City of Winston-Salem

Stormwater & Erosion Control Division

Permit Number: NCS000247

FY 2014 – 2015

Stormwater Management Plan

November 2014

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1. STORMWATER MANAGEMENT PROGRAM OVERVIEW

MISSION STATEMENT

The mission of the Stormwater Management Program is to restore, protect, and preserve the surface waters within the City of Winston-Salem and to maintain, repair, map, and evaluate drainage systems within the street right-of-ways.

PROGRAM DESCRIPTIONS

Stormwater Monitoring and Administration

- Manages the day-to-day operations of the Stormwater Management Program
- Implements the requirements of the City's Municipal Separate Storm Sewer System (MS4) permit
- Performs watershed master planning by developing maps and inventories of the entire drainage system within the City
- Monitors stormwater run-off as part of the program's efforts to improve water quality
- Provides educational programming to increase public awareness of water quality issues

Drainage Maintenance

- Repairs, replaces, and upgrades the City's drainage system within street right-of-ways
- Provides for drainage system repairs on private property through the 70/30 program in which the City covers 70 percent of the cost for qualified projects
- Removes debris from culverts and bridge abutments with many streams and creeks

Erosion Control

- Provides for the enforcement of regulations pertaining to land-disturbing activity, watershed and floodplain requirements by reviewing development plans and issuing grading permits for all commercial and multi-family sites over 10,000 square feet in all areas of Forsyth County, excluding Kernersville
- Monitors single family construction sites to ensure that sediment is controlled
- Identifies tree save and potential critical areas, controls sedimentation, and limits the time of exposure on all applicable construction sites through plan review and field inspection
- Maintains up-to-date floodway district maps to enforce floodway and floodway fringe regulations contained in the Unified Development Ordinance
- Reviews survey and plan information and conducts field inspections to ensure that permitted structures comply with floodplain regulations
- Enforces watershed regulations for density and impervious coverage on developed properties

STORMWATER MANAGEMENT PROGRAM
BUDGETARY INFORMATION FOR FY 2014 - 2015

	Actual	Budget	Proposed	Percent
EXPENDITURES BY PROGRAM	**FY 12-13**	**FY 13-14**	**FY 14-15**	**Change**
Monitoring and Administration				
Administration	$2,337,012	$2,311,210	$3,106,500	34.4%
Water Quality Monitoring	748,016	1,010,920	1,313,480	29.9%
Support for Seasonal Leaf Collection	1,304,096	1,681,150	1,733,330	3.1%
Subtotal	**$4,389,124**	**$5,003,280**	**$6,153,310**	**23.0%**
Drainage Maintenance	$1,622,265	$2,524,740	$2,606,070	3.2%
Erosion Control	$302,888	$328,880	$339,690	3.3%
Total Expenditures by Program	**$6,314,277**	**$7,856,900**	**$9,099,070**	**15.8%**

PERFORMANCE MEASURES AND SERVICE TRENDS

	Actual FY 12-13	Estimated FY 13-14	Projected FY 14-15
Effectiveness			
Achieve 91% collection rate of revenues for non-residential customers	92%	90%	90%
Achieve 92% collection rate of revenues for residential customers	88%	92%	90%
Respond to 100% of illicit discharge complaints by citizens within 24 hours	100%	100%	100%
Complete 100% of compliance schedules for water quality resolutions within 30 days	100%	100%	100%
Complete 100% of plan reviews within 10 days of receipt	100%	100%	100%
Provide 30 federally required educational programs a year	74	54	50
Ensure 100% of stormwater devices are built in accordance with approved plans	100%	100%	100%
Complete 90% of erosion control initial reviews within 10 days for development projects	100%	100%	100%
Keep 80% of active development sites in compliance (when inspected)	84%	82%	84%
Workload			
Number of pollution prevention inspections completed	45	25	30
Number of water quality samples taken	1,063	1,040	1,016
Number of catch basins cleaned	5,972	3,700	4,000
Linear feet of pipe installed	2,475	2,400	2,500
Number of new and redevelopment project plans reviewed yearly	43	50	57
Grading permits issued	69	60	65
Erosion control inspections conducted	4,349	5,300	5,400
Flood zone determinations conducted	59	50	55
Erosion investigations or inspections conducted on unpermitted sites	99	150	130
Notices of violation issued for Erosion Control	60	48	55

EXPENDITURES BY TYPE	Actual FY 12-13	Budget FY 13-14	Proposed FY 14-15	Percent Change
Personnel	$1,970,626	$2,399,150	$2,424,090	1.0%
Supplies and Services	2,619,520	3,351,950	3,602,070	7.5%
Subtotal	**$4,590,146**	**$5,751,100**	**$6,026,160**	**4.8%**
Capital Outlay	$0	$11,410	$0	-100.0%
Debt and Lease Expense	318,047	292,680	1,218,340	316.3%
Transfer to General Fund (Leaf Collection)	1,304,096	1,681,150	1,733,330	3.1%
Transfer to General Fund (Vector Control)	3,994	16,000	16,000	0%
Transfer to Solid Waste Disposal Fund	97,994	104,560	105,240	0.7%
Subtotal	**$1,724,130**	**$2,105,800**	**$3,072,910**	**45.9%**
Total Expenditures by Type	**$6,314,277**	**$7,856,900**	**$9,099,070**	**15.8%**

RESOURCES BY TYPE	Actual FY 12-13	Budget FY 13-14	Proposed FY 14-15	Percent Change
Stormwater Fees:				
Residential	$4,097,076	$4,105,000	$4,105,000	0%
Non-Residential	6,096,691	6,195,000	6,195,000	0%
Replacement Fee	25,912	0	35,000	N/A
Miscellaneous Revenues	3,972	0	0	N/A
Interest Income	-43,791	0	0	N/A
Interfund Charges	2,640	2,500	2,500	0%
Forsyth County	39,562	87,760	88,700	1.1%
Erosion Control Revenues	115,139	106,900	124,600	16.6%
Total Resources by Type	**$10,337,202**	**$10,497,160**	**$10,550,800**	**0.5%**
Addition to Fund Balance	$4,022,925	$2,640,260	$1,451,730	-45.0%
Positions				**Change**
Full-Time	49	49	49	0

BUDGET HIGHLIGHTS

- The percentage share of expenses to be covered by Forsyth County in FY 2014-2015 for Erosion Control is increased from 38.1% to 43.0%. This is due to an increase of erosion control activity in the County.

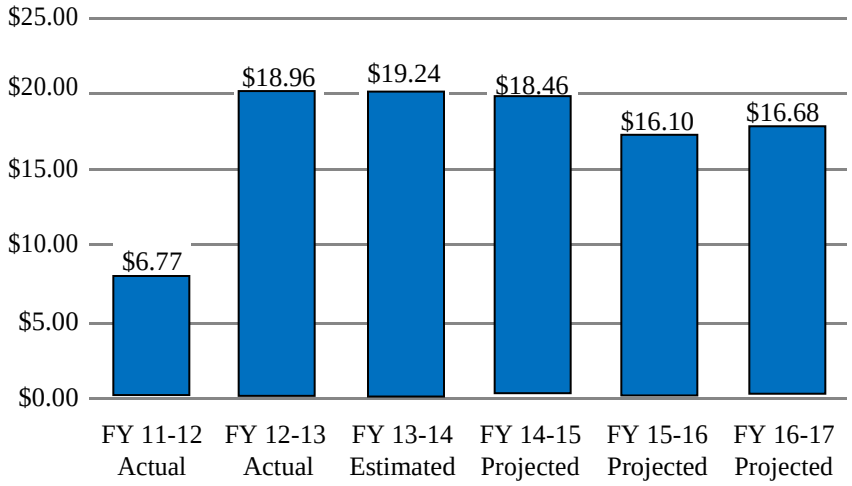
- Supplies and services are increased by $250,120 (7.5%). This is primarily due to an increase of $300,000 for stormwater control measure maintenance projects that will provide stormwater quality enhancements and stormwater quantity storage for commercial, private, institutional, and public properties. Reductions in revenue collections (-$21,740) and indirect cost allocation (-$42,940) help offset some of this increase.

- The proposed budget includes a net increase in debt and lease expenses of $925,660. The majority of this increase is for payments totaling $856,250 for revenue bonds issued in the spring of 2013. Also included are additional principal and interest payments for the replacement of a drainage vacuum truck ($76,500) and a crew truck ($7,650).

- Transfers to the general fund cover the cost of the City's seasonal leaf collection program ($1,733,330) and the City's vector control program ($16,000). The transfer to the solid waste disposal fund ($105,240) offsets the cost of management and disposal of household hazardous wastes including paints, pesticides, used oil, solvents, and other materials at risk for disposal in the stormwater system.

Long Range Financial Outlook

- The following chart provides a projection of the Stormwater Management fund balance. This outlook includes capital project expenditures, assuming all future projects are pay-as-you-go.



FY 13-14 Year-End Outlook

- The following table provides estimated year-end revenues and expenditures for stormwater management operations. Capital project revenues and expenditures are not included.

	Budget	**Estimated**
Operating Revenues	$10,497,160	$10,160,000
Operating Expenditures	5,751,100	5,067,760
Operating Income	**$4,746,060**	**$5,092,240**
Interest Income	0	813,630
Capital Outlay	(11,410)	(11,410)
Debt and Lease Expense	(292,680)	(1,150,270)
Transfer to General Fund	(1,697,150)	(1,523,040)
Transfer to Solid Waste	(104,560)	(104,560)
Net Income	**$2,640,260**	**$3,116,590**

2. STORM SEWER SYSTEM INFORMATION

2.1 Population Served:

Winston-Salem is located in the northwestern area of the Piedmont Region of North Carolina. Situated in Forsyth County, Winston-Salem is the fourth largest City in North Carolina and has an estimated population of 236,441 citizens.

2.2 Growth Rate:

The City of Winston-Salem increased its population size by 3.0 percent from April 1, 2010 to July 1, 2013, while the State of North Carolina grew at the rate of 3.3 percent during the same period. During the period of April 1, 2010 to July 1, 2012, Winston-Salem grew at the rate of 2.0 percent.

2.3 Jurisdictional and MS4 Service Areas:

The City of Winston-Salem does not have any ETJ areas at this time. The square mile area for the City is 132.4.

2.3a Latitude of Center of MS4 Area: 36 degrees. 06' 46"
Longitude of Center of MS4 Area: 80 degrees. 14' 37"

2.3b Storm Sewer Service Area (square miles): 132.4

2.4 Municipal Separate Storm Sewer System (MS4):

The City of Winston-Salem is authorized to discharge stormwater from its municipal separate storm sewer system (MS4) into the waters of the State of North Carolina. A National Pollutant Discharge Elimination System (NPDES) permit is the legal mechanism that allows the City of Winston-Salem to discharge stormwater runoff into streams. Appendix A is an electronic copy of the City's NPDES permit, which has the designation of NCS000247. All eight minimum measures, which govern the City of Winston-Salem's Stormwater Program, are contained within this permit.

The City of Winston-Salem is delineated into 17 different sub-watersheds that drain the City and its surrounding area. The streams within these sub-watersheds flow in a southwesterly direction into Lower Muddy Creek. Stormwater masterplans have been developed for the original fifteen watersheds within the municipal limits; currently, HDR Engineering is conducting stormwater inventory update assessments for the Upper and Lower Muddy Creek Watersheds. The objectives of masterplan efforts include: providing a comprehensive update of the existing storm sewer inventory (contained within public, private, and industrial properties), identify existing and future areas of flooding based on existing and future development patterns, and assess the impacts of stormwater discharges on the quality of Winston-Salem's streams. Information obtained from those plans show that Winston-Salem has approximately 538 miles of stormwater conveyance piping and 39,818 infrastructure devices, which includes catch basins and manholes.

2.4a MS4 maintenance activities:

Cave-in reports are responded to within 24 hours of knowledge of occurrence and simple repairs are completed within 72 hours. Maintenance activities include the following: catch basin inspection and cleaning – two, three-man crews inspect and clean catch basins on a daily basis; pipe repair – three drainage repair crews work on pipe repair,

replacement and upgrade projects as needed; ditching - performed as needed by contractors or in house crews; street sweeping – performed by contractor daily.

2.5 Land Use Composition Estimates:

The land use estimates below are from the City of Winston-Salem Planning Department:

Land Use Group	
Residential	72.44 %
Commercial	7.77 %
Industrial	9.39 %
Parks	3.90 %
Institutional	4.88 %
Mixed Use	1.04 %
Historic	0.11 %
Agricultural	0.45 %
TOTAL	**100.0%**

2.6 Estimate Methodology:

Classifications are based on zoning districts with the corresponding acreage versus the total acreage of the City of Winston-Salem. For this assessment, schools have been calculated as institutional purposes and parks are listed separately (typically included in the residential classification). Agricultural areas are zoned as *agricultur*e although the denotation is also used for large residential lots. Mixed Use is composed of residential and commercial used land.

2.7 TMDL Identification:

The N.C. Division of Water Quality (NCDWQ) has detected standard violations of turbidity and chlorophyll *a* at High Rock Lake, which is 25 miles south of Winston-Salem. A TMDL is currently being developed for High Rock Lake, which indirectly receives stormwater discharges from the City's MS4. The main contributing river to High Rock Lake is the Yadkin River, in which Muddy Creek discharges into near the Forsyth-Davidson County border. Muddy Creek flows partially within City limits; an approved TMDL requires a 58 percent reduction in total suspended solids loading from the City of Winston-Salem's MS4.

NCDWQ has designated the Salem Creek Watershed as biologically-impaired due to excessive fecal coliform pollution. The City of Winston-Salem's stormwater permit requires a 93 percent reduction of fecal coliform loadings from the MS4. As a result, the Stormwater Division continues to perform dry and wet weather water sampling to determine pollutant origin sources of fecal coliforms into Salem Creek. The City of Winston-Salem created and implemented a revised TMDL Implementation Plan, which encompasses 24 sampling sites and various BMPs in order to isolate and remove pollutant sources. Trend graphing of historical data has shown a slight, overall decrease in fecal coliform concentrations within the Salem Creek Watershed; however, statistical analysis has not proven a significant correlation between BMP implementation and pollutant reduction.

3. RECEIVING STREAMS

Major River Basin: Yadkin Pee-Dee

Name and Identification Number of the Primary Receiving Streams and Impoundments: The following inventory receives stormwater runoff from the MS4 jurisdictional area. All streams and impoundments are located within the Yadkin-Pee Dee River Basin.

Use Classifications:
WS-III: Water Supply Watershed
C: Aquatic Life Propagation and Biological Integrity and Secondary Recreation Purposes
I: Impaired
S: Supporting

Table 3.1 Yadkin-Pee Dee River Basin

Receiving Stream Name	Stream Segment	Water Quality Classification	Use Support Rating	Water Quality Issues
Clinard Lake	12-94-7-7	C	S	
Crystal Lake	12-94-7-6	C	S	
Dalton Pond	12-94-7-1-1	C	S	
Five Mile Branch	12-94-7-1	C	S	
Grassy Creek	12-94-7-3	C	S	
Jones Pond	12-94-7-1-2	C	S	
Leak Fork	12-94-7-4	C	S	
Little Creek	12-94-11	C	S	
Mill Creek	12-94-7	C	S	
Monarcas Creek	12-94-7-5	C	S	
Muddy Creek	12-94-(0.5)	C	I	TMDL approved for TSS reduction.
Ogburn Branch	12-94-7-2	C	S	
Pineview Lake	12-94-7-1-3	C	S	

Brushy Fork	12-94-12-6	C	S	
Brushy Fork Branch	12-94-12-6-1-1	C	S	
Burke Creek	12-94-12-9	C	S	
Fiddlers Creek	12-94-13-3	C	S	
Fishers Branch	12-94-12-2-2-(2)	WS-III;C	S	
Frazier Creek	12-94-12-6-1	C	S	
Hines Lake	12-94-13-2-1	C	S	
Kerners Mill Creek	12-94-12-2-(0.3)	WS-III	S	
Kerners Mill Creek	12-94-12-2-(1.5)	WS-III;C	S	
Leak Creek	12-94-13-7	C	S	
Lowery Mill Creek	12-94-12-3-(2)	WS-III;C	S	
Mallard Lake	12-91-1	WS-IV	S	
Myers Pond	12-94-12-5	C	S	
Perryman Branch	12-94-13-5	C	S	
Peters Creek	12-94-12-8	C	S	
Salem Creek	12-94-12-(1)	WS-III;C	S	
Salem Creek	12-94-12-(4)	C	I	TMDL approved for fecal coliform reduction.
Sawmill Branch	12-94-13-2	C	S	
Sides Branch	12-94-13-6	C	S	
Soakas Creek	12-94-13-4	C	S	
South Fork Muddy Creek	12-94-13	C	S	
Tar Branch	12-94-12-7	C	S	

4. EXISTING WATER QUALITY PROGRAMS

Local Programs

Water Supply Watershed Protection – The Salem Lake Watershed Protection Article is in place to provide regulations which protect drinking water quality in the Salem Lake Watershed. These regulations meet or exceed the minimum regulations established by the North Carolina Environmental Management Commission under the provisions of the Water Supply Watershed Protection Act of 1989.

Floodway and Floodway Fringe Regulations – Winston-Salem has adopted floodway and floodway fringe regulations in order to control alteration of natural drainage patterns, control development and to ensure stream velocities are not significantly increased.

Erosion and Sediment Control – The City has established a program as authorized by the North Carolina Sedimentation Pollution Control Act of 1973. The Erosion Control Ordinance regulates certain land disturbing activities to control accelerated erosion and sedimentation in order to prevent the pollution of water and other damage to lakes and watercourses.

