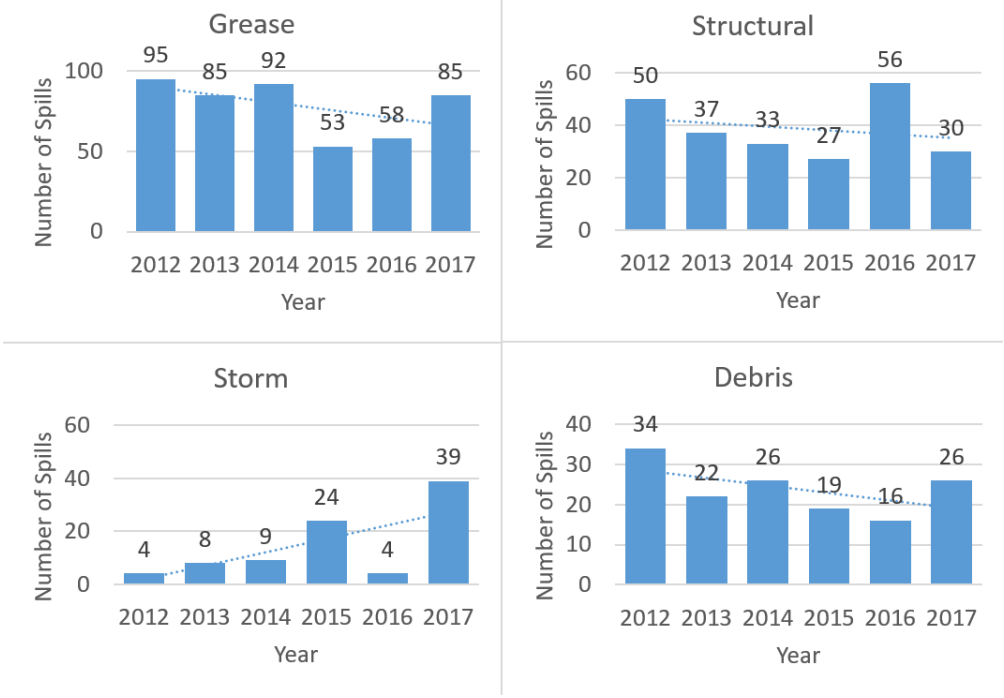


As shown in Figure ES-3, the number of spills attributable to structural causes decreased 46 percent from 2016 to 2017 to a similar number consistent with the number of spills attributable to structural causes recorded in 2014 and 2015. The number of spills attributable to grease, debris, and storms increased in 2017 compared to 2015 and 2016. To address ongoing issues with grease and debris, DWM has three existing small-diameter sewer cleaning contracts and a large-diameter cleaning contract in place. One of the primary causes for this increase in spills attributable to storms was the larger rainfall totals for 2017 (52.5 inches) compared to 2016 (38.7 inches), which is a 36 percent increase.

Furthermore, as the County's sewer condition assessment work progresses and MMS programs such as new stream sampling protocols and other measures are established, the County can more readily identify SSOs. From 2016 to 2017, DWM increased the number of inspections and put resources into the field in remote places, such as along streams and in ravines that are generally out of sight. If SSOs were found, DWM subsequently reported the findings appropriately. DWM also increased the stream sampling effort and the effectiveness of the increased stream sampling effort is also apparent from just one example. On August 23, 2017, a DeKalb County crew responded immediately to notification of an apparent spill emanating from a 54-inch creek crossing at the confluence of Panthers Creek and Snapfinger Creek. During the County's inspection, it was discovered that a tree had damaged the connecting point between the pipe and a junction box structure at the edge of the creek. Prior to discovery of the spill, DWM began detecting high fecal counts in the creek on July 13. After source tracking began, several additional rainfall events hindered tracking. However, during this tracking period other potential sources of high fecal

coliform levels were also discovered such as an overflowing private manhole and a broken waterline. Since fecal coliform levels remained elevated, source tracking continued until the spill from the 54-inch pipe was discovered on August 23. As a result of DWM's proactive work in interpreting sampling data, the County was able to identify the overflowing manhole and broken waterline as well as estimate that the single spill incident from the 54-inch pipe accounted for 45 percent (estimated 6,378,500 gallons) of the total volume of maintenance-related SSOs in 2017.

Figure ES-3 Total Spills by Year by Cause Category (2012–2017)



Notes: Cause Categories may include more than one cause. Some spills appear in more than one Cause Category. Dashed line is the linear trend line for each graph.

1. Classification of SSO Types and Causes

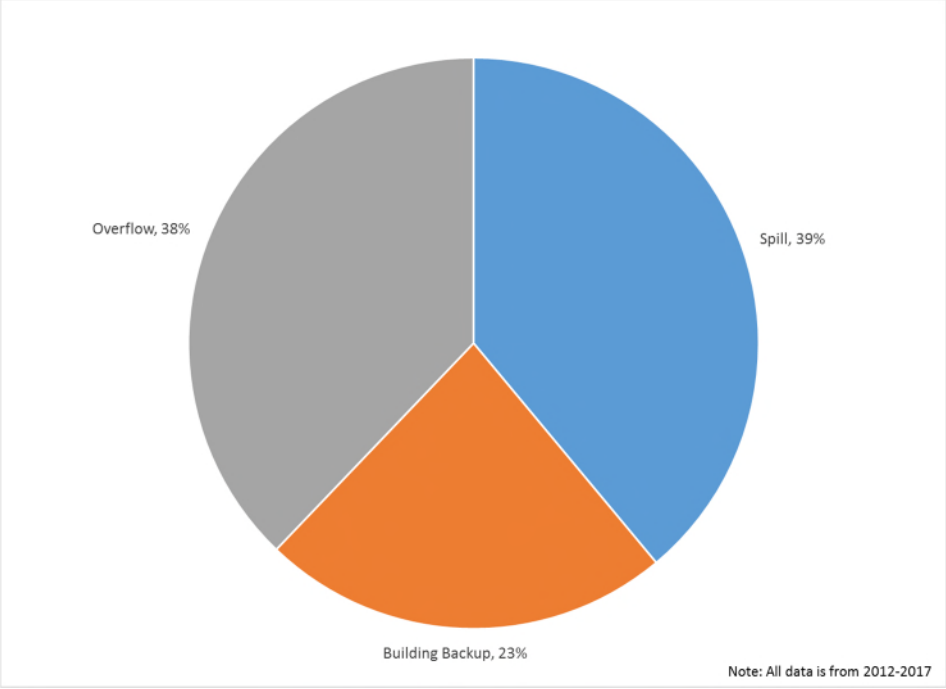
The CD requires a trend analysis of the prior 24-month period. To gain a more comprehensive view of the revised SSO data, DWM analyzed trends for the period from 2012 through 2017.

DWM categorizes each SSO that occurs as one of three types as defined in the CD. This initial categorization is based on multiple factors, including details provided by the reporting party, details provided by County response crews, and reports from County labs. As details of each SSO are learned, an SSO might be re-categorized accordingly. Definitions from the CD of each type of SSO are as follows:

- **Spill**: a discharge of wastewater from the WCTS, or from a wastewater treatment facility caused by problems in the WCTS, that reaches waters of the United States or the State, including a prohibited bypass, but not including other discharges from a point source that is specified in the National Pollutant Discharge Elimination System permits.
- **Overflow**: a release of wastewater from the WCTS, or from a wastewater treatment facility caused by problems in the WCTS, that does not reach waters of the United States or the State.
- **Building Backup**: a wastewater backup into a building that is caused by blockages, malfunctions, or flow conditions in the WCTS; however, provided that a wastewater backup into a building that is caused by a blockage or other malfunction of a Private Lateral, or other piping or conveyance system that the County does not own or operate, is not a Building Backup.

Figure 1-1 shows the distribution of SSOs by type for the period of record. Spills account for approximately 39 percent of the SSOs, overflows account for approximately 38 percent of the SSOs, and building backups account for approximately 23 percent of the SSOs.

Figure 1-1 SSOs by Type (2012–2017)



In addition to categorizing SSOs based on type, the County investigates the root cause of SSOs and classifies the events accordingly. Table 1-1 lists the types of causes used by DWM for the period of 2012 to 2017. This investigation and classification includes a review of the results of assessment tools, such as CCTV, and includes consideration of whether other sections of the WCTS might be vulnerable to a similar SSO event. To identify and prevent future SSOs, a portion of this analysis focuses on causes determined to be maintenance-related. For this Trends Analysis, the following terms are defined:

- Maintenance-Related: an SSO caused by grease, roots, debris, or any combination thereof.
- Other: an SSO caused by anything other than grease, roots, debris, or any combination thereof.

Table 1-1 lists the types of causes used by DWM for the period of 2012 to 2017.

Table 1-1 SSO Causes Used by DWM

Cause Code	Cause Title	Description
BRK LN/STR	Broken line/structure	Broken pipe, manhole, force main, or other appurtenance.
CC	County contractor	Caused by a contractor performing work for the County.
CRK BRK	Creek crossing break	Structural failure of sewer infrastructure at a creek crossing.
DB	Debris	Solids that have collected in a pipe or manhole.
GR	Grease	Build-up of grease in a pipe or manhole.
GRDB	Grease and debris	Combination of grease and solids build-up in a pipe or manhole.
GRRT	Grease and roots	Combination of grease build-up and root intrusion in a pipe or manhole.
GRRTDB	Grease, roots, and debris	Combination of grease and solids build-up and root intrusion in a pipe or manhole.
LFT STN FLR	Lift station failure	
MH	Manhole	Caused by structural defect at or in manhole.
OTH	Other	Use of this code requires a detailed description.
OUTSIDE CON	Outside contractor	Caused by a contractor not performing work for the County.
PMP FLR	Pump failure	
RT	Roots	Intrusion of roots into a pipe or manhole.
RTDB	Roots and debris	Combination of root intrusion and solids build-up in a pipe or manhole.
STORM	Storm	Caused by a storm. Includes wet weather capacity, failures at lift stations resulting from lightning strikes or storm-induced power outages, and maintenance-related SSO during storm events.
TREE	Tree (fallen)	Damaged caused by falling trees.
UNK	Unknown	Used when no clear cause can be identified. The in-depth data review previously conducted in 2016 identified additional SSOs where the cause could not be determined retroactively. For those instances, the UNK code was used.
VAND	Vandalism	Intentional damage caused by vandals.

2. Number and Volume of SSOs

As shown in Figure 2-1, the number of SSOs per year decreased during the period of record (2012–2017). DWM has reduced the number of SSOs by 39 percent since 2012, with the greatest annual reduction occurring from 2015 to 2016. SSOs increased from 2016 to 2017, which can be partially attributed to the increase in rainfall from 2016 to 2017 as well as the County's increased accuracy in identifying SSOs. As the County's sewer system condition assessment work progresses and MMS programs such as new stream sampling protocols, increased inspections of creek crossings and remote locations, and implementation of the SSO work order management system (Cityworks) are established, the County can more readily identify SSOs. The overall decreasing trend in the number of SSOs from 2012 to 2017 can be attributed to the County's MMS programs including sewer cleaning, root control, the FOG program, and extensive public education campaigns.

Figure 2-1 Reported SSOs per Year (2012–2017)

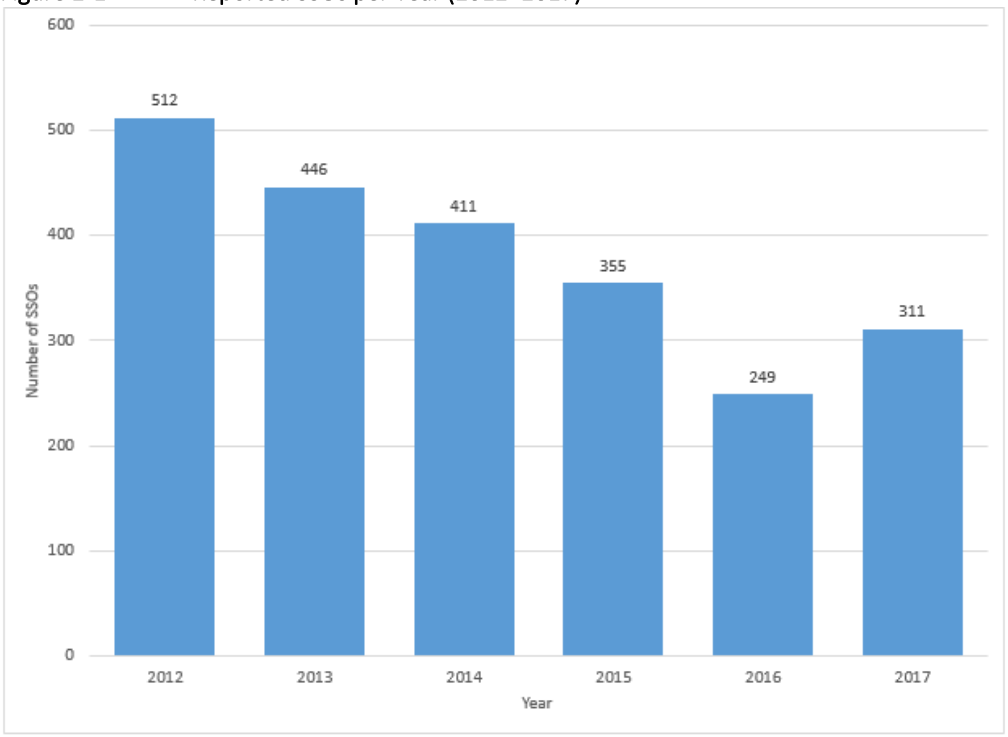


Figure 2-2 shows annual rainfall for the same period of record (2012–2017). Rainfall increased by 36 percent from 2016 to 2017.

