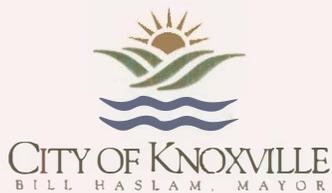
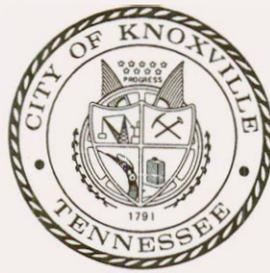


# THE CITY OF KNOXVILLE TENNESSEE

## NPDES Permit Annual Report



National Pollutant Discharge Elimination System  
Stormwater Discharge Permit TNS068055  
July 1, 2003 - June 30, 2004



BILL HASLAM, MAYOR

City of Knoxville

OPERATIONS & ENGINEERING  
JERRY LEDBETTER, P.E.  
SENIOR DIRECTOR

December 20, 2004

Ms. Pamela Myers  
Tennessee Department of Environmental and Conservation  
Division of Water Pollution Control  
Attention: Compliance Review  
401 Church Street  
L & C Annex, 6<sup>th</sup> Floor  
Nashville, TN 37243-1534

**RE: City of Knoxville, NPDES Permit # TNS068055  
2003 – 2004 Annual Report**

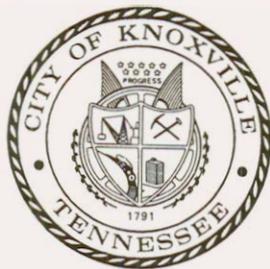
Dear Ms. Myers:

The City of Knoxville Engineering Department is pleased to submit the City of Knoxville's NPDES eighth Annual Report. This annual report summarizes the NPDES activities during the twelve-month period of July 1, 2003 through June 30, 2004. The annual report was coordinated and prepared by the Engineering Division 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 at (865) 215-3251.

Sincerely,

David Hagerman, P.E., Stormwater Management



BILL HASLAM, MAYOR

City of Knoxville

OPERATIONS & ENGINEERING  
JERRY LEDBETTER, P.E.  
SENIOR DIRECTOR

December 20, 2004

Ms. Natalie Ransone Harris  
Tennessee Department of Environmental and Conservation  
Division of Water Pollution Control  
Attention: Compliance Review  
2700 Middlebrook Pike, Suite 220  
Knoxville, TN 37921

**RE: City of Knoxville, NPDES Permit # TNS068055  
2003 – 2004 Annual Report**

Dear Ms. Harris:

The City of Knoxville Engineering Department is pleased to submit the City of Knoxville's NPDES eighth Annual Report. This annual report summarizes the NPDES activities during the twelve-month period of July 1, 2003 through June 30, 2004. The annual report was coordinated and prepared by the Engineering Division 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 at (865) 215-3251.

Sincerely,

  
David Hagerman, P.E., Stormwater Management

## Signature and Certification

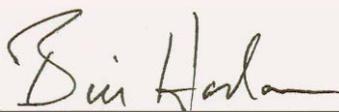
### NPDES STORMWATER PERMIT TNS068055 2003/2004 MUNICIPAL ANNUAL REPORT

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."*



Bill Haslam  
Mayor

12/13/04

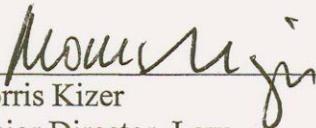
Date



Jerry Ledbetter, P.E.  
Senior Director, Operations & Engineering

12/13/04

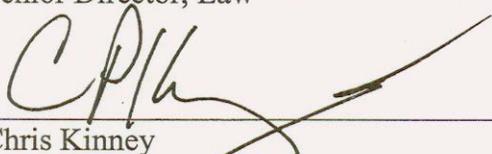
Date



Morris Kizer  
Senior Director, Law

12-13-04

Date



Chris Kinney  
Senior Director, Finance & Accountability

12-16-04

Date



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## **1.0 INTRODUCTION**

The Tennessee Department of Environment and Conservation, Division of Water Pollution Control issued the City of Knoxville a National Pollutant Discharge Elimination System (NPDES) 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 will drain to sinkholes, ponds, and lakes throughout the area. The City's first NPDES Permit was issued on July 1, 1996 and expired on June 28, 2001. In December 2000, the City submitted a reapplication as part of the Year Four annual report. The new permit was approved and made effective July 1, 2004.

The NPDES Permit requires an annual progress report for the Stormwater Management Program outlined in the Part I and Part II applications. The annual report was completed in accordance with the reporting requirements of Part VI of the permit and will complete the requirements for the eighth permit year from July 1, 2003 through June 30, 2004.

The Stormwater Quality Section of the City of Knoxville Engineering division coordinated preparation and submittal of the system-wide Annual Report. Information for the annual report has been provided by the Engineering Division, Public Service Division, Solid Waste Management office, and Knoxville/Knox County Emergency Management Agency (KEMA). The Engineering Division has compiled the available information into the format outlined in Part VI of the current NPDES Permit.

## **2.0 CONTACTS LIST**

David Hagerman, P.E., *(Primary Contact for City of Knoxville NPDES Related Issues)*  
NPDES Stormwater Management                      (865) 215-3251                      dhagerman@cityofknoxville.org

Brently Johnson, P.E., *(Secondary Contact for City of Knoxville NPDES Related Issues)*  
Stormwater Section Chief                              (865) 215-2148                      bjohnson@cityofknoxville.org

Steve King, P.E., Deputy Director  
Engineering Division                                      (865) 215-6100                      sking@cityofknoxville.org

Jerry Ledbetter, P.E., Senior Director  
Operations Department                                  (865) 215-2174                      jledbetter@cityofknoxville.org

Bob Whetsel, Director  
Public Services Division & Solid Waste              (865) 215-2060                      bwhetsel@cityofknoxville.org

Mailing Address:              City of Knoxville  
   P.O. Box 1631, Suite 480  
   400 Main Street  
   Knoxville, TN 37901



### **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 eighth year of the NPDES permit term. Since no new programs were scheduled in year eight, a strong focus was placed on the implementation of the much-anticipated Total Maximum Daily Load requirements that are attached to the new permit.

- The City of Knoxville partnered with TVA and the Center for Watershed Protection to host a free two-day Watershed Planning Workshop at the Knoxville Convention Center. The workshop provided instruction on topics including: Impacts of Urbanization, Eight Tools of Watershed Protection, Stormwater Treatment Practices, Better Site Design, Restoring Urban Watersheds and Developing a Watershed Education Campaign.

- Knoxville's residential population in the downtown area has experienced vibrant growth in the past few years. This growth has been stimulated by a combination of public and private commitments to restoration and redevelopment of downtown Knoxville. Along with the new downtown growth, the City was presented with the challenge of managing the increased pet waste downtown. The City satisfied the requests of the area residents, as well as one of the tasks of the new bacteria TMDL, by passing a "Pooper Scooper" ordinance for the downtown area known as the Central Business Improvement District (CBID). The ordinance requires the owner or custodian of any animal within the CBID to be responsible for the removal of any solid waste deposited by said animal. The first citation for a violation of this ordinance was issued last summer.

- To encourage the use of pooper-scoopers in City parks and the CBID, the City partnered with the Izaak Walton League and Prestige Cleaners to provide eight initial locations for the bag dispensers shown in the photo. Four of the dispensers are located downtown and four are located in two City parks. Additional dispensers may be added in other parks in future years.



- A citywide campaign was initiated to increase the public awareness of the impact of pet waste in our waterways. Eight thousand recyclable pooper scoops were acquired with penalty funds paid by polluters. Most of the scoops were delivered to pet stores and veterinary clinics for free distribution to their customers. An attention-grabbing poster was placed on display at each of these locations to help educate the pet owners of their responsibility to manage their pet's waste.



- The City of Knoxville, in conjunction with Knox County and the Town of Farragut is in the third year of administering the Adopt-A-Stream program. In the past fiscal year we have trained 36 Adopters and eight volunteer coordinators in the AAS program. Sixteen of these adopters have adopted six stretches of creeks inside the City of Knoxville. They have performed over ten creek clean-ups and other evaluation and education programs on their sectors of creek. The City has provided the supervision and training in addition to gloves, trash bags, pitchforks, wheelbarrows, waders and other tools for these activities.
- In compliance with the new bacteria TMDL, the City continued to install improved warning signs along the creeks, which are on the 303(d) list for bacteria. The locations for the placement of the new signs have been focused initially to public parks, greenways, schools, and other places with easy public access. The improved signs include the prominent warning, a list of possible sources, and a phone number to report problems or obtain more information.
- During year eight, the City worked closely with TDEC, EPA and the Tennessee Clean Water Network to reach a consent decree with the largest local sewage utility in the Knoxville area. The agreement will formalize the commitment of the City and utility to provide a safer and cleaner environment for the citizens of Knoxville and achieve the TMDL's goal of drastically reduced bacteria levels in Knoxville's creeks. In the next decade, this agreement may prove to be the most critical milestone along the course to cleaner water.



During the first eight years of the stormwater quality program, the City defined a baseline to compare future surface water improvements and/or degradations. Although the improvements may not be measured quantitatively at this time, many programs initiated during the first eight years have undeniably made improvements in the state of water quality throughout the city. The long-term results should become apparent in future years. The City implemented many of the SWMP tasks beyond the minimum permit requirements and will continue to advance the water quality programs beyond the minimum requirements as economically feasible.

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

SWMP activity summary tables for the eighth 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. Although the summary tables concisely document many program activities, some activities could not be quantified and have therefore been omitted.

**4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE**

<b>MONITORING TASKS WET/DRY WEATHER</b>	<b>SCHEDULE OF ACTIVITIES</b>	<b>SCHEDULE FOLLOWED</b>	<b>ACTIVITIES ACCOMPLISHED</b>	<b>COMMENTS</b>
Repeat High Parameter Sites	20 Outfalls repeated from year six	Yes	21	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	High Parameter repeats + 30 to 40	Yes	154	All field data sheets available for inspection. Outfalls tested four times this year.
Full Suite Stormwater Analysis (one station per year)	One Station pr year	Yes	2	Two Full Suite samples obtained at First Creek.
Storms Sampled at 5 monitoring stations	1 Storm / Quarter / 5 Sites	Yes	21	Summer: 5 storms, Fall: 5 storms, Winter: 6 storms, Spring: 5 storms
Storm Drain Televised	As Needed	Yes	2893 ft. / 19 pipes	Pipes are defined as sections between inlets, catch basins, junction boxes, or outlets.
Aerial Thermography	1 time fly-over	Yes	7 urban creeks	Creeks were flown and photographed using a thermography camera to locate illicit discharges in February, 2003.

5

<b>STORMWATER MANAGEMENT &amp; INDUSTRIAL PROGRAM TASKS</b>	<b>SCHEDULE OF ACTIVITIES</b>	<b>SCHEDULE FOLLOWED</b>	<b>ACTIVITIES ACCOMPLISHED</b>	<b>COMMENTS</b>
Stormwater Quantity Requests for Service (Received / Resolved)	As Needed	Yes	576/269	Complaints are investigated as received and resolved as solutions or resources are available
Stormwater Quality Requests for Service (Received / Resolved)	As Needed	Yes	294/315	Complaints are investigated as received and resolved as solutions or resources are available
Site Develop Workshop	Annually	Yes	90 attended	Included Engineers, contractors, developers, & surveyors involved in land disturbing activities.
Stormwater and Street Ordinance Workshop	As Required	Yes	20 attended	Included area surveyors and draftsman.
Stormwater GIS Field Investigations for Annexations	As Required	Yes	57	Newly annexed areas are investigated within 60 days for all storm drain features and possible pollution sources.

**4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE**

<b>STRUCTURAL CONTROLS</b>	<b>SCHEDULE OF ACTIVITIES</b>	<b>SCHEDULE FOLLOWED</b>	<b>ACTIVITIES ACCOMPLISHED</b>	<b>COMMENTS</b>
Street Cleaning	Daily/Bi-Weekly	Yes	23,697 Miles	Daily for downtown streets. Frequency varies for other streets.
Litter Pick-up, Hand	As Needed	Yes	53,130 Bags	Routine Schedule
Catch Basin Cleaning and Repair	As Needed	Yes	2,190 Jobs	Per work order and requests
Ditching: Hand, Truck, & Track/Gradall	As Needed	Yes	71,758 Feet	Per work order and requests
Storm Drain Installation & Repair	As Needed	Yes	399 Jobs	Per work order and requests
Brush & Leaf Pick-up	Bi-Weekly	Yes	18,116 Loads	Bi-Weekly curb pick-up
Seed/Sod, ROW	As Needed	Yes	4 Jobs	Per work order and requests
Storm Drain Cleaning	As Needed	Yes	36,126 Feet	Per work order and requests
Grate Replacement	As Needed	Yes	51 Jobs	As Needed
Field Inventory & Inspection of On-Site Detention Facilities	Within 60 Months	Yes	100% of City Completed	All new facilities are mapped after construction is complete. Existing facility's inventory is complete.
Creek Cleaning by Creek Restoration Crew	As Needed	Yes	225 Jobs	Creeks are inspected and cleaned on a routine schedule
Tree and Plant Planting	When Applicable	Yes	Over 300	Trees were planted by Americorp volunteers and City
Total Waste Recycled	As Brought In	Yes	41,335 Tons	5,266 tons of paper, metal, plastic, glass, etc. and over 36,069 tons of yard wastes

**4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE**

<b>EDUCATIONAL PROGRAM TASKS</b>	<b>SCHEDULE OF ACTIVITIES</b>	<b>SCHEDULE FOLLOWED</b>	<b>ACTIVITIES ACCOMPLISHED</b>	<b>COMMENTS</b>
Publicize Hotline Number	Within 24 Months	Yes	Undetermined	Hotline number has been published in phone book, on road signs, pamphlets, magnets, radio PSA's, etc.
River Rescue	Annual Event	Yes	1 day event	11.6 tons of trash and 18 tires removed by 772 volunteers from 41 sites.
Water Quality Forum	Meets Monthly and Quarterly	Yes	Undetermined	Three committees meet monthly to plan projects focused on urban water quality.
Storm Drain Marking	As Needed or by volunteers	Yes	Approx. 800	Catch Basins marked with decals labeled "Dump No Waste-Drains to Waterway"
Volunteer Creek Cleanups	Volunteers	Yes	Several sites on several creeks	65 volunteers at 8 sites removed 31.94 tons of trash from local creeks
Waterfest	Annual Event	Yes	1 Day Educational Event	A unique community event dedicated to educate citizens about water quality. Between 600-800 youths participated.
Pooper Scoopers	As Needed or by volunteers	Yes	Approx. 4500	Disposable dog waste containers were distributed to veterinary clinics and pet stores.

<b>NEW DEVELOPMENT PROGRAM TASKS</b>	<b>SCHEDULE OF ACTIVITIES</b>	<b>SCHEDULE FOLLOWED</b>	<b>ACTIVITIES ACCOMPLISHED</b>	<b>COMMENTS</b>
New Development Inspections	As Required	Yes	Approx. 1,000	As Required
Building Permits Reviewed/Issued	As Required	Yes	1,025/601	As Required
Site Development Permits Reviewed/Issued	As Required	Yes	168/114	As Required
Right of Way Permits Investigated	As Required	Yes	67	As Required
Citizen Concerns Investigated	As Required	Yes	Approx. 500	Development Complaints include erosion, sediment, grading, dumping, etc.



## **5.0 NARRATIVE REPORT**

The following narrative report is divided into the five main programs of the SWMP. The 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 Educational Activities and Public Outreach.

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. This report may be an abbreviated version of earlier reports since no new programs were required in year eight. Some of the changes for the new permit are discussed where applicable.

### **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, pp. 5-5 to 5-9.

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 the new creek crew may work in some of those areas.

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 and requests from the Engineering division. 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. Catch basins are inspected annually. 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 three 7-person multipurpose construction crews that perform storm drain installation. One of their primary responsibilities includes installing various sizes of corrugated metal pipe and reinforced concrete pipe, major repair to existing storm drains, and building catch basins. Each of the crews has seven employees, a backhoe, two single-axle dump trucks, and one 3/4-ton pickup truck. A 12-ton tool truck services 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: Stream Restoration and Channel Maintenance Program.      Status: Ongoing

Stream restoration and channel maintenance has typically been addressed with two new programs during the first permit cycle. These programs include stream bank stabilization projects to reduce erosion and sediment and a creek restoration crew to remove litter, debris, and flow blockages. In year eight, the PSD supplemented this program by providing a grant to the Izaak Walton League for debris and blockage removal on the major urban creeks.

In the first eight years, several bank stabilization projects have been completed with the help of TDEC, TVA, USCOE, UTK, and CAC Americorps along urban creeks throughout the city. The first demonstration project was completed Fall 1997 at Inskip Ball Field by using natural fiber coconut rolls and jute fiber mats and a synthetic mattress to protect the grass and live stakes during high water. Similar projects have been completed on Goose Creek, First Creek, Love Creek, and along Second Creek above the Worlds Fair Park.

Since sediment is one of the most common non-point source pollutants in our urban creeks, the City will complete at least two bank stabilization projects per year during the new permit term. Although these projects will certainly vary in scope, biostabilization 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.

The 4-person Creek Restoration Crew was added to the PSD in August 1996. This crew is primarily responsible for implementing a routine schedule of inspections and maintenance on the major creeks and tributaries. It has a knuckle boom and a single-axle dump truck assigned to aid in performing these duties. The crew routinely removes trash and debris from habitual dumpsites and responds to citizen requests and specific work orders. Often the crew is used to assist with illicit discharge investigations in the MS4.



This program will continue to focus on stream restoration and channel maintenance along the major creeks and the riverfront in the city. The creek crew has a laminated GIS field book, which contains every urban creek within the city limits. Each creek has been further divided into workable sections or map pages that show significant surrounding details such as topography, planimetrics, stormwater features, outfalls, streets, and addresses. This allows the crew to efficiently inspect and clear each segment of the creek before moving on to the next task. The PSD field crews have been instructed to document and report signs or incidences of illicit discharges and/or improper disposal as they are identified.

During year eight, the City contracted with the Izaak Walton League to help remove debris dams and trash in several urban streams. Removal of the dams helps prevent streambank erosion and reduce large destructive pools of silt and trash. The IWL primarily used chain saws and hand tools to restore flow and remove the unnatural dams. Large or heavy objects required assistance by heavy equipment. The City properly disposed all of the trash and debris.



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

Status: Ongoing.

Since the summer of 1999, the City has been coordinating with TVA, UTK, TDEC, USACOE, the Isaac Walton League (IWL), Keep America Beautiful 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 creek crew maintenance at the mouths of the major creeks, adding more trash receptacles at bus stops, increasing public awareness, installing temporary skimmers, etc. Long-term solutions have been researched and may include permanent skimmers on the major creeks, increased manpower on the river, and improved public awareness and participation. Current activities include working with volunteers to distribute BMPs and pollution prevention information to area restaurants and businesses.

During the first permit term, the City donated a new boat and hundreds of feet of trash skimmers to help the IWL collect litter and debris along the riverfront in the downtown area. The City has contracted with the IWL to maintain this "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 also effectively detained oil spills until remediation personnel could respond. During year eight, the City discussed the performance of the skimmers with the IWL and concluded that the booms have successfully prevented tons of floating material that would otherwise have been discharged from the creeks into the river. The City has agreed to purchase more skimmers to replace damaged booms and to expand the program to additional creeks during the new permit term. The additional booms should be installed during year one. All of the trash skimmers have been purchased with penalty funds collected from polluters.



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

Since 1997, permanent maintenance and/or covenants have been required for all new stormwater detention facilities and special pollution abatement devices (i.e. oil/water separators). 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 "Covenants". The end result is the same for water quality but the covenants do not require the Mayor's signature. The Stormwater and Street Ordinance section 22.5-34 (see appendix) now requires the owner of the property to execute a legal document entitled "Covenants for Permanent Maintenance of Stormwater Facilities" 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 lessee must also pay the City no less than \$5,000 to compensate for any perpetual maintenance that may be required after the expiration of their lease.

The City will retain the right to inspect and 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. 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.

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.

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: Revise Stormwater Ordinance To Incorporate Water Quality Considerations And To Require Water Quality BMP's For New Development. Status: Complete.

The City of Knoxville adopted a new Stormwater and Street Ordinance during year one and has revised it several times since that time to accommodate changes to the City's NPDES permit. The ordinance is included in appendix A of this report and may also be accessed on the City's web page 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 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. 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.

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

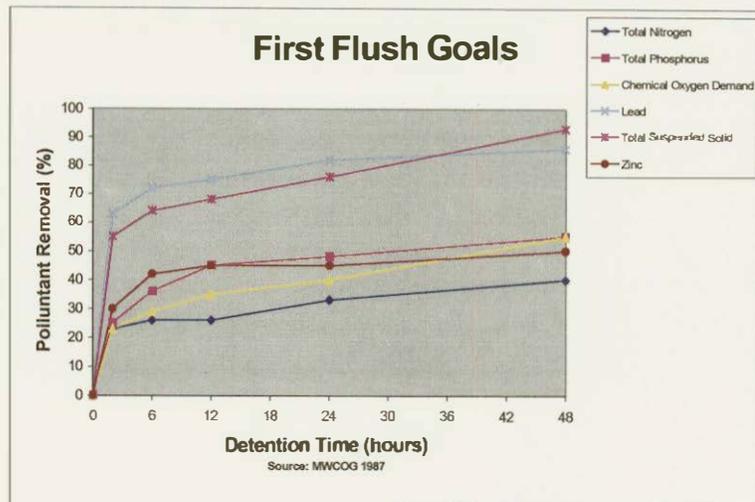
removed by the standard first flush control. The SPAP requires the operator to submit the management and structural controls necessary to address the expected pollutants and sources of pollution from the site after development. The typical special pollution abatement requirement has been a minimum of 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) 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 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. A local mall expects to greatly reduce their cost of roof replacement by implementing our grease controls around the grill exhaust vents for every restaurant. The controls keep the grease off their roof and out of our stormwater system.

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

**SWMP Task: Implement Master Plan pursuant to Part II, Application.** Status: Complete

The comprehensive stormwater management program (SWMP) submitted for TDEC approval on May 13, 1993 as Section 5 of the Part II Application has been implemented by the City as required by federal regulations except as amended by the NPDES Permit effective July 1, 1996 and subsequent amendments.



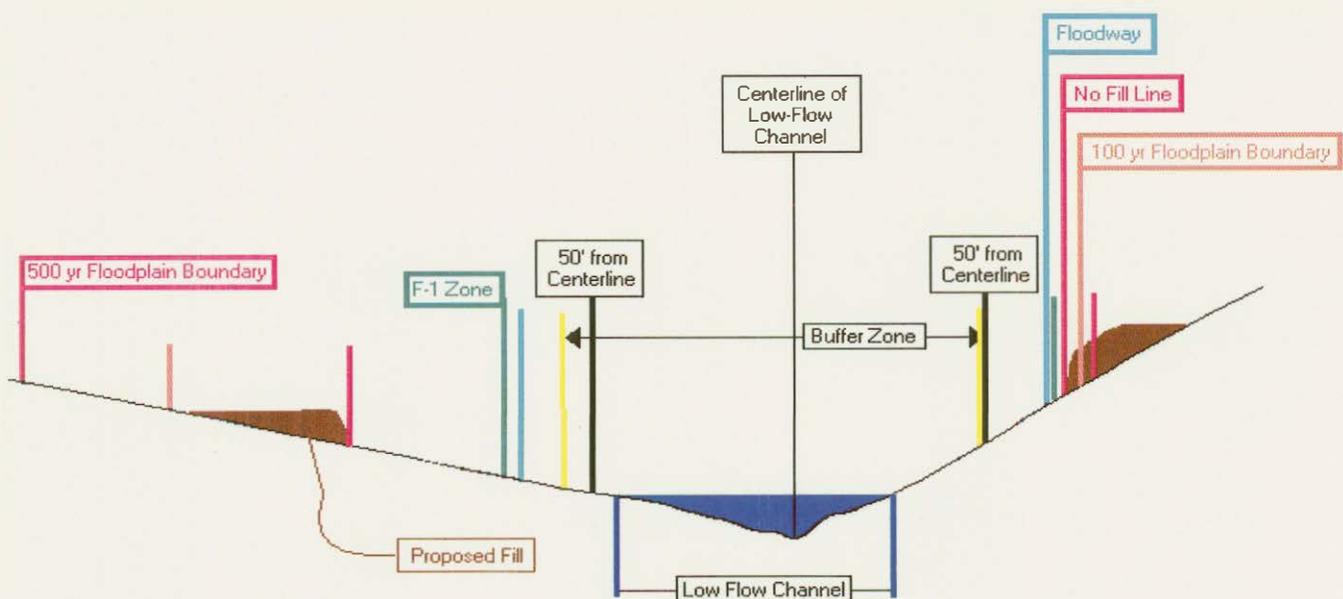


The current Stormwater and Street Ordinance includes five significant provisions for water quality protection. The combination of these provisions defines the core of the City's master plan for stormwater quality management. Implementation of the City's stormwater quality master plan includes but is not limited to the following:

1. First Flush control for new development and significant redevelopment;
2. Special Pollution Abatement for hotspot development and specific land uses;
3. A three-tiered Buffer Zone protection along blue-line streams;
4. Prohibitions and Enforcement of all illegal dumping and illicit discharges; and
5. A Comprehensive Best Management Practices Manual for common activities.

During the eight years of implementing the SWMP, the City has developed and implemented many system-wide requirements as a direct result of watershed based study and research. Best Management Practices (BMPs) and Stormwater Pollution Prevention Plans (SWPPPs) are now required as part of the new development process or retroactively on problem sites. A brief description of the First Flush and Special Pollution Abatement requirements is included in the previous section. Descriptions of all five of these provisions may be accessed in full on the web site as part of the ordinance and as part of both the published BMP manual and Land Development manual.

One landmark provision, which is not discussed elsewhere in this report, protects a streamside buffer zone along blue-line creeks. The three-tier restricted buffer zone requirement varies from 100', to 70' to 30', centered on the centerline of the creek, depending on the whether the creek is a FEMA studied named creek, unstudied named creek, or unnamed tributary respectively. The natural streamside buffer zone must be shown on the plat and maintained in a stable condition for the life of the development. 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. A typical cross-section of a studied blue-line stream is shown below.





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.

SWMP Task: Develop guidance criteria for BMP's.

Status: Ongoing

The City has successfully completed a comprehensive BMP manual. The manual may be accessed at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater) on the Engineering Division'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 will be kept on file in the Engineering Division 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 be made available for a fee at a local copy center. Free CD versions were made available during year eight at our new development seminars and in the office while they lasted. The website and BMP content will be updated at least annually.

TDEC and the UT Water Resources Research Center have adopted the BMP manual as a basic model for use by Phase II NPDES communities. The City provided an electronic copy and has authorized modifications by the State for this purpose.

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

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

Status: Ongoing

Street cleaning is performed daily for downtown streets and less frequently for all other streets. Streets with curbing are swept, while streets without curbing are flushed. Mowing is performed on a two to four week schedule between the months of April and September.

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 secondarily. 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.

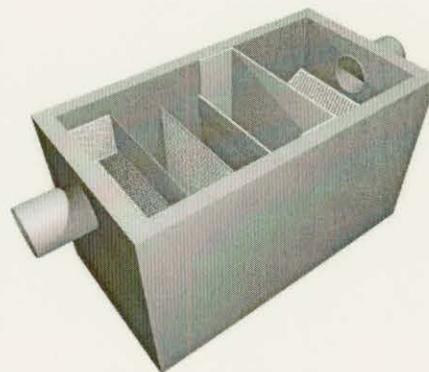
### **RC-4 Evaluation of Flood Management Projects**

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

The City only owns and maintains two regional detention facilities. Those facilities include the detention pond adjacent to Middlebrook Pike and Weisgarber Road at the Acker Place development and the detention pond located at the Northwest Crossing shopping center on Clinton Highway. Although the regional detention basins were designed for flood control, the City found that it was possible to retrofit these facilities 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 order to reduce the vast amount of sediment in the stormwater effluent and to prevent future accumulation of sediment down stream, two rock check dams and an 18-inch weir plate were placed in the pond's low flow channel. These velocity dissipaters allow the sediment time to settle out of the stormwater while still in the pond. The sediment is removed annually to prevent migration into Fourth Creek. A riparian zone vegetation farm has been planted in the pond with red osier, silky dogwood, black willow, and willow oak in addition to the existing species of white pine, cedar, and red oak trees. Further enhancements have been designed to reduce bank erosion of the low flow channel.

