

# THE CITY OF KNOXVILLE TENNESSEE

## NPDES Permit Annual Report



National Pollutant Discharge Elimination System  
Stormwater Discharge Permit TNS068055  
July 1, 2013 - June 30, 2014



CITY OF KNOXVILLE

Signature and Certification

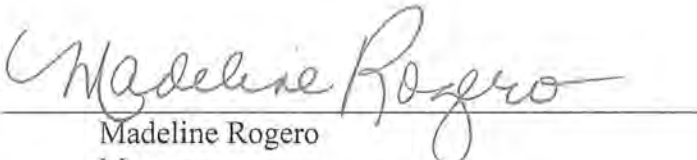
NPDES STORMWATER PERMIT TNS068055  
2013/2014 MUNICIPAL ANNUAL REPORT

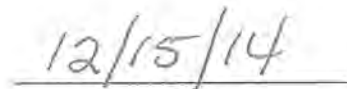
FOR: City of Knoxville, Tennessee

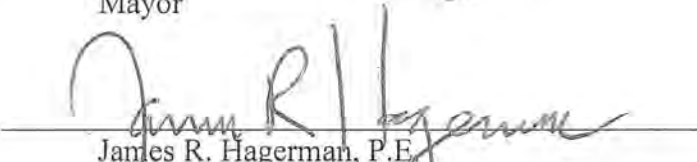
Federal regulations, 40 CFR 122.22 (a) (3) and 122.22 (d), require the application and reports for the NPDES permit to be signed and certified as follows:

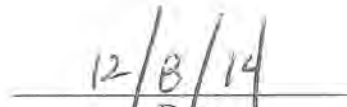
*For a municipality, State, Federal, or other public facility, by either a principal executive officer or ranking elected official.*

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

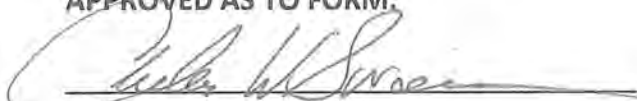
  
\_\_\_\_\_  
Madeline Rogero  
Mayor

  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
James R. Hagerman, P.E.  
Director of Engineering

  
\_\_\_\_\_  
Date

**APPROVED AS TO FORM:**

  
\_\_\_\_\_  
CHARLES W. SWANSON  
LAW DIRECTOR



December 19, 2014

Mr. Michael Atchley  
Tennessee Department of Environmental and Conservation  
Division of Water Pollution Control  
3711 Middlebrook Pike  
Knoxville, TN 37921

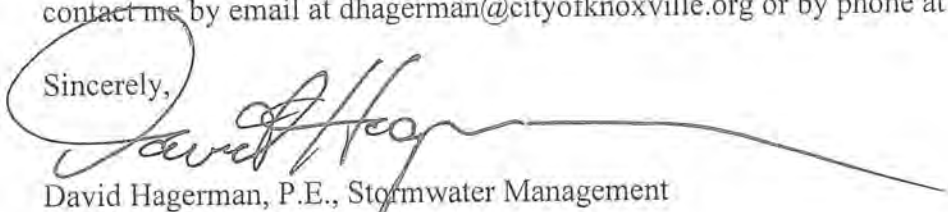
**RE: City of Knoxville, NPDES MS4 Permit # TNS068055  
2013 – 2014 Annual Report**

Dear Mr. Atchley:

The City of Knoxville is pleased to submit the tenth annual report for the NPDES permit issued July 1, 2004. This annual report summarizes the NPDES activities during the twelve-month period of July 1, 2013 through June 30, 2014. The annual report was coordinated and prepared by the Engineering Department in conformance with the reporting requirements in the City's NPDES Permit Part VI.

If you have any questions or wish to discuss any of the NPDES Permit programs, please contact me by email at [dhagerman@cityofknoxville.org](mailto:dhagerman@cityofknoxville.org) or by phone at (865) 215-3251.

Sincerely,

  
David Hagerman, P.E., Stormwater Management

CC: Mr. Vojin Janjic



December 19, 2014

Mr. Vojin Janjic  
Tennessee Department of Environmental and Conservation  
Division of Water Pollution Control  
401 Church Street  
L & C Annex, 6<sup>th</sup> Floor  
Nashville, TN 37243-1534


**RE: City of Knoxville, NPDES MS4 Permit # TNS068055  
2013 – 2014 Annual Report**

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Sincerely,

  
David Hagerman, P.E., Stormwater Management

CC: Mr. Michael Atchley



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## **1.0 INTRODUCTION**

In 1996, the Tennessee Department of Environment and Conservation, Division of Water Pollution Control first issued the City of Knoxville a Phase 1 National Pollutant Discharge Elimination System (NPDES) Individual Permit (TNS068055) for the discharge of stormwater from the municipal separate storm drain system (MS4). Stormwater from the City of Knoxville discharges directly to the Tennessee River and to major creeks that drain to the Tennessee River. Only a small portion of the MS4 runoff drains to sinkholes, ponds, and lakes throughout the area. In December 2008, the City submitted a reapplication as part of the Year Four annual report. The current permit was approved and made effective July 1, 2004 and expired June 30, 2009.

The NPDES Permit requires an annual progress report for the Stormwater Management Program as outlined in the Part I and Part II applications. This annual report was completed in accordance with the reporting requirements of Part VI of the permit and will complete the requirements for the permit year from July 1, 2013 through June 30, 2014.

The Stormwater Division of the City of Knoxville Engineering Department coordinated preparation and submittal of the system-wide annual report. Information for the annual report has been provided by the Engineering Department, Public Service Department, and the Solid Waste Management office. The Engineering Department has compiled the available information into the format outlined in Part VI of the current NPDES Permit.

## **2.0 CONTACTS LIST**

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### **3.0 STORMWATER MANAGEMENT PROGRAM (SWMP) EVALUATION**

The objective of the City of Knoxville's SWMP is to protect the taxpayer's health, safety, and welfare through an economically viable comprehensive stormwater quality and quantity program. Although it would be impossible to list all of the City's water quality related accomplishments in this report, the City is proud to report some of the major accomplishments related to the SWMP that occurred during the tenth year of this NPDES permit term.

- The City of Knoxville continued to expand the greenways/buffers zones along the major waterways. The City currently maintains over 86 miles of Greenways and unpaved trails. These linear parks help protect the adjacent waterways with natural riparian buffers and provide opportunities for stream enhancements. During 2014, the City partnered with The Tennessee Clean Water Network to accept and protect several more parcels along Williams Creek to expand the Williams Creek Urban Forest.
- Another 3,227 pounds of medication and packaging materials have been recycled and 64 mercury thermometers were exchanged for digital thermometers. Since November of 2008 through October 2014 the City of Knoxville's Solid Waste Division's Meds Collection program has collected 12,871 pounds of unused unwanted medications from residents of Knoxville and Knox County.
- The 25<sup>st</sup> annual River Rescue took place April 6, 2014. This event is coordinated by Ijams Nature Center and the Water Quality Forum partners. The spring 2014 River Rescue attracted 1003 volunteers who collected 9 tons of trash and 94 tires from the shores of the Tennessee River. There are 46 sites or "zones" that stretch from the forks of the river above Knoxville to Fort Loudoun Dam. River Rescue is also held in partnership with Lake User groups on Watts Bar Lake, Melton Hill Lake, and the Clinch River. Ijams Water Quality Specialists plan for this event throughout the year by recruiting volunteers, surveying riverbank conditions, securing additional sponsors, and pinpointing areas in need of cleanup.
- During the past twelve months the City coordinated efforts with volunteers from the Knox County Sheriff's Department to remove 98 tons of trash, invasive vegetation and debris from the city's drainage systems, at a savings to the City of approximately \$36,000 dollars. The volunteers also helped in the coordinated effort between TWRA and the City of Knoxville to prepare Fountain City Lake for restoration i.e. algae removal and fish relocation. Sheriffs volunteers help also with maintenance of stormwater infrastructure by clearing blocked culverts throughout the city, dike maintenance at Lakeshore Park, Pond Restoration at Northwest Crossing, and many other beneficial stormwater maintenance activities.





- The City of Knoxville Office of Solid Waste and Stormwater Engineering partnered with the Town of Farragut, Knox County Storm Water Management Department and the Water Quality Forum and offered the discounted rain barrels for sale at Earthfest 2014.
- The City of Knoxville was named a 2013 Tree City USA community by the Arbor Day Foundation in honor of its commitment to effective urban forest management. Cleaner air, improved storm water management, energy savings, increased property values and encouragement of commercial activity are among the benefits enjoyed by Tree City USA communities.
- Green Infrastructure projects in the city include many types and sizes of projects ranging from small scale local infiltration or bio-retention projects to large interdepartmental undertakings like the Whittle Springs Golf Course. These projects can take several years from the planning stages through construction and finally onto post construction monitoring. The City of Knoxville currently has projects in all phases being implemented throughout the city. Efforts are being made to develop a Green Infrastructure Watershed Development Plan for each city watershed. This plan would involve a strategic goal oriented approach for each watershed.
- A total of 2,369 tons of recyclables were collected at the City's seven drop-off recycling centers in 2013. The City's curbside recycling program now has over 20,000 participants and collected 5,166 tons of material. The City maintains updated information about recycling [www.cityofknoxville.org/solidwaste/recycle.asp](http://www.cityofknoxville.org/solidwaste/recycle.asp).



Since the stormwater quality program officially started in 1996, the City has defined a baseline to compare future surface water improvements and/or degradations. Although the continuing improvements are incremental and difficult to measure quantitatively, many programs initiated since the inception of this program have undeniably improved surface water quality throughout the city. The long-term results should become apparent in future years. Many of the SWMP tasks were implemented beyond the minimum requirements where economically feasible.

#### **4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE**

SWMP activity summary tables for the last year of the NPDES permit program were compiled in accordance with the reporting requirements specified in Part VI(A)(2)(c) of the permit and included on the next few pages.



#### 4.0 Stormwater Management Program Summary Table

MONITORING TASKS WET/DRY WEATHER	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Repeat High Parameter Sites	6 Outfalls repeated	Yes	6	Each outfall tested at least four times this year
Field Screening Industrial Outfalls	Visits to Industrial outfalls	Yes	38	Continued retesting outfalls from Industrial areas (four times)
Total Field Screening Outfalls	150 Outfalls	Yes	164	All field data sheets available for inspection. Outfalls tested four times this year.
Full Suite Stormwater Analysis (one station per year)	One Station / year	Yes	1 sample	Full Suite sample obtained at Third Creek Monitoring Station.
Storm Samples at 5 monitoring stations	1 sample / quarter / 5 sites	Yes	20 samples	Summer: 5 samples, Fall: 5 samples, Winter: 5 samples, Spring: 5 samples
Ambient Samples at 5 monitoring stations	1 sample / quarter / 5 sites	Yes	20 samples	Summer: 5 samples, Fall: 5 samples, Winter: 5 samples, Spring: 5 samples
Storm Drain Televised	As Needed	Yes	8155 ft	Pipes are defined as sections between inlets, catch basins, junction boxes, or outlets.

STORMWATER MANAGEMENT & INDUSTRIAL PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Stormwater Quantity Requests for Service (Received / Resolved)	As Needed	Yes	797/513	Complaints are investigated as received and resolved as solutions or resources are available
Stormwater Quality Requests for Service (Received / Resolved)	As Needed	Yes	189/118	Complaints are investigated as received and resolved as solutions or resources are available
Site Development Workshop/Professional Training	Annually	No	Regional Meeting Fall 2014	Included Engineers, contractors, developers, & surveyors involved in land disturbing activities.
Stormwater GIS Field Investigations for Annexations	As Required	Yes	1	Newly annexed areas are investigated within 60 days for all storm drain features and possible pollution sources.

4.0 Stormwater Management Program Summary Table

STRUCTURAL CONTROLS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Street Cleaning	Daily/Bi-Weekly	Yes	23,085 Miles	Daily for downtown streets. Frequency varies for other streets.
Litter Pick-up, Hand	As Needed	Yes	151,451 Bags	Routine Schedule
Catch Basin Cleaning and Repair	As Needed	Yes	5,515 Jobs	Per work order and requests
Ditching: Hand, Truck, & Track/Gradall	As Needed	Yes	46,272 Feet	Per work order and requests
Storm Drain Installation & Repair	As Needed	Yes	408 Jobs	Per work order and requests
Brush & Leaf Pick-up	Bi-Weekly	Yes	12,826 Loads	Bi-Weekly curb pick-up
Seed/Sod, ROW	As Needed	Yes	81 Jobs	Per work order and requests
Storm Drain Cleaning	As Needed	Yes	16,425 Feet	Per work order and requests
Grate Replacement	As Needed	Yes	109 Jobs	As Needed
Field Inventory & Inspection of On-Site Detention Facilities	Within 60 Months	Yes	As needed	All new facilities are mapped after construction is complete. Existing facility's inventory is complete.
Creek Cleaning by Creek Restoration Crew	As Needed	Yes	4 Jobs	Creeks are inspected and cleaned on a routine schedule
Tree and Plant Planting	When Applicable	Yes	155 trees	Trees were planted by the City's Service Department
Total Waste Recycled	As Brought In	Yes	34,126 tons	301 tons of paper, metal, plastic, glass, etc. and over 33,825 tons of yard wastes

4.0 Stormwater Management Program Summary Table

EDUCATIONAL PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Publicize Hotline Number	Within 24 Months	Yes	Undetermined	Hotline published in phone book, on road signs, pamphlets, magnets, radio PSA's, business cards, etc.
River Rescue	Annual Event	Yes	1 day event	9 tons of trash and 94 tires removed by 1003 volunteers from 46 sites.
Water Quality Forum	Meets Monthly and Quarterly	Yes	Undetermined	Meets monthly to plan projects focused on urban water quality.
Storm Drain Marking	As Needed or by volunteers	Yes	50	Catch Basins marked with decals labeled "Dump No Waste-Drains to Waterway"
Volunteer Creek Cleanups	Volunteers	Yes	Several sites on several creeks	A citizen based program that periodically hosts several creek cleanups in the spring and fall
Waterfest	Annual Event	Yes	1 Day Educational Event	A unique community event dedicated to educating citizens about water quality. Over 1100 youths, 250 teachers & parents, and 110 volunteers participated.
Pooper Scoopers	As Needed or by volunteers	Yes	60,000	Disposable dog waste containers were distributed to 36 different pooper scooper stations.

NEW DEVELOPMENT PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Residential/Commercial Inspections	As Required	Yes	7172	As Required
Final Inspections	As Required	Yes	346	As Required
Site Development Permits Reviewed	As Required	Yes	934	As Required
Right of Way Permits Issued	As Required	Yes	56	As Required
As-Built Certifications Reviewed	As Required	Yes	185	As Required



## **5.0 NARRATIVE REPORT**

The following narrative report is divided into the five main programs of the SWMP plus an additional section for specific Total Maximum Daily Load (TMDL) activities. The Phase 1 SWMP is described in the program element schedules listed in Part II of the permit application and Part III of the permit. The main programs are listed as follows:

- 5.1 Residential and Commercial Program (RC).
- 5.2 Illicit Discharges and Improper Disposal Program (ILL).
- 5.3 Industrial and Related Facilities Program (IN).
- 5.4 Construction Site Runoff Program (CS).
- 5.5 Comprehensive Monitoring Program (MN).
- 5.6 TMDL Implementation and Activities.

Each of the above programs are further divided into separate program elements and related tasks that correspond to the Implementation Schedules listed in Part IV of the Permit and to the requirements listed in 40 CFR 122.26(d)(2)(iv). Each specific task is briefly discussed in accordance with the reporting guidelines outlined in Part VI of the NPDES Permit. Some sections of this report may be a paraphrased version of earlier reports when the particular task elements are ongoing.

### **5.1 RESIDENTIAL AND COMMERCIAL PROGRAM (RC)**

*Program of Structural and Source Controls for Reducing Pollutants to the Municipal Separate Storm Sewer System, 40 CFR 122.26(d)(2)(iv)(A).*

#### **RC-1 Maintenance Activities for Structural Controls**

SWMP Task: Continue Existing Maintenance Activities from Part 2 application

Status: Ongoing

The City's Public Service Department (PSD) currently performs maintenance of the municipal stormwater system. The PSD has developed and maintained an extensive database to track work tasks performed during the year. The database not only tracks labor category (e.g., Equipment Operator) and labor hours devoted to each task, but also includes equipment type and costs. The PSD database produces summary reports for monthly and annual work production and costs. The database includes more than 80 task activities of which 18 were identified as relating directly or indirectly to stormwater management. Only a small portion of the stormwater conveyance system is located on public rights-of-way and city-held easements. The City generally assumes no responsibility for maintenance or improvements on private property even though crews may work in some of those areas to remove blockages, spills, and trash with permission or in emergencies.

Maintenance by the City within rights-of-way and easements is normally performed on an as-needed basis by the PSD. Approximately 75 percent of the storm drainage system maintenance work performed by the PSD is in response to direct calls from property owners, requests from the Engineering Department, and 311. The remainder of the storm drainage system maintenance work is in response to maintenance needs detected by the PSD, such as repairing collapsed pipes. Under



normal conditions, the PSD can respond to all complaints that are the responsibility of the City as defined by the City's stormwater policy.

Under the current system, the PSD has divided the City into six geographic maintenance zones, for routine work. Duties performed in each zone relating to stormwater are brush collection, leaf collection, street sweeping, and the cleaning of curb inlets. Cleaning and maintenance of catch basins are performed "as-needed". Most drainage facility maintenance is performed in response to complaints or known problems. The PSD logs all complaints by address and by category into the computerized database. The Construction Division of the PSD performs non-routine storm drain maintenance and installation.

The City has several multipurpose construction crews that perform storm drain installation. One of their primary responsibilities includes installing various sizes of infiltration BMP's, box culverts, reinforced concrete pipe, major repair to existing storm drains, and building catch basins. Each of the crews has 3-5 employees and access to backhoes or mini-excavators, dump trucks, and pickup trucks. A single track hoe is available to all crews. These crews also provide emergency response in the event of flooding. The Storm Drain Maintenance Crew has five employees. They perform such tasks as: clearing culverts of debris, flushing storm drains, hand and mechanical ditching, and performing minor catch basin repair. A Storm Drain Vacuum Machine, a ditching machine, and a 3/4-ton pickup truck with a small crane are used to perform these tasks.

SWMP Task: Continue Improved Stream Restoration and Channel Maintenance Program.

Status: Ongoing

Stream restoration and channel maintenance have improved since the first permit cycle. These programs included stream bank stabilization projects to reduce erosion and sediment and a creek restoration crew to remove litter, debris, and flow blockages. The City has improved this program by providing an annual agreement to the Fort Loudon Lake Association (FLLA) for removing debris and blockages on the major urban creeks. The summary report for the FLLA's efforts is included in appendix of this report. Removal of the dams helps prevent streambank erosion and reduce large destructive pools of silt and trash. The FLLA primarily uses chain saws and hand tools to restore flow and remove the unnatural dams. Large or heavy objects require assistance by heavy equipment. The City properly disposes all of the trash and debris.

With the addition of the FLLA's work in the creeks, the 4-person Creek Restoration Crew that was originally added to the Public Service Department will now be able to focus their attention on maintaining the stormdrain system as the Stormwater Maintenance Crew. Obviously, the crew will still respond on a work order basis for work in the creek when needed. The crew still has access to a knuckle boom and a single-axle dump truck for performing their work. The crew has been trained and is used to assist with illicit discharge investigations in the MS4.

Since the City's NPDES permit program began in 1996, many stream restoration projects have been completed with the help of TSMP, TDEC, TVA, USCOE, UTK, and CAC Americorps along urban creeks throughout the city.

Since sediment, hydro-modification, and habitat alteration are the most common impairments in our urban creeks, the City will continue to focus on stream restoration projects where possible. Although these projects will certainly vary in scope, bio-stabilization techniques will be used instead of concrete or riprap. Whenever possible, the adjacent riparian zone will be enhanced with trees and



native vegetation to provide cooling effects and help restore habitat. The City will work with TDEC to obtain the appropriate ARAP permits before work begins.

SWMP Task: Implement Improved Stream Restoration and Channel Maintenance Program.

Status: Ongoing

During this permit year, the City completed the design for three stream restoration projects along:

- Sims Road – Restoration of approximately 570 Ft. of eroded stream. Project will stabilize eroded stream banks and restore habitat and vegetative riparian buffer zone.
- Banks Ave – Daylight 140 Ft. of stream that is currently in a culvert, restore habitat and vegetative riparian buffer zone.
- Cavalier Ave. – Restoration of 580 Ft. of channelized stream. Project will relocate stream and re-establish floodplain, and restore habitat and vegetative riparian buffer zone.

Projects at Ulster Avenue and Graves Street were designed in the previous year but due to land acquisition and concern for disturbing potential bat habitat, the two projects will be constructed at the same time as the Cavalier Ave project in 2015.



SWMP Task: Implement Structural Controls To Prevent Floating Discharges To The TN River.  
Status: Ongoing

Since the summer of 1999, the City has coordinated with TVA, UTK, TDEC, USACOE, the Isaac Walton League (IWL), Keep Knoxville Beautiful (KKB), Fort Loudon Lake Association (FLLA), Ijams Nature Center and area businesses to reduce the amount of floating pollution entering the river from the urban creeks. The City has studied and identified several possible solutions. Short-term solutions have included increasing the frequency of the maintenance at the mouths of the major creeks, adding more trash receptacles at bus stops, increasing public awareness, installing temporary skimmers, etc.

During the first permit term, the City donated a new boat and hundreds of feet of trash skimmers to help then IWL and now the FLLA collect litter and debris along the riverfront in the downtown area. During 2013, the City spent \$25,000 dollars on replacement of the boat for the FLLA. The City has contracted with the FLLA to maintain a "Litter Free Zone" from the South Knoxville Bridge to the Alcoa Highway Bridge. Although the focus of this initiative has largely been to reduce unsightly trash from entering the river, the floating trash skimmers at the mouths of the creeks have effectively detained many oil/fuel spills until remediation personnel could respond. According to the FLLA, the booms have successfully prevented tons of floating material that would otherwise have been discharged from the creeks into the river. The original trash skimmers were purchased with penalty funds collected from polluters.

SWMP Task: Require Standard Maintenance Agreement for On-site Facilities.

Status: Ongoing

Since 1997, permanent maintenance agreements and/or covenants have been required for all new stormwater detention facilities and special pollution abatement devices (i.e. oil/water separators, catch basin inserts, etc.). To speed up the permit review process the original "Agreement" referred to in the Part II application and Part IV of the permit has been replaced with a "Covenant for Permanent Maintenance of Stormwater Facilities", which does not require the Mayor's signature or council approval. The end result for water quality protection and flood control is the same. The Stormwater and Street Ordinance section 22.5-34 now requires the owner of the property to execute a legal document entitled "Covenants" and record it in the office of the Knox County Register of Deeds before a site development permit is issued.

In the case of a lessee, the Stormwater and Street Ordinance Section 22.5-5 allows the City to require a Performance and Indemnity Agreement along with a surety bond or letter of credit to assure the stormwater facilities will be maintained and removed, if necessary, at the end of the lease. This is a new provision to allow some property owners the ability to share the responsibility of maintenance with the lessee who will use the land and create the need for the stormwater facility.

The City will retain the right to inspect to insure that the stormwater facilities are properly maintained, however, the responsibility for the maintenance of stormwater facilities will remain with the property owner unless legally transferred to another person or entity by a properly recorded legal agreement. If the property owner does not maintain the facility properly, the City



may authorize the maintenance to be completed and place a lien against the property for double the cost. To ensure access to the facility, a traversable access easement is recorded on the plat.

SWMP Task: Require Routine / Major maintenance of BMP facilities. Status: Ongoing

All stormwater facilities constructed since 1997 are required to be maintained according to the detailed agreement or covenant, which was recorded before the site development permit was issued. These agreements and covenants are discussed in the previous section above and also in the Stormwater and Street Ordinance sections 22.5-5 and 22.5-34. At a minimum, woody vegetation must be cut annually and sediment must be removed as necessary from detention ponds to maintain proper function of the facility. The standard maintenance requirements for large underground facilities (i.e. detention or oil/water separators) include a minimum of quarterly visual inspections and annual maintenance. Smaller BMPs, such as catch basin inserts, must be inspected at least monthly and maintained quarterly.

During the last permit term, the City designated a full time employee to inspect stormwater detention basins and to encourage property owners to maintain these devices. During this permit year the City has inspected 235 detention ponds. Sediment from the maintenance of detention/water quality ponds, treatment devices, or from stream restoration activities must be removed from the stormwater facility and disposed properly in a landfill classified for such material or used as fill outside the stormwater drainage system. The City does not propose to duplicate TDEC's efforts to regulate contaminated sediments from any stormwater management sources.

### **RC-2 Planning for New Development**

SWMP Task: Review Stormwater & Streets Ordinance to evaluate possible improvements to existing water quality and quantity requirements for new development. Status: Complete

The City of Knoxville revised the Stormwater and Street Ordinance in 2005. The ordinance may be accessed on the Internet at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater). A brief summary of the current development requirements for stormwater detention and water quality control is included in the following paragraphs.

Stormwater detention is required for the following categories of development:

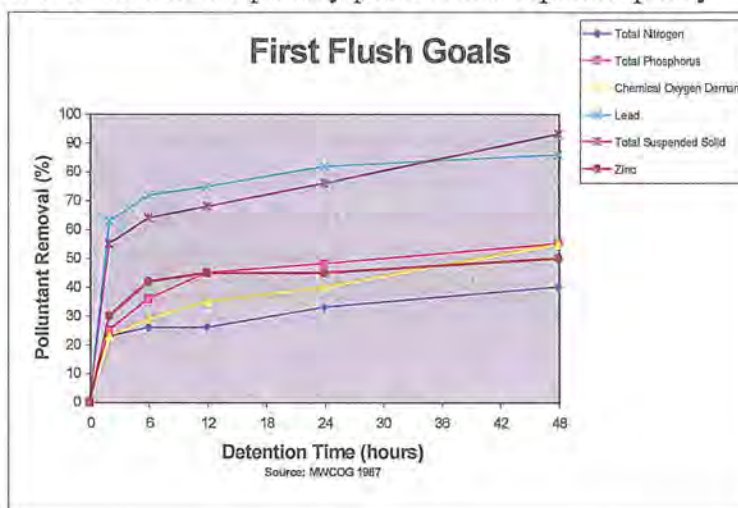
- (1) All road construction exceeding one-half (1/2) acre of impervious area;
- (2) All commercial, industrial, educational, institutional and recreational developments of one (1) acre or more of disturbed area;
- (3) Large single-family or duplex residential developments of five (5) acres or more of disturbed area or five (5) lots or more;
- (4) Any site development which contains one-half (1/2) acre or more of additional impervious area.
- (5) Any redevelopment that meets any of the four criteria above.





When a stormwater quantity detention pond is required, the engineer must design the pond to control the runoff from the 1-year, 2-year, 5-year, 10-year, 25-year and 100-year return frequency 24-hour storm events. The design Engineer must submit calculations to show that the detention facility will control the post development as required and that the downstream system is adequate to convey the flow from a 10-year storm. Detention may be waived for some developments discharging directly into a main stream (i.e. TN River) or if the developer submits supporting hydrologic and hydraulic computations to show that detention is unnecessary. For areas of redevelopment, detention requirements may be waived if the downstream stormwater system is adequate to convey the 2-year and 10-year 24-hour storms. The ordinance clearly states that a waiver of detention requirements “does not exempt the developer from providing the first flush and/or water quality requirements.”

The standard management method for water quality control from new development and redevelopment includes first flush control outlets in the quantity pond or in a separate quality pond. The quality pond must be designed to collect the first one-half inch of direct runoff from the contributing drainage basin or the first 4500 cubic feet of stormwater runoff, whichever is greater, and attenuate that runoff for a minimum 24-hour period. Alternate treatment methods are accepted if they provide equivalent or better pollutant removal efficiencies than the standard first flush detention ponds.



The target removal efficiencies for the first flush treatment were estimated from the research and chart provided by the Metropolitan Washington Council of Governments’ 1987 report titled “Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs.” The target removal efficiencies for a 24-hour detention are estimated as follows: Total Suspended Solids – 76%, Lead – 81%, Zinc – 47%, Total Phosphorus – 44%, COD – 40%, and Total Nitrogen – 33%. The City chose 24-hour attenuation of the first flush since the pollutant removal rates for detention longer than 24 hours did not increase significantly. This may be reevaluated before the next ordinance update.

In addition to first flush treatment, Section 22.5-37 of the ordinance requires a Special Pollution Abatement Permit (SPAP) for certain land uses that are known to either contribute a disproportionate amount of stormwater pollution (a.k.a. hotspots) or contribute pollutants which would not be effectively removed by the standard first flush control. The SPAP requires the operator to submit the management and structural controls necessary to address the expected pollutants and sources of pollution from the site after development. The typical special pollution abatement requirement has been a minimum of an oil/water separator for large parking lots of 400 spaces or 120,000 square feet of area along with a management plan to keep the site free of illicit discharges and pollution sources. Other special land uses that need a SPAP include any



type of vehicle maintenance, fueling, washing, and storage areas; scrap and recycling facilities; restaurants; grocery stores; animal housing facilities; and other areas with concentrated bacteria sources. Most of these land uses are expected to have a much higher potential for either floatable pollutants (e.g. oil, grease, hydrocarbons, trash) or soluble pollutants (e.g. bacteria, nutrients) that will not be collected in a standard first flush pond.

After implementing the illicit discharge program for a few years, some of these land uses were added in the 2003 ordinance update when they proved to be common hotspots for pollution. The pollution is typically caused by illicit dumping/discharges from employees and contractors or from an increased volume of vehicle traffic. The SPAP program has effectively reduced pollution in our waterways by requiring planning and education to prevent pollution before it occurs from these new sources. This is more economical for the operator and the City since it reduces the need for enforcement, penalties, structural retrofits, and downstream remediation. Some businesses have reported that the pollution control requirements have paid for themselves by reducing other normal costs.

As the City implements the requirements of the NPDES permit and as other TMDLs are issued, other land uses may be added to the SPAP program to control specific pollutants.

From 2003-2012, the ordinance required protective streamside buffer zone along blue-line creeks in a three tiered system. The latest ordinance requires a riparian buffer zone that is measured from the top of bank and extending perpendicular from each bank for the length, of the water body either 30' or 60' feet depending on if the drainage area is less than or greater than one square mile, respectively. The natural streamside buffer zone must be shown on the plat and maintained in a stable condition for the life of the development. The ordinance does not allow any vertical or actively eroding creek banks to remain after development is complete. This may require the stream bank to be stabilized as part of the construction project. If stabilization is necessary, hard armor may only be used when bioengineering alternatives are not technologically feasible.