Figure 2-2 Annual Precipitation (inches) (2012–2017)

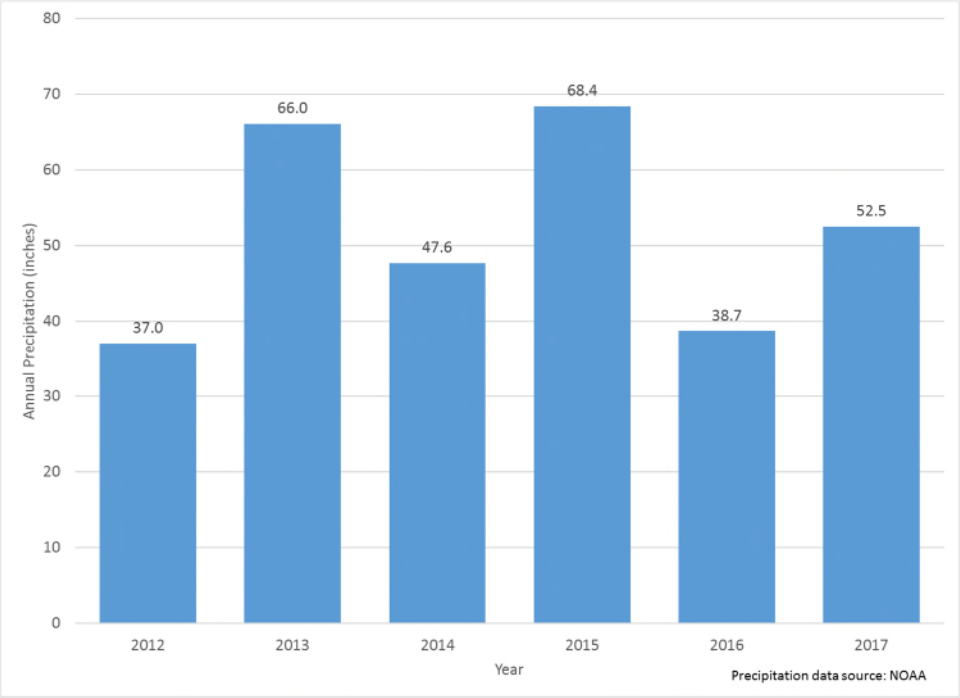
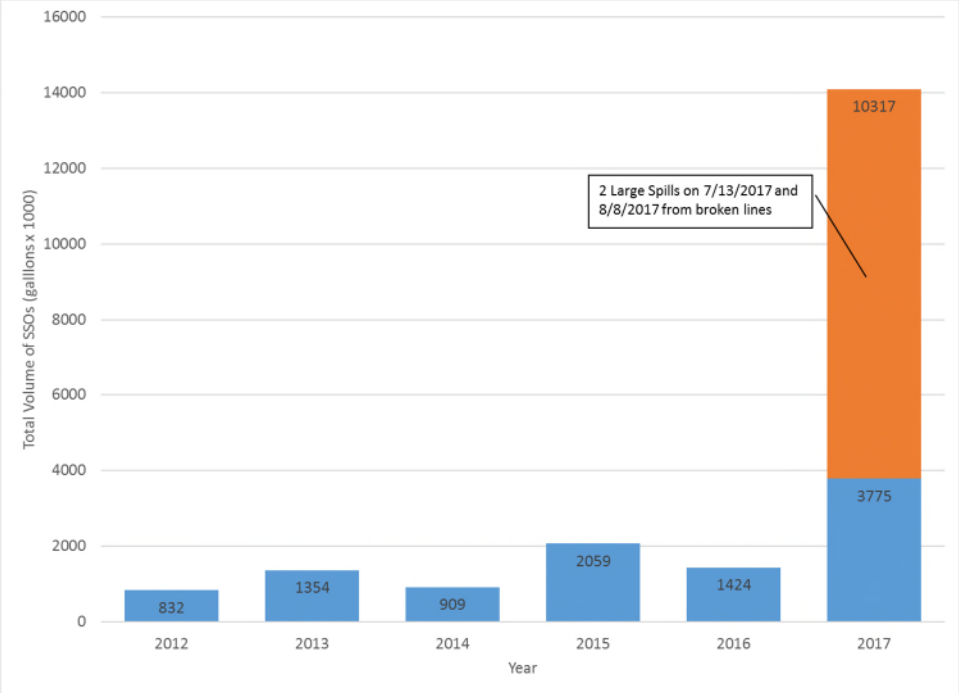


Figure 2-3 presents the total volume (gallons) of SSOs for each year. Volume was recorded for 63 percent of the SSOs that occurred from 2012 to 2016; the remaining 37 percent of SSO records did not include volume information, as SSOs identified by the retroactive data review did not have volumes recorded or information sufficient to estimate volumes. For 2017, 100 percent of the SSO occurrences have a volume recorded.

The volume of SSOs in Figure 2-3 reflects the rainfall increase from 2012 to 2013 and from 2014 to 2015, indicating that larger SSO volumes are related to storm events. Similarly, rainfall decreased from 2013 to 2014 and again from 2015 to 2016 as did the volume of SSOs in those periods. From 2016 to 2017, SSO volume trended up along with total rainfall. The 2017 total SSO volume was significantly impacted by two large spills that were caused by broken lines or structures. The spill at 3480 Mill Creek Road on August 8, 2017, had a volume of 3,938,974 gallons, and the creek crossing break at 3724 Eagles Beek Circle on July 13, 2017, had a spill volume of 6,378,500 gallons. The increase in total SSO volume recorded in 2017 over prior years can also be attributed, in part, to the increased accuracy and comprehensiveness of 2017 SSO volume records.

Figure 2-3 Reported Volume of SSOs per Year (2012–2017)

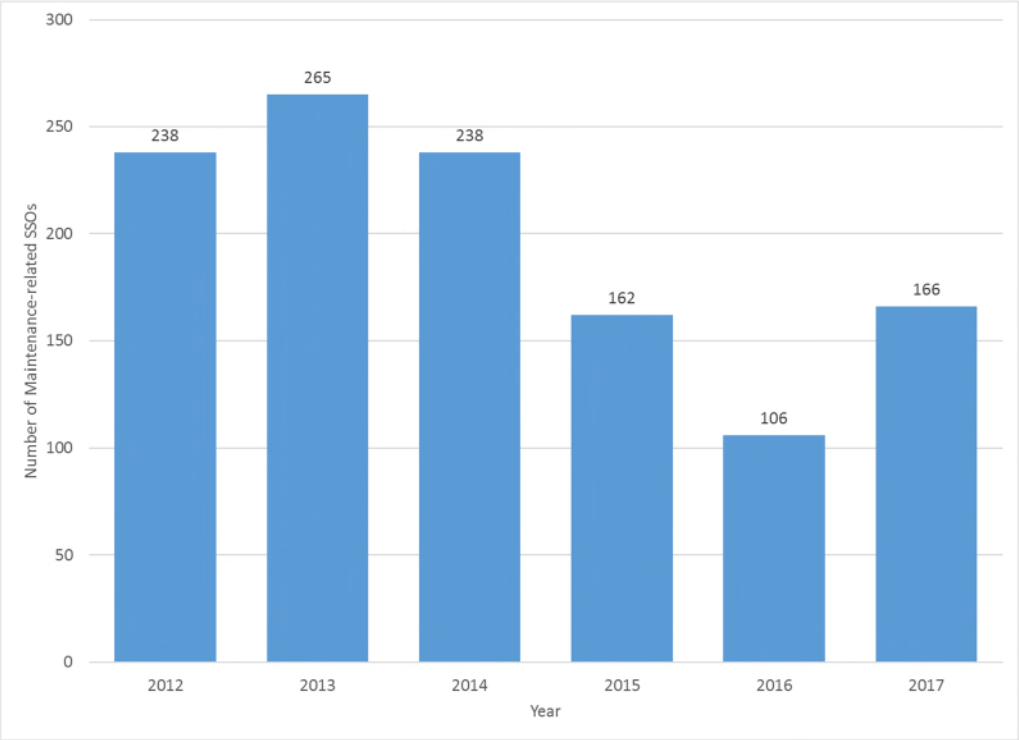


Notes:
For the period 2012–2016, 37 percent of the SSOs did not have a volume recorded because of retroactive review and inclusion. For 2017, all SSOs had a volume recorded.

Figures 2-4 and 2-5 show the number of maintenance-related SSOs and the associated annual volumes, respectively, for the period of record (2012–2017). The volume of maintenance-related SSOs for 2017 was higher than recorded in prior years. It is important to note that all SSOs recorded in 2017 included a total volume whereas, from 2012 to 2016, 37 percent of the SSOs did not have a volume recorded.

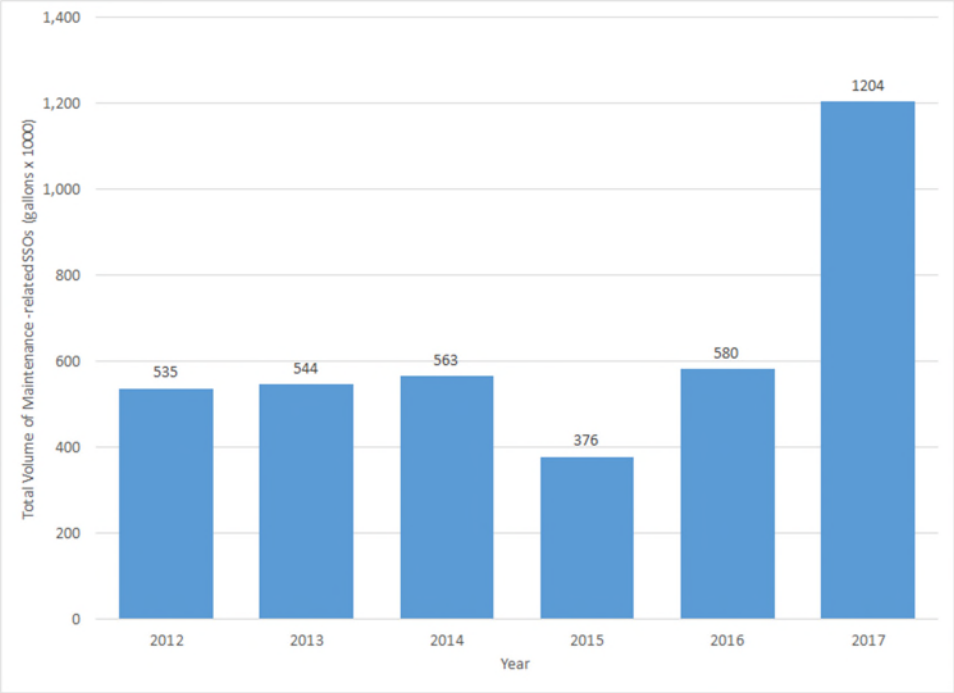
From the peak of 265 SSOs in 2013 to 166 SSOs in 2017, DWM has reduced maintenance-related SSOs by 37 percent. As discussed previously, DWM believes this is attributable to the County's implementation of MMS programs such as sewer cleaning, root control, Cityworks, and the effectiveness of the FOG Program and public education campaigns.

Figure 2-4 Maintenance-related SSOs per Year (2012–2017)



Note:
Maintenance-related SSOs are caused by grease, roots, debris, or any combination thereof.

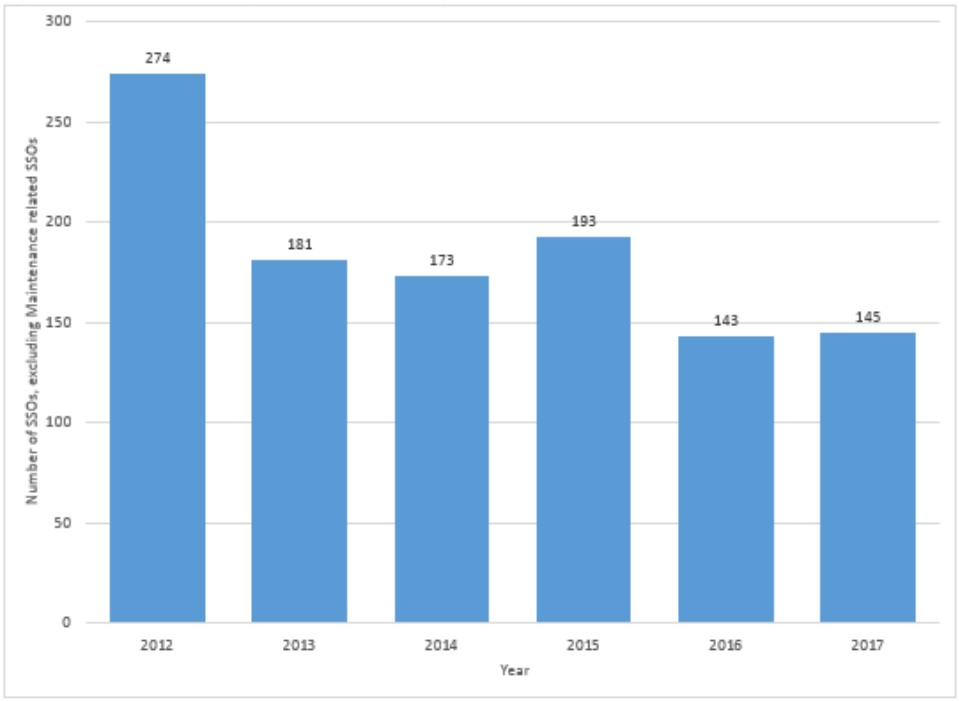
Figure 2-5 Volume of Maintenance-related SSOs per Year (2012–2017)



Notes:
For the period 2012–2016, 37 percent of the SSOs did not have a volume recorded because of retroactive review and inclusion. For 2017, all SSOs had a volume recorded.

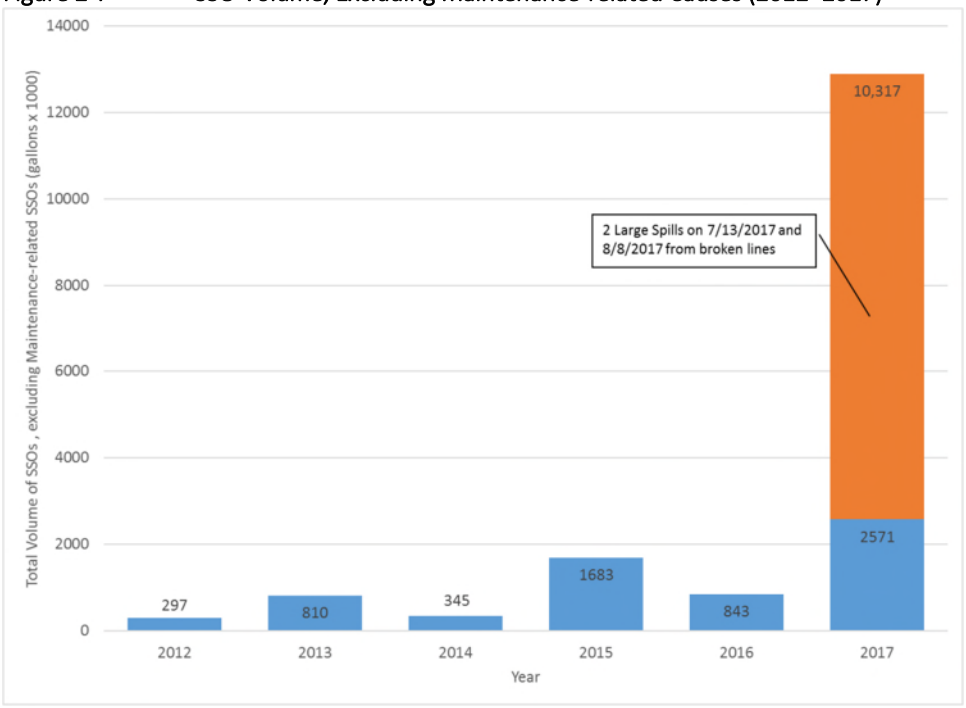
In Figure 2-6, the numbers of non-maintenance-related SSOs were similar for 2016 and 2017. However, as shown in Figure 2-7, the volume of non-maintenance-related SSOs increased significantly. As stated previously, all the SSOs recorded in 2017 included volume information whereas this information was not as accurately or comprehensively captured in prior years. The increase in volume in 2017 was also in part the result of increased rainfall compared to 2016 (see Figure 2-2). Two large spills in 2017 resulting from broken sewer lines were also a significant factor in the increased volume.