The regional pond at Northwest Crossing serves the Walmart, Lowes, and surrounding areas. 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 (see illustration) were installed during year eight. 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.



SWMP Task: Implement inspection program to inventory on-site facilities. Status: Complete.

During the last eight years, the City has 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, any new stormwater facilities will be properly recorded in the GIS after construction.

Engineering staff will maintain and update the existing inventory of ponds, pipes, water quality facilities and other drainage features as part of an ongoing GIS maintenance program. A GIS analyst inspects newly annexed areas in the field to verify the accuracy of the GIS stormwater features and to edit the stormwater layers as necessary.

### **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 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 certified and licensed by the University of Tennessee, spray the herbicide. 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; however, a household hazardous waste collection facility has been opened to collect all types of hazardous wastes including pesticides, herbicides, and fertilizer.

For pesticide, herbicide, and fertilizer pollutants, the control program 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.

SWMP Task: Public education program as part of the illicit connection and improper disposal program.

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. 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.

## **5.2 THE 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: Develop/Implement New City Ordinances Prohibiting Non-stormwater Discharges  
Status: Complete.

The Stormwater and Street Ordinance was developed and implemented during the first permit term to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new development. The ordinance may be accessed 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 according to 40 CFR 122.26(b)(2) as any non-stormwater discharge to the MS4. 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 the next permit term.

Exemptions to this prohibition were listed in the ordinance in accordance with the list in 40 CFR 122.26(d)(2)(iv)(B)(1). The City has reevaluated these exemptions and included the revisions in appendix A of this report.

### **ILL-2 Field Screening**

SWMP Task: Perform follow-up analysis at all high-risk field 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 that were tested the previous year. Each of the high-risk stormwater outfalls 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 (shown) for the following parameters: phenols, ammonia, detergents,

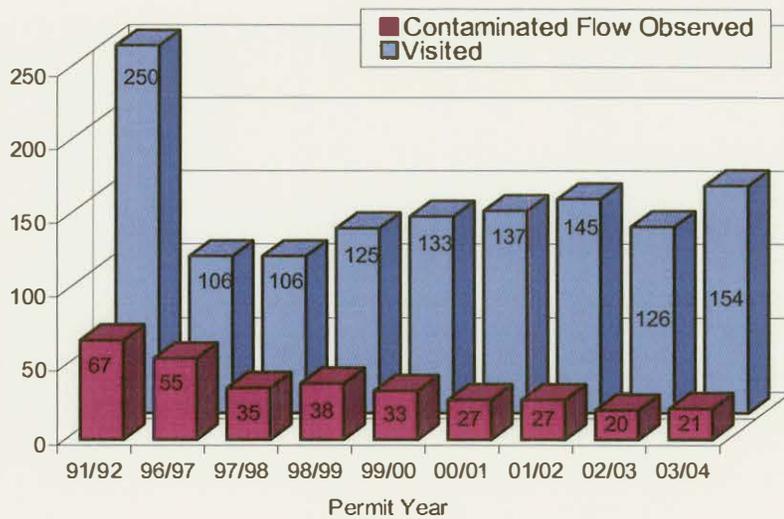


copper, chlorine, pH, turbidity, color, temperature, and flow rate. If ammonia is greater than one part per million, then a fecal coliform sample is collected for laboratory testing. The outfall test was repeated again between four and forty-eight hours after the first test. After one month, this process was repeated for each outfall to complete a total of four tests each year.

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 until the outfall is clean during all four annual visits. Once the outfall has tested clean during four site visits in a single year, it will only be retested if randomly selected from the list of inventoried outfalls.

The City previously developed and submitted the standard inspection guidelines for investigating illicit connections or illegal dumping in the first annual report. Any changes to these standard guidelines will be reported as they are implemented. As illustrated by the bar graph, the percentage of high-risk outfalls has continued to decrease each year since the program began in 1996. 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.

**Number of Dry Weather Screening Sites**



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. Of the 4403 outfall visits since the beginning of the program, flow from the outfall was only observed during 1343 of those visits. The results from each of the 1343 screenings are tabulated in our database by outfall identification number, testing date, and visit number. The testing results from the year-eight outfall screenings are included in appendix B of this report.

SWMP Task: Investigate 30 to 40 new field-screening sites 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 in the new permit term. The current permit required testing of the original 67 contaminated outfalls reported in the Part 1 application plus 40 additional sites each year. The City exceeded the minimum criteria by testing 154 outfalls during year eight. The tested outfalls consisted of the previous year's 20 high-risk outfall sites plus 134 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 Division 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 be resolved with education or enforcement.

The dry-weather-screening program has been one of the most successful programs in the current permit term and will continue to be a high priority in the new permit cycle.

### **II.L.-3 Investigation of the Storm Drain System**

SWMP Task: Develop and implement procedures for mapping, field surveys, and upstream source identification. Status: Complete.

The procedures for mapping, field surveys and upstream source identification were developed and included in the Part II Application section 5.3.5. These procedures were adopted as policy and successfully implemented during the first permit term. The City will continue to utilize and modify these procedures to increase the effectiveness of the Illicit Discharge and Illegal Dumping Program. These updated procedures for the first permit term were included for the Division's review in monitoring section 6.1.3 of the first annual report. Any updates during the first year of the new permit cycle will be included in the following annual report.

SWMP Task: Implement enforcement procedures and follow-up monitoring/ inspections. Status: Complete.

The schedule for this task appropriately coincided with the schedule for ordinance revisions. The Stormwater and Street Ordinance defined the existing enforcement procedures. An Enforcement policy was implemented immediately after the ordinance was effective in 1997.

Depending on the severity of the violation, a first-time offender is typically 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. Copies of the NOV are distributed to the property owner or developer, the City Law Department, and the Engineering Division. 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 the actions taken to remedy the violation may be fully evaluated.

When a penalty is assessed, a violator may appeal their penalty before a five-member Board of Environmental Appeals. The five volunteer members of the Board of Environmental Appeals were appointed by the Mayor and consists of individuals with an expertise as follows:

- 1) One licensed professional engineer with civil engineering expertise.
- 2) One licensed professional engineer.
- 3) One representative of the development or industrial community.



- 4) One neighborhood representative.
- 5) One member at large.

Board members will serve a 5-year term and may be reappointed at the end of their term. A list of the board members may be reviewed at [www.cityofknoxville.org/boards/env-appeals.asp](http://www.cityofknoxville.org/boards/env-appeals.asp) for current contact information and general information.

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 where necessary.

SWMP Task: Coordinate with KUB sanitary sewer inspections.

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 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 recent Memorandum of Understanding has clarified the cooperative roles and responsibilities of both the City and KUB with respect to stormwater management and compliance with the MS4 NPDES permit. A copy of the Memorandum of Understanding has been included in the appendix of this report.

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

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

Status: Ongoing.

The City of Knoxville Stormwater Quality Section of the Engineering Division will continue 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 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 Division staff participates in the EOC while the KEMA, KFD, Police Department, and Rural Metro units perform the field exercises.

The KFD and Engineering Division coordinate to respond to small spills and possible hazards as they are reported. 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 to assist with spills discharging into the river. When a responsible party is identified, the Engineering Division staff will follow normal investigation and enforcement procedures to order the containment and remediation at the violator's expense.

Engineering staff will continue to closely coordinate with other emergency personnel by attending the monthly Local Emergency Planning Committee meetings and by maintaining a supervisor on call after hours and on weekends to help respond to water quality emergencies.

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

SWMP Task: Establish and monitor "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 new permit term.

The Water Quality Hotline is a dedicated phone line attached to a phone in the Stormwater Quality Section of the Engineering Division. 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 by the on-call supervisor. If the water quality concern is within the City limits, the Engineering Division investigates the problem. Otherwise, the problem is referred to the Knox County Health Department, TDEC Environmental Assistance Center, or other appropriate agency.

SWMP Task: Publicize the "Water Quality Hotline".

Status: Ongoing.

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 currently publicizes the Water Quality Hotline on the Engineering Divisions website at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater) and annually in the blue pages of the Greater Knoxville Area BellSouth phone book.

The City includes the hotline number in thousands of mass produced stormwater pollution prevention educational handouts such as magnets, brochures, presentations, 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.

During year eight, the Hotline was advertised by placing the number on the stormdrain markers, which are placed on curb iron inlets. Although the curb iron markers have been used for several years, this is the first year the City has designed custom 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.

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

SWMP Task: Implementation and 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.

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. This is the first permanent HHW Collection Center in the State of Tennessee, which 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 paid for through a \$500,000 grant from the State of Tennessee. Activities at the center include:

- diverting reusable products;
- collecting, blending and recycling 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, individuals pull into a covered drive-through where staff removes HHW from vehicles. Material that is collected and is still "good" is separated and made available for pickup by the public free of charge. "Good" material includes containers that have never been opened or material that has not exceeded its useful shelf life.



The staff then processes materials that are not reusable. This includes testing of unknown materials, diverting selected acids and bases to the wastewater treatment facility, bulking flammable materials, lab packing, and blending paint. Latex paint is reconditioned at the facility and is used by the City and sold wholesale to local thrift stores and other groups. 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 City has hired a chemist and two technicians to operate the collection center. Due to the capital investment and success of this program, the City will likely maintain and operate the facility throughout the next permit term.

### ILL-7 Control Infiltration

SWMP Task: Assess Rehabilitation Study from outside consultant & recommend capital improvements.

Status: Complete.

In February 2003, the City, partnered with the state and the Tennessee Izaak Walton League to fund a pilot thermography project in Knoxville. Eight 303(d) streams were selected for investigation including: Love Creek, Williams Creek, First Creek, Second Creek, Third Creek, Fourth Creek, Baker Creek and Goose Creek. The investigations for each of the thermography anomalies were completed in year eight. Although some illicit discharges and leaking sewer manholes were detected, the vast majority of the anomalies turned out to be natural groundwater springs. The location of the natural springs may prove to be useful information to include in the City's geographic information system. One hard copy notebook has been assembled with the complete set of photos, GIS maps, and field notes. If this information is refined and duplicated, the City will provide a copy of this tool for TDEC's use with their ARAP program. The electronic version of the raw data was previously provided to TDEC, the Izaak Walton League, and to KUB.



Since the KUB and other smaller utilities maintain control and operation of the City's municipal sanitary sewer, compliance with the requirement to control infiltration is reflected in the City's maintenance of adequate legal authority over illicit discharges from the operators of the various sewer systems. During the first permit term, the City did maintain and exercise this legal authority. This fact was discussed in the year seven annual report and confirmed by the Knox County Circuit Court's opinion, which was included in appendix E of that report.

Although the City has reviewed various rehabilitation studies and does engage in ongoing communications with KUB to resolve illicit connections or unauthorized discharges to the MS4, KUB maintains complete control over capital project planning and scheduling. The City has recommended specific capital improvements and even provided funding for several sanitary sewer rehabilitation projects during the permit term. During year eight, for example, KUB



completed the sewer rehabilitation project along Second Creek from the Inskip Ballfield to the I-275 Business Park while the City administered a major sewer replacement project in Fountain City for KUB along First Creek. The Second Creek project was one of the specific recommendations the City made to KUB in previous years. The First Creek project was partially funded by the City in coordination with a City flood control project. Both of these projects are representative of the extent of the City's future involvement with capital improvements for the sanitary sewer system.

During the new permit term, the City will defer to any federal or state court order or consent decree in lieu of any additional program to control infiltration. In the past few years, the City has concentrated significant effort towards resolving the sewer overflow problem in Knoxville. The new permit will allow the City to concentrate on other sources of pollution while EPA and TDEC contend with sewage overflows via the new consent decree with KUB.

### **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: Develop/Implement New City Ordinance Prohibiting Non-stormwater Discharges.  
Status: Complete.

The Stormwater and Street Ordinance was developed during year one to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new development. The ordinance was updated this year to include specific examples of illegal non-stormwater discharges for clarification only. The non-stormwater discharge prohibition was not altered in the latest ordinance revisions. The current Stormwater and Street Ordinance is included in the appendix of this report and may be accessed on the Engineering Division'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. 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 the next permit term.

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

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

During year eight, the City coordinated with TDEC and industrial facilities to ensure that all Notices of Intent (NOIs) are received by the City as necessary. When the NOIs are received, 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 will verify that an NOI has been filed. If an NOI has not been filed, the City will coordinate with TDEC to obtain the NOI. Future NOIs may be obtained annually from TDEC in bulk or electronically.

An electronic database will be completed during the next permit term that should allow geographical linkages to the GIS. The prototype industrial database has been developed and may be converted to the City's new Sierra Permit Tracking system. Since several City Divisions are converting databases to this system, the exact schedule for conversion has not been determined at this time. The current industrial information is maintained by hard copies on file.

SWMP Task: Collect and analyze KUB inspection reports. Assess impact to the MS4.

Status: Program Terminated.

KUB had agreed to provide the City with the one-page inspection reports at the end of the year in which they were collected. At the beginning of year six, KUB notified the City that the inspection reports would no longer be collected. Since the inspection reports had been collected in previous years from the same group of industries, it is not likely that any significant new information would have been gathered. City employees will replace this program during the new permit term with a more effective inspection program that will include various commercial sectors in addition to the traditional industrial sources.

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. The majority 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 facilities' file in the 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.

In addition to the illicit connection and improper disposal program inspections, the City routinely performs inspections at commercial and industrial sites through a random selection process using the MPC inventory of industrial space and in response to citizen concerns reported to the water quality hotline. Some inspections have occurred as the City gained experience with common sources of pollution. Areas such as loading docks, food distributors, fuel storage/sales, restaurants, and car lots have become reoccurring areas for enforcement. These areas are now being targeted for education and inspection to prevent discharges. Some of these land uses are targeted during the pre-development phase with the Special Pollution Abatement Permit (SPAP) process described in section RC-2 of this report. The SPAP will be refined as an ongoing pollution prevention program in the new permit term.



SWMP Task: Develop 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 four 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.

Each facility has been evaluated and inspected regularly by Engineering personnel during the first permit term and will continue to be inspected at least annually in the future. Since the bus terminal is owned by the City but managed by KAT, they developed their own PPP, which was submitted in the first annual report in 1997.

Some structural pollution control measures have been implemented at several MIF sites. The bus station had two large Stormceptor brand stormwater treatment devices installed in November 1999. The total project cost was nearly \$300,000. A strip of the concrete parking lot along First Creek was removed and replaced with a slope directed away from the creek. The reversed slope and a large curb prevent the runoff from entering First creek directly. The runoff is routed through the two oil/water separators before being discharged. Other measures at KAT include their commitment for ongoing fleet upgrades to new lower pollution buses.

The SWMF has installed some above ground filters and catch basin inserts to mitigate potential pollution. The entire transfer facility is covered and the drain in the loading dock for the transfer trucks is routed to the sanitary sewer system. Both maintenance garages have adopted spill protection policies and all mechanical work is done inside. A hydrocarbon absorbent boom is maintained in a trench drain at the police garage as a secondary control for emergency spills.

A retrofit project is being designed to add an underground stormwater treatment structure at the outfall from the Loraine Street facility. Since all of the City's maintenance vehicles and heavy equipment are parked at this facility when they are not in use, the potential for polluted runoff is high. The retrofit project will update the facility to comply with the new ordinance requirements for vehicle storage and maintenance facilities. Funding for the project was placed in the 2004-2005 budget.

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

SWMP Task: Collect Monitoring Data from permitted 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 on an annual basis. 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: Develop ongoing monitoring program pursuant to 40 CFR 122.26(d)(2)(iv)(c)(2). Identify pollutants/sources as applicable. Status: Ongoing.

In the first permit cycle, the City's Ongoing Monitoring Program, defined in the Part 2 NPDES stormwater permit application, included the monitoring of stormwater runoff from two areas of industrial facilities (e.g. industrial parks). Stormwater samples were collected, analyzed, and recorded for 12 to 15 storms per year per site using flow weighted composites from ISCO monitoring stations. Each of the monitoring locations received runoff from small watersheds approximately 1/4 square mile with several different industries included. Therefore specific pollutants were not easily traced back to a specific industry but the general data did allow implementation of industry wide BMPs.

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 TSDs 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. The Stormwater & Streets ordinance Section 22.5-54 states, "*The Engineering Director 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.

SWMP Task: Analyze results from ongoing monitoring program. Status: Complete.

A summary of the analysis from the ongoing monitoring program was included in the appendix of the year five annual report. This detailed analysis will be repeated at the end of next permit term and included once more in the year five annual report for the new permit.

Some routine parameters associated with industrial activities have been extremely low or



non-existent. Phenols were essentially below non-detection limits for the first three years of sampling and were therefore removed from the monitoring program.

Although oil, grease, and hydrocarbons are not routine parameters, analysis and investigation of visual inspections have helped the City trace several problems back to the industrial source where they have been corrected. Changes to the Special Pollution Abatement Permit program should prevent many of these problems from occurring on new development.

SWMP Task: Develop, 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 was included in the 96/97 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 also 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. The City partnered with the University of Tennessee Civil & Environmental Engineering Department and with Aqua Shield to put two catch basin filters in place. One filter was installed at the SWMF and one was located on Phillip Fulmer Way outside Neyland Stadium. A similar BMP sampling project may be initiated for two vault type stormwater treatment devices that may be installed side-by-side at the Loraine Street facility. If the installation is completed during year one, the sampling project will begin in year two.

During year eight, each MIF outfall was 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. The City had proposed to initiate a wet-weather sampling program from these facilities in the new permit term. However, since the permit was not issued before the end of year eight, the wet-weather grab samples will start at the beginning of year one. Both sampling programs will continue to be conducted at least annually in the new permit term.

#### **5.4 THE 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: Revise City Ordinances to require construction sites greater than 10,000-sq. ft. to submit Erosion and Sediment (E&S) Control Plans. Status: Complete.

The Stormwater and Street Ordinance was developed during year one to specifically require construction sites greater than 10,000 square feet to provide erosion and sediment control plans according to section 22.5-28(4)(c). The ordinance was revised in year seven but the requirement for erosion control plans was only strengthened. The current ordinance may be



accessed on the Internet at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater) for review or download. The current ordinance is also provided in the appendix of this report.

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 during year eight. 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. 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*

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 Division.

SWMP Task: Require Site Plans Submittals per TN E/S Control Handbook. Status: Complete.

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 July 1992, or as amended by TDEC or its successor, or the City of Knoxville's Best Management Practices Manual, whichever is more restrictive.

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

Although the TDEC Erosion and Sediment Control Handbook does provide 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 insure consistency in the plan review process. The checklist is available on the Stormwater section's web page.



## CS-2 BMP Requirements

SWMP Task: Require Construction BMPs per the TN E/S Control Handbook. Status: Complete.

As outlined in the new Stormwater and Street Ordinance section 22.5-27, all erosion and sediment control plans must comply with either the Erosion and Sediment Control Handbook produced by TDEC, dated July 1992, or as amended by TDEC or its successor, or the City of Knoxville's Best Management Practices Manual, whichever is more restrictive.

SWMP Task: 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 regulations included in the new BMP manual address the following considerations:

- Designated areas for construction equipment maintenance and repair and prohibiting discharges of oil and grease into the storm drain system or receiving waters.
- Designated areas for construction equipment washing provided with a gravel or rock base and ensuring the wash waters are discharged to a regularly maintained temporary holding basin or sediment control device.
- 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.
- Provision of adequate sanitary facilities on construction sites in accordance with Health Department Regulations.

Many of these "good housekeeping" issues will be reviewed with the contractor, engineer, and developer during the pre-construction assistance meeting.

SWMP Task: Evaluate new BMP requirements/design modifications. Status: Ongoing.

The Stormwater and Street Ordinance section 22.5-22 authorizes the Engineering Division 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 Engineering Division web site at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater).

The guidance criteria in the new 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 new 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 and maintainable BMPs are constructed in the City, a standard maintenance covenant is executed before site development plans are approved. The guidance criteria addresses the goals of the NPDES stormwater program by allowing only BMPs which are effective in reducing the targeted pollutants.



### **CS-3 Inspection / Enforcement**

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

In the first year of the permit term, the City of Knoxville expanded new development construction inspections to include single-family residential sites. These single-family residential inspections will continue as an ongoing program during the next permit term.

SWMP Task: Increase penalties for violations to: \$5000. Status: Complete

The Stormwater and Street Ordinance, section 22.5-8 Penalties, increased the penalty for violations up to \$5,000 per day per violation. This ordinance was effective during year one and was included in that report. The latest revision of the ordinance is included in the appendix. It may also be accessed on the Internet at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater). The City has successfully implemented and collected penalties under this law.

SWMP Task: Implement Scheduled Site inspections: rough grading, E&S control installation, final grading, and final stabilization. Status: Ongoing.

The Engineering Division continues to implement site inspections for subdivision 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 scheduled with the contractor or developer, the City staff may visit the construction sites approximately every week. The time frame for some project inspections will vary due to the specific project.

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

A significant improvement in this process was implemented after the 2003 ordinance revision. The developer is now given a letter, which authorizes the installation of erosion and sediment controls after the submitted site development plan is approvable. After the e/s controls are in place, a licensed engineer must certify that the installation has been completed according to the e/s control plan. After the Engineering Division has received the certification, the site development plan will be approved and a permit issued.

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

SWMP Task: Co-Sponsor E&S Control Practice Seminars for City staff, developers, Engineers and contractors. 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.



Beginning in year six, 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 likely continue to promote and support the TDEC certification program in place of a separate erosion control workshop.

SWMP Task: Evaluate training materials from other jurisdictions.

Status: Ongoing.

During the first permit term, the City of Knoxville Engineering Division has evaluated training materials and programs from various Federal, State, and local jurisdictions around the country. This program will continue throughout the next permit term in an effort to continuously improve training programs provided and cosponsored by the City. The City will continue to evaluate training programs and materials to incorporate into the SWMP. This ongoing task should allow the City's SWMP to stay comparable with the other MS4's in the region.

Much of the information collected and reviewed by the City was used to develop the City of Knoxville's Best Management Practices manual. The manual may be used for training or information for contractors, businesses, and citizens. The City distributes the manual by free compact disk at our annual seminars and on the Internet for free download. The BMP manual may be accessed at [www.cityofknoxville.org/engineering/stormwater](http://www.cityofknoxville.org/engineering/stormwater) on the Engineering division web site. The City was pleased to provide the electronic file copy of the BMP manual to the University of Tennessee Water Resources Research Center to be used as a base model BMP manual for the Phase II NPDES communities in Tennessee. Many other phase II communities have contacted the City for permission to use the Knoxville BMP Manual as a base to develop their own. The City has provided this resource to everyone that has asked for permission.

In addition to the Tennessee E&S Control Handbook, some of the training materials already compiled, reviewed, and used by the City include but are not limited to:

- ASCE & IECA Soil Erosion & Sediment Control Videos
- Beaufort County Manual for Stormwater Best Management Practices
- California Stormwater Best Management Practices Handbooks
- Caltrans Stormwater Quality Handbook
- Charlotte-Mecklenburg Stormwater Management/ Land Development Manual
- Chattanooga Stormwater Management BMP Manual (1993)
- Fairfax County, Virginia E&S Control Inspector Training Video
- Kentucky Best Management Practices for Construction Activities
- MSD Erosion Prevention and Sediment Control
- Nashville Storm Water Management Manual
- North Carolina Erosion and Sediment Control Practices Video Modules (1991)
- North Carolina Sediment Control Planning and Design Manual (1988)
- Ohio Department of Natural Resources Keeping Soil on Construction Sites Video
- State of Florida Department of Environmental Regulation, The Florida Development Manual: A Guide to Sound Land and Water Management
- State of Maine Stormwater Best Management Practices Manual



- USEPA Developing Pollution Prevention Plans and Best Management Practices for Storm Water Management for Construction Activities (1992)
- USEPA NPDES Best Management Practices Manual (1993)
- Virginia Erosion and Sediment Control Handbook (Third Edition, 1992)

## **5.5 EDUCATIONAL ACTIVITIES and PUBLIC OUTREACH**

### River Rescue

Status: Ongoing

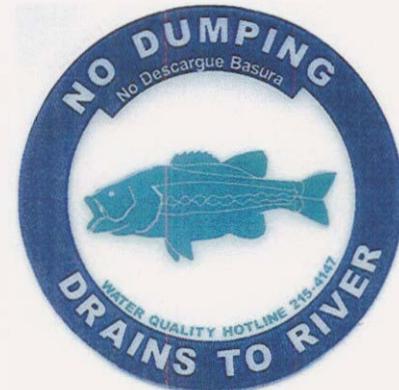
The year 2004 was the 15<sup>th</sup> year for the River Rescue. The spring 2004 River Rescue attracted hundreds of volunteers who collected many tons of trash and tires from the shores of the Tennessee River. This annual event is coordinated through Ijams Nature Center in cooperation with the City of 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 over 30 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

Status: Ongoing

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.

The message “DUMP NO WASTE, DRAINS TO STREAM” was stenciled on over ten thousand storm drains earlier in the permit term. In the last few years, the City replaced the stenciling program with DAS curb markers. These brightly colored plastic disks are affixed to the curb irons and carry the message “Dump no Wastes, Drains to Stream”. Although the curb markers are a temporary retrofit for the existing storm drains, they are more economical and environmentally friendly since they do not wear off as quickly as the painted stencils. When the disks were first introduced, volunteers and City staff placed several thousands of markers on storm drains in the city. Currently, several hundred of the informational disks are purchased and distributed to volunteers each year to attach to curb irons. During year eight the disks were revised to include the Water Quality Hotline phone number and some Spanish text.



In the City’s new permit application, a permanent version of this educational program was proposed. The City has already adopted a new 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 offer long-term educational benefits as citizens become familiar with the message and it's meaning.

#### Water Quality Forum

Status: Ongoing

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, the Sevier County Water Board, The League of Women Voters, 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.

#### Adopt-a-Watershed

Status: Ongoing

Currently, fifteen area high schools and middle schools are participating in the program. The City of Knoxville sponsors Americorp volunteers who 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, stencils, testing supplies, training, and grants.

#### Adopt-A-Stream

Status: Ongoing

The City of Knoxville, in conjunction with Knox County and the Town of Farragut is in the third year of administering the Adopt-A-Stream program. In the past fiscal year we have trained 36 Adopters and eight volunteer coordinators in the AAS program. Sixteen of these adopters have adopted six stretches of creeks inside the City of Knoxville. They have performed over ten creek clean-ups and other evaluation and education programs on their sectors of creek. The City has provided the supervision and training in addition to gloves, trash bags, pitchforks, wheelbarrows, waders and other tools for these activities.



Clean, Protect and Restore (CPR)

Status: Ongoing

This annual project coordinated by the Americorps Volunteers with the assistance of the Water Quality Forum, coordinates creek cleanups at seven sites throughout the City of Knoxville in December. It collected tons of trash and educated hundreds of volunteers.

Stock Creek Watershed Initiative

Status: Ongoing

The Stock Creek Watershed Initiative (SCWI) was established in 2002 under the direction of the Water Quality Forum to assess Stock Creek conditions, prioritize problems, educate and involve residents, and implement solutions.

The following agencies have made significant contributions to Stock Creek Watershed protection projects and will continue to do so during the implementation of this project: City of Knoxville, Knox County Soil Conservation District, Knox County, Knox-Chapman Utility District, KGIS, MPC, Little River Water Quality Forum, Little River Watershed Association, NRSC, TDEC, EAC, TVA, USGS and UT.