NPDES MS4 Phase II Permit – The City was issued a new stormwater permit that became effective April 2013. Program components include public education and outreach, public involvement and participation, illicit discharge detection and elimination, construction site runoff controls, post-construction site runoff controls, and pollution prevention and good housekeeping for municipal operations.

Code Enforcement Section of the Neighborhood Services Division – Enforcement of the sanitation code relating to weeded lots, shrubbery, solid waste in yards and curbside trash. It also includes rodent control in the storm drainage system, sanitary sewers (manholes), and along creek beds.

Other programs that support water quality within the City of Winston-Salem:

1. Emergency Spill Response by Winston-Salem/Forsyth County Emergency Management Division
2. 3RC, a Household Hazardous Material Disposal Facility
3. Forsyth County Department of Health for failing septic tank systems
4. Adopt-a-Street by Keep WS Beautiful
5. Big Sweep of Streams by Stormwater Division and Keep WS Beautiful
6. Recycle Today, the City of Winston Salem's household recycling program
7. Sanitary Sewer System Maintenance by City/County Utilities
8. Vegetative material composting by the City's Sanitation Division

State Programs

- Basinwide Planning Program - created the Yadkin-Pee Dee River Basinwide Water Quality Plan, which includes the City of Winston-Salem.

- High Rock Lake TMDL Development – several staff members of the Stormwater Division serve on the technical assistance committee (TAC) as advisory members.

- Stormwater NPDES Permit Compliance – The City of Winston-Salem Stormwater staff collaborates with North Carolina Department of Mineral and Land Resources (NCDMLR), Winston-Salem Regional Office regarding industrial NPDES permit requirements, water quality enforcement issues, and ensuring NPDES permit compliance for municipal operations.

5. PERMITTING INFORMATION

5.1 Responsible Party Contact List

Contact Information	Plan Component	Delegated Responsibilities
Gregory M. Turner ACM/Public Works 336-727-2545 336-748-3060 (fax) gregt@Cityofws.org	Overall Administration	Delegated Signing Official for NPDES correspondence.
Keith D. Huff Stormwater Director 336-747-6962 336-747-6917 (fax) keithh1@Cityofws.org	Administration of Phase I Program Components	* Municipal facility inspection * Annual status report * Implement stream enhancement & stabilization projects * Overall implementation of Phase I program components
Charles Norton Assistant Stormwater Director 336-724-2422 336-747-6917 (fax) charlesn@Cityofws.org	Construction Site Runoff Controls MS4 Drainage & Infrastructure	* Responds to citizens' drainage complaints and facilitates 70/30 cost share projects on private property * Oversees Erosion Control Section
Roseann L'Esperance Community Educator 336-747-6960 336-747-6917 (fax) roseannl@Cityofws.org	Public Education & Outreach Public Involvement & Participation	* Participate with PTWQP to develop TV & radio spots * Website maintenance – keep current * Distribute educational information * Development of brochures, flyers * Presentations – at least 20/year * Participate in community events * Adopt-a-stream
Joe Fogarty Stormwater Engineer 336-747-6961 336-747-6917 (fax) josephf@Cityofws.org	Post-Construction Stormwater Site Runoff Controls	* Plan Review * Annual Stormwater BMP inspections * Oversees the implementation of drainage improvement projects
Andy Allen Special Projects Coordinator 336-747-6968 336-747-6917 (fax) andrewa@Cityofws.org	Preservation of Surface Waters & Capital Improvement Projects	* MS4 TMDL Program Coordinator * Responsible for the coordination of environmental assessment projects * FEMA grant applications for citizens * NPDES Program Evaluation Analyst * Project Manager for Stormwater CIPs
Lance Covington Civil Engineer 336-734-1318 336-747-6917 (fax) lancec@Cityofws.org	Capital Improvement Projects for the MS4	* Responsible for the oversight of all right-of-way drainage improvement projects within the City's boundaries * Responds to citizens' drainage complaints and facilitates 70/30 cost share projects on private property * Project Manager and Engineer for Stormwater CIPs
Jamal Clark Industrial/Municipal Compliance Officer 336-727-2729 336-747-6917 (fax) ladontac@Cityofws.org	Pollution Prevention for Municipal Goodhousekeeping & Industrial Facilities and Operations	* Pollution prevention inspections for municipal and permitted industrial facilities * Impervious surface area investigations * GIS watershed assessments * IDDE complaint investigations * Water quality stream sampling

John Spainhour Environmental Control Supervisor 336-747-6965 336-747-6917 (fax) johns@Cityofws.org	Illicit Discharge Detection & Elimination Water Quality Sampling	* Responds to illicit activity complaints * Dry and wet weather water sampling * IDDE field screening
Toneq' McCullough Transportation Director 336-734-1550 336-748-3370(fax) toneqc@Cityofws.org	MS4 Maintenance	* Inspect/clean catch basins * Repair storm pipes * Sweep curb & gutter streets * Implements drainage improvements within the City's right-of-way
Matthew Osborne Erosion Control Engineer 336-747-7453 336-727-2792 (fax) matthewo@Cityofws.org	Construction Site Stormwater Runoff Control	* Regulate certain land disturbing activities pursuant to the North Carolina Sedimentation Pollution Control Act of 1973. * Floodplain Management and Ordinance Enforcement * Assists in FEMA projects for creating grant applications
Johnnie Taylor Sanitation Director 336-747-6986 336-734-1224 (fax) johnniet@Cityofws.org	Seasonal Leaf Collection & Household Recycling Programs	* Removal of leaf matter and debris from curb and gutter system * Collection of household recycling program

5.2 ORGANIZATIONAL CHART

The Stormwater Division's organizational chart is enclosed in Appendix B, which is located at the end of this Stormwater Management Plan.

5.3 SIGNING OFFICIAL

The Winston-Salem City Council has authorized Mr. Gregory Turner, Assistant City Manager/Public Works Director, as the signing official and appropriate person to sign the permit application.

5.4 DULY AUTHORIZED REPRESENTATIVE

The permit application responsibility is not being delegated to another individual and/or position than the signing official.

6. CO-PERMITTING INFORMATION

Not applicable to the City of Winston-Salem. The City of Winston-Salem will not be co-permitting with any other Phase II community.

7. RELIANCE ON OTHER GOVERNMENT ENTITY

The City of Winston-Salem will not rely on another government entity for permit compliance. However, the City of Winston-Salem will pursue the collective sharing of resources and knowledge with other Phase II communities, as the need arises.

8. PUBLIC EDUCATION and OUTREACH

Objectives:

1. Distribute educational materials to the community.
2. Conduct public outreach activities.
3. Raise public awareness on the causes and impacts of stormwater pollution.
4. Inform the public on steps they can take to reduce or prevent stormwater pollution.

The following BMP tables represent a combination of on-going activities, as well as some innovative pilot projects designed to achieve NPDES compliance. The Stormwater Public Education and Outreach program has been in existence for several years and is designed to inform citizens, business owners, civic groups, and organizations about how they can make a difference to reduce stormwater pollution.

8.1. BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Describe target pollutants and target pollutant sources	• Total Suspended Solids • Fecal Coliforms • Nutrients • Oil & Grease	x	x	x	x	x	Community Educator
b	Describe target audiences	• Construction Site Operators • Homeowner Associations • Landscape Professionals • Automotive Repair Shops • Animal Hospitals/Shelters	x	x	x	x	x	Community Educator
c	Informational Website	• Quarterly Updates	x	x	x	x	x	Community Educator Marketing and Communication Section
d	Distribute Public Education Materials to Identified User Groups	• Homeowners • Commercial/Industrial Businesses • Turf grass professionals • Classrooms • Hispanic Community	x	x	x	x	x	Community Educator
e	Promote and Maintain a Stormwater Hotline	To report illicit activity and obtain information on volunteer opportunities	x	x	x	x	x	CityLink
f	Implement a Public Education and Outreach Program	• Informational posters • Targeted direct mail campaigns	x	x	x	x	x	Community Educator

		• Public meetings • Public events (Earth Day and other community events as identified) • Presentations to businesses, classrooms, and homeowner groups • Distribution of promotional give-a-ways • Distribution of 'new homeowner' information • Information on local cable access • 'Clean Streams' Turf grass Professionals training						

Best Management Practices (BMPs) for Public Education and Outreach:

8.2 Describe Target Pollutants, Sources, and Audiences: The Stormwater Division uses three resources in order to identify and target pollutants of concern within local waterways of Winston-Salem: regulatory requirements, fixed interval stream sampling, and historical illicit discharge detection and elimination reports. Regulatory requirements are derived from Total Maximum Daily Loads (TMDL) that the City of Winston Salem must reduce waste load allocations to Muddy and Salem Creeks (currently, the High Rock Lake TMDL is pending). For the Muddy Creek TMDL, the pollutant of concern is turbidity (i.e. TSS). Most probable sources of turbidity (TSS) loading include construction sites, in-stream channel erosion, and industrial sites. Fecal coliform is the pollutant of concern from Salem Creek Watershed. Bacterial source tracking (BST) confirmed that sanitary sewer overflows, pet waste, and wildlife populations contribute to fecal coliform pollution. Once the High Rock Lake TMDL is approved, nutrients will be target pollutants of concern. Fecal coliform and turbidity pollution degrades biotic integrity, thus impairing the reproduction cycle of aquatic life within streams.

The Stormwater Division performs quarterly, fixed interval sampling to determine pollutant exceedences (when compared to Water Quality Redbook Standards) within streams. Since samples are collected during various weather conditions (e.g. dry, first flush, descending portion of a hydrograph, etc.), an accurate assessment of target pollutants has been established. Since 2011, the Stormwater Division has observed City-wide trending sample data that consistently shows evaluated concentrations of numerous pollutants. These pollutants of concern consist of: turbidity (i.e. TSS), fecal coliform, and nutrients (i.e. total nitrogen, total Kjeldahl nitrogen, total phosphorus, and dissolved phosphorus). Probable sources of nutrient exportation include excessive residential and commercial fertilizer applications, sanitary sewer overflows, atmospheric deposition on impervious surfaces, industrial facilities, and commercial car-washing activities. Nutrient loading depletes available dissolved oxygen concentrations for aquatic life due to excessive algal blooms, thus impacting water resources.

Historical illicit discharge detection and elimination (IDDE) reports indicate that hydrocarbon oil and grease is the most frequently released pollutant of concern within the City of Winston-Salem. Latino automobile repair shops, wrecked automobile salvage facilities, nonpoint oil spills/leaks on public streets, industrial entities, and commercial car-washing operations are sources of oil and grease pollution. Oil and grease float on the stream surface and obstruct sunlight, which is needed by aquatic fauna and flora. In addition, hydrocarbon oil and grease damage riverine habitat and

sensitive spawning areas due soil adsorption. Since contaminated soil particles settle at the bottom of spawning beds, fish cannot reproduce and eventually, vanish from the stream.

The Stormwater Division has identified numerous audiences for public outreach and education activities due to their potential risk of releasing targeted pollutants. Homeowners use lawn care products, dispose of household hazardous waste, and have pets and performance vehicular maintenance on their cars. Programs/workshops, such as *Carolina Yards & Neighborhoods*, address fertilizer and pesticide usage and pet waste. Other materials have been developed to address household hazardous waste, automotive maintenance and volunteer opportunities. The Latino population is a growing segment within the City of Winston-Salem. General storm water pollution information has been developed for this demographic as well as translations of current outreach materials in order to mitigate oil and grease releases. School-age children participate in *Creek Crawls*, an in-stream learning-experience concerning water quality issues and the difference between healthy and impaired streams. The overall goal from extensive school-age children education is to influence adult behavior, thus eliminating pollution-enhancing practices. A Stormwater Inspector performs industrial inspections and assessments on prioritized, permitted facilities; these inspections concentrate on pollution prevention and good housekeeping measures, which curtail exposure of pollutants to rainwater. Commercial landscapers have an opportunity for pesticide credit after attending a Clean Streams Program and passing a test after the workshop (based on the nine principles of the Carolina Yards and Neighborhoods Program). Stormwater staff focuses on educational efforts with commercial carwash facilities and businesses that wash vehicles and equipment; staff provides a non-residential carwash fact sheet in order to curb illicit activities. Erosion Control staff performs face-to-face informal meetings to discuss and implement corrective measures for containing sediment on-site. In the near future, the Stormwater Division will work in collaborative efforts with the City/County Utilities Division in order to reduce sanitary sewer overflows and leaks.

8.3 Informational Web Site: The Stormwater Division operates and maintains an informative website in order to achieve a heightened awareness of stormwater-related issues and/or events. Information is updated every three months or upon a significant event or issue. The Community Educator promotes the website at presentations, media releases, or posting the web address on distributed public educational materials. Topics for web postings range from pollutant 'factoids' to public involvement opportunities.

8.4 Distribute Public Education Materials to Identified User Groups: The City of Winston Salem distributes public educational materials that directly relates to specific, targeted audiences. In collaborated efforts with the Piedmont Triad Water Quality Partnership, the City creates communicative information for ranked pollutants of concern, such as fecal coliforms, oil and grease, sediment (i.e. total suspended solids), and nutrients. Educational materials (and opportunities) include brochures (paper and electronic), presentations, TV advertisements, workshops, community events, and targeted mailings. In order to ensure the maximum educational effectiveness, the City correlates the informative technique to the targeted audience. For example, best management practices brochures are written in Spanish for Latino automobile repair shops.

8.5 Promote and Maintain a Hotline/Helpline: In 2005, City Council commissioned the creation and implementation of a centralized telephone call center/web-based complaint hotline for the citizens of the City of Winston-Salem. Known to the public as CityLink, this communication center receives citizen-generated e-mails or telephone calls regarding stormwater-related items illicit within the City. The public can access CityLink on the City of Winston-Salem's

homepage of http://www.cityofws.org/departments/city-link; it appears on the bottom portion of the website. The Community Educator receives electronic notifications for presentation requests from CityLink or directly from website requests. Illicit discharges are received through the Stormwater Pollution Hotline (336-747-7480), which is operated by CityLink. The Stormwater/Sediment and Erosion Control Division has publicized its contact information on the City of Winston-Salem's main webpage. Once on the City's homepage, a citizen can locate staff member's name, e-mail address, and telephone number within four clicks of a computer mouse.

8.6 Public Education and Outreach Task Items for FY 2014 – 2015

1. The City of Winston-Salem will participate in collaborative efforts with the Piedmont Triad Water Quality Partnership (a consortium of 18 local governments) for continued educational awareness at local venues (e.g. Minor League baseball games).
2. Continue to air stormwater educational 'commercials' on Channel 13 (local access)
3. The City of Winston-Salem will coordinate and participate in the 2015 Forsyth Creek Week
4. The Stormwater Division will intensify resources regarding its Pet Waste Campaign. A social media blitz will be performed through various Internet resources.
5. Continue to perform stormwater educational presentations within the Winston-Salem/Forsyth County School system. Examples of these presentations include: Mudpuppy Pond, the use of an Enviroscape, and/or games such as Drippial Pursuit or Macroinvertebrate Mayhem.
6. Ensure that all new, pertinent municipal employees will view the stormwater orientation video and received a copy of the handbook, *Stormwater Runoff: Municipal Good Housekeeping and Pollution Prevention*.
7. In addition to community programs for Forsyth Creek Week, the Stormwater Department will participate in the following six volunteer events:
    a. Big Sweep
    b. Southeast Community Day
    c. Operation Medicine Drop
    d. The Great American Clean-up
    e. Richmond Elementary School Earth Day Fair
    f. Earth Day Fair
8. Distribute informational bookmarks through the Forsyth County Library system
9. Distributed informational brochures to the Latino community regarding through rental management offices at targeted locations.
10. Perform community presentations regarding the City of Winston Salem's fecal coliform and turbidity TMDLs.
11. Distribute informational handouts regarding pet waste throughout various locations.
12. Have citizens commit to *Scoop-the-Poop* by signing pledge cards.
13. Distribute informational handouts at numerous local real estate offices for new homeowner packets
14. Perform a targeted mailing to local lawn care businesses
15. The Stormwater Division will continue to be a sponsor of the annual Big Sweep event.
16. Assess educational activities for quantifying the level of increased public awareness
17. Create and distribute BMP information to Latino-owned/operated car washes and automotive repair businesses.
18. Explore the potential of posting water quality sampling data on the City's website; have data geospatially referenced.
19. Assess and update the commercial car washing/repair pollution reduction program; distribute informative literature to point-of-purchase vendors.

9. PUBLIC INVOLVEMENT and PARTICIPATION

Objectives:

1. Provide opportunities for the public, including major economic and ethnic groups, to participate in program development and implementation.