Figure 2-6 SSOs per Year, Excluding Maintenance-related Causes[a] (2012–2017)



Notes:
[a] SSOs attributed to causes other than grease, roots, debris, or any combination thereof.

Figure 2-7 SSO Volume, Excluding Maintenance-related Causes (2012–2017)



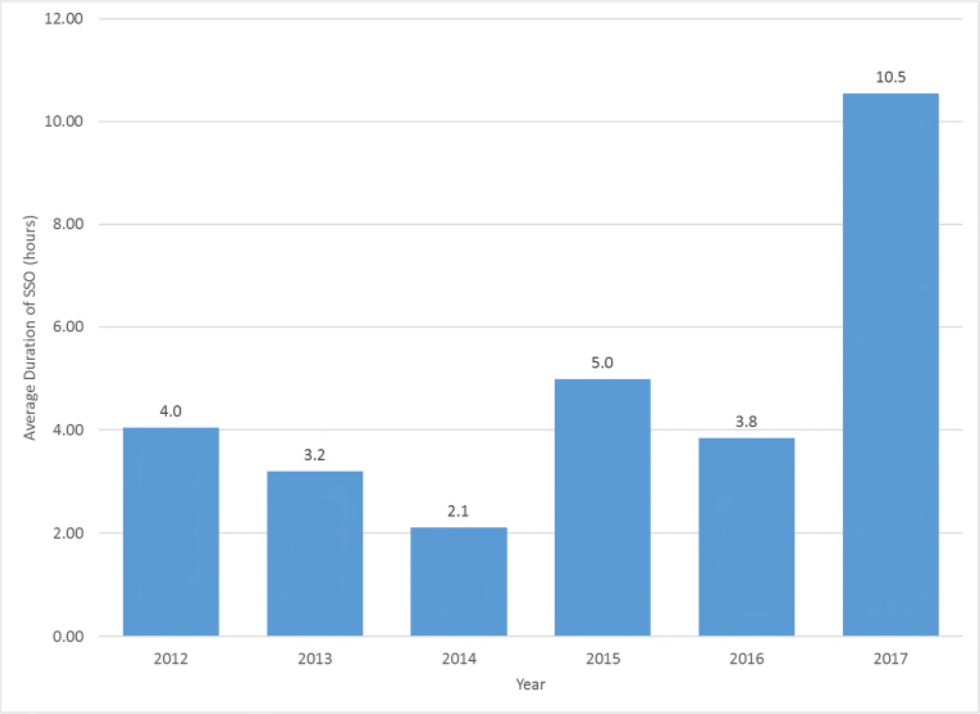
Notes:
For the period 2012–2016, 37 percent of the SSOs did not have a volume recorded because of retroactive review and inclusion. For 2017, all SSOs had a volume recorded.

3. Average Duration of SSOs

From 2012 to 2017, durations are available for 71 percent of the SSOs. The average SSO duration during the last 6 years (2012–2017) was approximately 4.8 hours, as shown in Figure 3-1. Figure 3-2 shows the average duration for those SSOs categorized as maintenance-related for 2012 through 2017.

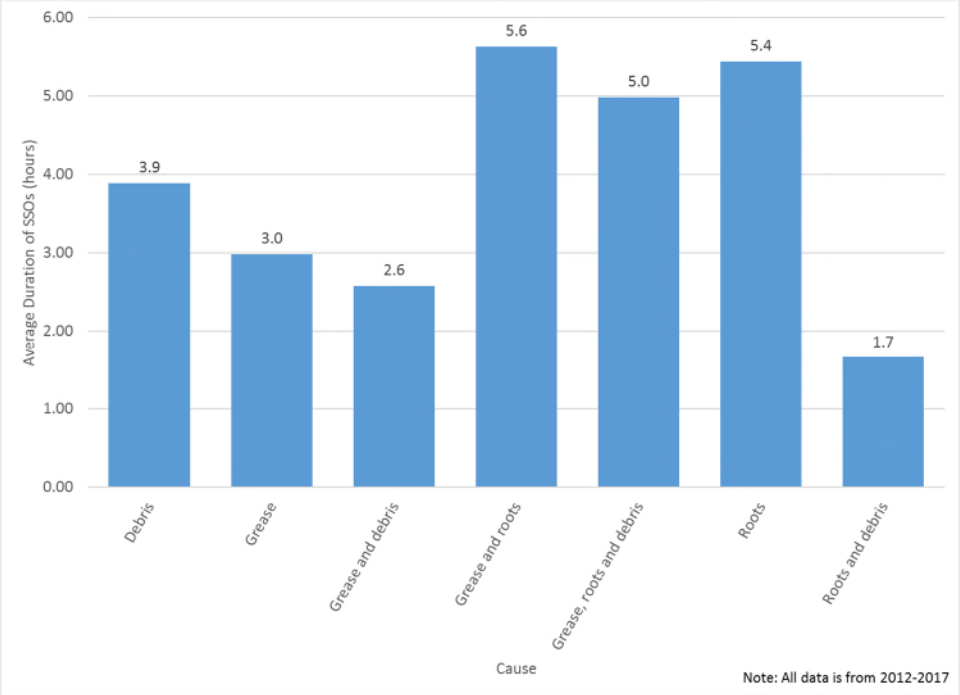
Figure 3-3 presents average durations for other SSOs, excluding maintenance-related SSOs. Five causes had durations above average: Broken Line/Structure, Creek Crossing Break, Lift Station Failure, Storm, and Vandalism. The two categories with the highest durations, Broken Line/Structure and Creek Crossing Break, can be attributed to two specific events in 2017 that required significant time to repair a broken line at 3480 Mill Creek Road on August 8, 2017, and a creek crossing break at 3724 Eagles Beek Circle on July 13, 2017.

Figure 3-1 Average SSO Duration by Year (2012–2017)



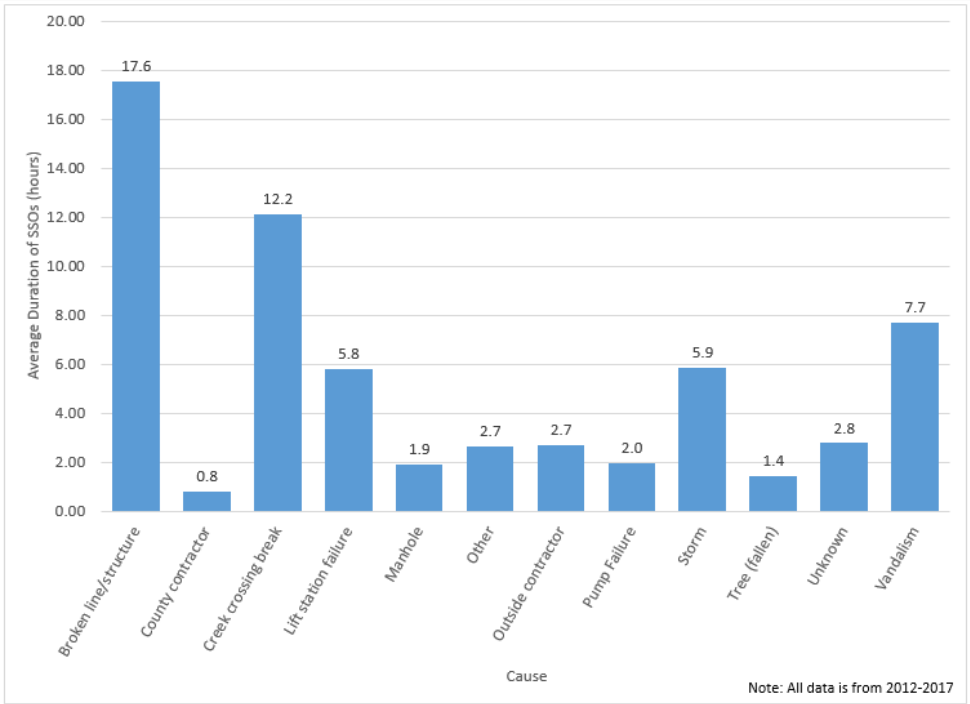
Note:
Durations are available for 71 percent of the SSOs from 2012 to 2017.

Figure 3-2 Average SSO Duration by Maintenance-related Cause (2012–2017)



Note:
Durations are available for 71 percent of the SSOs from 2012 to 2017.

Figure 3-3 Average SSO Duration, Excluding Maintenance-related Causes (2012–2017)



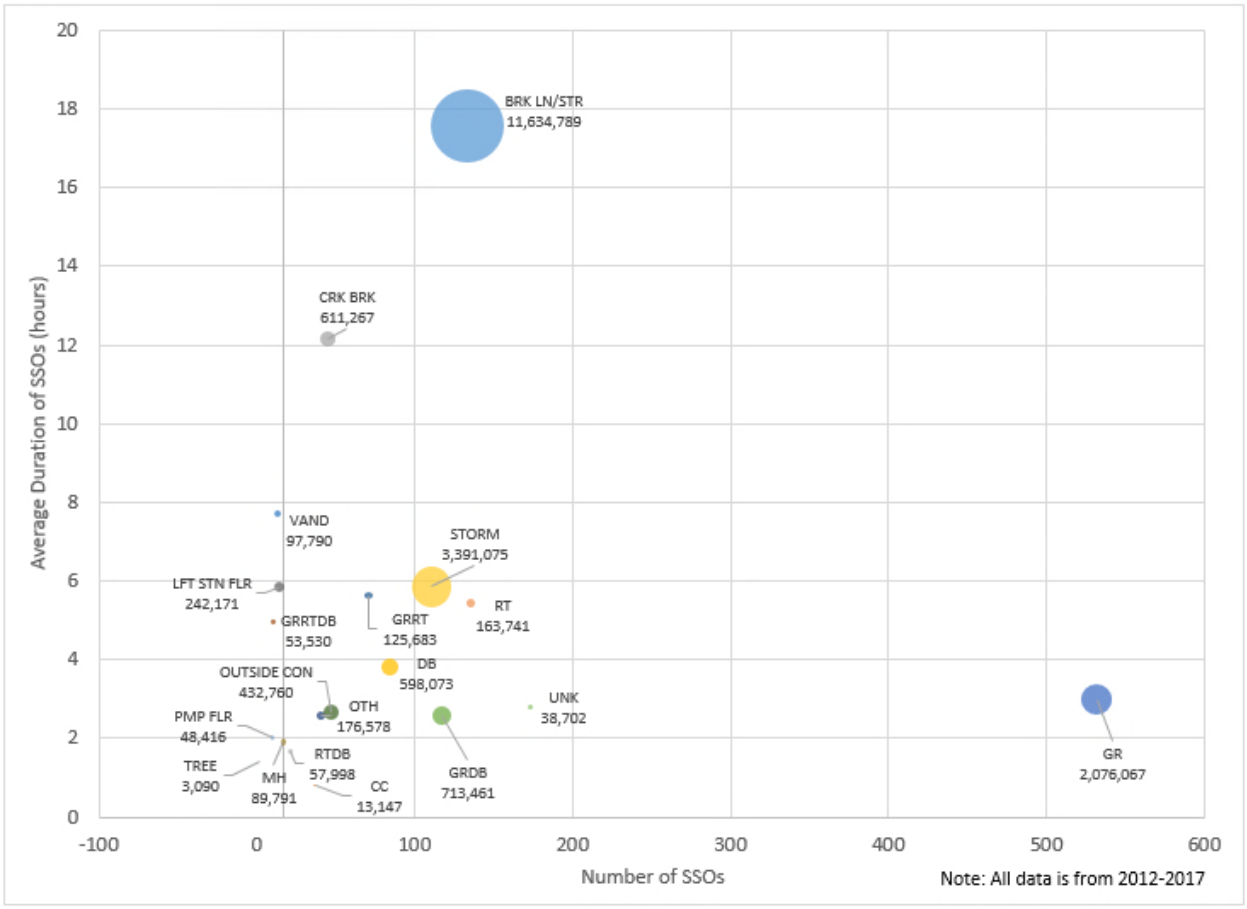
Note:
Durations are available for 71 percent of the SSOs from 2012 to 2017.

The scatter plot shown in Figure 3-4 shows the average SSO duration and number of SSOs by cause. The relative SSO volume is depicted by bubble size. Bubble size indicates volume in gallons—a larger bubble indicates more volume; a smaller bubble indicates less volume. Bubbles are labeled with cause and volume (in gallons).

While grease is the most common cause of SSOs (during the 6-year period), the average duration of grease-induced SSOs is low and the volume from grease-related SSOs is moderate. SSOs caused by broken line and creek crossing break had the largest durations compared to the other types of SSOs. This is attributable to difficulty in conducting repairs/bypasses on large-diameter lines as well as the duration to locate broken lines or creek crossing breaks based on source tracking.