The 21 square mile Stock Creek Watershed, a sub basin of the Little River Watershed, is located in the southern part of Knox County with a small portion in Blount County. Stock Creek is experiencing degradation related to development and land use. Significant progress has been made in the areas of building partnerships, educating citizens, assessing conditions and identifying pollution sources over the last two years. In order to focus our efforts and ensure development of a comprehensive plan that has community buy-in and support, we are requesting funding in this proposal to validate existing modeling data through visual assessments, involve stakeholders in a participatory planning process and write a watershed restoration plan for Stock Creek. This plan will be based on EPA's Nine Components of Watershed Plans and the Center for Watershed Protection's (CWP) Eight Tools of Watershed Protection.

Public Displays And Presentations

Status: Ongoing

In cooperation with the COK Solid Waste Office 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 Kiwanis Club, Boy Scouts, and University classes.

**6.0 MONITORING REPORTS SUMMARY**

6.1 Dry-Weather Screening Program - New Outfall Inventory.

During the past permit year, seventeen outfalls were added to the City's outfall inventory and no outfalls were removed. Outfalls are typically added as a result of re-development or annexations and removed as a result of drainage alterations. The outfalls added to the system are as follows: 00-400-0072, 02-100-0102, 02-100-0097. Due to redevelopment, outfall 01-400-0060 was deleted. All outfalls are clearly marked on the inventory map located in the appendix.

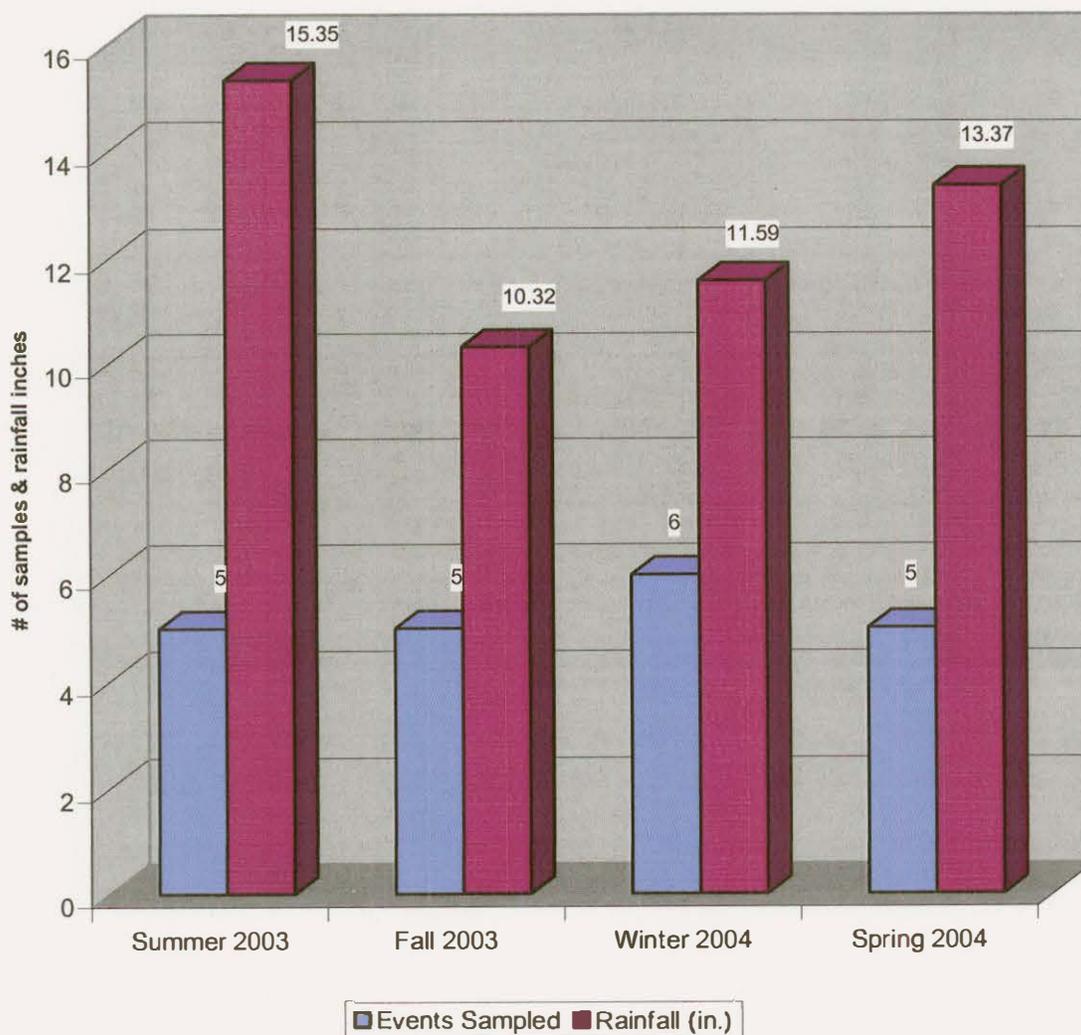


## 6.2 Ongoing Stormwater Monitoring Program.

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

During the July 1, 2003 to June 30, 2004 monitoring period, an average of 50.63 inches of rainfall was recorded and 21 storm events were sampled from the City's five ISCO monitoring stations. The sampling frequency requirements as described in section V of the NPDES Permit were amended this year to one storm event per season per station. The graph below shows the relationship between the amount of rainfall and number of events sampled per season. Monitoring data summaries for each of the sampling locations are included for TDEC's review on the following pages.

**Rainfall & Storm Event Summary**



**Acker Place Monitoring Station**

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>SUMMER 2003</b>	09/23/2003	Composite	7.0	1583407	1.80	5	U	104	101	0.35	0.02	0.21	0.19	6	71	0.09	
Quarter Average			7.0	1583407	1.80	5	U	104	101	0.35	0.02	0.21	0.19	6	71	0.09	

<b>FALL 2003</b>	10/15/2003	Composite	7.0	178025	0.42	5	5.6	157	111	0.44	U	0.14	0.14	6	99	0.044
Quarter Average			7.0	178025	0.42	5	5.6	157	111	0.44	U	0.14	0.14	6	99	0.044

<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.46
<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

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>WINTER 2004</b>	01/26/2004	Composite	6.5	693179	0.74	2	U	65	66	0.27	0.05	U	U	4.0	86	0.1	
Quarter Average			6.5	693179	0.74	2	U	65	66	0.27	0.05	U	U	4.0	86	0.1	

<b>SPRING 2004</b>	05/03/2004	Composite	7.0	559024	0.84	7		99	49	0.29	U	0.28		11	106	0.107
Quarter Average			7.0	559024	0.84	7	0.0	99	49	0.29	U	0.28	0.0	11	106	0.107

<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.46
<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

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

**First Creek Monitoring Station**

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>SUMMER 2003</b>	9/15/2003	Composite	7.0	52845	0.37	7	11.4	66	160	0.36	0.33	0.23	0.1	7	45	0.05	
Quarter Average			7.0	52845	0.37	7	11.4	66	160	0.36	0.33	0.23	0.1	7	45	0.05	
<b>FALL 2003</b>	10/15/2003	Composite	7.0	76908	0.42	7	6.06	99	122	0.67	0.03	0.2	0.17	11	60	0.049	
Quarter Average			7.0	76908	0.42	7	6.06	99	122	0.67	0.03	0.2	0.17	11	60	0.049	
<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
<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 - 10	

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>WINTER 2004</b>	1/26/2004	Composite	7.0	261825	0.68	3	25.5	53	142	0.78	0.07	U	U	7	40	U	
Quarter Average			7.0	261825	0.68	3	25.5	53	142	0.78	0.07	U	U	7	40	U	
<b>SPRING 2004</b>	4/12/2004	Composite		109741	0.73	6	43	93	176	0.2	0.05	0.38	0.33	5	28	0.032	
Quarter Average			0.0	109741	0.73	6	43	93	176	0.2	0.05	0.38	0.33	5	28	0.032	
<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
<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 - 10	

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

**Loves Creek Monitoring Station**

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>SUMMER 2003</b>	9/15/2003	Composite	7.0	504048	0.58	8	8.16	170	147	0.3	0.26	0.1	0.16	6	51	0.06	
Quarter Average			7.0	504048	0.58	8	8.16	170	147	0.3	0.26	0.1	0.16	6	51	0.06	
<b>FALL 2003</b>	12/11/2003	Composite	6.0	2101899	0.84	4	U	113	138	0.64	0.04	0.32	0.28	6	45	U	
Quarter Average			6.0	2101899	0.84	4	U	113	138	0.64	0.04	0.32	0.28	6	45	U	
<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
<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 - 10	

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>WINTER 2004</b>	1/26/2004	Composite	7.0	1385456	0.84	3	8.65	38	181	0.72	0.07	U	U	4	27	U	
Quarter Average			7.0	1385456	0.84	3	8.65	38	181	0.72	0.07	U	U	4	27	U	
<b>SPRING 2004</b>	4/13/2004	Composite	7.0	1858809	1.10	4	40	U	255	1.16	U	0.25	0.25	3	16	0.006	
Quarter Average			7.0	1858809	1.10	4	40	U	255	1.16	U	0.25	0.25	3	16	0.006	
<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
<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 - 10	

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

### Second Creek Monitoring Station

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>SUMMER 2003</b>	9/15/2003	Composite	7.0	3828465	0.65	5	5.38	71	122	0.73	0.02	0.1	U	13	60	0.06	
Quarter Average			7.0	3828465	0.65	5	5.38	71	122	0.73	0.02	0.1	U	13	60	0.06	
<b>FALL 2003</b>	10/29/2003	Composite	7.0	2489664	0.42	7	11.6	65	131	0.86	0.02	0.31	0.29	14	74	0.059	
Quarter Average			7.0	2489664	0.42	7	11.6	65	131	0.86	0.02	0.31	0.29	14	74	0.059	
<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
<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 - 10	

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Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>WINTER 2004</b>	3/22/2004	Composite	7.0	----	0.33	6	25	61	166	1.14	0.04	0.57	0.53	24	103	U	
	3/30/2004	Composite	7.5	1362211	0.29	7	37	41	201	1.06	0.06	0.47	0.41	12	55	0.057	
Quarter Average			7.3	1362211	0.31	7	31	51	184	1.10	0.05	0.52	0.47	18	79	0.029	
<b>SPRING 2004</b>	4/12/2004	Composite	----	1077213	0.23	6	125	46	177	1.15	U	1.8	1.8	6	35	0.058	
Quarter Average			----	1077213	0.23	6	125	46	177	1.15	U	1.8	1.8	6	35	0.058	
<b>*National NURP Study Average</b>						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
<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 - 10	

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

### Walden Drive Monitoring Station

Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>SUMMER 2003</b>	9/23/2003	Composite	6.5	10596650	1.63	4	U	334	80	0.31	0.05	U	U	11	90	0.06	
Quarter Average			6.5	10596650	1.63	4	U	334	80	0.31	0.05	U	U	11	90	0.06	

<b>FALL 2003</b>	12/15/2003	Composite	6.0	1571926	0.45	3	36.2	53	131	0.62	0.14	0.16	U	3	49	0.028
Quarter Average			6.0	1571926	0.45	3	36.2	53	131	0.62	0.14	0.16	U	3	49	0.028

<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 - 10

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Quarter	Date	Type	pH	Flow	Rainfall amount	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	
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
<b>WINTER 2004</b>	3/17/2004	Composite	7.0	889639	0.54	5	7.11	203	103	0.81	0.07	U	U	13	109	0.06	
Quarter Average			7.0	889639	0.54	5	7.11	203	103	0.81	0.07	U	U	13	109	0.06	

<b>SPRING 2004</b>	4/12/2004	Composite	----	397236	0.29	8	22.2	60	169	0.92	0.02	0.19	0.17	3	40	0.019
Quarter Average			----	397236	0.29	8	22.2	60	169	0.92	0.02	0.19	0.17	3	40	0.019

<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 - 10

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

**Laboratory Analysis Summary - Seasonal Storm Sampling Program**  
**July 1, 2003 thru June 30, 2004**

Site	Quarter	pH	Average Sampled Volume	Rainfall per Event	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite nitrogen	Ammonia nitrogen	Total Kjeldahl nitrogen	Total organic nitrogen	Lead	Zinc	Total Phosphorus
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
AP	Sum. '03	7.0	1583407	1.80	5	U	104	101	0.35	0.02	0.21	0.19	6	71	0.09
	Fall '03	7.0	178025	0.42	5	5.6	157	111	0.44	U	0.14	0.14	6	99	0.044
	Wtr. '04	6.5	693179	0.74	2.0	U	65	66	0.27	0.05	U	U	4.0	86	0.10
	Spr. '04	6.8	559024.0	0.84	4	5.60	111	89	0.36	U	0.14	0.1	5	93	0.072
FC	Sum. '03	7.0	52845	0.37	7	11.4	66	160	0.36	0.33	0.23	0.1	7	45	0.05
	Fall '03	7.0	76908	0.42	7	6.06	99	122	0.67	0.03	0.2	0.17	11	60	0.05
	Wtr. '04	7.0	261825	0.68	3	25.5	53	142	0.78	0.07	U	U	7	40	U
	Spr. '04	0	109741	0.73	6	43	93	176	0.2	0.05	0.38	0.33	5	28	0.032
LC	Sum. '03	7.0	504048	0.58	8	8.16	170	147	0.3	0.26	0.1	0.160	6	51	0.06
	Fall '03	6.0	2101899	0.84	4.0	U	113	138.0	0.6	0.04	0.32	0.280	6	45	U
	Wtr. '04	7	1385456	0.84	3	8.65	38	181	0.72	0.07	U	U	4	27	U
	Spr. '04	7	1858809	1.10	4	40	U	255	1.16	U	0.25	0.25	3	16	0.006
SC	Sum. '03	7.0	3828465	0.65	5	5	71.0	122	0.73	0.0	0.10	U	13	60	0.06
	Fall '03	7.0	2489664	0.42	7.00	11.6	65	131	0.86	0.02	0.31	0.29	14	74	0.06
	Wtr. '04	7.3	1362211	0.31	6.5	31	51	183.5	1.1	0.05	0.52	0.47	18	79	0.029
	Spr. '04	0.0	1077213	0.23	6	125	46	177	1.15	U	1.8	1.8	6	35	0.058
WD	Sum. '03	6.5	10596650	1.63	4	U	334	80	0.31	0.05	U	U	11	90	0.06
	Fall '03	6.0	1571926	0.45	3	36.2	53	131	0.62	0.14	0.16	U	3	49	0.03
	Wtr. '04	7.0	889639	0.54	5	7.11	203	103	0.81	0.07	U	U	13	109	0.06
	Spr. '04	0.0	397236	0.29	8	22.2	60	169	0.92	0.02	0.19	0.17	3	40	0.019
<b>National NURP Study Average</b>					11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.46
<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

-The above chart is comprised of seasonal averages from the data collected from each individual storm event.

-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: SMPS

-AP = Acker Place Monitoring Station

-LC = Loves Creek Monitoring Station

-FC = First Creek Monitoring Station

-WD = Walden Drive Monitoring Station

-SC = Second Creek Monitoring Station

### Seasonal Ambient Grab Samples 2003-2004

Summer 2003	Date	pH	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus
Acker Place	9/25/03	7.0	U	U	U	208	0.75	0.02	U	U	U	11	U
First Creek	9/25/03	7.0	U	U	U	230	1.49	0.02	U	U	1	13	0.007
Loves Creek	9/25/03	8.0	U	U	U	268	1.28	U	U	U	U	11	U
Second Creek	9/25/03	7.0	U	U	U	281	1.92	0.04	0.42	0.38	U	13	0.02
Walden Drive	9/25/03	7.5	U	U	U	220	1.06	U	U	U	U	16	0.009
<b>Average</b>		7.3	U	U	U	241	1.30	0.02	0.08	0.08	0.2	13	0.004

Fall 2003	Date	pH	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus
Acker Place	12/29/03	7.0	U	U	U	239	0.9	U	0.14	0.14	U	U	U
First Creek	12/29/03	7.0	U	U	U	243	1.83	0.02	U	U	U	4	U
Loves Creek	12/29/03	6.5	U	U	U	307	1.57	0.1	0.18	U	U	6	U
Second Creek	12/29/03	7.0	U	U	U	288	1.82	0.02	U	U	U	3	U
Walden Drive	12/29/03	7.0	U	U	U	228	1.15	U	0.25	0.25	U	9	0.016
<b>Average</b>		6.9	U	U	U	261	1.5	0.0	0.11	0.1	U	4.4	0.003

Winter 2004	Date	pH	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus
Acker Place	3/24/04	6.5	U	156	U	217	0.77	U	U	U	U	3	U
First Creek	3/24/04	7.0	U	14.1	U	217	1.55	0.02	0.13	0.11	U	7	U
Loves Creek	3/24/04	7.0	U	36.8	U	263	1.25	U	0.16	0.16	U	10	U
Second Creek	3/24/04	7.0	U	57.1	U	254	1.63	U	0.19	0.19	U	8	U
Walden Drive	3/24/04	7.5	U	U	U	239	1.00	U	U	U	U	9	U
<b>Average</b>		7.0	U	66	U	238.0	1.24	0.00	0.10	0.09	U	7	U

Spring 2004	Date	pH	BOD	COD	Suspended Residue	Dissolved Residue	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus
Acker Place	5/18/04	8.0	U	6.43	U	212	0.66	U	0.1	0.1	U	5	0.031
First Creek	5/18/04	7.5	U	8.8	U	220	1.12	0.03	0.14	0.11	2	11	0.053
Loves Creek	5/18/04	7.5	U	8.8	U	245	1.05	0.03	U	U	U	8	0.025
Second Creek	5/18/04	8.0	U	7.19	U	241	1.56	U	U	U	U	12	0.04
Walden Drive	5/18/04	8.0	U	6.72	U	226	0.98	0.04	U	U	U	12	0.01
<b>Average</b>		7.8	U	7.6	U	229	1.07	0.02	0.03	0.02	0.4	10	0.03

U = Analyte requested but not detected



### 6.2.3 Noncompliance.

The City of Knoxville has complied with all permit requirements during year eight.

### 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 year eight was determined to be an average of the annual rainfall recorded during year eight from the City's five stormwater monitoring stations located throughout the city plus the National Weather Service's rain gage at the McGhee Tyson Airport. During year eight, the average annual rainfall amount was 50.63 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 42.99 inches/year, the average annual runoff from a single-family residential land use (25% impervious) is 15.05 in/yr ( $42.99 * [(0.15 * 0.75) + (0.95 * 0.25)]$ ). 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) = 50.63 in./yr. = 4.2192 ft./yr.

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

A = drainage area (acres) = acres  $\times$  (4.35E4 ft<sup>2</sup>/acre) = ft<sup>2</sup>

Q =  $\Sigma Q_i$  = total runoff rate / E6 = Mgal

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, 2003 - June 30, 2004

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/ Comm.	Major Roads/ Hwys/ ROWs	Under Const.	Not Loaded	Total Acres in Watershed	Acres in the City Limits	Est. % Imperv-ious	C Value	Rainfall during Permit year 02/03 (in./yr)	Total Runoff for 02/03 (Mgal/yr)
Baker Cr.	412	2	107	640	90	77	32	1	1	3	269	13	27	1,674	1,674	32	0.41	50.63	938
East Fork	313	0	10	475	302	78	73	31	195	235	584	33	180	2,509	2,509	53	0.57	50.63	1,973
First Cr.	724	0	300	3,152	544	501	110	157	127	556	1,412	51	116	7,750	7,750	44	0.50	50.63	5,311
Fourth Cr.	965	57	423	2,026	468	406	93	206	201	568	881	61	414	6,769	5,920	41	0.48	50.63	3,880
Goose Cr.	639	40	126	669	213	67	8	21	77	131	327	34	29	2,381	1,755	35	0.43	50.63	1,031
Grassy Cr.	2,230	176	561	610	215	24	0	14	31	95	211	39	95	4,301	433	17	0.29	50.63	170
Holston R.	2,362	69	371	1,222	417	45	5	2	219	33	805	32	50	5,632	2,455	28	0.37	50.63	1,251
Inman Br.	563	33	214	138	4	12	0	0	0	0	145	0	34	1,143	99	21	0.31	50.63	43
Knob Cr.	1,719	195	481	843	125	84	1	19	1	29	296	4	169	3,966	989	19	0.30	50.63	413
Knob Fork	1,659	26	398	675	182	56	5	93	6	124	257	19	252	3,752	823	22	0.33	50.63	370
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	50.63	3,082
Second Cr.	443	0	90	1,281	346	247	29	107	140	542	1,161	35	82	4,503	4,498	53	0.57	50.63	3,526
Sinking Cr.	1,614	146	459	1,266	284	90	17	33	31	267	881	12	347	5,447	2,434	33	0.41	50.63	1,387
Swanpond C	3,892	303	833	604	121	36	4	79	240	232	457	65	285	7,151	499	19	0.30	50.63	208
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	50.63	2,425
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	50.63	5,162
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	50.63	3,699
Toll Cr.	535	69	154	222	42	26	1	0	37	4	93	42	4	1,229	767	22	0.32	50.63	340
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	50.63	885
Whites Cr.	2,733	154	782	1,298	575	59	31	11	49	126	608	51	578	7,055	1,634	23	0.34	50.63	756
Williams Cr.	358	11	47	561	46	96	125	17	10	61	276	3	30	1,641	1,605	37	0.45	50.63	991
Woods Cr.	1,220	106	281	371	0	26	0	2	140	43	261	1	157	2,608	143	23	0.33	50.63	66
Sink-East	1,226	0		728	9	17	0	17	3	27	0	0	0	2,027	91	12	0.24	50.63	31
Beaver Cr	21,174	0	0	21,230	1,292	845	4	259	283	712	0	160	0	45,959	162	16	0.28	50.63	62
Tuckahoe	4,293	0	0	1,829	18	14	0	8	2	1	0	4	0	6,169	229	8	0.22	50.63	68
Fr.Broad riv	8,954	0	0	2,744	73	40	24	24	497	117	0	166	0	12,639	551	11	0.24	50.63	181
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	25	0.35	50.63	38,248

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) = 50.63 in./yr. = 4.22 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 One = 38,248 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.



### **6.3 IN-STREAM AMBIENT MONITORING PROGRAM**

Ambient monitoring has evolved throughout the permit term from field-testing at many locations on several creeks to laboratory analysis of grab samples. During year four, the storm event monitoring stations were relocated to in-stream locations to enhance the ambient monitoring program and prepare for TMDLs. Beginning in year four and throughout year eight, quarterly grab samples were taken at the monitoring station locations and delivered to the laboratory for analysis. The samples were analyzed for all of the routine parameters listed in the seasonal monitoring program requirements. By collecting the ambient samples from the storm event monitoring locations and analyzing the samples for the exact same parameters as the storm event samples, the City will be able to compile a more useful comparison between the wet-weather and dry-weather pollutant levels. The ambient sampling results from year eight are included in the previous section of this report.

### **6.4 BIOLOGICAL SAMPLING PROGRAM.**

During year eight, the City contracted with the Tennessee Izaak Walton League (IWL) to continue their study the biological health of urban streams. This year the IWL conducted studies of Williams Creek, Baker Creek, First Creek, Fourth Creek, and Goose Creek. The IWL collected the field data and determined an Index of Biotic Integrity (IBI) for multiple locations. The results of this year's IBI studies are included in the appendix.



The City has encouraged TVA to continue selecting sites within the urban environment to help track any improvement or degradation of the urban streams. If TVA does not continue to perform urban stream IBIs, the City will supplement as required.

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

During the eight years of the NPDES permit, the City of Knoxville has developed and implemented all of the scheduled programs. The Ongoing Monitoring Program was started in January of 1997 and resulted in the collection of 90 months of storm event data through year eight. The dry weather-screening program was implemented in year one and has continued throughout the permit term.

Quantitative estimates of pollutant loads and event mean concentrations were reported as required in the fifth annual report. In the fifth year of the new permit term, the pollutant loads and event mean concentrations will be calculated again and compared to the previous results. Any quantitative reductions or groundwater impacts from the MS4 may become evident at that time and will be reported. However, as described in the dry weather-screening program (ILL-2), noticeable reductions in contaminated outfalls have been observed in the first eight years.

Although no testing data is available to substantiate all the illicit discharges and illegal dumping problems resolved, the qualitative effect on water quality within the MS4 and waters-of-the State is irrefutable. Several industries have removed illicit discharges, sections of leaking



or broken sanitary sewers have been repaired and/or replaced, the last known sections of the combined sewers have been separated, unknown combined sewer systems have been located and planned for repair, creek restoration and cleanup activities have begun, 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 require that these water quality facilities are maintained and/or replaced as needed. The City has also installed oil/water separators 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, and the Solid Waste Transfer facility. The City is planning new structural controls at the transfer station and the Loraine Street fleet storage and maintenance facility in the next permit term. Floating trash skimmers were installed near the mouth of some major creeks to prevent floating pollutants from discharging to the river. The Izaak Walton League 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.**

Many modifications of the SWMP are planned for year one of the new permit cycle. The proposed SWMP was updated in February of 2003 to accommodate the TMDL requirements and other issues that occurred after the reapplication was originally submitted in 2000. Since the public comment period ended on March 31, 2003, TDEC continued to accept comments and from stakeholders and the City until the new permit was issued effective July 1, 2004. Modifications due to the new permit will not be listed in this report. Future modifications to the new SWMP will be made in accordance with 40 CFR 122.62, 122.63, 124.5 and with Part VIII of the NPDES Permit.

Since 1997, permanent maintenance and/or covenants have been required for all new stormwater detention facilities and special pollution abatement devices (i.e. oil/water separators). 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 "Covenants". The end result is the same for water quality but the covenants do not require the Mayor's signature. The Stormwater and Street Ordinance section 22.5-34 (see appendix) now requires the owner of the property to execute a legal document entitled "Covenants for Permanent Maintenance of Stormwater Facilities" 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 lessee must also pay the City no less than \$5,000 to compensate for any perpetual maintenance that may be required after the expiration of their lease.



**9.0 FISCAL ANALYSIS**

The Fiscal Analysis for the eighth annual report will list the eighth permit year budget sources and amounts along with estimates for year one of the new permit. 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. Actual funding sources for future years are subject to change in the new permit cycle due to the possibility of implementing a stormwater utility fee.

<b>Program Description</b>	<b>Fund Source</b>	<b>Actual FY 03/04</b>	<b>Est. FY 04/05</b>
Solid Waste Recycling (includes: composting, education, staff, etc.)	General Fund	\$1,160,179	\$1,769,070
Household Hazardous Waste Facility & Operation	General & Grant Funds	\$161,000	\$170,000
Stormwater Mgmt Operating expenses	220 Fund	\$1,447,664	\$1,582,970
Public Service operating/maintenance (brush, leaf, & litter pickup; street cleaning; curb & gutter repair; catch basin cleaning and repair; ditching; storm drain repair, installation, & cleaning; seed/ sod in R.O.W.; grate replacement; water pumping; tree trimming, removal, and planting.)	General Fund	\$3,065,985	\$2,990,873
Northwest Crossing drainage project	General Fund	\$517,676	\$0
Papermill Road Culverts @ 4 <sup>th</sup> Creek	General Fund	\$ 174,460	\$691,510
Stormwater Education Project	220 Fund	\$0	\$13,000
Birdsong/Mohawk Stormdrain	General Fund	\$4,250	\$0
Forest Park Stormdrain	General Fund	\$188,940	\$0
Westmoreland Hills Detention Pond	General Fund	\$0	\$28,554
Wilson Avenue Drainage	General Fund	\$0	\$79,191
Second Creek Floodway Study	General Fund	\$0	\$6,703
Other Capital Improvements	General Fund	\$ 425,000	\$ 250,000
<b>Total Estimated Stormwater Management Program Costs</b>		<b><u>\$ 7,076,161</u></b>	<b><u>\$ 7,581,871</u></b>



# APPENDIX A

Revised Stormwater and Street Ordinance

Effective September 2004



## Chapter 22.5 STORMWATER AND STREET ORDINANCE

### Chapter 22.5 - STORMWATER

#### ARTICLE I.

#### In General

Section 22.5-1.	Title of chapter.
Section 22.5-2.	Purpose.
Section 22.5-3.	Administration of chapter.
Section 22.5-4.	Definitions.
Section 22.5-5.	Performance and Indemnity Agreement.
Section 22.5-6.	Right of entry.
Section 22.5-7.	Notice of Violation.
Section 22.5-8.	Penalties.
Section 22.5-9.	Board of Environmental Appeals.
Section 22.5-10.	Appeals.
Section 22.5-11.	Severability.
Sections 22.5-12-17.	Reserved.