The permittee shall implement the following BMPs to meet the objectives of the Public Involvement and Participation Program:

9.1 BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Volunteer Community Involvement Program	Please reference BMPs #2 through #5 below.	x	x	x	x	x	Stormwater Director Community Educator
b	Establish a Mechanism for Public Involvement	• Stormwater Appeals Board • Monthly Public Works Committee Meeting (City Council)	x	x	x	x	x	Stormwater Director Community Educator
c	Establish Hotline/Helpline	To report polluters	x	x	x	x	x	Community Educator
d	Establish a Mechanism for Public Involvement	• Stormwater Appeals Board • Monthly Public Works Committee Meeting (City Council)	x	x	x	x	x	Stormwater Director Community Educator
e	Public Notice	Public notice requirements for soliciting feedback from the community as well as establishing transparency and accountability to the public.	X	x	x	x	x	Citizens Stormwater Director Community Educator

9.2 Volunteer Community Involvement Program: The City of Winston-Salem has implemented following programs to various degrees in order to promote volunteer opportunities and ongoing citizen participation for FY 2014 - 2015:

- Creek Week: Is a week-long series of events geared to engage the public and support water quality awareness. Events included Enviroscape presentations, classrooms in the creek, Facebook photo contests, Rain Barrel workshops, Creek Week craft time and other interactive program elements. Creek Week occurs in March and is organized by a committee of municipal, county, and non-profit organizations.
- Creek Crawls: Are held with local school classes were the students visit a nearby creek to examine the water quality of the stream using water quality test kits. Benthic macroinvertebrates are collected, examined, and discussed as to form an overall assessment of the water quality of the selected stream. Students are taught to collect water samples and to identify the macroinvertebrates collected based on provided keys as part of this 'hands on' approach.
- Buffer in-a-Bag program: This campaign is targeted to residents with creeks or streams in their yard. To reduce sedimentation of urbanized stream channels, the City of Winston-Salem in cooperation with the Forsyth Cooperative Extension, provided a workshop to

train land owners with creeks on their property how to install and maintain riparian vegetation.

- Adopt-a-Stream: Homeowner associations, companies, special interest groups, families or other interested parties can request to Adopt-A-Stream in their area of interest. Interested parties will commit to conducting two clean-ups per year and the City will provide signage and debris removal after each cleanup.
- Adopt-a-Park: Homeowner associations, companies, special interest groups, families or other interested parties can request to Adopt-a-Park in their area of interest. Interested parties will commit to conducting two clean-ups per year and the City will provide signage and debris removal after each cleanup.
- Adopt-a-Street: Homeowner associations, companies, special interest groups, families or other interested parties can request to Adopt- a-Street in their area of interest. Interested parties will commit to conducting two clean-ups per year and the City will provide signage and debris removal after each cleanup.
- Big Sweep is conducted every year in October for removing trash and debris for local waterways.
- Storm Drain Marking: Volunteer groups place adhesive punks and 'No Dumping, Drains to Creek' markers on catch basins and other drainage structures within the community. Volunteer groups situate door hangers that contain stormwater education material informing citizens about fertilizer use, pet waste and illegal dumping within targeted neighborhoods due to the number of reoccurring complaints.

9.3 Establish a Mechanism for Public Involvement: The City of Winston-Salem has three main mechanisms for public input on stormwater issues and input on the stormwater management program: City Council Committee meetings, Stormwater Appeals Board and the City Link "suggestion and comment" service. The City Council has established committee level meetings that citizens are invited to attend to discuss any topic including stormwater management issues. The City Council committee that hears citizen input on stormwater management issues is the Public Works Committee. Public Works Committee meetings are advertised on the City's website and are held the second Tuesday of every month. The Stormwater Appeals Board has been created to hear appeals if an owner, developer, engineer or other party disagrees with the decision of staff. City Link has instituted a citizen "suggestion and comment" service request that allows any citizen to make a suggestion or comment which relates to the Stormwater Management Program. These suggestions or comments are forwarded to the Department Head for review and action, if necessary.

9.4 Establish Hotline/Helpline: The City of Winston Salem has an established stormwater hotline that is attended by City Link staff, from 7:00 a.m. to 7:00 p.m. weekdays, 9:00 a.m. to 5:30 p.m. weekends and all holidays with the exception of New Year's Day, Thanksgiving Day, and Christmas Day. City Link refers all illicit discharge complaints to Stormwater staff, who will investigate these reports within 24 hours.

9.5 Public Review and Comment: Copies of this City Stormwater Management Plan are available for public comment on the City's website located at www.stormwatersmart.com.

9.6 Public Notice: The City of Winston-Salem will comply with applicable public notice requirements when implementing a public involvement and participation program. Compliance with 40 CFR 122.34 is achieved by working with the City Secretary's Office, Marketing and Communications and the Community Assistance Specialist for scheduling, advertising and posting public meetings.

9.7 Public Involvement and Participation Task Items for FY 2014 - 2015

1. The Stormwater Division will continue to sponsor the City's Adopt-A-Stream program; targeted watersheds for clean-up include Salem Creek, Mill Creek, Silas Creek, Peters Creek and Salem Lake watersheds. The Stormwater Division greatly appreciates its volunteers that contribute to the Adopt-A-Stream program!
2. The Stormwater Division will sponsor area workshops; attendees will receive free riparian buffer kits while supplies are available (which includes five each of four different species for a total of 20 live stakes per a kit).
3. The City will offer stormwater drain placards to civic organizations for denoting the connectivity of conveyance systems to local waterways.
4. Informative door hangers will be offer to volunteers for achieving a heightened awareness of how citizens can protect and improve water quality in their neighborhoods.
5. The Stormwater program website is continually updated with information for citizens. Currently, the Division's emphasis includes the opportunity for residents to pledge on-line to *Scoop the Poop*.
6. Local students can participate in *Creek Crawls*, a volunteer program for removing trash and debris from streams.
7. Business representatives and citizens attend monthly Public Works Committee Meetings in order to participate in the stakeholder process. The Public Works Committee invites citizens to participate in these discussions and agendas are posted on the City's website. In addition, the City Council has created Stormwater Appeals Board, which makes decisions of various ordinances.
8. Post-construction Stormwater Control Ordinance training and education sessions for engineers and developers continue on an individual basis after adoption of the City's Post-construction Stormwater Control Ordinance.
9. Publish major NPDES permit components on the Stormwater Division's webpage for soliciting public feedback.

10. ILLICIT DISCHARGE and ELIMINATION

Objectives:

1. Detect and eliminate illicit discharges, including preventable spills and illegal dumping into the municipal separate storm sewer system (MS4).

2. Implement appropriate enforcement procedures and actions.

3. Maintain a map showing the permittee's major MS4 outfalls to state waters receiving discharges.

4. Inform employees, businesses, and general public of hazards associated with illegal discharges and improper disposal of waste.

5. Prohibit illicit connection(s)

10.1 BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Maintain Appropriate Legal Authorities	If warranted, a Notice of Violation (NOV) is issued with required compliance measures and due date. NOV is tracked by designated staff until final resolution is achieved. Enforcement actions are described in Section 75-11 of the IDDE Ordinance.	x	x	x	x	x	Environmental Control Supervisor Engineering Technicians
b	Maintain a Storm Sewer System Base Map	The City of Winston-Salem has hired a consultant for outfall identification and creation of a comprehensive stormwater system inventory. Staff updates the City's GIS major outfall database, as needed.	x	x	x	x	x	Stormwater Director Industrial/Municipal Compliance Officer
c	Inspection/Detection Program to Detect Dry Weather Flows to MS4 Outfalls in Targeted Areas	Written standard operating procedures were established in April 2006 and revised in July 2011. Illicit discharges or connections are permanently removed from the MS4 in accordance with the City's IDDE Ordinance.	X	X	X	X	X	Environmental Control Supervisor Engineering Technicians
d	Employee Training	All current and new municipal employees, which are not administrative positions, are required to review a web-based power point presentation and booklet regarding IDDE detection and reporting.	X	X	X	X	X	Community Educator City Employees
e	Maintain a Public Reporting Mechanism	The public can assess the City's Homepage, Citizen Service Request webpage, or CityLink and provide notification of illicit discharges to the Stormwater staff.	x	x	x	x	x	CityLink Environmental Control Supervisor Engineering Technicians
f	Documentation	Stormwater staff records IDDE activities, which includes date, time, investigative findings, NOVs, and completion letter within an internal Excel database.	x	x	x	x	x	Environmental Control Supervisor Engineering Technicians

Best Management Practices (BMPs) for Illicit Discharge Detection and Elimination:

10.2 Maintain Appropriate Legal Authorities: The City of Winston-Salem has an illicit discharge, connection, and disposal ordinance that regulates the introduction of illegal pollutants to the City's MS4 and receiving streams. The stormwater staff is adequate to provide enforcement actions, as per the existing ordinance. The adopted ordinance has an enforcement section that provides for notice of violations and civil penalties. One can reference the City's Stormwater Illicit Discharges and Connection Ordinance, Chapter 75, at: ARTICLE I. ILLICIT STORMWATER DISCHARGES AND CONNECTIONS

10.3 Maintain a Storm Sewer System Base Map: Inventories of the initial fifteen watersheds have been completed. A consultant is in the process of revising all watershed master plans as well as stormwater sewer system inventories for the annexed areas of the City of Winston-Salem. The inventory is accessible as a GIS layer and amended from submitted new development as-built plans and 'in-the-field' surveyed locations. For FY 2014-2015, Muddy Creek Watershed has been scheduled for a major outfall and stormwater system inventory update.

10.4 Inspect/Detect Dry Weather Flows at MS4 Outfalls in Targeted Areas: Illicit discharge detection and elimination procedures are contained within the Stormwater Division's Sampling Manual, which is located on the filing cabinets in Room 53 (storage area on the ground floor). The Center of Watershed Protection and Mr. Robert Pitt published a guidance manual for program development and technical information regarding illicit discharge detection and elimination (IDDE). When compared to the IDDE manual created by the Center of Watershed Protection, the Stormwater Division's standards of operating procedures were very similar. Instead of expending City resources to create its own manual, the Stormwater Division adopted Chapters 11, 12, and 13 from the Center of Watershed Protection's IDDE technical manual.

10.5 Employee Training: The Stormwater Division has created and distributes a web-based power point presentation and booklet to all current and new municipal employees (pertinent field staff) in order to increase the success rate of detecting illicit discharges to the MS4/receiving waters.

10.6 Establish a Public-Reporting Mechanism: Citizens may call the stormwater hotline or use the CRM system to report illicit discharges, connections, and disposal within the City's limits. All pertinent information regarding reporting procedures is posted on the City of Winston-Salem's website, www.Cityofws.org and the Stormwater Division's homepage, www.stormwatersmart.com. The public can call (336)747-7480 to report illicit discharges, spills, or connections for Stormwater staff to perform investigative activities.

10.7 Documentation of IDDE Activities: When staff investigates an illicit discharge activity, a discharge report is developed and filed by the investigating staff member, regardless of the outcome. If an illicit activity is discovered, staff prepares a Notice of Violation (NOV), as per the requirements of Chapter 75-11 of the City Code. The NOV is sent to the violator(s) via registered or certified mail. The NOV clearly states the violation, as well as any abatement activities required by the City. Upon successful completion of abatement activities by the violator, a notification is sent that the illicit activity has been resolved. Staff records all electronic and hardcopies of all correspondence, photos, mapping, civil penalty assessments, and sampling results pertaining to the IDDE activity for future reference.

10.8 Illicit Discharge Detection and Elimination Task Items for FY 2014 – 2015

1. Mapping updates to the storm sewer drainage system continue from initial efforts conducted in the prior permit years. A contracted consultant has commenced for survey activities of the stormwater collection system (including major stormwater discharge outfalls) for Muddy Creek Watershed. Basin tracing models have been incorporated into the geodatabase to allow staff the ability to track illicit discharges to their sources. Outfalls are being identified and field-screened as part of this process.
2. Staff will continue to detect and eliminate illicit discharge situations and issue corresponding Notice of Violations.
3. As part of the masterplan inventory update, stormwater outfalls will continued to be investigated and screened for the presence of pollutants.
4. As part of the City's Good Housekeeping and Pollution prevention programs, new City employees will be trained to identify illicit discharges and how to report them.
5. CityLink takes illicit discharge calls and within 24 hours, Stormwater staff will investigate all received complaints.
6. Stormwater staff performs quarterly, fixed interval sampling at 13 locations throughout Winston-Salem for the following perimeters: BOD, TSS, TDS, Turbidity, Cd, Cr, Ni, Pb, Total & Dissolved Cu, Total & Dissolved Zn Total & Dissolved P, NO2, NO3, TKN, and fecal coliforms. Staff anticipates collecting in approximately 2,000 certified lab results; roughly 1,000 samples will be collected within the Salem, Brushy, and Peters Creek Watersheds.
7. Staff anticipates stream-walking almost 25 miles within creeks, in which approximately half of the total distance will be evaluated for illicit discharges/connections within the Salem, Brushy, and Peters Creek Watersheds. Appendix E contains the proposed stream segments that will be assessed for FY 2014 – 2015 by Stormwater staff.
8. Staff will use instanteous multiparameter meters, in conjunction with portable Chemet sampling kits for early detection of sanitary sewer overflows and failing septic systems.
9. Staff will continue to issue Notices of Violations for resolving all illicit discharge investigations and successful removal from the MS4.
10. Assess and update (if needed) the Illicit Discharge Detection and Elimination Handbook for determination of accepted staff protocols and procedures.
11. Record the number of detected sanitary sewer overflows by Stormwater staff and reported to Utilities Construction and Maintenance Section.

11. CONSTRUCTION SITE RUNOFF CONTROLS

Objectives:

1. Reduce pollutants in stormwater runoff from construction activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development.

2. Provide procedures for public input, sanctions to ensure permit compliance, requirements for construction site operators to implement appropriate erosion and sediment control practices, review of site plans which incorporates consideration of potential water quality impacts, and procedures for site inspection and enforcement of control measures.

3. A locally delegated program that meets or exceeds the state requirements covering the jurisdictional area of the permittee complies with the required minimum of this section.

4. The City of Winston-Salem has been delegated by NCDENR to establish a local erosion and sedimentation control program to administer the Sedimentation Pollution Control Act of 1973; stormwater NPDES permit requirements will be fulfilled using this existing program. Plan review, plan approval and permits are required for any land disturbing activity that is equal to or greater than 20,000 square feet in surface area for development of a single-family dwelling, 10,000 square feet on any land disturbing activity for any other purpose, and for those single-family residential sites under 20,000 square feet, an executed erosion control affidavit stipulating minimum measures to prevent off-site sediment is required of the permit holder.

11.1 BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION / PARTY
a	Erosion and Sediment Control Program	Local program mandates NCDENR approved sediment & erosion control practices for construction activities disturbing more than 20,000 ft2 for single-family construction or 10,000 ft2 for any other purpose, plus a single-family residential program.	X	X	X	X	X	Erosion and Sediment Control Engineer Erosion Control Inspectors
b	Plan Review Process	Local program adheres to regulations and requirements of the Sedimentation Pollution Control Act of 1973 and current NCDENR BMP construction standards.	X	X	X	X	X	Erosion and Sediment Control Engineer Erosion Control Inspectors
c	Field Inspections, Complaint Response, and Enforcement Procedures	On-site inspections are conducted once per three weeks; on average, each inspector has 50 sites. In addition, staff responds to all received complaints within 48 hours of first knowledge. Article 5 of the City's Unified Development Ordinance includes Civil Penalty, Injunctive Relief, Stop Work Orders, and Restoration.	X	X	X	X	X	Erosion and Sediment Control Engineer Erosion Control Inspectors

d	Notify the responsible City Divisions that have enforcement capabilities in order to eliminate construction site wastes from entering the MS4 and/or Waters of the State	Building Inspectors and Erosion Control Section ensure construction debris and trash removal from sites. Off-site sediment release enforcement measures are levied by the Erosion Control Section. Any other pollutants that enter the MS4 or Waters of the State are resolved by the Stormwater Division.	X	X	X	X	X	Stormwater/ Erosion Control Division Building Inspections Section
e	Educational and Training Materials	* Erosion Control Personnel distribute educational pamphlets illustrating proper pollution controls methods and devices. *Inspectors conduct on-site and in-office educational seminars with contractors, designers and the general public. * Information is provided on-line	X	X	X	X	X	Erosion Control Section Staff
f	Public Information	* City Link-web-based computer program and phone line that citizens and City employees can report off-site sedimentation issues/complaints *STOPMUD Hotline – staff responds to complaints with 48 hours of first knowledge * City Website – publicized contact information of Erosion Control staff, which includes telephone numbers and email addresses.	X	X	X	X	X	NC Division of Land Resources CityLink Marketing & Communications Section

Best Management Practices for Construction Site Runoff Controls:

11.2 Erosion and Sediment Control Program: The Sediment and Erosion Control Section of the City of Winston-Salem's Stormwater/Erosion and Sedimentation Control Program require erosion and sediment control measures at construction sites. Article V of the Unified Development Ordinance (Chapter C) regulates land disturbing activities within Forsyth County's boundaries (this includes the City of Winston-Salem). For additional information regarding the City's Sediment and Erosion Control Ordinance, please visit this link: Article V Erosion Control.

11.3 Develop Requirements for Construction Site Operators: Article V of the Unified Development Code, Section 5-7(G) and 5-16.1 states that no person shall undertake any land disturbing activity without first obtaining a permit from the Director. Section 5-16.2 states that any area exceeding 20,000 square feet in surface area on one tract for construction of a single-family dwelling or 10,000 square feet on one tract for any other purpose must be permitted. To be permitted, Section 5-18.7 mandates the creation and submittal of a development plan and Section 5.8 provides the design standards criteria of erosion and sedimentation control measures, structures, and devices to be reviewed, approved, and installed.

Three City Divisions monitor and eliminate construction site wastes from adverse impacts to water quality. The Building Inspections Section requires construction solid waste (for example: wood, sheet rock, concrete truck washout, etc.) to be placed in trash receptacles and disposed at an appropriate facility. Off-site sediment recovery and maintenance of erosion control structures

are regulated and enforced by the Erosion Control Section. Any other pollutants that are directly (or indirectly) discharged, disposed, or illicitly-connected to storm drain systems (public or private-owned) or to Watercourses and Waters of the State, which are located within the City limits and any of the City's extra territorial jurisdictions, are monitored and enforced by the Stormwater Division.