SWMP Task: Require "No Dumping" message cast into all curb irons and solid stormwater catch basin covers installed on new developments. Status: Complete

In January 2000, the City set a new standard to require a "No Dumping" message to be cast in all new curb irons and solid stormwater catch basin covers. The following year, the City included covers for stormwater treatment devices in this requirement. The message is an attempt to educate the public that our stormdrain system is not a sewer for their waste. When polluters are caught discharging or dumping pollutants into the stormdrain, they often plead ignorance to the fact that the stormdrain is directly connected to the creeks. After using stencils and plastic curb markers for years, the City decided to halt the growing number of curb irons that needed the temporary markers by requiring the permanently cast message. Before setting the standard, the City contacted the major foundries to be sure they could manufacture the new irons and remain competitive in Knoxville. East Jordon Iron Works, NEENAH, John Bouchard & Sons, Acheson, and Deeter are the primary foundries that provide irons in Tennessee. Each of the foundries could provide the new pattern without any additional cost to the development community. Since there was no additional cost for the messages and the message will never need to be replaced, this new standard may be the most cost effective educational program in the City.



SWMP Task: Plan and site location for regional BMP facilities for areas of new development.

Status: Ongoing

During the term of the permit, the City will target large development projects or strategically located smaller developments that are suitable for siting regional BMPs. Regional BMPs would serve multiple upstream developments and typically have drainage areas ranging from 50 acres to several hundred acres. Since most development activity within the City is primarily "infill" that occurs on the limited number of remaining vacant parcels, there are limited opportunities for siting regional BMPs without impacting existing developments.

The City only owns and maintains three regional detention facilities. Those facilities include the detention pond at the Acker Place development, the detention pond located at the Northwest Crossing shopping center on Clinton Highway, and the retention pond at Victor Ashe Park. However, private developers continue to build regional ponds for developments that have drainage areas over 50 acres.

In 2005, the City partnered with Knox County to hire a consultant to review the stormwater ordinances for each agency and to develop a master plan and SWMM model for First and Whites Creek. Although the initial project focused on flooding, it created a base model that was expanded to include water quality parameters and analysis for the watershed. One benefit of the watershed model is to help identify potential locations for regional detention. The full report for the quantity model was completed in year four and the executive summary listed three locations of regional detention that were evaluated. One is an existing on line pond South of Adair Drive on a tributary to First Creek that might be improved. The other two locations are located on White's Creek immediately upstream of I-640 and at McCampbell Road. The City has filled a full time hydrologist position to replicate the model in other watersheds.

SWMP Task: Review, update, and maintain guidance criteria for BMPs on City web page ([www.cityofknoxville.org/engineering](http://www.cityofknoxville.org/engineering)).

Status: Ongoing

The City successfully completed a comprehensive BMP manual during the first permit term. The manual may be accessed at [www.cityofknoxville.org/engineering](http://www.cityofknoxville.org/engineering) on the Engineering Department's web page. The guidance criteria describe acceptable types of BMPs, design standards, and maintenance requirements for BMPs to be used throughout the City to meet the requirements of the new Stormwater and Street Ordinance. The guidance criteria is kept on file in the Engineering Department and distributed to developers as the official reference to ensure proper selection, design and maintenance criteria for BMPs.

Because maintenance of BMPs is critical to their long-term effectiveness in reducing pollutant loading from stormwater, the guidance criteria incorporates maintenance considerations with the design criteria to ensure that effective and maintainable BMPs are constructed in the City. The guidance criteria addresses the goals of the NPDES stormwater program by only allowing BMPs which are effective in reducing pollutants targeted by the NPDES stormwater regulations.

This manual is intended to be a live document that changes as new technology or future needs develop. Therefore, the website version is the preferred method of free distribution while CDs and paper copies may also be made available. The website and BMP content will continue



to be updated at least annually as needed.

### **RC-3 Maintenance Activities for Public Streets, Roads, and Highways**

SWMP Task: Continue street maintenance activities outlined in Part 2 application, p. 5-8.

Status: Ongoing

Street cleaning is performed daily for the downtown streets and less frequently for all other streets throughout the City. Eight large Vac-All trucks are used in most service areas while two smaller Johnston vacuum sweepers and a Green Machine are used in the downtown areas where maneuverability is key. The Vac-All trucks are also used to vacuum debris from catch basins and remove leaves in the fall. Mowing in City rights of way is typically performed on a two to four week schedule between the months of April and September.

SWMP Task: Evaluate current deicing program and study alternatives and improvements.

72.

Status: Complete

Snow removal, anti-icing, and de-icing of roadways are performed by the PSD and are essential programs to ensure public safety. Sodium chloride, stored undercover at the Loraine Street facility, mixed with liquid calcium chloride is applied to highways and streets by spreaders as necessary. Application of de-icing/anti-icing materials targets highways and major arteries first, and residential streets next. Priorities follow the adopted Major Roads Plan of the City of Knoxville. Because of the importance of maintaining public safety and public commerce, the City aggressively pursues its road clearing operations.

The Public Service Department evaluated the snow removal activities and materials and revises the Snow Removal Plan as needed. The City has been able to significantly reduce the quantity of deicing materials used by improved equipment, improved forecasting, chemicals, and operator training. During this permit term, the City installed a brine mixing facility and now adds this solution during dry weather as a preventative measure, which further reduces the overall quantity of de-icing materials. The City will continue to look for opportunities to minimize the use of deicing materials to reduce costs and protect the environment.

### **RC-4 Evaluation of Flood Management Projects**

SWMP Task: Evaluate regional BMP facilities for water quality retrofit. Status: Ongoing

The City only owns and maintains three regional detention facilities. Those facilities include the detention pond adjacent to Middlebrook Pike and Weisgarber Road at the Acker Place development, the detention pond located at the Northwest Crossing shopping center on Clinton Highway, and the regional retention pond at Victor Ashe Park. Although the regional basins were designed for flood control, the City found that it was possible to retrofit the sites to achieve additional water quality benefits as well. All ponds built since 1997 were required to



comply with the water quality requirements for new development.

The City has assumed the responsibility of continued maintenance and water quality improvements at the large regional pond (Acker Place) in the Fourth Creek Watershed. The City restored a large section of Fourth Creek downstream of the pond in the first year of the permit. In 2008, the City made significant improvements to the pond to reduce sediment off loading from the stream bank erosion, establishment of the flood plain, re-meandering of the channel, and re-vegetation restoration. The City is currently evaluating further water quality retrofits to this regional pond through a partnership with an adjacent property development.

The regional pond at Northwest Crossing on Clinton Highway serves the Wal-Mart, Lowe's, and surrounding area. The City accepted the maintenance of this pond and immediately designed a water quality retrofit to reduce the pollution in the stormwater runoff. Three large Crystal Stream stormwater treatment devices ([www.crystalstream.com](http://www.crystalstream.com)) were installed. The units have effectively removed large amounts of trash, sediment, hydrocarbons and organic material from the runoff and prevented the discharge of those pollutants into the receiving stream.

The retention pond at Victor Ashe Park was designed and built with water quality in mind. Three Crystal Stream stormwater treatment vaults were installed to improve the quality of the stormwater runoff from the contributing parking lots, park, and subdivisions. Maintenance and inspection of the Crystal Stream units has been contracted out to Crystal Stream's service company to ensure proper function at both regional ponds.

SWMP Task: Maintain existing GIS inventory of on-site BMP facilities. Status: Ongoing

When the NPDES permit program first started, the City implemented a systematic method of inventorying the existing detention ponds by using a GIS grid of the city. Field crews inspected drainage features in each map grid and recorded the detention facilities in the GIS with a circled D. Since all new development must be certified to confirm that constructed facilities were built as planned, all new stormwater facilities will be properly recorded in the GIS after construction.

Engineering staff will continue to maintain and update the existing inventory of ponds, pipes, water quality facilities and other drainage features as part of an ongoing GIS maintenance program. The City has several positions which maintain and update the GIS program including; a stormwater technician designated to inspect and map field conditions, a GIS analysts which edits field note corrections, and a dedicated technician who inspects and records maintenance data related to stormwater detention/retention facilities.



### **RC-5 Monitoring of Solid Waste Facilities**

This program is described in the management section IN-3 for industrial facilities.

### **RC-6 Management Program for Pesticides, Herbicides, and Fertilizer**

SWMP Task: Evaluate possible improvements to existing public education program as part of the illicit connection and improper disposal program. Educate City staff, public, etc.

Status: Ongoing

Public education programs for pesticides, herbicides, and fertilizer use have already been implemented in conjunction with City public education programs for collection and recycling of household hazardous waste (HHW). In addition to the solid waste and household hazardous waste informational programs, the City has developed a stormwater pollution program that includes helpful information regarding pesticide and fertilizer use. The City's online Best Management Practices manual located at [www.cityofknoxville.org/engineering/bmp\\_manual/](http://www.cityofknoxville.org/engineering/bmp_manual/) offers two BMPs for proper pesticide, herbicide, and fertilizer use and disposal. The BMP AM-13 is targeted towards institutional and commercial applications while the BMP RH-05 is directed towards residential and homeowner uses.

The HHW collection program, which includes collection of pesticide, herbicide, and fertilizer waste material, was officially implemented when the facility opened on April 22, 1997. More information about the HHW facility is included in the Illicit Discharges and Improper Disposal Program section ILL-6.

SWMP Task: Reevaluate effect of fertilizers as part of the City's ongoing monitoring program.

Status: Ongoing

Pesticides, herbicides, and fertilizer used by the City are stored in a building at the Loraine Street Operations Center. This building is in compliance with all regulations regarding the storage of hazardous materials. The Horticulture and Grounds Maintenance section of the PSD is responsible for the application of pesticides, herbicides, and fertilizer. The herbicide "Roundup" is applied annually to City parks and rights-of-way to control unwanted weed growth. PSD personnel, who have been trained to apply the herbicide as needed. Fertilizer is only used for minor landscaping projects and stormwater runoff from these projects is not considered a threat to receiving water quality.

The City does not currently require registration by commercial applicators; however, commercial applicators must be licensed under State and Federal Regulations. There are no regulations restricting the use of these substances by individual landowners. A permanent household hazardous waste collection facility is open six days per week to collect all types of hazardous wastes including pesticides, herbicides, and fertilizer.

The control program for pesticide, herbicide, and fertilizer pollutants is difficult to define since the presence of pesticides, herbicides, and fertilizers in urban runoff is not always evident. Current problems with pesticide, herbicide, and fertilizer pollutants are not believed to be significant. As part of the ongoing stormwater-monitoring program, the City will continue to



monitor the significance of these pollutants. Pesticides, PCBs, and nutrients are tested as part of the ongoing monitoring program described in Sections 5.5 and 6.0 of this report. To date, no significant traces of pesticides have been detected in the annual full-suite grab sample.

## **5.2 ILLICIT DISCHARGES AND IMPROPER DISPOSAL PROGRAM**

*Program to Detect and Remove Illicit and Improper Discharges to the Municipal Storm Sewer System, 40 CFR 122.26(d)(2)(iv)(B).*

### **ILL-1 Ordinances**

SWMP Task: Evaluate the prohibitions and exemptions of non-stormwater discharges in the original Stormwater & Streets Ordinance. Maintain authority for \$5,000 penalties.

Status: Complete

**This task was completed in 1997. See description below.**

SWMP Task: Implement any new revisions to the Stormwater and Street ordinance.

Status: Complete

The Stormwater and Street Ordinance was developed to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new development. The first ordinance was effective June 20, 1997. The ordinance has been updated several times since then. The revised ordinance is available on the Internet at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater).

The ordinance section 22.5-52 specifically prohibits illicit discharges and illegal dumping to any portion of the MS4 or any area draining to the MS4. Illicit discharges were defined consistent with 40 CFR 122.26(b)(2) as any non-stormwater discharge to the MS4, which is not specifically exempted in the ordinance. This definition, along with the \$5,000 penalty for violations, has formed the cornerstone of our successful enforcement program and will remain in place during this permit term.

Exemptions to the non-stormwater prohibition are listed in the ordinance in accordance with the list in 40 CFR 122.26(d)(2)(iv)(B)(1). The City added language to the exemption for individual car washing on residential property to include fund-raising washes by non-profit organizations for no more than two consecutive days in duration. During this permit term, the City did purchase two car washing kits which are available to charitable events at no charge.



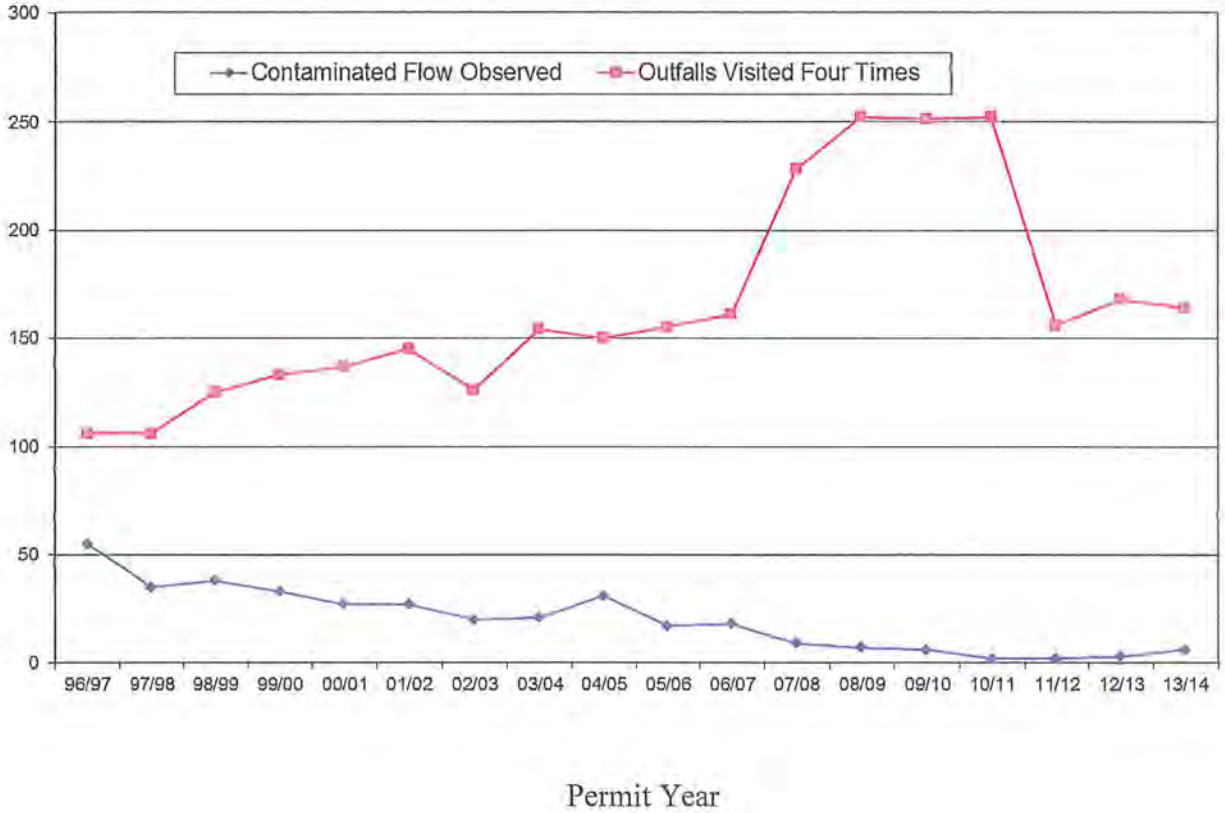
15.

### ILL-2 Field Screening

SWMP Task: Perform follow-up analysis at all high-risk screening sites. Status: Ongoing

The Dry-Weather Screening Program was developed and implemented during the first permit term to evaluate both randomly chosen outfalls and high-risk outfalls, which were tested during the previous year. Each high-risk stormwater outfall was checked for flow after a period of dry weather. If flow was present, the discharge was tested with a Chemetrics colorimetric field test kit for the following parameters: phenols, ammonia, detergents, copper, and chlorine. Turbidity, pH, color, temperature, and flow rate are also measured and recorded. If ammonia is greater than one part per million, then a fecal coliform and E-coli sample is collected for laboratory testing. The outfall test was repeated again between four and forty-eight hours after the first test. After one month, this process was repeated for each outfall to complete a total of four tests each year.

<sup>15.</sup> Since this program has successfully identified many illegal dumps and illicit discharges during the first permit term, the City will continue to annually retest all sites that have high parameters or signs of illegal dumping. Once the outfall has tested clean or dry during four site visits in a single year, it will only be retested if randomly selected from the list of inventoried outfalls. The number of high-risk outfalls that need to be retested each year will obviously vary depending on the tested results of the previous year.







As required by Part VI (A)(2)(f)(ii) of the NPDES permit, the results of the dry-weather screening are included in the appendix of this report. Since the beginning of the program over 12,000 outfall-screening visits have been conducted. The results from each of those visits are tabulated in the database by outfall identification number, testing date, and visit number. The testing results from the outfall screenings that occurred during the last permit year are included in the appendix of this report.

SWMP Task: Investigate 150 field-screening sites four times per year. Status: Ongoing

To insure that all outfalls are eventually tested each permit cycle, the City will continue to monitor a minimum of 150 outfalls each year throughout the new permit term. Last year the City visited 164 outfalls four times each. The monitored outfalls consisted of the previous year's 6 high-risk outfall sites plus 127 randomly selected outfalls from the general outfall inventory. The randomly selected sites were selected from areas of primarily industrial use and from areas that had not been previously tested. The City also selected outfalls throughout the city with some preference given to the highly developed areas.

The Engineering Department has developed an outfall database to maintain the testing data and site information for each outfall in the inventory. This outfall database is linked to the GIS to allow data access geographically for a single point or by report/query functions for many outfalls at a time. By maintaining a history of each outfall, illicit discharge trends may become apparent and therefore may be resolved with education or enforcement.

The dry-weather-screening program has been one of the most successful programs during the last permit term and will continue to be a high priority throughout the next permit cycle.

### **ILL-3 Investigation of the Storm Drain System**

SWMP Task: Implement procedures for mapping, field surveys and upstream source identification. Status: Ongoing

The procedures for mapping, field surveys and upstream source identification were developed and included in the Part II Application section 5.3.5. The City will continue to utilize these procedures to maintain the effectiveness of the Illicit Discharge and Illegal Dumping Program. Last year there were no updates to report for this procedure. If the procedure is updated, it will be included in the following annual report.

SWMP Task: Evaluate and update enforcement procedures, policies, monitoring and inspections. Status: Ongoing

The schedule for this task appropriately coincided with the schedule for ordinance updates. The existing enforcement procedures and policies have been effective and were not amended when the ordinance was updated in 2005.

Depending on the violation, a first-time offender is usually educated and asked to remediate the damage or correct the violation if possible. This is usually followed up with a letter to inform the violator of the City's expectations and to provide helpful BMPs to prevent



future problems. More severe or repeated violations will merit a Notice of Violation (NOV), which is issued in the field directly to the violator if available on site. Copies of the NOV are distributed to the property owner or developer by certified mail, the City Law Department, and the Engineering Department's file. The NOV may order specific remedies and require the violator to submit reports and/or pollution prevention plans. Penalties, if any, are only issued after the NOV expires so the violation and remedies may be fully evaluated.

In the event that a penalty is assessed, a violator may appeal the penalty before a five-member Environmental Appeals Board. The five volunteer members of the Environmental Appeals Board are appointed by the Mayor and consist of individuals with an expertise as follows:

- 1) One licensed professional engineer with three (3) years of engineering experience as a Professional Engineer;
- 2) One architect, engineer, landscape architect or surveyor with three (3) years of experience;
- 3) One representative of the development or industrial community;
- 4) One neighborhood representative;
- 5) One member at large.

Board members serve a 5-year term and may be re-appointed at the end of their term for one additional consecutive term. The member may be reappointed after skipping a term.

Some research has already begun to determine appropriate penalties for discharges that cannot be recovered but do not cause a fish kill or other quantifiable immediate damage. The City's current evaluation method does not account for incremental contributions to the overall pollutant loading or degradation of the waterway.

To help identify repeat violators, the City maintains an updated record of every NOV issued and a database for stormwater complaints. Follow-up monitoring and inspections will be a combination of City and self-inspections by industries. Enforcement actions resulting from the dry-weather screening program will be followed as defined within that program as a minimum. Any outfall that is tested for high parameters or identified as an illicit connection/ illegal dump source, will be tested four times a year, every year, until the outfall is dry or clean on all four visits. Sources of pollution identified by other means will be monitored as needed or specified for the individual situation. The ordinance Section 22.5-53 requires immediate reporting of spills and illicit discharges and Section 22.5-54 allows the City to require additional monitoring.

SWMP Task: Inspect stormdrain system and update features on GIS.      Status: Ongoing

The City is dedicated to updating and maintaining reliable stormdrain data on the GIS. This task is implemented by a concerted effort within the Engineering Department. All employees are instructed to submit their completed stormwater work orders to a designated GIS analyst for the purpose of updating the GIS stormwater layer. All new developments require a development certification submitted by a design professional upon completion. The analyst in the stormwater division records the stormdrain features from the development certifications into the GIS. Field personnel are instructed to log and report any discrepancies that are found between the maps and actual system in the field. The GIS analyst is responsible for completing the proper updates.



Engineering staff will continue to maintain and update the existing inventory of ponds, pipes, water quality facilities and other drainage features as part of an ongoing GIS maintenance program. The City has several positions which maintain and update the GIS program including; a stormwater technician designated to inspect and map field conditions, a GIS analysts which edits field note corrections, and a dedicated technician who inspects and records maintenance data related to stormwater detention/retention facilities.

#### **ILL-4 Spill Response Program**

SWMP Task: Coordinate with Knoxville Emergency Response Team (KERT) and TDEC.

Status: Ongoing

The City of Knoxville Stormwater Section of the Engineering Department continued to coordinate with both the KERT and TDEC during emergency situations. Each agency has specific roles to play during an emergency event. When discharges enter the MS4, the City's Stormwater Quality Section assists with information gathering, investigations, GIS support, containment, remediation, follow-up monitoring, and enforcement when necessary.

The Knoxville- Knox County Emergency Management Agency (KEMA) and/or the Knoxville Fire Department (KFD) coordinate most major spills when they are called in to 911. KEMA also coordinates routine training and simulations for various situations throughout the year. Workshops are provided to simulate real scenarios and allow coordination of the field teams and the Emergency Operations Center (EOC). Engineering Department staff participates in the EOC while the KEMA, KFD, Police Department, and Rural Metro units perform the field exercises.

The KFD and Engineering Department coordinate to respond to small spills and possible hazards as they are identified. The two groups will continue to work closely together to contain and remediate discharges in the street, stormdrain system, creeks or wherever necessary. The KFD maintains a fireboat downtown on the waterfront and a Hazardous Materials truck in one fire hall to assist with spills and signification discharges into the river, creeks or stormdrains.

When a responsible party is identified for a spill or hazardous discharge, the Engineering Department staff follow normal investigation and enforcement procedures to ensure the containment and remediation at the violator's expense. The HAZMAT team will work to contain the spill until the responsible party takes over. The City's HAZMAT team will then report back to the station to be ready for the next emergency while the Stormwater Section personnel monitor the remediation of site until the stormdrain and creek are restored.

This year, the Stormwater staff responded to assist the Fire Department with a variety of spills including traffic and boat accidents that lost fuel, illegal dumping, and discharges from permanent facilities. The Stormwater management staff monitors water quality, provide technical assistance, and enforcement. The small releases from accidents and illegal dumping were contained by the Fire Department and Stormwater management staff. Stormwater staff and/or Public Service Department will remove and dispose of the materials from the small spills. Larger spills are typically referred to a private remediation company. Engineering staff will continue to closely coordinate with other emergency personnel by attending the monthly Local Emergency Planning Committee meetings and by maintaining a staff member on call after hours



and on weekends to help respond to water quality emergencies.

### **ILL-5 Reporting of Illicit Discharges**

SWMP Task: Maintain and monitor the “Water Quality Hotline” for public reporting.

Status: Ongoing

The Water Quality Hotline for public reporting of water quality concerns was established as planned during year one of the first permit term. The hotline was operational in November of 1996 but did not receive mass publicity until December 1996. The hotline phone number is a local Greater Knoxville Area number listed in the blue pages as follows:

**WATER QUALITY HOTLINE-**  
**To Report Illegal Dumping Into Ditches**  
**Creeks Or Catch Basins 24-Hours/Day.....(865) 215-4147**

The hotline has received a variety of calls including: industrial discharges, gray water discharges, broken laterals, commercial washing, and neighbors dumping, etc. The hotline has been a popular and convenient method for callers to anonymously report problems that they have witnessed or created. Common calls are from neighbors or dissatisfied employees of polluters. This program has been very successful and will be continued throughout the permit term.

The Water Quality Hotline is a dedicated phone line attached to a phone in the Stormwater Section of the Engineering Department. Employees in the section also have the hotline linked as a second line on their individual office phones so anyone may answer the phone during the day. After hours and on weekends, the messages are recorded and routinely retrieved on the next business day. Emergency calls are prompted to call 911 for immediate action. If the water quality concern is within the City limits, the Engineering Department investigates the problem. Otherwise, the problem is referred to the Knox County Health Department, TDEC Environmental Assistance Center, or other appropriate agency.

The objective of this task is to increase the public awareness of the City’s role in water quality issues and to create a quick and anonymous method for citizens to report water quality concerns. The publicity of the hotline has already provided a consistent and convenient resource for concerned citizens.

The City includes the hotline number in thousands of mass produced stormwater pollution prevention educational handouts such as magnets, brochures, presentations, business cards, and routine correspondence with residents. The hotline is prominently displayed at the bottom of the Second Creek watershed boundary road signs to let travelers know where they may report water quality concerns.

Recently, the Hotline was advertised by placing the number on the plastic stormdrain markers, which are placed on curb iron inlets. Although the curb iron markers have been used for years, this custom design helps identify the markers specifically for Knoxville. The City will continue to seek out and develop innovative methods to advertise this successful program as a method for citizens to anonymously report complaints. Future opportunities to advertise may include: utility bills, public access TV, radio PSAs, signs on city buses, refrigerator magnets, pamphlets, brochures, BMP manual CDs, permits, etc. The innovative methods of publicity will vary each year as opportunities are developed.



SWMP Task: Maintain public education program.

Status: Ongoing

### River Rescue

The year 2014 was the 25<sup>th</sup> year for the River Rescue. The spring 2014 River Rescue attracted 1003 volunteers who collected 9 tons of trash and 94 tires from the shores of the Tennessee River. This annual event is coordinated through Ijams Nature Center in cooperation with the City of Knoxville and Sea Ray Boats and more than 20 other partners, including members of the business community, government agencies, private organizations, and individuals. There are 46 sites or “zones” that stretch from the forks of the river above Knoxville to Fort Loudoun Dam. River Rescue is also held in partnership with Lake User groups on Watts Bar Lake, Melton Hill Lake, and the Clinch River. Ijams Water Quality Specialists plan for this event throughout the year by recruiting volunteers, surveying riverbank conditions, securing additional sponsors, and pinpointing areas in need of cleanup.



### Operation Storm Drain

The Blue Thumb Coalition started this ongoing program in 1994 in an effort to educate the public that there is a difference between the stormdrain system and the sanitary sewer. Operation Storm Drain attempts to reduce the amount of pollutants dumped into our waterways through education instead of enforcement.

Since January 1, 2000, a permanently cast “DUMP NO WASTE, DRAINS TO WATERWAYS” message has been the development standard for all new curb irons and solid stormwater manhole covers. The new standard requires the iron to be cast with the educational message included on top of all new curb irons and solid manhole lids. In an effort to make the curb irons more eye-catching, several foundries have cast into the iron a graphic of a fish in addition to the environmental message. The foundries offer these designs to the surrounding communities to simplify their stock requirements. This program should continue to offer long-term educational benefits as citizens become familiar with the message and its meaning. Currently, the City has purchased and started to install permanent aluminum informational disks that contain the Water Quality Hotline number with the no dumping message.



### Water Quality Forum

The WQF is a consortium of agencies, organizations, academic institutions, public



utilities, and interested citizens working to protect and restore the waterways in Knox and the eight surrounding counties. It was initiated by the City of Knoxville in 1990. Currently it has twelve dues paying Partners; the City, TVA, Ijams Nature Center, Knox County, UTK-WRRC, the Town of Farragut, KGIS, the Knox County Soil Conservation District, KUB, QE2, Fort Loudon Lake Association, and the Hallsdale–Powell Utility District. There are numerous other stakeholders, who attend the quarterly meetings ranging from concerned individuals to agencies from other counties seeking information and guidance. The WQF's website is [www.waterqualityforum.org](http://www.waterqualityforum.org).

### Adopt-a-Watershed

Currently, fourteen area high schools and middle schools are participating in the program. The Americorp volunteers coordinate the program with the individual schools. This program has helped implement the goals of the NPDES program and increased public awareness of water quality issues. The primary goals of the Adopt-a-Watershed program include:

- Characterizing the school's watershed using, at minimum, two AAW characterization tools (e.g., watershed inventory, watershed mapping, windshield survey, stream walk).
- Monitor the school's watershed stream(s), conducting, at minimum, chemical testing twice and a biological (i.e. macroinvertebrate and/or fish) assessment once.
- Conduct at least one water quality improvement activity (e.g., tree planting, storm drain stenciling, stream cleanup, stream bank restoration, presentations to school groups/community organizations on the "state of the watershed" as determined by the students' characterization/monitoring efforts).

The City will continue working with the schools and provide support such as information, solid waste support for cleanups, GIS maps, testing supplies, training, and grants.



### Adopt-A-Stream

The City of Knoxville, in conjunction with Knox County and The Town of Farragut is in the tenth year of administering the Adopt-A-Stream program. The City has provided the supervision and training in addition to gloves, trash bags, pitchforks, wheelbarrows, waders, and other tools for these activities.





### City Employee Training

The City purchased two stormwater pollution prevention videos from Excal Visual to train City employees. The 'Illicit Discharge Detection & Elimination' and 'Rain Check' videos outline BMP's for stormwater pollution prevention and has been shown to the PSD. To learn more about the videos, go to [www.excalvisual.com](http://www.excalvisual.com).

### Public Displays And Presentations

In cooperation with the COK Solid Waste Office, Stormwater staff presented displays and informational materials at several public events including the Dogwood Arts Festival, Home Show, and Earth Day Celebration.

Various environmental presentations were also made to citizens through groups such as the West High School, Carter High School, and rain barrel workshops.

### WaterFest

WaterFest is an annual festival designed to educate youth about the many values of water. It was initiated in 1995 by the Water Quality Forum (WQF) and has grown into an event with hundreds of elementary and middle school children attending from across Knox County. The photo to the right is the kids setting off "water rockets". Ijams Nature Center hosts and coordinates this springtime event that is planned by forum partners throughout the year. It is designed to be fast-paced, engaging, educational, entertaining and just plain fun for the students. On the day of this event, WQF partners come together to make WaterFest happen.