#### ARTICLE II.

#### Site Development Criteria

Section 22.5-18.	Purpose.
Section 22.5-19.	Approval of plan required prior to issuance of building permit.
Section 22.5-20.	Partial Plat process.
Section 22.5-21.	General design criteria.
Section 22.5-22.	Site development design manuals.
Section 22.5-23.	Stormwater detention.
Section 22.5-24.	Erosion and sediment control.
Section 22.5-25.	Objectives of erosion and sediment control.
Section 22.5-26.	Site development permit required before site development.
Section 22.5-27.	Site development permit requirements.
Section 22.5-28.	Emergency Site Development Permit.
Section 22.5-29.	Fees.
Section 22.5-30.	Violation of a site development permit.
Section 22.5-31.	Design standard for detention and/or retention ponds.
Section 22.5-32.	Requirements for developments draining to a sinkhole.
Section 22.5-33.	Hydrologic and hydraulic computations.
Section 22.5-34.	Maintenance of stormwater facilities.
Section 22.5-35.	Acceptance of streets and stormwater systems within public rights-of-way.
Section 22.5-36.	First Flush requirements for detention ponds.
Section 22.5-37.	Technical requirements for Special Pollution Abatement Permits.
Section 22.5-38.	Additional permits required.
Section 22.5-39.	NPDES permits.



Sections 22.5-40-49. Reserved.

**ARTICLE III. Illicit Connections and Illegal Dumping**

- Section 22.5-50. Findings of fact.
- Section 22.5-51. Objectives.
- Section 22.5-52. Prohibitions.
- Section 22.5-53. Notification of spills and illicit discharges.
- Section 22.5-54. Requirements for monitoring.
- Sections 22.5-55-60. Reserved.

*This ordinance was initially issued in June 1997 (Ordinance O-224-97) with further revisions in December 1997 (Ordinance O-666-97), May 1998 (Ordinance O-247-98), May 2003 (Ordinance O-155-03), June 2003 (Ordinance O-264-03) and August 2004 (Ordinance O-139-04)*

**ARTICLE I. IN GENERAL**

**Section 22.5-1. Title of chapter.**

This chapter shall be known and may be cited as the Stormwater and Street Ordinance of the City of Knoxville. (Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-2. Purpose.**

The purpose of this chapter is to consolidate all regulations pertaining to the stormwater system and the local street system and to accomplish the following:

- (a) Improve stormwater management;
- (b) Control the discharge of pollutants to the stormwater system;
- (c) Improve public safety;
- (d) To comply with the City of Knoxville’s NPDES Permit;
- (e) Establish procedures to accomplish the above purposes.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-3. Administration of chapter.**

The Engineering Director and the engineering staff under the Director's supervision shall administer the provisions of this chapter. (Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-4. Definitions.**

Unless specifically defined in this section, words or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage, and to give this chapter its most reasonable application.

**1-year frequency storm** - A storm event defined to be 2.5 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.



**2-year frequency storm** - A storm event with a fifty (50) percent chance of being equaled or exceeded in a given year. Defined to be 3.3 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**5-year frequency storm** - A storm event with a twenty (20) percent chance of being equaled or exceeded in any given year. Defined to be 4.1 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**10-year frequency storm** - A storm event with a ten (10) percent chance of being equaled or exceeded in any given year. Defined to be 4.8 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**25-year frequency storm** - A storm event with a four (4) percent chance of being equaled or exceeded in any given year. Defined to be 5.5 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**50-year frequency storm** - A storm event with a two (2) percent chance of being equaled or exceeded in any given year. Defined to be 6.1 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**100-year frequency storm** - A storm event with a one (1) percent chance of being equaled or exceeded in any given year. Defined to be 6.5 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**500-year frequency storm** - A storm event with a one-fifth (1/5) of one (1) percent chance of being equaled or exceeded in any given year. Defined to be 7.6 inches in 24 hours or other such magnitude the Engineering Director shall establish based upon scientific and engineering information.

**Administrative Plat** – A plat prepared and certified by a Registered Land Surveyor and approved or denied for recording by the Metropolitan Planning Commission (MPC) through staff administrative procedures. A plat shall be classified as an Administrative Plat when it meets one or more of the following criteria: 1) It divides one tract into no more than two lots; 2) It combines existing lots into no more than two lots; 3) It adjusts the common lot line(s) between two existing recorded lots; 4) It is for the purpose of recording an easement or other new information and no subdivision of land is involved; or, 5) It qualifies as an exempt or corrected plat as defined by the Knoxville-Knox County Minimum Subdivision Regulations.

**Best Management Practices Manual (BMP Manual)** - A manual produced by the City of Knoxville containing best management practices for use on site development plans and construction projects.



**Blue-Line Stream** - Any stream shown on the 7.5 minute USGS Quad Maps.

**Board of Environmental Appeals** - Appointed by the Mayor and confirmed by Council to hear appeals filed by any person incurring a civil penalty or damage assessment imposed pursuant to Section 22.5-8 of the Stormwater and Street Ordinance.

**Buffer Zone** - A naturally undisturbed, vegetated and pervious streamside zone that is protected from clearing, grading, filling, paving, building, or other destruction of the naturally vegetated state.

**Condominium (Condo) Development** - A development of attached or detached units where the individual units take access from a private drive that is neither a Joint Permanent Easement nor City Right-of-Way.

**Covenants by Lessee for Maintenance of Stormwater Facilities on Leased Property** - A legal document executed by a Lessee and recorded with the Knox County Register of Deeds guaranteeing proper maintenance of stormwater facilities during the term of the Lessee's lease and the proper removal of the water quality facilities at the end of the term of the Lessee's lease.

**Covenants by Property Owner for Permanent Maintenance of Stormwater Facilities** - A legal document executed by the Property Owner and recorded with the Knox County Register of Deeds guaranteeing perpetual and proper maintenance of stormwater facilities.

**Detention** - A practice to store stormwater runoff by collection as a temporary pool of water and provide for its gradual (attenuated) release and thereby control peak discharge rates.

**Development Certification** - As-built, field-verified plans signed and sealed by a registered Professional Engineer and a Registered Land Surveyor, both licensed to practice in the State of Tennessee, showing contours, elevations, grades, locations, drainage and hydraulic structures, and detention basin volumes.

**Development, large residential and commercial** - Any development, commercial, office, industrial, multiple single family lots, any non-residential use, or any development of a single residential lot with a disturbed area of ten thousand (10,000) square feet, etc.

**Development, small single family residential** - Development of a single recorded residential lot with less than ten thousand (10,000) square feet of disturbed area.

**Downstream** - Downgradient from the lowest point of each subwatershed in a development.

**Discharge** - Dispose, deposit, spill, pour, inject, seep, dump, leak or place by any means, or that which is disposed, deposited, spilled, poured, injected, seeped, dumped, leaked, or placed by any means including any direct or indirect entry of any solid or liquid matter into the stormwater system by any means intentional or otherwise.

**Disturbed Area** - Portion of any site that has been altered from existing conditions, including but not limited to the following: providing access to a site, clearing of



vegetation, grading, earth moving, providing utilities and other services such as parking facilities, stormwater management and erosion control systems, potable water and wastewater systems, altering land forms, or construction or demolition of a structure on the land.

**Erosion** - The removal of soil particles by the action of water, wind, ice or other geological agents, whether naturally occurring or acting in conjunction with or promoted by anthropogenic activities or effects.

**Extended detention** - A practice to store stormwater runoff by collection as a temporary pool of water and provide for its gradual (attenuated) release over a minimum of twenty-four (24) hours and no more than seventy-two (72) hours and thereby control peak discharge rates and allow for gravity-driven settling of some types of pollutants. A practice which is used to control peak discharge rates, and which provides gravity settling of pollutants.

**First flush** - The initial or early stages of stormwater runoff from a storm event which commonly delivers a disproportionately large amount of previously accumulated pollutants due to the rapid rate of runoff. The first flush is defined as the first one-half (1/2) inch of direct runoff from the contributing drainage basin.

**Floodplain** - For a given flood event, that area of land temporarily covered by water which adjoins a watercourse.

**Hydraulic** - Pertaining to, involving, moved or operated by a fluid, especially water, under pressure or under a gravity-driving force.

**Hydrologic** - Pertaining to the scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

**Illicit discharge** - Any discharge to the stormwater system that is not composed entirely of stormwater and not specifically exempted in Article III.

**Impervious area** - Impermeable surfaces, such as pavement or rooftops, which prevent the percolation of water into the soil.

**Infiltration** - A practice designed to promote the recharge of groundwater by containment and concentration of stormwater in porous soils.

**Infiltration basin** - An impoundment made by excavation or embankment construction to contain and infiltrate runoff into the soil layer.

**Land Development Manual (LDM)** - Manual produced by the City of Knoxville that provides additional information about the specifics of the Stormwater and Street Ordinance.

**Lessee** - A lessee occupying real property pursuant to a lease agreement entered into prior to February 4, 1987, which contains no contractual provisions requiring the landlord to execute Property Owner's covenants, whose site development plan is five (5) acres or less, and whose use of the real property will not create environmental hazards.



**Main stream** - A stream on which floods are controlled by the Tennessee Valley Authority reservoir system, i.e., the Tennessee and Holston Rivers.

**Major storm** - A 100-year design storm or a storm that has a probability of one (1) percent chance in any given year.

**Natural Resources Conservation Service (NRCS)** - An organization within the U.S. Department of Agriculture that has published standard drainage procedures in the form of Technical Release No. 55. Formerly known as the Soil Conservation Service (SCS).

**Outfall** - The terminus of a stormwater system where the contents are released.

**Parking area** - The off-street facility including parking spaces along with adequate provision for drivers and aisles for maneuvering and giving access, and for entrance and exit, designed to be usable for the parking of vehicles.

**Partial plat** - A survey plat prepared and certified by a Registered Land Surveyor for recording as an exhibit to a written legal document that describes and establishes property easements and access for stormwater facilities. Only that portion of the total property necessary to show new easements relative to the property boundaries and all other conflicting property rights or uses must be included.

**Peak flow** - The maximum instantaneous rate of flow of water at a particular point resulting from a storm event.

**Peak flow attenuation** - The reduction of the peak discharge of a storm.

**Performance and Indemnity Agreement** - A contract between the Property Owner, Lessee or Developer and the City that assures construction and compliance as per site development plans approved by the Department of Engineering and in the case of a Lessee, assures the Lessee's proper maintenance of stormwater facilities during the term of its lease, and the proper removal of water quality facilities by the Lessee at the end of the term of its lease.

**Person** - Any individual, firm, corporation, partnership, association, organization or entity, including governmental entities, or any combination thereof.

**Redevelopment** - The improvement of 50% of the assessed value of the lot, building, or lot use.

**Restaurant** - An establishment or facility where food is prepared and sold.

**Retention** - A practice designed to store stormwater runoff by collection as a permanent pool of water without release except by means of evaporation, infiltration, or attenuated release when runoff volume exceeds storage capacity of the permanent pool.

**Riprap** - A combination of large stone, cobbles and boulders used to line channels, stabilize stream banks, and reduce runoff velocities.

**Runoff** - The water resulting from precipitation that is not absorbed by the soil.

**Sanitary sewer** - A system of underground conduits that collect and deliver sanitary wastewater to a wastewater treatment plant.



**Sanitary wastewater** - Wastewater from toilets, sinks and other plumbing fixtures.

**Sewage** - Human wastes carried by water from residences, buildings, industrial establishments or other places, together with such industrial wastes, stormwater or other water as may be present; or any substance discharged from a sanitary sewer collection system.

**Sinkhole** - (1) A naturally occurring depression where drainage collects in the earth's surface that is a minimum of two (2) feet deep. These depressions are typically denoted as closed contours and are shown as hachured contours on the City of Knoxville's Geographic Information System, or

(2) A hole, fissure or other opening in the ground, often underlain with limestone, dolomite or other rock formation that provides for and is being designated as a natural conduit for the passage of stormwater.

For both 1 and 2 above, the extent of the area considered to be a sinkhole is at a minimum the limits determined by the 100-year water surface elevation, assuming plugged conditions (0 cfs outflow).

**Site Development** - To physically alter a site. Site development includes, but is not limited to, providing access to a site, clearing of vegetation, grading, earth moving, providing utilities and other services such as parking facilities, stormwater management and erosion control systems, potable water and wastewater systems, altering land forms, or construction or demolition of a structure on the land.

**Stormwater** - Runoff from rain, snow or other forms of precipitation, resulting in surface runoff and drainage.

**Stormwater system** - The system of roadside drainage, roadside curbs and gutters, curb inlets, swales, catch basins, manholes, gutters, ditches, pipes, lakes, ponds, sinkholes, channels, creeks, streams, storm drains, and similar conveyances and facilities, both natural and manmade, located within the city which are designated or used for collecting, storing, or conveying stormwater, or through which stormwater is collected, stored or conveyed, whether owned or operated by the city or other person.

**Swale** - A natural or manmade depression or wide shallow ditch used to route or filter runoff.

**Upstream** - Upgradient of the lowest point of each subwatershed of a development.

**Vegetation** - Collection of plant life, including trees, shrubs, bushes, and grass.

**Wastes, industrial/commercial** - Liquid or other wastes resulting from any process of industry, manufacture, trade or business, or from the development of any natural resources.

**Wastes, other** - Decayed wood; sawdust; shavings; fallen bark; fallen leaves; lawn clippings; animal wastes; used or previously applied lime; garbage; trash; refuse, loose used paper, paper products, plastic containers, or metal containers; ashes, offal, discarded tar; discarded paint; discarded or uncontained solvents; used, discarded, or spilled petroleum products, antifreeze, motor vehicle fluids; used or discarded tires, gas tanks, or



chemicals; or any other used, uncontained, or unpackaged, or disposed of materials which may discharge to or otherwise enter the stormwater system.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-5. Performance and Indemnity Agreement.**

In order to ensure that any site development complies with the requirements of this chapter, the Engineering Director shall have the authority to require a Performance and Indemnity Agreement, together with a letter of credit, a cashier's check, or a surety bond from an approved financial institution or insurance carrier which guarantees satisfactory completion of the project and names the city as beneficiary, and in the case of a Lessee, assures the Lessee's proper maintenance of stormwater facilities during the term of its lease and the proper removal of water quality facilities by the Lessee at the end of the term of its lease. The security shall be provided by the property owner, Lessee or developer in a form and in an amount to be determined by the Department of Engineering based on submission of plans and actual construction or potential remediation expenses. In addition, a Lessee shall pay the city an amount determined by the Engineering Director, that in no event shall be less than \$5,000.00, to compensate the city for any perpetual maintenance that may be required after the expiration of the Lessee's lease. (Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-6. Right of entry.**

The Engineering Director or his designated representatives may enter upon any property which discharges or contributes, or is believed to discharge or contribute, to stormwater runoff or the stormwater system; stream; natural drainage way; or other stormwater system during all reasonable hours to monitor, remove foreign objects or blockages, and to inspect for compliance with the provisions of this chapter.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-7. Notice of Violation.**

Whenever the Engineering Director or his representative determines that a violation of any provision of this chapter has occurred, or that work does not have a required plan or permit, or that work does not comply with an approved plan or permit, the representative may issue a Notice of Violation to the property owner, utility, facility operator, Lessee, tenant, contractor, permittee, the equipment operator and/or any other person or entity doing work on the site. The Notice of Violation shall:

- (a) Be in writing;
- (b) Include a description of the property sufficient for identification of where violation has occurred;
- (c) List the violation;
- (d) State the action required;
- (e) Provide a deadline for compliance or to stop work.

(Ord. No. O-139-04, § 1, 8-17-04)



**Section 22.5-8. Penalties.**

- (a) Any person violating the provisions of this chapter shall be guilty of a misdemeanor and punished as provided in the general provisions of the City Code. Each day that a continuing violation of this chapter is maintained or permitted to remain shall constitute a separate offense.
- (b) Any person violating the provisions of this chapter may be assessed a civil penalty by the city of not less than fifty dollars (\$50.00) or more than five thousand dollars (\$5,000.00) per day for each day of violation. Each day of violation shall constitute a separate violation. The city may also recover all damages proximately caused to the city by such violations.
- (c) In assessing a civil penalty, the city may consider:
  - (1) The harm done to the public health or the environment;
  - (2) Whether the civil penalty imposed will be a substantial economic deterrent to the illegal activity;
  - (3) The economic benefit gained by the violator;
  - (4) The amount of effort put forth by the violator to remedy this violation;
  - (5) Any unusual or extraordinary enforcement costs incurred by the city;
  - (6) The amount of penalty established by ordinance or resolution for specific categories of violations; and
  - (7) Any equities of the situation that outweigh the benefit of imposing any penalty or damage assessment.
- (d) In addition to the civil penalty in subsection (b) above, the city may recover all damages proximately caused by the violator to the city, which may include any reasonable expenses and attorney's fees incurred in investigating, enforcing and/or correcting violations of this chapter.
- (e) The city may bring legal action to enjoin the continuing violation of this chapter, and the existence of any other remedy, at law or in equity, shall be no defense to any such actions.
- (f) The remedies set forth in this section shall be cumulative, not exclusive, and it shall not be a defense to any action, civil or criminal, that one (1) or more of the remedies set forth herein has been sought or granted.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-9. Board of Environmental Appeals.**

- (a) There is created a Board of Environmental Appeals (BEA) to hear appeals filed by any person incurring a civil penalty or damage assessment imposed pursuant to the Stormwater and Street Ordinance.



- (b) The BEA may issue subpoenas requiring attendance of witnesses and production of such evidence as requested, administer oaths, and take testimony as the BEA deems necessary to fulfill its purpose.
- (c) The BEA shall be composed of five members appointed by the Mayor and confirmed by Council.
  - (1) The Mayor shall select appointees so that the BEA will consist of individuals with an expertise as follows:
    - (A) One licensed Professional Engineer with three (3) years of engineering experience as a Professional Engineer;
    - (B) One architect, engineer, landscape architect or surveyor with three (3) years of experience;
    - (C) One representative of the development or industrial community;
    - (D) One neighborhood representative;
    - (E) One member at large.
  - (2) In addition to the above qualifications (A) through (E), one (1) of the five (5) members must have at least three (3) years civil engineering experience and a second member must have at least three (3) years civil or environmental engineering experience.
  - (3) BEA members shall serve for a term of five (5) years. A BEA member shall continue to serve, however, until a successor has been appointed, or until the BEA member has been reappointed, as the case may be. The terms of the original BEA members shall be staggered so that the term of one member shall expire each year.
  - (4) An appointment to succeed a BEA member who is unable to serve said member's full term shall be for the remainder of said member's term.
  - (5) BEA members may be reappointed, but they do not succeed themselves automatically.
  - (6) BEA members shall serve without compensation.
- (d) The BEA shall annually select one of its members to serve as chair and another member to serve as vice-chair of the BEA by a majority vote of all members.
- (e) The BEA shall keep complete and accurate records of the proceedings of all their meetings. The Department of Engineering shall designate a person to serve as secretary to the BEA.
- (f) No BEA member shall participate in the appeal of any matter in which the member has a direct personal or financial interest.
- (g) Three members of the BEA shall constitute a quorum, and the concurrence of a majority of the BEA present and voting in any matter shall be required for a determination of any matter within its jurisdiction.

(Ord. No. O-139-04, § 1, 8-17-04)



**Section 22.5-10. Appeals.**

Any person aggrieved by the imposition of a civil penalty or damage assessment as provided by this chapter may appeal said penalty or damage assessment to the Board of Environmental Appeals (BEA).

- (a) The appeal shall be in writing and filed with the Law Department within thirty (30) days after the damage assessment or civil penalty is served in any manner authorized by law.
- (b) Upon receipt of an appeal, the BEA shall hold a public hearing within sixty (60) days, or a later date mutually agreed upon by the parties. Ten (10) days prior notice of the time, date, and location of said hearing shall be published in a daily paper of general circulation. Ten (10) days notice shall be provided to the aggrieved party at the address provided at the time of appeal.
- (c) Any alleged violator may appeal a decision of the BEA pursuant to the provisions of title 27, chapter 8 of Tennessee Code Annotated.
- (d) If a petition for review of such damage assessment or civil penalty is not filed within thirty (30) days after the damage assessment or civil penalty is served in any manner authorized by law, the violator shall be deemed to have consented to the damage assessment or civil penalty, and it shall become final.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-11. Severability.**

Each separate provision of this chapter is deemed independent of all other provisions herein so that if any provision or provisions of this chapter shall be declared invalid, all other provisions thereof shall remain enforceable. (Ord. No. O-139-04, § 1, 8-17-04)

**Sections 22.5-12--22.5-17. Reserved.**

**ARTICLE II. SITE DEVELOPMENT CRITERIA**

**Section 22.5-18. Purpose.**

This article is adopted to improve public safety, to control the rate of flow of stormwater, to minimize increases in the peak flow rates of stormwater runoff caused by site development within the city, to control new site development, to minimize any detrimental effect on water quality by the completed facility, and to avoid such effects during construction.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-19. Approval of plan required prior to issuance of a building permit.**



No building permit shall be issued until the required site development plan and stormwater facilities are approved by the Department of Engineering, and the portion of the property required for stormwater facilities is recorded as a permanent drainage, water quality, and/or access easement, except that a Lessee shall be required to record a drainage, water quality and/or access easement running only through the term of its lease.

**Section 22.5-20. Partial Plat process**

- (a) In limited situations, the Partial Plat Process may be used to establish easements for stormwater facilities, such as detention and retention basins, water quality devices, access from a public road, storm drain pipes, and open drainage ditches, as an alternative to dedicating easements by recording a subdivision plat.
- (b) The Partial Plat Process allows (1) a property owner to create permanent easements, and (2) a Lessee to create easements running through the term of its lease, by recording a written legal document in which the easements are shown and defined on attached survey plat and written property description exhibits. All exhibits shall be prepared on letter or legal-sized paper, certified by a Registered Land Surveyor, and recorded with the Knox County Register of Deeds. The written document shall be prepared by the property owner's or Lessee's attorney and approved by the Department of Law. Survey plat and property description exhibits shall be approved by the Department of Engineering.
- (c) The Partial Plat Process is not an option in the following situations:
  - (1) When any portion of a pre-existing easement would be relocated or abandoned.
  - (2) If the Law Director or Engineering Director decides, in unforeseen or unusual circumstances, that this process shall not be an option.
- (d) The Partial Plat Process is an option for those sites with the following:
  - (1) An existing survey plat of the entire property recorded with the Knox County Register of Deeds.
  - (2) A Site Development Plan approved by the Department of Engineering and showing the proposed easements.
  - (3) A legal document, "Covenants by Property Owner for the Permanent Maintenance of Stormwater Facilities" in the case of a property owner, or "Covenants by Lessee for the Maintenance of Stormwater Facilities on Leased Property" in the case of a Lessee, approved by the Department of Engineering and recorded with the Knox County Register of Deeds.



- (4) A Special Pollution Abatement Permit (SPAP) approved by the Department of Engineering, if one was required.

**Section 22.5-21. General design criteria.**

- (a) The Engineering Director or his representative has the authority to adopt site development design criteria.
- (b) The standard method of drainage computation shall be as set forth in Article II, Hydrologic and hydraulic computations.
- (c) The stormwater system, excluding stormwater detention ponds, water quality control facilities and sinkholes, shall be designed to accommodate a 10-year return frequency 24-hour duration storm, except for those facilities which would flood public roads classified as locals, collectors or arterials. A 25-year storm runoff prevention plan shall be used to prevent flooding of local roads and collectors, and a 50-year storm runoff prevention plan shall be used to prevent flooding of arterial streets. A 100-year design storm shall be used to prevent flooding of all new structures and have no additional adverse impact on existing structures. For site development on blue-line streams included in the Flood Insurance Study, the Flood Damage Protection Ordinance O-347-90 (Chapter 12 of the City Code) shall govern. All stormwater systems shall be designed to have no additional adverse impact on upstream and adjacent property in the 50-year storm, unless an adequate permanent drainage easement is obtained.
- (d) For drainage generated by areas greater than 200 acres, the flow for a 100-year storm shall be computed. Such flow may exceed the capacity of facilities designed to comply with the requirements of lesser floods as noted in paragraph (c) above, and shall be contained in the public right-of-way or a permanent drainage easement on the property being improved or developed. Pipes and culverts designed for a 100-year storm shall be constructed of reinforced concrete if such pipes or culverts lie in public lands or easements.
- (e) Material for pipes used for conveyance of stormwater within the City of Knoxville shall be in accordance with the following:
- (1) Cross drains and any other pipe under the pavement surfaces shall be reinforced concrete pipe (RCP). Storm drains within the roadway prism, but not under the pavement, shall also be RCP.
  - (2) Any pipe, culvert, or drainage system dedicated to the City of Knoxville, whether inside or outside the right-of-way, shall be constructed of RCP.
  - (3) RCP is required if the failure of the pipe would cause flooding or potential property damage on adjacent properties. RCP is required for all storm pipes and culverts that carry through water from adjacent properties ("off-site water").
  - (4) RCP is required for all detention basin outlet structures.
  - (5) Material for driveway pipes may be RCP, corrugated metal pipe (CMP), or double-walled high-density-polyethylene-pipe (HDPE) as desired by the responsible agency, corporation, or individual. RCP is required underneath any



driveways or entrances that are heavily traveled or which would have the potential to flood areas within the public right-of-way or any structure.

(6) Double-walled HDPE pipe and CMP may be used to convey stormwater generated on the particular property ("on-site drainage"), such as parking lots, buildings, etc. Both pipe materials (HDPE and CMP) may be used to convey water under driveways in locations where a pipe is outside of the roadway prism, has adequate cover, and would not cause flooding of adjacent properties or rights-of-way in the event of pipe failure. Installation of all pipe must be done with adequate pipe bedding, backfill material, and coupling bands as recommended by the pipe manufacturer.

(e) To comply with Federal mandates, protect stream water quality, and to reduce flood insurance rates for the City of Knoxville residents, development or significant redevelopment of land adjacent to or containing a blue-line stream shall include the following permanent protection measures.

(1) Construction fill that alters the conveyance and/or storage capacity of the regulated floodplain is prohibited in the flood fringe one-half the linear distance between the floodway line and the 100-year floodplain line. This requirement may be waived if a drainage study prepared by a registered Professional Engineer licensed to practice in the state of Tennessee shows a rise of less than 0.0 ft. on existing properties within 0.5 miles (upstream or downstream) of the proposed development using a method widely accepted among engineering professionals.

(2) All blue-line stream banks shall be left in a stabilized condition upon completion of the project. No actively eroding bare or unstable vertical stream banks shall remain unless TDEC has determined there is no better alternative. Placement of riprap and other hard armor is only allowed when bioengineering alternatives are not technologically feasible.