11.4 Educational and Training Materials for Construction Site Operators: Erosion Control Inspectors perform on-site and in-office educational discussions with licensed contractors, designers and developers, as per service requests and/or issuance of violations. These educational discussions are very interactive and personal. Historically, Inspectors have distributed approximately 1,500 educational pamphlets to construction site operators per a fiscal year, on average.

11.5 Plan Reviews: When finalized, development plans are submitted to the City of Winston-Salem for permit approval of land disturbing activities; Erosion Control staff determines regulatory compliance in accordance with the Sedimentation Pollution Control Act of 1973. As a result, sediment control devices for construction activities are evaluated for capture of 75 percent of the 40 micron particle and larger.

11.6 Public Information: In 2005, City Council and the City Manager commissioned the creation and implementation of a centralized telephone call center/web-based complaint hotline for the citizens of the City of Winston-Salem. Known to the public as CityLink, this communication center receives citizen-generated e-mails or telephone calls regarding illicit activity within the City or County. The public can access CityLink on the City of Winston-Salem's homepage of www.Cityofws.org.; it appears on the bottom portion of the website. The Erosion and Sediment Control Section has been integrated into the CityLink system and implemented a 72 hour response time of first knowledge.

The Sediment and Erosion Control Section has publicized its contact information on the City of Winston-Salem's main webpage. Once on the City's homepage, a citizen can locate each Erosion Control staff member's name, e-mail address, and telephone number within three clicks of a computer mouse.

In addition, by calling 1-866-STOPMUD, citizens can report violations of the Sedimentation Pollution Control Act. The Sediment and Erosion Control Section responds to e-mails and received complaints from the hotline within 48 hours of first knowledge.

11.7 Inspection and Enforcement Procedures: Site inspections are conducted by one of four qualified erosion control inspectors, which are assigned to a section of Forsyth County. Each inspector reviews, approves and releases grading/erosion control permits for construction activities, conducts on-site inspections, and ensures program compliance in their respective part of the County. Routine inspections are performed once every three weeks, however, the frequency of inspections will increase (as needed) for overall program compliance.

Enforcement action provisions are described in Sections 5-18.8, 5-20, 5-21, 5-22, 5-23 and 5-25 of Article V of the Unified Development Ordinance (Chapter C). The City of Winston-Salem will not issue a grading permit for a development site unless the sediment and erosion control plan has been approved. Deviation from the approved plan will result in a Notice of Violation (NOV) from an erosion control inspector with violations of noncompliance and a compliance due date will be listed. Mitigation activities are enforced in the event of off-site sedimentation -

NCDWQ receives a copy of every NOV that is issued by the Erosion Control Section. If the corrective measures are not resolved by the due date, a monetary fine, Stop Work Order, and/or Injunction may be imposed on the developer or contractor. In addition, the City of Winston-Salem may withhold any certificates of occupancy until absolute resolution has been achieved.

11.8 Eminent Domain Authority: The City of Winston-Salem's Sediment and Erosion Control Section has an established procedure of sending a copy of every issued grading permit and application within Forsyth County to the Winston-Salem Regional Office of NCDENR. This protocol provides the NC Division of Minerals and Land Resources an opportunity to collaborate with the Stormwater/Erosion Control Division concerning the approval of a post-construction stormwater management BMP within the City's limits.

11.9 Construction Site Runoff Control Task Items for FY 2014 - 2015

1. The Sedimentation and Erosion Control Section will review submitted, complete plans and perform corresponding onsite compliance inspections.
2. If needed, staff will issue Notices of Violations and levy civil penalties in order to achieve regulatory compliance.
3. Verify the flow process Erosion Control staff uses for ensure containment of construction waste streams. Ensure that no construction waste can enter (directly or indirectly) the MS4 or waters of the State.
4. Assess the percentage of compliant sites versus the number of NOVs issued for all active construction sites for observing trends in programmatic function.

12. POST-CONSTRUCTION SITE RUNOFF CONTROLS

Objectives:

1. Manage stormwater runoff from new development/redevelopment that drains to the MS4 and disturbs an acre or more of land surface, including projects less than an acre that are part of a larger common plan of development or sale.

2. Provide a mechanism to require long-term operation and maintenance of BMPs.

3. Ensure controls are in place to minimize water quality impacts.

4. Permittee shall not be required to apply post-construction site runoff controls to entities that are exempt from permittee's jurisdiction, including entities exempted under N.C.G.S. 113A-56.

12.1 BMP Summary Table

	BMP	Measureable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Post-construction Stormwater Management Program	The City of Winston Salem adopted a Post-construction Stormwater Control Ordinance in September of 2008.	x	x	x	x	x	Stormwater Director
b	Strategies which include BMP's appropriate for the MS4	The City uses the State BMP Manual as engineering criteria for stormwater plan submittals.	x	x	x	x	x	Stormwater Director
c	Deed Restrictions and Protective Covenants	Deed restrictions and protective covenants are required in the City's ordinance to ensure that stormwater controls are not altered or removed.	x	x	x	x	x	Stormwater Director Stormwater Engineer
d	Operation and Maintenance Plan	An operation and maintenance plan is required as part of the permit approval process. The City uses state-approved criteria for initiating BMP maintenance activity.	x	x	x	x	x	Stormwater Director Stormwater Engineer
e	Educational Materials and Training for Developers	Multiple training sessions have been provided by Stormwater staff prior and after ordinance implementation. Educational materials include: guiding stormwater applications, example calculations, and other supplementary information. Please refer to www.stormwatersmart.com for additional information.	x	x	x	x	x	Stormwater Director Stormwater Engineer

12.2 Post-Construction Storm Water Management in New Development and Redevelopment:

The Stormwater Division oversees and enforces the City's post-construction stormwater management program. The City of Winston-Salem has supplemented previous water supply watershed regulations with current post-construction regulations for Class 'C' waters in order to

address stormwater runoff from new and re-developed sites. The City of Winston-Salem has adopted the State's Best Management Practices Manual as a technical guide for designing structural BMPs within its municipal boundaries.

12.3 Strategies which include BMPs Appropriate for the MS4:

Programs with development/redevelopment draining to Nutrient Sensitive waters:
Drainage from the City of Winston-Salem ultimately flows to the Yadkin River, which is the main tributary for High Rock Lake. High Rock Lake has been classified as nutrient sensitive and currently has a TMDL in development for Chlorophyll A and turbidity. Structural and non-structural BMPs will be utilized to address the requirements of 15A NCAC .0126 (10) (e). These BMP's will provide sediment removal, which ultimately reduces the nutrient inputs to receiving streams. Proper application and storage of fertilizers is being addressed through a Turf Management Certification, which is administered by the Stormwater Division and the Forsyth County Cooperative Extension Service in efforts to reduce nutrient loading to receiving streams.

Fecal Coliform Source Control:
The City of Winston-Salem coordinates with the Forsyth County Department of Public Health to reduce fecal coliform inputs to the MS4 to the maximum extent practicable. This process includes an oversight program to ensure proper operation and maintenance of on-site wastewater treatment systems. The City will also work to implement structural BMPs that encourage the die-off of fecal coliform bacteria to the maximum extent practicable. The City/County Utilities Commission (CCUC) has an extensive capital improvement program to rehabilitate failing sections of the sewer collection system. Stormwater staff works closely with the CCUC to locate and resolve sanitary sewer overflows into the MS4.

Non-Structural BMPs:
Currently, the City of Winston-Salem has implemented a comprehensive plan for growth – the Legacy Development Guide, which was adopted in 2012. Environmental quality is a key subject area, which is addressed with an objective to protect our local watersheds, wetlands, and streams. The City also has adopted local water supply watershed protection regulations, as required by DWQ. The Unified Development Ordinance regulates development in the Water Supply watershed areas of the City. Development is subject to zoning restrictions, erosion control measures, floodplain management and low density development provisions as they pertain to the water quality criteria of the Post-Construction Stormwater Control Ordinance such as recording of stream buffers where applicable and use of vegetative conveyances to the maximum extent practicable.

Structural BMPs:
In 2008, the City of Winston-Salem adopted the State's model ordinance, which provides sizing and performance criteria for water quality BMP's. This ordinance addresses both low density and high density development scenarios as regards water quality attenuation. Low density developments (less than 24 percent built upon area and/or less than 2 dwelling units per acre) must provide and record stream buffers where applicable and use vegetative conveyances to the maximum extent practicable. High density developments (greater than 24 percent built upon area and/or more than 2 dwelling units per acre) in addition to meeting all of the low density non-structural BMP requirements must also provide structural BMPs. In addition, City Council adopted water quantity standards for stormwater BMP design in order to mitigate detrimental downstream effects of flooding and erosion in various design storm events. Any BMP or combination of BMPs approved for 85 percent TSS removal that can be effectively constructed in the Piedmont physiographic region may be approved by the Stormwater Engineer.

12.4 Deed Restrictions and Protective Covenants: The City of Winston-Salem created, adopted, and implemented its post-construction ordinance on September 19, 2008. This ordinance includes comprehensive regulatory procedures in order to ensure compliance. Right of entry drainage and access easements must be granted to the City to inspect, monitor, maintain, repair, or to reconstruct the stormwater management system as necessary. Notice of violations, remedies, and monetary penalties are examples of regulatory tools contained within the post-construction ordinance that the Stormwater Division utilizes as enforcement mechanisms. For further reference, the City's Post-construction Stormwater Control Ordinance (Chapter 75, Article IV) can be located at this link: ARTICLE IV. POST CONSTRUCTION STORMWATER

12.5 Operation and Maintenance Plan: Stormwater Division personnel inspect water quantity BMPs as well as Salem Lake Watershed (Water Supply IV Classification) stormwater management controls on an annual basis. Stormwater control devices, which were approved after the adoption of the post-construction ordinance, must have an Operation and Maintenance Agreement recorded as part of the ordinance permit process. The emphasis of BMP inspection and maintenance is placed on the designated property owner. Beginning after the certification of the as-built drawings for a permitted stormwater management system, the system must be inspected per the frequency described in this agreement by a suitably qualified professional on behalf of the owner. The owner must keep all records of these inspections and any maintenance activities that may have been necessary and submit these records to the Stormwater Director for review on an annual basis. The Stormwater Director or his designee may carry out his own inspection to validate such submitted records.

The City of Winston-Salem inspects all City-wide water quantity BMPs that were approved prior to the Post Construction Stormwater Control Ordinance implementation as well as water quality BMPs contained within the Salem Lake Watershed on an annual basis. The City requires performance bonding or other cash securities on BMPs within the water supply watershed areas. Currently, all structural BMPs approved in accordance with the post-construction ordinance must have a financial surety in force prior to permit issuance.

12.6 Educational Materials and Training for Developers: Multiple training sessions have been provided by Stormwater Division staff prior to and after the ordinance implementation in 2008. Educational materials include a post construction stormwater management permit application guidance flowchart, example of design calculations and other supplementary information such as Operation and Maintenance Manual templates. These are available on the Stormwater Divisions website. The Stormwater Engineer also makes himself regularly available to meet with developers at their request on both an individual basis and via interdepartmental design review committees, in the event that they need guidance on permit policies and procedures before submitting an application for a permit. The Stormwater Engineer has on average three such meetings on a weekly basis.

12.7 Post-Construction Stormwater Control Task Items for FY 2014 - 2015

1. Stormwater staff will inspect water quantity control BMPs during the 2014 – 2015 permit year.

2. The Stormwater Division will review and permit applicable plans that require structural BMPs for high density developments under water quality standards as well as obtaining

water quantity control. Please note that as per Section 12.5, these stormwater management systems will be inspected and maintained by the owners' qualified representatives; records of such inspections and maintenance activities shall be submitted annually to the Stormwater Director.

3. Assess the need for increased educational efforts for structural BMP maintenance after devices have been finalized. For example, BMP owners failing to have devices inspected by a certified professional on an annual basis.

4. Assess the percentages of structural BMPs (since 2008) for operational function (e.g. functional, underperforming, nonfunctional, and failing). Ensure the overwhelming water quality and quantity BMPs are functioning as designed.

5. Execute a maintenance contract with an outsider vendor in order to return city-owned structural BMPs to their designed operational effectiveness.

13. POLLUTION PREVENTION and GOOD HOUSEKEEPING for MUNICIPAL OPERATIONS

Objectives:

1. Prevent or reduce stormwater pollution from municipal operations.

2. Train employees on how to incorporate Pollution Prevention and Good Housekeeping techniques into municipal operations.

13.1 BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Operation and Maintenance Program for Municipal Facilities and Operations	The City of Winston-Salem has implemented the following programs to prevent or eliminate pollutants from entering the MS4: street sweeping, household hazardous waste collection and disposal, household recycling, residential yard waste composting, and street drainage maintenance.	X	X	X	X	X	Sanitation Director Streets Director 3RC Recycle Program Administrator
b	Site Pollution Prevention Plan for Municipal Facilities and Operations	The Stormwater Division has prioritized eight municipal operations/facilities for SPPP creation. Currently, fourteen municipal operations/facilities have SPPPs with implemented recommended BMPs.	X	X	X	X	X	Industrial/Municipal Compliance Officer
c	Inspection and Evaluation of Facilities and Operations	Site evaluations are conducted for the need of BMPs; if the opportunity arises, the Stormwater Division will work with the responsible municipal operation to implement the appropriate controls. Once controls are implemented, BMP effectiveness will be evaluated by the Division and the respective City entity.	X	X	X	X	X	Stormwater Director Stormwater Engineer Industrial/Municipal Compliance Officer
d	Spill Response Procedures for Municipal Facilities and Operations	For municipally-owned facilities that are **not** required to obtain a general stormwater permit, an abbreviated stormwater pollution prevention plan (SPPP) will be created and implemented. A key component of this abbreviated SPPP is spill response plan and procedures, which are site-specific.	X	X	X	X	X	Industrial/Municipal Compliance Officer
e	Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning	During municipal facility/operation assessments, vehicle and equipment-washing practices are evaluated. If needed, washing procedures are modified to prevent or minimize exposure to surface waters. These procedures are documented in the SWPPP and verified on a BMP checklist. Fire Stations are scheduled for site assessments during FY 2014-2015.	X	X	X	X	X	Industrial/Municipal Compliance Officer
f	Streets, Roads, and Public Parking Lots Maintenance	The Stormwater Division has work in collaborated efforts with Winston-Salem Transit Authority, Streets Division, and Winston-Salem		X	X	X	X	Industrial/Municipal Compliance Officer

		Department of Transportation in order to identify pollutant-laden stormwater runoff from public streets, roads, and parking lots. Selected BMPs for implementation include: increased street sweeping, enhanced MS4 trash and sediment removal, issuance of condensed spill response plans and procedures for hydrocarbon releases, and implementing a maintenance program for existing structural BMPs, which receive inputs from public streets and roads.						Streets Division Winston-Salem Department of Transportation Stormwater Director
g	Streets, Roads, and Public Parking Lots Maintenance	Since the City's NPDES Permit became effective on 4/24/2013, BMP (g) will be fully completed by 4/24/2015. Some BMPs have already been implemented; these items include: street sweeping, MS4 maintenance activities of pipe and catch basin cleaning, and SPPP issuance to top priority municipal facilities/operations.			X	X	X	Industrial/Municipal Compliance Officer Streets Division Winston-Salem Department of Transportation Stormwater Director
h	Operation and Maintenance (O&M) for Municipal-owned or Maintained Structural Stormwater BMPs and Stormwater Sewer System (including catch basins, conveyance system, and structural controls).	The Stormwater Division has work in collaborated efforts with the Streets Division in order to develop and implement an O& M program for mitigating pollutant-laden stormwater runoff from entering the MS4. Selected BMPs for implementation include: increased street sweeping and enhanced MS4 trash and sediment removal. The Stormwater Division will implement a maintenance program for existing structural BMPs during FY 2014-2015.		X	X	X	X	Streets Division Stormwater Director Stormwater Engineer
i	Conduct staff training	A web-based power point presentation and booklet is mandatory for all current and new municipal employees, which are not administrative positions, to view and synthesize awareness information regarding goodhousekeeping practices as well as illicit discharge identification and detection.	X	X	X	X	X	Community Educator

13.2 Identified Municipal Facilities/Operations: In 2007, the Stormwater Division performed an inclusive assessment of municipal facilities/operations that have a significant potential for generating polluted stormwater runoff. Subsequently, staff prioritized these municipal operations for SPPP creation and implementation due to the magnitude and nature of activities that each municipal operation provides to the public. Since that time, the Stormwater Division provides professional services to City entities in order to create and implement BMPs for mitigating or eliminating exposure of pollutants to stormwater runoff. The following tables provide an overview of the City's progression in reducing stormwater pollution from municipal operations, as of March 2014.

