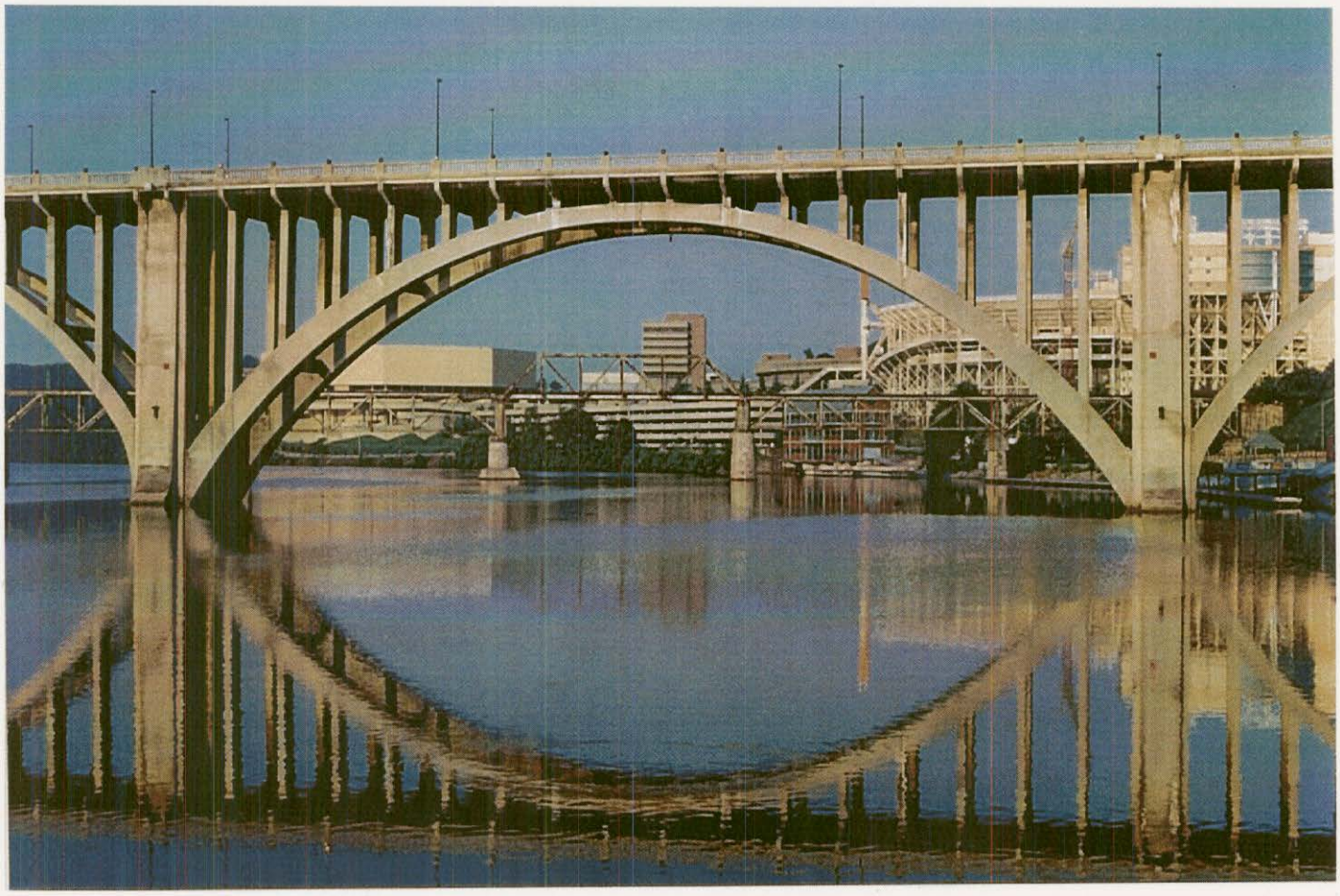
THE CITY OF KNOXVILLE
TENNESSEE

NPDES Permit Annual Report



CITY OF KNOXVILLE
BILL HASLAM, MAYOR

National Pollutant Discharge Elimination System
Stormwater Discharge Permit TNS068055
July 1, 2004 - June 30, 2005

Signature and Certification

NPDES STORMWATER PERMIT TNS068055
2004/2005 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 — 12-29-05 — Date

Dave Hill, COO
Senior Director, Operations & Engineering — 12/29/05 — 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 current 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. This annual report was completed in accordance with the reporting requirements of Part VI of the permit and will complete the requirements for the first permit year from July 1, 2004 through June 30, 2005.