### **ILL-6 Used Oil & Toxic Materials Program**

SWMP Task: Continue coordination of Recycling Program.

Status: Ongoing

The Solid Waste Division manages the City of Knoxville's recycling program. The entire annual report of these programs is included in the appendix of this report. This program is an important part of the City's solid waste reduction efforts and will continue in the future.

SWMP Task: Maintain and Operate Household Hazardous Waste Facility.

Status: Ongoing

The City continues to operate the Household Hazardous Waste (HHW) Collection Center, which first opened on April 22, 1997. When first opened, the City of Knoxville HHW Facility was the first permanent HHW Collection Center in the State of Tennessee. The HHW Facility is open five days a week. The center accepts HHW from both Knoxville and Knox County residents. Knox County shares the annual costs of operation. The capital expenditures associated with construction of this facility were partially paid for through a grant from the State of Tennessee. Activities at the center include:

- Diverting reusable products;
- Collecting, reusing and solidifying latex paint;
- Collecting car batteries, oil and antifreeze;
- Diverting selected acid and bases to waste water treatment;
- Bulking flammable materials; and
- Packing miscellaneous HHW materials for safe shipment and disposal.

Upon entering the HHW Collection Center, customers pull into a covered drive-through unloading area, where technicians remove HHW from vehicles. Material that is collected and is still "good" is separated and made available for pickup by the public free of charge in a "reuse area". "Good" material includes containers that have never been opened or materials that have not yet exceeded their useful shelf life. The staff then processes materials that are not reusable; diverting selected acids and bases to the wastewater treatment facility, bulking flammable materials, lab packing, and solidifying latex paint. After materials are processed, they are packed into 55-gallon drums, which are placed in one of two prefabricated storage units. Each of these units has a special fire suppression system, and drainage/spill containment systems. The hazardous materials are then stored in the units and held until sufficient quantities are collected. The HHW is operated by technicians trained to the 40-hour OSHA site worker level and managed by an on-site foreman and manager.





### **5.3 THE INDUSTRIAL AND RELATED FACILITIES PROGRAM (IN)**

*Program to Monitor and Control Runoff from TSD and Industrial Facilities Subject to SARA Title III, Section 313, requirements, 40 CFR 122.26(d)(2)(iv)(C).*

#### **IN-1 Ordinances**

SWMP Task: Evaluate and implement revisions to the prohibitions and exemptions of non-stormwater discharges in the existing Stormwater & Streets Ordinance. Status: Complete

The Stormwater and Street Ordinance was developed to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new and redevelopment. The latest version of the ordinance was revised in 2005. The current Stormwater and Street Ordinance may be accessed on the Engineering Department's web page at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater).

The ordinance section 22.5-52 specifically prohibits illicit discharges and illegal dumping to any portion of the MS4 or any area draining to the MS4. Illicit discharges were defined according to 40 CFR 122.26(b)(2) as any non-stormwater discharge to the MS4, which is not specifically exempted in the ordinance. This definition, along with the \$5,000 maximum penalty for violations, has formed the cornerstone of our successful enforcement program.

Exemptions to the non-stormwater prohibition are listed in the ordinance in accordance with the list in 40 CFR 122.26(d)(2)(iv)(B)(1). The City added language to the exemption for individual car washing on residential property to include fund-raising washes by non-profit organizations for no more than two consecutive days in duration. This exemption will likely be eliminated in the new permit cycle as alternative methods of car wash fund raising are established.

#### **IN-2 Inspection Element**

SWMP Task: Continue inspection program for non-permitted commercial facilities (i.e. car lots, restaurants, service stations, grocery stores, etc.). Status: Ongoing

The City has identified many common discharges from facilities that were not required to be permitted under the TDEC multi-sector general stormwater permit or individual NPDES permit program. Rather than spend limited resources attempting to duplicate the efforts of TDEC and EPA by monitoring existing permitted facilities, the City added a Special Pollution Abatement Permit (SPAP) program for those specific land-uses that have proven to cause polluted runoff problems (a.k.a. Hotspots). This program has been developed to fill in the gaps in the existing permit programs of those agencies with a local inspection program for otherwise non-permitted facilities.

In the current term, the City added a new Stormwater Technician position to perform additional education and inspections for industry and certain commercial areas. The technician performs most of the industrial and commercial facility inspections on sites that currently have a Special Pollution Abatement Permit (SPAP). Other technicians also perform inspections as



needed. A complete list of the SPAP facilities that were inspected during this permit year can be found in the appendix.

Each of the SPAP facilities is required to have some type of structural stormwater treatment device (i.e. oil/water separators, catch basin insets, sand filters, grass swales, etc.) in addition to their pollution prevention management controls. During the SPAP inspection, the City typically reviews the facilities maintenance records, provides technical advice on proper maintenance scheduling, records the GPS coordinates of the stormwater treatment devices if needed, and updates the City's industrial and commercial facilities database. Inspection of the SPAP facilities will occur systematically to insure that the structural controls are maintained and the management controls are being followed.

Stormwater Quality compliance inspections for non-SPAP sites are conducted in direct response to specific complaints from citizens or tips from the water quality hotline. The City will decide on a case-by-case basis whether this group of inspections will use education or enforcement to correct any problems found. In some cases, the old facility may be required to apply for a SPAP to correct violations.

The inspection program will focus on performing routine and/or random inspections on a variety of commercial sectors. The inspectors can work with the business to develop site-specific pollution prevention plans, employee training and structural modifications, if needed. The City's BMP manual has a wide assortment of information to assist a variety of businesses develop their stormwater quality pollution prevention plans. Since these businesses are not regulated in a permit program now, many of the operators are not focused on how their actions impact water quality in the area streams.

Section 22.5-37 of the Stormwater and Street Ordinance requires a Special Pollution Abatement Permit (SPAP) on new development and redevelopment of projects for certain land uses. Section RC-2 of this report provides more details on this program.

SWMP Task: Collect and analyze NOIs from Industrial Permit applicants.

Status: Ongoing

When the NOIs are received from TDEC or directly from the private industry, the City reviews and evaluates the information for potential impacts to the municipal storm drain system. In the past, the NOIs have been instrumental in locating and removing discharges from local industries. During inspections or enforcement actions with an industry, the City may verify that an NOI has been filed.

SWMP Task: Identify potential industrial discharges through Illicit Connection and Improper Disposal Program. (Both stormwater & non-stormwater discharges).

Status: Ongoing

The illicit connection and improper disposal program defined in the City's Part II NPDES stormwater permit application and in the previous section of this report, primarily addresses runoff from industrial facilities. A large portion of dry weather screening occurs from areas of industrial use or outfalls indicated by a "300" in the identification number. Illicit connections or improper disposal from industrial facilities that are discovered while inspecting the storm drain



system under this program are recorded in the facility's file in the Work Manager Database. The City contacts the industrial facility directly, along with TDEC if necessary, to identify the problem and work on an appropriate solution. If enforcement action is necessary, the City will track the situation until the illicit connection is corrected, the illegal dumping stopped, or until the facility receives a valid NPDES permit for the discharge.

SWMP Task: Review and update inspection program as part of Pollution Prevention Plans for Municipal Industrial Facilities. Conduct annual inspections at MIFs. Status: Ongoing

During the first permit term, the City developed an inspection and pollution prevention program for municipal industrial facilities. Currently only five municipal industrial facilities are operated in the City. These facilities include:

- the Solid Waste Management Facility (SWMF) on Elm Street,
- the fleet truck & heavy equipment garage on Loraine Street,
- the fleet and police garage at Prosser Road, and
- the Knoxville Area Transit (KAT bus station) on Magnolia Avenue
- the new Knoxville Area Transit Station on Church St.

Each facility is currently evaluated and inspected regularly by Engineering personnel and will continue to be inspected at least annually in the future. A new KAT facility opened during this permit term. The new facility was built using LEED standards and included stormwater quality treatment devices for the runoff.

The inspection and monitoring program has been productive at all of the MIF's in the past. Structural and management BMP's have been installed to control pollution and improve the runoff from each facility and all of the improvements were reported as they occurred. The SWMF has been retrofitted with structural controls to reduce the solids, sediment, hydrocarbons, and bacteria in the runoff from the paved areas. Additional water quality improvements were constructed at the SWMF that includes: new grit/sediment sumps, floatables skimmers, grass swale, and low flow modifications to the detention pond.

### **IN-3 Monitoring Element**

SWMP Task: Collect monitoring data from industrial stormwater dischargers and/or from TDEC. Assess impacts to the storm drain system. Status: Ongoing

As part of the NPDES Permit for stormwater discharges associated with industrial activity, applicants are required to monitor, at least bi-annually, representative stormwater outfalls identified on the facilities' Pollution Prevention Plans. Applicants must monitor in accordance with TDEC Rule 1200-4-10-.04. The City currently receives copies of the results of the industrial outfall self-monitoring from some of the regulated industries. The City will continue to work with TDEC or directly with the industrial discharger to obtain copies of the information, as it becomes available. The City will maintain this information in the City's industrial files, and will assess the impact of the monitored discharges on the water quality of the storm drain system as the City receives the data.

If the City determines that additional data needs to be provided in the monitoring program



for an industry (reports on additional parameters, etc.), requirements for an expanded program for subsequent monitoring events will be coordinated with TDEC and/or the industrial discharger.

The Stormwater and Street Ordinance authorizes the City to require additional monitoring from industries not covered under the TDEC programs whenever necessary. This will usually be required in conjunction with some enforcement action after a problem has been observed.

SWMP Task: Continue monitoring program at non-permitted commercial facilities using guidelines pursuant to 40 CFR 122.26(d)(2)(iv)(c)(2). Identify pollutants and sources.

Status: Ongoing

During the current permit term, the City developed a program to sample commercial "hotspots" sites that do not require TDEC or EPA permits. The land uses that require a City of Knoxville Special Pollution Abatement Permit (see section RC-2) are targeted for samples. The standard operating procedures for the City's wet-weather sampling program are used except grab samples are substituted for the automatic sampler stations.

The samples from the hotspot land uses are analyzed for a wide range of parameters which vary depending on the pollutants of concern for each land use. For example, restaurants and grocery stores will likely have runoff containing a higher nutrient load from their dumpster/grease bin area than a new auto dealership. Both will likely have oil/grease, sediments, and metals from the vehicle traffic. An animal kennel will obviously have an entirely different set of concerns. This monitoring data may play an important role in determining the future direction of the SPAP program and to verify the suitability and effectiveness of the SPAP runoff controls.

In addition to the stormwater sampling above, all outfalls from industrial areas have been tested as part of the dry weather field-screening program to identify potential specific sources of the pollutants. Each year the City will continue to choose random outfalls from industrial areas as the primary dry weather screening locations. These outfalls are tested with field screening kits with additional laboratory tests as necessary.

Additional monitoring and reports from Hazardous Waste Treatment Storage and Disposal Facilities (HWTSDF) and industrial facilities subject to SARA Title III, Section 313 may be required when a problem has occurred, when the City has reason to believe a pollution problem exists, when TDEC or EPA do not already require sufficient testing, or if the City is mandated to test and report those facilities. Legal authority to require reports is maintained under Section 22.5-54 of the Stormwater & Streets Ordinance.

SWMP Task: Continue monitoring program at non-permitted commercial facilities and analyze the results from ongoing commercial monitoring program.

Schedule: Ongoing

Beginning in year two, the City initiated an annual sampling program at the storage and maintenance areas at the City's Loraine Street facility, Solid Waste Management Facility, and the KAT bus station. Samples are also collected at non-permitted commercial facilities such as restaurants, gas stations, car lots, grocery stores and other known hotspots. The sampling locations will change each year to ensure a wide variety of sites within each commercial group.



SWMP Task: Maintain adequate legal authority to require monitoring and reports from TSDs and Industrial facilities subject to SARA Title III, Section 313. Schedule: Ongoing

The Stormwater & Streets ordinance Section 22.5-54 states, "*The Director of Engineering may require any person engaging in any activity or owning any property, building or facility (including but not limited to a site of industrial activity) to undertake such reasonable monitoring of any discharge(s) to the stormwater system operated by the City and to furnish periodic reports of such discharges.*" The City will maintain this legal authority to require monitoring from all facilities necessary when the Stormwater & Streets ordinance is updated in the next permit term. Additional monitoring may be required when a problem has occurred or still exists, when the City has reason to believe a pollution problem exists, when TDEC or EPA do not already require sufficient testing, or if the City is mandated to test and report those facilities.

SWMP Task: Evaluate and update the monitoring program for Municipal Industrial Facilities. Status: Ongoing

The City has implemented limited testing at these facilities including ambient monitoring, dry-weather screening, and industrial stormwater inspections conducted by the Engineering Department. Initial monitoring inspections resulted in some of the structural modifications mentioned above in section IN-2 as well as some management policies and procedures. The City evaluated the current monitoring at MIFs and updated the plan to include some laboratory analysis to help evaluate the effectiveness of the installed structural controls.

The Loraine Street facility was the site for a full-scale side-by-side BMP investigation project. Inflow and effluent samples were collected from each of the structural devices to determine the efficiency of each unit.

Stormwater runoff from the SWMF is sampled annually as described in MN-2. BMP monitoring has begun on the structural retrofits that included new filters for bacteria removal.

The dry-weather screening program will continue to monitor the outfalls from all MIFs to insure that management controls are effective.

SWMP Task: Manage and Conduct Monitoring Program at MIFs. Status: Ongoing

The monitoring program for the municipal industrial facilities was developed during the first permit term and included in the first annual report. The program specified that the only municipal industries included in the City's monitoring program will be limited to the Knoxville Area Transit station, the Prosser Road fleet and passenger vehicle garage, and the Loraine Street maintenance and storage facility. However, the City added additional monitoring and testing of the parking lot runoff from the Solid Waste Management Facility (SWMF) on Elm Street during the first permit term. This monitoring program was developed as a Best Management Practices test site to evaluate the usefulness and effectiveness of catch basin filters on ultra-urban land uses. After a significant amount of bacteria was found in the runoff at the SWMF, the City installed an Aqua-Swirl and Aqua-Filter system for sediment and bacteria removal. Monitoring results indicate significant removal rates for sediment and bacteria. This year the City



implemented additional stormwater controls to treat the upper loading section of the SWMF. The system includes: new grit/sediment sumps, floatables skimmers, grass swale, and low flow modifications to the detention pond.

A BMP sampling project began in 2007 at the Loraine Street as described earlier. Two vault type stormwater treatment units were installed side-by-side at the Loraine Street facility in 2006.

Each year, the MIF outfalls are inspected at least once for non-stormwater flow in dry weather. If flow is observed, the normal dry weather screening parameters are analyzed, recorded, and investigated. In addition to the dry-weather screening, grab samples are collected from storage/maintenance areas at the City's Loraine Street facility, the Solid Waste Management Facility, Prosser Road Police Garage, and the KAT bus station.

#### **5.4 CONSTRUCTION SITE RUNOFF PROGRAM (CS)**

*Program to Implement and Maintain BMP Plans to Reduce Construction Site Runoff to the Municipal Storm Sewer System, 40 CFR 122.26(d)(2)(iv)(D).*

##### **CS-1 Site Planning**

SWMP Task: Requires construction sites greater than 10,000 sq. ft. to submit Erosion and Sediment (E&S) Control Plans. Status: Ongoing

The original Stormwater and Street Ordinance was passed in 1997 and specifically required construction sites greater than 10,000 square feet to provide erosion and sediment control plans. The ordinance was revised in 2005 but the requirement for erosion control plans was not removed. The current ordinance may be reviewed or downloaded on the Internet at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater). This requirement is satisfied in Section 22.5-27(j)(1) of the ordinance and will remain in place when the ordinance is renewed.

SWMP Task: Require Site Plans Submittals per the City of Knoxville BMP Manual. Status: Ongoing

The Stormwater and Street Ordinance requires all erosion and sediment control plan submittals and all site development work to comply with the Erosion and Sediment Control Handbook produced by TDEC, dated March 2002, or as amended by TDEC or its successor, or the City of Knoxville's Best Management Practices Manual, whichever is more restrictive. The City will continue to maintain the requirement for compliance with the City's BMP manual or an equivalent BMP in the future.

SWMP Task: Review and update minimum criteria for plan review and checklists. Status: Complete

Although the TDEC Erosion and Sediment Control Handbook provides a checklist for review of Erosion and Sediment Control Plans, the City developed a list of minimum criteria to



supplement the State checklist for various categories of site plans (residential, commercial, etc.). The City plans review staff uses the minimum criteria and checklists to ensure consistency in the plan review process. The checklist is available on the Stormwater section's web page at [www.cityofknoxville.org/engineering/ldmanual](http://www.cityofknoxville.org/engineering/ldmanual) as part of the Land Development manual.

SWMP Task: Require Pre-construction Assistance Meetings with Developers/Contractors for any project that requires a performance bond. Status: Ongoing

Since 1999, the City of Knoxville has required a Pre-construction Assistance Meeting with the contractor, and/or the developer, design engineer, and the City staff before a Site Development Permit is issued. This meeting is scheduled after the Site Development plans are ready for approval but before construction begins. The meeting ensures that all parties involved with the construction project are equally aware of the City's expectations. Topics covered in the meeting may include:

- The Development Inspection Checklists,
- The Stormwater & Streets Ordinance,
- The Engineering Department Enforcement Policy,
- Construction Best Management Practices,
- Inspection Schedules,
- State of Tennessee Erosion & Sediment Control Handbook,
- The City of Knoxville BMP manual,
- TDEC's ARAP,
- CGP SWPPP,
- Special notes and considerations for the particular site,
- Other important information relevant to the project.

The Pre-construction Assistance Meeting format will continue to be reviewed and updated throughout the permit term as new policies, procedures, BMPs, and other regulations necessitate. Since the assistance meetings have been successful at increasing compliance and reducing enforcement, they will be an ongoing policy.

### **CS-2 BMP Requirements**

SWMP Task: Require Construction BMPs from the City BMP manual or equivalent. Status: Ongoing

As outlined in the new Stormwater and Street Ordinance section 22.5-27, all erosion and sediment control plans must comply with either the latest version of the Erosion and Sediment Control Handbook produced by TDEC, or the City of Knoxville's Best Management Practices Manual, whichever is more restrictive. The requirement to use BMPs from the BMP manual or TDEC manual applies to Utility, Single Family Residential (>10,000 s.f) and Large Residential and Commercial Developments. The City proposed to maintain the requirement for compliance with the City's BMP manual or an equivalent BMP in the reapplication.



SWMP Task: Evaluate additional BMP requirements and design modifications. Maintain the updated BMP requirements on the City's web page. Status: Ongoing

The Stormwater and Street Ordinance section 22.5-22 authorizes the Engineering Department to compose a development design manual as the standard for which the ordinance requirements will be met. The BMP manual may be accessed on the Stormwater Section's web site at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater).

The guidance criteria in the manual describe acceptable types of BMPs, design standards, and maintenance requirements for BMPs to be used throughout the City to meet the requirements of the Stormwater and Street Ordinance. The guidance criteria are maintained on the Internet and distributed to developers as the official reference to ensure proper selection, design and maintenance criteria for BMPs. To ensure that effective post-development BMPs are constructed and maintained in the City, a standard maintenance covenant is executed before site development plans are approved. The guidance criterion addresses the goals of the NPDES stormwater program by allowing only BMPs which are effective in reducing the targeted pollutants.

The BMP manual is intended to be a live manual with updates to add additional BMPs as necessary and to remove ineffective BMPs when appropriate. Maintaining the manual on the web is the easiest method to keep the manual current and available to the public.

SWMP Task: Continue to require construction site Good Housekeeping practices. Status: Ongoing

To ensure that construction sites are kept clean and orderly, and to minimize pollutants in stormwater runoff as a result of other construction activities, the City will continue to require good housekeeping measures on all active construction sites. The good housekeeping practices included in the BMP manual address the following considerations:

- Designated areas for construction equipment maintenance and repair,
- Prohibition of discharges of oil and grease into the MS4 or receiving waters,
- Designated areas for construction equipment washing to ensure washwater is discharged to a maintained temporary holding basin or sediment trapping device,
- Designated construction site entrances, exits, and staging areas for all site traffic,
- Provision of storage areas for construction materials and receptacles for liquids (solvents, paints, acids) and solids in accordance with manufacturers recommendations,
- Provision of adequate waste storage areas and ensuring that the locations for collection of waste materials do not receive concentrated runoff, and
- Provision of adequate sanitary facilities on construction sites in accordance with Health Department Regulations.

Good Housekeeping issues are reviewed with the contractor, engineer, and developer during the pre-construction assistance meeting.





### CS-3 Inspection / Enforcement

SWMP Task: Maintain expanded inspections to include smaller construction sites (single family). Status: Ongoing.

In the first permit term, the City of Knoxville expanded new development construction inspections to include single-family residential sites. The Engineering Department also created a new triage plans review position to focus primarily on small projects. Additional inspectors have been added in the current permit term to allow for inspections on these smaller sites. Although the small sites do not require the same type of frequency of inspections as the larger sites, all small sites should be inspected at some point in the construction process.

SWMP Task: Implement routine site inspections on commercial and large residential developments (e.g. rough grading, E&S control installation, final grading, and final stabilization.) Status: Ongoing

The Engineering Department continues site inspections for large residential and commercial developments. These inspections are not a new program and have been occurring since at least 1994. Inspections are performed during rough grading, final grading, and at various other times during the construction process. Although the site inspections are not always scheduled with the contractor or developer, the City staff may visit the construction sites approximately every three weeks or sooner if necessary. The time frame for some project inspections will vary due to the specific project.

These inspections are performed to ensure compliance with the approved erosion and sediment control plan, good housekeeping measures, and the design plan.

A significant improvement in this process was implemented after the 2003 ordinance revision. For bonded projects, the developer is now given a letter, which authorizes the installation of erosion and sediment controls after the submitted site development plan is approvable, but before the permit is issued. After the erosion and sediment controls are in place, a licensed professional must certify that the installation has been completed according to the e/s control plan. The site development permit is issued after the Engineering Department receives the certification and all other items complete.

SWMP Task: Require post-construction Development Certifications from licensed design professionals, before bond release to ensure the stormwater facilities are built as planned. Status: Ongoing

Since 1999, the City required all developments with a bond to submit to a post-construction Development Certification before the bond is released. A licensed professional Engineer and land surveyor must certify that the roads and stormwater features (quality & quantity) comply with the approved plans. Some deviation from the permitted plan may be allowed during construction as long as the final project still meets the City's minimum requirements. If the final certified project does not meet the minimum requirements, further adjustments must be made before the entire bond is released to the developer. This program does



require a second plan review by the Engineering Department after construction has finished to insure proper results in the field.

The Development Certification requires the following components when applicable:

- As-built drawings
- Complete detention calculations
- Roadway inspection reports
- Final site inspection in accordance with checklist
- Verification that all stormwater quantity and quality facilities are covered by a Covenants for Permanent Maintenance of Stormwater Facilities
- Engineering certification or soil retaining calculations for critical retaining walls

This program has been successful and will be continued throughout the permit term.

SWMP Task: Maintain enforcement procedures, policies, and follow-up monitoring/ inspections.

Status: Ongoing

The schedule for this task appropriately coincided with the schedule for ordinance updates. The existing enforcement procedures and policies have been effective and were not amended when the ordinance was updated in 2005. During this permit year, 248 NOVs were written for construction site runoff violations, 17 of those resulted in civil penalties totaling \$35,691.

Depending on the violation, a first-time offender is usually educated and asked to remediate the damage or correct the violation if possible. Repeat violators may be invited to attend a show-cause hearing before civil penalties are assessed. More severe or repeated violations will merit a Notice of Violation (NOV), which is issued in the field directly to the violator if available on site. Copies of the NOV are distributed to the property owner or developer by certified mail, the City Law Department, and the Engineering Department's file. The NOV may order specific remedies and require the violator to submit reports and/or pollution prevention plans. Penalties, if any, are often issued after the NOV expires so the violation and remedies may be fully evaluated.

In the event that a penalty is assessed, a violator may appeal the penalty before a five-member Environmental Appeals Board. The five volunteer members of the Environmental Appeals Board are appointed by the Mayor and consist of individuals with an expertise as follows:

1. One licensed professional engineer with three (3) years of engineering experience as a Professional Engineer;
2. One architect, engineer, landscape architect or surveyor with three (3) years of experience;
3. One representative of the development or industrial community;
4. One neighborhood representative;
5. One member at large.

Board members serve a 5-year term and may be re-appointed at the end of their term for one additional consecutive term. The member may be reappointed after skipping a term.



To help identify repeat violators, the City maintains an updated record of every NOV issued and a database for stormwater complaints.

### **CS-4 Training Programs**

SWMP Task: Co-Sponsor E&S Control Practice Seminars for all participants.

Status: Annually

The City and other Water Quality Forum members developed and presented free erosion and sediment control workshops throughout the first five years of the first permit term. To maximize participation, the workshops were typically presented in the early spring or late fall while construction activities are least intense. The workshops were very successful.

By the end of the first permit term, the City assisted UT and TDEC with promotion and presentation of the new TDEC erosion control certification program. This new certification program effectively duplicates the information the City had been providing in our annual seminars. To reduce the amount of competition for the two programs, the City will continue to promote and support the TDEC certification program in place of a separate competing erosion control workshop. Each year, the City will send inspectors and supervisors to the training program as needed. Last year, all the new inspectors received this training while some inspectors were retrained.

SWMP Task: Provide training for City plans review staff.

Status: Ongoing

In an effort to fully train the Stormwater Management staff, the City has participated in several stormwater seminars around the region. Most staff members at the Engineer level will attend at least one, but typically more, seminars or training workshops annually. Typical seminars attended each year include: stormwater modeling, NAFSMA conference, regulatory updates, erosion control certification, NPDES updates, ASCE seminars, software workshops, and others. All licensed engineers must complete at least twelve hours of professional development each year. In addition to the stormwater management seminars attended, the Engineering staff have sponsored, planned, and presented a series of annual workshops/seminars to better educate the staff and development community about the development and plans review processes. Some of the topics of the City sponsored development process training sessions include:

- *Technical Requirements of the Stormwater & Streets Ordinance*
- *Construction Site Erosion and Sediment Control design and implementation*
- *Site Development Permit Review*
- *Special Pollution Abatement Permit program*
- *Performance and Indemnity Agreements, Permanent Maintenance Covenants for Stormwater Facilities*
- *Plat Review Process and Procedures*
- *Development Certifications*



The City will continue to provide training to the Engineering staff by participating in seminars locally and outside the city; in-house training by professional engineers; tuition reimbursement for university engineering classes; cooperating with TDOT, TDEC, TVA, UTK, and other agencies to provide professional training for the staff. Training of the plans review and inspections staff is an ongoing program within the Engineering Department.

### **5.5 COMPREHENSIVE MONITORING PROGRAM (MN)**

*Program to Collect Quantitative Data to Determine the Impacts of Urban Stormwater on the Natural Environment, pursuant to 40 CFR 122.26(d)(2)(iii)(A).*

#### **MN-1 Seasonal Storm Event Monitoring**

SWMP Task: Review and update the Standard Operating Procedures (SOP) for the seasonal sampling program. Status: Complete

The original SOP was developed in 1996 and submitted with the first annual report. Over time, the SOP became outdated and some parts became obsolete. The City revised the SOP to make it current and valid for the equipment, software, site locations, and procedures that are currently in use.

SWMP Task: Maintain at least five (5) automatic monitoring stations. Status: Ongoing

The five monitoring stations are currently located on First Creek, Love Creek, Williams Creek, Fourth Creek and Third Creek. The specific locations are noted on the large inventory map in the appendix of this report.

Each monitoring station consists of a tipping bucket rain gauge, an automatic sampler with 24 individual bottles/bags, a flow meter, and data logger. The intake line and flow sensors are installed in the low flow path for constant monitoring. The city replaced two monitoring stations with digital technology that provides temperature monitoring and remote access. This newer equipment has restored communications to five out of the five stations and provides real time access to data. Rain, level and flow data is now available to the public from a city managed website: <http://stormwater.knx/Flowlink> (username = "hotline" and password = call "215-4147").

After each rain event, a technician will interrogate the sampler in the field via laptop computer and calculate the appropriate flow-weighted composite sample. The information is then used to prepare the actual sample from the individual bottles. The composite sample is prepared; it is immediately transported to the laboratory for analysis.

SWMP Task: Collect twenty (20) to thirty (30) flow-weighted composite storm samples annually. Schedule: Ongoing

Each year, the automatic sampling stations should collect at least twenty (20) flow-



weighted composite storm samples. Each of the five monitoring stations collect four (4) to six (6) storm samples each year with at least one storm sample per quarter to help distribute the sampling events seasonally. During dry weather, the stations also collect ambient samples as described below in section MN-3 unless grab samples are taken manually.

Each of the flow-weighted storm samples are analyzed for thirteen (13) routine parameters. Only pH will be recorded in the field. The remaining routine parameters are analyzed and recorded in the laboratory in accordance with 40 CFR part 122.26 and 40 CFR part 136. The routine parameters to be tested in the laboratory are listed in the table below:

Routine Parameters for Laboratory Analysis		
Total Suspended Solids (TSS)	Nitrate + Nitrite Nitrogen (as N)	Total Recoverable Lead
Total Dissolved Solids (TDS)	Total Nitrogen	Total Recoverable Zinc
Total Ammonia Nitrogen (as N)	Biochemical Oxygen Demand (BOD <sub>5</sub> )	Dissolved Phosphorus
Total Ammonia + Organic Nitrogen	Chemical Oxygen Demand (COD)	Total Phosphorus

SWMP Task: Collect five (5) wet weather bacteria samples.

Schedule: Ongoing

Five bacteria samples were collected this year. One grab sample was collected manually at each monitoring station during a qualified storm event. Since the TMDL includes both fecal coliform and e-coli standards, both parameters were analyzed in the laboratory.

SWMP Task: Collect five (5) full-suite grab samples (one/station/permit).

Schedule: Ongoing

Each year, one monitoring station was selected for a full-suite grab sample. The five stations were rotated throughout the permit term to allow one sample from each location. The full-suite sample was obtained from the Third Creek location this year. In addition to the 13 routine parameters, the full-suite grab sample includes analysis for oil & grease and all the pollutants listed in Tables II & III of 40 CFR Part 122 Appendix D including: volatiles, pesticides, acids, base/neutrals, toxic metals, total phenol, and cyanide.

SWMP Task: Analyze Results from Ongoing Monitoring Program.