Municipal Facilities/Operations that have Comprehensive Stormwater Pollution Prevention Plans (General Stormwater Permitted or Significant Operations that require SPPPs, as if permitted)

Table 13.3

City Department	Division or Operational Activities	Contact Name	NPDES Permit Number
Utilities	Muddy Creek WWTP	Ronald Hargrove	NC0050342
	Archie Elledge WWTP	Ronald Hargrove	NC0037834
	Hanes Mill Landfill	Jan McHargue	NCG120034
Property Facilities Management	Fleet Services	James Mitchell	NCG080801
WSDOT	Winston-Salem Transit Authority	Toneq' McCullough	NCG080023
Streets	Salt, Sand, and Soil Storage and Maintenance Activities	Ryan Newcomb	N/A
Sanitation	Refuse & Yard Waste Collection, Household Recycling	Johnnie Taylor	N/A
LJVM Memorial Coliseum	Concerts, Sporting Events, Ice-Skating		N/A
Benton Convention Center	Food Service, Convention Activities		N/A
Dixie Classic Fairgrounds	Food Service, Agricultural Exhibits, Automobile Demolition Derby		N/A
Bowman Grey Stadium	Automobile Racing, Sporting Events, Food Service		N/A

Municipal Facilities/Operations that have Abbreviated Stormwater Pollution Prevention Plans (Spill Response Plans and Procedures with Nonstructural BMPs, including Site Maps)

Table 13.4

City Department	Division or Operational Activities	Contact Name	NPDES Permit Number
WSDOT (Five facilities)	Parking Decks/Lots	Toneq' McCullough	N/A
Parks and Recreation (30 facilities)	Equipment Maintenance and Washing, Swimming Pool Chemicals, and Recreation Centers	Tim Grant	N/A
Central Warehouse (Two facilities)	Fertilizer and Chemical Storage	James Mitchell	N/A

Municipal Facilities/Operations that are scheduled for Site Assessments and/or Stormwater Pollution Prevention Plans (General Stormwater Permitted or Abbreviated – Depends on Operational Magnitude and Nature of Activities)

Table 13.5

City Department	Division or Operational Activities	Contact Name	NPDES Permit Number
Utilities	Construction and Maintenance Division	Ronald Hargrove	N/A
	Northwest WTP	Ronald Hargrove	NC0086762
	Thomas WTP	Ronald Hargrove	NC0079821
	Neilson WTP	Ronald Hargrove	NC0086011
Fire	Fire Stations and HazMat Storage	Chief Tony Farmer	N/A
Police	Crime Evidence Storage and Vehicle Preparation and Processing	Chief Barry Roundtree	N/A
Vegetation Management	Chemical Storage and Fertilizer Application Activities	James Mitchell	N/A
Neighborhood Services	Abandoned Automobile Storage Area	Richie Brooks	N/A
Property Maintenance	Properties that may cause or contribute to stormwater pollution (e.g. Gun Range, maintenance facilities, vehicle storage, etc.)	James Mitchell	N/A
3RC	Household Hazardous Waste Disposal	Michelle Sakwa	N/A
WSDOT	Traffic Maintenance, Warehouse Storage, and Paint Shop Activities	Toneq' McCullough	N/A

Best Management Practices for Pollution Prevention and Good Housekeeping for Municipal Operations:

13.6 Operation and Maintenance Program for Municipal Facilities: The City of Winston-Salem has created and implemented multiple comprehensive programs in order to mitigate or eliminate pollutant exposure from entering the Waters of the State or MS4 – please reference the BMP Summary, Table 13.3.

13.7 Site Pollution Prevention Plans for Municipal Facilities and Operations: The Stormwater Division has identified 22 municipal facilities/operations that have the significant potential for generating polluted stormwater runoff. As of March 2014, 14 municipal facilities/operations have implemented stormwater pollution prevention plans (SPPPs) in order to remove pollutant exposure to stormwater runoff (Tables 13.3 and 13.4). Eight municipal facilities/operations have been designated for site pollution assessments/inspections with SPPP creation and implementation, if needed (Table 13.5). The Winston-Salem Fire Department will be evaluated for vehicle-washing BMPs during the Permit Year of 2014 – 2015.

13.8 Inspection and Evaluation of Municipal Facilities and Operations (including the MS4 system and associated Structural BMPs): The Stormwater Division has been conducting good housekeeping inspections of municipal facilities/operations since January 2004. The inspection process focuses on current best management practices (BMPs) of: chemical/substances (e.g. salt, gasoline, soil, etc.) storage, waste disposal, outdoor processes (e.g. vehicle and equipment washing), material un/loading, and automotive-related activities. In addition, Stormwater staff evaluates the effectiveness of structural BMPs, stormwater discharge outfall(s) condition, off-site erosion, and recommends corrective measures and/or BMP implementation (nonstructural or structural) for the facility. All generated inspection reports are posted on an internal shared drive as well as hard copies that are delivered to the Division/Department Superintendent and ACM Gregory Turner. The Stormwater Division retains an electronic copy and hard copies of completed inspection forms. Once corrective measures have been installed or implemented, stormwater personnel verify BMP effectiveness. The last comprehensive revision to the City's municipal inventory database was completed in October 2013; an update was finalized by the Stormwater Division in March 2014.

13.9 Spill Response Procedures for Municipal Facilities and Operations: For municipally-owned facilities that are **not** required to apply for a NPDES stormwater permit, an abbreviated SPPP has been created and implemented by City staff. A key component of this abbreviated SWPPP is spill response plan and procedures that are site-specific. Each municipal operation/facility performs spill response training on an annual basis. Table 13.4 contains a list of municipal facilities/operations that have implemented an abbreviated SPPP.

13.10 Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning: Upon inspection of each municipal facility/operation, structural and nonstructural BMPs are recommended for implementation. Stormwater staff promotes vehicle/equipment washing at City Yard. These washing bays discharge into an oil and water separator, which is connected into the sanitary sewer. Parking lots for abandoned vehicles will be evaluated for installation of an oil and water separator. If structural BMPs cannot be installed, the vehicle-washing activities will be performed in accordance with NPDES requirements. Selected BMPs will be incorporated into an abbreviated SPPP in order to reflect on-site practices and measures. The Winston-Salem Fire Department has been scheduled for site assessments as well as SPPP implementation for FY 2014 - 2015.

13.11 Select BMPs for Pollutant Reduction on Municipal Streets, Roads, and Public Parking Lots: The Stormwater Division has worked in collaborative efforts with Winston-Salem Transit Authority, Streets Division, and Winston-Salem Department of Transportation in order to identify pollutant-laden stormwater runoff from public streets, roads, and parking lots. Selected BMPs for implementation include: increased street sweeping, enhanced MS4 trash and sediment removal, issuance of condensed spill response plans and procedures for hydrocarbon releases, and implementing a maintenance program for existing structural BMPs, which receive inputs from public streets and roads.

13.12 Implementation of Maintenance Programs for Municipal Streets, Roads, and Public Parking Lots: The targeted date for BMP implementation is March 2015 since the Stormwater Division must perform required budgetary processes for procuring additional funds, in accordance with state purchasing regulations.

13.13 Operation and Maintenance (O & M) for Municipal Structural Stormwater BMPs and the Stormwater Sewer System: The Stormwater Division has developed and implemented a comprehensive operation and maintenance program for structural BMPs as well as the MS4. This O & M Program includes (but not limited to) these activities:

- **Street (right-of-way) structure maintenance (pipes and catch basins) –** *every* drainage structure is inspected and cleaned (if needed) once a year. Structure condition is denoted, prioritized for repairing, when required.
- **Street sweeping –** each city street is swept once a year with heavily polluted roadways being swept bimonthly. The Streets Division contracts with an outside vendor, who utilizes high efficiency vacuum street sweeper for maximum pollutant (e.g. trash, TSS, and nutrient) removal.
- **Structural BMP maintenance:** The Stormwater Division has dedicated approximately $300,000 to the procurement of a licensed contractor for BMP maintenance during FY 2015 - 2016. Maintenance activities include vegetative control of invasive species, sediment removal from forebays, trash and debris removal, and inlet and outlet cleaning services. This contract encompasses all municipal-owned structural BMPs, which includes five stormwater wetlands, two streambank restoration projects, and two stormwater wet ponds.

13.14 Conduct Staff Training: A web-based power point presentation and booklet is mandatory for all current and new municipal employees, which are not administrative positions, to view and synthesize awareness information regarding goodhousekeeping practices as well as illicit discharge identification and detection. Once training has been completed, City departments record each employee's name and employee ID number for documentation purposes and submit these training logs to the Community Educator**.** These educational materials serve for refreshing current employees' awareness of pollution prevention techniques.

13.15 Municipal Goodhousekeeping and Pollution Prevention Task Items for FY 2014 - 2015

1. Stormwater staff will performed SPPP audits on core municipal operations.
2. Continue to have new City employees view the stormwater orientation video and receive a copy of the handbook, *Stormwater Runoff: Municipal Good Housekeeping and Pollution Prevention*.
3. The City's *Recycle Today* Program will continue to recycle appropriate materials.

4. The City will provide funding to 3RC, a facility that collects, disposes, and/or recycles household hazardous materials.
5. The Sanitation Division will collect and compost leaves and vegetative material.
6. The Streets Division will remove and dispose of trash and debris from the MS4.
7. An outside contractor will perform streets sweeping activities within the municipal limits; increased efforts will be directed to the Downtown, business core.
8. Create stormwater pollution prevention plans for all Winston-Salem Fire Stations; implement appropriate BMPs for reducing or eliminating pollutants to the MS4.
9. Assess current cleaning procedures for city-owned parking lots and decks and implement proper BMPs, if needed.
10. Sample municipal stormwater discharge outfalls that have the potential to contribute fecal coliform loading for prioritizing the capital improvement project list.

14. MONITOR and EVALUATE STORMWATER DISCHARGES to MUNICIPAL SYSTEMS

Objective:

1. Evaluate pollutants in stormwater discharges to the permittee's MS4 from hazardous waste treatment, disposal and recovery facilities, industrial facilities subject to Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the Permittee determines are contributing or having a potential to contribute a substantial pollutant loading to the municipal storm sewer system.

14.1 BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Maintain an Inventory of Industrial Sites	A complete list has been generated and updated by the Stormwater Division. This list consists of: industrial facilities that are permitted as defined by 40 CFR 122.26, SARA Title III, Resource Conservation & Recovery Act (i.e. hazardous waste), or identified as having/had an illicit discharge.	x	x	x	x	x	Industrial Inspector
b	Inspection Program	Created and implemented in early 2004, the Stormwater Division has proactively inspected NPDES industrial facilities. Our current inventory has been prioritized based upon potential impacts to surface waters. Inspection procedures were modified in July 2006, as a result of an EPA Audit.	x	x	x	x	x	Industrial Inspector
c	Establish and Implement Measures to Evaluate Commercial and Industrial Facilities discharging stormwater to the City of Winston-Salem's MS4	During the course of the on-site inspection, the Stormwater staff evaluates analytical and qualitative sampling data, visual field observations of the stormwater collection system and outfalls, and effectiveness of BMPs (nonstructural and structural). A copy of every completed inspection form is forwarded to NCMLR, WSRO.	x	x	x	x	x	Industrial Inspector

Best Management Practices for the Program to Monitor and Evaluate Stormwater Discharges to Municipal Systems:

14.2 Maintain an Inventory of Industrial Sites: A complete list has been created by the Stormwater Division. This list consists of: industrial facilities that are permitted as defined by 40 CFR 122.26, SARA Title III, hazardous waste facilities, or identified as having or had an illicit discharge. The Stormwater Division updated this master list in February 2014; annual updating will occur from this month.

14.3 Inspection Program: Initially, inspection techniques consisted of examining every permit compliance measure in accordance with state NPDES stormwater permit, inspect the inside facility for illicit connections, and focus on SPPP records. Our current techniques are based upon revised 2006 EPA inspection methods, which include: observations of effectiveness of nonstructural and structural BMPs, the facility's stormwater collection system and stormwater discharge outfalls, site maps, and validation written SPPP protocols to actual field observations.

The City of Winston-Salem has prioritized industrial facilities within its municipal limits to be inspected. The Stormwater Division used the following sources to generate the list:

1. EPA's Envirofacts Database for Toxic Release Inventory (SARA Title III) and RCRA (hazardous waste treatment, disposal, and recovery) facilities
2. NC Department of Water Resources Database (General and Individual Permitted industrial facilities, as per 40 CFR 122.26)
3. The City of Winston-Salem Facilities' Database (Municipal Operations/Facilities that are permitted under 40 CFR 122.26)
4. Illicit Discharge Reports

When combining the above-mentioned databases, facilities that appeared multiple times due to their industrial activities and governmental regulations were ranked. As a result, the Stormwater Division assigned these industrial facilities with a 'high-priority' ranking due to the elevated probability of significant adverse impact to surface waters. The Industrial Inspector will target these facilities for inspections; our goal is to inspect every permitted facility once every five years. Appendix C contains proposed industrial and municipal facilities that will be inspected during FY 2014 – 2015 by Stormwater staff.

14.4 Establish and Implement Measures to Evaluate Commercial and Industrial Facilities discharging stormwater to the City's MS4: During the course of the on-site inspection, the Stormwater staff evaluates first flush data in regards to benchmark values from the NPDES permit, visual field observations of the stormwater collection system, current and past conditions of stormwater discharge outfalls (by means of qualitative monitoring records), and effectiveness of nonstructural and structural BMPs. The Stormwater Division has a good working relationship with the NC Division of Mineral and Land Resources, Winston-Salem Regional Office. A copy of every completed inspection and reinspection form is forwarded to Sue White and Aana Taylor-Smith, Environmental Specialists, who are assigned to Forsyth County.

14.5 Monitor and Evaluate Stormwater Discharges to Municipal Systems Program Summary

1. The Stormwater Division will inspect permitted industrial facilities to ensure compliance with state stormwater regulations.
2. Track the number of *Required Actions Items* with the corresponding percentage of successful corrective measures completed.
3. Incorporate a defining parameter for pollutants of concern into the Stormwater Division's prioritization plan regarding permitted industrial facilities within the municipal boundaries.

15. WATER QUALITY ASSESSMENT and MONITORING

Objective:

1. Evaluate the impacts on water quality.

15.1 BMPs for Water Quality Assessment and Monitoring

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITIONS
a	Water Quality Assessment and Monitoring Plan	The Stormwater Division has created and implemented a water quality assessment and monitoring plan.	x	x	x	x	x	Stormwater Director Environmental Control Supervisor Engineering Technicians
b	Water Quality Monitoring	Stormwater staff performs quarterly, fixed interval sampling at 13 locations throughout Winston-Salem.	x	x	x	x	x	Environmental Control Supervisor Engineering Technicians

15.2 Water Quality Assessment and Monitoring Program: Water quality samples are collected on a quarterly, fixed interval basis at each monitoring site – thirteen monitoring locations have been strategically-selected throughout the municipal boundaries. Samples are collected in a composite method, except for fecal coliforms and *E. coli*, which are grab samples in accordance with 40 CFR 136.3. Composite samples are collected every 15 minutes in 100 milliliter aliquots for a 24 hour period. Parameters analyzed by a multiparameter meter are immediately obtained and recorded streamside. Appendix D provides maps of sampling locations throughout the City of Winston-Salem that staff conducts water quality assessments.

15.3 Water Quality Assessment and Monitoring Task Items for FY 2014 – 2015:

1. Stormwater staff will perform quarterly, fixed interval sampling at 13 locations throughout Winston-Salem for pollutant perimeters of BOD, TSS, TDS, Turbidity, Cd, Cr, Ni, Pb, Total & Dissolved Cu, Total & Dissolved Zn Total & Dissolved P, NO2, NO3, TKN, and fecal coliforms

2. During stream walking, the YSI multiparameter meter will be used as well as portable Chemets test kits for ammonia and nitrate detection.

3. Perform stream sampling in Salem, Peters, and Brushy Fork Watersheds in order to identify fecal coliform sources for BMP retrofit opportunities.

4. Perform structural BMP sampling (before and after BMP implementation) in order to determine pollutant removal efficiency.

16 TOTAL MAXIMUM DAILY LOADS (TMDLs)

Objectives:

1. Determine whether a TMDL has been developed and approved or established by EPA for the receiving water(s) of the permittee's MS4 NPDES stormwater discharge.

2. The permittee will utilize BMPs within the six minimum measures to address the permittee's assigned NPDES regulated stormwater waste load allocation (WLA) identified in the approved TMDL to the maximum extent practical and to the extent authorized by law.

3. If subject to an approved TMDL with a NPDES regulated WLA assigned to the permittee, the permittee will be considered in compliance with the TMDL if the permittee complies with the conditions of this permit, including developing and implementing appropriate BMPs within the six minimum measures to address the MS4's NPDES regulated WLA to the maximum extent practical (MEP). While improved water quality is expected outcome, the permittee's obligation is to implement BMPs designed to address the NPDES regulated waste load allocation assigned to the permittee to the maximum extent practical. The permittee is not responsible for attaining water quality standards (WQS). The Division expects attaining WQS will only be achieved through reduction from all point and nonpoint source contributors identified in the approved TMDL.