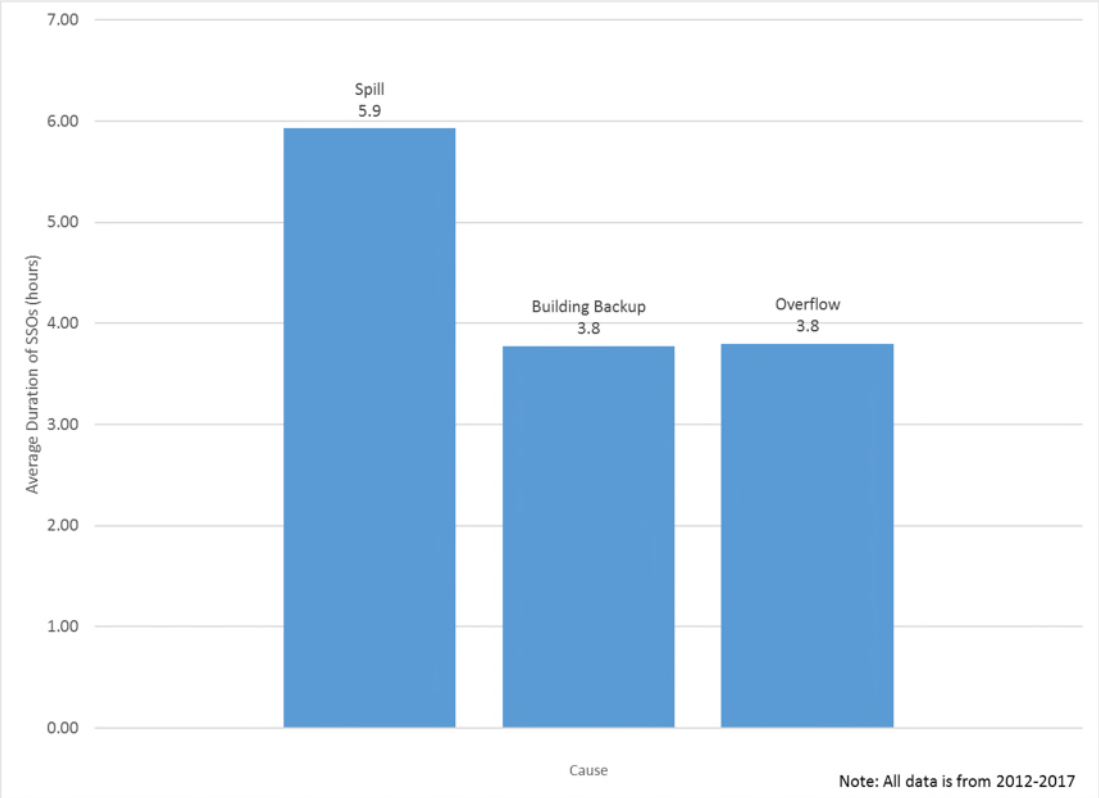
Figure 3-5 shows the average duration for SSOs by type (spill, overflow, and building backup). Spills account for most of the volume and have higher average durations than building backup or overflows, which are contained on land. The duration of building backups and overflows are approximately the same.

Figure 3-4 Average SSO Duration with Count by Cause (2012–2017)



Notes:
Durations are available for 71 percent of the SSOs from 2012 to 2017.

Figure 3-5 Average SSO Duration by Type (2012–2017)



Notes:
Durations are available for 71 percent of the SSOs from 2012 to 2017.

4. Causes of SSOs

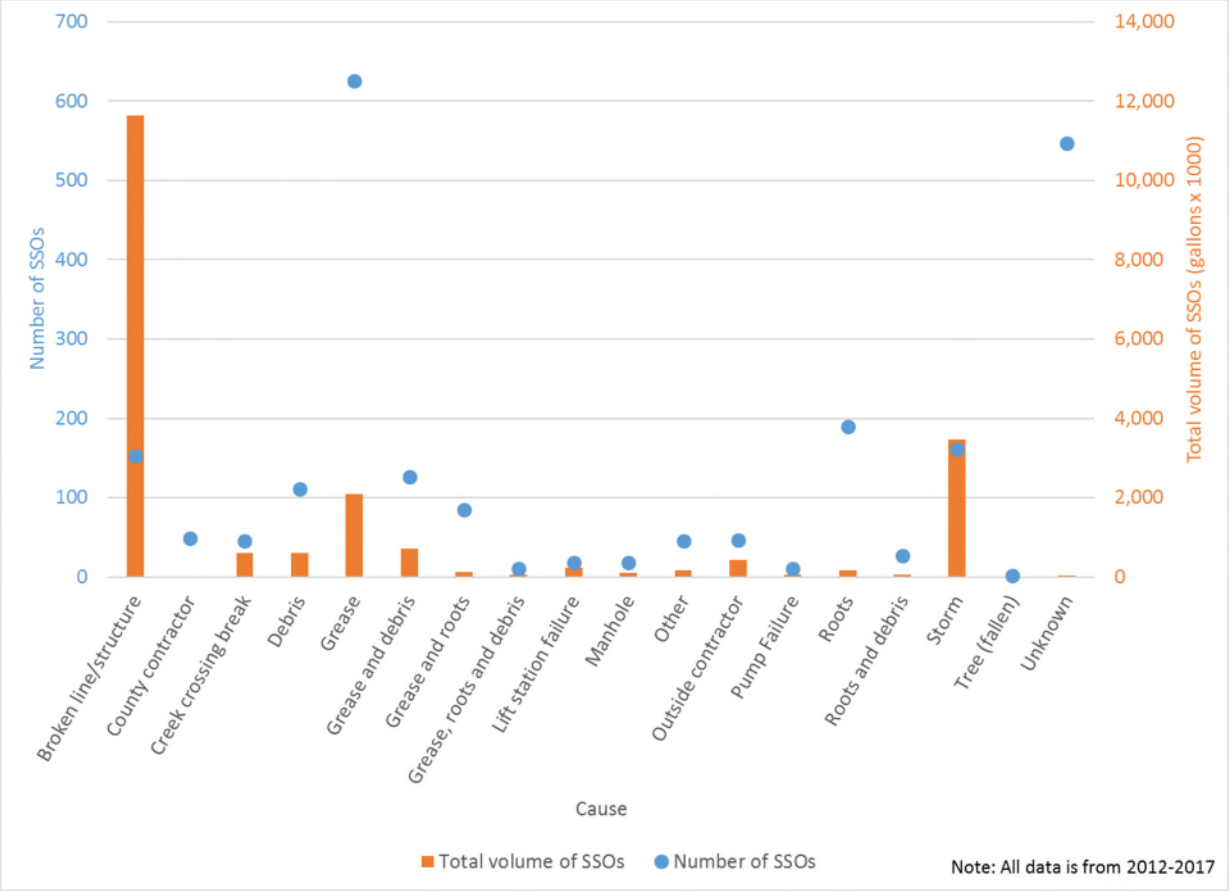
While grease-related SSOs decreased from 2012 to 2017 by 30 percent, resulting, in part, from increased sewer cleaning and the County's commercial FOG Management Program and Public Education Programs, grease accounts for more SSOs than any other cause (45 percent) and represents the third highest volume (14 percent) of all SSO causes (see Figure 4-1). Broken line/structure SSOs account for more volume than any other cause but occur less frequently. The cause with the second highest volume is storms, and the County has taken steps to address impacts from storm-related events. Specifically, follow up and corrective action for private laterals and stormwater connections to the sanitary sewer has been undertaken in the Priority Areas. In 2017, 1,274 notices were sent to private owners or other incorporated cities to correct violations that may have allowed stormwater to enter the sewer infrastructure. The County has also replaced 2,285 vented manhole covers in 2017 to reduce the amount of inflow into the sewer system.

Figure 4-2 shows the number of SSOs by cause by year for the period of record. The number of SSOs listed as unknown declined because of improved investigations and recordkeeping.

Figure 4-3 shows SSO volume by cause by year from 2012 through 2017. As noted above, SSO volume was reported for all records in 2017; from 2012 through 2016, 37 percent of the SSOs did not have a volume recorded. The volume of SSOs caused by storms was significant in 2017 because of more rainfall. The volume from broken pipe or other structural failure increased significantly in 2017, primarily because of two incidents (3480 Mill Creek Road on August 8, 2017, and 3724 Eagles Beek Circle on July 13, 2017). The

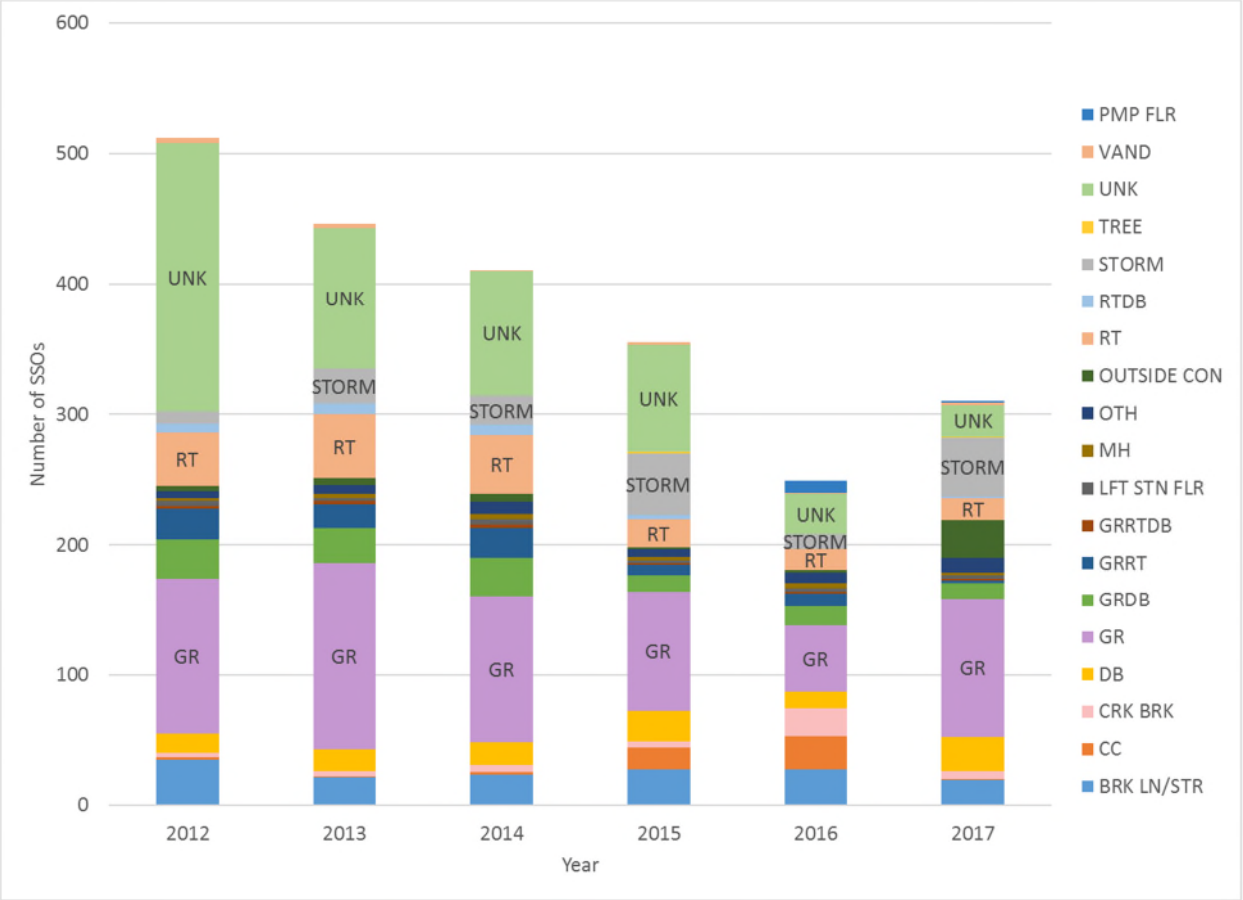
estimated volumes for these spills were 3,938,974 gallons and 6,378,500 gallons. Together, these two events account for 75 percent of the volume for this type of SSO cause.

Figure 4-1 SSOs by Count, Volume, and Cause (2012–2017)



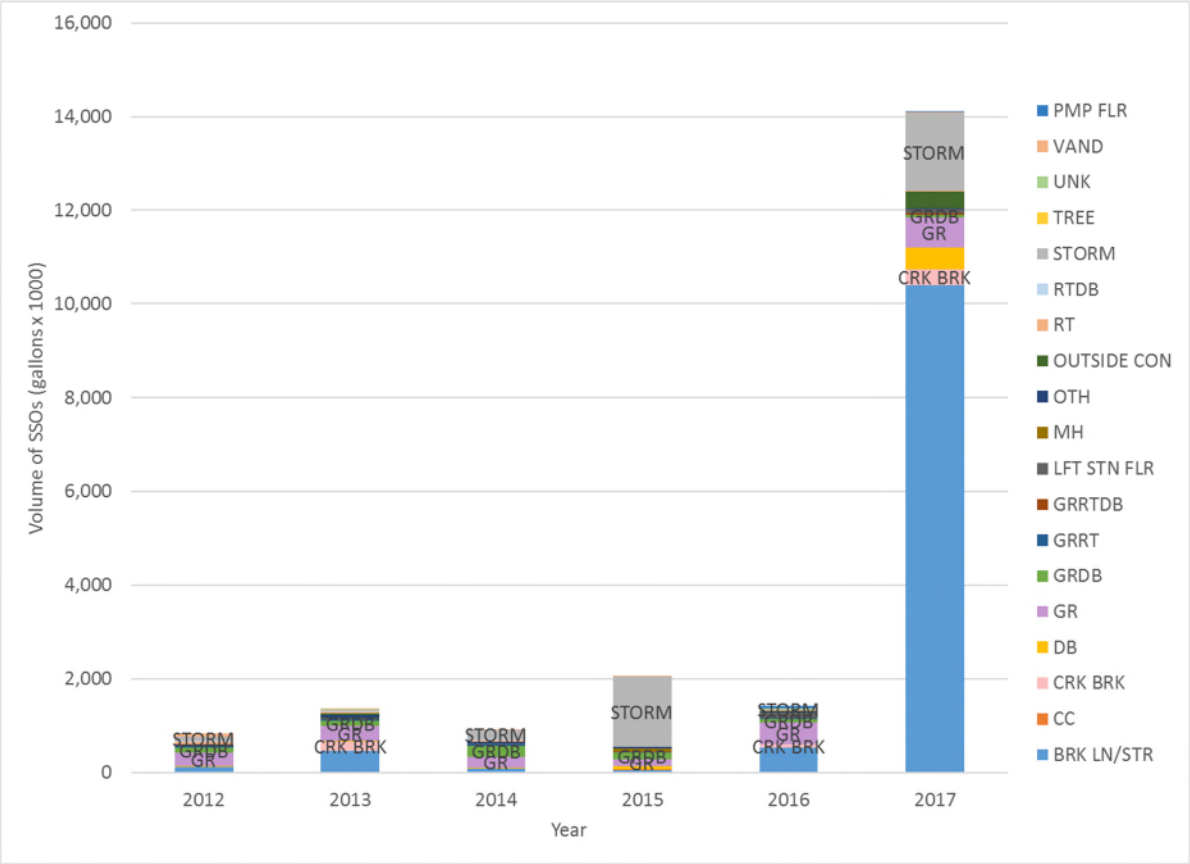
Note:
For the period 2012–2016, 37 percent of the SSOs did not have a volume recorded because of retroactive review and inclusion. For 2017, all SSOs had a volume recorded. The relatively high percentage of causes listed as unknown (UNK) is because of the retroactive data review. The cause of many of the SSOs could not be determined from the information recorded about the event.