Schedule: Complete

Sampling data were collected, evaluated, and analyzed by City staff as part of the ongoing seasonal monitoring program. The updated seasonal pollutant loading and event mean concentration for the major watersheds within the MS4 may be estimated from the City monitoring data and/or from other regional data, which may include:

- NURP study,
- USGS Open-File Report 94-68 titled "Rainfall, Streamflow, and Water-Quality Data for Five Small Watersheds, Nashville, Tennessee, 1990-1992",
- USGS Water-Resources Investigations Report 95-4140,
- USGS Open-File Report 93-xxx titled "Stormwater Data for Knoxville, TN '91-'92.
- Any available data from TVA, EPA, and the State of Tennessee.



The latest results of the analysis were included in the appendix for the year five annual report. An estimate of the total annual runoff from each of the major watersheds within the City will be provided in each annual report (see Section 6.2.4 in this report). Due to ongoing annexations, watersheds or portions of watersheds may be added to this estimate as needed.

### **MN-2 Dry Weather Screening & Industrial/Commercial Site Monitoring**

SWMP Task: Dry Weather Screening as described in ILL-2. Status: Annually

SWMP Task: Implement Commercial/Industrial Monitoring in IN-3. Status: Ongoing

The City began sampling runoff from commercial sites such as restaurants, automotive facilities, and large parking lots in the current permit term. The purpose of this sampling is to determine the magnitude and variety of pollutants discharging from sites that have been targeted as pollution hotspots. The City began regulating some hotspots in 1997 through the Special Pollution Abatement Permit (SPAP) program. The list of SPAP land uses has expanded in the ordinance revisions. The current sampling program helped refine the SPAP requirements to better regulate the hotspots and reduce pollution in the streams.

### **MN-3 Ambient & Biological Monitoring**

SWMP Task: Implement ongoing Ambient sampling program. Schedule: Ongoing

At least twenty (20) ambient samples were collected each year at a rate of one sample per quarter from each of the five monitoring station locations. The City has implemented a quarterly ambient sampling program since the first permit and continued in the next term.

The samples were collected either by a single grab sample or by using the automatic samplers for a timed composite. Each ambient sample collected was analyzed for the 13 routine parameters listed in MN-1. This program was first implemented after the monitoring stations were moved to locations that have base flow in dry weather. Since all of the locations have some flow in ambient conditions, the samples can be retrieved at the same location as the storm event samples. This is an added convenience for direct comparison of storm event and ambient samples as well as allowing more options for collecting samples automatically.

SWMP Task: Collect five (5) wet weather bacteria samples. Schedule: Ongoing

Five bacteria samples were collected each year. One grab sample was collected manually at each monitoring station during a qualified storm event. Since the TMDL includes both fecal coliform and e-coli standards, both parameters were analyzed in the laboratory.

SWMP Task: Collect five (20) ambient bacteria samples. Schedule: Ongoing

Twenty bacteria samples were collected each year by one grab sample per station per



quarter. Each of the monitoring stations was sampled each quarter. The analysis of all 20 samples is summarized in section 6.2.2. of this report and will continue to be reported each year in the future permit. Both fecal coliform and e-coli parameters are analyzed as required in City's TMDL requirement.

SWMP Task: Continue the Biological-monitoring program (IBI, RBP III and stream surveys).  
Status: Ongoing

During the current permit term, the City improved the Biological monitoring program by contracting with the Fort Loudon Lake Association to complete the Rapid Bioassessment Protocols (RBP III) studies. The City also partnered with TDEC biologist's to complete an Index of Biological Integrity (IBI) studies. Multiple streams and sites are selected to provide data to supplement any available TDEC data and to assess overall stream health. In addition to the IBI and RBP III studies, the City has used staff and interns to perform stream walks and surveys.

In 2013, the City was granted QLP status from TDEC. Under the finalized QLP incentives, IBI's are no longer required and the City is required to perform visual stream assessments on streams listed for siltation. The biological monitoring program will now be project site specific, to monitor local impacts of stream restoration projects.

#### **MN-4 Training Programs**

SWMP Task: Implement Monitoring Training Program for staff and/or volunteers.  
Status: Ongoing

Ongoing training is necessary for staff and volunteers as part of sampling programs, stream walks, and the Adopt-a-Stream program. All new staff, interns, and volunteers will receive the appropriate training for their specific monitoring project as necessary. A mock IBI was conducted with Central High during this permit year, along with training a new staff member for the monitoring stations, and several informative webinars on water monitoring.

#### **5.6 TMDL IMPLEMENTATION AND ACTIVITIES**

*A TMDL Implementation Plan was approved by EPA on January 15, 2003 for the Fort Loudoun Lake Watershed (HUC 06010201) for the following creek systems: First Creek, Second Creek, Third Creek, Fourth Creek, and Goose Creek.*

The City of Knoxville addressed the following bacteria sources and activities as required by the TMDL and permit.

Farm Animals Schedule: Complete

At the end of year two, the City contracted the CAC Americorps Water Quality Team (AWQT) to begin a study of the potential bacteria impact of farm animals on the 303(d) streams



in Knoxville. Using agricultural zoning maps and GIS, the AWQT started to field verify potential livestock sites. During year two and three, they checked each site for signs of livestock access and runoff to the creek as well as erosion caused by access. Five properties in the Third Creek watershed contained a total of 94 head of livestock, including horses and cattle. Grab samples were collected from upstream and downstream of the study sites and delivered to the State of Tennessee's Laboratory for bacteria analysis. The data was compiled and analyzed during year three but did not indicate that the livestock create a significant impact on the bacteria in the stream. In fact, two of the sampled sites showed a decrease in both fecal coliform and E. coli from the upstream sample to the downstream sample. A third property was sampled on three different dates with upstream and downstream samples. Only one of the downstream samples showed an increase in bacteria levels. The City may reevaluate the effect of livestock on urban streams in the future but at this time there is no evidence to indicate that livestock are a significant source of bacteria in Knoxville's streams. Due to codes and zoning, the properties that do contain livestock will likely shrink or be eliminated in the future.

#### Wild Birds

Schedule: Ongoing

During year one, the CAC Americorps Water Quality Team (AWQT) volunteered to study the biological impact that waterfowl populations have on our local waterways. The City identified 56 possible waterfowl locations that could be either a source or sink for bacteria. The AWQT visited those locations in the fall and spring, counted the number of birds, and selectively sampled for ammonia. Six sites that had a large number of waterfowl or high concentrations ammonia were analyzed for fecal Coliform and E. coli. Four sites were considered to be sources of bacterial pollution since they discharged to creeks and two were considered sinks since they had no outlet to waters. The results of the initial investigation were reported in year one.

The initial investigation reduced the original 56 possible locations down to only four sites that need to be analyzed for structural retrofit or some management control to reduce the bacteria levels entering the stream or river. Since two of those sites enter the Tennessee River directly, the City will concentrate on analyzing, designing and implementing some mitigation measure for the remaining two sites, which discharge directly into 303(d) streams listed in the bacteria TMDLs.

The City met with the property owners, a stormwater treatment unit manufacturer, and the Fort Loudon Lake Association to discuss retrofitting the outlet of the Fountain City Duck Pond (FCDP) on First Creek with a device to reduce bacteria. At TDEC's request, the project was put on hold until toxicity data could be collected on the media filter. During permit year 2013-2014, the City hired a consultant to design the new outlet structure. The City investigated the possibility of including a passive sand filter into the pond outlet structure design, again TDEC decided that other BMP's should be implemented before resorting to treatment. For fiscal year 2014-2015, a Capital Improvement Project (CIP) was funded for construction of the new outlet structure, installation of a new fountain-pump-aerator system, removal of accumulated pond muck, and development of a comprehensive pond management program. These structural improvements and managerial controls will help to improve pond water quality. Any future analysis or progress on the FCDP CIP will be reported in subsequent annual reports.

During this permit term the City also partnered with Izaak Walton League (IWL) to





investigate ways to reduce waterfowl populations at the FCDP. The IWL and the Lions Club have worked to reduce domestic duck populations. Duck food vending machines have been added to reduce the popular use of bread which is not healthy for the ducks. This management practice is already in place and will continue as part of the new pond management program.

### Domestic Pets

Status: Ongoing

The City partnered with the Izaak Walton League and Prestige Cleaners to encourage the use of pooper-scoopers in City parks and the Central Business Improvement District. A total of 40 pet waste bag dispensers are located within the City. Approximately 82,000 pooper-scoopers bags were restocked last year throughout the City, which indicates a successful start to our pet waste challenge downtown. Additional dispensers may be added in other parks in the future. The City has distributed pooper-scoopers to vet clinics, pet stores, and during public functions such as Bark-in-the-Park and Earth Fest. An attention-grabbing poster was placed on display at these functions to help educate the pet owners of their responsibility to manage their pet's waste. In March 2003, the City passed a pet waste ordinance (O-98-03) to require the owner or custodian of any pet to collect and remove all solid pet wastes from all areas within the CBID.



### Outside Dumping of Animal Wastes

Status: Ongoing

In year one, the City investigated possible bacterial pollution sources from the Knoxville/Knox County Animal shelter. The City helped the shelter personnel setup a maintenance schedule for quarterly inspections and annual cleanout of their Nutrient Baffle Box.

### Fish/Bait Shops

Status: Complete

The City inspected Rea Springs Live Bait, Seymour Bait & Tackle, and Conservation Fisheries Inc. as possible sources of bacterial pollution. The effluent from Seymour Bait & Tackle and Conservation Fisheries Inc. discharged directly to a KUB sewer line. The effluent from Rea Springs Live Bait shop discharges to a constructed wetland and then into First Creek. Results of the bacterial sampling of the effluent entering First Creek were well below the threshold for human contact. TDEC was notified of the sampling and results.

### Private Leaking Laterals

Status: Ongoing

The City has continued to coordinate with KUB to identify and correct sanitary sewer discharges as necessary. A standard procedure has been developed to insure that each possible



contamination source is investigated after a problem is identified during dry weather screening. When high ammonia or fecal coliform levels are detected in the MS4, KUB and City personnel cooperate to identify the contamination source through dye testing or manhole by manhole testing. Once a source has been identified, KUB will be responsible for correcting problems in the main sanitary sewer system while the City will work with KUB and the private property owners to correct problems on private property. These coordinated inspections have identified private residences, industries, and businesses with plumbing or floor drains connected to the MS4 instead of the sanitary sewer system. This type of close coordination with all sewer utilities is essential for solving illicit discharges to the MS4 and will likely continue throughout the new permit term.

A Memorandum of Understanding has clarified the cooperative roles and responsibilities of both the City and KUB with respect to the City's stormwater management program and compliance with the MS4 NPDES permit. A copy of the MOU was included in the appendix of the 2003/2004 annual report.

Human Wastes (Outdoor Elimination by Humans)

Schedule: Completed

In year two, the City implemented a survey and inventory of homeless populations in Knoxville. The Engineering Department was able to add a few questions to the survey to determine how transients use the creeks while living outdoors. The results of the survey indicate that there is likely some impact on stream water quality by homeless people.

Dr. Nooe issued the following statement regarding his homeless study for the City of Knoxville: *"In the February, 2006, survey of homelessness, we had planned to examine use of creeks and streams by those persons living in outside locations. However, finding a limited number of persons in the six camps visited, the data are incomplete. There are several observations based on visits to camps and conversations with outreach workers that I can share. Homeless camps are scattered throughout the county. Many are located in or near center city, but others can be found in various sections such as west in the Cedar Bluff and Lovell Road area. There appear to be approximately 18-20 camps along creeks and streams, with an average of 4-6 persons staying in each camp. Occasionally, someone will use the water for bathing, but the most frequent use seems to be cooling food and beverages (tying the food in a plastic bag and suspending it in the water). We did not observe directly using the water for disposal of waste, but the proximity suggests possible runoff."*

Illicit Connections to Storm Drain System

Status: Ongoing

The Illicit Connections and Illegal Dumping Program (ILL) is an ongoing program reported in section 5.2 of this report.



## 6.0 MONITORING REPORTS SUMMARY

### 6.1 Dry-Weather Screening Program - New Outfall Inventory.

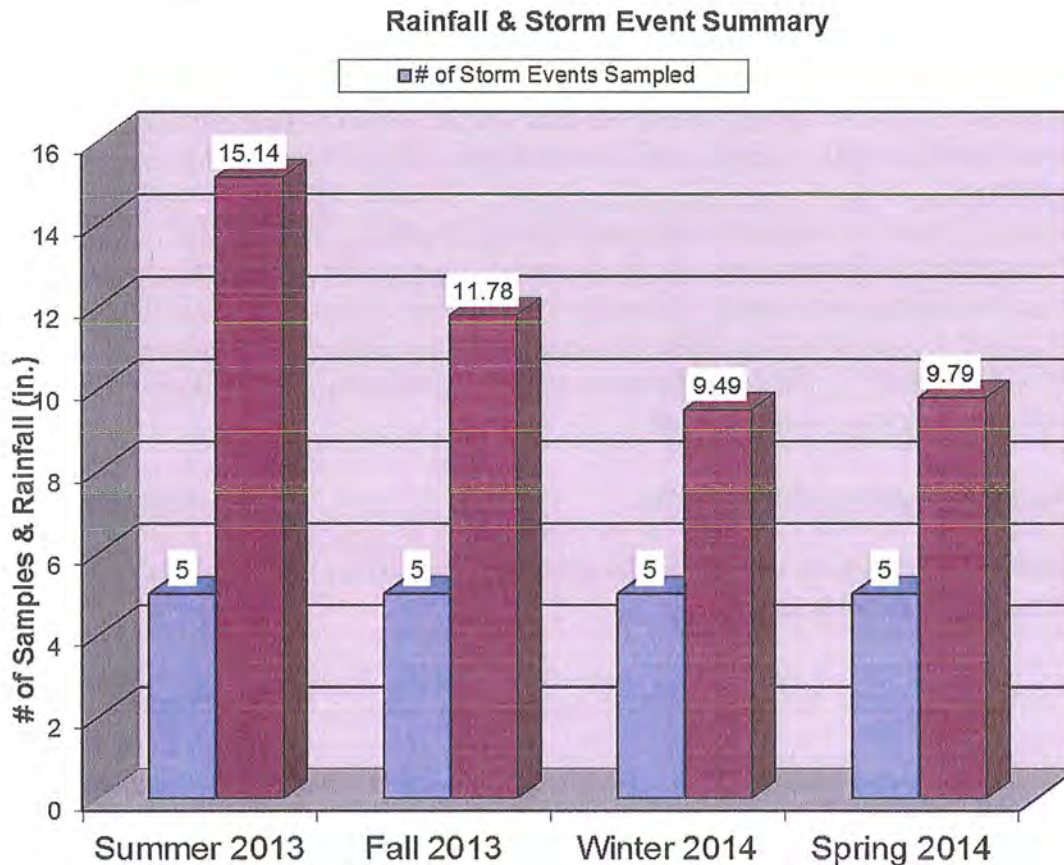
During the past permit year, no outfalls were removed from the City’s outfall inventory and 3 outfalls were added. Outfalls are typically added as a result of re-development or annexations and removed as a result of drainage alterations.

All updated outfalls are clearly marked on the inventory map located in the appendix but attached separately. Three new outfalls were added to the inventory this year.

### 6.2 Ongoing Stormwater Monitoring Program.

#### 6.2.1 Area Rainfall Data & Storm Event Summary.

During the July 1, 2013 to June 30, 2014 monitoring period, an average of 46.20 inches of rainfall was recorded and 20 storm events were sampled from the City’s five ISCO monitoring stations. Section V of the current NPDES Permit requires a sampling frequency for routine wet-weather samples of one storm event per season per station. This requirement was met. The graph below shows the relationship between the amounts of rainfall received and the number of storm events sampled per season. Monitoring data summaries for each of the sampling locations are included for TDEC’s review on the following pages.



## 6.2.2 Laboratory Analysis Summary First Creek Monitoring Station (KAT)

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.	
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/100mL	cfu/100 mL
SUMMER 2013	22-Jul	Comp	7.0	21,341,500	1.08	9.4	47	60	130	0.74	0.10	0.70	0.60	0.005	0.030	0.14	0.031			
FALL 2013	01-Nov	Comp	6.0	6,307,040	0.54	5.9	32	56	170	0.61	0.21	0.76	0.55	0.005	0.037	0.13	0.035			
WINTER 2014	17-Mar	Comp	6.0	14,028,600	0.44	5.0	35	12	200	0.87	0.10	0.10	0.10	0.005	0.030	0.10	0.025			
SPRING 2014	15-May	Comp	5.5	5,217,020	0.36	5.0	19	4	250	0.86	0.10	0.10	0.10	0.005	0.030	0.10	0.025			
Sample Average			6.1	11,723,540	0.61	6.3	33.3	33	188	0.77	0.13	0.42	0.34	0.0051	0.032	0.12	0.029	N/A	N/A	
*National NURP Study Average						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16				
*Characteristics of Urban Stormwater Range						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10				

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\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

TNTC- too numerous to count

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

## 6.2.2 Laboratory Analysis Summary

### Laboratory Analysis Summary - Seasonal Storm Sampling Program

July 1, 2012 thru June 30, 2013

Site	Quarter	pH	Average Sampled Volume	Rainfall per Event	BOD	COD	Total Suspended Solids (TSS)	Total Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia nitrogen	Total Kjeldahl nitrogen	Total organic nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate
Units			cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
KAT First Creek	Sum '13	7.0	21,341,500	1.08	9.4	47	60	130	0.74	0.10	0.70	0.60	0.005	0.030	0.14	0.031
	Fall '13	6.0	6,307,040	0.54	5.9	32	56	170	0.61	0.21	0.76	0.55	0.005	0.037	0.13	0.035
	Wtr '14	6.0	14,028,600	0.44	5.0	35	12	200	0.87	0.10	0.10	0.10	0.005	0.030	0.10	0.025
	Spr '14	5.5	5,217,020	0.36	5.0	19	4	250	0.86	0.10	0.10	0.10	0.005	0.030	0.10	0.025
	<b>Average:</b>	<b>6.1</b>	<b>11,723,540</b>	<b>0.61</b>	<b>6.33</b>	<b>33.3</b>	<b>32.9</b>	<b>187.5</b>	<b>0.77</b>	<b>0.13</b>	<b>0.42</b>	<b>0.34</b>	<b>0.005</b>	<b>0.032</b>	<b>0.12</b>	<b>0.029</b>
Love Creek	Sum '13	7.0	2662510.0	0.74	5.0	23	65	180	1.00	0.21	0.45	0.24	0.010	0.032	0.15	0.025
	Fall '13	5.5	313779.0	0.54	5.0	34	38	190	0.65	0.19	0.59	0.40	0.005	0.030	0.11	0.029
	Wtr '14	6.0	8693320.0	1.09	5.0	22	29	140	0.58	0.15	0.61	0.46	0.005	0.032	0.10	0.200
	Spr '14	5.0	4498350.0	1.23	5.0	44	230	140	0.40	0.10	0.44	0.44	0.015	0.100	0.17	0.088
	<b>Average:</b>	<b>5.9</b>	<b>4,041,990</b>	<b>0.90</b>	<b>5.00</b>	<b>30.8</b>	<b>90.5</b>	<b>162.5</b>	<b>0.66</b>	<b>0.16</b>	<b>0.52</b>	<b>0.39</b>	<b>0.009</b>	<b>0.049</b>	<b>0.13</b>	<b>0.086</b>
Third Creek	Sum '13	7.0	3516650.0	1.02	5.0	23	86	130	0.84	0.10	0.52	0.52	0.013	0.060	0.15	0.058
	Fall '13	6.0	1973730.0	0.71	6.3	27	110	140	0.66	0.26	1.20	0.94	0.028	0.140	0.27	0.066
	Wtr '14	6.0	10208200.0	1.30	5.0	31	55	160	0.69	0.19	0.70	0.51	0.013	0.054	0.10	0.140
	Spr '14	5.0	6574010.0	0.93	5.0	89	380	160	0.53	0.10	0.73	0.73	0.043	0.220	0.21	0.300
	<b>Average:</b>	<b>6.0</b>	<b>5,568,148</b>	<b>0.99</b>	<b>5.33</b>	<b>42.5</b>	<b>157.8</b>	<b>147.5</b>	<b>0.68</b>	<b>0.16</b>	<b>0.79</b>	<b>0.68</b>	<b>0.024</b>	<b>0.119</b>	<b>0.18</b>	<b>0.141</b>
Walden Drive Fourth Creek	Sum '13	7.0	3097430.0	0.82	6.6	18	43	110	0.63	0.10	0.53	0.53	0.006	0.030	0.10	0.035
	Fall '13	5.5	633770.0	0.63	5.0	24	100	120	0.59	0.18	1.00	0.82	0.006	0.067	0.16	0.041
	Wtr '14	6.5	5694520.0	0.90	9.0	25	55	85	0.54	0.10	0.60	0.60	0.005	0.039	0.10	0.200
	Spr '14	5.0	3065010.0	0.63	5.0	51	260	130	0.50	0.10	1.20	1.20	0.014	0.140	0.13	0.980
	<b>Average:</b>	<b>6.0</b>	<b>3,122,683</b>	<b>0.75</b>	<b>6.40</b>	<b>29.5</b>	<b>114.5</b>	<b>111.3</b>	<b>0.57</b>	<b>0.12</b>	<b>0.83</b>	<b>0.79</b>	<b>0.008</b>	<b>0.069</b>	<b>0.12</b>	<b>0.314</b>
Williams Creek	Sum '13	6.5	38975100.0	1.55	8.6	24	44	110	0.50	0.41	1.00	0.59	0.014	0.032	0.22	0.056
	Fall '13	6.0	1333370.0	0.49	6.7	26	75	100	0.53	0.39	1.10	0.71	0.018	0.064	0.21	0.058
	Wtr '14	6.5	1608720.0	0.45	5.0	44	8	220	0.75	0.10	0.39	0.39	0.005	0.030	0.10	0.025
	Spr '14	5.0	2761580.0	0.95	5.0	28	130	140	0.66	0.10	0.68	0.68	0.017	0.066	0.13	0.190
	<b>Average:</b>	<b>6.0</b>	<b>11,169,693</b>	<b>0.86</b>	<b>6.33</b>	<b>30.5</b>	<b>64.4</b>	<b>142.5</b>	<b>0.61</b>	<b>0.25</b>	<b>0.79</b>	<b>0.59</b>	<b>0.014</b>	<b>0.048</b>	<b>0.17</b>	<b>0.082</b>
<b>National NURP Study Average</b>					<b>11.9</b>	<b>90.8</b>	<b>na</b>	<b>na</b>	<b>na</b>	<b>*****</b>	<b>2.35</b>	<b>3.31</b>	<b>0.18</b>	<b>0.176</b>	<b>0.16</b>	
<b>Characteristics of Urban Stormwater Range</b>					<b>1 - 700</b>	<b>5 - 3,100</b>	<b>2 - 11,300</b>	<b>200 - 14,600</b>	<b>na</b>	<b>0.1 - 2.5</b>	<b>0.01 - 4.5</b>	<b>na</b>	<b>0.0 - 1.9</b>	<b>na</b>	<b>0.1 - 125</b>	
-Winter (Jan., Feb., and March); Spring (April, May, and June); Summer (July, Aug., and Sept.); Fall (Oct., Nov., and Dec.) -The Characteristics of Urban Stormwater and National NURP Study Average data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS																
BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030																

## 6.2.2 Laboratory Analysis Summary First Creek Monitoring Station (KAT)

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.	
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/100mL	cfu/100 mL
SUMMER 2013	22-Jul	Comp	7.0	21,341,500	1.08	9.4	47	60	130	0.74	0.10	0.70	0.60	0.005	0.030	0.14	0.031			
FALL 2013	01-Nov	Comp	6.0	6,307,040	0.54	5.9	32	56	170	0.61	0.21	0.76	0.55	0.005	0.037	0.13	0.035			
WINTER 2014	17-Mar	Comp	6.0	14,028,600	0.44	5.0	35	12	200	0.87	0.10	0.10	0.10	0.005	0.030	0.10	0.025			
SPRING 2014	15-May	Comp	5.5	5,217,020	0.36	5.0	19	4	250	0.86	0.10	0.10	0.10	0.005	0.030	0.10	0.025			
Sample Average			6.1	11,723,540	0.61	6.3	33.3	33	188	0.77	0.13	0.42	0.34	0.0051	0.032	0.12	0.029	N/A	N/A	

*National NURP Study Average	11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16
*Characteristics of Urban Stormwater Range	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10

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\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

TNTC- too numerous to count

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

## 6.2.2 Laboratory Analysis Summary

### Laboratory Analysis Summary - Seasonal Storm Sampling Program

July 1, 2012 thru June 30, 2013

Site	Quarter	pH	Average Sampled Volume	Rainfall per Event	BOD	COD	Total Suspended Solids (TSS)	Total Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia nitrogen	Total Kjeldahl nitrogen	Total organic nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate
Units			cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
KAT First Creek	Sum '13	7.0	21,341,500	1.08	9.4	47	60	130	0.74	0.10	0.70	0.60	0.005	0.030	0.14	0.031
	Fall '13	6.0	6,307,040	0.54	5.9	32	56	170	0.61	0.21	0.76	0.55	0.005	0.037	0.13	0.035
	Wtr '14	6.0	14,028,600	0.44	5.0	35	12	200	0.87	0.10	0.10	0.10	0.005	0.030	0.10	0.025
	Spr '14	5.5	5,217,020	0.36	5.0	19	4	250	0.86	0.10	0.10	0.10	0.005	0.030	0.10	0.025
	<b>Average:</b>	<b>6.1</b>	<b>11,723,540</b>	<b>0.61</b>	<b>6.33</b>	<b>33.3</b>	<b>32.9</b>	<b>187.5</b>	<b>0.77</b>	<b>0.13</b>	<b>0.42</b>	<b>0.34</b>	<b>0.005</b>	<b>0.032</b>	<b>0.12</b>	<b>0.029</b>
Love Creek	Sum '13	7.0	2662510.0	0.74	5.0	23	65	180	1.00	0.21	0.45	0.24	0.010	0.032	0.15	0.025
	Fall '13	5.5	313779.0	0.54	5.0	34	38	190	0.65	0.19	0.59	0.40	0.005	0.030	0.11	0.029
	Wtr '14	6.0	8693320.0	1.09	5.0	22	29	140	0.58	0.15	0.61	0.46	0.005	0.032	0.10	0.200
	Spr '14	5.0	4498350.0	1.23	5.0	44	230	140	0.40	0.10	0.44	0.44	0.015	0.100	0.17	0.088
	<b>Average:</b>	<b>5.9</b>	<b>4,041,990</b>	<b>0.90</b>	<b>5.00</b>	<b>30.8</b>	<b>90.5</b>	<b>162.5</b>	<b>0.66</b>	<b>0.16</b>	<b>0.52</b>	<b>0.39</b>	<b>0.009</b>	<b>0.049</b>	<b>0.13</b>	<b>0.086</b>
Third Creek	Sum '13	7.0	3516650.0	1.02	5.0	23	86	130	0.84	0.10	0.52	0.52	0.013	0.060	0.15	0.058
	Fall '13	6.0	1973730.0	0.71	6.3	27	110	140	0.66	0.26	1.20	0.94	0.028	0.140	0.27	0.066
	Wtr '14	6.0	10208200.0	1.30	5.0	31	55	160	0.69	0.19	0.70	0.51	0.013	0.054	0.10	0.140
	Spr '14	5.0	6574010.0	0.93	5.0	89	380	160	0.53	0.10	0.73	0.73	0.043	0.220	0.21	0.300
	<b>Average:</b>	<b>6.0</b>	<b>5,568,148</b>	<b>0.99</b>	<b>5.33</b>	<b>42.5</b>	<b>157.8</b>	<b>147.5</b>	<b>0.68</b>	<b>0.16</b>	<b>0.79</b>	<b>0.68</b>	<b>0.024</b>	<b>0.119</b>	<b>0.18</b>	<b>0.141</b>
Walden Drive Fourth Creek	Sum '13	7.0	3097430.0	0.82	6.6	18	43	110	0.63	0.10	0.53	0.53	0.006	0.030	0.10	0.035
	Fall '13	5.5	633770.0	0.63	5.0	24	100	120	0.59	0.18	1.00	0.82	0.006	0.067	0.16	0.041
	Wtr '14	6.5	5694520.0	0.90	9.0	25	55	85	0.54	0.10	0.60	0.60	0.005	0.039	0.10	0.200
	Spr '14	5.0	3065010.0	0.63	5.0	51	260	130	0.50	0.10	1.20	1.20	0.014	0.140	0.13	0.980
	<b>Average:</b>	<b>6.0</b>	<b>3,122,683</b>	<b>0.75</b>	<b>6.40</b>	<b>29.5</b>	<b>114.5</b>	<b>111.3</b>	<b>0.57</b>	<b>0.12</b>	<b>0.83</b>	<b>0.79</b>	<b>0.008</b>	<b>0.069</b>	<b>0.12</b>	<b>0.314</b>
Williams Creek	Sum '13	6.5	38975100.0	1.55	8.6	24	44	110	0.50	0.41	1.00	0.59	0.014	0.032	0.22	0.056
	Fall '13	6.0	1333370.0	0.49	6.7	26	75	100	0.53	0.39	1.10	0.71	0.018	0.064	0.21	0.058
	Wtr '14	6.5	1608720.0	0.45	5.0	44	8	220	0.75	0.10	0.39	0.39	0.005	0.030	0.10	0.025
	Spr '14	5.0	2761580.0	0.95	5.0	28	130	140	0.66	0.10	0.68	0.68	0.017	0.066	0.13	0.190
	<b>Average:</b>	<b>6.0</b>	<b>11,169,693</b>	<b>0.86</b>	<b>6.33</b>	<b>30.5</b>	<b>64.4</b>	<b>142.5</b>	<b>0.61</b>	<b>0.25</b>	<b>0.79</b>	<b>0.59</b>	<b>0.014</b>	<b>0.048</b>	<b>0.17</b>	<b>0.082</b>
<b>National NURP Study Average</b>					11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	
<b>Characteristics of Urban Stormwater Range</b>					1-700	5-3,100	2-11,300	200-14,600	na	0.1-2.5	0.01-4.5	na	0.0-1.9	na	0.1-125	
-Winter (Jan., Feb., and March); Spring (April, May, and June); Summer (July, Aug., and Sept.); Fall (Oct., Nov., and Dec.) -The Characteristics of Urban Stormwater and National NURP Study Average data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine; BMPS BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030																