(3) A naturally vegetated and pervious streamside buffer zone shall be created, maintained, and protected from clearing, grading, filling, paving, building, or other destruction of the naturally vegetated state. Acceptable uses of this buffer zone may include but are not limited to: yards, picnic areas, walking trails, greenways, landscaped areas, wildlife habitat, primitive areas, roadway and sidewalk stream crossings as close to perpendicular to the stream centerline as practicable (bridge abutments, driveway/road culverts, etc.), or other similar uses approved by the Engineering Director. Specifically prohibited uses include but are not limited to: parking lots, dumpster storage, grease-bin storage, vehicle storage/maintenance, concentrated animal lots or kennels, or other uses known to contribute pollutants to waterways. The buffer zone will extend the length of the blue-line stream. The width of the buffer zone will be determined by the following criteria:

(A) Blue-line streams where a floodway profile has been computed, as part of the Flood Insurance Study, shall require a natural buffer



measured fifty (50) feet from the center of the low flow channel or the width of the floodway, whichever is greater.

- (B) Blue-line streams where a floodway profile has not been computed, as part of the Flood Insurance Study but are named on the USGS 7.5 minute quadrangle map, shall require a natural buffer zone measured thirty-five (35) feet from the center of the low flow channel.
- (C) Blue-line streams and tributaries where a floodway profile has not been computed as part of the Flood Insurance Study and are not named on the USGS 7.5 minute quadrangle map, shall require a natural buffer zone measured fifteen (15) feet from the center of the low flow channel.
- (D) Blue-line streams that have been determined not to be Waters-of-the-State by the criteria adopted by the Tennessee Department of Environment and Conservation are excluded from this provision.
- (E) The Engineering Director may approve mitigation for buffer zones to achieve a higher standard of water quality.
- (F) Blue-line streams that are in culverts at the date of adoption of this ordinance do not require a buffer zone.

(f) When existing or documented flooding problems are present, the Engineering Director has authority to condition the approval of a permit upon the compliance with additional requirements, including but not limited to detention, conveyance facilities, or other stormwater management solutions required to reduce the adverse impact of the proposed development on other properties or on the subject development.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-22. Site development design manuals.**

The Department of Engineering is authorized to adopt additional policies, criteria, specifications, and standards, for the proper implementation of the requirements of this chapter in a Land Development Manual (LDM) and a Best Management Practices (BMP) Manual. The policy, criteria, and requirements of the Land Development Manual dated February 2002, and the Best Management Practices Manual dated March 2001, as amended by the City of Knoxville's Department of Engineering, shall be enforceable consistent with other provisions of this chapter.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-23. Stormwater detention.**

- (a) The requirement for stormwater detention ponds shall apply to the following:
  - (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.
- (b) For areas of redevelopment, if the downstream system (to the second existing road crossing or blue-line stream) is examined and found to be adequate to carry the 2 and 10-year 24-hour storms, the requirement for detention for areas of redevelopment may be waived. However, if the examination finds inadequate conveyance for the 2 and 10-year 24-hour storms, the Engineering Director has authority to condition the approval of a permit upon compliance with additional requirements, including but not limited to detention, conveyance facilities, or other stormwater management solutions required to reduce the adverse impact of the proposed development on other properties or on the subject development. The engineer is charged with determining the predeveloped (before any site development had occurred) conditions, including the curve number. If the engineer cannot determine the predeveloped conditions, then a maximum predeveloped curve number of seventy (70) may be used to compute the predeveloped flow and satisfy the requirement. In areas of redevelopment, detention or retention is required for the entire developed site, not just the portion of the site being redeveloped. This does not exempt the developer from providing the first flush and/or water quality requirements.
- (c) If in the developer's judgment, stormwater detention is either unwarranted or impractical, hydrologic and hydraulic computations to support such a conclusion and demonstrate that stormwater runoff shall not be increased in peak rate for storm events identified in the design standards for detention ponds in this chapter shall be furnished to the Department of Engineering for review. This does not exempt the developer from providing the first flush and/or water quality requirements.
- (d) Where the development's stormwater discharges directly into a main stream, detention for peak flow attenuations is not required unless deemed necessary by the Department of Engineering. This does not exempt the developer from providing the first flush and/or water quality requirements.
- (e) When existing or documented flooding problems are present, the Engineering Director has authority to condition the approval of a permit upon the compliance with additional requirements, including but not limited to detention, conveyance facilities, or other stormwater management solutions required to reduce the adverse impact of the proposed development on other properties or on the subject development.
- (f) Detention basins located in subdivisions must be located on two or more buildable lots or in a common area with a legally established property owners' organization with responsibility for maintenance and repair of the detention basin.

(Ord. No. O-139-04, § 1, 8-17-04)



**Section 22.5-24. Erosion and sediment control.**

To comply with state, federal, and local regulations, erosion and sediment control shall be regulated by this article because of the following water quality impacts:

- (a) Stormwater runoff can carry pollutants into receiving water bodies, thereby degrading water quality;
- (b) The increase in nutrients in stormwater runoff such as phosphorus and nitrogen accelerates eutrophication of receiving waters;
- (c) Construction requiring land clearing and the alteration of natural topography tend to increase erosion;
- (d) Siltation of water bodies resulting from increased erosion decreases their capacity to hold and transport water, interferes with navigation, and harms flora and fauna;
- (e) Substantial economic losses can result from these adverse impacts on community waters.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-25. Objectives of erosion and sediment control.**

In order to protect, maintain and enhance the immediate and long-term health, safety and general welfare of the citizens of the city, this article has the following objectives:

- (a) Control erosion and sedimentation to limit deposition in streams and other water bodies;
- (b) Facilitate the removal of pollutants in stormwater runoff to perpetuate the natural biological functions of streams.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-26. Site development permit required before site development.**

No person shall:

- (a) Grade, dump, alter natural or existing topography, move or place fill material, excavate, remove any vegetation not exempted by the tree protection ordinance, or begin any site development activities without first obtaining a site development permit from the Department of Engineering.
- (b) Alter any natural or manmade drainage system so as to divert, constrict, increase or change in any manner the natural or existing flow of any stream, or natural or existing drainage of any area without obtaining a site development permit from the Department of Engineering.
- (c) Commence site development and/or construction of any building or structure without obtaining a site development permit from the Department of Engineering.
- (d) Clear any site by means that causes disturbance of soil without first obtaining a site development permit from the Department of Engineering.

(Ord. No. O-139-04, § 1, 8-17-04)



**Section 22.5-27. Site development permit requirements.**

- (a) A site development plan shall be required for any site development except when:
- (1) The developed area is used for gardening or agricultural purposes;
  - (2) The proposed work does not, in the opinion of the Department of Engineering, affect the drainage on the site or the quality of stormwater runoff from the site.
- (b) Before any residential lot(s) in an unplatted subdivision may be transferred, the engineer of record must sign and seal a letter stating that all supporting infrastructure and grading has been completed for the subject lot(s), or the development certification may be submitted to and approved by the Department of Engineering. Failure to comply with this requirement may result in the revocation of the surety bond, cashiers check, or letter of credit and implementation of all available legal remedies. A site development plan shall contain the following:
- (1) The name, address, and telephone number of all persons having a legal interest in the property;
  - (2) The tax map number, group, and parcel number of the property or properties affected;
  - (3) Information that complies with the requirements of the Tree Protection Ordinance and the City Arborist.
- (c) Additional information is required for site development plans based on the type of development.
- (1) Small Single Family Residential Development - requires a topographic map showing the proposed area of land disturbance, the layout of the structure(s), identification of all areas of depression, blue-line streams, easements, and stormwater system, and other information as required by the Engineering Director.
  - (2) Large Residential and Commercial Development - requires plans showing existing and proposed 2-foot contours as they relate to the roadway, parking lot, drainage facilities, cut and fill slopes, all stormwater pipe size, material and location, identification of all areas of depression, blue-line streams, easements, erosion and sediment control measures, detention pond data including size, location, slope of bottom, outlet, invert, top elevations, spillway size and elevation, and the detention easement and an adequately sized traversable access easement. Also, catch basin location, elevation, slope, swales, ditches, and their stabilization treatment. Building pad contours and building pad elevations are also required when existing elevations are altered by more than 4 feet. When this site development plan includes a street to be dedicated to the city, a complete set of roadway plans must be submitted including profiles, grades, and cross sections showing cross slope, limits of construction, clear zone, utility strip, greenway/pedestrian space, signage plan, and a street-lighting plan. All Large Residential and Commercial Development Plans that are submitted to the Department of Engineering must meet the following minimum standards:



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- (a) Stamp and signature from appropriate design professional;
- (b) Legible (for micro-filming and reproducing)
- (c) Constructible plans;
- (d) All required hydraulic and hydrologic calculations with reasonable assumptions (including downstream calculations with descriptive numbers, time of concentration, pre- and post-development delineated watersheds, and the City of Knoxville's detention pond design sheet completed);
- (e) Pre- and post-developed contours;
- (f) Erosion and sediment control plan;
- (g) Required retaining wall calculations;
- (h) Owner's name address, and phone number;
- (i) Vicinity map;
- (j) City block number;
- (k) CLT number (including map, insert, group and parcel);
- (l) Certified address from the Metropolitan Planning Commission.

Plans that do not meet these minimum standards will be rejected, and will not be reviewed further until submission standards are met:

- (d) Plans shall be prepared and stamped by an engineer, landscape architect, or architect competent in civil and site design and licensed to practice in the state of Tennessee with the following conditions:
  - (1) Portions of the Site Development Plan that require hydraulic or hydrology calculations and design must be prepared and stamped by a Professional Engineer competent in civil and site design and licensed to practice in the state of Tennessee.
  - (2) All roads and Joint Permanent Easements that are required to be designed and built to Public Road Standards shall be designed and stamped by a Professional Engineer competent in civil and site design and licensed to practice in the state of Tennessee.
- (e) Prior to the release of a bond, a Development Certification must be completed showing that all roadway lines, grades, cross slopes, locations, contours, elevations, drainage structures or facilities, and detention basin volumes, size, slopes, locations, elevations, and hydraulic structures have been field verified, represent the as-built field conditions, and comply with the approved plans. This certification must be stamped by the appropriate design professional required to stamp the original Site Development Permit as stated in Section 22.5-28(d)(3) as well as a Registered Land Surveyor licensed to practice in the State of Tennessee.
- (f) When the Department of Engineering has determined the site development plan is approvable, it will send a letter authorizing the installation of the erosion and sediment control measures. When the erosion and sediment control plan has been implemented on site, the appropriate design professional required to stamp the erosion and sediment



control portion of the site development permit will provide a letter to the Department of Engineering stating that he has inspected the site and the erosion control has been implemented as shown on the approved erosion and sediment control plan. This letter must be signed and sealed by the appropriate design professional. Once this letter is received by the Department of Engineering, the site development permit can be issued.

- (g) The City Arborist and the Zoning Inspector must approve all plans prior to the issuance of a site development permit. The Metropolitan Planning Commission must approve all plans in a planned zone and overlays prior to the issuance of a site development permit.
- (i) A Registered Land Surveyor licensed to practice in the state of Tennessee shall prepare and submit a plat for all plans that propose stormwater facilities. The plat shall locate, establish, and define an easement around each facility and traversable access to it. The plat must be approved and recorded with the Knox County Register of Deeds before a building permit can be issued.
- (j) When existing or documented flooding problems are present, the Engineering Director has authority to condition the approval of a permit upon the compliance with additional requirements, including but not limited to detention, conveyance facilities, or other stormwater management solutions required to reduce the adverse impact of the proposed development on other properties or on the subject development.
- (k) An erosion and sediment control plan must be provided as follows:
  - (1) Small Single Family Residential Development requires no erosion and sediment control plan except if the residential development, exclusive of agricultural, gardening, farming, and similar areas of activity, results in disturbance of more than 10,000 square feet or except as deemed necessary by the Engineering Director. When a plan is deemed necessary, the erosion and sediment control must comply with the Erosion and Sediment Control Handbook produced by the Tennessee Department of Environment and Conservation, dated July 1992, as amended by that organization or its successor, or the City of Knoxville's Best Management Practices (BMP) Manual, whichever is more restrictive.
  - (2) Large Residential and Commercial Development requires an erosion and sediment control plan that is stamped by a competent registered Professional Engineer, architect, or landscape architect licensed to practice in the State of Tennessee and complies with the Erosion and Sediment Control Handbook produced by the Tennessee Department of Environment and Conservation, dated July 1992, as amended by that organization or its successor, or the City of Knoxville's Best Management Practices (BMP) Manual, whichever is more restrictive.
  - (3) Portions of the erosion and sediment control plan that require hydrology or hydraulic calculations and design shall be prepared and stamped by a competent licensed Professional Engineer registered in the State of Tennessee.
- (l) A surety bond, cashier's check, or letter of credit must be provided as follows:
  - (1) A Performance and Indemnity Agreement is required prior to the issuance of a site development permit for rough grading or site development when there is a



potential for runoff to adversely impact city rights-of-way and other property, when sites drain into sinkholes, or when the site is used for a borrow pit. The Performance and Indemnity Agreement shall be guaranteed in the form of a cashier's check, a letter of credit, or a surety bond.

- (2) A Performance and Indemnity Agreement is required for Large Residential Development when there is a potential for runoff to adversely impact city rights-of-way and other property, when sites drain into sinkholes, when the site is used for a borrow pit, a detention pond is required, or there is construction of a joint permanent easement or public road. The Performance and Indemnity Agreement shall be guaranteed in the form of a cashier's check, a letter of credit, or a surety bond. The actual amount is based on a remediation and completion estimate as determined by the Department of Engineering, with a minimum amount of \$50,000.
- (3) A Performance and Indemnity Agreement is required for Commercial Development when there is a potential for runoff to adversely impact city rights-of-way and other property, when sites drain into sinkholes, when the site is used for a borrow pit, a detention pond is required, or there is construction of a joint permanent easement or public road. The amount is based on the project cost estimate that includes roadway facilities, drainage facilities, and erosion and sediment control remediation. The Performance and Indemnity Agreement shall be guaranteed in the form of a cashier's check, a letter of credit, or a surety bond. The actual amount is based on a remediation and completion estimate as determined by the Department of Engineering, with a minimum amount of \$10,000.
- (4) A surety bond, cashier's check, or letter of credit is not required for Small Single Family Residential Development except when deemed necessary by the Engineering Director based on site conditions and the adverse impact on downstream conditions or other properties.
- (5) The Engineering Director may refuse brokers or financial institutions the right to provide a surety bond, letter of credit, etc. based on past performance, ratings of the financial institution, or other appropriate sources of reference information.

(Ord. No. O-139-04, § 1, 8-17-04)

#### **Section 22.5-28. Temporary emergency exemption**

In extreme circumstances when a delay in construction may cause significant property damage or loss of life, the Engineering Director may grant a temporary exemption from a Site Development Permit. Specific instances may include a sinkhole opening up which threatens homes or personal safety, a failure of a storm system where the flooding could cause property damage or loss of life, etc. This exemption is limited to work specific to resolving the dangerous situation(s). Any approval for work granted under this emergency exemption must be issued in writing and approved by the Engineering Director. After the emergency has been resolved, a Site Development Permit must be obtained for the emergency work and any additional proposed



work. This should be accomplished through the standard review process. This temporary emergency exemption does not provide immunity from any of the design criteria of this ordinance.

**Section 22.5-29. Fees.**

(a) The following fees shall be charged for reviewing site development plans and will be required upon the submittal of the plans.

- (1) Site Development Plans for an Administrative Plat:
  - (A) Small Single Family Residential \$0.00
  - (B) Less Than one (1) acre: \$150.00
  - (C) One (1) acre to five (5) acres: \$150.00 + \$20/acre (acres 1-5)
  - (D) More than five acres: \$250.00 + \$10/ acre (acres 6+)
  - (E) Condominium/Apartment Developments: \$150.00 + \$5/ unit
- (2) Subdivisions:
  - (A) One (1) to fifty (50) lots: \$150.00 + \$12/ lot (lots 1-50)
  - (B) Fifty-One (51) lots or more: \$750.00 + \$8/ lot (lots 51+)

(b) The following fees shall be charged for site development permits and will be required before the issuance of the permit.

- (1) Site Development Plans for an Administrative Plat without a bond:
  - (A) Small Single Family Residential: \$10.00
  - (B) All other projects: \$50.00
- (2) Site Development Plans for an Administrative Plat with a bond:
  - (A) Projects of less than (1) acre: \$350.00
  - (B) Projects of one (1) acre or more: \$350.00 + \$15/ acre
  - (C) Condominium/Apartment Developments: \$350.00 + \$5/ unit
- (3) Subdivisions:
  - (A) One (1) to four (4) lots: \$150.00 + \$10/ lot (lots 1-4)
  - (B) Five (5) to fifty (50) lots: \$350.00 + \$20/ lot (lots 1-50)
  - (C) Fifty-One (51) lots or more: \$1,350.00 + \$5/ lot (lots 51+)

(c) The fee for a site development permit issued after site development has begun without a permit shall be ten times the standard fee.

(d) A Site Development Permit is valid for one year. A permit may be renewed before it expires at no additional cost. Once a permit expires, the appropriate permitting fee shall be charged for the renewal.

(e) If an individual permit for grading, erosion control, or drainage is requested, the appropriate permitting and review fee will be charged for each permit.

(f) The cost of each special pollution abatement permit shall be one hundred dollars (\$100.00), which will cover the entire period of the permit.



(g) The following fees shall be charged for reviewing final plats and will be required before approval of plat:

- |  |                             |
|--|-----------------------------|
| (1) Administrative Plat                    | \$80.00                     |
| (2) Exempt Subdivision and Corrected Plats | \$70.00                     |
| (3) All Other Plats:                       |                             |
| (A) One (1) to fifty (50) lots             | \$100 + \$10/ lot           |
| (B) Fifty-One (51) or more lots            | \$600 + \$6/ lot (lots 51+) |
| (4) Partial Plat                           | \$150.00                    |

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-30. Violation of a site development permit.**

No person shall perform site development work that does not conform to an approved site development plan. (Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-31. Design standards for detention and/or retention ponds.**

- (a) The calculated peak flow rate of stormwater runoff resulting from a 1-year, 2-year, 5-year, 10-year, 25-year and 100-year return frequency 24-hour duration storm shall be no greater after site development of the site than that which would result from a 1-year, 2-year, 5-year, 10-year, 25-year and 100-year return frequency 24-hour duration storm on the same site prior to site development.
- (b) Adequate attention must be given to safety and sanitation in the design of any detention facility. This includes, but is not limited to, a minimum of 2% slope in the bottom of all detention ponds, a minimum of 3:1 (H:V) side slopes or with traversable access to the pond's vegetated bottom and side slopes for maintenance, proposed contours should reflect 15% additional area for each two (2) foot contour of the detention or retention pond based on the appropriately sized pond for the 1, 2, 5, 10, 25 and 100-year storms, a minimum of 4,500 cubic feet of storage volume, and a minimum of one (1) foot of freeboard from the highest water surface elevation for the largest required design storm to the top of the berm before the 15% additional volume is added.
- (c) The plans shall include sufficient design information to show that the facility will operate as required. This shall include the existing (or before site development) peak flow discharges, the after site development peak flow discharges, and/or volumes of stormwater runoff based on the proposed site development, as well as all necessary computations used to determine the reduced peak flow rates for the design storms. The capacity of the facility shall be sufficient to control the volume of stormwater runoff resulting from 1-year, 2-year, 5-year, 10-year, 25-year and 100-year frequency 24-hour duration storms within the peak rate of flow requirements stated in the subsection.
- (d) Discharge from the stormwater detention pond shall be routed to a ditch, channel, or stormwater facility of adequate capacity. Calculations showing the capacity of the receiving stormwater facility and its capability to convey a 10-year frequency storm shall



be provided. If the receiving stormwater facility is incapable of conveying a 10-year frequency storm, calculations showing the capacity of the receiving stormwater facility and its capability to convey a 2-year frequency storm shall also be provided. The above calculations will be routed to the closer of the second existing street crossing or blue-line stream. The Engineering Director has authority to condition the approval of a permit upon the compliance with additional requirements, including but not limited to correctly sizing and installing offsite conveyance facilities or other stormwater management solutions required to reduce the adverse impact of the proposed development on other properties or the development.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-32. Requirements for developments draining to a sinkhole.**

- (a) Site development on property that includes a sinkhole will require copies of the appropriate permits from the Tennessee Department of Environment and Conservation (TDEC) prior to site development approval. After review of the State permit, the Engineering Director may require additional information related to structural integrity and flood protection. If the proposed development does not require TDEC approval, a letter from TDEC shall be submitted prior to the issuing of a Site Development Permit, stating that a TDEC permit is not required.
- (b) For site development or redevelopment projects requiring attenuation or retention of the 1-year, 2-year, 5-year, 10-year, 25-year and a 100-year frequency 24-hour duration storms with sinkholes entirely on site, calculations shall be provided showing that 100-year 24-hour design storm will not flood any structures assuming plugged conditions (0 cfs outflow) for the sinkhole. These calculations must include the entire contributing watershed for the sinkhole. An easement is required around the sinkhole to include an area that is a minimum of five (5) feet horizontally outside the highest closed contour.
- (c) For site development or redevelopment projects requiring attenuation or retention of the 1-year, 2-year, 5-year, 10-year, 25-year and 100-year frequency 24-hour duration storms with sinkholes partially on site, calculations must be provided showing that there will not be a rise in water surface elevations between the 100-year predeveloped and the 100-year postdeveloped 24-hour design storm assuming plugged conditions (0 cfs outflow) for the sinkhole. An easement is required at a minimum of five (5) feet horizontally outside the highest closed contour on the section of the sinkhole located on the developed property. A rise in the 100-year water surface elevation is allowable when no structures will be flooded and all parties with ownership of the sinkhole agree in writing to allow the rise. In this case, an easement is required around the sinkhole to include an area that is a minimum of five (5) feet horizontally outside the highest closed contour.
- (d) Stormwater retention is required for site developments that meet the requirements for stormwater attenuation and are located in one of the following critical watersheds:
  - (1) Ten Mile Creek
  - (2) Sinking Creek
  - (3) Emily Ave. and Timothy Ave. area



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- (4) Harrell Hills watershed (near Cranberry Dr., Clairmont Dr., and Gaines Rd.)
- (5) Prosser Road #1 (immediately between north of the railroad crossing and Cherry St.)
- (6) Prosser Road #2 (approximately halfway between Knoxville Zoo Dr. and Magnolia Ave.)
- (7) Pamela Ln.
- (8) All areas draining to a sinkhole
- (9) Any area of known flooding where deemed necessary by the Engineering Director.

The retention pond shall be designed so that the overflow in the 1-year, 2-year, 5-year, 10-year, 25-year and 100-year design storms must meet the predeveloped discharges in addition to retaining the difference in the predeveloped and postdeveloped 100-year design storm. In basins or sub-basins where there is a documented historical draw down time for the sinkhole or region being drained to, it may be acceptable for a detention pond to be used instead of retention. For detention to be approvable, the draw down time of the detention pond must be a minimum of one and a half times the draw down time for the region.

- (e) When existing or documented flooding problems are present, the Engineering Director has authority to condition the approval of a permit upon the compliance with additional requirements, including but not limited to detention, conveyance facilities, or other stormwater management solutions required to reduce the adverse impact of the proposed development on other properties or on the subject development.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-33. Hydrologic and hydraulic computations.**

- (a) All hydrologic and hydraulic computations utilized in the design of stormwater detention facilities must be prepared by a registered engineer proficient in the field of hydrology and hydraulics and licensed to practice engineering in the State of Tennessee.
- (b) The required hydrologic and hydraulic computations shall be in accordance with NRCS (formerly known as the SCS) unit hydrograph procedures using AMC II curve numbers and Type II rainfall distribution, or other criteria that the Engineering Director shall establish based on scientific and engineering information. All post developed conditions must be routed at appropriately small time intervals through the detention pond using either hand calculations or computer models that are widely accepted among engineering professionals. The BMP Manual contains accepted methods and procedures.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-34. Maintenance of stormwater facilities.**

- (a) Property owners are responsible for maintaining stormwater and/or water quality facilities located on their property. Prior to the issuance of a site development permit, the property owner shall execute a legal document entitled "Covenants for Permanent



Maintenance of Stormwater Facilities” (Covenants) and record it in the office of the Knox County Register of Deeds. The location of the facility, the recorded location of the Covenants document, and a note stating the owner’s responsibility shall be shown on a plat that is also recorded in the office of the Knox County Register of Deeds.

- (b) The Covenants shall specify minimum maintenance requirements to be performed at necessary intervals by the property owner.
- (c) In order to provide access to stormwater and/or water quality facilities by personnel, vehicles and equipment, the property owner will provide a traversable twenty (20) foot wide access within an easement from a public street in strict accord with the Plan and any conditions required by the Department of Engineering.
- (d) The Covenants shall grant the City permission to enter the property to inspect any stormwater facility for proper functioning and maintenance. If the facility is not being maintained as required, the City will notify the property owner in writing. If property owner fails to repair or maintain the facility within the allotted time, the Engineering Director may authorize the work to be performed by the City or others. In such cases, property owner shall reimburse the City for double its direct and related expenses. If the property owner fails to reimburse the City, the City is authorized to file a lien for said costs against the property and to enforce the lien by judicial foreclosure proceedings.
- (e) Sediment removal and disposal shall be performed in accordance with all local, state, and federal laws. Guidelines for sediment removal and disposal are given in the City’s LDM. The Engineering Director may stipulate additional guidelines if deemed necessary for public safety.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-35. Acceptance of streets and stormwater systems within public rights-of-way.**

No street or stormwater system shall be dedicated to the city for public use or maintained by the city as a public street, until said street and stormwater facility have been accepted in writing by the Engineering Director. The Engineering Director shall only approve streets constructed according to the current version of "A Policy on Geometric Design of Highways and Streets", published by the American Association of State Highway and Transportation Officials, and designed by a registered Professional Engineer licensed to practice in the State of Tennessee. The design speed for local streets in residential subdivisions shall be a minimum of thirty (30) miles per hour, unless the Engineering Director deems a different design speed appropriate. Additionally, stormwater systems and streets must conform to the city standard specifications and the city construction standards.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-36. First flush requirements for detention ponds.**

- (a) The requirements of this article shall not apply to those developments built or approved before the passage of this article.
- (b) All requirements of sections 22.5-20 through 22.5-35 shall apply to this article.



- (c) All stormwater detention ponds that are required under section 22.5-23 and which are approved after the adoption of this article shall be built to improve first flush water quality by using the best management practices outlined in this section. The standard management method shall be to collect the first flush or the first 4,500 cubic feet, whichever is greater, of stormwater runoff in a pond and release that runoff over a minimum 24-hour and a maximum of a 72-hour period. The Engineering Director may approve other methods of improving first flush water quality if valid documentation from full-scale testing by an independent third party is provided indicating that a higher or equal level of water quality will result from the alternate method.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-37. Technical requirements for Special Pollution Abatement Permits.**

Technical requirements for the permit shall be based on the current Best Management Practices Manual subject to the approval of the Department of Engineering.

- (a) Specific land uses are known to produce pollutants that are detrimental to water quality and would not be corrected by the standard methods outlined in the preceding section. A Special Pollution Abatement Permit is required to ensure that structural and management best management practices are used to control water quality for these uses. Before the approval of structural stormwater treatment devices, the Engineering Director may require valid documentation from full-scale testing by an independent third party to verify that the pollutants of concern will be properly controlled. A Special Pollution Abatement Permit will be valid for a period of five (5) years, at which point it must be renewed. At the time of renewal, any deficiency in the management method must be corrected. Any development that occurs without a required permit shall be a violation of this chapter of the code.
- (b) A Special Pollution Abatement Permit shall be required for the following land uses:
- (1) Vehicle, truck or equipment maintenance, fueling, washing or storage areas including but not limited to: automotive dealerships, automotive repair shops, and car wash facilities;
  - (2) Any property containing more than 400 parking spaces, or 120,000 square feet of impervious parking area;
  - (3) Recycling and/or salvage yard facilities;
  - (4) Restaurants, grocery stores, and other food service facilities;
  - (5) Commercial facilities with outside animal housing areas including animal shelters, fish hatcheries, kennels, livestock stables, veterinary clinics, or zoos;
  - (6) Other producers of pollutants identified by the Engineering Director by information provided to or collected by him or his representatives, or reasonably deduced or estimated by him or his representatives from engineering or scientific study.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-38. Additional permits required.**



- (a) Where a National Pollutant Discharge Elimination System (NPDES) permit has been issued for NPDES regulated stormwater discharges from a facility, no local permit will be required for those NPDES regulated stormwater discharges from the facility for which such permit has been issued and remains in effect. For site development, both a TDEC construction site NPDES permit and a City of Knoxville Site Development Permit are required.
  - (b) Additional permits may be required from various state and federal agencies before a site development permit will be issued by the City of Knoxville.
- (Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-39. NPDES permits.**

- (a) Any person who holds an individual National Pollutant Discharge Elimination System (NPDES) permit shall provide a copy of such permit to the Engineering Director no later than sixty (60) calendar days after issuance or renewal of the permit. The permit holder shall also provide copies of all discharge monitoring reports required by the permit for any discharge to the stormwater system.
- (b) Any person who holds an NPDES general permit and/or multi-sector permit (as distinct and different from an individual permit) shall provide either a copy of such permit or the permit number assigned to them by the Tennessee Department of Environment and Conservation to the Engineering Director no later than sixty (60) calendar days after issuance of the permit.