16.1 Salem Creek Watershed TMDL BMP Summary Table

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	RESPONSIBLE POSITION/PARTY
a	Identify, Describe, and Map Watershed, Outfalls, and Streams	The City of Winston-Salem has completed a comprehensive watershed masterplan update of Salem, Brushy Fork, and Peters Creek Watersheds in 2011. GIS data was collected for these watersheds; information gathered included all perennial streams, major stormwater outfalls, and MS4 conveyance systems. A revised reassessment date for these watersheds is scheduled in 2017-2018.	X	X	X	X	X	Stormwater Director Contracted Consultant
b	Existing Measures	The City of Winston Salem has implemented ten nonstructural and structural BMPs in order to reduce fecal coliform pollution within the Salem Creek (and contributing tributaries) Watershed.	X	X	X	X	X	Stormwater Director Civil Engineer Special Projects Coordinator
c	Assessment of Available Monitoring Data	Historical water quality data shows continual fecal coliform pollution, with the majority of results exceeding 400 cfu/100 milliliters during wet and dry weather conditions.	X	X	X	X	X	Stormwater Director Special Projects Coordinator
d	Monitoring Plan	The Stormwater Division performed a comprehensive program evaluation of its TMDL monitoring plan in order to become more efficient and effective. Implementation of these improved screening and trending methods is scheduled for FY 2014 – 2015.		X	X	X	X	Environmental Control Supervisor Stormwater Engineering Technicians

e	Additional Measures	The Stormwater Division has identified sixteen nonstructural/structural BMPs for pollutant reduction within the Salem Creek Watershed. In addition, the Stormwater Division hired a consultant to explore the costs of installing/retrofitting structural BMPs with modeled reduction levels of fecal coliforms.			X	X	X	Stormwater Director Civil Engineer Special Projects Coordinator
f	Implementation Plan	The City's Capital Improvement Plan (CIP) comprises of six structural BMPs for construction, starting in 2017. Washington Dog Park is the first proposed project for the Salem Creek Watershed.				X	X	Civil Engineer Special Projects Coordinator Stormwater Engineer
g	Incremental Success	The Stormwater Division plans to utilize its geodatabase (Geographical Information System) to document, analyze, and report incremental successes to achieve its waste load allocation.		X	X	X	X	Environmental Control Supervisor Stormwater Director

16.2 Identify, Describe, and Map Watershed, Outfalls, and Streams: The City of Winston-Salem has completed comprehensive watershed masterplan updates of Salem, Brushy Fork, and Peters Creek Watersheds in 2011. GIS data was collected for these watersheds; information gathered included all perennial streams, major stormwater outfalls, and MS4 conveyance systems. In addition, the Stormwater Division received hydraulic and hydrological modeling data as well as pollutant loading data for future BMP implementation projects. A revised reassessment date for these watersheds is scheduled for in FY 2018-2019.

16.3 Existing Measures: The City of Winston-Salem is implementing various structural and nonstructural BMPs to achieve its waste load allocation (WLA) for fecal coliform reduction within the Salem Creek Watershed. During FY 2013 – 2014, the Stormwater Division commenced these BMPs for program implementation:

Existing Measures	Status	Explanation to Reduce Pollutant of Concern
Central District PTRP Wet Pond – captures first flush of runoff from the adjacent Piedmont Triad Research Park. In addition, 355 acres of ultra-urban drainage area discharges to the pond. Pond has a surface area of 2.98 acres and average depth of ten feet (in the lower pond).	100 percent complete	Designed to remove 85 percent TSS removal from influent; since fecal coliforms adhere to TSS, a reduction in TSS should yield a fecal coliform reduction of 50 percent. These reductions pertain to the PTRP drainage area only.
Utilities Construction & Maintenance Division *Pipe Bursting and Slipping Program *Lift Station Repair and Rehabilitation Program *Flood Reduction Projects – Inflow and Infiltration	100 percent complete; on-going operation	80 percent of the City's sewer collection system uses gravity for transporting sewage to the POTW. As a result, a significant portion of sewer truck lines are positioned adjacent to streams. Once implemented, engineered solutions eliminates the exposure of sewerage to surface waters.
Illicit Discharge Detection and Elimination Program (IDDE) - the Stormwater Division performs fixed interval sampling regime of 13 sites across the City – 7 sites are located in Salem, Brushy Fork, and Peters Creek Watersheds.	100 percent complete; on-going operation	By proactively finding sanitary sewer overflows (SSOs) and reducing the quantity of sewage, the amount of fecal coliform pollution is minimized. As a result, the regeneration of fecal coliform bacteria within the stream matrix is reduced, which facilitates the recovery of the biotic ecosystem at a more rapid rate.

Stream Walking (IDDE Program Component) – Stormwater staff walked approximately 13 miles of streams within the Salem, Brushy Fork, and Peters Creek Watershed.	100 percent complete; on-going operation	By proactively finding and eliminating illicit sewer discharges and connections, staff reduces the quantity of sewage released to surface waters. As a result, the total amount of released fecal coliform pollution is reduced.
Public Education – Scoop-the-Poop campaign. The public educator highlights the detriments of fecal coliform pollution within a riverine ecosystem as well as 'factoids' of feces (e.g. the amount of fecal coliform bacteria per a gram of fecal matter, the average weight of a dog's bowel movement, etc.)	100 percent complete; on-going operation	By making pet owners aware of the detriment of fecal coliform pollution, the Stormwater Division wishes to facilitate a behavioral change in citizens. If citizens remove feces from the open environment, the exposure of fecal coliform bacteria to stormwater runoff has been eliminated.
Pet Waste Stations - the City's Parks and Recreation Department installed seven pet waste collection stations within green spaces throughout downtown Winston-Salem.	100 percent complete; continuous operation	Stations provide ease of access for pet owners to discard fecal waste and remove from the open environment. To further encourage participation, the City furnishes waste bags to the public, which are positioned on top of the waste reticle. By eliminating the exposure of fecal matter to the runoff, bacteria are not discharged into waterways.
Pet Waste Ordinance – the City of Winston-Salem has an in-force ordinance that requires pet owners to pick up fecal matter within its municipal boundaries.	100 percent complete; continuous operation	By requiring pet owners to pick up fecal matter from their pets, the exposure of stormwater runoff to fecal coliforms has been eliminated, thus reducing the fecal pollution load to receiving waters.
Erosion and Sediment Control Ordinance – the City of Winston-Salem has adopted and enforces its Sediment and Erosion Control Ordinance, as per the 1973 Sedimentation Control Act. Erosion control devices must be installed and maintained for disturbed areas greater than 10,000 square feet in order to retain soils on-site.	100 percent complete; continuous operation	Fecal coliforms are transported to receiving waters by soil particles. In addition, fecal coliform bacteria become resuspended once discharged into the water matrix. As a result, fecal coliform bacteria proliferate at an increased rate and degrade surface waters more rapidly. Thus, a decreased sediment load yields reduced fecal coliforms to receiving waters.
SUSTAIN Modeling Study – A consultant preformed an EPA SUSTAIN model for the Salem Creek Watershed. Eleven structural BMPs were identified for installation or retrofit.	100 percent complete	Based upon screening criteria, the consultant determined that eleven sites could be retrofitted or installed for bioretention cells or stormwater wet ponds. The modeling results showed that these eleven sites may produce a 1.9 percent reduction of fecal coliform pollution. The associated costs would total $15,113,135.
Ditch Repair and Stabilization Program – the Streets Division hires a private contractor to repair and stabilize ditches within the public right-of-way.	100 percent complete; continuous operation	The Streets Division assesses and prioritizes earthen conveyance swales that serve as drainage for ribbed and paved roadways. A private contractor restores channel capacity to the ditch by removing trash, sediment, or excessive vegetation. If needed, the contractor reestablishes vegetative cover within the ditch line in order to eliminate sedimentation to receiving waters.
Fats, Oil, and Grease (FOG) Reduction Program – the City/County Utilities Division has adopted and implemented a FOG Reduction Program to remove excess	100 percent complete; continuous operation	Grease and oil are the second-leading cause of sewer overflows that reach surface waters within the City of Winston-Salem. By requiring grease/oil interceptors to be

cooking and petroleum oils and grease prior to entering the sewer collection system. Responsible parties must have their grease/oil separators pumped out by licensed haulers at scheduled frequencies.		properly maintained, these passive devices can effectively retain grease from entering the sewer collective system. As a result, the quantity of released sewage (and fecal coliforms) is reduced to streams.

16.4 Assessment of Available Monitoring Data: Since 2008, the Stormwater Division has collected fecal coliform samples from 52 major stormwater discharge outfalls within Salem, Peters, and Brushy Fork Watersheds. Stormwater staff performed fecal coliform sampling during dry and wet weather conditions with over 261 samples collected and analyzed. Appendix F contains annual fecal coliform data (with corresponding geometric means) from 2005 to 2014. When assessing fecal coliform sample concentrations, staff observed numerous trends from the database. These observations include:

- During wet weather conditions, all fecal coliform samples were above 400 cfu/100 milliliters. A majority of this sample population exceeded 1,000 cfu/100 milliliters.
- Dry weather sampling results showed an inconsistent pattern of fecal coliform exceedences. When staff sampled the same outfall at differed time intervals, fecal coliform concentrations oscillated above or below the water quality standard for Class C waters.
- The Stormwater Division identified the positive correlation of an independent variable to fecal coliform concentrations. As ambient temperature increases, so does fecal coliform concentrations within local streams.
- A very weak correlation exists between fecal coliform concentrations and upland land use; insufficient evidence for predicting or isolating fecal coliform sources.
- Due to the above-mentioned observations, the Stormwater Division assumes that fecal coliform pollution exists universally throughout its municipal boundaries.

16.5 Monitoring Plan: The Stormwater Division performed a comprehensive program evaluation of its TMDL monitoring plan in order to become more efficient and effective. Implementation of these improved screening and trending methods is scheduled for FY 2014 – 2015. The Stormwater Division intents to implement the following proposed modifications to existing plan:

- Obtain absolute fecal coliform concentrations in stream segments to establish an impairment priority ranking, through aliquot dilution.
- Sample targeted subwatersheds during varying weather conditions. The approved Salem Creek TMDL states that fecal coliform violations occur between 10 – 75 percent of days flow exceeded.
- Concentrate sampling efforts in first order streams (near/at confluence with second order streams) and adjust future locations based upon sample results. If sample results above 400 cfu/100 milliliters (geometric mean value), move upstream to finger tributaries. If below, move downstream to the next confluence point.
- Verify that a fixed, in-stream sampling site exists for purposes of a baseline assessment within Salem Creek (e.g. Fraternity Church Road); quarterly frequency is recommended.
- Instantaneous water quality indicators to be obtained at each sampling event: water temperature, solar radiation conditions (e.g. sunny, overcast) total dissolved solids, conductivity, pH, dissolved oxygen (milligrams per a liter and percent saturation), and rainfall amount or time since last rainfall.

- Collect water samples in various dry and wet weather conditions – strive to achieve a 50/50 ratio during the fiscal year
- Once pollutant loadings have been established for impaired stream segments, compare these loadings against the GIS matrix. Determine which independent variables are causing the impairness and consider the appropriate six minimum measure(s) that could be implemented for reducing waste allocations.
- Create and implement quality control/quality assurance measures (e.g. three percent of total samples are field blanks)
- Ensure proper sampling techniques are being followed when conditions allow

16.6 Additional Measures: The City of Winston-Salem anticipates the implementation of numerous nonstructural BMPs in order to expand current pollutant reduction strategies within the Salem Creek Watershed. By expanding current BMP strategies to the maximum extent practical, the City hopes to benefit from synergic pollutant reductions within the targeted watershed. The following matrix presents the City's expanded measures (with corresponding explanations) in order to reduce fecal coliform loadings within the Salem Creek Watershed:

Additional Measures	Explanation of Desired Outcomes	Responsible Staff for Implementation
Perform Goodhousekeeping Awareness Training with local Animal Shelters	By evaluating current business practices, the Stormwater Division wishes to provide local shelters with new or modified cleaning methods to prevent or eliminate fecal coliform exposure to the open environment.	Community Educator Stormwater Inspector
Perform a collaborated awareness program with the City's Parks and Recreation for signage and pet waste collection station implementation at frequently used municipally-owned areas.	The Stormwater Division wishes citizens to have a heightened awareness of the detrimental effects of bacterial pollution to receiving waters. Thus, the overarching goal of this measure is to highlight the importance of collecting pet waste and eliminating the exposure of fecal coliforms to runoff.	Community Educator Parks and Recreation staff
Facilitate a private-public partnership for pet waste receptacle placement in common areas of high density residential housing.	By having readily access to disposal bins, the Stormwater Division anticipates targeted residents to use waste stations rather than leaving fecal matter on the ground.	Community Educator
Create and implement a rain garden training program for treating runoff from residential properties.	The Stormwater Division will provide technical knowledge as well as rain garden plants and soil media for BMP construction. Stormwater runoff will infiltrate into the garden and eliminate discharge into the MS4.	Stormwater Engineer Stormwater Director
Create GIS layers for independent variables of fecal coliform contamination to validate appropriate BMPs implementation.	By importing independent variable data (e.g. sewer pipe and material type, per capita of pet ownership, etc.), the Stormwater Division analyses and prioritizes subbasins for fecal coliform contamination. This GIS analysis will allow Stormwater staff to effectively select appropriate BMPs for implementation. Hopefully, staff will be able to prove significant pollutant reduction within targeted subbasins.	Stormwater Technicians Special Projects Coordinator
Evaluate municipal operations and general stormwater-permitted industrial facilities for	The goal of this nonstructural control measure entails the modification of work practices to eliminate fecal coliform exposure to the environment. By	Stormwater Inspector

opportunities of fecal coliform reduction.	eliminating fecal coliform exposure, the overall waste load allocation is reduced.	
Generate a comprehensive list of municipal facilities that would benefit from retrofitting/constructing structural control measures. Prioritize sites and coordinate with responsible parties for measure planning and design activities.	By designing and implementing structural control measures for removing fecal coliforms from MS4 discharges, the City will reduce bacterial pollution to receiving streams.	Stormwater Inspector Stormwater Engineer City staff
Create and implement confirmation methodology for locating failing septic tank systems within the City of Winston-Salem	Failing septic tanks contribute human fecal coliform loading to the MS4, if illicit discharges are allowed to persist. By refining the City's IDDE protocols for failing septic tanks, the City will achieve greater success in obtaining its waste load allocation.	Stormwater Technicians
Create and implement a water quality sampling program for 'at-risk' areas of exfiltration from the City's sewer collection system. After significant storm events, Stormwater staff will sample the downstream stream for sewage indicator pollutants in order to minimize the quantity of released sewage.	The Utilities Division has modeled and identified areas of exfiltration within the sewer collection system. Since 80 percent of sewer collection system is adjacent to surface waters, the likelihood of a SSO remains great. Therefore, a proactive program of mitigating released sewage to waterways remains paramount.	Stormwater Technicians Utilities Construction & Maintenance Engineer
Explore new methodologies of locating and removing failing septic tank systems from discharging into receiving surface waters.	Current procedures for discovering failed septic tank systems rely on passive techniques. By utilizing GIS tools in conjunction with innovative techniques, the Stormwater Division wishes to proactively locate potential 'hot spots' of septic tank failures.	Forsyth County Department of Health Stormwater Technicians
Perform water quality sampling of stormwater discharge outfalls from municipally-owned properties that have a great potential to contribute fecal coliform pollution to streams. The purpose of this sampling effort is to confirm the justification of designing and constructing structural control measures to treat stormwater runoff.	By validating fecal coliform pollutant concentrations, the Stormwater Division is able to justify and prioritize capital improvement funds for structural control measure expenditures. The Stormwater Division can maximize the pollutant removal efficiency per a dollar spent. An overall reduction to the City's WLA is expected from implementing structural control measures.	Stormwater Technicians Stormwater Engineer
Locate, inspect, and sample treated wastewater from NPDES-permitted sand filters/package plants for fecal coliforms. If the effluent concentrations exceed 400 cfu/100mL, report the responsible party to NCDWR.	The continuous, effective operation of an on-site wastewater treatment device is critical for achieving compliance with the WQ Redbook Standard. By sampling the effluent of these devices, the Stormwater Division is confirming effective operation. Exceedences of the WQ Standard constitute a point source load of fecal coliforms to the MS4. Removing coliform-laden discharges will assist the Stormwater Division to meet the City's WLA.	Stormwater Technicians Stormwater Inspector N.C. Department of Minerals and Land Resources
Locate livestock populations within the Salem Creek Watershed. Assess the potential of stream access/proximity of livestock	The overall goal of this action item is to evaluate the potential of fecal coliform contamination from agricultural areas. Once livestock fecal coliform sources are identified, the Stormwater Division can	Stormwater Technicians

populations. Compile assessment results and incorporate into the Stormwater Division's GIS.	propose and implement non/structural control measures to treat or reduce fecal coliform loadings to Salem Creek.	
Designate a program coordinator to oversee and manage the routine maintenance of all City-owned structural control measures within the City of Winston-Salem.	By ensuring the effective and continuous operation of City-owned wetlands, wet detention ponds, and bioretention cells, the maximum fecal coliform die-off rates can be achieved. Maintenance activities will focus on conditions for maximum mortality rates such as: minimal tree canopy cover, sediment, trash, debris removal, and promotion of riparian buffers along applicable BMPs to deter waterfowl.	Stormwater Engineer Stormwater Director
Street sweeping activities in 'hot spot' areas within the Salem Creek Watershed that focuses on strategic timing and location.	Fecal coliform bacteria are transported into receiving streams by adsorbing onto soil particles. By increasing the frequency of street sweeping in designated areas, the City will eliminate the transport mechanism, thus reducing the fecal coliform loading within the Salem Creek Watershed.	Assistant Transportation Director Stormwater Director
Continued rehabilitation of infrastructure collection systems (sanitary sewer and stormwater) for continuous and effective operation	Aging infrastructure creates conditions that permit fecal coliform pollution to persist, which include hydraulic overloading, sedimentation due to structural failures, and riverine flooding. Rehabilitation improvement projects will reduce fecal coliform loading by eliminating failure causes.	Utilities Construction & Maintenance Division Streets Division
Social media campaign to target specific demographics regarding proper handling of pet waste.	By creating and implementing an engaging social media strategy, the Stormwater Division anticipates that targeted audiences will retain take-away messages as well as increase its number of friends/subscribers/followers on social media. As a result, the Division hopes that pet owners will change their behavior and remove feces from the open environment. Thus, the exposure of fecal coliforms to rainfall will be eliminated.	Community Educator Marketing and Communications Department

16.7 Implementation Plan: The City of Winston-Salem plans to implement the following structural and nonstructural BMPs in order to reduce fecal coliform pollution within the Salem Creek Watershed, in accordance with permit requirements. Appendix G contains a five year capital improvement project (CIP) list of structural BMPs that support fecal coliform load reduction within the City of Winston-Salem.