## 6.2.2 Laboratory Analysis Summary Love Creek Monitoring Station

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.	
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/100mL	cfu/100 mL
SUMMER 2013	22-Jul	Comp	7.0	2,662,510	0.74	5.0	23	65	180	1.00	0.21	0.45	0.24	0.010	0.032	0.15	0.025			
FALL 2013	01-Nov	Comp	5.5	313,779	0.54	5.0	34	38	190	0.65	0.19	0.59	0.40	0.005	0.030	0.11	0.029			
WINTER 2014	03-Mar	Comp	6.0	8,693,320	1.09	5.0	22	29	140	0.58	0.15	0.61	0.46	0.005	0.032	0.10	0.200			
SPRING 2014	03-Apr	Comp	5.0	4,498,350	1.23	5.0	44	230	140	0.40	0.10	0.44	0.44	0.015	0.100	0.17	0.088			
Sample Average			5.9	4,041,990	0.90	5.0	30.8	90.5	163	0.66	0.16	0.52	0.39	0.0087	0.049	0.13	0.086	N/A	N/A	

*National NURP Study Average	11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16								
*Characteristics of Urban Stormwater Range	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10								

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\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

TNTC- too numerous to count

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030



## 6.2.2 Laboratory Analysis Summary Third Creek Monitoring Station

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.	
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/100mL	cfu/100 mL
SUMMER 2013	22-Jul	Comp	7.0	3,516,650	1.02	5.0	23	86	130	0.84	0.10	0.52	0.52	0.013	0.060	0.15	0.058			
FALL 2013	02-Nov	Comp	6.0	1,973,730	0.71	6.3	27	110	140	0.66	0.26	1.20	0.94	0.028	0.140	0.27	0.066			
WINTER 2014	03-Mar	Comp	6.0	10,208,200	1.30	5.0	31	55	160	0.69	0.19	0.70	0.51	0.013	0.054	0.10	0.140			
SPRING 2014	03-Apr	Comp	5.0	6,574,010	0.93	5.0	89	380	160	0.53	0.10	0.73	0.73	0.043	0.220	0.21	0.300			
Sample Average			6.0	5,568,148	0.99	5.33	42.5	157.8	148	0.68	0.16	0.79	0.68	0.0243	0.119	0.18	0.141	N/A	N/A	

*National NURP Study Average	11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16								
*Characteristics of Urban Stormwater Range	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10								

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\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

TNTC- too numerous to count

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

## 6.2.2 Laboratory Analysis Summary Williams Creek Monitoring Station

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.	
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/100mL	cfu/100 mL
SUMMER 2013	22-Jul	Comp	6.5	38,975,100	1.55	8.6	24	44	110	0.50	0.41	1.00	0.59	0.014	0.032	0.22	0.056			
FALL 2013	01-Nov	Comp	6.0	1,333,370	0.49	6.7	26	75	100	0.53	0.39	1.10	0.71	0.018	0.064	0.21	0.058			
WINTER 2014	17-Mar	Comp	6.5	1,608,720	0.45	5.0	44	8	220	0.75	0.10	0.39	0.39	0.005	0.030	0.10	0.025			
SPRING 2014	03-Apr	Comp	5.0	2,761,580	0.95	5.0	28.0	130	140	0.66	0.10	0.68	0.68	0.017	0.066	0.13	0.190			
Sample Average			6.0	11,169,693	0.86	6.3	30.5	64.4	142.5	0.61	0.25	0.79	0.59	0.0135	0.048	0.17	0.082	N/A	N/A	

*National NURP Study Average	11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16								
*Characteristics of Urban Stormwater Range	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10								

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\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

TNTC- too numerous to count

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

## 6.2.2 Laboratory Analysis Summary Walden Drive Monitoring Station

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.	
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/100mL	cfu/100 mL
SUMMER 2012	22-Jul	Comp	7.0	3,097,430	0.82	6.6	18	43	110	0.63	0.10	0.53	0.53	0.006	0.030	0.10	0.035			
FALL 2012	01-Nov	Comp	5.5	633,770	0.63	5.0	24	100	120	0.59	0.18	1.00	0.82	0.006	0.067	0.16	0.041			
WINTER 2013	03-Mar	Comp	6.5	5,694,520	0.90	9.0	25	55	85	0.54	0.10	0.60	0.60	0.005	0.039	0.10	0.200			
SPRING 2013	03-Apr	Comp	5.0	3,065,010	0.63	5.0	51	260	130	0.50	0.10	1.20	1.20	0.014	0.140	0.13	0.980			
Sample Average			6.0	3,122,683	0.75	6.40	29.5	114.5	111.3	0.57	0.12	0.83	0.79	0.0076	0.069	0.12	0.314	N/A	N/A	

*National NURP Study Average	11.9	90.8	na	na	na	*****	2.35	3.31	0.180	0.176	0.16
*Characteristics of Urban Stormwater Range	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10

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\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

TNTC- too numerous to count

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

## 6.2.2 Laboratory Analysis Summary

### Municipal Wet Weather Sampling Results

Point Source Sample Site	Period/Unit	Date	Type	pH	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	Oil/Grease	E. Coli	Fecal Colif.
					mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		CFU/100ml
KAT	Annual	14-Apr	Grab	5.5	17.0	95	14	130	<i>0.10</i>	<i>0.10</i>	1.70	1.70	<i>0.0050</i>	0.090	0.19	0.067	5.8	3,790	3,200
Loraine Street Treatment Units	Pretreated	24-Jun	Grab	8.0	100.0	540	450	870	0.89	0.36	4.70	4.30	0.0690	1.100	2.20	1.400	58.0	<i>2,420</i>	4,400
	East Suntree	24-Jun	Grab	6.0	<i>5.0</i>	140	12	170	<i>0.10</i>	0.70	1.60	0.90	<i>0.0050</i>	0.044	0.29	0.170	<i>5.3</i>	<i>2,420</i>	3,800
	West Baysaver	24-Jun	Grab	7.0	13.0	150	59	270	0.18	<i>0.10</i>	1.50	1.50	0.0086	0.170	0.48	0.240	13.0	<i>2,420</i>	<i>6,000</i>
Transfer Station	Pretreated	24-Jun	Grab	6.0	25.0	180	500	240	0.62	0.38	2.80	2.40	0.1300	0.740	0.90	0.340	6.5		
	Treated	24-Jun	Grab	8.0	5.2	39	37	190	0.66	0.27	0.95	0.68	0.0100	0.140	0.31	0.240	<i>5.3</i>	980	<i>6,000</i>
	Catch Basin																		
Prosser Rd	Annual	25-Jun	Grab	7.0	14.0	27	11	330	1.10	<i>0.10</i>	0.52	0.52	0.0069	0.640	0.11	0.100	<i>5.3</i>	11	
Average				<b>6.8</b>	<b>25.6</b>	<b>167.3</b>	<b>154.7</b>	<b>314.3</b>	<b>0.5</b>	<b>0.3</b>	<b>1.97</b>	<b>1.71</b>	<b>0.0335</b>	<b>0.418</b>	<b>0.64</b>	<b>0.365</b>	<b>14.2</b>	<b>2007</b>	<b>4680</b>
*National NURP Study Average					11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16				
*Characteristics of Urban Stormwater Range					1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10				

\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

Microbiological analysis: Results greater than the detectable range are listed in italics – maximum E. coli value from lab is 2420 and maximum Fecal Colif is 6000.

6.2.2 Laboratory Analysis Summary  
Auto Repair Shops Wet Weather Sampling Results

Point Source Sample Site	Location	Date	Type	pH	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	Oil/ Grease	E. Coli	Fecal Colif	
					mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mpn/ 100mL	cfu/ 100 mL	
AAMCO	8844 Kingston Pike (10 Mile Creek)	4/14/14	Grab	7.0	290.0	790	530.0	210	1.80	0.60	17.0	16.00	0.01	0.480	1.90	0.460	15.0	27	27	
Knoxville Radiator	6242 Chapman Highway (Knob Creek)	4/14/14	Grab	5.5	290.0	940	240.0	320	1.40	0.77	21.0	20.00	0.48	1.000	1.70	0.460	9.5	56	6000	
Atkins and Sons Transmission	4001 Rutledge Pike (Love Creek)	4/14/14	Grab	5.0	63.0	190	210.0	83	0.67	0.10	3.3	3.30	0.01	0.048	0.32	0.066	9.4	19	700	
Free Service Tire Company	4925 N. Broadway (First Creek)	5/15/14	Grab	5.0	5.0	72	40.0	85	0.16	0.10	0.5	0.46	0.01	0.096	0.25	0.025	5.3	147	6000	
Landmark International Trucks	4550 Rutledge Pike (Love Creek)	5/15/14	Grab	5.0	5.0	58	13.0	73	0.16	0.10	0.1	0.10	0.01	0.044	0.10	0.058	5.3	416	220	
			Grab																	
			Grab																	
			Grab																	
			Grab																	
Average				5.5	130.6	410	206.6	154	0.84	0.33	8.4	7.97	0.10	0.334	0.85	0.214	8.9	133	2589	
*National NURP Study Average					11.9	91	na	na	na	*****	2.35	3.31	0.18	0.176	0.16					
*Characteristics of Urban Stormwater Range					1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10					

\* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030

Microbiological analysis: Results greater than the detectable range are listed in italics – maximum E. coli value from lab is 2420 and maximum Fecal Colif is 6000.

## 6.2.2 Laboratory Analysis Summary

### Seasonal Ambient Grab Samples 2012-2013

Summer 2013	Date	pH	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.
First Creek	8/28/13	7.5	5.0	16	2.8	250	1.20	0.14	0.10	0.10	0.0050	0.030	0.10	0.025	365	800
Love Creek	8/28/13	7.5	5.0	17	9.5	300	1.10	0.10	1.40	0.30	0.0050	0.030	0.10	0.025	579	490
Third Creek	8/29/13	7.5	5.0	25	1.0	310	1.50	0.14	0.15	0.10	0.0050	0.030	0.10	0.025	461	460
Walden Drive	8/28/13	7.5	5.0	10	1.0	270	1.20	0.12	0.81	0.69	0.0050	0.030	0.10	0.025	214	200
Williams Creek	8/29/13	7.0	5.0	22	13.0	260	1.70	0.20	0.10	0.10	0.0050	0.030	0.10	0.025	345	250
<b>Average</b>		<b>7.4</b>	<b>5.0</b>	<b>18.0</b>	<b>5.5</b>	<b>278</b>	<b>1.34</b>	<b>0.14</b>	<b>0.51</b>	<b>0.26</b>	<b>0.0050</b>	<b>0.030</b>	<b>0.10</b>	<b>0.025</b>	<b>393</b>	<b>440</b>
Fall 2013	Date	pH	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.
First Creek	10/28/13	6.0	5.0	60	1.0	260	1.10	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	152	118
Love Creek	10/28/13	5.5	5.0	10	2.9	310	1.10	0.10	0.28	0.28	0.0050	0.030	0.10	0.025	291	400
Third Creek	10/28/13	6.0	5.0	10	1.0	260	1.30	0.10	0.20	0.20	0.0050	0.030	0.10	0.025	479	490
Walden Drive	10/28/13	6.0	5.0	10	1.0	270	1.30	0.10	0.2	0.2	0.0050	0.030	0.10	0.025	157	145
Williams Creek	10/28/13	5.5	5.0	10	1.0	260	1.50	0.10	0.14	0.14	0.0053	0.030	0.10	0.033	115	110
<b>Average</b>		<b>5.8</b>	<b>5.0</b>	<b>20.0</b>	<b>1.4</b>	<b>272</b>	<b>1.26</b>	<b>0.10</b>	<b>0.18</b>	<b>0.18</b>	<b>0.0051</b>	<b>0.030</b>	<b>0.10</b>	<b>0.027</b>	<b>239</b>	<b>253</b>
Winter 2014	Date	pH	BOD	COD	Suspended Solids (TSS)	Dissolved Solids (TDS)	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.
First Creek	1/22/14	5.0	5.0	10	1.0	270	1.50	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	102	88
Love Creek	1/22/14	5.0	5.0	10	1.0	240	1.50	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	31	34
Third Creek	1/22/14	5.0	5.0	10	1.0	250	1.70	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	214	86
Walden Drive	1/22/14	5.0	5.0	10	1.0	240	1.30	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	24	23
Williams Creek	1/22/14	5.0	5.0	10	14.0	270	1.60	0.10	0.10	0.10	0.0050	0.030	0.10	0.028	71	23
<b>Average</b>		<b>5.0</b>	<b>5.0</b>	<b>10.0</b>	<b>3.6</b>	<b>254</b>	<b>1.52</b>	<b>0.10</b>	<b>0.10</b>	<b>0.10</b>	<b>0.0050</b>	<b>0.030</b>	<b>0.10</b>	<b>0.026</b>	<b>88</b>	<b>51</b>
Spring 2014	Date	pH	BOD	COD	Suspended Solids	Dissolved Solids	Nitrate + Nitrite	Ammonia Nitrogen	Total Kjeldahl	Total Organic	Lead	Zinc	Total Phosphorus	Ortho Phosphate	E. Coli	Fecal Colif.
BDL: Results from lab procedures were below test detectable limits. Laboratory procedural limit values were used (in place of BDL) to determine averages for this report: BOD-5.0, COD-10, Ammonia-0.10, Nitrate-0.10, Organic Nitrogen-0.10, Oil & Grease-5.3, Ortho Phosphate-0.025, Total Phosphate-0.10, Kjeldahl-0.10, TDS-10, TSS-1, Lead-0.0050, Zinc-0.030														0.025	82	70
Third Creek	4/2/14	5.0	5.0	11	1.0	260	1.20	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	57	48
Walden Drive	4/2/14	5.0	5.0	14	1.0	260	1.00	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	365	340
Williams Creek	4/2/14	5.0	5.0	10	1.0	240	1.40	0.10	0.10	0.10	0.0050	0.030	0.10	0.025	104	88
<b>Average</b>		<b>5.2</b>	<b>5.0</b>	<b>11.0</b>	<b>1.0</b>	<b>254</b>	<b>1.08</b>	<b>0.10</b>	<b>0.10</b>	<b>0.10</b>	<b>0.0050</b>	<b>0.030</b>	<b>0.10</b>	<b>0.025</b>	<b>136</b>	<b>121</b>



### 6.2.3 Noncompliance.

The City of Knoxville has complied with all permit requirements.

### 6.2.4 Estimated Runoff from Major Watersheds within the MS4 Area.

Part VI (A)(2)(e)(i)(3) of the NPDES permit requires an estimate of the total volume of urban runoff discharged by the City of Knoxville for the year. This estimate is to be based on total rainfall for the year and the estimated imperviousness of different land uses. The total rainfall for the year was determined to be an average of the annual rainfall recorded during the year from the City's five stormwater monitoring stations located throughout the city and the National Weather Service's rain gage at the McGhee Tyson Airport. The average recorded annual rainfall amount was 46.20 inches.

To estimate the total runoff volume, the City utilized the GIS to determine approximate areas for each watershed within the city limits along with the corresponding land uses. Each land use is assigned an approximated impervious percentage according to the Camp Dresser and McKee Watershed Management Model described in the Part 2 application, pages 4-14 to 4-18.

It was assumed for each watershed that 95 percent of the rainfall from the impervious fraction, and 15 percent of the rainfall from the pervious fraction of each land use was converted to runoff. Therefore the impervious runoff coefficient and the pervious runoff coefficient were assumed to be 0.95 and 0.15, respectively. For example, based upon an average annual rainfall volume of 46.20 inches/year, the average annual runoff from a single-family residential land use (25% impervious) is 21.25 in/yr ( $46.20 * [(0.15 * 0.75) + (0.95 * 0.25)]$ ). The runoff coefficient for a single land use is the sum of the impervious percentage multiplied times the impervious runoff coefficient plus the pervious percentage multiplied by the pervious runoff coefficient. For the previous example, the average runoff coefficient for the single-family residential land use is 0.35 ( $[(0.15 * 0.75) + (0.95 * 0.25)]$ ). For a watershed, the average runoff coefficient is an area weighted average of each land use runoff coefficients times the percentage of the area of each land use.

The runoff from the major watersheds within the MS4 area was estimated by a formula in Camp Dresser & McKee's Watershed Management Module shown below:

$$Q_i = P \times C_i \times A_i$$

Where,

P = total precipitation (inches/year)

C = land use area weighted runoff coefficient =  $0.15 * \text{Pervious\%} + 0.95 * \text{Impervious\%}$

A = drainage area (acres) = acres x (43,560 ft<sup>2</sup>/acre) = ft<sup>2</sup>

Q =  $\sum Q_i$  = total runoff rate / 1,000,000 = Mgal

Q<sub>tot 13/14</sub> = **34,950** Million Gallons

Please find the analysis for the each watershed and for the entire city in table 6.2.4 on the following page.

6.2.4 ESTIMATED RUNOFF FROM MAJOR WATERSHEDS WITHIN THE MS4

July 1, 2013 - June 30, 2014

Watershed	Agricul./ Forest/ Vacant, Public Parks	Vacant (>10)	Rural Res.	Single Family Res.	Private Rec., Public Land	Multi-Family Res., Church	Insti-tutional	Mining, Office/ Service	Manu-facturing/ Whole-sale	Commer., Trans./ Utility/ Commun.	Major Roads/ Hwys/ ROWs	Under Const	Not Loaded	Total Acres in Watershed	Acres in the City Limits	Est. % Impervious	C Value	Total Rainfall during 13/14 (in./yr)	Total Runoff for 13/14 (Mgal/yr)
Baker Cr.	412	2	107	640	90	77	32	1	1	3	269	13	27	1,674	1,674	32	0.41	46.2	857
East Fork	313	0	10	475	302	78	73	31	195	235	584	33	180	2,509	2,509	53	0.57	46.2	1,803
First Cr.	724	0	300	3,152	544	501	110	157	127	556	1,412	51	116	7,750	7,750	44	0.50	46.2	4,853
Fourth Cr.	965	57	423	2,026	468	406	93	206	201	568	881	61	414	6,769	5,920	41	0.48	46.2	3,546
Goose Cr.	639	40	126	669	213	67	8	21	77	131	327	34	29	2,381	1,755	35	0.43	46.2	942
Grassy Cr.	2,230	176	561	610	215	24	0	14	31	95	211	39	95	4,301	433	17	0.29	46.2	155
Holston R.	2,362	69	371	1,222	417	45	5	2	219	33	805	32	50	5,632	2,455	28	0.37	46.2	1,144
Inman Br.	563	33	214	138	4	12	0	0	0	0	145	0	34	1,143	99	21	0.31	46.2	39
Knob Cr.	1,719	195	481	843	125	84	1	19	1	29	296	4	169	3,966	989	19	0.30	46.2	377
Knob Fork	1,659	26	398	675	182	56	5	93	6	124	257	19	252	3,752	823	22	0.33	46.2	338
Love Cr.	1,735	102	505	1,625	311	212	51	94	178	408	1,038	46	103	6,408	5,090	36	0.44	46.2	2,816
Second Cr.	443	0	90	1,281	346	247	29	107	140	542	1,161	35	82	4,503	4,498	53	0.57	46.2	3,222
Sinking Cr.	1,614	146	459	1,266	284	90	17	33	31	267	881	12	347	5,447	2,434	33	0.41	46.2	1,267
Swanpond C	3,892	303	833	604	121	36	4	79	240	232	457	65	285	7,151	499	19	0.30	46.2	190
Ten Mile Cr.	1,879	0	638	3,421	165	895	55	115	58	615	1,500	24	641	10,006	3,921	38	0.45	46.2	2,216
Third Cr.	1,757	79	436	3,003	406	512	184	124	225	443	1,252	98	220	8,739	8,417	37	0.45	46.2	4,717
TN River	7,197	503	2,269	4,681	2,910	403	187	72	170	238	990	121	1,113	20,854	8,232	22	0.33	46.2	3,380
Toll Cr.	535	69	154	222	42	26	1	0	37	4	93	42	4	1,229	767	22	0.32	46.2	310
Turkey Cr.	3,353	235	603	2,693	264	343	121	104	91	442	1,161	68	738	10,216	1,677	29	0.38	46.2	809
Whites Cr.	2,733	154	782	1,298	575	59	31	11	49	126	608	51	578	7,055	1,634	23	0.34	46.2	691
Williams Cr.	358	11	47	561	46	96	125	17	10	61	276	3	30	1,641	1,605	37	0.45	46.2	906
Woods Cr.	1,220	106	281	371	0	26	0	2	140	43	261	1	157	2,608	143	23	0.33	46.2	60
Sink-East	1,226	0		728	9	17	0	17	3	27	0	0	0	2,027	91	12	0.24	46.2	28
Beaver Cr	21,174	0	0	21,230	1,292	845	4	259	283	712	0	160	0	45,959	162	16	0.28	46.2	57
Tuckahoe	4,293	0	0	1,829	18	14	0	8	2	1	0	4	0	6,169	229	8	0.22	46.2	63
Fr.Broad riv	8,954	0	0	2,744	73	40	24	24	497	117	0	166	0	12,639	551	11	0.24	46.2	165
COK Total	73,949	2,306	10,088	58,007	9,422	5,211	1,160	1,610	3,012	6,052	14,865	1,182	5,664	192,528	64,357				34,950

The runoff from the major watersheds within the MS4 area was estimated by a formula in Camp Dresser & Mckee's Watershed Management Module.  $Q = P \times C \times A$

- where, P = total precipitation (inches/year) = 46.20 in./yr. = 3.85 ft./yr.
- C = land use area weighted runoff coefficient =  $0.15 \times \text{Pervious\%} + 0.95 \times \text{Impervious\%}$
- A = drainage area (acres) = acres in watershed  $\times (4.35E4 \text{ ft}^2/\text{acre}) = A_i \text{ ft}^2$
- Q = total runoff rate = sum of each watershed's  $Q_i$ .

Total estimated runoff for Year Ten = 34,950 Mgal

Approximate area and land use for each watershed was determined through the City's GIS. Total yearly rainfall amount was determined by averaging the amount of rain collected from the City's five monitoring stations located throughout the city (refer to map in appendix). Runoff coefficient (C) was calculated by adding 15 % of the pervious fraction to 95% of the impervious fraction in each watershed. This assumes that the fraction of rainfall producing runoff is 15% and 95% from pervious and impervious surfaces respectively. The summary of the runoff calculations are provided in the table above. Calculations for some of the watersheds were left out due to the insignificant amount of runoff that would be produced.





## **7.0 ASSESSMENT OF CONTROLS: ESTIMATED POLLUTANT LOADING REDUCTIONS FROM THE MS4.**

Since the NPDES permit was first issued in 1996, the City of Knoxville has developed and implemented all of the scheduled programs. The ongoing monitoring program and the dry weather-screening program were started during the 1996-1997 permit year. Each required program has been implemented annually since that time. Data has been collected, analyzed, and archived for future reference.

Quantitative estimates of pollutant loads and event mean concentrations (EMC) were reported as required in the fifth annual report for each permit term. The new estimates have lower EMC values for BOD, COD, TSS, TKN, Pb and Zn. In addition, the new estimates have higher EMC values for N+NN and DP. However, as described in the dry weather-screening program (ILL-2), noticeable reductions in contaminated outfalls have been observed since the program began.

Although testing data may not be available to substantiate all of the illicit discharges and illegal dumping problems, which have been resolved, the qualitative effect on water quality within the MS4 and Waters-of-the State is irrefutable. Many industries have removed illicit discharges, homeowners and utilities have replaced sections of leaking or broken sanitary sewers, the last known sections of the combined sewers were separated, unknown combined sewer systems have been located and planned for repair, creek restoration and cleanup activities are continuing, and many educational and volunteer programs have been sponsored, conducted, and/or coordinated to reduce dumping.

Structural controls for water quality control include stormwater treatment facilities on most new development and significant redevelopment throughout the city since 1997. Covenants are in place to insure that these water quality facilities are maintained and/or replaced as needed. The City has also installed oil/water separators and/or stormwater treatment devices at the following locations: the KAT bus facility on First Creek, Victor Ashe Park, Northwest Crossing regional detention pond, the Prosser Road garage, the Loraine Street Public Works facility, and the Solid Waste Transfer Station. The City has completed additional structural controls at the Solid Waste Transfer Station this year. Floating trash skimmers were installed near the mouth of some major creeks to prevent floating pollutants from discharging to the river. The Fort Loudon Lake Association has been contracted to maintain and replace the skimmers as needed.

All of the programs implemented to improve water quality in the creeks and river throughout the city should provide some quantitative evidence of improvement in future years. This data will be reported, as it becomes apparent.



## **8.0 SUMMARY OF MODIFICATIONS TO THE SWMP.**

In compliance with Part III (G)(2)(a) on page 8 of the NPDES Permit, the City proposes to modify the existing SWMP with additional components that neither subtract nor replace any existing requirements in the approved SWMP. As the modifications are developed and implemented, they will be reported as required in the subsequent annual report. The sections on the SWMP that will be impacted by the modifications include RC-1 and RC-2 as described below:

1. Residential and Commercial Program – Planning for New Development (RC-2)

Runoff Reduction design requirements that were proposed in the 2008 Reapplication will be updated, developed, and implemented so the City can proactively promote volume based Green Infrastructure for Development and Redevelopment. The volume based approach will not only improve water quality by reducing pollution in runoff but may also prevent scour in the streams to reduce a significant source of sediment loads. As more infiltration practices are implemented citywide, base flow in streams may be influenced positively by reducing the impact of dry periods as well as hot, polluted runoff. Only time will tell if economic benefits are realized from a reduced demand to expand the conveyance systems or to repair stream erosion.

2. Residential and Commercial Program – Planning for New Development (RC-2)

An Off-site Mitigation and Public Stormwater Project Fund program will be developed to assist those developments that cannot meet the runoff reduction, pollutant removal, or riparian buffer regulations entirely on site for whatever reason. This program will help direct improvements strategically throughout the watersheds to provide the greatest benefit for flood control or quality depending on the original purpose of the particular mitigation need. However, the proximity to the original development project may influence the mitigation multiplier in order to encourage mitigation as close to the impacted area as possible. The exact details of the program will be submitted to TDEC as soon as it is developed.

3. Residential and Commercial Program – Maintenance Activities (RC-1)

The City will develop and implement a Permanent Stormwater BMP Inventory, Tracking, Inspection, and Maintenance program that will ensure proper operation and maintenance for any BMP that is required as part of a permitted development. The existing program will be modified to include annual routine inspections and comprehensive inspections by a qualified professional every five years.



### 9.0 FISCAL ANALYSIS

The Fiscal Analysis for this annual report will list the permit year budget sources and amounts along with estimates for the following permit year. Sources of funds are listed for each major program. Due to complexity, all of the support activities such as purchasing, payroll, legal support, information systems, fleet management, and human resources are not reflected in the table. Future funding sources may change if a stormwater utility fee is implemented.