(Ord. No. O-139-04, § 1, 8-17-04)

**Sections 22.5-40--22.5-49. Reserved.**

**ARTICLE III. ILLICIT CONNECTIONS AND ILLEGAL DUMPING**

**Section 22.5-50. Findings of fact.**

The city council finds that the uncontrolled discharge of pollutants to the stormwater system has an adverse impact upon the water quality of the receiving waters.

- (a) The 1987 amendments to the Federal Water Pollution Control Act, commonly known as the Clean Water Act, established the National Pollutant Discharge Elimination System (NPDES) program, which requires permits for discharges from stormwater systems into waters of the United States. The Environmental Protection Agency has promulgated regulations implementing the NPDES program.
- (b) The NPDES regulations for stormwater discharges require certain municipalities, including the City of Knoxville, to:
  - (1) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to municipal stormwater systems by stormwater discharges associated with industrial activity and the quality of stormwater discharged from sites of industrial activity;



- (2) Prohibit through ordinance, order or similar means, illicit discharges to the stormwater system;
- (3) Control through ordinance, order or similar means, discharges to the stormwater system of spills, dumping or disposal of materials other than stormwater;
- (4) Require compliance with conditions in ordinances, permits, contracts or orders; and
- (5) Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with permit conditions, including the prohibition of illicit discharges to the stormwater system.

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-51. Objectives.**

This chapter is adopted as part of the city stormwater management program in order to prevent certain non-stormwater discharges to, and improper disposal of substances in, the stormwater system, as to reduce, to the maximum extent practicable, pollutants that may be present in discharges from the stormwater system. (Ord. No. O-155-03, § 1, 5-13-03)

**Section 22.5-52. Prohibitions.**

(a) No person shall:

- (1) Connect, or allow to be connected, any sanitary sewer to the stormwater system, including any sanitary sewer connected to the stormwater system as of the date of adoption of this chapter. Illicit discharges include, but are not limited to:
  - (A) Sewage discharges or overflows, including Sanitary Sewer Overflows (SSOs);
  - (B) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
  - (C) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
  - (D) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc;
  - (E) Discharges of wash water from the cleaning or hosing of impervious surfaces in industrial and commercial areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards, and outdoor eating or drinking areas, etc.;
  - (F) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
  - (G) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;
  - (H) Discharges of sediment, or construction-related wastes, etc.;



- (1) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).
  - (2) Cause or allow an illicit discharge to the stormwater system, or any component thereof, or onto driveways, sidewalks, parking lots, sinkholes, creek banks, or other areas draining to the stormwater system.
- (b) Subject to the provisions of subsection (c), the following discharges shall not be in violation of this chapter:
- (1) Water line flushing;
  - (2) Landscape irrigation;
  - (3) Diverted stream flows or rising groundwater;
  - (4) Infiltration of uncontaminated groundwater [as defined at 40CFR35.2005(20)] to separate storm drains;
  - (5) Pumping of uncontaminated groundwater;
  - (6) Discharges from potable water sources, foundation drains, uncontaminated air conditioning condensation, irrigation waters, springs, water from crawl space pumps, or footing drains;
  - (7) Lawn watering;
  - (8) Individual noncommercial car washing on residential properties; or car washing of less than two (2) consecutive days in duration for a charity, nonprofit fund raising, or similar noncommercial purpose;
  - (9) Flows from riparian habitats and wetlands;
  - (10) Dechlorinated swimming pool discharges;
  - (11) Incidental street wash water from street cleaning equipment designed for cleaning paved surfaces and limiting waste discharges;
  - (12) Street deicing for public safety;
  - (13) Any activity authorized by a valid NPDES permit; and
  - (14) Any flows resulting from firefighting.
- (c) If the Engineering Director finds that any activity, including but not limited to any of the activities listed in subsection (b) above, are found to cause or may cause sewage, industrial wastes or other wastes to be discharged into the stormwater system, the Engineering Director shall so notify the person performing such activities, and shall order that such activities be stopped or conducted in such a manner as to avoid the discharge of sewage, industrial wastes or other wastes into the stormwater system. The Engineering Director may require a stormwater pollution prevention plan to insure that the activity can be conducted without causing further discharge of pollution to the stormwater system.

(Ord. No. O-139-04, § 1, 8-17-04)



**Section 22.5-53. Notification of spills and illicit discharges.**

As soon as any person has knowledge of any illicit spills or discharges to the stormwater system in violation of this chapter, such person shall immediately notify the Engineering Director by telephone of this discharge. If such person is directly or indirectly responsible for such discharge or responsible for the operation of the system or business, then such person shall also take immediate action to ensure the containment and cleanup of such discharge and shall confirm such telephone notification with a written report to the Engineering Director within three (3) calendar days. At a minimum, the written report for any illicit discharge shall include:

- i. Date and time of the discharge
- ii. Location of the discharge
- iii. Material or substance discharged
- iv. Duration and rate of flow
- v. Total volume discharged
- vi. Total volume recovered
- vii. Cause or reason for the discharge
- viii. Remediation and containment action taken
- ix. Material Safety Data Sheets (MSDS) for the discharged material
- x. Action taken to prevent further discharges
- xi. Description of any environmental impact

(Ord. No. O-139-04, § 1, 8-17-04)

**Section 22.5-54. Requirements for monitoring.**

The Engineering Director 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 detailed reports of such discharges.

(Ord. No. O-139-04, § 1, 8-17-04)

**Sections 22.5-55--22.5-60. Reserved.**

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## **APPENDIX B**

### Summary of Dry Weather Screening Results

1. List of outfalls tested during year eight with status (5 pages)
2. Table of testing results for outfalls with dry-weather flow (5 pages)

## Dry Weather Screening - Sample Events for 2004

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
00-500-0075	ILLCIT DUMP	10/23/2003	10/23/2003	12/02/2003	12/02/2003
00-400-0215	DRY	10/23/2003	10/23/2003	12/02/2003	12/02/2003
00-300-0285	DRY	10/23/2003	10/23/2003	12/02/2003	12/02/2003
00-100-0300	ILLCIT CONNECTION	10/23/2003	10/23/2003	12/02/2003	12/02/2003
00-400-0305	ILLCIT CONNECTION	02/19/2004	02/19/2004	03/22/2004	03/22/2004
00-400-0310	DRY	10/23/2003	10/23/2003	12/02/2003	12/02/2003
00-400-0315	DRY	02/19/2004	02/19/2004	03/22/2004	03/22/2004
00-400-0320	DRY	09/17/2003	09/17/2003	10/16/2003	10/16/2003
00-400-0325	DRY	09/17/2003	09/17/2003	10/16/2003	10/16/2003
00-400-0340	DRY	10/23/2003	10/23/2003	12/02/2003	12/02/2003
00-400-0365	DRY	02/19/2004	02/19/2004	03/22/2004	03/22/2004
00-400-0390	ILLCIT CONNECTION	09/17/2003	09/17/2003	10/16/2003	10/16/2003
00-400-0395	DRY	09/17/2003	09/17/2003	10/16/2003	10/16/2003
00-400-0400	DRY	02/19/2004	02/19/2004	03/22/2004	03/22/2004
00-400-0405	DRY	09/16/2003	09/16/2003	10/16/2003	10/16/2003
00-400-0410	DRY	09/16/2003	09/16/2003	10/16/2003	10/16/2003
00-500-0525	DRY	09/17/2003	09/17/2003	10/16/2003	10/16/2003
01-300-0060	ILLCIT CONNECTION	05/11/2004	05/11/2004	06/08/2004	06/08/2004
01-300-0095	ILLCIT CONNECTION	05/11/2004	05/11/2004	06/08/2004	06/08/2004
01-300-0100	DRY	05/11/2004	05/11/2004	06/11/2004	06/11/2004
01-400-0105	DRY	05/11/2004	05/11/2004	06/11/2004	06/11/2004
01-300-0110	DRY	05/11/2004	05/11/2004	06/11/2004	06/11/2004
01-300-0115	DRY	05/11/2004	05/11/2004	06/11/2004	06/11/2004
01-300-0160	ILLCIT CONNECTION	05/12/2004	05/12/2004	06/17/2004	06/17/2004
01-400-0185	DRY	05/12/2004	05/12/2004	06/17/2004	06/17/2004

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
01-400-0190	DRY	05/12/2004	05/12/2004	06/17/2004	06/17/2004
01-400-0195	DRY	05/12/2004	05/12/2004	06/17/2004	06/17/2004
01-300-0200	DRY	05/12/2004	05/12/2004	06/17/2004	06/17/2004
01-400-0205	DRY	05/13/2004	05/13/2004	06/17/2004	06/17/2004
01-100-0230	ILLCIT CONNECTION	05/13/2004	05/13/2004	06/17/2004	06/17/2004
01-300-0520	ILLCIT CONNECTION	05/13/2004	05/13/2004	06/23/2004	06/23/2004
02-400-0045	ILLCIT CONNECTION	03/29/2004	03/29/2004	05/07/2004	05/07/2004
02-400-0050	ILLCIT DUMP	03/29/2004	03/29/2004	05/07/2004	05/07/2004
02-300-0165	ILLCIT CONNECTION	03/29/2004	03/29/2004	05/07/2004	05/07/2004
02-400-0169	ILLCIT CONNECTION	03/29/2004	03/29/2004	05/07/2004	05/07/2004
02-400-0330	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
02-400-0335	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
02-400-0340	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
02-400-0345	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
02-400-0350	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
02-400-0355	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
02-100-0360	DRY	12/09/2003	12/09/2003	01/15/2004	01/15/2004
03-400-0020	DRY	01/31/2004	01/31/2004	05/25/2004	05/25/2004
		06/23/2004	06/23/2004		
03-400-0025	DRY	01/31/2004	01/31/2004	05/25/2004	05/25/2004
		06/23/2004	06/23/2004		
03-400-0030	DRY	01/31/2004	01/31/2004	05/07/2004	05/07/2004
		06/30/2004	06/30/2004		
03-300-0035	DRY	01/31/2004	01/31/2004	05/12/2004	05/12/2004
		06/30/2004	06/30/2004		
03-400-0040	DRY	01/31/2004	01/31/2004	05/07/2004	05/07/2004
		06/30/2004	06/30/2004		

<b>Outfall</b>	<b>Outfall Status</b>	<b>Visit #1</b>	<b>Visit #2</b>	<b>Visit #3</b>	<b>Visit #4</b>
03-100-0045	DRY	01/31/2004	01/31/2004	05/10/2004	05/10/2004
		06/30/2004	06/30/2004		
03-400-0050	DRY	01/31/2004	01/31/2004	05/12/2004	05/12/2004
		06/30/2004	06/30/2004		
03-300-0385	DRY	05/10/2004	05/10/2004	06/30/2004	06/30/2004
03-400-0390	DRY	05/10/2004	05/10/2004	06/30/2004	06/30/2004
03-300-0400	ILLCIT CONNECTION	05/25/2004	05/25/2004	06/23/2004	06/23/2004
03-300-0550	WET	12/22/2003	12/22/2003	01/22/2004	01/23/2004
03-400-0950	DRY	12/22/2003	12/22/2003	01/22/2004	01/23/2004
03-100-0960	DRY	12/22/2003	12/22/2003	01/22/2004	01/23/2004
03-200-0965	WET	12/22/2003	12/22/2003	01/22/2004	01/23/2004
03-400-0970	DRY	12/22/2003	12/22/2003	01/22/2004	01/23/2004
03-400-0975	DRY	12/22/2003	12/22/2003	01/22/2004	01/23/2004
03-400-0980	DRY	12/08/2003	12/08/2003	01/13/2004	01/13/2004
03-400-0985	DRY	12/08/2003	12/08/2003	01/13/2004	01/13/2004
03-200-0990	WET	12/08/2003	12/08/2003	01/13/2004	01/13/2004
03-400-0995	DRY	12/08/2003	12/08/2003	01/13/2004	01/13/2004
03-400-1000	DRY	12/08/2003	12/08/2003	01/13/2004	01/13/2004
04-400-0020	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0025	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0030	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0035	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0040	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-200-0055	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0060	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0065	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004
04-400-0070	DRY	03/23/2004	03/23/2004	04/21/2004	04/21/2004

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
04-100-0326	DRY	03/24/2004	03/24/2004	04/28/2004	04/28/2004
04-300-0327	DRY	03/24/2004	03/24/2004	04/28/2004	04/28/2004
04-400-0330	DRY	03/24/2004	03/24/2004	04/28/2004	04/28/2004
04-400-0335	DRY	12/03/2003	12/03/2003	01/07/2004	01/07/2004
04-300-0337	DRY	12/03/2003	12/03/2003	01/07/2004	01/07/2004
04-400-0340	DRY	12/03/2003	12/03/2003	01/07/2004	01/07/2004
04-300-0345	DRY	12/03/2003	12/03/2003	01/13/2004	01/13/2004
04-400-0360	DRY	03/24/2004	03/24/2004	04/28/2004	04/28/2004
04-400-0365	DRY	03/24/2004	03/24/2004	04/28/2004	04/28/2004
04-300-0375	DRY	03/24/2004	03/24/2004	04/28/2004	04/28/2004
05-400-0075	DRY	03/26/2004	03/26/2004	05/04/2004	05/04/2004
05-400-0080	DRY	03/26/2004	03/26/2004	05/04/2004	05/04/2004
05-400-0085	DRY	03/26/2004	03/26/2004	05/04/2004	05/04/2004
05-400-0090	DRY	03/26/2004	03/26/2004	05/04/2004	05/04/2004
05-400-0095	DRY	03/26/2004	03/26/2004	05/04/2004	05/04/2004
05-100-0100	ILLCIT DUMP	03/26/2004	03/26/2004	05/04/2004	05/04/2004
05-300-0185	DRY	04/05/2004	04/05/2004	05/04/2004	05/04/2004
05-300-0240	DRY	04/05/2004	04/05/2004	05/04/2004	05/04/2004
06-400-0090	DRY	04/07/2004	04/07/2004	05/10/2004	05/10/2004
06-400-0095	DRY	04/07/2004	04/07/2004	05/10/2004	05/10/2004
06-400-0100	DRY	04/05/2004	04/05/2004	05/10/2004	05/10/2004
06-400-0105	DRY	04/05/2004	04/06/2004	05/10/2004	05/10/2004
06-500-0110	WET	04/05/2004	04/06/2004	05/10/2004	05/10/2004
06-400-0115	DRY	04/05/2004	04/06/2004	05/10/2004	05/10/2004
07-400-0070	ILLCIT CONNECTION	04/19/2004	04/19/2004	05/18/2004	05/18/2004
07-400-0075	DRY	04/19/2004	04/19/2004	05/18/2004	05/18/2004
07-400-0080	DRY	04/19/2004	04/19/2004	05/18/2004	05/18/2004

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
07-400-0085	DRY	04/19/2004	04/19/2004	05/18/2004	05/18/2004
07-100-0090	WET	04/19/2004	04/19/2004	05/18/2004	05/18/2004
07-400-0095	DRY	04/19/2004	04/19/2004	05/18/2004	05/18/2004
07-400-0100	DRY	04/19/2004	04/19/2004	05/18/2004	05/18/2004
11-300-0610	DRY	01/29/2004	01/29/2004	03/12/2004	03/12/2004
11-300-0611	DRY	01/29/2004	01/29/2004	03/12/2004	03/12/2004
11-300-0612	DRY	01/29/2004	01/29/2004	03/12/2004	03/12/2004
11-300-0613	DRY	01/29/2004	01/29/2004	03/12/2004	03/12/2004
11-300-0614	DRY	01/29/2004	01/29/2004	03/12/2004	03/12/2004
11-500-0625	WET	01/29/2004	01/29/2004	03/12/2004	03/12/2004
13-300-0140	ILLCIT CONNECTION	10/21/2003	10/21/2003	12/01/2003	12/01/2003
13-300-0145	DRY	10/21/2003	10/21/2003	12/01/2003	12/01/2003
13-300-0147	DRY	10/21/2003	10/21/2003	12/01/2003	12/01/2003
13-300-0150	ILLCIT DUMP	12/03/2003	12/03/2003	01/07/2004	01/07/2004
13-300-0155	ILLCIT CONNECTION	12/03/2003	12/03/2003	01/07/2004	01/07/2004
13-300-0181	DRY	10/21/2003	10/21/2003	11/21/2003	11/21/2003
13-300-0182	DRY	10/21/2003	10/21/2003	11/21/2003	11/21/2003
13-300-0226	DRY	10/08/2003	10/08/2003	11/21/2003	11/21/2003
13-300-0227	DRY	10/08/2003	10/08/2003	11/21/2003	11/21/2003
13-300-0228	ILLCIT CONNECTION	10/08/2003	10/08/2003	11/21/2003	11/21/2003
13-400-0235	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-100-0240	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-400-0245	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-400-0250	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-200-0255	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-400-0260	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-400-0265	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003

<b>Outfall</b>	<b>Outfall Status</b>	<b>Visit #1</b>	<b>Visit #2</b>	<b>Visit #3</b>	<b>Visit #4</b>
13-400-0270	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
13-300-0350	DRY	10/08/2003	10/08/2003	11/21/2003	11/21/2003
13-300-0355	DRY	10/08/2003	10/08/2003	11/21/2003	11/21/2003
13-300-0365	DRY	10/08/2003	10/08/2003	11/21/2003	11/21/2003
50-400-0085	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
50-400-0090	DRY	08/19/2003	08/19/2003	09/18/2003	09/18/2003
50-400-0095	DRY	08/20/2003	08/20/2003	09/24/2003	09/24/2003
50-400-0100	DRY	08/20/2003	08/20/2003	09/24/2003	09/24/2003
50-400-0105	DRY	08/20/2003	08/20/2003	09/24/2003	09/24/2003
50-100-0130	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
50-100-0135	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
53-400-0025	DRY	08/26/2003	08/26/2003	09/24/2003	09/24/2003
53-100-0030	DRY	08/26/2003	08/26/2003	09/24/2003	09/24/2003
53-400-0035	DRY	08/26/2003	08/26/2003	09/24/2003	09/24/2003
53-400-0040	DRY	08/26/2003	08/26/2003	09/24/2003	09/24/2003
53-400-0055	DRY	08/26/2003	08/26/2003	09/24/2003	09/24/2003
53-100-0130	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
53-100-0250	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
53-100-0255	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
53-100-0260	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
53-100-0265	DRY	10/02/2003	10/02/2003	11/04/2003	11/04/2003
79-400-0010	DRY	08/27/2003	08/27/2003	09/25/2003	09/25/2003
79-400-0015	DRY	08/27/2003	08/27/2003	09/25/2003	09/25/2003
79-400-0020	DRY	08/27/2003	08/27/2003	09/25/2003	09/25/2003
79-400-0025	DRY	08/27/2003	08/27/2003	09/25/2003	09/25/2003
79-400-0030	DRY	08/27/2003	08/27/2003	09/25/2003	09/25/2003
79-400-0035	DRY	08/27/2003	08/27/2003	07/25/2003	07/25/2003

<b>Outfall</b>	<b>Outfall Status</b>	<b>Visit #1</b>	<b>Visit #2</b>	<b>Visit #3</b>	<b>Visit #4</b>
79-400-0340	ILLCIT CONNECTION	08/27/2003	08/27/2003	09/25/2003	09/25/2003

# Dry Weather Screening Data

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>00-100-0300</b>																
2004	10/23/03	1	Yes	32	7.0	1.00	0	0	0	0	No	0	0	No	No	Yes
	10/23/03	2	Yes	48	7.0	1.00	0	0	0	0	No	0	0	No	No	Yes
	12/2/03	3	Yes	29	6.5	0.40	0	0	0	0	No	0	0	No	No	No
	12/2/03	4	Yes	29	6.5	0.60	0	0	0	0	No	0	0	No	No	No
<b>00-400-0305</b>																
2004	2/19/04	1	Yes	INTERMIT	7.0	5.00	0	0	0	0	No	0	0	No	No	No
	2/19/04	2	Yes	LATERAL							No	0	0	No	No	No
<b>00-400-0390</b>																
2004	9/17/03	1	Yes	10	7.0	3.00	0	0	0	0.80	No	0	0	No	No	No
	9/17/03	2	Yes	10	7.0	3.50	0	0	0	0.40	No	0	0	No	No	No
	10/16/03	3	Yes	3	7.0	4.00	0	0	0	0	No	0	0	No	No	No
	10/16/03	4	Yes	3	7.0	4.00	0	0	0	0	No	0	0	No	No	No
<b>00-500-0075</b>																
2004	12/2/03	3	Yes	0.02	7.0	0.40	0	0	0	2.00	No	0	20	No	No	No
<b>01-100-0230</b>																
2004	5/13/04	1	Yes	0.24	7.0	0.30	0	0	0	1.50	Yes	5.300	50	50	No	No
	5/13/04	2	Yes	0.24	7.0	0	0	0	0	3.00	No	25	50	No	No	No
	6/17/04	3	Yes	0.27	7.0	0.40	0	0	0	0.80	No	0	30	SEWAGE	No	No
	6/17/04	4	Yes	0.26	7.0	0.40	0	0	0	0.80	No	0	30	SEWAGE	No	No
<b>01-300-0060</b>																
2004	5/11/04	1	Yes	TLTM	7.0	0.80	0	0	0	0	No	0	20	No	SILVER SH	No
	5/11/04	2	Yes	TLTM	7.0	2.00	0	0	0	0	No	0	20	No	SILVER SH	No
	6/8/04	3	Yes	TLTM	7.0	0.40	0	0	0	0	No	0	0	No	No	No
	6/8/04	4	Yes	TLTM	7.0	0.40	0	0	0	0	No	0	0	No	No	No
<b>01-300-0095</b>																
2004	5/11/04	1	Yes	TLTM	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	5/11/04	2	Yes	TLTM	7.0	2.00	0	0	0	0	No	0	0	No	No	No
	6/8/04	3	Yes	TLTM	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	6/8/04	4	Yes	TLTM	7.0	2.00	0	0	0	0	No	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>01-300-0160</b>																
2004	5/12/04	1	Yes	5	6.5	<u>2.00</u>	0	0	0	0	No	0	0	No	No	No
	5/12/04	2	Yes	5	7.0	<u>2.00</u>	0	0	0	0	No	0	0	No	No	No
	6/17/04	3	Yes	2	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
	6/17/04	4	Yes	2	7.0	<u>1.00</u>	0	0	0	0	No	0	0	No	No	No
<b>01-300-0520</b>																
2004	5/13/04	1	Yes	TLTM	7.0	<u>2.50</u>	0	0	0	0	No	0	0	No	No	No
	5/13/04	2	Yes	TLTM	7.0	<u>0.80</u>	0	0	0	0	No	0	30	No	No	No
	6/23/04	3	Yes	9	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
	6/23/04	4	Yes	9	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
<b>02-300-0165</b>																
2004	3/29/04	1	Yes	POOL	7.0	<u>0.30</u>	0	0	0	0.20	No	0	0	No	No	No
	3/29/04	2	Yes	POOL	7.0	0.10	0	0	0	0.20	No	0	40	No	No	No
	5/7/04	3	Yes	SLOW	7.0	<u>2.00</u>	0	0	0	0	No	0	0	No	No	No
	5/7/04	4	Yes	SLOW	7.0	<u>2.00</u>	0.10	<u>0.10</u>	<u>1.50</u>	<u>1.00</u>	Yes <u>2.500</u>	25	50	No	SUDS	No
<b>02-400-0045</b>																
2004	3/29/04	1	Yes	0.02	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
	3/29/04	2	Yes	0.01	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
	5/7/04	3	Yes	5	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
	5/7/04	4	Yes	6	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
<b>02-400-0050</b>																
2004	3/29/04	1	Yes	4	7.5	<u>0.30</u>	<u>0.20</u>	0	0	<u>3.00</u>	Yes 88	0	0	No	No	No
	3/29/04	2	Yes	4	8.0	<u>0.30</u>	<u>0.20</u>	0	0	0.30	No	25	60	No	No	No
<b>02-400-0169</b>																
2004	3/29/04	1	Yes	2	7.0	<u>0.30</u>	0	0	0	0	No	0	0	No	No	No
	3/29/04	2	Yes	29	7.0	<u>0.80</u>	0	0	0	0	No	0	0	No	No	No
	5/7/04	3	Yes	2	7.0	<u>2.00</u>	0	0	0	0	No	0	0	No	No	No
	5/7/04	4	Yes	2	7.0	<u>2.00</u>	0	0	0	0	No	0	0	No	No	No
<b>03-200-0965</b>																
2004	12/22/03	1	Yes	1,650	7.0	0	0	0	0	0	No	0	0	No	No	No
	12/22/03	2	Yes	1,650	7.0	0	0	0	0	0	No	0	30	No	No	No
	1/22/04	3	Yes	150	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/23/04	4	Yes	150	7.0	0	0	0	0	0	No	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>03-200-0990</b>																
2004	12/8/03	1	Yes	5	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	12/8/03	2	Yes	5	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/13/04	3	Yes	150	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	1/13/04	4	Yes	150	7.0	0	0	0	0	0	No	0	0	No	No	No
<b>03-300-0400</b>																
2004	5/25/04	1	Yes	0.32	7.0	0.60	0	0	0	0.70	No		30	No	No	No
	5/25/04	2	Yes	0.11	7.0	0.60	0	0	0	0.60	No		30	No	No	No
	6/23/04	3	Yes	4	7.0	0	0	0	0	0.80	No	25	20	No	No	No
	6/23/04	4	Yes	5	7.0	0	0	0	0	0.80	No	0	40	No	No	No
<b>03-300-0550</b>																
2004	12/22/03	1	Yes	3	6.5	0	0	0	0	0	No	0	0	No	No	No
	12/22/03	2	Yes	3	7.0	0	0	0	0	0	No	0	0	No	No	No
<b>05-100-0100</b>																
2004	3/26/04	1	Yes	6	7.0	0	0	0	0	0	No	0	30	No	No	No
	3/26/04	2	Yes	6	7.0	0	0	0	0	0	No	0	30	No	No	No
	5/4/04	3	Yes	5	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	5/4/04	4	Yes	5	7.0	0.40	0	0	0	0	No	0	0	No	No	No
<b>06-500-0110</b>																
2004	4/5/04	1	Yes	PONDED	7.0	0	0	0	0	0	No	0	0	No	No	No
	4/6/04	2	Yes	PONDED	7.0	0	0	0	0	0	No	0	7	No	No	No
	5/10/04	3	Yes	2	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	6/10/04	4	Yes	2	7.0	0.60	0	0	0	0	No	0	0	No	No	No
<b>07-100-0090</b>																
2004	4/19/04	1	Yes	0.16	7.0	0	0	0	0	0	No	0	0	No	No	No
	4/19/04	2	Yes	0.16	7.0	0	0	0	0	0	No	0	0	No	No	No
	5/18/04	3	Yes	0.11	7.0	2.00	0	0	0	0	No	0	0	No	No	No
	5/18/04	4	Yes	0.11	7.0	0.60	0	0	0	0	No	0	0	No	No	No
<b>07-400-0070</b>																
2004	4/19/04	1	Yes	0.06	7.0	0.80	0	0	0.50	2.00	No	0	0	No	No	No
	4/19/04	2	Yes	0.06	7.0	0.40	0	0	0.50	1.00	No	0	0	No	No	No
	5/18/04	3	Yes	0.04	7.0	2.50	0	0	0.50	0.60	No	0	30	No	No	No
	5/18/04	4	Yes	0.04	7.0	2.00	0	0	0.50	0.80	No	0	50	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>11-500-0625</b>																
2004	1/29/04	1	Yes	SEEP	7.0	<u>0.30</u>	0	0	0	0	No	0	0	No	No	No
	1/29/04	2	Yes	SEEP	7.0	<u>0.30</u>	0	0	0	0	No	0	0	No	No	No
	3/12/04	3	Yes	2	7.0	<u>0.60</u>	0	0	0	0	No	0	0	No	No	No
	3/12/04	4	Yes	2	7.0	<u>0.60</u>	0	0	0	0	No	0	30	No	No	No
<b>13-300-0140</b>																
2004	10/21/03	1	Yes	19	7.0	<u>0.40</u>	0	0	0	0	No	0	0	No	No	No
	10/21/03	2	Yes	19	7.0	<u>0.30</u>	0	0	0	0	No	0	0	No	No	No
	12/1/03	3	Yes	19	7.0	<u>0</u>	0	0	<u>0.25</u>	0	No	0	0	No	No	No
	12/1/03	4	Yes	19	7.0	<u>0.40</u>	0	0	0	0	No	0	0	No	No	No
<b>13-300-0150</b>																
2004	12/3/03	1	Yes	2	7.0	<u>0</u>	0	0	0	0	No	0	0	No	No	No
	12/3/03	2	Yes	2	7.0	<u>0</u>	0	0	0	0	No	0	0	No	No	No
	1/7/04	3	Yes	5	7.0	<u>0</u>	0	0	0	0.60	No	0	0	No	No	No
	1/7/04	4	Yes	5	7.0	<u>0.30</u>	0	0	0	0.20	No	0	0	No	No	No
<b>13-300-0155</b>																
2004	12/3/03	1	Yes	20	7.0	<u>0</u>	0	<u>0.30</u>	0	0	No	0	0	No	No	No
	12/3/03	2	Yes	20	7.0	<u>0</u>	0	<u>0.30</u>	0	0	No	0	0	No	No	No
	1/7/04	3	Yes	20	7.0	<u>0.30</u>	0	<u>0.10</u>	0	0.60	No	0	50	No	No	No
	1/7/04	4	Yes	20	7.0	<u>0.40</u>	0	<u>0.10</u>	0	0.30	No	0	50	No	No	No
<b>13-300-0228</b>																
2004	10/8/03	1	Yes	2	7.0	<u>0.40</u>	0	<u>0.20</u>	<u>3</u>	0.40	No	50	60	SEWAGE	No	Yes
	10/8/03	2	Yes	2	7.0	<u>0.60</u>	0	<u>0.40</u>	<u>2</u>	0.60	No	100	60	SEWAGE	No	Yes
	11/21/03	3	Yes	TLTM	7.0	<u>0.60</u>	0	<u>0</u>	<u>1.50</u>	0	No	0	50	No	No	No
	11/21/03	4	Yes	TLTM	7.0	<u>0.20</u>	0	<u>0</u>	<u>2</u>	0.20	No	20	30	No	No	No
<b>79-400-0340</b>																
2004	8/27/03	1	Yes	6	<u>5.0</u>	<u>0.80</u>	<u>0.20</u>	<u>10.00</u>	<u>0.25</u>	<u>10.00</u>	No	0	0	No	No	No
	8/27/03	2	Yes	6	<u>5.0</u>	<u>0.80</u>	<u>0.20</u>	<u>10.00</u>	<u>0.25</u>	<u>10.00</u>	No	0	0	No	No	No
	9/25/03	3	Yes	19	<u>5.5</u>	<u>0.80</u>	<u>0.20</u>	<u>10.00</u>	<u>0.25</u>	<u>10.00</u>	No	0	0	No	BROWN F(	No
	9/25/03	4	Yes	19	<u>5.8</u>	<u>0.80</u>	<u>0.10</u>	<u>10.00</u>	<u>0.25</u>	<u>10.00</u>	No	0	0	No	BROWN F(	No