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

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3.0 STORMWATER MANAGEMENT PROGRAM (SWMP) EVALUATION

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

- Reaching agreeable terms for a new NPDES permit was a significant accomplishment to start off year one. The new permit realizes the evolution and maturity of the City's program and allows resources to be better focused on program elements that effectively protect water quality. One of the most significant additions to the new permit is the latitude to recognize enforcement actions from other agencies for discharges to the MS4.

- A new effort to educate City employees about pollution prevention was initiated this year. Employees from Fleet, Facility Services, Engineering, and Public Service watched an 18 minute video training course that focuses on BMPs for municipal operations such as good housekeeping, spill response, materials storage and handling, landscape maintenance and street maintenance, and illicit discharge detection. The City plans to educate all employees that work outside or near municipal industrial operations.

- Phase 1 of the riverbank restoration project at Holston River Park was completed last year. This project was a partnership with the University of Tennessee. The City removed invasive plants while UT students planted native plants on the riverbank.

- The City initiated a major improvement project on Third Creek that will restore over 8,000 feet of degraded and channelized stream. The TSMP project should reduce sediment, hydromodification and flooding while improving habitat, riparian zones and water quality. The City obtained letters of commitment from the private landowners and to provided information for the initial design. The City plans to partner with the TSMP to complete design and construction of the project in year two.

- The City of Knoxville continued to expand the greenways/buffers zones along the major waterways throughout the city. The City currently maintains 34.32 miles of trail distributed over 26 greenways. These linear parks help protect the adjacent waterways and provide opportunities for stream enhancements.

- The City successfully passed a TDEC inspection at the beginning of this permit year. The following five areas of improvement were identified and are included with the City's improvement plan for each item in this report:
    1. Additional inspections for small residential infill development – the Engineering Division will request additional funding for two new inspectors (CS-3, pp. 40-41),
    2. Maintain/repair stormwater treatment devices at the bus facility - the units were maintained in June 2005 and repaired in December 2005 (IN-2, pp. 33-34),
    3. Improve runoff from Loraine Street equipment storage lot – a contract has been let to install treatment BMPs the outfall for that facility (IN-2, p. 34),
    4. The Loraine Street car wash seemed short for large trucks and trailers – the City has funded improvement which are in design phase now (IN-2, p. 34),
    5. Improve industrial/commercial program inspections – an additional Stormwater Technician was added in March 2005 to perform additional education and inspections for industry and certain commercial areas (IN-2, pp. 31-32).

- 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.

- In November 2004, a consent decree to eliminate sewage overflows into Knoxville's creeks was finally reached with the largest local sewage utility in the Knoxville area. The agreement formalizes the commitment of the City and the utility to provide a safer and cleaner environment for the citizens of Knoxville and to 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 in the City's effort to improve Knoxville's surface waters.

During the first nine 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 nine 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 first 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

MONITORING TASKS WET/DRY WEATHER	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Repeat High Parameter Sites	20 Outfalls repeated from year six	Yes	31	Each outfall tested a t least four times this year
Field Screening Industrial Outfalls	Visits to Industrial outfalls	Yes	33	Continued retesting outfalls from Industrial areas (four times)
Total Field Screening Outfalls	High Parameter repeats + 30 to 40	Yes	150	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	1 sample	Full Suite sample obtained at Acker Place Monitoring Station.
Storms Sampled at 5 monitoring stations	1 storm / quarter / 5 sites	No	20 storms	Summer: 3 storms, Fall: 7 storms, Winter: 5 storms, Spring: 5 storms
Ambient Samples at 5 monitoring stations	1 sample / quarter / 5 sites	Yes	20 samples	Summer: 5 samples, Fall: 5 samples, Winter: 5 samples, Spring: 5 samples
Storm Drain Televised	As Needed	Yes	1,794 feet	Pipes are defined as sections between inlets, catch basins, junction boxes, or outlets.