<b>Program Description</b>	<b>Fund Source</b>	<b>Actual FY 13/14</b>	<b>Est. FY 14/15</b>
Solid Waste Recycling (includes: composting, education, staff, etc.)	Fund 230	\$2,436,402	\$2,700,000
Household Hazardous Waste Facility	Fund 230	\$161,126	\$170,000
Stormwater Mgmt Operating expenses	Fund 220	\$2,763,900	\$2,775,740
Public Service operating/maintenance (brush/leaf/litter pickup; street cleaning; curb/gutter repair; stormdrain/catch basin cleaning, repair, & installation; ditching; seed/sod in R.O.W.; grate replacement; water pumping; tree trimming, removal, and planting.)	General Fund 100	\$3,220,885	\$3,800,000
First Creek Restoration/Improvements	Mixed	\$100,031	\$750,000
Cross Park Dr. Drainage Improvement	Fund 401	\$68,347	\$3,735,868
Prosser Rd/Emily Improvements	Fund 401	\$321,660	\$1,442,974
MLK Jr./Chestnut MS4	Fund 401	\$977,907	\$275,000
Solid Waste CIP	Fund 401	\$19,268	\$585,774
Water Quality CIP	Fund 401	\$289,059	\$990,526
Neighborhood Drainage Projects	Fund 401	\$205,809	\$1,525,000
Fountain City Lake Improvements	Fund 401	\$0	\$250,000
<b>Total Estimated Stormwater Costs</b>		<b><u>\$10,564,394</u></b>	<b><u>\$19,000,882</u></b>



# APPENDIX A

## Dry Weather Screening Results Summary

List of outfalls tested during the permit year with status

## Dry Weather Screening Data for 2014

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>00-500-0075</b>																
2014	11/25/13	1	No													
2014	11/25/13	2	No													
2014	4/17/14	3	No													
2014	4/17/14	4	No													
<b>00-400-0095</b>																
2014	11/22/13	1	No													
2014	11/22/13	2	No													
2014	4/21/14	3	No													
2014	4/21/14	4	No													
<b>00-500-0100</b>																
2014	11/25/13	1	No													
2014	11/25/13	2	No													
2014	4/21/14	3	No													
2014	4/21/14	4	No													
<b>00-500-0110</b>																
2014	11/25/13	1	No													
2014	11/25/13	2	No													
2014	4/17/14	3	No													
2014	4/17/14	4	No													
<b>00-400-0125</b>																
2014	11/25/13	1	No													
2014	11/25/13	2	No													
2014	4/17/14	3	No													
2014	4/17/14	4	No													

<b>Outfall Permit Year</b>	<i>Date</i>	<i>Visit #</i>	<i>Flow ?</i>	<i>Flow Rate (gpm)</i>	<i>pH (su)</i>	<i>Chlorine (ppm)</i>	<i>Copper (ppm)</i>	<i>Phenol (ppm)</i>	<i>Detergents (ppm)</i>	<i>Ammonia (ppm)</i>	<i>Fecal Sample (mpn/100ml)</i>	<i>Turbidity (ntu)</i>	<i>Color</i>	<i>Odor?</i>	<i>Surface Scum</i>	<i>Oil Sheen</i>
<b>00-500-0160</b>																
2014	12/2/13	1	No													
2014	12/2/13	2	No													
2014	4/21/14	3	No													
2014	4/21/14	4	No													
<b>00-400-0210</b>																
2014	12/2/13	1	No													
2014	12/2/13	2	No													
2014	4/11/14	3	No													
2014	4/11/14	4	No													
<b>00-400-0215</b>																
2014	12/2/13	1	No													
2014	12/2/13	2	No													
2014	4/11/14	3	No													
2014	4/11/14	4	No													
<b>00-300-0230</b>																
2014	12/2/13	1	No													
2014	12/2/13	2	No													
2014	4/11/14	3	No													
2014	4/11/14	4	No													
<b>00-100-0300</b>																
2014	8/16/13	1	No													
2014	8/16/13	2	No													
2014	5/8/14	3	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	5/8/14	4	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
<b>01-400-0015</b>																
2014	10/31/13	1	No													
2014	11/1/13	2	No													
2014	5/5/14	3	No													
2014	5/5/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>01-300-0052</b>																
2014	10/30/13	1	No													
2014	10/30/13	2	No													
2014	5/5/14	3	No													
2014	5/5/14	4	No													
<b>01-300-0100</b>																
2014	11/5/13	1	No													
2014	11/5/13	2	No													
2014	5/5/14	3	No													
2014	5/5/14	4	No													
<b>01-300-0125</b>																
2014	10/29/13	1	No													
2014	10/29/13	2	No													
2014	1/21/14	3	No													
2014	1/21/14	4	No													
<b>01-400-0130</b>																
2014	10/31/13	1	No													
2014	11/1/13	2	No													
2014	5/5/14	3	No													
2014	5/5/14	4	No													
<b>01-400-0135</b>																
2014	10/23/13	1	No													
2014	10/23/13	2	No													
2014	1/22/14	3	No													
2014	1/22/14	4	No													
<b>01-400-0140</b>																
2014	10/29/13	1	No													
2014	10/29/13	2	No													
2014	1/21/14	3	No													
2014	1/21/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>01-300-0144</b>																
2014	10/31/13	1	Yes	5 5	7.0	0	0	0	0	0	0	0	0	No	No	No
2014	11/1/13	2	Yes	5 5	7.0	0	0	0	0	0	0	0	0	No	No	No
2014	5/5/14	3	Yes	5 5	7.0	0	0	0	0	0	0	0	0	No	No	No
2014	5/5/14	4	Yes	5 5	7.0	0	0	0	0	0	0	0	0	No	No	No
<b>01-300-0145</b>																
2014	10/30/13	1	No													
2014	10/30/13	2	No													
2014	5/5/14	3	No													
2014	5/5/14	4	No													
<b>01-300-0150</b>																
2014	10/29/13	1	Yes	3 3	7.0	0	0	0	0	0	0	0	0	No	No	No
2014	10/29/13	2	Yes	3 3	7.0	0	0	0	0	0	0	0	0	No	No	No
2014	1/21/14	3	Yes	3 3	7.0	0	0	0	0	0	0	0	0	No	No	No
2014	1/21/14	4	Yes	3 3	7.0	0	0	0	0	0	0	0	0	No	No	No
<b>01-400-0157</b>																
2014	10/22/13	1	No													
2014	10/22/13	2	No													
2014	1/9/14	3	No													
2014	1/9/14	4	No													
<b>01-400-0235</b>																
2014	10/23/13	1	No													
2014	10/23/13	2	No													
2014	1/22/14	3	No													
2014	1/22/14	4	No													
<b>01-400-0236</b>																
2014	10/28/13	1	No													
2014	10/28/13	2	No													
2014	1/17/14	3	No													
2014	1/17/14	4	No													



Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>01-400-0238</b>																
2014	10/31/13	1	No													
2014	11/1/13	2	No													
2014	1/8/14	3	No													
2014	1/8/14	4	No													
<b>01-400-0240</b>																
2014	1/9/14	3	No													
2014	1/9/14	4	No													
2014	10/22/14	2	No													
2014	10/23/14	1	No													
<b>01-400-0250</b>																
2014	10/28/13	1	Yes	10	10	6.0	.4	0.40	0	0	0	0	0	No	No	No
2014	10/28/13	2	Yes	10	10	6.0	0	0	0	.4	0.00	0	0	No	No	No
2014	1/22/14	3	Yes	10	10	6.0	.08	0.08	0	0	0	0	0	No	No	No
2014	1/22/14	4	Yes	10	10	6.0	.8	0.80	0	0	0	0	0	No	No	No
<b>01-400-0345</b>																
2014	10/23/13	1	No													
2014	10/23/13	2	No													
2014	1/9/14	3	No													
2014	1/9/14	4	No													
<b>01-400-0355</b>																
2014	10/23/13	1	No													
2014	10/23/13	2	No													
2014	1/9/14	3	No													
2014	1/9/14	4	No													
<b>01-400-0370</b>																
2014	10/23/13	1	No													
2014	10/23/13	2	No													
2014	1/9/14	3	No													
2014	1/9/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>01-400-0410</b>																
2014	8/16/13	1	No													
2014	8/16/13	2	No													
2014	1/22/14	3	Yes	5	5	6.0	1.0	1.00	0	0	0	0	0	No	No	No
2014	1/22/14	4	Yes	5	5	6.0	1	1.00	0	0	0	0	0	No	No	No
<b>01-400-0502</b>																
2014	10/29/13	1	No													
2014	10/29/13	2	No													
2014	1/17/14	3	No													
2014	1/17/14	4	No													
<b>01-400-0515</b>																
2014	10/28/13	1	No													
2014	10/28/13	2	No													
2014	1/17/14	3	No													
2014	1/17/14	4	No													
<b>01-100-0550</b>																
2014	10/30/13	1	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	10/30/13	2	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	5/8/14	3	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	5/8/14	4	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
<b>01-400-0812</b>																
2014	10/24/13	1	No													
2014	10/25/13	2	Yes		3	7.0	0	0	0	0		0	0	No	No	No
2014	1/22/14	3	Yes		3	7.0	0	0	0	0		0	0	No	No	No
2014	1/22/14	4	Yes		3	7.0	0	0	0	0		0	0	No	No	No
<b>01-500-0830</b>																
2014	10/24/13	1	No													
2014	10/25/13	2	No													
2014	1/22/14	3	No													
2014	1/22/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>01-100-0855</b>																
2014	10/22/13	1	No													
2014	10/22/13	2	No													
2014	1/9/14	3	No													
2014	1/9/14	4	No													
<b>01-100-0860</b>																
2014	11/5/13	1	No													
2014	11/5/13	2	No													
2014	1/8/14	3	No													
2014	1/8/14	4	No													
<b>01-100-0875</b>																
2014	10/24/13	1	No													
2014	10/25/13	2	No													
2014	1/17/14	3	No													
2014	1/17/14	4	No													
<b>01-400-0885</b>																
2014	10/30/13	1	No													
2014	10/30/13	2	No													
2014	1/8/14	3	No													
2014	1/8/14	4	No													
<b>01-400-0900</b>																
2014	10/28/13	1	Yes	5	5	6.0	0	0	0	0	0	0	0	No	No	No
2014	10/28/13	2	Yes	5	5	6.0	0	0	0	0	0	0	0	No	No	No
2014	1/21/14	3	Yes		8	7.0	0	0	0	0		0	0	No	No	No
2014	1/21/14	4	Yes		8	7.0	0	0	0	0		0	0	No	No	No
<b>01-100-0905</b>																
2014	11/5/13	1	No													
2014	11/5/13	2	No													
2014	1/8/14	3	No													
2014	1/8/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>01-100-0907</b>																
2014	10/24/13	1	No													
2014	10/25/13	2	No													
2014	1/17/14	3	No													
2014	1/17/14	4	No													
<b>01-100-0920</b>																
2014	11/5/13	1	No													
2014	11/5/13	2	No													
2014	1/8/14	3	No													
2014	1/8/14	4	No													
<b>01-400-0925</b>																
2014	10/24/13	1	No													
2014	10/25/13	2	No													
2014	1/17/14	3	No													
2014	1/17/14	4	No													
<b>01-100-0940</b>																
2014	10/22/13	1	No													
2014	10/22/13	3	No													
2014	10/23/13	2	No													
2014	1/9/14	4	No													
<b>01-200-0945</b>																
2014	10/30/13	1	No													
2014	10/30/13	2	No													
2014	1/8/14	3	No													
2014	1/8/14	4	No													
<b>02-400-0020</b>																
2014	9/20/13	1	No													
2014	9/20/13	2	No													
2014	12/12/13	3	No													
2014	12/12/13	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>02-400-0045</b>																
2014	9/20/13	1	No													
2014	9/20/13	2	No													
2014	12/12/13	3	No													
2014	12/12/13	4	No													
<b>02-400-0065</b>																
2014	9/20/13	1	No													
2014	9/20/13	2	No													
2014	12/12/13	3	No													
2014	12/12/13	4	No													
<b>02-400-0110</b>																
2014	9/20/13	1	No													
2014	9/20/13	2	No													
2014	12/12/13	3	No													
2014	12/12/13	4	No													
<b>02-300-0165</b>																
2014	9/24/13	1	Yes	.5 0.50	6.0	0	0	0	0	0		0	0	No	No	No
2014	9/24/13	2	Yes	.5 0.50	6.0	0	0	0	0	0		0	0	No	No	No
2014	12/13/13	3	Yes	.5 0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	12/13/13	4	Yes	.5 0.50	7.0	0	0	0	0	0		0	0	No	No	No
<b>02-300-0167</b>																
2014	10/1/13	1	No													
2014	10/1/13	2	No													
2014	12/13/13	3	No													
2014	12/13/13	4	No													
<b>02-400-0169</b>																
2014	9/24/13	1	Yes	3 3	6.0	0	0	0	0	0		0	0	No	No	No
2014	9/24/13	2	Yes	3 3	6.0	0	0	0	0	0		0	0	No	No	No
2014	12/13/13	3	Yes	2 2	7.0	0	0	0	0	0		0	0	No	No	No
2014	12/13/13	4	Yes	2 2	7.0	0	0	0	0	0		0	0	No	No	No

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>02-300-0253</b>																
2014	9/27/13	1	No													
2014	9/27/13	2	No													
2014	12/13/13	3	No													
2014	12/13/13	4	No													
<b>02-400-0290</b>																
2014	9/27/13	1	Yes	.2 2	7.0	0	0	0	0	0		0	0	No	No	No
2014	9/27/13	2	Yes	.2 2	7.0	0	0	0	0	0		0	0	No	No	No
2014	12/18/13	3	Yes	2 0.20	7.0	0	0	0	0	0		0	0	No	No	No
2014	12/18/13	4	Yes	2 0.20	7.0	0	0	0	0	0		0	0	No	No	No
<b>02-100-0360</b>																
2014	9/27/13	1	No													
2014	9/27/13	2	No													
2014	12/19/13	3	No													
2014	12/19/13	4	No													
<b>02-100-0375</b>																
2014	11/6/13	1	No													
2014	11/6/13	2	No													
2014	12/12/13	3	No													
2014	12/12/13	4	No													
<b>02-100-0390</b>																
2014	10/1/13	1	No													
2014	10/1/13	2	No													
2014	12/18/13	3	No													
2014	12/18/13	4	No													
<b>02-100-0465</b>																
2014	9/27/13	1	No													
2014	9/27/13	2	No													
2014	12/18/13	3	No													
2014	12/18/13	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>02-100-0480</b>																
2014	10/1/13	1	Yes	0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	10/1/13	2	No													
2014	12/18/13	3	Yes	1 1	7.0	0	0	0	0	0		0	0	No	No	No
2014	12/18/13	4	Yes	1 1	7.0	0	0	0	0	0		0	0	No	No	No
<b>02-400-0485</b>																
2014	9/27/13	1	No													
2014	9/27/13	2	No													
2014	12/16/13	3	No													
2014	12/16/13	4	No													
<b>02-400-0489</b>																
2014	8/16/13	1	Yes	5 5	6.0	0	0	0	0	0		0	0	No	No	No
2014	8/16/13	2	Yes	5 5	6.0	0	0	0	0	0		0	0	No	No	No
2014	12/16/14	3	Yes	5 5	7.0	0	0	0	0	0		0	0	No	No	No
2014	12/16/14	4	Yes	5 5	7.0	0	0	0	0	0		0	0	No	No	No
<b>02-200-0490</b>																
2014	10/1/13	1	No													
2014	10/1/13	2	No													
2014	12/16/13	3	No													
2014	12/16/13	4	No													
<b>02-100-0495</b>																
2014	9/27/13	1	No													
2014	9/27/13	2	No													
2014	12/16/13	3	No													
2014	12/16/13	4	No													
<b>02-400-0520</b>																
2014	8/16/13	1	No													
2014	8/16/13	2	No													
2014	12/16/13	3	No													
2014	12/16/13	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>02-100-0545</b>																
2014	10/1/13	1	No													
2014	10/1/13	2	No													
2014	12/18/13	3	No													
2014	12/18/13	4	No													
<b>03-300-0005</b>																
2014	10/2/13	1	No													
2014	10/2/13	2	No													
2014	1/23/14	3	No													
2014	1/23/14	4	No													
<b>03-100-0375</b>																
2014	9/27/13	1	No													
2014	10/4/13	2	No													
2014	11/13/13	3	No													
2014	12/19/13	4	No													
<b>03-300-0399</b>																
2014	10/10/13	1	No													
2014	10/10/13	2	No													
2014	2/10/14	3	No													
2014	2/10/14	4	No													
<b>03-500-0425</b>																
2014	9/18/13	1	Yes	.5 0.50	6.0	0	0	0	0	0	0	0	0	No	No	No
2014	9/18/13	2	Yes	.5 0.50	6.0	0	0	0	0	0	0	0	0	No	No	No
2014	2/24/14	3	Yes	.5 0.50	6.0	0	0	0	0	0	0	0	0	No	No	No
2014	2/25/14	4	Yes	.5 0.50	6.0	0	0	0	0	0	0	0	0	No	No	No
<b>03-300-0430</b>																
2014	9/18/13	1	No													
2014	9/18/13	2	No													
2014	1/24/14	3	Yes	5 5	6.0	0	0	0	0	0	0	0	0	No	No	No
2014	1/24/14	4	Yes	5 5	6.0	0	0	0	0	0	0	0	0	No	No	No



Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>03-100-0435</b>																
2014	9/18/13	1	No													
2014	9/18/13	2	No													
2014	1/24/14	3	No													
2014	1/24/14	4	No													
<b>03-200-0436</b>																
2014	9/18/13	1	No													
2014	9/18/13	2	No													
2014	1/24/14	3	No													
2014	1/24/14	4	No													
<b>03-400-0440</b>																
2014	9/18/13	1	No													
2014	9/18/13	2	No													
2014	1/24/14	3	No													
2014	1/24/14	4	No													
<b>03-400-0470</b>																
2014	10/2/13	1	No													
2014	10/2/13	2	No													
2014	1/30/14	3	No													
2014	1/30/14	4	No													
<b>03-100-0490</b>																
2014	5/12/14	1	No													
2014	5/12/14	2	No													
2014	5/30/14	3	No													
2014	5/30/14	4	No													
<b>03-100-0530</b>																
2014	10/10/13	1	No													
2014	10/10/13	2	No													
2014	2/12/14	3	No													
2014	2/12/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>03-500-0540</b>																
2014	10/4/13	1	No													
2014	10/4/13	2	No													
2014	2/12/14	3	No													
2014	2/12/14	4	No													
<b>03-100-0553</b>																
2014	10/10/13	1	No													
2014	10/10/13	2	No													
2014	2/12/14	3	No													
2014	2/12/14	4	No													
<b>03-200-0555</b>																
2014	10/9/13	1	No													
2014	10/9/13	2	No													
2014	2/12/14	3	No													
2014	2/12/14	4	No													
<b>03-200-0580</b>																
2014	10/2/13	1	No													
2014	10/2/13	2	No													
2014	1/30/14	3	No													
2014	1/30/14	4	No													
<b>03-200-0595</b>																
2014	10/11/13	1	No													
2014	10/11/13	2	No													
2014	2/17/14	3	No													
2014	2/17/14	4	No													
<b>03-300-0660</b>																
2014	10/2/13	2	No													
2014	10/2/13	3	No													
2014	1/23/14	1	No													
2014	1/23/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>03-300-0675</b>																
2014	11/13/13	1	No													
2014	11/13/13	2	No													
2014	1/23/14	3	No													
2014	1/23/14	4	No													
<b>03-200-0685</b>																
2014	10/9/13	1	No													
2014	10/9/13	2	No													
2014	1/23/14	3	No													
2014	1/23/14	4	No													
<b>03-200-0690</b>																
2014	11/22/13	1	No													
2014	11/22/13	2	No													
2014	1/23/14	3	No													
2014	1/23/14	4	No													
<b>03-200-0720</b>																
2014	10/11/13	1	No													
2014	10/11/13	2	No													
2014	2/17/14	3	No													
2014	2/17/14	4	No													
<b>03-200-0725</b>																
2014	10/11/13	1	No													
2014	10/11/13	2	No													
2014	2/17/14	3	No													
2014	2/17/14	4	No													
<b>03-100-0795</b>																
2014	10/2/13	1	No													
2014	10/2/13	2	No													
2014	1/27/14	3	No													
2014	1/28/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>03-200-0820</b>																
2014	10/14/13	1	No													
2014	10/14/13	2	No													
2014	1/27/14	3	No													
2014	1/28/14	4	No													
<b>03-100-0830</b>																
2014	10/4/13	1	No													
2014	10/4/13	2	No													
2014	1/27/14	3	No													
2014	1/28/14	4	No													
<b>03-100-0845</b>																
2014	10/9/13	1	No													
2014	10/9/13	2	No													
2014	1/27/14	3	No													
2014	1/28/14	4	No													
<b>03-200-0855</b>																
2014	10/10/13	1	No													
2014	10/10/13	2	No													
2014	1/27/14	3	No													
2014	1/28/14	4	No													
<b>03-200-0865</b>																
2014	10/4/13	1	No													
2014	10/4/13	2	No													
2014	2/24/14	3	No													
2014	2/25/14	4	No													
<b>03-200-0870</b>																
2014	10/11/13	1	No													
2014	10/11/13	2	No													
2014	2/24/14	3	No													
2014	2/25/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>03-200-0875</b>																
2014	10/14/13	1	No													
2014	10/14/13	2	No													
2014	2/24/14	3	No													
2014	2/25/14	4	No													
<b>03-200-0900</b>																
2014	10/9/13	1	No													
2014	10/9/13	2	No													
2014	2/10/14	3	No													
2014	2/10/14	4	No													
<b>03-200-0920</b>																
2014	10/10/13	1	No													
2014	10/10/13	2	No													
2014	2/10/14	3	No													
2014	2/10/14	4	No													
<b>03-200-0930</b>																
2014	10/14/13	1	No													
2014	10/14/13	2	No													
2014	2/17/14	3	No													
2014	2/17/14	4	No													
<b>03-200-0937</b>																
2014	10/9/13	1	No													
2014	10/9/13	2	No													
2014	2/10/14	3	No													
2014	2/10/14	4	No													
<b>03-100-0960</b>																
2014	10/10/13	1	No													
2014	10/10/13	2	No													
2014	1/30/14	3	No													
2014	1/30/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>04-200-0055</b>																
2014	10/21/13	1	No													
2014	10/21/13	2	No													
2014	2/25/14	3	No													
2014	2/25/14	4	No													
<b>04-200-0157</b>																
2014	10/21/13	1	No													
2014	10/21/13	2	No													
2014	2/27/14	3	No													
2014	2/27/14	4	No													
<b>04-500-0238</b>																
2014	8/16/13	1	Yes	1	1	7.0	0	0	0	0	0	0	0	No	No	No
2014	8/16/13	2	Yes	1	1	7.0	0	0	0	0	0	0	0	No	No	No
2014	2/25/14	3	Yes	1	1	7.0	0	0	0	0	0	0	0	No	No	No
2014	2/25/14	4	Yes	1	1	7.0	0	0	0	0	0	0	0	No	No	No
<b>04-100-0250</b>																
2014	10/14/13	1	No													
2014	10/14/13	2	No													
2014	2/27/14	3	No													
2014	2/27/14	4	No													
<b>04-400-0280</b>																
2014	8/16/13	1	No													
2014	8/16/13	2	No													
2014	10/21/13	3	No													
2014	10/21/13	4	No													
<b>04-200-0290</b>																
2014	10/15/13	1	No													
2014	10/15/13	2	No													
2014	2/11/14	3	No													
2014	2/11/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>04-300-0308</b>																
2014	10/21/13	1	No													
2014	10/21/13	2	No													
2014	2/25/14	3	No													
2014	2/25/14	4	No													
<b>04-100-0325</b>																
2014	10/15/13	1	No													
2014	10/15/13	2	No													
2014	2/11/14	3	No													
2014	2/11/14	4	No													
<b>04-100-0326</b>																
2014	10/21/13	1	No													
2014	10/21/13	2	No													
2014	2/25/14	3	No													
2014	2/25/14	4	No													
<b>04-300-0345</b>																
2014	10/15/13	1	Yes	30	30	6.0	1	1.00	0	0	0	0	0	No	No	No
2014	10/15/13	2	Yes	30	30	6.0	1	1.00	0	0	0	0	0	No	No	No
2014	2/11/14	3	Yes	5	5	6.0	1	1.00	0	0	0	0	0	No	No	No
2014	2/11/14	4	Yes	5	5	6.0	1	1.00	0	0	0	0	0	No	No	No
<b>04-300-0352</b>																
2014	10/15/13	1	No													
2014	10/15/13	2	No													
2014	2/11/14	3	No													
2014	2/11/14	4	No													
<b>04-300-0359</b>																
2014	10/15/13	1	No													
2014	10/15/13	2	No													
2014	2/11/14	3	Yes	2	2	7.0	0	0	0	0	0	0	0	No	No	No
2014	2/11/14	4	Yes	2	2	7.0	0	0	0	0	0	0	0	No	No	No

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>05-200-0010</b>																
2014	11/6/13	1	No													
2014	11/6/13	2	No													
2014	3/6/14	3	No													
2014	3/6/14	4	No													
<b>05-400-0065</b>																
2014	11/11/13	1	No													
2014	11/11/13	2	No													
2014	3/6/14	3	No													
2014	3/6/14	4	No													
<b>05-400-0075</b>																
2014	11/12/13	1	No													
2014	11/12/13	2	No													
2014	2/28/14	3	No													
2014	2/28/14	4	No													
<b>05-400-0080</b>																
2014	11/12/13	1	No													
2014	11/12/13	2	No													
2014	2/28/14	3	No													
2014	2/28/14	4	No													
<b>05-500-0110</b>																
2014	11/11/13	1	Yes	.5 0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	11/11/13	2	No	<Null>												
2014	3/6/14	3	Yes	.5 0.50	7.0	0	0	0	0	0		0	0	No	No	No
2014	3/6/14	4	Yes	.5 0.50	7.0	0	0	0	0	0		0	0	No	No	No
<b>05-200-0130</b>																
2014	11/11/13	1	No													
2014	11/11/13	2	No													
2014	2/28/14	3	No													
2014	2/28/14	4	No													



Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>05-500-0145</b>																
2014	11/6/13	1	No													
2014	11/6/13	2	No													
2014	3/6/14	3	No													
2014	3/6/14	4	No													
<b>05-500-0155</b>																
2014	8/27/13	1	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
2014	8/27/13	2	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
2014	11/2/13	3	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
2014	11/6/13	4	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
<b>05-500-0190</b>																
2014	11/11/13	1	No													
2014	11/11/13	2	No													
2014	2/28/14	3	No													
2014	2/28/14	4	No													
<b>05-100-0200</b>																
2014	11/6/13	1	No													
2014	11/6/13	2	No													
2014	3/7/14	3	No													
2014	3/7/14	4	No													
<b>05-300-0222</b>																
2014	11/11/13	1	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
2014	11/11/13	2	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
2014	3/6/14	3	Yes	10	10	7.0	0	0	0	0	0	0	0	No	No	No
2014	3/6/14	4	Yes	20	20	7.0	0	0	0	0	0	0	0	No	No	No
<b>05-300-0240</b>																
2014	11/12/13	1	No													
2014	11/12/13	2	No													
2014	2/28/14	3	No													
2014	2/28/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>06-200-0050</b>																
2014	11/14/13	1	No													
2014	11/14/13	2	No													
2014	3/10/14	3	No													
2014	3/10/14	4	No													
<b>06-400-0080</b>																
2014	8/27/13	1	Yes	5	5	7.0	0	0	0	0		0	0	No	No	No
2014	8/27/13	2	Yes	5	5	7.0	0	0	0	0		0	0	No	No	No
2014	11/12/13	3	No													
2014	11/12/13	4	No													
<b>06-100-0085</b>																
2014	11/13/13	1	No													
2014	11/13/13	2	No													
2014	3/10/14	3	Yes	2	2	7.0	0	0	0	0		0	0	No	No	No
2014	3/10/14	4	Yes	2	2	7.0	0	0	0	0		0	0	No	No	No
<b>06-400-0100</b>																
2014	11/12/13	1	No													
2014	11/12/13	2	No													
2014	3/11/14	3	No													
2014	3/11/14	4	No													
<b>06-400-0110</b>																
2014	11/14/13	1	No													
2014	11/14/13	2	No													
2014	3/10/14	3	No													
2014	3/10/14	4	No													
<b>06-200-0118</b>																
2014	11/14/13	1	No													
2014	11/14/13	2	No													
2014	3/10/14	3	No													
2014	3/10/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>06-200-0139</b>																
2014	11/14/13	1	No													
2014	11/14/13	2	No													
2014	3/11/14	3	No													
2014	3/11/14	4	No													
<b>06-100-0146</b>																
2014	11/13/13	1	No													
2014	11/13/13	2	No													
2014	3/11/14	3	No													
2014	3/11/14	4	No													
<b>06-200-0155</b>																
2014	11/14/13	1	No													
2014	11/14/13	2	No													
2014	3/10/14	3	Yes	1	1	7.0	0	0	0	0	0	0	0	No	No	No
2014	3/10/14	4	Yes	1	1	7.0	0	0	0	0	0	0	0	No	No	No
<b>06-200-0190</b>																
2014	11/13/13	1	No													
2014	11/13/13	2	No													
2014	3/11/14	3	No													
2014	3/11/14	4	No													
<b>07-200-0005</b>																
2014	11/19/13	1	No													
2014	11/19/13	2	No													
2014	3/13/14	3	No													
2014	3/13/14	4	No													
<b>07-200-0015</b>																
2014	11/19/13	1	No													
2014	11/19/13	2	No													
2014	3/20/14	3	No													
2014	3/21/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>07-500-0025</b>																
2014	11/20/13	1	No													
2014	11/20/13	2	No													
2014	3/20/14	3	No													
2014	3/21/14	4	No													
<b>07-400-0070</b>																
2014	11/19/13	1	No													
2014	11/19/13	2	No													
2014	3/13/14	3	No													
2014	3/13/14	4	No													
<b>07-400-0085</b>																
2014	11/20/13	1	Yes	3	3	6.0	1.1.00	0	0	0	0	0	0	No	No	No
2014	11/20/13	2	Yes	3	3	6.0	1.1.00	0	0	0	0	0	0	No	No	No
2014	3/20/14	3	Yes	3	3	7.0	1.1.00	0	0	0	0	0	0	No	No	No
2014	3/21/14	4	Yes	3	3	7.0	1.1.00	0	0	0	0	0	0	No	No	No
<b>07-400-0095</b>																
2014	11/20/13	1	No													
2014	11/20/13	2	No													
2014	3/13/14	3	No													
2014	3/13/14	4	No													
<b>07-100-0225</b>																
2014	11/19/13	1	No													
2014	11/19/13	2	No													
2014	3/20/14	3	No													
2014	3/21/14	4	No													
<b>08-200-0030</b>																
2014	11/20/13	1	No													
2014	11/20/13	2	No													
2014	3/26/14	3	No													
2014	3/26/14	4	No													

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>08-400-0035</b>																
2014	11/20/13	1	No													
2014	11/20/13	2	No													
2014	3/26/14	3	No													
2014	3/26/14	4	No													
<b>08-500-0090</b>																
2014	11/20/13	1	No													
2014	11/20/13	2	No													
2014	3/26/14	3	No													
2014	3/26/14	4	No													
<b>11-500-0625</b>																
2014	8/29/13	1	No													
2014	8/29/13	2	No													
2014	3/27/14	3	No													
2014	3/27/14	4	No													
<b>13-300-0135</b>																
2014	8/29/13	1	No													
2014	8/30/13	2	No													
2014	3/27/14	3	No													
2014	3/27/14	4	No													
<b>13-300-0140</b>																
2014	8/29/13	1	Yes	10	10	5.0	1 1.00	0	0	0	0	0	0	No	No	No
2014	8/30/13	2	Yes	10	10	5.0	1 1.00	0	0	0	0	0	0	No	No	No
2014	3/27/14	3	Yes	10	10	7.0	1 1.00	0	0	0	0	0	0	No	No	No
2014	3/27/14	4	Yes	10	10	7.0	1 1.00	0	0	0	0	0	0	No	No	No
<b>13-300-0150</b>																
2014	8/29/13	1	Yes	5	5	6.0	0	0	0	0	0	0	0	No	No	No
2014	8/30/13	2	Yes	5	5	6.0	0	0	0	0	0	0	0	No	No	No
2014	3/27/14	3	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No
2014	3/27/14	4	Yes	5	5	7.0	0	0	0	0	0	0	0	No	No	No

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>13-300-0155</b>																
2014	8/29/13	1	Yes	5	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	8/29/13	2	Yes	5	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	3/27/14	3	Yes	2	7.0	0	0	0	0	0		0	0	No	No	No
2014	3/27/14	4	Yes	2	7.0	0	0	0	0	0		0	0	No	No	No
<b>13-300-0228</b>																
2014	9/5/13	1	Yes	.1 0.10	<u>5.0</u>	0	0	0	0	0		0	0	No	No	No
2014	9/5/13	2	Yes	.1 0.10	<u>5.0</u>	0	0	0	0	0		0	0	No	No	No
2014	4/1/14	3	Yes	.1 0.10	7.0	0	0	0	0	0		0	0	No	No	No
2014	4/1/14	4	Yes	.1 0.10	7.0	0	0	0	0	0		0	0	No	No	No
<b>13-400-0260</b>																
2014	8/29/13	1	Yes	.5 0.50	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	8/30/13	2	Yes	.5 0.50	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	4/1/14	3	No													
2014	4/1/14	4	No													
<b>13-400-0265</b>																
2014	8/29/13	1	Yes	.5 0.50	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	8/30/13	2	Yes	.5 0.50	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	4/1/14	3	No													
2014	4/1/14	4	No													
<b>13-300-0305</b>																
2014	9/5/13	1	Yes	3 3	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	9/5/13	2	Yes	3 3	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	4/1/14	3	Yes	5 5	7.0	0	0	0	0	0		0	0	No	No	No
2014	4/1/14	4	Yes	5 5	7.0	0	0	0	0	0		0	0	No	No	No
<b>53-100-0045</b>																
2014	9/5/13	1	Yes	5 5	<u>6.0</u>	0	0	0	.5 0.50	0		0	0	No	No	No
2014	9/5/13	2	Yes	5 5	<u>6.0</u>	0	0	0	0	0		0	0	No	No	No
2014	4/2/14	3	Yes	5 5	7.0	0	0	0	0	0		0	0	No	No	No
2014	4/2/14	4	Yes	5 5	7.0	0	0	0	0	0		0	0	No	No	No

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
<b>53-400-0050</b>																
2014	9/5/13	1	No													
2014	9/5/13	2	No													
2014	4/2/14	3	No													
2014	4/2/14	4	No													
<b>79-400-0030</b>																
2014	9/12/13	1	No													
2014	9/12/13	2	No													
2014	4/11/14	3	No													
2014	4/11/14	4	No													

Shaded rows represent samples which contained elevated levels for at least 1 sampled parameter.

Oracle - Dry Weather Screening Data

Elevated readings have been underlined.