<b>Outfall</b> 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
-------------------------------	------	------------	-----------	--------------------	------------	-------------------	-----------------	-----------------	---------------------	------------------	-----------------------------	--------------------	-------	-------	-----------------	--------------

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

Elevated readings have been underlined.

Record Selection Criteria: SELECT \* FROM qryAllData WHERE  
(((flow)=Yes)) and ((PermitYear)="2004")

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

pH <= 6 or >8 su  
 Chlorine >=0.3 ppm  
 Copper >=0.1 ppm  
 Phenol >=0.1 ppm  
 Detergents >=0.25 ppm  
 Ammonia >=1 ppm  
 Fecal Sample >=200 mpn/100 ml

City of Knoxville  
Bill Haslam, Mayor  
Jerry Ledbetter, P.E., Senior Director



Engineering Division  
NPDES Annual Report  
July 1, 2003 - June 30, 2004

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## **APPENDIX C**

Summary Reports for Year Eight IBI Studies

### Summary of TVA / TDEC IBI Analyses for 2003

	Third Creek (2.7)	Fourth Creek (1.3)	Turkey Creek (3.0)	Holston River (5.0)	First Creek (3.6)	Second Creek (0.3)	Third Creek (0.8)
Metric Description	Score	Score	Score	Score	Score	Score	Score
Total number of native fish species	3	1	3	3	1	1	3
Number of darter species	1	1	1	3	1	1	3
Number of sunfish species, less Micropterus	1	1	3	5	3	1	5
Number of sucker species	1	3	5	3	3	3	1
Number of intolerant species	1	1	1	3	1	1	1
Percent of individuals as tolerant species	3	5	3	3	3	5	5
Percent of individuals as omnivores and stoneroller species	3	1	5	3	1	1	1
Percent of individuals as specialized insectivores	1	1	1	1	1	1	1
Percent of individuals as piscivores	1	1	1	5	5	1	3
Catch rate(average number of fish per 300 sq. ft. sampling unit)	1	1	1	3	3	1	1
Percent of individuals as hybrids	5	5	5	5	5	5	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	1	1	5	5	3	1	1
IBI	22	22	34	42	30	22	30
IBI Clasification	very poor	very poor	poor	fair	poor	very poor	poor

	Sinking Creek (2.1)	Williams Creek (0.8)
Metric Description Small Headwater Stream	Score	Score
Total number of native fish species	3	1
Number of riffle species	1	1
Number of pool species	3	1
Percent individuals of two dominant species	3	1
Number of head water intolerant species	1	1
Percent of individuals as tolerant species	1	5
Percent of individuals as omnivores and stoneroller species	5	3
Percent of individuals as specialized insectivores	1	1
Percent of individuals as piscivores	1	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	1	1
Percent of individuals as lithophilic spawners	1	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	3	3
IBI	24	22
IBI Clasification	very poor/poor	very poor

## Index of Biotic Integrity

**Fourth Creek - UTK ( mile 2.9 ) - 10/24/ 2003**

Drainage Area 6768.2 Acres

Ecoregion: Central Appalachian Ridges and Valleys

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<10	(10 - 19)	>19	4	1
Number of darter species	<2	2	>2	0	1
Number of sunfish species, less <i>Micropterus</i>	<2	2	>2	0	1
Number of sucker species	<2	2	>2	0	1
Number of intolerant species	<2	2	>2	0	1
Percent of individuals as tolerant species	>33%	17% - 33%	<17%	100.00%	1
Percent of individuals as omnivores and stoneroller species	>40%	21% - 40%	<21%	25%	3
Percent of individuals as specialized insectivores	<19%	19% - 36%	>36%	0.00%	1
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	<22	22 - 43.8	>43.8	22.2	3
Percent of individuals as hybrids	>1 %	TR-1 %	0%	0%	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	>5%	2% - 5%	<2%	19.50%	1
<b>IBI</b> <b>IBI Classification</b>				<b>20</b> <b>V Poor</b>	

**IBI Range: 0= No fish; 12-22= Very Poor;  
28-34= Poor; 40-44= Fair; 48-52= Good;  
59-60= Excellent**

<b><u>E.P.T. Families Present</u></b>	<b>Score: 2 (Poor)</b>
E: none	
P: none	
T: Hydropsychidae, Glossosomatidae	
Comments: Poor bug diversity at this location	

## Index of Biotic Integrity

**Goose Creek - ( mile 1.1 ) - 11/11/ 2003**

**Drainage Area 2382.8 Acres**

**Ecoregion: Central Appalachian Ridges and Valleys**

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<10	(10 - 19)	>19	8	1
Number of darter species	<2	2	>2	0	1
Number of sunfish species, less <i>Micropterus</i>	<2	2	>2	0	1
Number of sucker species	<2	2	>2	2	3
Number of intolerant species	<2	2	>2	1	1
Percent of individuals as tolerant species	>33%	17% - 33%	<17%	80.00%	1
Percent of individuals as omnivores and stoneroller species	>40%	21% - 40%	<21%	20%	3
Percent of individuals as specialized insectivores	<19%	19% - 36%	>36%	0.00%	1
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	<22	22 - 43.8	>43.8	11.3	1
Percent of individuals as hybrids	>1 %	TR-1 %	0%	0%	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	>5%	2% - 5%	<2%	5.00%	3
<b>IBI</b>					<b>22</b>
<b>IBI Classification</b>					<b>V Poor</b>

**IBI Range: 0= No fish; 12-22= Very Poor;  
28-34= Poor; 40-44= Fair; 48-52= Good;  
59-60= Excellent**

<u>E.P.T. Families Present</u>	Score: (Poor)
E: none	
P: none	
T: Hydropsychidae	
Comments: Poor bug diversity at this location	

## Index of Biotic Integrity

**First Creek -( mile 6.8 ) - 11/12/ 2003**

**Drainage Area 7739.3**

**Ecoregion: Central Appalachian Ridges and Valleys**

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<10	(10 - 19)	>19	9	1
Number of darter species	<2	2	>2	1	1
Number of sunfish species, less <i>Micropterus</i>	<2	2	>2	1	1
Number of sucker species	<2	2	>2	0	1
Number of intolerant species	<2	2	>2	1	1
Percent of individuals as tolerant species	>33%	17% - 33%	<17%	90.00%	1
Percent of individuals as omnivores and stoneroller species	>40%	21% - 40%	<21%	35%	3
Percent of individuals as specialized insectivores	<19%	19% - 36%	>36%	10.40%	1
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	<22	22 - 43.8	>43.8	44.2	5
Percent of individuals as hybrids	>1 %	TR-1 %	0%	0%	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	>5%	2% - 5%	<2%	3.20%	3
<b>IBI</b>					<b>24</b>
<b>IBI Classification</b>					<b>Poor</b>

IBI Range: 0= No fish; 12-22= Very Poor;  
 28-34= Poor; 40-44= Fair; 48-52= Good;  
 59-60= Excellent

<b><u>E.P.T. Families Present</u></b>	<b>Score: 1 (Poor)</b>
E: none	
P: none	
T: Hydropsychidae	
Comments: Poor bug diversity at this location	

## Index of Biotic Integrity

**Williams Creek -( mile 0.8 ) -12/8/ 2003**

Drainage Area 1,641.22 acre

Ecoregion: Central Appalachian Ridges and Valleys

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<10	(10 - 19)	>19	6	1
Number of darter species	<2	2	>2	0	1
Number of sunfish species, less <i>Micropterus</i>	<2	2	>2	1	1
Number of sucker species	<2	2	>2	1	1
Number of intolerant species	<2	2	>2	0	1
Percent of individuals as tolerant species	>33%	17% - 33%	<17%	83.00%	1
Percent of individuals as omnivores and stoneroller species	>40%	21% - 40%	<21%	16%	5
Percent of individuals as specialized insectivores	<19%	19% - 36%	>36%	0.00%	1
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	<22	22 - 43.8	>43.8	33.4	3
Percent of individuals as hybrids	>1 %	TR-1 %	0%	0%	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	>5%	2% - 5%	<2%	4.00%	3
<b>IBI</b>					<b>24</b>
<b>IBI Classification</b>					<b>Very Poor</b>

**IBI Range: 0= No fish; 12-22= Very Poor;  
28-34= Poor; 40-44= Fair; 48-52= Good;  
59-60= Excellent**

<b><u>E.P.T. Families Present</u></b>	<b>Score: 1 (Poor)</b>
E: none	
P: none	
T: Hydropsychidae	
Comments: Poor bug diversity at this location	

## Index of Biotic Integrity

**Baker Creek -( mile 0.9 ) - 12/ 9/ 2003**

Drainage Area 1673. Acres

Ecoregion: Central Appalachian Ridges and Valleys

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<10	(10 - 19)	>19	10	3
Number of darter species	<2	2	>2	1	1
Number of sunfish species, less <i>Micropterus</i>	<2	2	>2	1	1
Number of sucker species	<2	2	>2	2	3
Number of intolerant species	<2	2	>2	2	3
Percent of individuals as tolerant species	>33%	17% - 33%	<17%	60.00%	1
Percent of individuals as omnivores and stoneroller species	>40%	21% - 40%	<21%	40%	3
Percent of individuals as specialized insectivores	<19%	19% - 36%	>36%	20.00%	3
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	<22	22 - 43.8	>43.8	18.5	1
Percent of individuals as hybrids	>1 %	TR-1 %	0%	0%	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	>5%	2% - 5%	<2%	1.00%	5
<b>IBI</b>					<b>30</b>
<b>IBI Classification</b>					<b>Poor</b>

**IBI Range: 0= No fish; 12-22= Very Poor;  
28-34= Poor; 40-44= Fair; 48-52= Good;  
59-60= Excellent**

<b><u>E.P.T. Families Present</u></b>	<b>Score: 2 (Poor)</b>
E: none	
P: none	
T: Hydropsychidae, Helicopsychidae	
Comments: Reasonable bug diversity at this location	

City of Knoxville  
Bill Haslam, Mayor  
Jerry Ledbetter, P.E., Senior Director



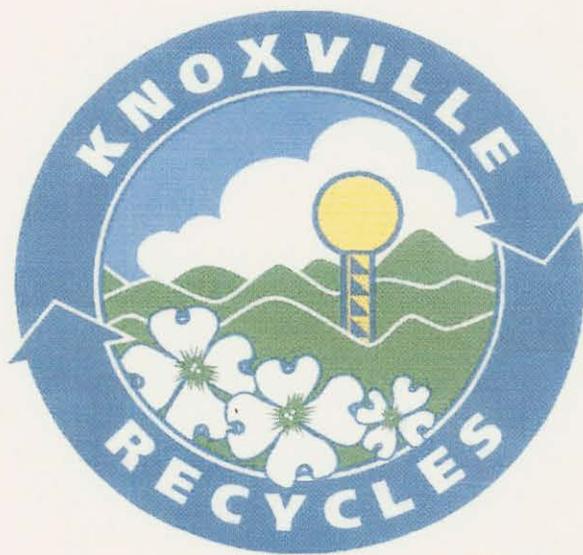
Engineering Division  
NPDES Annual Report  
July 1, 2003 - June 30, 2004

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## **APPENDIX D**

City of Knoxville Solid Waste Office 2003 Annual Report

**City of Knoxville  
Solid Waste Office  
2003 Annual Report**



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**Bill Haslam, Mayor**

Department of Community & Neighborhood Services  
Sam Anderson, Director

Public Service Division  
Bob Whetsel, Director

## **INTRODUCTION**

In 2003, we continued to show positive progress in the development of our solid waste programs. This is the second year of our on-site paint recycling program at the Solid Waste Management Facility, we continued active enforcement of the solid waste ordinances, and completed our sixth full year of operations at the Household Hazardous Waste Collection Center. The Solid Waste Office is in its second year of city garbage collection service and recycling in the Central Business District at a cost savings of \$30,000 per year. All of these programs have been successful and reflect the continued interest in and growth of our comprehensive solid waste management program.

The following pages summarize our activities for the calendar year 2003.

The last page is a residential waste stream analysis that reflects some notable statistics:

- \* The total waste stream increased by 13,354.35 tons over 2002
- \* The diversion rate increased to 59.46% from 57.81% in 2002
- \* The recycling rate decreased to 27.16% from 27.95% 2002

The total waste stream shows a increase for the second time in four years. This is attributed to increased use of the household trash and bulky waste pickup, increased yard waste, and an increase in demolition of condemned properties. Diversion and recycling rates remain level over the last five years.

### **I. RECYCLING**

A total of 5,265.60 tons of recyclables was collected at the City's twelve drop-off recycling centers in 2002. This number is level with recyclables in 2001. All commodities remained level or a slight decrease except aluminum showing the largest gain of almost 24 tons.

Goodwill Industries is in the second year of a 5 year contract to assist in on-site operation of the recycling centers. The contract that was negotiated with SP Recycling to haul newspaper paid the City current market value for material collected in the amount of \$93,028.84. This, and the contract with Waste Management for the other materials, combined to save the City \$136,558.34 in operational costs. Third year contract options were approved with both companies.

In 2003, the City continued processing and marketing cardboard brought to the Solid Waste Management Facility (SWMF). Fifty seven tons was processed in 2003. Businesses, in particular, are encouraged to bring recyclables to the SWMF free of charge.

### **II. MUNICIPAL SOLID WASTE (MSW)**

A total of 50,658.06 tons of garbage was collected from Knoxville homes in 2003 as part of the weekly garbage collection service the City offers via its contractor, Waste Connections (formally BFI). This number reflects a less than 1% increase from the

previous year. The City is currently in a five year contract with Waste Connections that expires in 2006. Current collection costs per this contract are:

*	Curbside Collection	\$5.74 / house/month	41,567 residents
*	Backdoor Collection	\$7.18 / house/month	14,236 residents

All garbage is disposed of at the Chestnut Ridge Landfill operated by Waste Management of Knoxville. The City is currently in a 10 year contract with Waste Management that expires in 2010. Disposal costs for 2003 were as follows:

*	Jan - Jun.	\$22.22 / ton
*	Jul. - Sep.	\$22.65 / ton
*	Oct. - Dec.	\$23.29 / ton

### **III. COMPOSTING**

A total of 36,069.89 tons of yard waste was collected by City crews in 2003. This number is up by 3051.26 tons from last year. The Solid Waste Department attributes this increase to the storms in early spring of 2003 and of educating residents about proper yard waste practices. All yard waste is taken to Shamrock Organic Products where it is turned into mulch products. The City is currently in a 6 year contract with Shamrock that expires in 2006. Costs for disposal in 2003 at Shamrock were:

*	Jan. - Dec.	\$33 / ton
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### **IV. SOLID WASTE MANAGEMENT FACILITY**

#### **Transfer Station**

When the Transfer Station was redesigned in 1997, one of our goals was to be able to separate construction waste (C&D) from MSW. This would allow us to save money by sending C&D waste to a Class III landfill and also enable us to comply with the State mandate calling for a reduction in the volume of waste placed in Class I landfills. In 2003, we diverted 29,628 tons of C&D waste to a Class III landfill. This was 65% of the waste received at the Transfer Station.

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

Staffed by City Solid Waste personnel, the HHW Facility is operated jointly by the City and County for all residents. The County contributes 50% of the operating costs and a prorated portion of the materials disposal costs based on City/County usage. In 2003, this facility was visited by 4,920 vehicles, up 576 from 2002, and processed 197 tons of HHW, 47% of which was latex paint.

Rather than pay to dispose of the latex paint by the City's contracted hazardous materials hauler, we have developed an in-house paint re-manufacturing facility.

Last year we produced 1,250 gallons of high quality paint which was made available to Knox County Schools and to City and County Maintenance Departments. We were also able to contribute 200 gallons of paint to a local non-profit organization.

## **V. EDUCATION**

The Solid Waste Office engaged in many activities and special programs throughout 2003 to educate Knoxvilleians 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 seventh annual America Recycles Day, a national education campaign aimed at increasing citizens' commitment to recycling and buying recycled goods.

**Telephone Book Recycling** - Once again this year the Solid Waste Office coordinated the Knoxville/Knox County schools telephone book recycling program. Forty three Knox County schools competed for cash prizes donated by Waste Management and Kroger. Over 157.83 tons of old books was collected from the schools and 8 City of Knoxville drop-off centers.

**Earth Day** - The Solid Waste Office was a part of a city-wide steering committee that developed Earthfest 2003 which celebrated the 33rd anniversary of Earth Day. Over 6,000 people attended the event which had 80 + exhibitors from the environmental community.

**One-Day Computer Collection Event** - A one day computer collection event was held in July at Staples with ten sponsors contributing to the success of the event. There were 600 residents participating in the event with just over 19 tons of materials collected. The material was recycled at The Oak Ridge National Recycling Center, Oak Ridge, TN.

**Tennessee Recycling Coalition** - The Tennessee Recycling Coalition held their 2003 annual conference in Knoxville, TN in October. Approximately 120 people attended the sessions held at the Knoxville Marriott. Technical tours included visits to The Oak Ridge National Recycling Center Clinton Facility, Advanced Polymer Recycling in Knoxville, and the Goodwill Recycling Center in Morristown.

**Other** - In 2003, the Solid Waste Office continued to produce and distribute educational information. Brochures about recycling, composting, and other solid waste issues are now available for citizens at City Hall at the Knoxville Center Mall. Members of the Solid Waste Office participated in several educational events in 2003 using our exhibit booth display at events including Kids Day America/International, the Dogwood Arts' House and Garden Show, and America Recycles Day Events. Over 100 school children toured the SWMF and listened to a presentation at the HHW facility. The HHW facility hosted a training workshop on paint recycling to 20 area solid waste and recycling departments.

Annual Report 2003	Kroger 5003	Walker Springs 8526	Kroger 4501	Kroger 5425	Kroger 4818	Kroger 2217	Kroger 225	Kroger 9305	Kroger 4440	Food City 5941	Food City 2939	Totals
Drop Off Centers	N. Broadway	Kingston Pk.	Asheville Hwy	Clinton Hwy	Kingston Pk.	N. Broadway	Moody Av.	Kingston Pk.	Western Av.	Kingston Pk	Alcoa Hwy.	
Aluminum	11888 lbs	1595 lbs	7653 lbs	9765 lbs	17733 lbs	12016 lbs	12813 lbs	22400 lbs	5306 lbs	3447 lbs	5697 lbs	55.16 tons
Steel	27247 lbs	7395 lbs	20180 lbs	21502 lbs	39348 lbs	23320 lbs	31928 lbs	52704 lbs	12318 lbs	0 lbs	0 lbs	117.97 tons
Plastics	50781 lbs	11078 lbs	26478 lbs	48561 lbs	77105 lbs	28601 lbs	51670 lbs	89246 lbs	26739 lbs	4065 lbs	5575 lbs	209.95 tons
Clear Glass	74477 lbs	16497 lbs	50786 lbs	47891 lbs	161833 lbs	65419 lbs	71412 lbs	155587 lbs	27969 lbs	0 lbs	0 lbs	335.94 tons
Brown Glass	56658 lbs	12569 lbs	38670 lbs	36512 lbs	123321 lbs	49777 lbs	54375 lbs	118451 lbs	21347 lbs	0 lbs	0 lbs	255.84 tons
Green Glass	46165 lbs	10214 lbs	31684 lbs	29657 lbs	100246 lbs	40587 lbs	44333 lbs	96462 lbs	17444 lbs	0 lbs	0 lbs	208.40 tons
Newspaper	579207 lbs	111960 lbs	334663 lbs	409890 lbs	555335 lbs	280349 lbs	359610 lbs	756960 lbs	233654 lbs	89790 lbs	81767 lbs	1,896.59 tons
Mixed Paper	409490 lbs	101620 lbs	200680 lbs	277140 lbs	651940 lbs	222660 lbs	297790 lbs	911600 lbs	158750 lbs	14375 lbs	33550 lbs	1,639.80 tons
Cardboard	34490 lbs	30040 lbs	65560 lbs	98200 lbs	45360 lbs	20340 lbs	90460 lbs	361310 lbs	60340 lbs	0 lbs	8500 lbs	407.30 tons
City Cardboard	89740 lbs	1120 lbs	1900 lbs	4960 lbs	111500 lbs	56720 lbs	1380 lbs	10000 lbs	0 lbs	0 lbs	0 lbs	138.66 tons
<b>Drop Off Center Totals</b>	<b>690.07 tons</b>	<b>152.04 tons</b>	<b>389.13 tons</b>	<b>492.04 tons</b>	<b>941.86 tons</b>	<b>399.89 tons</b>	<b>507.89 tons</b>	<b>1,287.36 tons</b>	<b>281.93 tons</b>	<b>55.84 tons</b>	<b>67.54 tons</b>	<b>5,265.60 tons</b>

KPD / Lorain St. Cardboard / Paper	14.82 tons
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Downtown Recycling	37.69 tons
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Phone Books	157.83 tons
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	Leaves	Brush	Total
Mulching Site	8344.35 tons	27725.54 tons	36069.89 tons

	Scrap Metal	Cardboard	Rec. Tir. / Backing	HHW REC.	HHW Divert.	Pallets
Transfer Station	799.64 tons	57.73 tons	22.04 tons	79.01 tons	98.66 tons	446.02 tons

	C&D	Compacted	Computers	Tires	Total
Transfer Station Cont.	29628.00 tons	13663.01 tons	30.16 tons	141.03 tons	44,965.30 tons
				13238	

	Household Trash	Misc. Trash	Total
Landfill Class I	50658.06 tons	39.48 tons	50,697.54 tons

	Transfer Station	Construction	Codes	Total
Landfill Class III	29628.00 tons	16450.00 tons	5098.00 tons	51,176.00 tons

Total Waste Recycled	43,121.46 tons
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	27.16%
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Total Waste Diverted, Class III & Rec.	94,396.12 tons
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Diversion	59.46%
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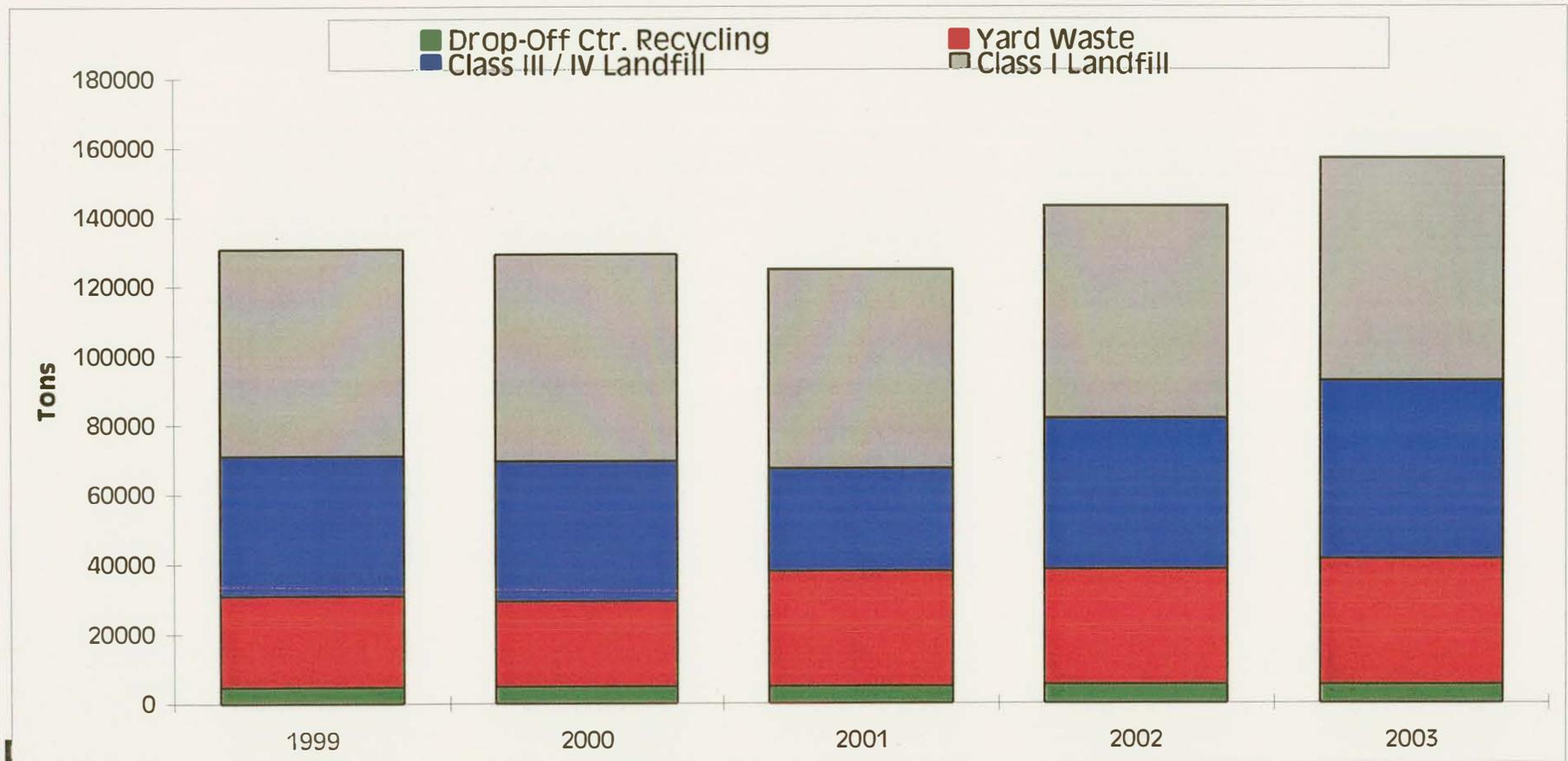
Total Waste Landfilled, Class I	64,360.55 tons
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* Recycling / Total WS	5.75%
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Total Wastestream	158,756.67 tons
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* Yard Waste NOT Included w/ Just residential trash	9.41%
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## Destination of Knoxville's Residential Waste Stream, 1999 - 2003



**59.46%**

**Recycling Rate 24.28%**

**23.29%**

**31.35%**

**27.95%**

**27.16%**



## **APPENDIX E**

Memorandum of Understanding between City and KUB

## MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made by and between **THE CITY OF KNOXVILLE**, a municipal corporation organized and existing under the laws of the State of Tennessee (hereinafter referred to as "City"), and **KNOXVILLE UTILITIES BOARD**, a board created and existing under and by virtue of the Charter of the City of Knoxville, Tennessee (hereinafter referred to as "KUB"), to resolve certain disagreements that have existed between them and to provide a framework for more effective future cooperation between the parties.