STORMWATER MANAGEMENT & INDUSTRIAL PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Stormwater Quantity Requests for Service (Received / Resolved)	As Needed	Yes	530/423	Complaints are investigated as received and resolved as solutions or resources are available
Stormwater Quality Requests for Service (Received / Resolved)	As Needed	Yes	213/235	Complaints are investigated as received and resolved as solutions or resources are available
Site Develop Workshops	Annually	Yes	Over 90	Included Engineers, contractors, developers, & surveyors involved in land disturbing activities.
Stormwater GIS Field Investigations for Annexations	As Required	Yes	34	Newly annexed areas are investigated within 60 days for all storm drain features and possible pollution sources.

4.0 Stormwater Management Program Summary Table

STRUCTURAL CONTROLS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Street Cleaning	Daily/Bi-Weekly	Yes	22,113 Miles	Daily for downtown streets. Frequency varies for other streets.
Litter Pick-up, Hand	As Needed	Yes	126,121 Bags	Routine Schedule
Catch Basin Cleaning and Repair	As Needed	Yes	4,039 Jobs	Per work order and requests
Ditching: Hand, Truck, & Track/Gradall	As Needed	Yes	71,798 Feet	Per work order and requests
Storm Drain Installation & Repair	As Needed	Yes	202 Jobs	Per work order and requests
Brush & Leaf Pick-up	Bi-Weekly	Yes	14,408 Loads	Bi-Weekly curb pick-up
Seed/Sod, ROW	As Needed	Yes	0 Jobs	Per work order and requests
Storm Drain Cleaning	As Needed	Yes	34,774 Feet	Per work order and requests
Grate Replacement	As Needed	Yes	74 Jobs	As Needed
Field Inventory & Inspection of On-Site Detention Facilities	Within 60 Months	Yes	As needed	All new facilities are mapped after construction is complete. Existing facility's inventory is complete.
Creek Cleaning by Creek Restoration Crew	As Needed	Yes	154 Jobs	Creeks are inspected and cleaned on a routine schedule
Tree and Plant Planting	When Applicable	Yes	457 trees	Trees were planted by the City's Service Department
Total Waste Recycled	As Brought In	Yes	40,438 tons	5,486 tons of paper, metal, plastic, glass, etc. and over 33,085 tons of yard wastes

4.0 Stormwater Management Program Summary Table

EDUCATIONAL PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Publicize Hotline Number	Within 24 Months	Yes	Undetermined	Hotline 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.	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.	Disposable dog waste containers were distributed to veterinary clinics and pet stores.

NEW DEVELOPMENT PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
New Development Inspections	As Required	Yes	Approx.	As Required
Building Permits Issued	As Required	Yes	561	As Required
Site Development Permits Issued	As Required	Yes	128	As Required
Right of Way Permits Investigated	As Required	Yes	22	As Required
Citizen Concerns Investigated	As Required	Yes	Approx.	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 plus an additional section for specific TMDL activities. 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 Comprehensive Monitoring Program (MN).
5.6 TMDL Implementation and Activities.

Each of the above programs are further divided into separate program elements and related tasks that correspond to the Implementation Schedules listed in Part IV of the Permit and to the requirements listed in 40 CFR 122.26(d)(2)(iv). Each specific task is briefly discussed in accordance with the reporting guidelines outlined in Part VI of the NPDES Permit. Some sections of this report may be an abbreviated version of earlier reports when the particular task elements are ongoing. Changes for the new permit cycle 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 crews may work in some of those areas to remove blockages, spills, and trash with permission or in emergencies.

Maintenance by the City within rights-of-way and easements is normally performed on an as-needed basis by the PSD. Approximately 75 percent of the storm drainage system maintenance work performed by the PSD is in response to direct calls from property owners 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: Develop Improved Stream Restoration and Channel Maintenance Program.