Below is a listing of sample parameters and their elevated reading criteria:

- pH < 6.5 or > 9 su
- Chlorine > 0.2 ppm
- Copper >= 0.1 ppm
- Phenol >= 0.1 ppm
- Detergents > 0.25 ppm
- Ammonia >= 1 ppm
- Fecal Sample >= 200 mpn/100 ml

## Dry Weather Screening - Sample Events for 2014

Outfall Name	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
00-500-0075	DRY	11/25/2013	11/25/2013	4/17/2014	4/17/2014
00-400-0095	DRY	11/22/2013	11/22/2013	4/21/2014	4/21/2014
00-500-0100	DRY	11/25/2013	11/25/2013	4/21/2014	4/21/2014
00-500-0110	DRY	11/25/2013	11/25/2013	4/17/2014	4/17/2014
00-400-0125	DRY	11/25/2013	11/25/2013	4/17/2014	4/17/2014
00-500-0160	DRY	12/2/2013	12/2/2013	4/21/2014	4/21/2014
00-400-0210	DRY	12/2/2013	12/2/2013	4/11/2014	4/11/2014
00-400-0215	DRY	12/2/2013	12/2/2013	4/11/2014	4/11/2014
00-300-0230	DRY	12/2/2013	12/2/2013	4/11/2014	4/11/2014
00-100-0300	<u>WET</u>	8/16/2013	8/16/2013	5/8/2014	5/8/2014
01-400-0015	DRY	10/31/2013	11/1/2013	5/5/2014	5/5/2014
01-300-0052	DRY	10/30/2013	10/30/2013	5/5/2014	5/5/2014
01-300-0100	DRY	11/5/2013	11/5/2013	5/5/2014	5/5/2014
01-300-0125	DRY	10/29/2013	10/29/2013	1/21/2014	1/21/2014
01-400-0130	DRY	10/31/2013	11/1/2013	5/5/2014	5/5/2014
01-400-0135	DRY	10/23/2013	10/23/2013	1/22/2014	1/22/2014
01-400-0140	DRY	10/29/2013	10/29/2013	1/21/2014	1/21/2014
01-300-0144	<u>WET</u>	10/31/2013	11/1/2013	5/5/2014	5/5/2014
01-300-0145	DRY	10/30/2013	10/30/2013	5/5/2014	5/5/2014
01-300-0150	<u>WET</u>	10/29/2013	10/29/2013	1/21/2014	1/21/2014
01-400-0157	DRY	10/22/2013	10/22/2013	1/9/2014	1/9/2014
01-400-0235	DRY	10/23/2013	10/23/2013	1/22/2014	1/22/2014
01-400-0236	DRY	10/28/2013	10/28/2013	1/17/2014	1/17/2014
01-400-0238	DRY	10/31/2013	11/1/2013	1/8/2014	1/8/2014
01-400-0240	DRY	10/23/2014	10/22/2014	1/9/2014	1/9/2014
01-400-0250	ILLICIT CONNECTION	10/28/2013	10/28/2013	1/22/2014	1/22/2014



Outfall Name	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
01-400-0345	DRY	10/23/2013	10/23/2013	1/9/2014	1/9/2014
01-400-0355	DRY	10/23/2013	10/23/2013	1/9/2014	1/9/2014
01-400-0370	DRY	10/23/2013	10/23/2013	1/9/2014	1/9/2014
01-400-0410	ILLICIT CONNECTION	8/16/2013	8/16/2013	1/22/2014	1/22/2014
01-400-0502	DRY	10/29/2013	10/29/2013	1/17/2014	1/17/2014
01-400-0515	DRY	10/28/2013	10/28/2013	1/17/2014	1/17/2014
01-100-0550	<u>WET</u>	10/30/2013	10/30/2013	5/8/2014	5/8/2014
01-400-0812	<u>WET</u>	10/24/2013	10/25/2013	1/22/2014	1/22/2014
01-500-0830	DRY	10/24/2013	10/25/2013	1/22/2014	1/22/2014
01-100-0855	DRY	10/22/2013	10/22/2013	1/9/2014	1/9/2014
01-100-0860	DRY	11/5/2013	11/5/2013	1/8/2014	1/8/2014
01-100-0875	DRY	10/24/2013	10/25/2013	1/17/2014	1/17/2014
01-400-0885	DRY	10/30/2013	10/30/2013	1/8/2014	1/8/2014
01-400-0900	<u>WET</u>	10/28/2013	10/28/2013	1/21/2014	1/21/2014
01-100-0905	DRY	11/5/2013	11/5/2013	1/8/2014	1/8/2014
01-100-0907	DRY	10/24/2013	10/25/2013	1/17/2014	1/17/2014
01-100-0920	DRY	11/5/2013	11/5/2013	1/8/2014	1/8/2014
01-400-0925	DRY	10/24/2013	10/25/2013	1/17/2014	1/17/2014
01-100-0940	DRY	10/22/2013	10/23/2013	10/22/2013	1/9/2014
01-200-0945	DRY	10/30/2013	10/30/2013	1/8/2014	1/8/2014
02-400-0020	DRY	9/20/2013	9/20/2013	12/12/2013	12/12/2013
02-400-0045	DRY	9/20/2013	9/20/2013	12/12/2013	12/12/2013
02-400-0065	DRY	9/20/2013	9/20/2013	12/12/2013	12/12/2013
02-400-0110	DRY	9/20/2013	9/20/2013	12/12/2013	12/12/2013
02-300-0165	<u>WET</u>	9/24/2013	9/24/2013	12/13/2013	12/13/2013
02-300-0167	DRY	10/1/2013	10/1/2013	12/13/2013	12/13/2013
02-400-0169	<u>WET</u>	9/24/2013	9/24/2013	12/13/2013	12/13/2013
02-300-0253	DRY	9/27/2013	9/27/2013	12/13/2013	12/13/2013

Outfall Name	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
02-400-0290	<u>WET</u>	9/27/2013	9/27/2013	12/18/2013	12/18/2013
02-100-0360	DRY	9/27/2013	9/27/2013	12/19/2013	12/19/2013
02-100-0375	DRY	11/6/2013	11/6/2013	12/12/2013	12/12/2013
02-100-0390	DRY	10/1/2013	10/1/2013	12/18/2013	12/18/2013
02-100-0465	DRY	9/27/2013	9/27/2013	12/18/2013	12/18/2013
02-100-0480	<u>WET</u>	10/1/2013	10/1/2013	12/18/2013	12/18/2013
02-400-0485	DRY	9/27/2013	9/27/2013	12/16/2013	12/16/2013
02-400-0489	<u>WET</u>	8/16/2013	8/16/2013	12/16/2014	12/16/2014
02-200-0490	DRY	10/1/2013	10/1/2013	12/16/2013	12/16/2013
02-100-0495	DRY	9/27/2013	9/27/2013	12/16/2013	12/16/2013
02-400-0520	DRY	8/16/2013	8/16/2013	12/16/2013	12/16/2013
02-100-0545	DRY	10/1/2013	10/1/2013	12/18/2013	12/18/2013
03-300-0005	DRY	10/2/2013	10/2/2013	1/23/2014	1/23/2014
03-100-0375	DRY	9/27/2013	10/4/2013	11/13/2013	12/19/2013
03-300-0399	DRY	10/10/2013	10/10/2013	2/10/2014	2/10/2014
03-500-0425	<u>WET</u>	9/18/2013	9/18/2013	2/24/2014	2/25/2014
03-300-0430	<u>WET</u>	9/18/2013	9/18/2013	1/24/2014	1/24/2014
03-100-0435	DRY	9/18/2013	9/18/2013	1/24/2014	1/24/2014
03-200-0436	DRY	9/18/2013	9/18/2013	1/24/2014	1/24/2014
03-400-0440	DRY	9/18/2013	9/18/2013	1/24/2014	1/24/2014
03-400-0470	DRY	10/2/2013	10/2/2013	1/30/2014	1/30/2014
03-100-0490	DRY	5/12/2014	5/12/2014	5/30/2014	5/30/2014
03-100-0530	DRY	10/10/2013	10/10/2013	2/12/2014	2/12/2014
03-500-0540	DRY	10/4/2013	10/4/2013	2/12/2014	2/12/2014
03-100-0553	DRY	10/10/2013	10/10/2013	2/12/2014	2/12/2014
03-200-0555	DRY	10/9/2013	10/9/2013	2/12/2014	2/12/2014
03-200-0580	DRY	10/2/2013	10/2/2013	1/30/2014	1/30/2014
03-200-0595	DRY	10/11/2013	10/11/2013	2/17/2014	2/17/2014

Outfall Name	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
03-300-0660	DRY	1/23/2014	10/2/2013	10/2/2013	1/23/2014
03-300-0675	DRY	11/13/2013	11/13/2013	1/23/2014	1/23/2014
03-200-0685	DRY	10/9/2013	10/9/2013	1/23/2014	1/23/2014
03-200-0690	DRY	11/22/2013	11/22/2013	1/23/2014	1/23/2014
03-200-0720	DRY	10/11/2013	10/11/2013	2/17/2014	2/17/2014
03-200-0725	DRY	10/11/2013	10/11/2013	2/17/2014	2/17/2014
03-100-0795	DRY	10/2/2013	10/2/2013	1/27/2014	1/28/2014
03-200-0820	DRY	10/14/2013	10/14/2013	1/27/2014	1/28/2014
03-100-0830	DRY	10/4/2013	10/4/2013	1/27/2014	1/28/2014
03-100-0845	DRY	10/9/2013	10/9/2013	1/27/2014	1/28/2014
03-200-0855	DRY	10/10/2013	10/10/2013	1/27/2014	1/28/2014
03-200-0865	DRY	10/4/2013	10/4/2013	2/24/2014	2/25/2014
03-200-0870	DRY	10/11/2013	10/11/2013	2/24/2014	2/25/2014
03-200-0875	DRY	10/14/2013	10/14/2013	2/24/2014	2/25/2014
03-200-0900	DRY	10/9/2013	10/9/2013	2/10/2014	2/10/2014
03-200-0905	<u>WET</u>	10/4/2013	10/4/2013	2/10/2014	2/10/2014
03-200-0920	DRY	10/10/2013	10/10/2013	2/10/2014	2/10/2014
03-200-0930	DRY	10/14/2013	10/14/2013	2/17/2014	2/17/2014
03-200-0937	DRY	10/9/2013	10/9/2013	2/10/2014	2/10/2014
03-100-0960	DRY	10/10/2013	10/10/2013	1/30/2014	1/30/2014
04-200-0055	DRY	10/21/2013	10/21/2013	2/25/2014	2/25/2014
04-200-0157	DRY	10/21/2013	10/21/2013	2/27/2014	2/27/2014
04-500-0238	<u>WET</u>	8/16/2013	8/16/2013	2/25/2014	2/25/2014
04-100-0250	DRY	10/14/2013	10/14/2013	2/27/2014	2/27/2014
04-400-0280	DRY	8/16/2013	8/16/2013	10/21/2013	10/21/2013
04-200-0290	DRY	10/15/2013	10/15/2013	2/11/2014	2/11/2014
04-300-0308	DRY	10/21/2013	10/21/2013	2/25/2014	2/25/2014
04-100-0325	DRY	10/15/2013	10/15/2013	2/11/2014	2/11/2014

Outfall Name	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
04-100-0326	DRY	10/21/2013	10/21/2013	2/25/2014	2/25/2014
04-300-0345	ILLCIT CONNECTION	10/15/2013	10/15/2013	2/11/2014	2/11/2014
04-300-0352	DRY	10/15/2013	10/15/2013	2/11/2014	2/11/2014
04-300-0359	<u>WET</u>	10/15/2013	10/15/2013	2/11/2014	2/11/2014
05-200-0010	DRY	11/6/2013	11/6/2013	3/6/2014	3/6/2014
05-400-0065	DRY	11/11/2013	11/11/2013	3/6/2014	3/6/2014
05-400-0075	DRY	11/12/2013	11/12/2013	2/28/2014	2/28/2014
05-400-0080	DRY	11/12/2013	11/12/2013	2/28/2014	2/28/2014
05-500-0110	<u>WET</u>	11/11/2013	11/11/2013	3/6/2014	3/6/2014
05-200-0130	DRY	11/11/2013	11/11/2013	2/28/2014	2/28/2014
05-500-0145	DRY	11/6/2013	11/6/2013	3/6/2014	3/6/2014
05-500-0155	<u>WET</u>	8/27/2013	8/27/2013	11/2/2013	11/6/2013
05-500-0190	DRY	11/11/2013	11/11/2013	2/28/2014	2/28/2014
05-100-0200	DRY	11/6/2013	11/6/2013	3/7/2014	3/7/2014
05-300-0222	<u>WET</u>	11/11/2013	11/11/2013	3/6/2014	3/6/2014
05-300-0240	DRY	11/12/2013	11/12/2013	2/28/2014	2/28/2014
06-200-0050	DRY	11/14/2013	11/14/2013	3/10/2014	3/10/2014
06-400-0080	<u>WET</u>	8/27/2013	8/27/2013	11/12/2013	11/12/2013
06-100-0085	<u>WET</u>	11/13/2013	11/13/2013	3/10/2014	3/10/2014
06-400-0100	DRY	11/12/2013	11/12/2013	3/11/2014	3/11/2014
06-400-0110	DRY	11/14/2013	11/14/2013	3/10/2014	3/10/2014
06-200-0118	DRY	11/14/2013	11/14/2013	3/10/2014	3/10/2014
06-200-0139	DRY	11/14/2013	11/14/2013	3/11/2014	3/11/2014
06-100-0146	DRY	11/13/2013	11/13/2013	3/11/2014	3/11/2014
06-200-0155	<u>WET</u>	11/14/2013	11/14/2013	3/10/2014	3/10/2014
06-200-0190	DRY	11/13/2013	11/13/2013	3/11/2014	3/11/2014
07-200-0005	DRY	11/19/2013	11/19/2013	3/13/2014	3/13/2014
07-200-0015	DRY	11/19/2013	11/19/2013	3/20/2014	3/21/2014

Outfall Name	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
07-500-0025	DRY	11/20/2013	11/20/2013	3/20/2014	3/21/2014
07-400-0070	DRY	11/19/2013	11/19/2013	3/13/2014	3/13/2014
07-400-0085	ILLCIT CONNECTION	11/20/2013	11/20/2013	3/20/2014	3/21/2014
07-400-0095	DRY	11/20/2013	11/20/2013	3/13/2014	3/13/2014
07-100-0225	DRY	11/19/2013	11/19/2013	3/20/2014	3/21/2014
08-200-0030	DRY	11/20/2013	11/20/2013	3/26/2014	3/26/2014
08-400-0035	DRY	11/20/2013	11/20/2013	3/26/2014	3/26/2014
08-500-0090	DRY	11/20/2013	11/20/2013	3/26/2014	3/26/2014
11-500-0625	DRY	8/29/2013	8/29/2013	3/27/2014	3/27/2014
13-300-0135	DRY	8/29/2013	8/30/2013	3/27/2014	3/27/2014
13-300-0140	ILLCIT CONNECTION	8/29/2013	8/30/2013	3/27/2014	3/27/2014
13-300-0150	<u>WET</u>	8/29/2013	8/30/2013	3/27/2014	3/27/2014
13-300-0155	<u>WET</u>	8/29/2013	8/29/2013	3/27/2014	3/27/2014
13-300-0228	<u>WET</u>	9/5/2013	9/5/2013	4/1/2014	4/1/2014
13-400-0260	<u>WET</u>	8/29/2013	8/30/2013	4/1/2014	4/1/2014
13-400-0265	<u>WET</u>	8/29/2013	8/30/2013	4/1/2014	4/1/2014
13-300-0305	<u>WET</u>	9/5/2013	9/5/2013	4/1/2014	4/1/2014
53-100-0045	ILLCIT CONNECTION	9/5/2013	9/5/2013	4/2/2014	4/2/2014
53-400-0050	DRY	9/5/2013	9/5/2013	4/2/2014	4/2/2014
79-400-0030	DRY	9/12/2013	9/12/2013	4/11/2014	4/11/2014

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<u>TYPE CODE</u>	<u>COUNT</u>
100	33
200	33
300	27
400	50
500	15

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# APPENDIX B

Stream Restoration/Weir Removal Contract Report

**2014**  
**City of Knoxville**  
**Weir Removal Program**



Fort Loudoun Lake Association,  
956 Volunteer Landing Lane, Knoxville, TN 37915  
865-523-3800 [www.fllake.org](http://www.fllake.org)

## Baker Creek 01

N 35°57.129'  
W 83°53.698'



This weir was found by FLLA staff. On March 03, 2014, it was removed by Kirk Forgety and Jake Hudson. A tree had fallen at Rock City Park blocking the stream and collecting trash. Using rakes and grabbers, the log and debris were removed.



## Baker Creek 02

N 35°57.127'  
W 83°53.677'



This weir was found by FLLA staff. On March 03, 2014, it was removed by Kirk Forgety and Jake Hudson. Rocks had dammed the creek at Rock City Park blocking the stream. Using hands and a potatoe hoe, the rocks were removed.

### Baker Creek 03

N 35°57.136'  
W 83°53.297'



This weir was found by FLLA staff. On March 3, 2014 it was removed by Kirk Forgety and Jake Hudson. A pile of rocks and debris was blocking the stream at Mary James Park, and the diverted water was eroding the bank. The stones were removed and placed to protect the eroded bank as flow was restored.

## Baker Creek 04

N 35°57.158'  
W 83°53.333'



This weir was found by FLLA staff. On March 3, 2014, it was removed by Kirk Forgety and Jake Hudson. Two logs were blocking the creek in Mary James Park. The logs were removed and the flow was restored.

## Baker Creek 05

N 35°57.163'  
W 83°53.335'



This weir was found by FLLA staff. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. Willow tree roots were blocking the creek in Mary James Park. The debris and some of the roots were removed and the flow was restored. We would recommend that the willow tree be removed from the stream or the stream rerouted.

## Baker Creek 06

N 35°57.164'  
W 83°53.344'



This weir was found by FLLA staff. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. Several logs were blocking the creek in Mary James Park. The logs and debris were removed and the flow was restored.

## Baker Creek 07

N 35°57.155'  
W 83°53.331'



This weir was found by FLLA staff. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A log was blocking the creek in Mary James Park. The log was removed and the flow was restored.

## Ten Mile Creek 01

N 35°55.684'  
W 84°04.137'



This weir was found by FLLA staff. On March 5, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by vines and a fallen tree was blocking the creek at Ten Mile Greenway Park. The vines and logs were removed and the flow was restored.

## Ten Mile Creek 02

N 35°55.679'  
W 84°04.145'



This weir was found by FLLA staff. On March 5, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a fallen tree was blocking the creek at Ten Mile Greenway Park. The logs were removed and the flow was restored.



## Ten Mile Creek 03

N 35°55.696'  
W 84°04.123'



This weir was found by FLLA staff. On March 5, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a fallen tree was blocking the creek at Ten Mile Greenway Park. The logs were removed and the flow was restored.

## Ten Mile Creek 04

N 35°55.448'  
W 84°04.447'



This weir was found by FLLA staff. On March 5, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a huge fallen tree was blocking the creek at Ten Mile Greenway Park. The tree was removed and the flow was restored.

## Second Creek 01

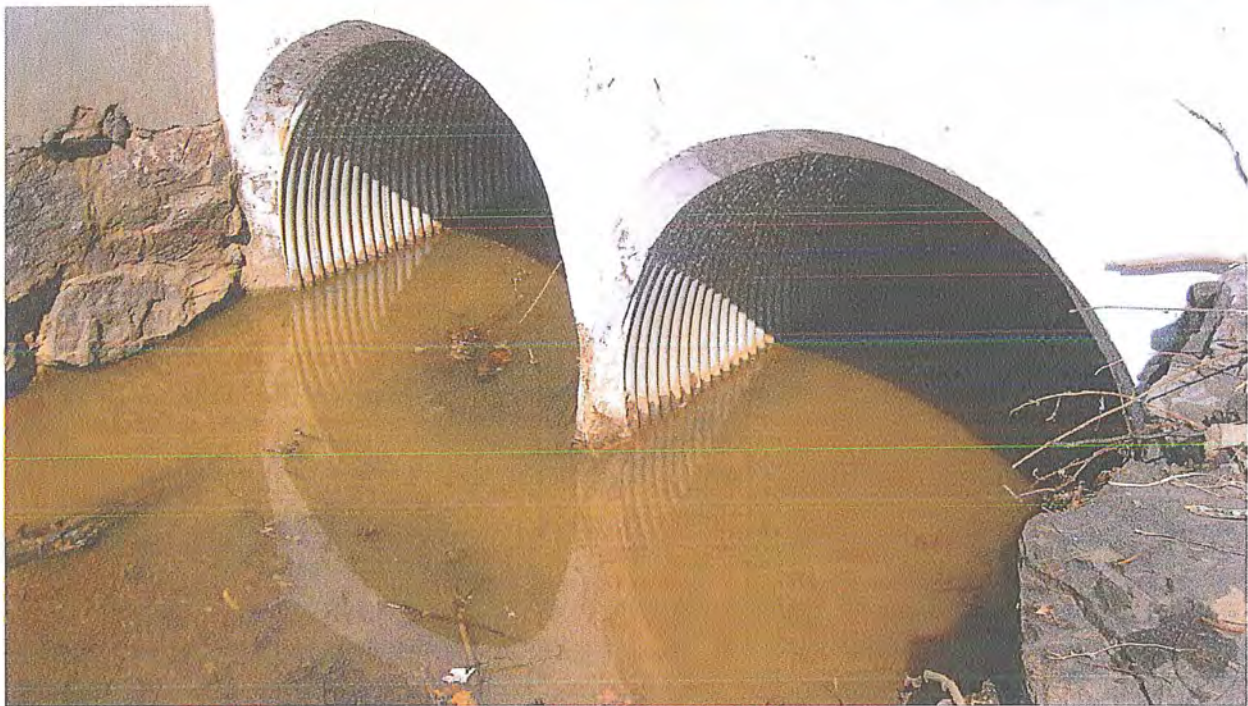
N 35°58.679'  
W 83°55.968'



This weir was found by FLLA staff. On March 10, 2014, it was removed by Kirk Forgety and Jake Hudson. A log wedged between two walls was blocking the creek in the Baxter Avenue right of way. The log was removed and the flow was restored.

## Fourth Creek 01

N 35°56.142'  
W 84°00.756'



This weir was found by FLLA staff. On March 11, 2014, it was removed by Jake Hudson. A log jam at a bridge was blocking the creek in the Papermill Drive right of way. The logs were removed and the flow was restored.

## Fourth Creek 02

N 35°56.151'  
W 84°00.738'



This weir was found by FLLA staff. On March 11, 2014, it was removed by Jake Hudson. A log jam at a pipe crossing was blocking the creek in the Papermill Drive right of way. The logs and debris were removed and the flow was restored. We recommend the rerouting of this pipe, as it will continue to cause weirs in the future.

## Knob Creek 01

N 35°54.752'  
W 83°53.139'



This weir was reported to the FLLA by staff of the City Engineering Department. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by several logs was blocking the creek behind 644 Southbrook Drive. The logs were removed and the flow was restored.

## Knob Creek 02

N 35°54.756'  
W 83°53.156'



This weir was reported to the FLLA by staff of the City Engineering Department. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a fallen tree and several logs was blocking the creek behind 644 Southbrook Drive. The logs were removed and the flow was restored.

### Knob Creek 03

N 35°54.751'  
W 83°53.165'



This weir was reported to the FLLA by staff of the City Engineering Department. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a fallen tree and several logs was blocking the creek behind 644 Southbrook Drive. The logs were removed and the flow was restored.



### Third Creek 01

N 35°57.037'  
W 83°58.076'



This weir was found by FLLA staff. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a fallen tree was blocking the creek at the Third Creek Greenway Park. The log was removed and the flow was restored.

## First Creek 01

N 35°01.892'  
W 83°55.959'



This weir was found by FLLA staff. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by several logs was blocking the creek on city owned land at 2535 Maple Drive. The logs were removed and the flow was restored.

## First Creek 02

N 35°01.880'  
W 83°55.949'



This weir was found by FLLA staff. On March 12, 2014, it was removed by Kirk Forgety and Jake Hudson. A debris jam caused by a downed tree and several logs was blocking the creek on city owned land at 2535 Maple Drive. The logs were removed and the flow was restored.

## Summary

As urban runoff has increased within the watersheds in Knoxville, the resultant stream bank scouring and widening has increased the frequency of tree falls into the creeks causing weirs. These weirs are a problem in that they can create additional stream bank scouring and erosion, trash and debris buildup, stream bed sedimentation, urban flooding, oxygen depletion, mosquito and other pest breeding sites and barriers to fish movement. The removal of these obstructions can help prevent further degradation of the creek, both visually and biologically. The above weirs were removed by Fort Loudoun Lake Association employees Kirk Forgety and Jake Hudson, utilizing chain saws, a one-ton come-along winch, potato hoes, rakes, pitch forks, mattocks, machetes and a Dodge Dakota 4X4 pick-up truck.



# APPENDIX C

## Table of SPAP Facility Inspections

Commerical and Industrial Facilities Inspected During 2013-2014

Permit Number	Project Name	Address	Street Name	Inspection Date	Inspector	Water Quality Device
10-029	Kroger Fuel Center GA-506	2223	N Broadway	07/24/2013	Storm System Services	Aquashield Swirl Unit
09-041	New Retail Building	5563	Clinton Hwy	08/14/2013	J. Shubzda	Catch Basin Insert
10-014	Cheddar's Restaurant	5615	Clinton Hwy	08/14/2013	J. Shubzda	Crystal Stream Vault Unit
10-044	Rowland Auto Sales	5711	Clinton Hwy	08/14/2013	J. Shubzda	Grassy Swale
11-038	Merchants Corner LP (Jimmy John's)	5400	Clinton Hwy	08/14/2013	J. Shubzda	Catch Basin Inserts
11-052	Mercanica Engeneral	5715	Clinton Hwy	08/14/2013	J. Shubzda	Grassy Swale
11-060	Instant Auto LLC	6258	Clinton Highway	08/14/2013	J. Shubzda	Catch Basin Insert
12-014	Jimmy Johns Sub Shop - DC Thompson, LLC	5525	Clinton Hwy	08/14/2013	J. Shubzda	Catch Basin Inserts
12-021	Papa John's Pizza	6529	Clinton Hwy	08/14/2013	J. Shubzda	Grassy Swale
12-022	Wings Express	5227	Clinton Hwy	08/14/2013	J. Shubzda	Managerial Controls
12-054	Harry Lane North Superstore	5724	Clinton Hwy	08/14/2013	J. Shubzda	Catch Basin Inserts
10-003	Dadu Mart Gas Station	1025	Heiskell Avenue	10/28/2013	J. Shubzda/L. Marcum	Suntree Box
04-027	Ingles Markets Gas Express #399	430	East Emory Road	10/30/2013	Dynamis, Inc.	Stormceptor Oil/Water Separator
08-028	Ingles Expansion	430	E. Emory Rd	10/30/2013	Dynamis, Inc.	
04-005	Outback Steakhouse Strawberry Plains	7400	Sawyer Ln	11/12/2013	Dynamis, Inc.	4 catch basin Inserts
02-009	Fed Ex Ground Package	3700	Middlebrook Pk	12/03/2013	Storm System Services	Crystal Stream 1056
12-067	Fed Ex Ground	3700	Middlebrook Pike	12/03/2013	Storm System Services	Crystal Stream 1056
02-011	Kroger Fuel Facility -U525	9501	S. Northshore Dr	12/04/2013	Saftey Kleen	Aqua-Swirl AS-4
03-004	Chapman Hwy Wal-Mart Supercenter	7420	Chapman Hwy	12/04/2013	Storm System Services	Oil and grit seperator
12-019	Kroger GA -525	9501	S Northshore Dr	12/04/2013	Saftey Kleen	
13-002	CarMax #7241	11225	Parkside Dr.	12/17/2013	Ledford	Aqua-Swirl AS-9
14-007	CarMax #7241	11225	Parkside Drive	12/17/2013	Ledford	Aqua-Swirl AS-9
06-019	Lexus of Knoxville	10315	Parkside Drive	12/19/2013	T&W Properties	5 Suntree Catch Basin Inserts
07-016	Toyota of Knoxville-Service Bay Addition	10415	Parkside Drive	12/19/2013	T&W Properties	AquaGuardian Catch Basin insert AG-18
06-032	Knoxville PDI Center	10416	Parkside Drive	12/21/2013	T&W Properties	Suntree Vault
05-014	Stowers Rental & Supply	10616	Lexington Drive	12/30/2013	J. Shubzda	Suntree Vault
14-017	Stowers Rental & Supply, Inc.	10644	Lexington Drive	12/30/2013	J. Shubzda	Suntree Vault
03-012	Earthfare and Shops	10921	Parkside Dr	01/24/2014	J. Shubzda	3 Catch basin inserts
05-001	Texas Roadhouse @ Turkey Creek	11001	Turkey Drive	01/24/2014	J. Shubzda	2 Suntree Catch Basin Inserts
06-021	Building 400, The Village at Northshore Town Centre	2099	Thunderhead Rd, STE TBD	01/24/2014	J. Shubzda	Kristar Flogard
11-015	Panda One	7741	S. Northshore Dr.	01/24/2014	J. Shubzda	5 Catch Basin Inserts
13-027	Shops at Northshore Town Center	2061	Thunderhead Road	01/24/2014	J. Shubzda	Catch Basin Inserts
09-051	The Parlor	726	Chickamauga Ave	02/14/2014	J. Shubzda/L. Marcum	Managerial Controls, Grease control
11-051	McDonalds - 5055 N. Broadway	5055	N Broadway	02/19/2014	J. Shubzda	CB Inserts and Flume guards
12-040	Taco Bell #28135	2085	N. Broadway	02/19/2014	J. Shubzda	Managerial Controls
12-056	Union Place	118	S Central Street	02/19/2014	J. Shubzda	Managerial Contros
12-066	115 S. Gay St to be determined	115	S. Gay Street	02/19/2014	J. Shubzda	Not Opened
01-008	Lowe's East Knoxville	4927	Millertown Pk	03/11/2014	J. Shubzda	CDS PMSU30_28 X (2)
08-042	Lowe's East of Knoxville	3100	South Mall Rd	03/11/2014	J. Shubzda	CDS PMSU30-28
08-012	Sherrill Hill Senior Living Facility	9320	Kingston Pike	03/14/2014	J. Shubzda	Aqua-swirl
09-033	Amberleigh Knoxville	272	Moss Grove Blvd	03/21/2014	J. Shubzda	
10-049	ALDI Grocery Store #12	110	Moss Grove Blvd	03/21/2014	J. Shubzda	Flexstorm Catch Basin Inserts
11-020	Academy Sports & Outdoors	145	Moss Grove Blvd	03/21/2014	J. Shubzda	Suntree Vault
11-035	Chick-Fil-A	4942	Homberg Dr.	03/21/2014	J. Shubzda	Catch Basin Inserts
12-007	Sherrill Hill Sr Living	271	Moss Grove Blvd.	03/21/2014	J. Shubzda	Swirl Vault
12-027	Lot 1R5R at Sherrill Hill	105	Moss Grove Blvd	03/21/2014	J. Shubzda	
13-004	Salsarita's Fresh Cantina	105	Moss Grove Blvd.	03/21/2014	J. Shubzda	
13-038	Express Carwash	106	Moss Grove Blvd	03/21/2014	J. Shubzda	Not installed
12-053	Chick Fil A N Broadway	5100	North Broadway	03/24/2014	J. Shubzda/B. Swanner	Catch Basin Inserts