Figure 4-2 SSOs by Year by Cause (2012–2017)



Note:
The relatively high percentage of causes listed as unknown (UNK) is because of the retroactive data review. The cause of many of the SSOs could not be determined from the information recorded about the event.

Figure 4-3 SSO Volume by Year by Cause (2012–2017)



Notes:
For the period 2012–2016, 37 percent of the SSOs did not have a volume recorded because of retroactive review and inclusion. For 2017, all SSOs had a volume recorded.

Selected causes can be grouped into categories that help assess the effectiveness of DWM's efforts to reduce SSOs. These broader categories are grease, structural, storm, and debris. Table 4-1 lists the causes assigned to each category. As shown by the dashed trend line in Figure 4-4, the number of grease, structural, and debris-related SSOs decreased from 2012 to 2017. This is a positive trend and directly correlates to the increased field activity undertaken by DWM to clean sewer lines and conduct CCTV inspections to assess structural conditions. Because 2017 experienced a 36-percent increase in rainfall compared to 2016, there were more SSOs resulting from storms than in 2016. The general trend since 2012 shows the number of SSOs resulting from storms to be increasing. This could be attributed to improved reporting and/or more frequent occurrences of large rain events.

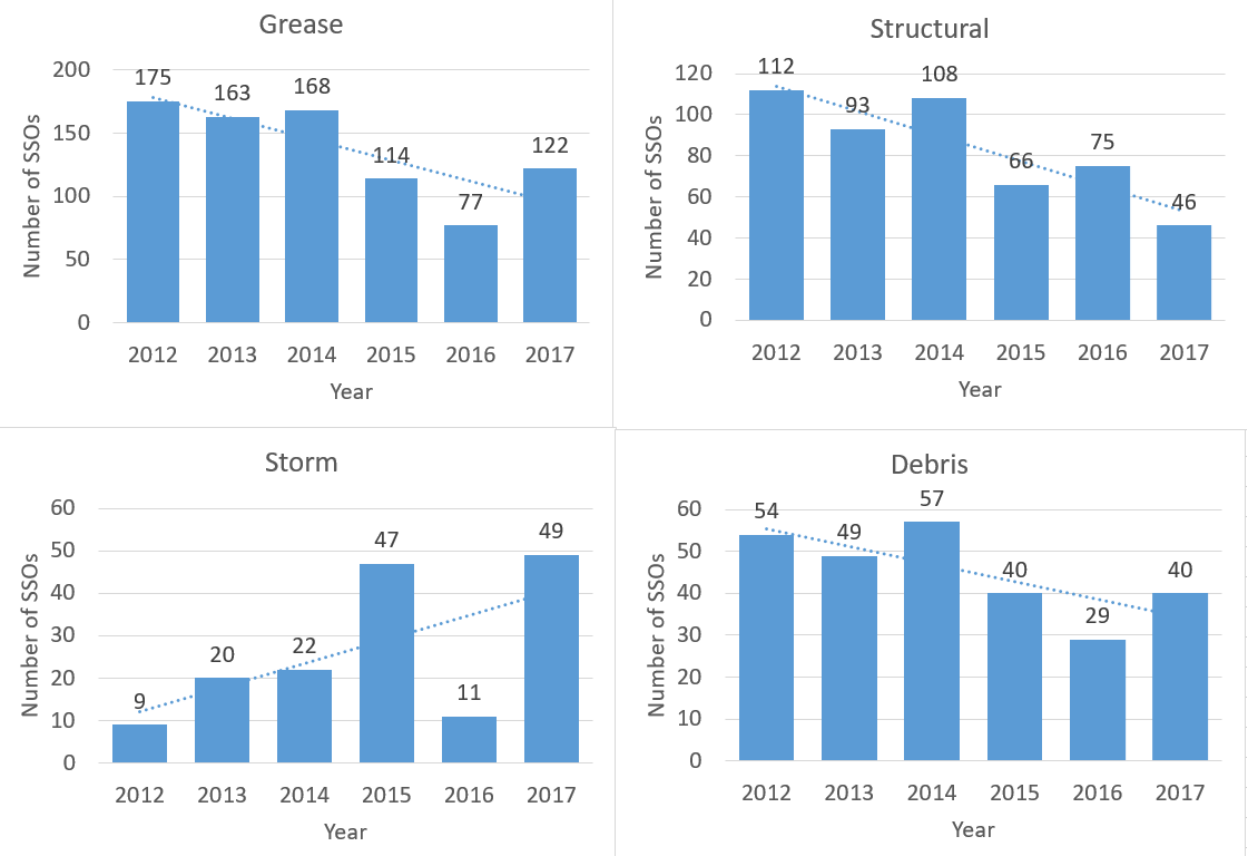
These same cause categories, when applied specifically to spills, show the same trends except for structural causes (see Figure 4-5). The number of spills attributable to structural causes decreased 46 percent from 2016 to 2017 to a similar number consistent with the number of spills attributable to structural causes recorded in 2014 and 2015. DWM's increased field presence in 2017 resulted in the identification of more broken mains than any other year from 2012 through 2016. While the increase in spills from structural causes is undesirable, it is a positive indicator of the effectiveness of the field inspections conducted in 2017.

Figure 4-6 presents the number of spills by year. The trend in the number of spills per year increased from 2012 to 2017. This may be partially attributable to the increased field inspections and putting resources into the field in remote places, such as along streams and in ravines that are generally out of site. If SSOs were found, DWM subsequently reported the findings appropriately. DWM also increased the stream sampling effort, which has resulted in identifying SSOs that could have gone undetected or spilled for a longer time without DWM's proactive work in interpreting sampling data.

Table 4-1 Mapping Cause to Cause Categories

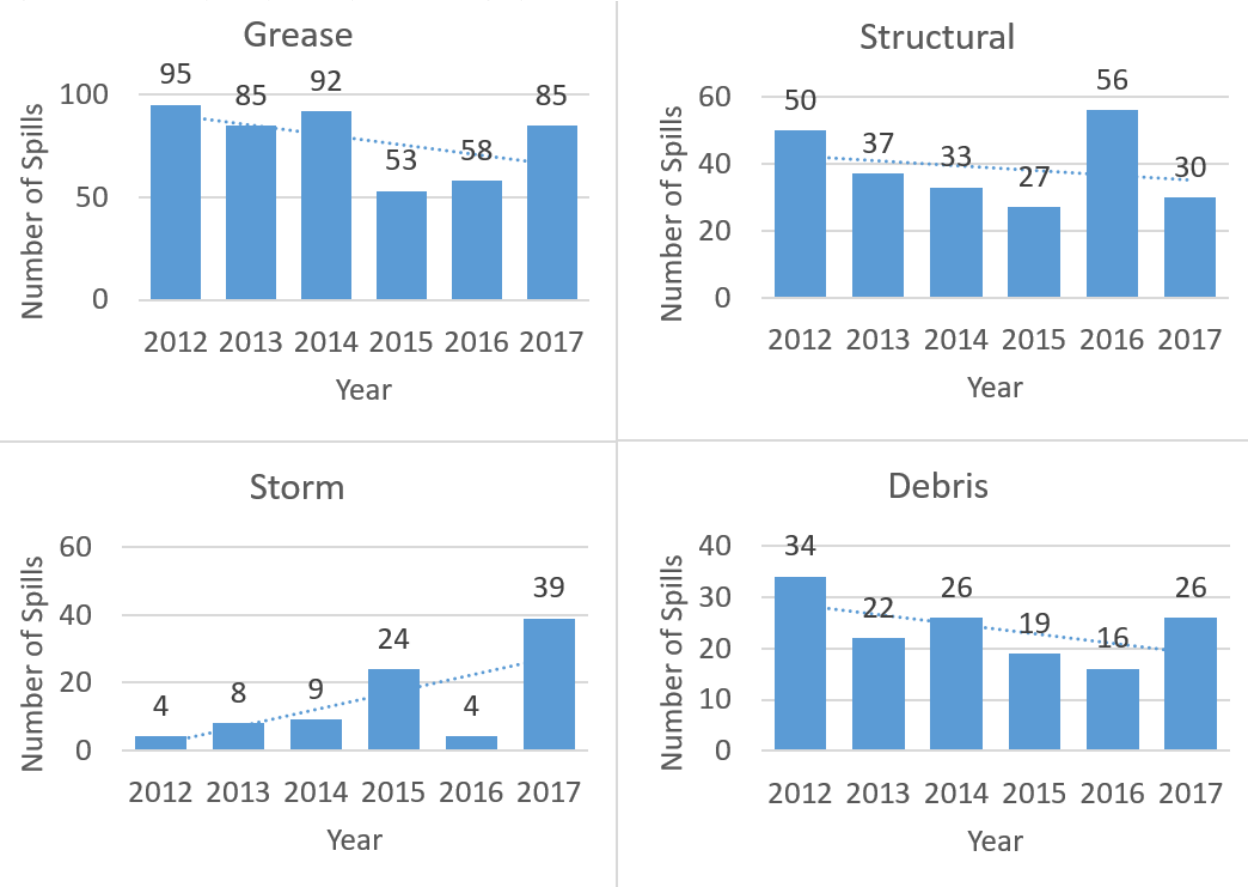
Cause	Grease	Structural	Storm	Debris
BRK LN/STR		STRUC		
CC				
CRK BRK		STRUC		
CRK BRN		STRUC		
DB				DB
GR	GR			
GRDB	GR			DB
GRRT	GR	STRUC		
GRRTDB	GR	STRUC		DB
LFT STN FLR				
MH				
OTH				
OUTSIDE CON				
PMP FLR				
RT		STRUC		
RTDB		STRUC		DB
STORM			STORM	
TREE				
UNK				
VAND				

Figure 4-4 SSOs by Year by Cause Category (2012–2017)



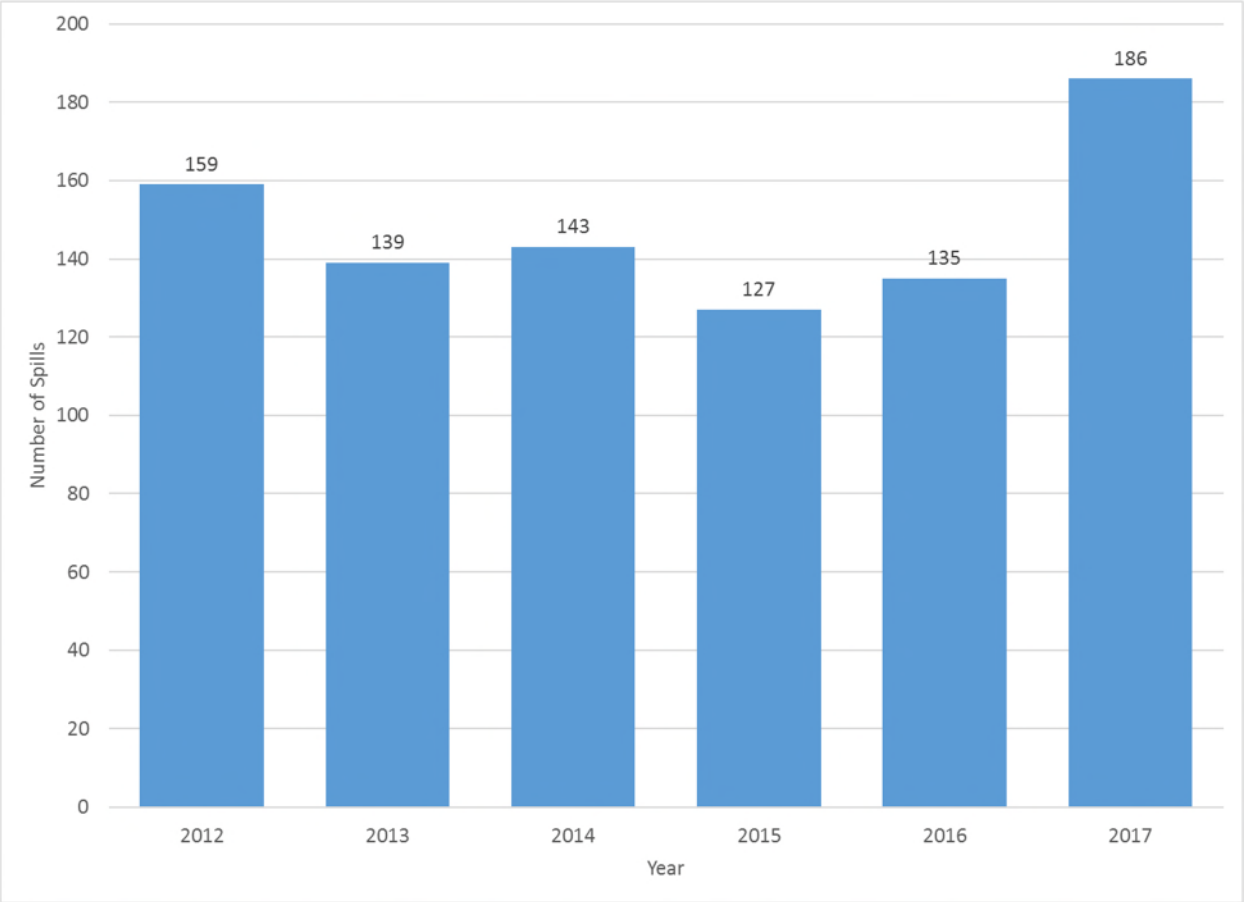
Notes:
Cause Categories may include more than one cause. Some SSOs appear in more than one Cause Category.
Dashed line is the linear trend line for each graph.

Figure 4-5 Spills by Year by Cause Category (2012–2017)



Note:
Cause Categories may include more than one cause. Some SSOs appear in more than one Cause Category.
Dashed line is the linear trend line for each graph.

Figure 4-6 Spills by Year (2012–2017)



5. Other Trends

DWM evaluated other potential trends including those based on pipe size and rainfall.

Pipe Size

The most common pipe diameter in the collection system is 8 inches, as shown in Figure 5-1. Pipes with a diameter of 8 inches account for 85 percent of the total number of pipes and 83 percent of the total length of pipe. Likewise, most spills are associated with pipes of 8 inches in diameter, as shown in Figure 5-2.