Status: Complete

Stream restoration and channel maintenance were addressed with two new programs during the first permit cycle. These programs included stream bank stabilization projects to reduce erosion and sediment and a creek restoration crew to remove litter, debris, and flow blockages. The City has improved this program by providing an annual grant to the Tennessee Izaak Walton League for removing debris and blockages on the major urban creeks. The summary report for the TN IWL's efforts are included in appendix of this report. 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 require assistance by heavy equipment. The City properly disposes all of the trash and debris.

With the addition of the Izaak Walton League's work in the creeks, the 4-person Creek Restoration Crew that was added to the Public Service Department in 1996 will now be able to focus their attention on the maintaining the stormdrain system as the Stormwater Maintenance Crew. Obviously, the crew will still respond on a work order basis for work in the creek when needed. This new division of responsibilities has proven to be an improvement over the initial program that was created in the first permit term. The crew still has access to a knuckle boom and a single-axle dump truck for performing their work. The crew has been trained and is used to assist with illicit discharge investigations in the MS4.

In the first nine years of the City's permit program, 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, hydromodification, and habitat alteration are the most common impairments in our urban creeks, the City will continue to focus on stream restoration projects where possible 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.

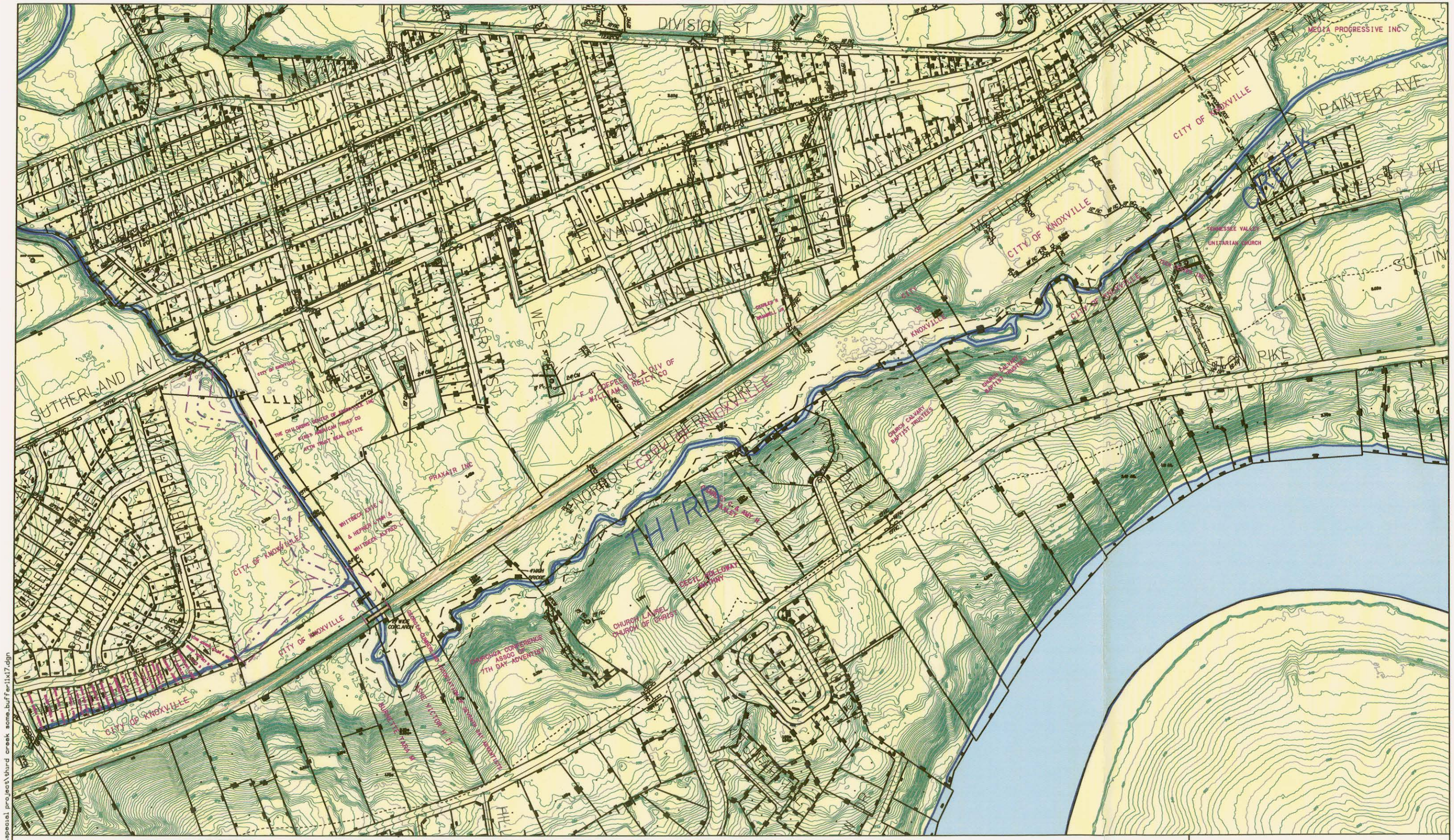
SWMP Task: Implement Improved Stream Restoration and Channel Maintenance Program.