Structural/Nonstructural Control Measures	Explanation of Desired Outcomes	Status and Schedule
Washington Dog Park – a 950 square feet bioretention cell will receive the first inch of stormwater runoff from the upland 3.48 acre drainage area. Storm flows greater than the first inch will be diverted to Salem Creek. Vegetative Management and Streets Drainage Divisions will perform routine maintenance on the bioretention cell.	The Washington Dog Park is located within 75 feet of Salem Creek's top of bank. The park is the only and most heavily-used dog recreational area within Winston-Salem. A pet waste receptacle is positioned at the park's only access point; the total elimination of fecal coliform bacteria from the open environment remains unachievable to obtain. Thus, the permanent installation of a bioretention cell will remove the residual fecal matter from stormwater runoff. The anticipated pollutant removal of fecal coliform bacteria should be approximately 80 percent.	Stormwater staff will seek CIP funding from the City Manager's Office for approximately $40,000. Construction activities should commence in July 2017.

Sanitation Collection Truck Storage Yard – the City's Property Maintenance Section is redesigning a new storage facility for sanitation collection trucks. Stormwater runoff from the proposed storage area will be conveyed into an oil water separator, which discharges into the facility's stormwater wet pond.	This treatment train is designed to significantly reduce fecal coliform pollution through solid separation, exposure to ultraviolet radiation, and natural predation from protozoan organisms within the wet pond.	This BMP is contingent upon bond procurement, thus an approximate implementation schedule is pending. Once funds become available, the Stormwater Division will develop a project schedule.
City of Winston Salem, Parks and Recreation Maintenance Facility/Reynolds Golf Course – a substantial Canada Geese population as well as numerous wildlife sightings/scat observations have prompted staff to design a bioretention cell for capturing and removing fecal coliform bacteria.	An area of the golf course is located adjacent to Berry Branch, a tributary of Salem Creek. By intercepting stormwater runoff and routing through a bioretention cell, fecal coliform load reduction should increase to 80 – 90 percent.	On-goings basin studies are verifying project viability. Staff will perform water quality sampling of stormwater discharge outfalls to confirm fecal coliform loading in 2015. Once confirmed, the project should commence by June 2018.
TMDL Monitoring Plan – a program evaluation was performed by staff, which revealed several information gaps within the monitoring plan. In order to devise a clearer and effective strategic TMDL masterplan, the Stormwater Division will implement new sampling procedures to identify and quantify fecal coliform loadings from contributing drainage areas.	By incorporating new procedures into its Monitoring Plan, the Stormwater Division will be able to prioritize drainage areas for stormwater management controls. In addition, Stormwater staff becomes able to determine the appropriate nonstructural/structural control measures for implementation. A pilot study may result in a statistical correlation of workload measures to actual waste load allocation reduction.	New sampling procedures have been finalized with Stormwater staff being trained on program amendments. The new sampling procedures will be implemented by December 2014.
Wildlife Educational Initiative – urban wildlife constitutes the largest source of fecal coliform loading to the MS4. By educating citizens of the unexpected effects of human/wildlife interactions, the City hopes to reduce its waste load allocation within impaired watersheds.	Since the City needs to reduce fecal coliform loadings from the MS4 by 93 percent, this isolate group provides the largest promise of waste load reduction. As a result, the City wishes to reduce fecal coliform loading to the MS4 through the combination of nonstructural BMPs.	This program initiative will be developed by the Stormwater Division; educational efforts should commence by June 2017.
Salem Creek Structural Control Masterplan – a consultant performed an assessment of the Salem Creek Watershed in order to generate a prospective list of sites for structural control measure placement. Once identified, computer modeling was used to develop a priority ranking system for BMP type, size, and projected costs.	The masterplan serves as a long-term strategic blueprint to achieving the MS4's waste load allocation. By strategically placing structural control measures on sites with high pollutant loadings, the Stormwater Division is able to validate the cost-effectiveness and removal efficiency to the public, elected officials, and the City Manager's Office. In addition, the Stormwater Division will develop a long-term capital improvement project preforma spending plan for Council's approval.	This structural control measure masterplan was completed and delivered to the Stormwater Division in July of 2013. Due to fund availability and project prioritization order, the first designated bioretention cell for implementation is scheduled to be operational by the Summer of 2020. Since 15 sites were selected for BMP retrofit/installation opportunities, the Stormwater Division projects BMP implementation to continue until 2035.

16.8 Incremental Success: The Stormwater Division plans to utilize various databases (e.g. GIS, Microsoft Excel database, and Microsoft Access database) to document, analyze, and report incremental successes to achieve WLA reduction. In addition, the geodatabase platform serves as multifunctional networking tool for other internal or external governmental entities for sharing information. The methodology used for documenting measure success (and ultimately, wasteload reduction) depends on measure type (i.e. nonstructural and structural). However, the Stormwater Division has adopted the below-posted departmental standards for validating *actual* pollutant reduction loading to the effectiveness of implemented control measures. These standards include:

- Perform water quality sampling before and after control measures have been implemented at major stormwater discharge outfalls. This methodology allows staff to determine the casual relationship of measure(s) effectiveness to actual pollutant reduction. Since water quality samples will collected during varying weather conditions, the overall trend in percent reduction should become evident over a period of time. The Stormwater Division realizes that other variables may cause anomalies or 'outliers' within trending data, but overall long-term declining percentages should be able to validate implemented control measures.
- Long-term data (four to five years) will be needed to provide observable deductions in wasteload allocation reductions within subwatersheds. Due to the dynamic nature of biological ecosystems as well as the large percentage of pollutant reduction required, the Stormwater Division needs a substantial data population (n = 20) to correlate a percent reduction.
- Fecal coliform concentrations are interval data – a common standard is used to derive colony-forming units (cfu) per 100 milliliters of sample. Therefore, every effort should be spent to use statistical correlation to refine appropriate BMPs for WLA reduction.
- Whenever possible, use scientific journal articles (or similar professionally peer-reviewed literature), quality controlled/assured laboratory analyses (from a North Carolina certified laboratory), or professional engineered-sealed material when validating reduction methodologies for this TMDL Implementation Plan. Any best professional assumptions must be qualified with footnotes within supporting documents.

In order to track and report fecal coliform load reductions, all nonstructural and structural control measures are recorded into the Stormwater Division's GIS. The City's GIS Matrix provides a quantitative representation of drainage areas with elevated fecal coliform loading as well as most probable contributing isolate source(s). Stream segments, within impaired watersheds, will be sampled for fecal coliforms concentrations in order to create a contribution load-ranking model. Once structural BMPs have been successfully implemented, staff will sample both influent and effluent locations in order to obtain the reduced waste load percentage from receiving waters. A cumulative table (e.g. Excel spreadsheet) will track all removed pollutant loading within the Salem Creek (and contributing tributaries) Watershed. Staff will continue to collect fecal coliform samples at a baseline monitoring station, which is positioned within the bottom reach of the watershed. This baseline station will confirm the overall reduction of fecal coliforms concentrations within the watershed. By continued efforts of BMP implementation, the City of Winston-Salem strives to achieve its waste load allocation reduction.

The Stormwater Division envisions that the City's Geographical Information System (GIS) will serve as a central hub of tracking and reporting its WLA reduction success. This GIS database possesses full integration capabilities with Microsoft Access, Word, and Excel as well as statistical analysis tools, basic modeling functions, and data storage (e.g. fecal coliforms concentrations) ability. The multifunctional nature of GIS will allow for future expansion and adaptability as regulatory demands dictate program direction as well as achievable waste load reduction.

16.9 Muddy Creek Watershed TMDL

In November 2011, the North Carolina Department of Environment and Natural Resources (NCDENR) issued a final report for turbidity impairment of the Muddy Creek Watershed. The Muddy Creek TMDL designates the City of Winston-Salem's MS4 as a significant contributor of turbidity (i.e. total suspended solids) pollution. A waste load allocation (WLA) was not assigned to the City's NPDES permit; however, total suspended solids loading (ton per a day) must be reduced by 58 percent. In accordance with its NPDES permit, the City must evaluate strategies and adapt BMPs to reduce TSS loading within the Muddy Creek Watershed.

The Stormwater Division performed a BMP assessment and selected appropriate reduction strategies in order to mitigate TSS pollution. These selected BMPs are posted in the below table for FY 2013 - 2014.

16.10 Muddy Creek Watershed TMDL BMP Summary Table

Selected BMP Strategies	Explanation of Desired Outcomes	BMP Status
Erosion Control Educational Program with Local Professionals - The Stormwater Division conducted a best management practices workshop for local engineers and developers.	Local engineers and developers will have a heightened awareness of designing and maintaining erosion control structures. This heightened awareness should reduce incidents of off-site sedimentation to the MS4 and receiving waters.	During FY 2013-2014, 38 engineers and construction site managers attended the Stormwater Division's Educational Workshop for proper BMP construction and maintenance.
Intensified Inspection Regime for Construction Sites – In order to ensure off-site sedimentation does not occur, Erosion Control staff performs increased inspections for site compliance.	Muddy Creek Watershed is experiencing an influx of construction activities due to land availability and improving economic conditions. Erosion Control staff inspect construction sites more frequently in order to ensure proper BMP maintenance and structural soundness. As a result, the Stormwater Division anticipates a reduction of off-site sedimentation.	During FY 2013-2014, Erosion Control staff performed 20 commercial site inspections.
Comprehensive Masterplan Update – The Stormwater Division contracted a consultant to inventory, assess, and model the Muddy Creek Watershed.	A consultant has completed a comprehensive watershed masterplan of the Muddy Creek Watershed. The masterplan evaluates numerous TSS exportation sources, such as stream bank erosion, compromised infrastructure and outfalls, and potential areas of future development. This tool guides staff to assess, prioritize, and repair identified projects, thus ultimately removing sedimentation sources.	The consultant will identify potential areas of streambank erosion for assessment; Stormwater staff will commence field reconnaissance activities during FY 2015-2016.
Increased Street Sweeping Activities - Increased frequency of street sweeping activities in 'hot spot' areas within the Muddy Creek Watershed.	In the Muddy Creek TMDL Assessment, NCDLR denoted 80 percent of TSS exceedences occurred during summer months. In addition to increased construction site inspections, the Stormwater Division envisions increased street sweeping activities within the public right-of-way in order to remove off-site, refuge soil.	The Streets Division will expand street sweeping activities with the hired Contractor during FY 2014-2015.

Industrial Inspection Program - In accordance with NPDES requirements, Stormwater staff performs facility inspections in order to eliminate pollutant loadings to the MS4 or local streams.	The City of Winston Salem has 84 NPDES permitted facilities (General and Individual Stormwater Permits) within its municipal boundaries. A majority of these facilities must monitor TSS concentrations within their stormwater discharge. If benchmark values are exceeded, the permitted facility must implement additional BMPs in order to reduce TSS loading.	The Stormwater Division performed seven industrial inspections within the Muddy Creek Watershed (and its tributaries). Six of these facilities have TSS benchmark values. For FY 2014 – 2015, the Stormwater will prioritize additional industrial inspections with TSS requirements within the Muddy Creek Watershed.
Municipal Goodhousekeeping Inspection Program–In accordance with NPDES requirements, Stormwater staff performs municipal operational audits in order to eliminate pollutant loadings to the MS4.	Stormwater staff assesses municipal operations for reducing or eliminating TSS pollutant loadings to the MS4/receiving waters.	The Stormwater Division inspected four municipal operations during FY 2013-2014. Stormwater staff recommended BMP improvements for reducing TSS loading, if needed.
Streambank Stabilization Program – The Stormwater Division identifies degraded sections of stream banks, prioritizes repair needs, and implements CIPs for bank restoration.	In-stream sediment sources contribute significant amounts of TSS within riverine systems. By using appropriate stabilization methods and materials, the exposure of raw stream banks to flood waters will be eliminated.	The Stormwater Division completed a stream stabilization project during FY 2013-2014. 7,500 square feet of raw stream bank area was stabilized within Salem Creek using stone blocks, coir fiber matting, and vegetative cover. Salem Creek is the largest tributary of Muddy Creek.
70/30 Cost Share Drainage Improvement Projects on Private Property – the City of Winston Salem participates in repairing private drainage conveyances, structures, or channels. The City pays 70 percent of total costs; the private party pays the remaining 30 percent.	The City of Winston Salem offers its citizens a cost share program for public assistance to mitigate drainage issues on private property. One of the project qualifying criteria is severe erosion of earthen conveyances or stream banks; erosion is a sediment-gain source to receiving waters. The synergic effect of numerous drainage CIPs being completed throughout the Muddy Creek Watershed (and contributing tributaries) will remove direct sediment-gaining sources from receiving waters.	The Stormwater Drainage Team stabilized 275 linear feet of eroded streambank within the Muddy Creek Watershed during FY 2013 – 2014.
Ditch Repair and Stabilization Program – the Streets Division hires a private contractor to repair and stabilize ditches within the public right-of-way.	The Streets Division assesses and prioritizes earthen conveyance swales that serve as drainage for ribbed and paved roadways. A private contractor restores channel capacity to the ditch by removing trash, sediment, or excessive vegetation. If needed, the contractor reestablishes vegetative cover within the ditch line in order to eliminate sedimentation to receiving waters.	887 feet of ditch line was repaired and/or stabilized within the Muddy Creek Watershed.

16.11 TMDL Task Items for FY 2014 – 2015:

1. Record the total distance (in linear feet) of restored or stabilized streambank and dry ditches within the City of Winston-Salem.

2. Participate in stream stabilization projects with the Utilities Division when environmental factors are conducive for resolving sanitary sewer overflows.

3. Coordinate with the Utilities Division in order to record infiltration and inflow (I &I) reduction projects within Salem, Peters, and Brushy Fork Watersheds. This proposed coordination will allow staff to observe any casual relationships when performing trend analyses.

4. Investigate the potential for increased street sweeping activities for municipally-owned operations that generate fecal coliform loading (e.g. Hanes Mill Landfill, Sanitation Yard)

5. Review the City's street sweeping contract and increase the area (or distance) swept within the Downtown Business District.

6. Develop field reconnaissance procedures to capture information for identifying TSS and fecal coliforms 'hot spots'.

APPENDIX F

Stormwater/Erosion Control Division

Annual (by Permit Year) Geometric Mean for Fecal Coliforms

2005 - 2014

SITE NUMBER	DATE OF SAMPLE COLLECTED	SAMPLING QUARTER	PERMIT YEAR	FECAL COLIFORM CONCENTRATION (expressed as cfu/100mL)	GEOMETRIC MEAN
FI_020_01	8/15/2005	1		1800	
FI_020_01	11/8/2005	2		382	
FI_020_01	3/29/2006	3		36	
FI_020_01	6/7/2006	4	2005 - 2006	5200	**599**
FI_020_01	10/31/2006	2		172	
FI_020_01	3/22/2007	3	2006 - 2007	19	**57**
FI_020_01	8/2/2007	1		2000	
FI_020_01	10/30/2007	2	2007	38	**276**
FI_020_01	10/20/2009	2		152	
FI_020_01	4/13/2010	3		32	
FI_020_01	6/22/2010	4	2009 - 2010	2800	**239**
FI_020_01	10/20/2010	2		4200	
FI_020_01	2/15/2011	3		3400	
FI_020_01	5/19/2011	4	2010 - 2011	1800	**2,951**
FI_020_01	8/22/2011	1		84	
FI_020_01	10/27/2011	2		360	
FI_020_01	2/20/2012	3		580	
FI_020_01	5/23/2012	4	2011 - 2012	2000	**433**
FI_020_01	8/23/2012	1		600	
FI_020_01	11/14/2012	2		144	
FI_020_01	2/20/2013	3		30	
FI_020_01	5/30/2013	4	2012 - 2013	1200	**236**
FI_020_01	8/28/2013	1		320	
FI_020_01	10/31/2013	2		206	
FI_020_01	2/26/2014	3	2013 - 2014	144	**212**
FI_020_02	9/8/2005	1		2400	
FI_020_02	12/19/2005	2		53	
FI_020_02	4/11/2006	3	2005 - 2006	3200	**741**
FI_020_02	7/10/2006	1		1400	
FI_020_02	11/27/2006	2		208	
FI_020_02	4/25/2007	3	2006 - 2007	3000	**956**
FI_020_02	3/12/2009	4		52	
FI_020_02	10/20/2009	2	2009	176	**96**
FI_020_02	7/1/2010	1		1000	
FI_020_02	10/21/2010	2		1200	
FI_020_02	10/31/2010	2		300	
FI_020_02	2/15/2011	3		184	
FI_020_02	5/19/2011	4	2010 - 2011	360	**474**
FI_020_02	8/22/2011	1		360	
FI_020_02	10/27/2011	2		4000	