Figure 5-1 Sewer Gravity Main Pipe Count and Length by Diameter

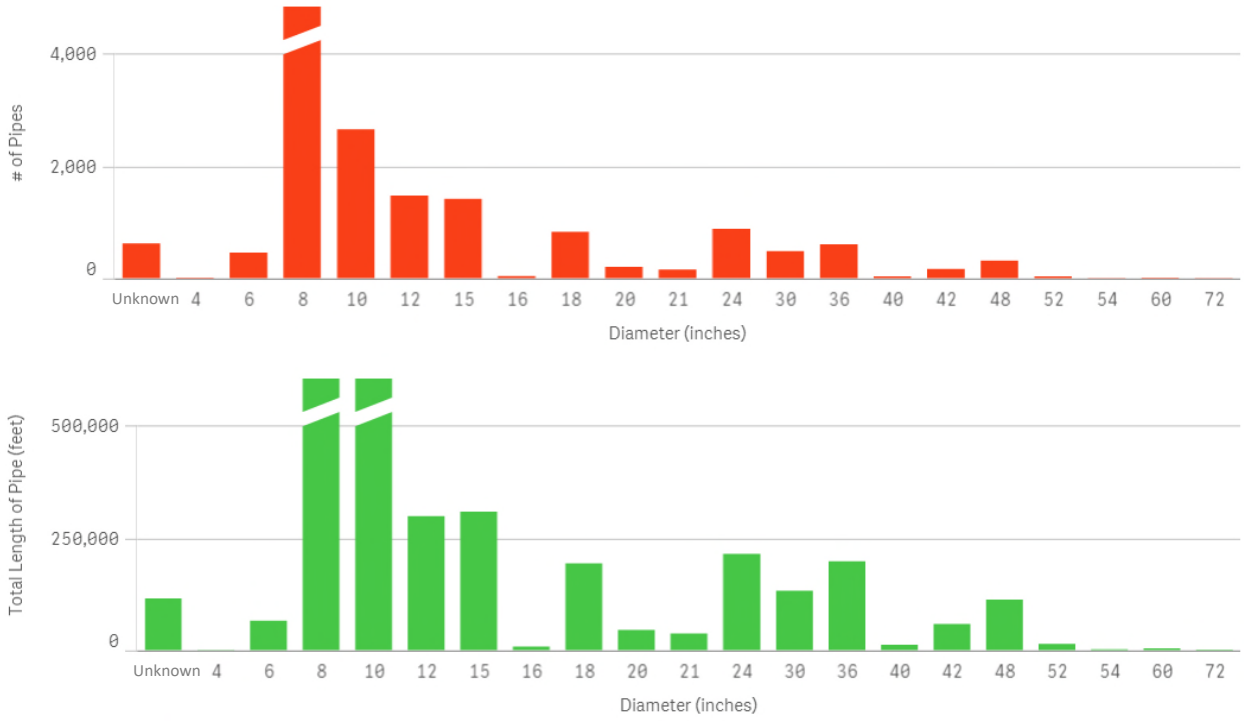
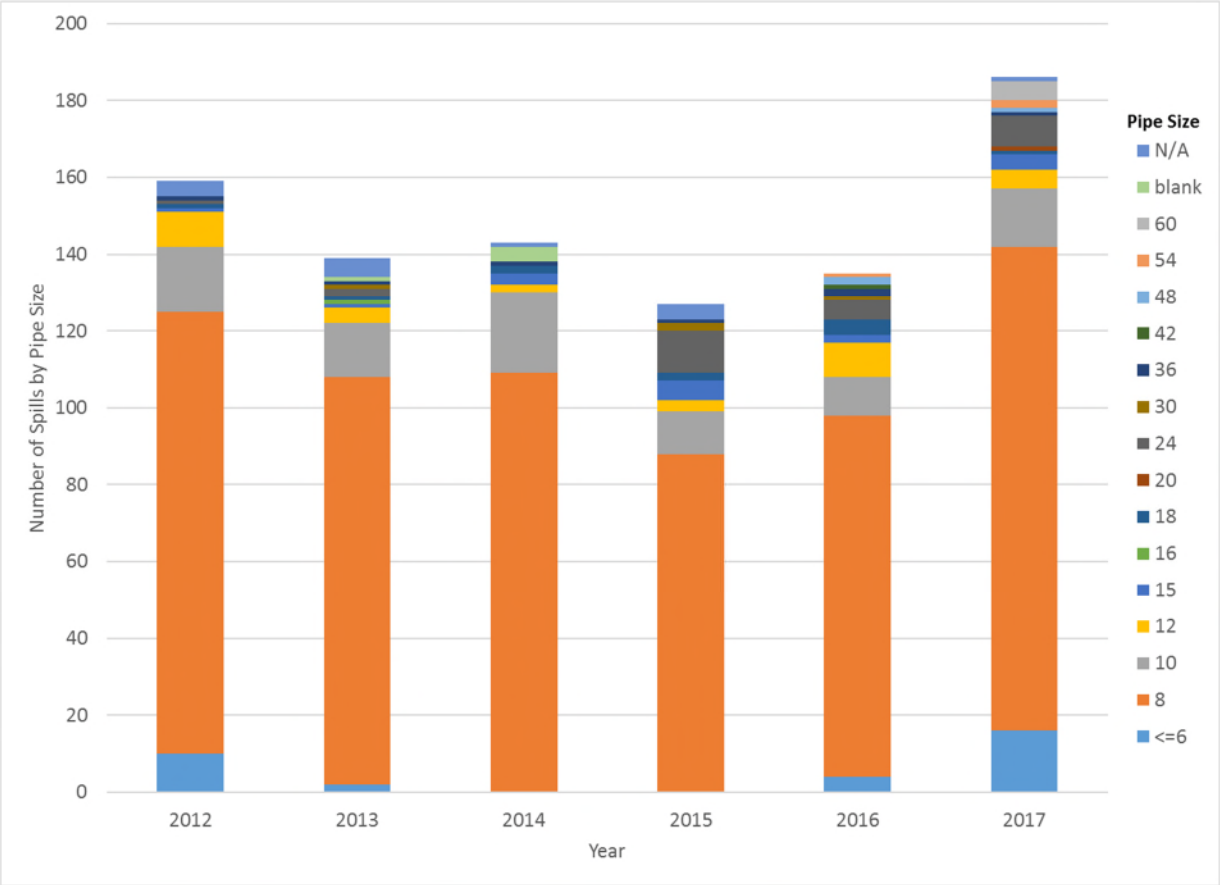


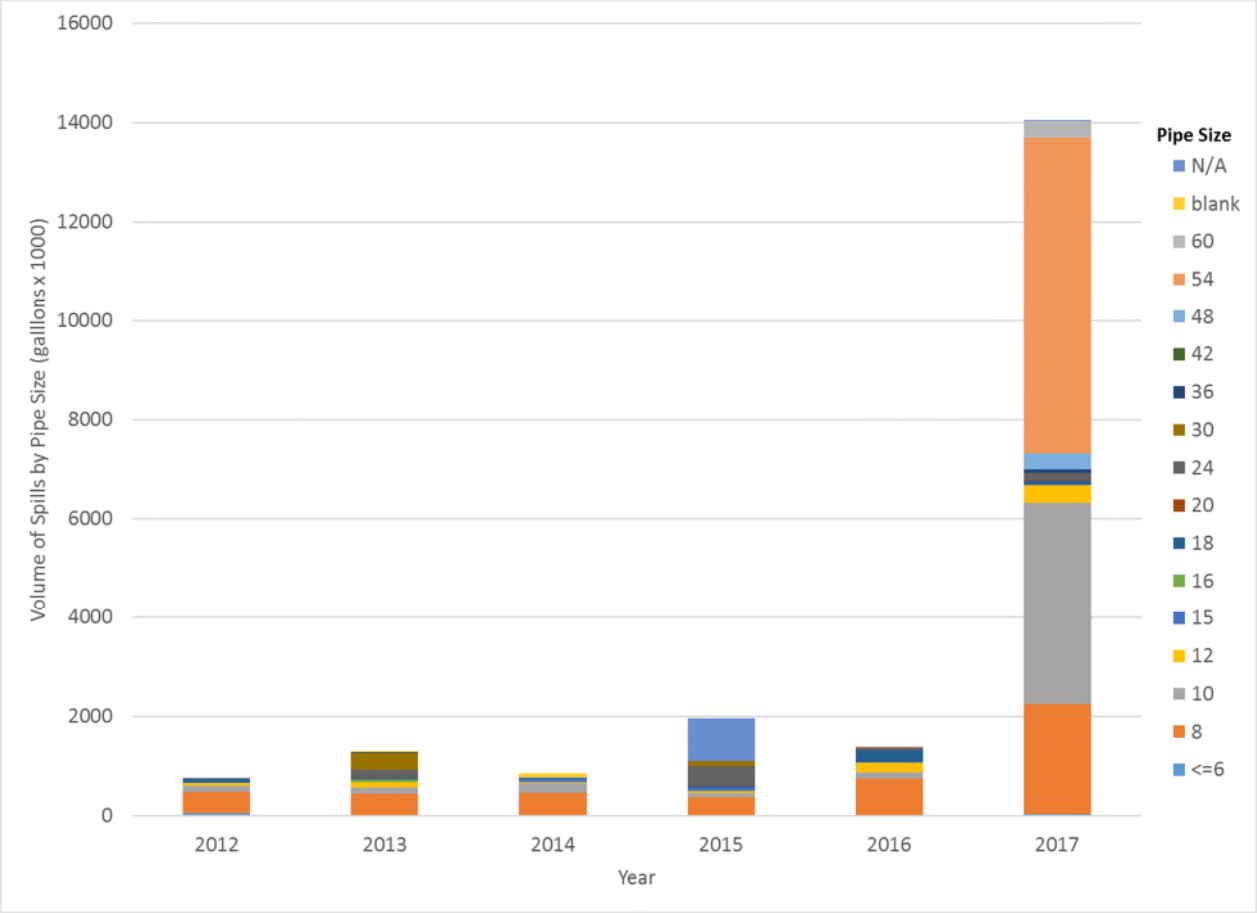
Figure 5-2 Spills by Year by Pipe Size (inches) (2012–2017)



Notes:
Only spills have an associated pipe size linked to an SSO, so only spills are included in this figure. DWM has other, larger, pipe sizes that are not shown in this figure. SSOs did not occur in pipes larger than 60 inches during the period 2012–2017.

Figure 5-3 shows the volume of spills by pipe size. The largest spill in 2017 (3724 Eagles Beek Circle) accounts for almost 100 percent of the volume (6,378,500 gallons) of spills from 54-inch-diameter pipes. The second largest spill in 2017 (3480 Mill Creek Road) accounts for 97 percent of the volume (3,938,974 gallons) of spills from 10-inch-diameter pipes.

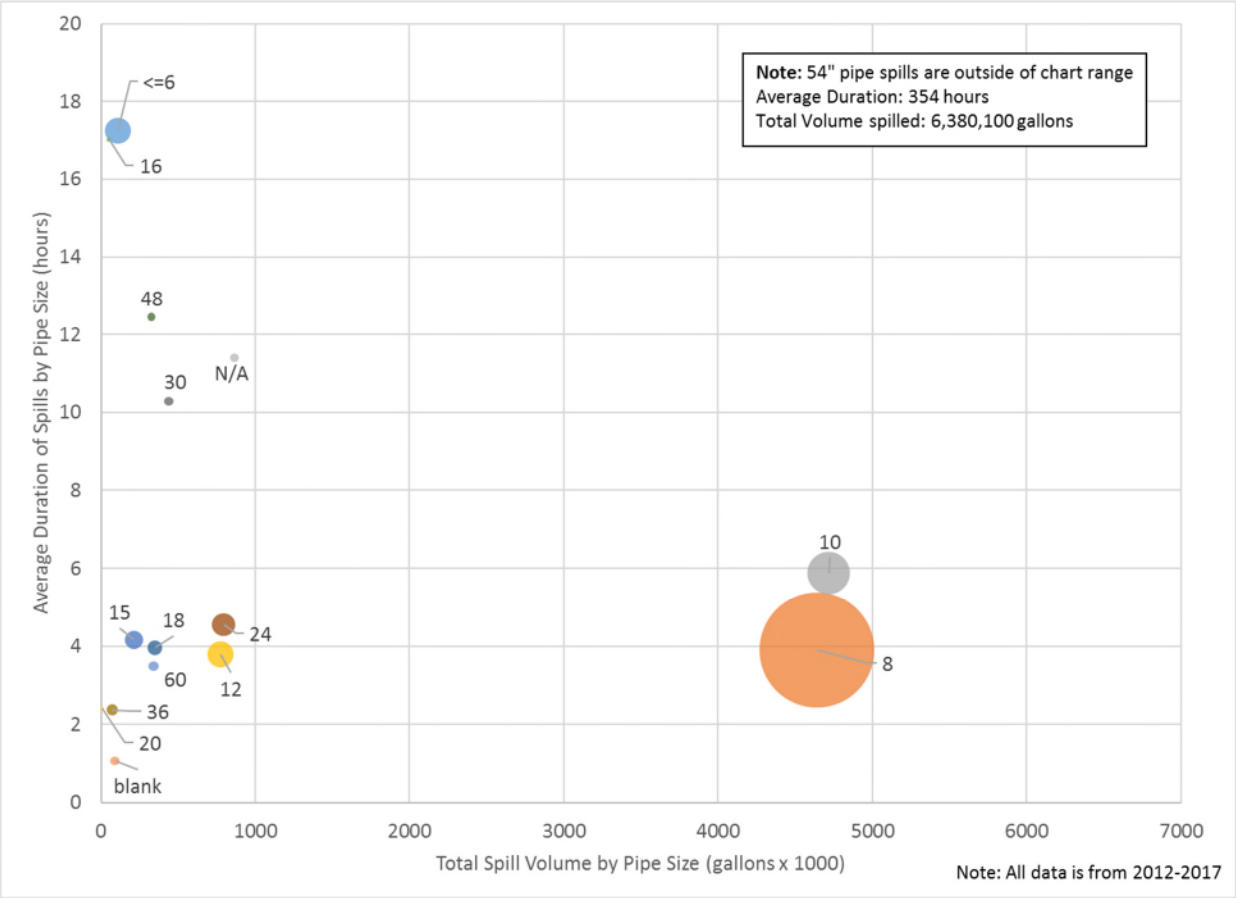
Figure 5-3 Spill Volume by Year by Pipe Size (2012–2017)



Notes:
Only spills have an associated pipe size linked to an SSO, so only spills are included in this figure. DWM has other, larger, pipe sizes that are not shown in this figure. SSOs did not occur in pipes larger than 60 inches during the period 2012–2017.
Pipe diameter was not always recorded; thus, some are blank or N/A.

Figure 5-4 shows the average duration of spills by pipe size, volume, and number. As expected, larger-diameter pipes generally have longer average spill durations than smaller pipes, as smaller pipes can be repaired in a shorter amount of time. The large spill from the 54-inch-diameter pipe accounts for the largest volume spill and had a long duration.