**Commerical and Industrial Facilities Inspected During 2013-2014**

Permit Number	Project Name	Address	Street Name	Inspection Date	Inspector	Water Quality Device
13-042	Time to Shine Car Wash	2935	Millerpike Place Way	03/24/2014	J. Shubzda/B. Swanner	ADS Flexstorm
09-046	Pup's Pit BBQ	7660	S. Nothshore Dr.	03/26/2014	J. Shubzda	Managerial Controls
10-004	Roosters Bar and Grill	7585	S. Northshore Drive	03/26/2014	J. Shubzda	Catch Basin Insert
10-021	Brusters of Rocky Hill	7670	S Northshore Drive	03/26/2014	J. Shubzda	Infiltration BMP's
10-026	Five Guys Burger and Fries	234	Brookview Centre Way	03/26/2014	J. Shubzda	Suntree and DVS
11-005	Tin Roof	7428	S. Northshore Dr.	03/26/2014	J. Shubzda	Managerial Controls
11-055	Ott's BBQ	234	Brookview Centre	03/26/2014	J. Shubzda	Suntree and DVS
12-042	McDonalds	9526	S Northshore Dr SW	03/26/2014	J. Shubzda	Catch Basin Inserts, Flexstorm
08-018	The Supershine Express	9423	S. Northshore Dr.	03/27/2014	J. Shubzda	Suntree
08-031	Parkway Farms	9411	S Northshore Dr	03/27/2014	J. Shubzda	Kristar FloGard, Model FGP-2024F
09-015	Weigels Fox Lonas Rd	9148	Fox Lonas Rd	04/02/2014	J. Shubzda	Catch Basin Inserts and Oil boom in trench drain
09-013	JJ's Supershine Western Ave	4416	Western Ave	04/09/2014	J. Shubzda	Kristar Catch Basin Insert
12-062	Subway #1552 (N.Broadway)	3121	North Broadway	04/09/2014	J. Shubzda	Manigerial Controls
12-016	Taco Bell	411	Merchants Dr	04/10/2014	J. Shubzda	Catch Basin Inserts
08-004	Joe Neubert Collision Center	5086	Clinton Hwy	04/15/2014	J. Shubzda	Suntree
14-027	Joe Neubert Collision Centers	5086	Clinton Highway	04/15/2014	J. Shubzda	Catch Basin Insert
11-044	Weigel's Western Ave and Palmetto	5621	Western Ave	04/23/2014	J. Shubzda	Catch Basin Inserts
09-003	Weigels Mountain Grove Rd	7514	Mountain Grove Rd	04/30/2014	US Tanks	Suntree Catch Basin Insert
07-011	Taco Bell	5322	Millertown Pike	05/05/2014	J. Shubzda	Catch Basin Inserts
05-023	Gary Swaggerty (Auto-Outlet)	4403	Clinton Highway	05/07/2014	J. Shubzda	2 Suntree Catch Basin Inserts
10-011	Hibachi Grill & Buffett	9645	Kingston Pike	05/07/2014	J. Shubzda	2 Catch Basin Inserts, Suntree
14-040	Roadmaster Auto Sales	4403	Clinton Highway	05/07/2014	J. Shubzda	Suntree CB Inserts
08-008	Taco Bell	4413	Western Ave.	05/13/2014	J. Shubzda	5 Suntree Catch Basin Inserts
11-049	Suburban Plaza	8025	Kingston Pike	05/13/2014	Turn Key Plumbing	Flex Storm
14-012	JJ's Super Shine Car Wash	4416	Western Avenue	05/13/2014	J. Shubzda	Kristar Catch Basin Insert
03-002	Parkwest Medical Center	9352	Park West Blvd	05/15/2014	Storm Sys Svc	Crystal Stream-Oil and grit seperator
05-005	Burlington Save-A-Lot	3840	Holston Drive	05/16/2014	J. Shubzda	Catch Basin Insert
10-028	J and S Inc.	2816	John Deere Dr	05/16/2014	J. Shubzda	Grassy Swale
13-003	Sam's Club #6572-03-Knoxville East	2920	Knoxville Center Drive	05/16/2014	J. Shubzda	Aqua Swirl, 3 units
04-024	Five Points Re-Development	2332	Martin Luther King, Jr.	05/19/2014	J. Shubzda	Catch Basin Inserts
06-025	Long John Silvers	2816	E. Magnolia Ave	05/19/2014	J. Shubzda	Enviropod
07-021	Diamond Mobil Car Wash	2908	E. Magnolia Ave.	05/19/2014	J. Shubzda	Management Controls
08-041	San Juan De Los Lagos Market	703	N Cherry St	05/19/2014	J. Shubzda	Closed
14-044	Long John Silver's #31884	2816	E. Magnolia Avenue	05/19/2014	J. Shubzda	Catch Basin Insert
04-022-1	Food City	4805	N. Broadway	05/20/2014	J. Shubzda	6 Hancor Flow-Guard Plus catch basin inserts
08-021	Food City Gas-n-Go Clinton Plaza	5078	Clinton Hwy	05/20/2014	J. Shubzda	Triton T-Dam 12 filters in trench drain
10-015	Gentry Trailways	2519	Mitchell St	05/20/2014	J. Shubzda	Trench Drain with sock
11-018	American Compressor Engineering	1518	Wright St	05/20/2014	J. Shubzda	Manigerial Controls
13-044	Gas & Go at Food City	5078	Clinton Highway	05/20/2014	J. Shubzda	Triton T-Dam 12 Filters
09-031	The Bistro by the Tracks	215	Brookview Centre Way	05/23/2014	J. Shubzda	Suntree and DVS
05-017	McDonalds	7030	Kingston Pike	05/29/2014	J. Shubzda	3 Suntree Catch Basin Inserts
08-039	Dunkin Donuts	7114	Kingston Pike	05/29/2014	J. Shubzda	Infiltration Trench
09-023	Davinci's Pizza	3337	Sutherland Ave	05/29/2014	J. Shubzda	Catch Basin Inserts
09-026	Subway	3317	Sutherland	05/29/2014	J. Shubzda	Catch Basin Inserts
10-039	Expressway 40	7301	Kingston Pike	05/29/2014	J. Shubzda	Suntree Catch Basin Insert
10-040	Mooyah Burgers & Fries	7301	Kingston Pike	05/29/2014	J. Shubzda	Suntree Catch Basin Insert
14-045	Storage Pro Sutherland	3033	Sutherland Avenue	05/29/2014	J. Shubzda	Catch Basin Inserts
09-006	Kroger #698	5201	N Broadway	06/02/2014	Storm System Services	Flo Guard Plus
05-004	Aubrey's Restaurant	6005	Brookvale Lane	06/03/2014	J. Shubzda	Catch Basin Inserts

**Commerical and Industrial Facilities Inspected During 2013-2014**

Permit Number	Project Name	Address	Street Name	Inspection Date	Inspector	Water Quality Device
07-013	Waffle House	6230	Papermill Dr.	06/03/2014	J Shubzda	Suntree Tech Grate Inlet Skimmer Box
08-025	East TN Healthcare Development	1451	Old Weisgarber Rd.	06/03/2014	J. Shubzda	Catch Basin Inserts and 2 vaults
11-010	TN Proton Therapy Center	1445	Dowell Springs Blvd.	06/03/2014	J. Shubzda	Snout at outlet structure
12-026	Bojangles	5916	Middlebrook Pike	06/03/2014	J. Shubzda	Catch Basin Inserts
14-037	Aubrey's Papermill	6005	Brookvale Lane	06/03/2014	J. Shubzda	Catch basin Inserts
02-013	Kroger Fuel Facility U-531	4409	Chapman Hwy	06/05/2014	Storm System Services	Crystal Stream 645
04-009	Bonefish Grill/Bearden Station	6610	Kingston Pike	06/05/2014	J. Shubzda	Grate Inlet Skimmer Box
10-052	Bearden Hill Fieldhouse	6600	Kingston Pike	06/05/2014	J. Shubzda	Managerial Controls
11-007	Krispy Kreme Doughnut Shop	6201	Kingston Pike	06/05/2014	J. Shubzda	Catch Basin Insert Flexstorm
11-029	Humane Society of the TN Valley	6717	Kington Pike	06/05/2014	J. Shubzda	Catch Basin Insert
13-032	Papermill Plaza	6700	Papermill Drive	06/05/2014	J. Shubzda	
13-052	Zaxby's	6913	Kingston Pike	06/05/2014	J. Shubzda	





# APPENDIX D

City of Knoxville Solid Waste Office 2013 Report

# **Public Service Department Solid Waste Division 2013 Annual Report**



**CITY OF KNOXVILLE**  
**MAYOR MADELINE ROGERO**

**Public Works**  
**Christi Branscom, Senior Director**

**Public Service Department**  
**David Brace, Director**



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## INTRODUCTION

In 2013, the City of Knoxville Public Service Department continued to show positive results in the development of its solid waste management programs. We continued active enforcement of the solid waste ordinances through the Neighborhood Codes Enforcement field inspections program and completed our fifteenth full year of operations at the Household Hazardous Waste (HHW) Collection Facility. The Public Service Department is in its twelfth year of providing garbage collection and recycling services in the Central Business Improvement District (CBID) resulting in annual cost savings of approximately \$30,000. In addition, the City has worked tirelessly to refine and continue its household curbside single stream recycling program. This new service started on October 1, 2011 with much fanfare and excitement from City customers. This new service is offered via contractor to residents, with the City providing the service within the CBID. All of these initiatives reflect the Solid Waste Division's progressive thinking and innovative approach in the development of a truly comprehensive solid waste management program.

The following pages summarize our solid waste activities for the calendar year 2012. The final page is a compilation and analysis of residential waste stream data indicating that:

- \* The total waste stream decreased by 174.47 tons from 2012
- \* The diversion rate decreased to 58.20% from 65.39% in 2012
- \* The recycling rate decreased to 28.73% from 28.92% in 2012

The total waste stream shows an overall decrease from 2012. Household curbside recycling averaged 15.49% during the second full year of operation in 2013.

### I. RECYCLING

A total of 2,369.03 tons of recyclables were collected at the City's five drop-off recycling centers in 2013. This number decreased in 2013 due to the direct impact of the household curbside single stream recycling program as well as the closure of two drop off center locations as a result of site ownership changes in 2012. It was the intention of the City to close some centers as a result of the curbside recycling program, but the closures in 2013 were not anticipated until a later date. These closures also reflect the City's increasing challenges in securing economical drop center locations at retail "big box" sites within the City.

Goodwill Industries is in year four of a five year contract to assist in the on site staffing of the City's recycling drop off centers. Rock-Tenn Recycling is in year three of a five year contract to handle processing of recyclable materials collected at all drop off centers and for single stream curbside recycling materials. Rock-Tenn made significant capital equipment investments at their Knoxville operation in anticipation of the City's new single stream program and continues to invest in technology supportive of modern recycling processes. Waste Connections of Tennessee, Inc. is in year three of a five year contract to haul recyclable materials from City drop centers and those households participating in curbside recycling. Processing of single stream materials is an added cost to the City; however, Rock-Tenn Recycling continues to revenue share on separated materials collected at the City's five drop centers based on market values which have been low the past three years.

In 2012, the City ended a contract with the Knoxville Recycling Coalition to collect cardboard within the CBID brought to the Market Street Garage by downtown businesses. This contract was phased out and assumed by City collection resources. During 2013, over 144 tons of materials were collected from the downtown area, which represents an increase of 16 tons from 2012.

In 2011, a pilot project was established to study and consider recycling on the City's 50+ miles of multi-purpose greenways. In 2012 and 2013 the work of this project is now being completed pursuant to a contract with the Knoxville Recycling Coalition and a bicycle trailer system. This zero emissions collection program hauls material from receptacles located in as many as twelve locations along a four-mile stretch of the 3<sup>rd</sup> Creek Greenway. Just over two and a half tons of single stream recycling materials have been collected since the beginning of this program.

One major initiative of the Solid Waste Office has been the continued goal towards implementing a new household curbside single stream recycling program. In 2007, the City began seriously examining ways to bring sustainable practices into the way it does business. As part of this process, and at the request of then Mayor Bill Haslam, the Public Service and Policy & Communications Departments initiated a process to evaluate best practices and to consider improvements to the City's existing solid waste management system, specifically recycling. Two key goals of this initiative were for the City to increase both recycling participation and the diversion of recyclable materials from area landfills. A research-based strategy resulting from a Model Cities grant was used to implement the new single-stream, curbside recycling collection service for 20,000 residents. In addition to the Model Cities grant, the City was awarded \$2,012,700 in 2009 for energy savings initiatives through a DOE program. Of the \$2,012,700 award, \$700,000 was designated to assist in the implementation of the new City-wide curbside recycling program and used for the acquisition of needed capital items (carts) from Toter Inc. The 2011 contracts specified that the new service be provided by City vendors starting October 1, 2011 for up to 20,000 households. The City's Solid Waste Office is excited to announce that it met its goal signing up all 20,000 participants by December of 2011. 2012 was an exciting time for this program as the City fully captured the diversion benefits of 5,198.18 tons of recyclable materials from 20,000 households. In 2013 there was a slight decrease resulting in 5,166.44 tons of recyclable materials collected.

## II. MUNICIPAL SOLID WASTE (MSW)

A total of 150,220.86 tons of garbage were collected from Knoxville homes in 2013 as part of the weekly garbage collection service the City offers via its contractor, Waste Connections of Tennessee, Inc. The City is currently in a five year contract extension with Waste Connections of Tennessee, Inc. that expires in 2016. The extension eliminated a backdoor collection service inequity offered to only some households and now offers subsidized backdoor service only to those with a verified medical or age necessity. Current collection costs per this contract are:

Jan. - Dec. 13 Curbside Collection	\$6.71 / house/month	57,507 residents
Jan. - Dec. 13 Backdoor Collection	\$6.71 / house/month	2,455 residents

All household garbage is disposed of at the Chestnut Ridge Landfill operated by Waste Management. The City is currently in a new 10-year contract with Waste Management that expires in 2020. Contract prices change in October of each year based on the CPI.

Oct. '12 - Sep. '13	\$21.02 / ton
Oct. '13 - Sep. '14	\$22.63 / ton

## III. YARD WASTE COLLECTION / MULCHING

A total of 34,592.73 tons of yard waste was collected by City Public Service Department crews in 2013. This number decreased slightly by 48.52 tons from 2012 and not a significant change. All yard waste is taken to Shamrock Organic Products where it is recycled into mulch and soil products. The City is currently in a five year contract with Shamrock and recently executed the final

extension early based on rate savings to the City. The current contract expires in 2016. Costs for disposal in 2012 at Shamrock are as follows:



Jan. 13—Dec. 13 \$28.82 / ton

#### **IV. SOLID WASTE MANAGEMENT FACILITY**

##### **Transfer Station**

The design of the Public Service Department, Solid Waste Division and Transfer Station encourages separation of C&D from municipal solid waste. This allows for the City to save money by sending C&D waste to a Class III landfill and for compliance with the State of Tennessee mandate for a reduction in the volume of waste placed in Class I landfills. In 2013, we diverted 36,476.64 tons of C&D waste to a Class III landfill at a rate of \$16.00 a ton. This amount represented 72% of the waste received at the Transfer Station. The total number of vehicles accessing the numerous services at the facility in 2012 was just over 56,930, which was an decrease of 6,551 vehicles as compared to 2012 and includes City of Knoxville vehicles. Total revenue from charge and cash customers was \$923,606.06, a decrease of \$9,533.09 from 2012. This decrease is a reflection of a heightened C&D debris volume in 2012 due to severe weather events in 2011 and 2012.

##### **Household Hazardous Waste (HHW) Collection Center**

Staffed by Public Service Department Solid Waste Management Facility employees, the HHW Facility is operated by the City with equal funding for operating and disposal costs from Knox County and the City of Knoxville. All City and County residents are permitted to use the facility. In 2013, this facility was visited by 5,874 vehicles, an decrease of 257 from 2012, and processed 155.27 tons of HHW, 73% of which was latex paint.

#### **V. EDUCATION**

The Public Service Department Solid Waste Office engaged in many activities and special awareness programs throughout 2013 to educate Knoxville residents and visitors about waste reduction, recycling, composting and other solid waste issues.

**America Recycles Day** - The City of Knoxville, along with several other local organizations, participated in the twelfth annual America Recycles Day, a national education campaign aimed at increasing citizens' commitment to recycling and buying recycled goods.

**Earth Day** - The Solid Waste Office helped develop this program fourteen years ago and once again played an active role on the steering committee that developed EarthFest 2013, which celebrated the 40th anniversary of Earth Day at Pellissippi State Community College. Over 8,000 people attended the event which hosted 100 + exhibitors from the region's environmental community.

**Computer Collection Events** - One E-cycle collection event was held in January 2013 with ten sponsors contributing to the success of the event. Approximately 900 residents participated in the events with just over fifty four tons of electronic materials collected. All material collected at the event was recycled at Creative Recycling, Nashville, TN.

**Used Residential Thermometer Exchange** - The Solid Waste Office started an ongoing mercury thermometer exchange program in 2005. The exchanges, conducted in cooperation with the Tennessee Department of Environment and Conservation, the City of Knoxville Public Service Department and the Safe Kids Coalition of the Greater Knoxville Area, collected over 55 mercury thermometers from City and County residents in 2013. New digital thermometers were given out for each used mercury thermometer that was turned in.

**Unwanted Medicines Collection Event** - The Solid Waste Office coordinated several unwanted medicines collection events in cooperation with the Knoxville Police Department, Knox County Solid Waste Office and Health Department and The University of Tennessee Student Pharmacy Association. This program was initiated by the City in November of 2008 and has grown rapidly since its inception. Over 3,227 pounds of medications were collected during 2013 and properly disposed of by the KPD and just over 10 tons since 2008. It is estimated that just over 450 pounds of that total were controlled substances. KPD maintains a permanent secure medications collection container at the KPD safety building with access for the public 24/7.

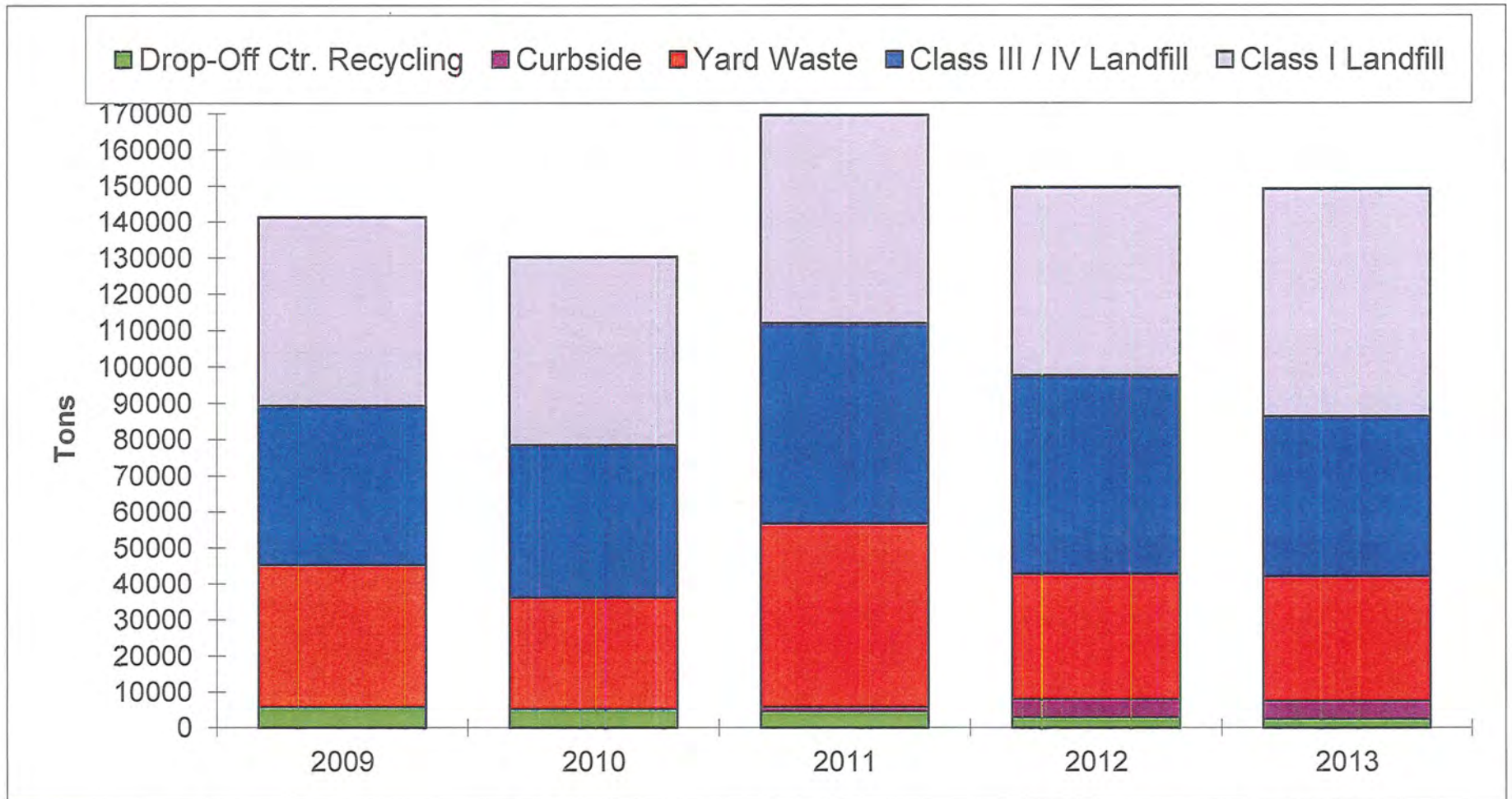
**Other** - In 2013, the Solid Waste Office continued to produce and distribute educational brochures and promotional items. Staff of the Solid Waste Office participated in several educational events in 2013 using our exhibit booth display at the City County Building and at events including EarthFest, the Dogwood Arts' House and Garden Show, Parenting Expo and, America Recycles Day Events.

## **CONCLUSION**

The 2013 year has been both an exciting and challenging time for solid waste within the City of Knoxville. The advent of the City's new household curbside single stream recycling program completed its second full year as result of many years of planning and research and the start of this program timed well with current advances in recycling technology, federal stimulus dollars and the Model Cities research grant. As we transition into the 2014 calendar year, the Public Service Department Solid Waste team is focused on providing great services with a focus on both environmental and fiscal responsibility.

More information on the City's Public Service Department, Solid Waste Division and Sustainability Office can be found at the City's website at: [www.cityofknoxville.org](http://www.cityofknoxville.org).

## Destination of Knoxville's Residential Waste Stream, 2009 - 2013



**Diversion Rate 63.52%**  
**Recycling Rate 32.50%**

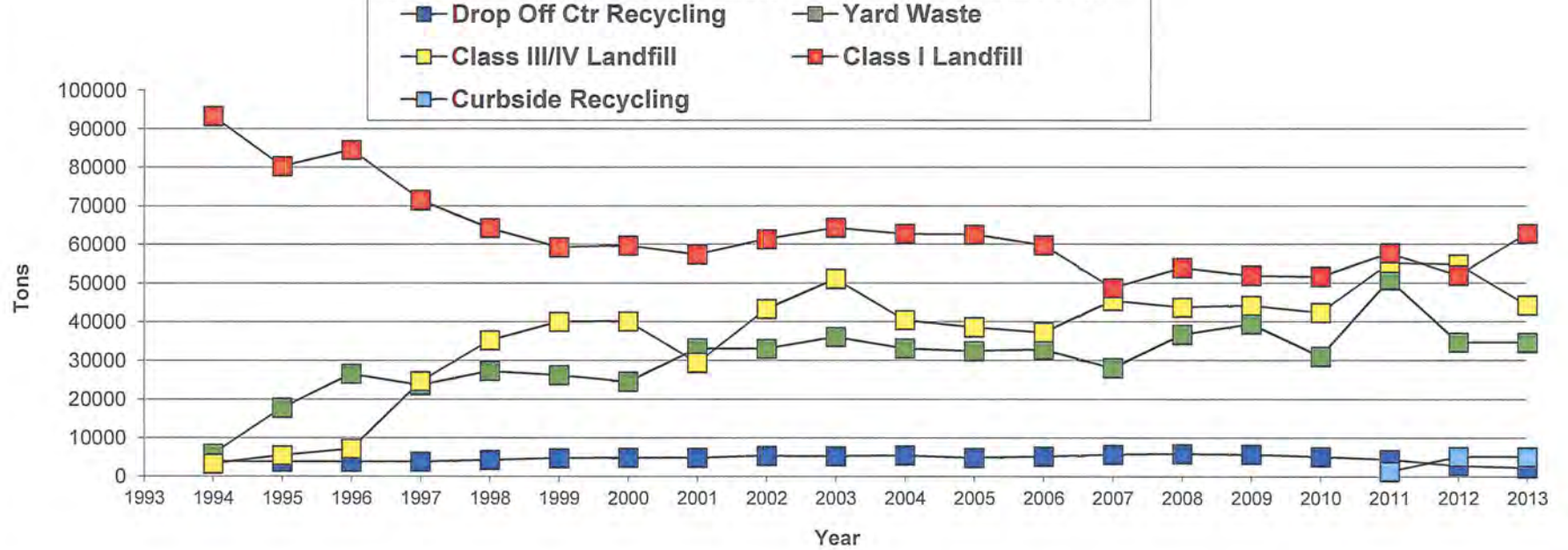
**60.47%**  
**26.51%**

**65.87%**  
**33.18%**

**65.39%**  
**28.92%**

**58.20%**  
**28.73%**

Destination of Knoxville's Residential Waste Stream 1994-2013





Annual Report  
2013

Drop Off Centers	Goodwill Magnolia & Alice	Kroger 4818 Kingston Pk.	Goodwill 225 Moody Av.	Kroger 4440 Western Av.	Goodwill 341 Parkvillage	Goodwill 820 Metler	Downtown 400 State St.	Drop Off Center Totals	Curbside Recycling City Wide Totals	Totals
Aluminum	3620 lbs	7020 lbs	7933 lbs	3660 lbs	34240 lbs	760 lbs	5320 lbs	62553.00 lbs	51867 lbs	57.21 tons
Steel	5360 lbs	7010 lbs	11793 lbs	38620 lbs	31360 lbs	1060 lbs	10600 lbs	105803.00 lbs	177139 lbs	141.47 tons
Plastics	64440 lbs	54300 lbs	95600 lbs	62160 lbs	307524 lbs	4260 lbs	46160 lbs	634444.00 lbs	757999 lbs	696.22 tons
Clear Glass	21605 lbs	28325 lbs	29131 lbs	25112 lbs	113336 lbs	2759 lbs	32891 lbs	253159.96 lbs	558399 lbs	405.78 tons
Brown Glass	21605 lbs	28325 lbs	29132 lbs	25112 lbs	113336 lbs	2759 lbs	32891 lbs	253160.66 lbs	558399 lbs	405.78 tons
Green Glass	21605 lbs	28325 lbs	29132 lbs	25112 lbs	113336 lbs	2759 lbs	32891 lbs	253160.66 lbs	558399 lbs	405.78 tons
Newspaper	67480 lbs	55880 lbs	92260 lbs	74920 lbs	414780 lbs	11360 lbs	58560 lbs	775240.00 lbs	3032200 lbs	1903.72 tons
Mixed Paper	147860 lbs	178860 lbs	203980 lbs	136120 lbs	764902 lbs	13940 lbs	159780 lbs	1605442.00 lbs	3032200 lbs	2318.82 tons
Cardboard	101160 lbs	71240 lbs	86328 lbs	108560 lbs	321829 lbs	6080 lbs	99907 lbs	795104.00 lbs	1606280 lbs	1200.69 tons
<b>Drop Off Center Totals</b>	<b>227.37 tons</b>	<b>229.64 tons</b>	<b>292.64 tons</b>	<b>249.69 tons</b>	<b>1,107.32 tons</b>	<b>22.87 tons</b>	<b>239.50 tons</b>	<b>2,369.03 tons</b>	<b>5,166.44 tons</b>	<b>7,535.47 tons</b>

KPD / Lorain St. / Fleet	29.89 tons
Cardboard Down Town	144.64 tons
Downtown Curbside	149.04 tons

Goodwill Lease Containers	214.82 tons
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	Leaves	Brush	Total
Mulching Site	7072.01 tons	27520.72 tons	34592.73 tons

	Scrap Metal	Rec. Tir.	HHW REC.	HHW Divert.	C&D for Class III	Compacted	Computers	Tires	Total
Transfer Station	220.00 tons	4.44 tons	36.13 tons	5.09 tons	26476.64 tons	10006.93 tons	87.21 tons	140.14 tons	36,976.58 tons

12.55 lakeshore

	Household Trash	Misc. Trash	Total
Landfill - Class I	41102.19 tons	1679.99 tons	52,789.11 tons

	Transfer Station	Construction	Codes	Total
Landfill - Class III	26476.64 tons	9350.00 tons	8438.58 tons	44,265.22 tons

<b>Total Waste Recycled</b>	<b>43,154.51 tons</b>
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<b>Recycling</b>	<b>28.73%</b>
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<b>Total Waste Diverted, Class III &amp; Rec.</b>	<b>87,424.82 tons</b>
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<b>Diversion</b>	<b>58.20%</b>
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<b>Total Waste Landfilled, Class I</b>	<b>62,796.04 tons</b>
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<b>* Recycling</b>	<b>7.40%</b>
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<b>Total Wastestream</b>	<b>150,220.86 tons</b>
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\* Yard Waste Not Included  
w/ just residential trash 15.49%



# APPENDIX E

NPDES Permit Program Inventory Map

(Attached separately)

**The entire inventory map is not reproduced as part of the online version of the Year 18 Annual Report. The entire map is approximately 66 inches by 32 inches (covering an area of approximately 33 miles by 16 miles) at a scale of 1- inch equals one-half mile.**

**To view the entire map, please contact the Stormwater Engineering Division at (865) 215-2148.**