FI_020_02	2/20/2012	3		640	
FI_020_02	5/23/2012	4	2011 - 2012	1200	**1025**
FI_020_02	8/23/2012	1		1400	
FI_020_02	11/14/2012	2		156	
FI_020_02	2/20/2013	3		15	
FI_020_02	5/30/2013	4	2012 - 2013	440	**195**
FI_020_02	8/28/2013	1		480	
FI_020_02	10/31/2013	2		96	
FI_020_02	2/26/2014	3	2013 - 2014	8	**72**
FI_030_01	8/22/2005	1		104	
FI_030_01	12/14/2005	2		50	
FI_030_01	3/29/2006	3		184	
FI_030_01	6/20/2006	4	2005 - 2006	560	**152**
FI_030_01	10/25/2006	2		48	
FI_030_01	5/1/2007	4	2006 - 2007	420	**142**
FI_030_01	10/20/2009	2		55	
FI_030_01	4/28/2010	3		400	
FI_030_01	6/22/2010	4		800	
FI_030_01	10/31/2010	2	2009 - 2010	22	**140**
FI_030_02	8/25/2005	1		84	
FI_030_02	12/14/2005	2		273	
FI_030_02	3/29/2006	3		204	
FI_030_02	6/20/2006	4	2005 - 2006	1200	**274**
FI_030_02	10/25/2006	2		232	
FI_030_02	4/23/2007	3	2006 - 2007	172	**200**
FI_030_02	10/20/2009	2		84	
FI_030_02	4/13/2010	3		100	
FI_030_02	6/22/2010	4		420	
FI_030_02	10/31/2010	2	2009 - 2010	43	**111**
FI_040_01	8/25/2005	1		860	
FI_040_01	12/19/2005	2		560	
FI_040_01	4/11/2006	3		260	
FI_040_01	6/20/2006	4	2005 - 2006	380	**467**
FI_040_01	10/31/2006	2		60	
FI_040_01	5/1/2007	4	2006 - 2007	180	**104**
FI_040_01	8/7/2007	1		180	
FI_040_01	11/1/2007	2	2007	176	**178**
FI_040_01	10/19/2009	2		400	
FI_040_01	4/28/2010	3		640	
FI_040_01	6/23/2010	4	2009 - 2010	780	**584**
FI_040_01	10/25/2010	2		11200	
FI_040_01	2/17/2011	3		168	
FI_040_01	5/19/2011	4	2010 - 2011	1000	**1235**
FI_040_01	8/24/2011	1		280	
FI_040_01	10/25/2011	2		460	
FI_040_01	2/22/2012	3		960	
FI_040_01	5/23/2012	4	2011 - 2012	400	**472**
FI_040_01	8/23/2012	1		400	
FI_040_01	11/14/2012	2		112	
FI_040_01	2/20/2013	3		45	
FI_040_01	5/30/2013	4	2012 - 2013	200	**142**

FI_040_01	8/28/2013	1		212	
FI_040_01	10/31/2013	2		108	
FI_040_01	2/26/2014	3	2013 - 2014	44	**100**
FI_040_02	9/9/2005	1		840	
FI_040_02	12/19/2005	2		780	
FI_040_02	4/13/2006	3		168	
FI_040_02	6/20/2006	4	2005 - 2006	320	**433**
FI_040_02	10/31/2006	2		36	
FI_040_02	5/3/2007	4	2006 - 2007	92	**58**
FI_040_02	8/8/2007	1		100	
FI_040_02	11/1/2007	2	2007	148	**122**
FI_040_02	4/28/2009	4		6	
FI_040_02	10/19/2009	2		800	
FI_040_02	4/28/2010	4	2009 - 2010	204	**99**
FI_040_02	7/2/2010	1		180	
FI_040_02	10/21/2010	2		400	
FI_040_02	2/17/2011	3		148	
FI_040_02	5/17/2011	4	2010 - 2011	1600	**361**
FI_040_02	8/24/2011	1		280	
FI_040_02	10/25/2011	2		300	
FI_040_02	2/22/2012	3		4600	
FI_040_02	5/21/2012	4	2011 - 2012	440	**642**
FI_040_02	8/21/2012	1		3000	
FI_040_02	11/12/2012	2		500	
FI_040_02	2/18/2013	3		160	
FI_040_02	5/28/2013	4	2012 - 2013	380	**550**
FI_040_02	8/26/2013	1		164	
FI_040_02	10/29/2013	2		116	
FI_040_02	2/24/2014	3	2013 - 2014	320	**183**
FI_050_01	8/15/2005	1		820	
FI_050_01	12/14/2005	2		164	
FI_050_01	3/29/2006	3		460	
FI_050_01	6/20/2006	4	2005 - 2006	780	**469**
FI_050_01	10/25/2006	2		132	
FI_050_01	3/26/2007	3	2006 - 2007	184	**156**
FI_050_01	8/2/2007	1		136	
FI_050_01	10/30/2007	2	2007	100	**117**
FI_050_01	3/11/2009	3		112	
FI_050_01	10/20/2009	2		120	
FI_050_01	4/12/2010	4		1000	
FI_050_01	6/9/2010	1	2009 - 2010	700	**311**
FI_050_01	10/21/2010	2		224	
FI_050_01	2/15/2011	3		52	
FI_050_01	5/19/2011	4	2010 - 2011	1800	**276**
FI_050_01	8/22/2011	1		160	
FI_050_01	10/27/2011	2		720	
FI_050_01	2/20/2012	3		200	
FI_050_01	5/23/2012	4	2011 - 2012	800	**368**
FI_050_01	8/23/2012	1		1000	
FI_050_01	11/14/2012	2		176	
FI_050_01	2/20/2013	3		92	

FI_050_01	5/30/2013	4	2012 - 2013	360	**276**
FI_050_01	8/28/2013	1		136	
FI_050_01	10/31/2013	2		108	
FI_050_01	2/26/2014	3	2013 - 2014	112	**118**
FI_060_01	8/22/2005	1		84	
FI_060_01	12/13/2005	2		9400	
FI_060_01	3/29/2006	3		4000	
FI_060_01	6/20/2006	4	2005 - 2006	2800	**1724**
FI_060_01	10/25/2006	2		12000	
FI_060_01	3/26/2007	3	2006 - 2007	212	**1595**
FI_060_01	8/6/2007	1		220	
FI_060_01	10/30/2007	2	2007	440	**311**
FI_060_01	3/11/2009	1		420	
FI_060_01	10/19/2009	2		12000	
FI_060_01	4/12/2010	3		600	
FI_060_01	6/9/2010	4	2009 - 2010	2600	**1675**
FI_060_01	10/21/2010	2		900	
FI_060_01	2/15/2011	3		4400	
FI_060_01	5/19/2011	4	2010 - 2011	2000	**1993**
FI_060_01	8/22/2011	1		460	
FI_060_01	10/27/2011	2		1400	
FI_060_01	2/20/2012	3		4600	
FI_060_01	5/23/2012	4	2011 - 2012	2800	**1697**
FI_060_01	8/23/2012	1		2600	
FI_060_01	11/15/2012	2		540	
FI_060_01	2/20/2013	3		720	
FI_060_01	5/30/2013	4	2012 - 2013	720	**924**
FI_060_01	8/28/2013	1		560	
FI_060_01	10/31/2013	2		196	
FI_060_01	2/26/2014	3	2013 - 2014	148	**148**
FI_070_01	9/8/2005	2		360	
FI_070_01	12/19/2005	3		220	
FI_070_01	4/11/2006	4	2005 - 2006	220	**259**
FI_070_01	7/10/2006	1		12000	
FI_070_01	11/27/2006	2		92	
FI_070_01	4/25/2007	3		56	
FI_070_01	8/7/2007	4	2006 - 2007	100	**280**
FI_070_01	3/12/2009	4		180	
FI_070_01	10/20/2009	2	2009	160	**170**
FI_070_01	7/1/2010	1		820	
FI_070_01	10/21/2010	2		360	
FI_070_01	2/15/2011	3		36	
FI_070_01	5/19/2011	4	2010 - 2011	1800	**372**
FI_070_01	8/22/2011	1		360	
FI_070_01	10/25/2011	2		160	
FI_070_01	2/20/2012	3		136	
FI_070_01	5/23/2012	4	2011 - 2012	780	**280**
FI_070_01	8/23/2012	1		400	
FI_070_01	11/14/2012	2		56	
FI_070_01	2/20/2013	3		33	
FI_070_01	5/30/2013	4	2012 - 2013	192	**109**

FI_070_01	8/28/2013	1		132	
FI_070_01	10/31/2013	2		196	
FI_070_01	2/26/2014	3	2013 - 2014	144	**155**
FI_080_01	9/8/2005	1		240	
FI_080_01	12/19/2005	2		127	
FI_080_01	4/11/2006	4	2005 - 2006	380	**226**
FI_080_01	7/10/2006	1		560	
FI_080_01	11/27/2006	2		92	
FI_080_01	4/25/2007	4	2006 - 2007	188	**213**
FI_080_01	8/8/2007	1		49	
FI_080_01	11/1/2007	2	2007	68	**58**
FI_080_01	3/12/2009	3		176	
FI_080_01	10/20/2009	2		144	
FI_080_01	4/29/2010	4	2009 - 2010	196	**171**
FI_080_01	7/10/2010	1		680	
FI_080_01	10/21/2010	2		480	
FI_080_01	2/17/2011	3		160	
FI_080_01	5/17/2011	4	2010 - 2011	380	**375**
FI_080_01	8/24/2011	1		420	
FI_080_01	10/25/2011	2		180	
FI_080_01	2/22/2012	3		820	
FI_080_01	5/21/2012	4	2011 - 2012	216	**340**
FI_080_01	8/21/2012	1		2800	
FI_080_01	11/12/2012	2		56	
FI_080_01	2/18/2013	3		148	
FI_080_01	5/28/2013	4	2012 - 2013	88	**213**
FI_080_01	8/26/2013	1		320	
FI_080_01	10/29/2013	2		128	
FI_080_01	2/24/2014	3	2013 - 2014	110	**165**
FI_110_01	8/25/2005	1		360	
FI_110_01	12/13/2005	2		176	
FI_110_01	3/29/2006	3		92	
FI_110_01	6/20/2006	4	2005 - 2006	216	**188**
FI_110_01	10/31/2006	2		25	
FI_110_01	3/22/2007	3		28	
FI_110_01	8/2/2007	1		280	
FI_110_01	10/30/2007	2	2006 - 2007	51	**56**
FI_110_01	3/11/2009	3		34	
FI_110_01	10/19/2009	2		96	
FI_110_01	4/12/2010	4		72	
FI_110_01	6/9/2010	1	2009 - 2010	420	**100**
FI_110_01	10/19/2010	2		112	
FI_110_01	2/15/2011	3		68	
FI_110_01	5/17/2011	4	2010 - 2011	10200	**427**
FI_110_01	8/23/2011	1		320	
FI_110_01	10/27/2011	2		104	
FI_110_01	2/20/2012	3		200	
FI_110_01	5/21/2012	4	2011 - 2012	5800	**443**
FI_110_01	8/21/2012	1		3800	
FI_110_01	11/12/2012	2		128	
FI_110_01	2/18/2013	3		27	

FI_110_01	5/28/2013	4	2012 - 2013	120	**199**
FI_110_01	8/26/2013	1		84	
FI_110_01	10/29/2013	2		35	
FI_110_01	2/24/2014	3	2013 - 2014	64	**57**
FI_130_01	8/22/2005	1		192	
FI_130_01	12/13/2005	2		160	
FI_130_01	4/11/2006	3		180	
FI_130_01	6/20/2006	4	2005 - 2006	216	**186**
FI_130_01	10/31/2006	2		92	
FI_130_01	4/24/2007	4		28	
FI_130_01	8/7/2007	1		19	
FI_130_01	10/31/2007	2	2006 - 2007	49	**39**
FI_130_01	3/12/2009	3		168	
FI_130_01	10/20/2009	2		660	
FI_130_01	4/28/2010	4	2009 - 2010	148	**254**
FI_130_01	7/2/2010	1		560	
FI_130_01	10/19/2010	2		144	
FI_130_01	2/17/2011	3		39	
FI_130_01	5/17/2011	4	2010 - 2011	3600	**326**
FI_130_01	8/24/2011	1		360	
FI_130_01	10/25/2011	2		108	
FI_130_01	2/22/2012	3		1040	
FI_130_01	5/21/2012	4	2011 - 2012	1600	**504**
FI_130_01	8/21/2012	1		3400	
FI_130_01	11/12/2012	2		200	
FI_130_01	2/18/2013	3		44	
FI_130_01	5/28/2013	4	2012 - 2013	84	**224**
FI_130_01	8/26/2013	1		380	
FI_130_01	10/29/2013	2		35	
FI_130_01	2/24/2014	3	2013 - 2014	88	**105**
FI_140_01	8/25/2005	1		340	
FI_140_01	12/13/2005	2		164	
FI_140_01	4/11/2006	3		188	
FI_140_01	6/20/2006	4	2005 - 2006	12000	**596**
FI_140_01	11/28/2006	2		29	
FI_140_01	4/23/2007	4		46	
FI_140_01	8/7/2007	1		59	
FI_140_01	10/31/2007	2	2006 - 2007	36	**41**
FI_140_01	3/12/2009	3		33	
FI_140_01	10/19/2009	2		104	
FI_140_01	4/28/2010	3		620	
FI_140_01	6/23/2010	4	2009 - 2010	540	**184**
FI_140_01	10/21/2010	2		300	
FI_140_01	2/17/2011	3		84	
FI_140_01	5/17/2011	4	2010 - 2011	1020	**295**
FI_140_01	8/24/2011	1		144	
FI_140_01	10/25/2011	2		260	
FI_140_01	2/22/2012	3		620	
FI_140_01	5/21/2012	4	2011 - 2012	1400	**425**
FI_140_01	8/21/2012	1		1200	
FI_140_01	11/12/2012	2		940	

FI_140_01	2/18/2013	3		100	
FI_140_01	5/28/2013	4	2012 - 2013	180	**377**
FI_140_01	8/26/2013	1		192	
FI_140_01	10/29/2013	2		172	
FI_140_01	2/24/2014	3	2013 - 2014	26	**95**
FI_150_01	8/25/2005	1		280	
FI_150_01	12/13/2005	2		148	
FI_150_01	3/29/2006	3		160	
FI_150_01	6/6/2006	1	2005 - 2006	280	**208**
FI_150_01	10/31/2006	2		28	
FI_150_01	3/22/2007	3		100	
FI_150_01	8/6/2007	1		4200	
FI_150_01	10/30/2007	2	2006 - 2007	108	**189**
FI_150_01	3/11/2009	3		64	
FI_150_01	10/19/2009	2		35	
FI_150_01	12/19/2009	2		35	
FI_150_01	4/12/2010	4		164	
FI_150_01	6/9/2010	1	2009 - 2010	179	**75**
FI_150_01	10/19/2010	2		60	
FI_150_01	2/15/2011	3		172	
FI_150_01	5/17/2011	4	2010 - 2011	1000	**218**
FI_150_01	8/22/2011	1		540	
FI_150_01	10/27/2011	2		192	
FI_150_01	2/20/2012	3		220	
FI_150_01	5/21/2012	4	2011 - 2012	72	**201**
FI_150_01	8/21/2012	1		400	
FI_150_01	11/12/2012	2		76	
FI_150_01	2/18/2013	3		144	
FI_150_01	5/28/2013	4	2012 - 2013	96	**143**
FI_150_01	8/26/2013	1		64	
FI_150_01	10/29/2013	2		92	
FI_150_01	2/24/2014	3	2013 - 2014	112	**87**
FI_150_02	9/8/2005	1		540	
FI_150_02	12/19/2005	2		327	
FI_150_02	4/12/2006	4	2005 - 2006	208	**332**
FI_150_02	7/10/2006	1		460	
FI_150_02	11/27/2006	2		128	
FI_150_02	5/3/2007	4		100	
FI_150_02	8/8/2007	1		48	
FI_150_02	11/1/2007	2	2006 - 2007	420	**164**
FI_150_02	4/28/2009	4		166	
FI_150_02	10/20/2009	2		1040	
FI_150_02	4/29/2010	4	2009 - 2010	184	**317**
FI_150_02	7/1/2010	1		540	
FI_150_02	10/21/2010	2		780	
FI_150_02	2/17/2011	3		112	
FI_150_02	5/17/2011	4	2010 - 2011	1600	**524**
FI_150_02	8/24/2011	1		204	
FI_150_02	10/25/2011	2		220	
FI_150_02	2/22/2012	3		880	
FI_150_02	5/21/2012	4	2011 - 2012	780	**419**

FI_150_02	8/21/2012	1		1800	
FI_150_02	11/14/2012	2		140	
FI_150_02	2/18/2013	3		84	
FI_150_02	5/28/2013	4	2012 - 2013	180	**248**
FI_150_02	8/26/2013	1		220	
FI_150_02	10/29/2013	2		132	
FI_150_02	2/24/2014	3	2013 - 2014	100	**143**

APPENDIX G

Stormwater Capital Improvement Projects (CIPs) for FY 2014 - 2015

Rank	Project Title	Anticipated Project Cost	New or Continuing
1	Stormwater Infrastructure Improvements	$1,493,070	Continuing
2	Drainage Improvements On Private Property	$250,000	Continuing
3	City Yard Contamination (Phase III)	$2,600,000	Continuing
4	28th Street Infrastructure Improvements	$2,200,000	Continuing
5	Stormwater Basin Studies	$800,000	Continuing
6	Edgebrook and Bethabara Infrastructure Improvements	$690,000	New
7	Bennett Infrastructure Improvements	$180,000	New
8	FEMA Flood Grant Assistance 5525 Phillips Bridge Road	$321,734	New
9	FEMA Flood Grant Assistance 2870 Marguerite Park Drive	$206,921	New
10	Stormwater Control Measure Maintenance & Enhancement	$300,000	New
11	Beaty Center Drainage Project	$600,000	New
12	Friendship Circle (Oversight)	Unknown	New
13	SWPPP Plan V (Fire and Parking)	$40,000	New
14	70/30 Enhancement Study	$40,000	New
15	ISA Mangement Study	$49,000	New
		$9,770,725	