Figure 5-4 Spill Average Duration and Volume by Pipe Size, 2012 to 2017

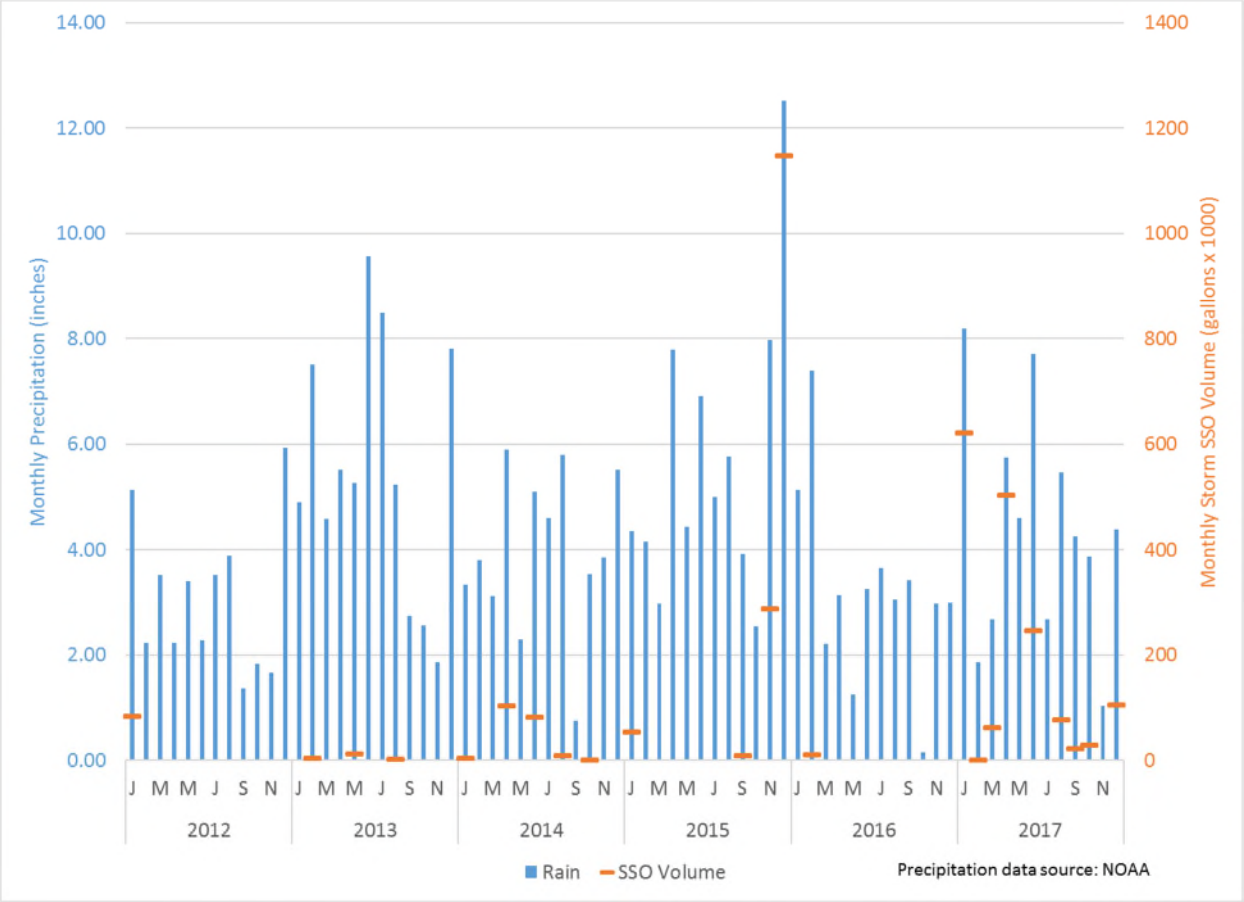


Notes:
Bubble size indicates relative number of SSOs.
Bubbles are labeled with pipe diameter, in inches.
Pipe diameter was not always recorded; thus, some are blank or N/A.

Rainfall

The rainfall total for 2017 was 52.5 inches, which was 13.5 inches more than the 39 inches of rainfall in 2016. This difference in rainfall total and intensity is reflected in the data for SSOs and spills caused by storms. In 2016, only 4 spills were attributed to storms whereas in 2017 there were 39 spills attributed to storms. During 2017, the County encountered four (4) storms with intensities greater than 1-inch per hour that resulted in 21 spills. The volume for spills caused by storms was 4,440 gallons in 2016 but more than 1,600,000 gallons in 2017. Similarly, there were 6 overflows caused by storms in 2016 and 9 in 2017. There was 1 building backup in 2017 caused by storms but none in 2016. Figure 5-5 shows rainfall and SSO volume by month from 2012 through 2017.

Figure 5-5 Monthly Precipitation and Storm-induced SSO Volume (2012–2017)



Note: Only spills with a cause of STORM are represented in this figure. For the period 2012–2016, 37 percent of the SSOs did not have a volume recorded because of retroactive review and inclusion. For 2017, all SSOs had a volume recorded.

Repeat SSOs

DWM reviewed SSOs in their spatial context to identify repeat SSO locations. These locations were recorded and prioritized for further investigation to define permanent solutions to prevent future recurrence of SSOs.

DWM defined 500-foot radius areas with repeat SSOs and tallied the repeat SSO locations by sewershed (see Figure 5-6). The North Fork Peachtree Creek and South Fork Peachtree Creek have the highest number of repeated SSO locations. The most common cause of repeat SSOs is grease (see Figure 5-7).

Similarly, DWM analyzed only those SSOs that are categorized as spills. These same two basins, North Fork Peachtree Creek and South Fork Peachtree Creek, had the highest number of repeat spill locations (see Figure 5-8). The most common cause of repeat spills is grease (see Figure 5-9).

The spatial distribution of repeat SSOs and repeat spills are shown in Figures 5-10 and 5-11, respectively.