Each party binds itself to carry out the undertakings described herein.

1. Future Communications. A commitment by KUB to provide the City any requested documents on a voluntary basis, utilizing primary contact persons thus avoiding the need for formal written "open records" requests.
  
2. Planning Commitment. An agreement by KUB to share on an ongoing and timely basis with the technical staff at the City draft Wastewater Projects and draft Wastewater Project Budgets, providing the City with an opportunity to discuss and have input into those plans before they are finalized and presented annually to the KUB Board of Commissioners.
  
3. Stormwater Management.
  - a. The City will present to Council for its consideration on first reading within 30 days from the entry of the Consent Decree between KUB and EPA an Amendment to the City of Knoxville Plumbing Code, which will include language to the effect that: "No person shall connect, or allow to be connected, any stormwater system to a sanitary sewer without the permission of the owner of the wastewater system."
  
  - b. Permits, Control Plans, Fees, Notification (See Exhibit A attached hereto).
  
4. Private Sewer Laterals. Pursuant to KUB's Sewer Lateral Inspection and Rehabilitation Program, at the time the customer is notified in writing by KUB of the need for lateral repair, the customer will be provided with all documentation associated with the defective lateral. The letter will inform the customer that they will be given 120 days in which to secure a

plumbing permit and complete all work or initiate an appeals process under KUB's Rules and Regulations. The customer will also be advised that if no action is taken within the 120-day period, they face termination of water service by KUB. The City Plumbing Inspector will be copied on this correspondence and provided with all documentation.

All repairs of laterals would be subject to the plumbing inspection requirements administered by the City. This would include repairs voluntarily made and those repairs made after water service had been turned off.

In the event that the customer has taken no action within the first 30 days, the City Plumbing Inspector will send a second notification to the customer reminding the customer of the need to take corrective action in accordance with KUB's original notice of defect. The City's letter will stress the serious nature of the problem and inform the customer of the need to obtain a City Plumbing Permit for the work. It will also include permit application forms that can be completed and mailed back to the Plumbing Inspector and provide information on how to obtain a list of qualified plumbers. If no permit has been issued at the end of 90 days, the City will notify KUB and KUB will send the customer a third notice informing them that the water service will be terminated in 30 days if the permit is not obtained and work completed. If the permit has not been issued ten (10) days prior to the termination date, the City will notify KUB and KUB will place a door hanger on the customer's door notifying them that service is to be terminated. If the permit is not obtained one day prior to the termination date, the Plumbing Inspector will notify KUB of that fact and KUB will call the customer to inform them of the pending cut-off schedule. If the customer still does not comply, KUB will terminate the customer's water service. If the occupant of the property is different from the owner, KUB may elect at its sole discretion to provide the occupant with temporary water service for an additional 30 days.

5. Roadway Repairs. The City and KUB agree that KUB may utilize TDOT backfilling standards (No. 57 Stone) for all utility construction and repairs within the City, including construction within the City right-of-way done voluntarily by KUB on private sewer

laterals. KUB will be responsible for any future repairs to any roadway within the City which are causally related to KUB's utility construction (included but not limited to lateral repairs), and KUB shall make such repairs on a timely basis in coordination with the City. KUB's obligation to make repairs shall survive the termination of this Memorandum of Understanding and shall specifically apply to those situations where the need for repair first becomes known following the termination of this Memorandum of Understanding.

6. Pending Circuit Court Case. An Order dismissing this case has been prepared and a copy attached as Exhibit B. This Order will be presented to the Court for approval and entry upon the execution of this Memorandum of Understanding.

7. Hold Harmless Agreement. In consideration for the execution of Exhibit B dismissing the pending action, the parties have entered into a Supplemental Memorandum Agreement which is attached hereto as Exhibit C. Within that document KUB has committed to provide legal representation at its expense and to hold the City harmless from certain claims; all as set forth in the Hold Harmless Agreement executed by the parties and attached hereto as Exhibit C.

8. Termination. Either party may terminate this Memorandum of Understanding, in whole or in part, upon thirty (30) days written notice to the other. The termination of this Memorandum of Understanding does not affect any rights or duties created during the period of this Memorandum of Understanding.

IN WITNESS WHEREOF, the parties have executed this Memorandum of Understanding as of the 4th day of November, 2004.

CITY OF KNOXVILLE

By:

  
\_\_\_\_\_  
Bill Haslam  
Mayor

KNOXVILLE UTILITIES BOARD

By: Mintha Roach  
Mintha Roach  
President and Chief Executive Officer

### Right-of-Way Permits

KUB and/or its contractor will continue the current practice of obtaining right-of-way permits for all new utility construction work within the City's rights-of-way.

### Traffic Control Plans

New Construction: KUB and/or its contractors will continue the current practice of submitting a traffic control plan whenever new utility construction will occur in or near traffic lanes.

Emergency/Other: KUB will continue the current practice of following the standards in the Manual on Uniform Traffic Control Devices or the TDOT Work Zone Safety Guidelines as previously agreed upon with the City's Department of Engineering. This applies to all emergency work, routine maintenance work, and the installation of service lines.

### Site Development Permits for Utilities

KUB will obtain annually from the City a Master Permit and certify that it will use TDEC Best Management Practices for utility construction and follow these procedures:

Emergency/Other: Whenever activities are related to emergency repairs, routine maintenance, service line installation, setting of poles, construction within areas already covered by permits of others (i.e. developers), or any maintenance/construction activities that result in a disturbed area of less than 20 square yards, the submittal of sediment and erosion control plans will not be required, but KUB will utilize the appropriate BMPs from the City of Knoxville Best Management Practices Manual to prevent sediment from entering the City's stormwater system. As an alternative to the City BMPs, KUB may develop and submit BMPs related to its construction activities for consideration by the City.

New Construction Projects: New construction projects will require project plan sets that include a site specific erosion and sediment control plan stamped by an engineer authorized in the State of Tennessee and complying with the Tennessee Erosion and Sediment Control Handbook Second Edition dated March 2002 and all subsequent updates.

KUB will submit plans at least twelve (12) calendar days prior to the construction start date. City will provide written comments within seven (7) business days of receipt. Once all comments or any additional concerns raised by the City are resolved, KUB may begin work after the erosion and sediment control facilities are installed. If KUB receives no comments within the seven (7) business day period, KUB may proceed with the work.



**Fees**

KUB shall continue its current practice for payment of fees related to the Right-of-Way and Traffic Control permits.

KUB shall pay a fee for all new construction where sediment and erosion control plans are not required by TDEC but are submitted to the City for review and comment. KUB will pay \$1.00 per linear foot (based on the length of the project) with a minimum of \$100.00 and a maximum of \$750.00 per project.

KUB shall not pay any Site Development fees for any work defined above as Emergency or Other.

KUB shall not pay any Site Development fees for any work where KUB has obtained and paid fees for work as a part of the City's Right-of-Way Permit.

**Notification**

KUB will continue its current notification practices to the City related to work associated with Right-of-Way Permits.

With regard to immediate notification of work related to main breaks and emergency excavation, to the extent possible, the City will utilize the notification that results from KUB's emergency locate request to Tennessee One Call. Additionally, KUB will notify the City directly before activity begins on emergency repairs when KUB determines running water is leaving the emergency repair site. Additionally, on all activities related to emergency repairs, routine maintenance, and service line installation, KUB will notify the City when it determines the activity will result in a disturbed area of twenty (20) square yards or more unless notice has previously been given. On new construction projects not requiring temporary Traffic Control permits, KUB will notify the City two (2) business days in advance of initial construction activities.



IN THE CIRCUIT COURT FOR KNOX COUNTY, TENNESSEE

KNOXVILLE UTILITIES BOARD,

Plaintiff,

vs.

No: 3-292-03

and

No. 3-605-03

THE CITY OF KNOXVILLE, TENNESSEE  
and THE CITY OF KNOXVILLE BOARD  
OF ENVIRONMENTAL APPEALS, consisting  
of Nancy Roberts, Chairperson, Tim Wheeler,  
Marvin Lowery, and Lisa Beard,

Defendants.

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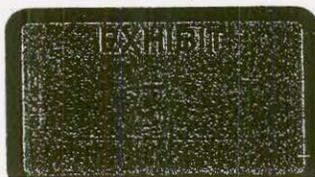
AGREED ORDER TO DISMISS WITHOUT PREJUDICE

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Upon the joint motion of the parties and upon a showing to the Court that all matters in controversy between them have been compromised, resolved, or otherwise settled, it is hereby ORDERED that the claims between the parties in this cause be dismissed without prejudice as to any party and that the actual court costs shall be taxed equally to the parties herein.

ENTER this the \_\_\_\_\_ day of \_\_\_\_\_, 2004.

\_\_\_\_\_  
THE HONORABLE WHEELER A. ROSENBALM



APPROVED FOR ENTRY:

W. MORRIS KIZER  
City Law Director  
699 City-County Building  
400 Main Avenue  
Knoxville, Tennessee 37902

J. MICHAEL HAYNES (BPR # 001344)  
J. WILLIAM COLEY (BPR # 011442)  
Attorneys for Knoxville Utilities Board  
617 West Main Street  
Post Office Box 869  
Knoxville, Tennessee 37901-0869  
(865) 292-2307

**CERTIFICATE OF SERVICE**

I certify that a true and exact copy of the foregoing has been served upon the following counsel of record by delivering a copy to the offices of said counsel or by placing a copy in the United States mail, addressed to counsel at his/her office, with sufficient postage thereon to carry same to its destination:

Mark Jendrek, Esq.  
800 South Gay Street, Suite 1910  
Knoxville, Tennessee 37929

This \_\_\_\_\_ day of \_\_\_\_\_, 2004.

**HODGES, DOUGHTY & CARSON, PLLC**

By: \_\_\_\_\_

J. Michael Haynes

**SUPPLEMENTAL MEMORANDUM OF UNDERSTANDING  
AND AGREEMENT**

This Memorandum of Understanding is made by and between the City of Knoxville, a municipal corporation organized and existing under the laws of the State of Tennessee ("City"), and Knoxville Utilities Board, a board created and existing under and by virtue of the Charter of the City of Knoxville, Tennessee ("KUB"), to assist the parties in meeting the requirements of their respective National Pollution Discharge Elimination System ("NPDES") permits, to resolve pending litigation and administrative appeals, and to provide a framework for cooperation that best meets the interests of the community relative to municipal separate storm sewer system and wastewater system issues.

**Obligations of Parties**

In consideration of the mutual promises and commitments contained in this Memorandum of Understanding and for other good and valuable consideration, the receipt of which is acknowledged by both parties, the City and KUB agree as follows:

1. KUB is required to report the occurrence of wastewater overflows (SSOs) from KUB's system to the State of Tennessee Department of Environment and Conservation ("TDEC"). In furtherance of the spirit of cooperation and communication fostered by this Memorandum of Understanding, KUB will contemporaneously provide the City by e-mail a copy of the SSO reports which it sends to TDEC of initial overflows and the follow-up notification of cleanup, including overflow volumes.
2. The City and KUB agree to designate representatives who will meet to discuss issues of concern related to the operation of the City's MS4 and KUB's wastewater system, including but not limited to SSOs, seepage, or other discharges from KUB's wastewater system, infiltration and inflow from and to the MS4 and the wastewater system, illicit connections to the MS4 or KUB's wastewater system, and any



other matter involving water quality and NPDES permit compliance as deemed appropriate by the City or KUB. These meetings will be undertaken as part of a cooperative effort between the City and KUB.

3. KUB encourages the City's input into KUB's wastewater planning processes as a part of the ongoing communication and cooperation contemplated by this Supplemental Memorandum of Understanding. Such input may include any areas of interest or concern that the City has identified, including the City's assessment of priorities and any other information or data that may be helpful. KUB will consider this information and will share with the City how it intends to address the issues identified. This communication will flow between the primary contact persons identified by the City and KUB.

4. It is the intent of KUB to be fully responsible for the operation of its wastewater system as provided by the Charter of the City of Knoxville and to protect and hold harmless the City, its Mayor, and any employee of the City from liability or damage caused by KUB's operation of its wastewater system. Therefore, to the extent permitted by law, KUB will be responsible, hold harmless, defend at its cost, and make whole the City, its Mayor, and any employee of the City who incurs personal liability for any liability or damage incurred by the City or any such individual, to the extent that such liability or damage is caused by KUB's operations of its wastewater system, including but not limited to any unpermitted discharges.

Notwithstanding anything else to the contrary, the provisions of this section shall not be construed to alter the status of any party hereto or any third party under any applicable provisions of the Tennessee Governmental Tort Liability Act, as codified at Tenn. Code Ann. § 29-20-101, et seq. as it may be amended from time to time by act of the Legislature (the "Act"), it being the intent of this section not to waive, diminish, or

otherwise affect the statutory limits of liability, the statutory immunity, the extent of immunity, or any other provisions that may have been established for any party hereto under the Act.

It is the intent of the parties that the City and KUB will not, by virtue of the obligations provided by each party to the other party in this Agreement, assume toward any third party any liability that would exceed any liability that the City or KUB would have in the absence of this Agreement.

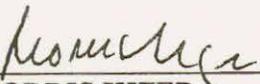
5. KUB is currently negotiating with the Environmental Protection Agency (“EPA”), TDEC, the Tennessee Clean Water Network (“TCWN”), and the City on issues relating to KUB’s wastewater system, including the wastewater collection system, over the terms of a proposed Consent Decree. KUB expects to spend significant amounts for capital improvement to its wastewater collection system over the next several years, which amounts are well in excess of the amounts represented by the combined pending penalty assessments against KUB by the City. Enforcement of the provisions of the Consent Decree will be carried out by both EPA and TDEC and will include regular and comprehensive reports by KUB to all regulatory agencies and an active monitoring by the agencies of the required rehabilitation, maintenance, and improvements of the KUB wastewater collection system.

6. In consideration of and recognition of the obligations which will be required of KUB under the Consent Decree, when entered, and the obligations established hereunder, all of which address the respective NPDES permit requirements of the City and KUB and the issues related thereto, and upon entry of a Consent Decree in the pending federal litigation, the City will withdraw and dismiss without prejudice all Notices of Violation and penalty assessments to date for discharges from KUB’s wastewater system to the MS4, including those pending before the Board of

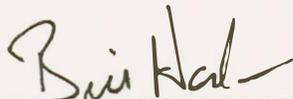
Environmental Appeals or Knox County Circuit Court, and will agree, to the extent permitted by TDEC and EPA, not to issue Notices of Violation or seek to enforce the penalties section of its stormwater and street ordinances against KUB for discharges from KUB's wastewater system for the life of said Consent Decree.

IN WITNESS WHEREOF, the City of Knoxville and Knoxville Utilities Board have caused this Memorandum of Understanding to be executed on the day and year written below.

APPROVED AS TO FORM:

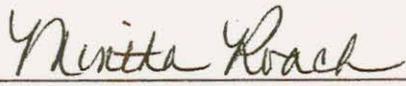
  
\_\_\_\_\_  
W. MORRIS KIZER  
City Law Director

City of Knoxville

By:   
\_\_\_\_\_  
BILL HASLAM  
Mayor

Date: 11/4/04

Knoxville Utilities Board

By:   
\_\_\_\_\_  
MINTHA ROACH  
President and Chief Executive Officer

Date: 11-4-04



## **APPENDIX F**

Summary of Pooper Scooper Distribution

**Distribution Locations for free Pooper Scoopers and the Pet Waste Educational Posters  
2003-2004**

	<b>Name</b>	<b>No.</b>	<b>Street</b>	<b>Zip</b>
1	Active Pets	6205	Chapman Hwy	37920
2	Adorable Pets	10420	Kingston Pike Suite D3	37922
3	Agri Feed & Pet Supply City	5716	Middlebrook Pike	
4	All Kreatures Pet Care	11132	Outlet Drive	37932
5	All Paws Veterinary Clinic	2799	Woods-Smith Rd	37921
6	Animal Spay And Neuter Clinic	2436	E Magnolia Ave	37917
7	Asheville Highway Animal Clinic	4516	Asheville Hwy	37914
8	Broadway Dog Salon	3127	N. Broadway St	37917
9	Broadway Veterinary Clinic	4207	N.Boradway St	37917
10	Butler Animal Clinic	7545	Oak Ridge Hwy	37931
11	Cedar Bluff Animal Clinic	9049	Middlebrook Pike	37922
12	Central Veterinary Hospital	1212	West Clinch Ave	37916
13	Companion Animal Hospital of Ftn City	2930	Tazewell Pike	37918
14	Critter Barn Pet Shop	2153	Sutherland Ave	
15	Crossings Animal Hospital & Laser Center	8705	Asheville Highway	37924
16	Dixon Animal Hospital	5400	Western Ave	37921
17	Dyer Animal Hospital	6400	Asheville Hwy	37924
18	Farragut Animal Hospital		Kingston Pike	37922
19	Forest Park Clinic for Cats & Dogs	318	N.Forest Park Blvd	37919
20	Fountain City Animal Hospital	5630	N.Boradway St	37918
21	Golda's Grooming Boutique	3869	Western Ave	37921
22	Groves Animal Hosptial	1439	Ebenezer Rd	37922
23	Karn's Animal Hospital - Mailing Address		P.O. Box 7218	37921
24	Karns Animal Hospital - Physical Address	7752	Oak Ridge Hwy	37931
25	Knoxville Animal Clinic	5312	Homberg Drive	37921
26	Luv-A-Pet	6208	Western Ave	37921
27	North Knox Vet Clinic	4700	Central Ave Pike	37912
28	Northshore Animal Hospital	9315	S. Northshore Dr	37922
29	Norwood Vet Clinic	2828	Merchants Dr	37912
30	Pampered Pets	5100	N. Broadway St	37918
31	Pellissippi Vet Hospital	1717	Schaeffer Rd	37932
32	Pet Supplies Plus	4856	Harvest Mill Way	37918
33	Pet Supplies Plus	7107	Kingston Pike	37919
34	Petsmart	214	Morrell Rd	37922
35	PetSafe Village	10424	Electric Ave	37932
36	Rocky Hill Animal Hospital	7656	S. Northshore Dr	37919
37	University of Tennessee Vet Clinic		UT Ag Campus	37902
38	Veterinary Medical Center	5009	Clinton Highway	37912
39	Veterinary Services	263	S. Peters Rd	37923
40	Volunteer Vet Hospital	3039	Alcoa Hwy	37920
41	Washington Pike Vet Hosptial	3400	Mill Road	37924
42	West Bearden Vet Hosptial	8706	Unicorn Dr	37923



# **APPENDIX G**

NPDES Permit Program Inventory Map  
(Attached separately)

### CLEAN WATER IS IMPORTANT TO ALL OF US

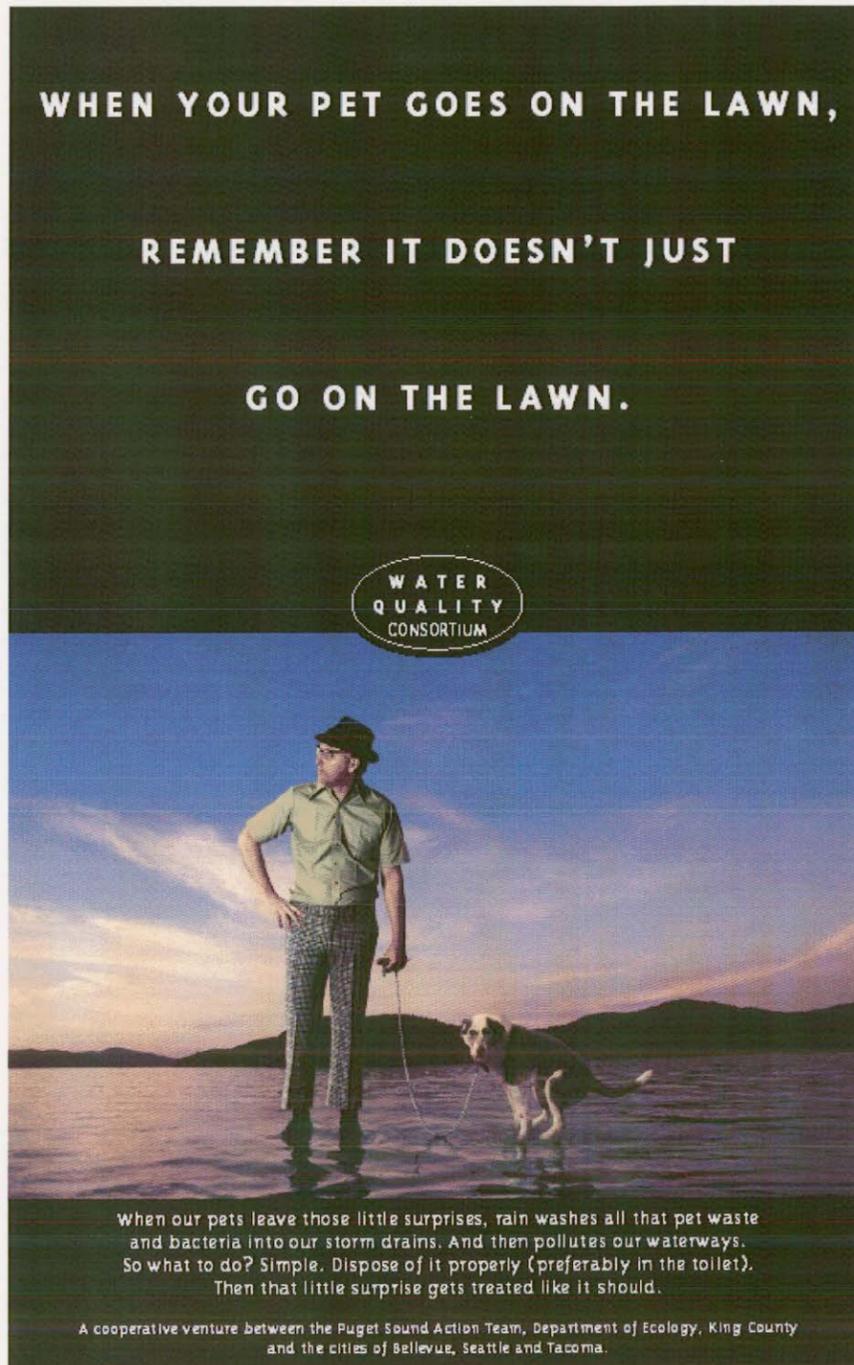
It's up to all of us to make it happen. In recent years sources of water pollution like industrial wastes from factories have been greatly reduced. Now, more than 60 percent of water pollution comes from things like cars leaking oil, fertilizers from farms and gardens, and failing septic tanks. All these sources add up to a big pollution problem. But each of us can do small things to help clean up our water too—and that adds up to a pollution solution!

### Why do we need clean water?

Having clean water is of primary importance for our health and economy. Clean water provides recreation, commercial opportunities, fish habitat, drinking water and adds beauty to our landscape. All of us benefit from clean water—and all of us have a role in getting and keeping our lakes, rivers, marine and ground waters clean.

### What's the problem with pet waste?

It's a health risk to pets and people, especially children. It's a nuisance in our neighborhoods. Pet waste is full of bacteria that can make people sick. If it's washed into the storm drain and ends up in a lake, stream or marine water, the bacteria ends up in shellfish. People who eat those shellfish can get very sick. The waste produced by dogs and cats in a city the size of Seattle is about what about 50,000 people (the towns of Farragut, Maryville and Alcoa combined) would produce. Unless people take care of it, the waste enters our water with no treatment. This information is brought to you by the Water Quality Consortium, a group of public agencies working together to reduce nonpoint water pollution through education. Partially funded by a Centennial Clean Water Fund grant from Washington State Department of Ecology.



**WHEN YOUR PET GOES ON THE LAWN,  
REMEMBER IT DOESN'T JUST  
GO ON THE LAWN.**

WATER  
QUALITY  
CONSORTIUM

When our pets leave those little surprises, rain washes all that pet waste and bacteria into our storm drains. And then pollutes our waterways. So what to do? Simple. Dispose of it properly (preferably in the toilet). Then that little surprise gets treated like it should.

A cooperative venture between the Puget Sound Action Team, Department of Ecology, King County and the cities of Bellevue, Seattle and Tacoma.

### CLEAN WATER TIPS: How can you get rid of pet waste and help keep our waters clean?

- Scoop it up and flush it down the toilet. That's best because then your community sewage treatment plant or your septic system treats the pet waste.
- Seal the waste in a plastic bag and throw it in the garbage.
- Bury small quantities in your yard where it can decompose slowly. Dig a hole one foot deep. Put three to four inches of waste at the bottom of the hole. Cover the waste with at least eight inches of soil. Bury the waste in several different locations in your yard and keep it away from vegetable gardens.
- Encourage your friends and neighbors to pick up after their pets.
- To find out more about the problems of pet waste and what you can do to prevent water pollution, call the City of Knoxville Stormwater Management at 215-2148 or visit [www.cityofknoxville.org/engineering](http://www.cityofknoxville.org/engineering)
- Report water pollution to the City of Knoxville Water Quality Hotline at 215-4147.
- Volunteer at [www.waterqualityforum.org](http://www.waterqualityforum.org)



**The entire inventory map is not reproduced as part of the online version of the Year 8 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.**