Figure 5-6 Number of Locations with Repeat SSOs by Sewershed

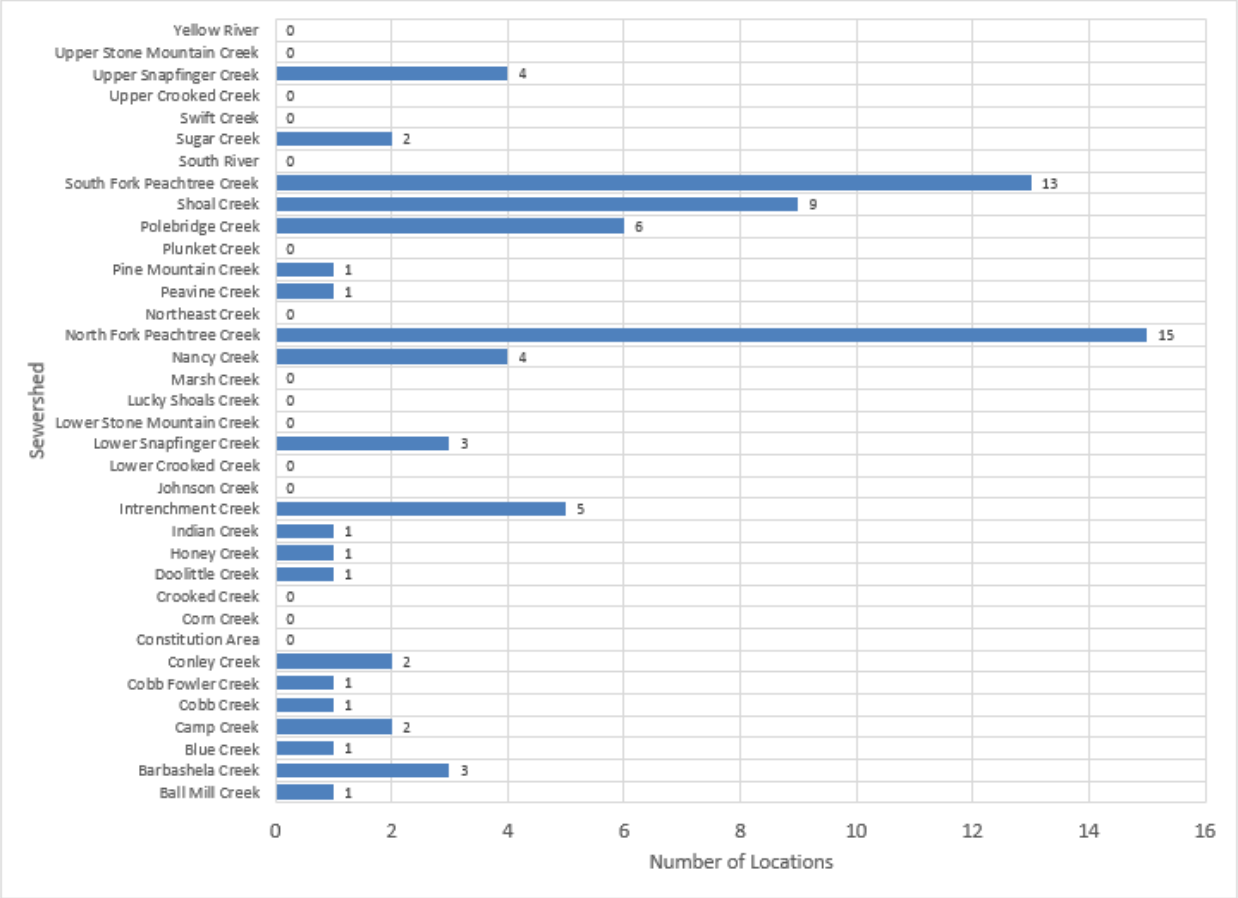


Figure 5-7 Number of Repeat SSOs by Cause

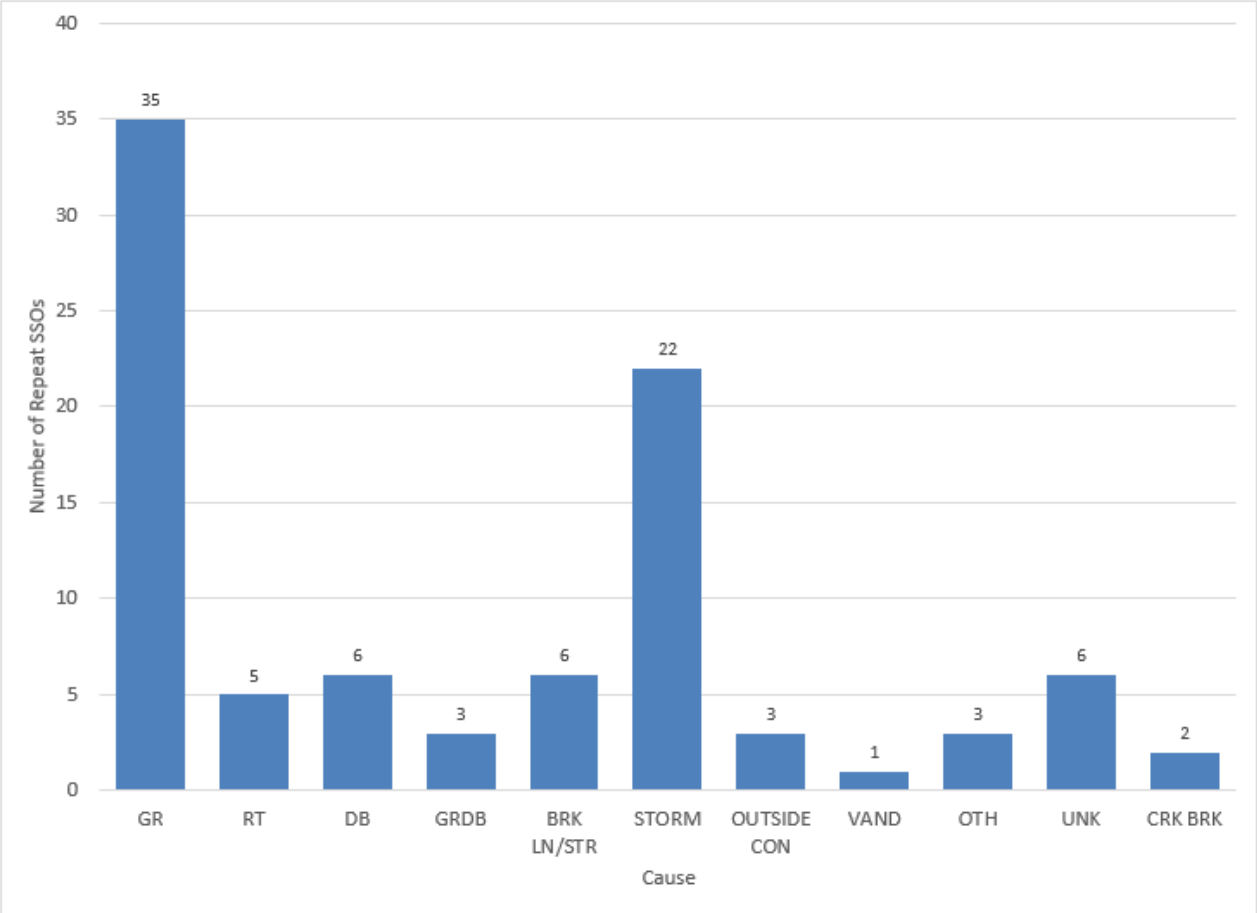


Figure 5-8 Number of Locations with Repeat Spills by Sewershed

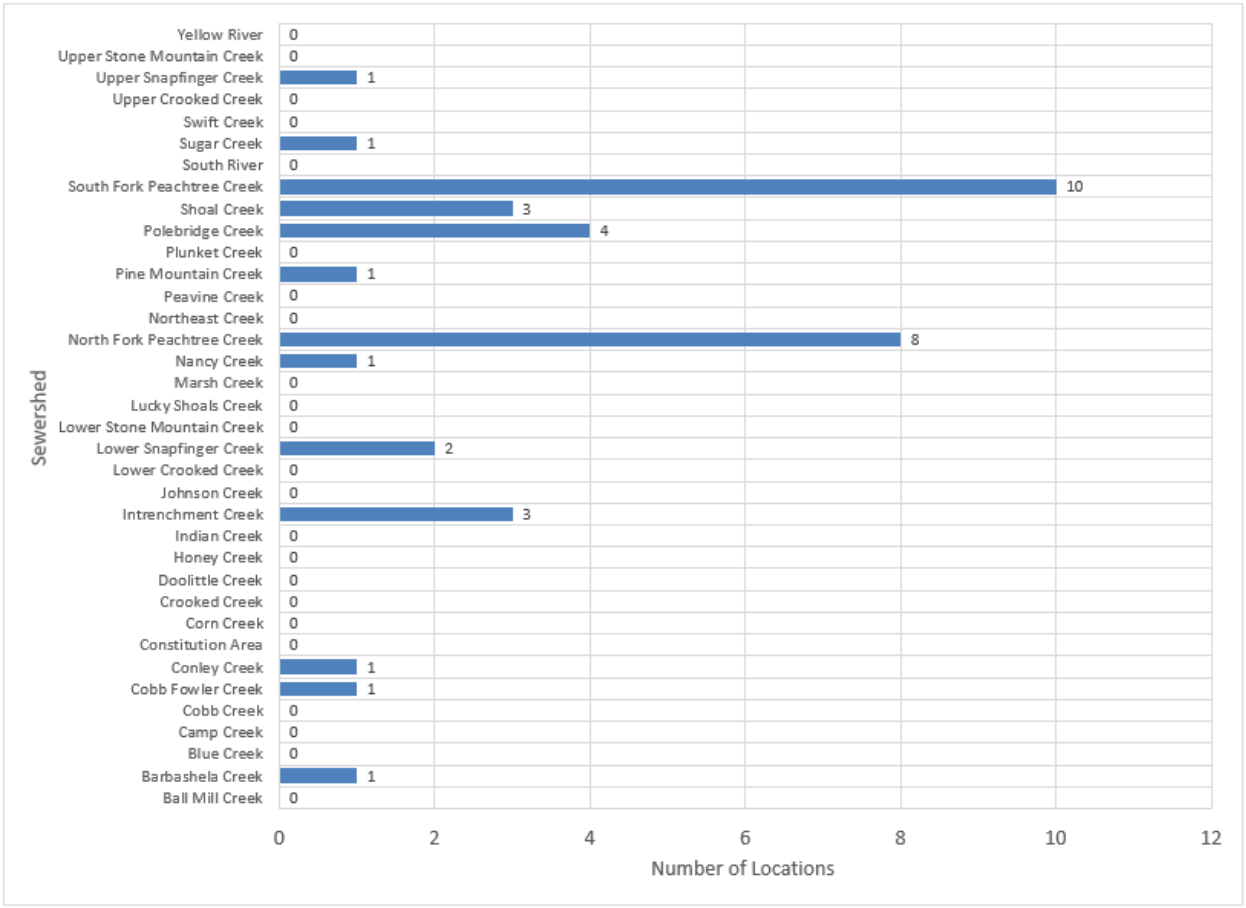


Figure 5-9 Number of Repeat Spills by Cause

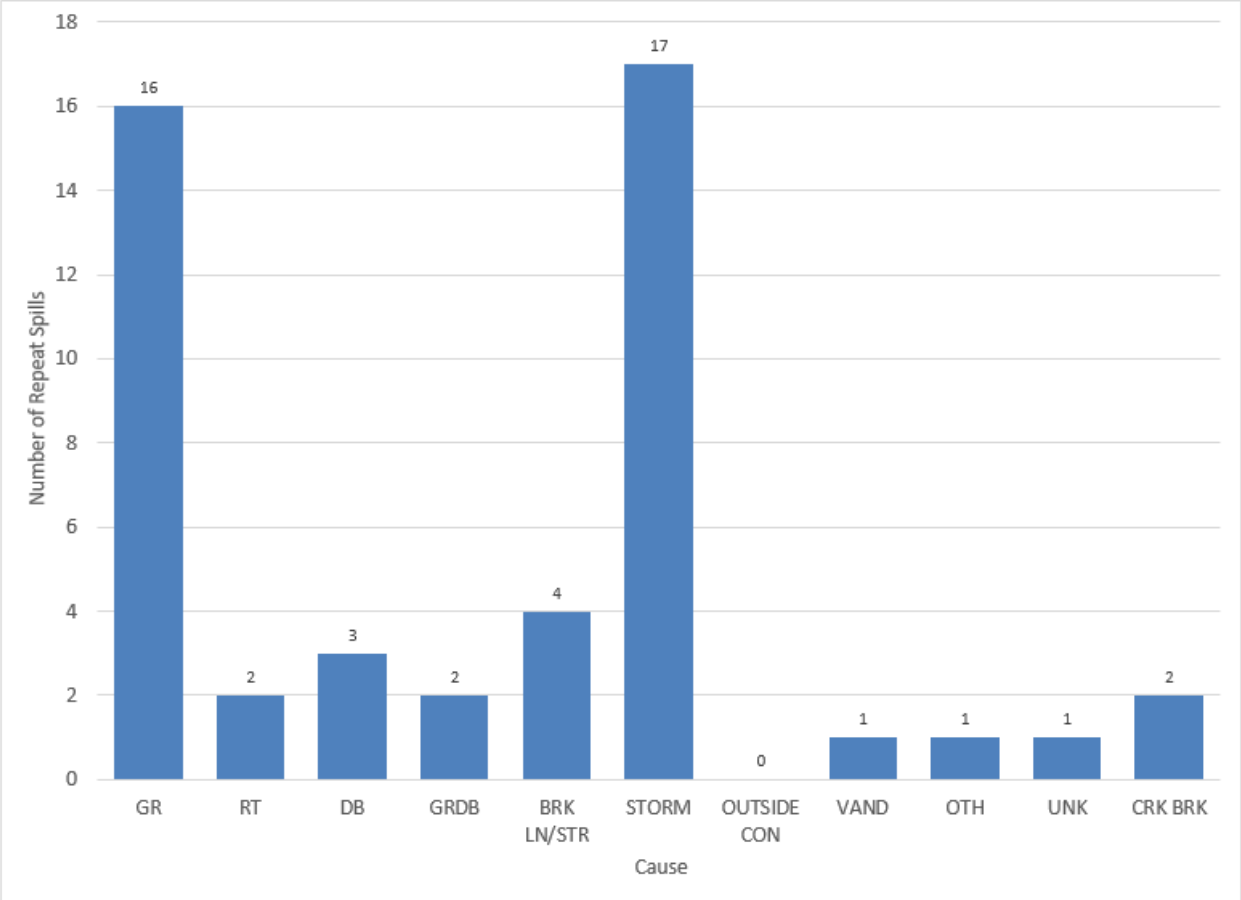


Figure 5-10 Repeat SSOs

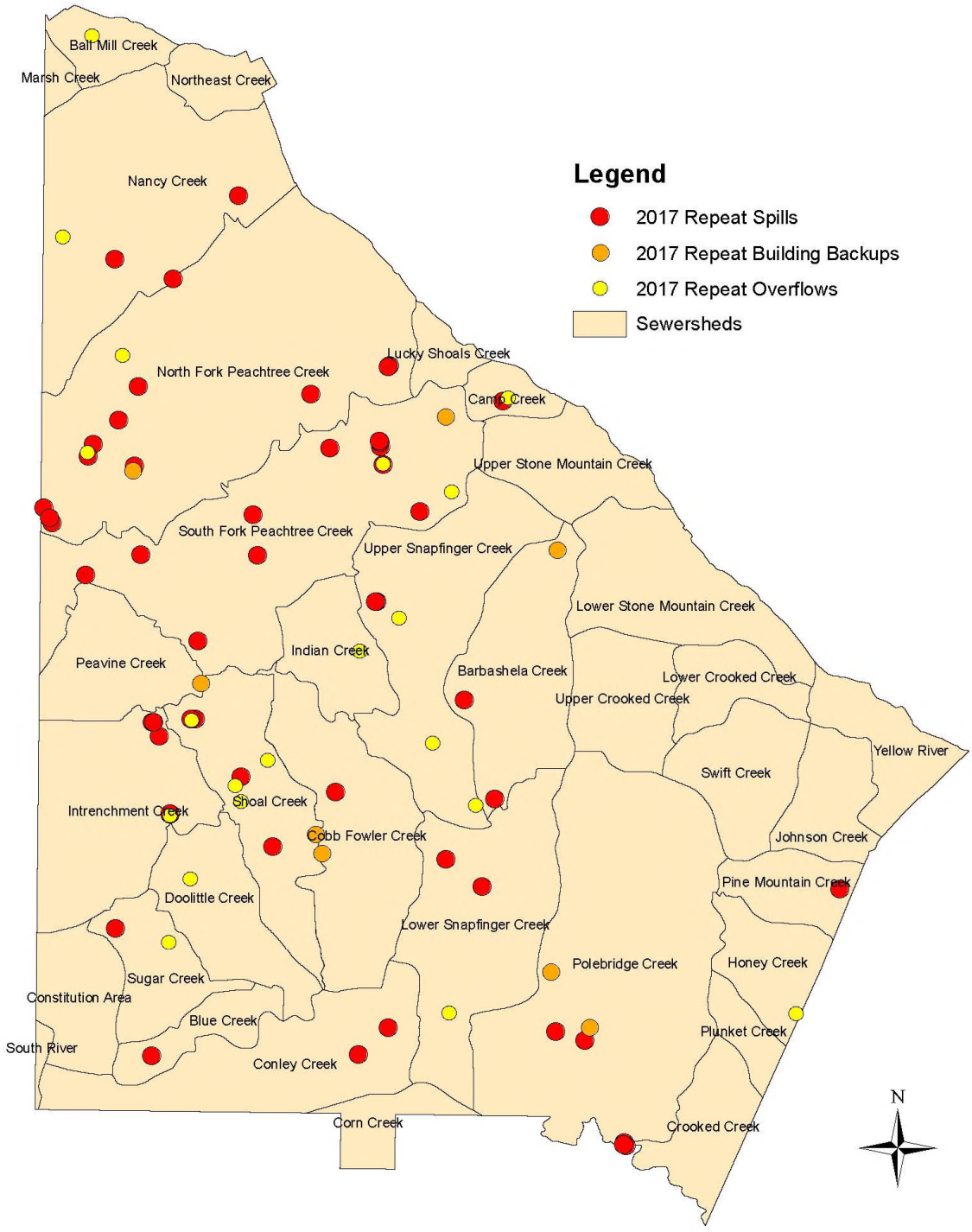
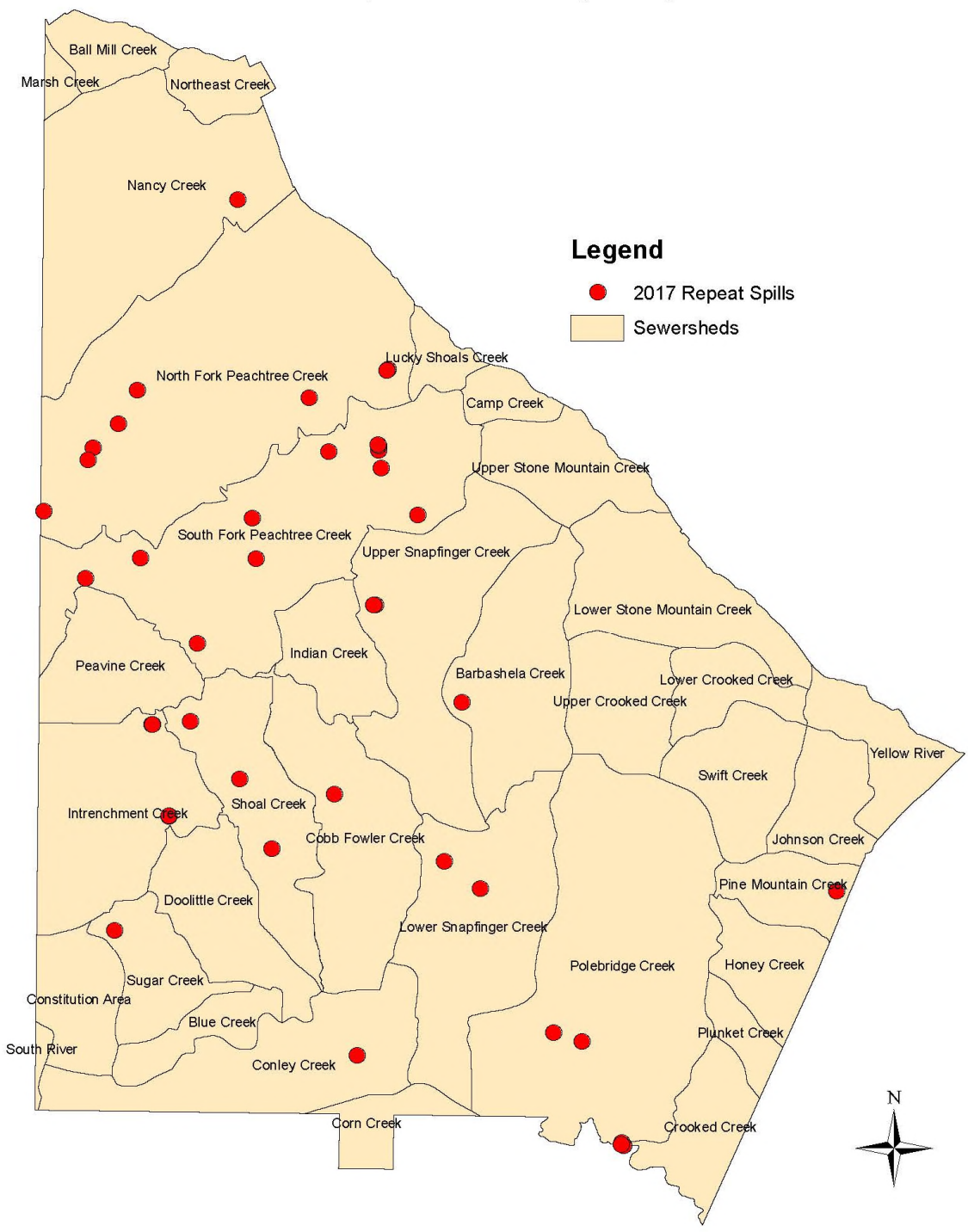


Figure 5-11 Repeat Spills



6. Summary

A summary of the trend analysis presented in this report is provided below:

- Downward trend for the number of SSOs per year during the period of record (2012–2017), which can be attributed to maintenance programs including sewer cleaning, the FOG program, and extensive public education campaigns (Figures ES-1 and 2-1).
- Increase in spill from 2016 to 2017, which can be attributed to the following factors:
    - 36 percent increase in rainfall from 2016 to 2017 (Figure 2-2).
    - County's increased accuracy in identifying SSOs through increased inspection of stream banks and creek crossings, putting resources in the field in remote locations that are generally out of sight, and new stream sampling protocols.
    - Less sewer cleaning occurring in 2017 than in 2016.
- The average SSO duration for the last 6 years is approximately 4.8 hours (Figure 3-1).
- Grease is the most common cause of SSOs and accounts for 45 percent of the SSOs occurring from 2012 to 2017. During this same period, grease accounted for 14 percent of the estimated volume of SSOs (Figure 4-1).
- The number of SSOs caused by grease has declined from 175 in 2012 to 122 in 2017 (Figure 4-4).
- SSOs caused by sewer line breaks occur less often than SSOs attributed to other causes but account for more SSO volume, especially in 2017 because of two large SSOs (Figures 2-7 and 4-1).