Status: Complete

The City has completed some initial flood control projects in the upper portion of First Creek. The photo to the right was taken after the new grass was established on the newly stabilized creek bank and improved high-flow bench. The design for the lower sections of the First Creek project will include the same concept for stabilizing the low-flow channel and creating access to the floodplain. Stream improvements and watershed modeling in First Creek will continue to be a priority in the next year. One million dollars is budgeted in the 2005/2006 fiscal year to continue improvements in First Creek.

A major improvement project on Third Creek was initiated by the City this year to restore over 8,000 feet of degraded and channelized stream. The proposal for restoration project was made to the Tennessee Stream Mitigation Program in year one and was accepted. The TSMP project should reduce sediment, hydromodification and flooding while improving habitat, riparian zones and water quality. The City obtained letters of commitment from the private landowners and provided information for the initial design. The City owns the largest portion of property, which will be impacted by the restoration project. The TSMP is expected to complete design and construction of the project in year two with assistance from the City. A map of the concept plan has been included on the following page. The first section of creek below Sutherland Avenue will be significantly improved by restoring the original meanders. The 90-degree bend will be smoothed out and the entire reach stabilized. Upon completion the stream will be protected with a 100' wide conservation easement.

Opportunities to implement large-scale restoration projects such as the First Creek and Third Creek projects may not be feasible every year. However, the City will continue to focus when feasible on large projects, which may produce significant and measurable impacts.



LEGEND

- PROPERTY OWNERS
- Proposed Buffer Zone
- Proposed Creek

THIRD CREEK

11-28 -2005

Scale: 1 In = 400 ft

CITY OF KNOXVILLE
DEPARTMENT OF OPERATIONS
STORMWATER DIVISION

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

Since the summer of 1999, the City has coordinated with TVA, UTK, TDEC, USACOE, the Isaac Walton League (IWL), Keep 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 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.

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 will continue to fund replacement of the skimmers (left) as long as they remain effective. The City has contracted with the IWL to maintain a "Litter Free Zone" from the South Knoxville Bridge to the Alcoa Highway Bridge. Although the focus of this initiative has largely been to reduce unsightly trash from entering the river, the floating trash skimmers at the mouths of the creeks have also effectively detained oil spills until remediation personnel could respond. According to the IWL, the booms have successfully prevented tons of floating material that would otherwise have been discharged from the creeks into the river. All of the trash skimmers have been purchased with penalty funds collected from polluters.

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

Since 1997, permanent maintenance agreements and/or covenants have been required for all new stormwater detention facilities and special pollution abatement devices (i.e. oil/water separators). 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", which does not require the Mayor's signature. The end result for water quality protection is the same. 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 to insure that the stormwater facilities are properly maintained, however, the responsibility for the maintenance of stormwater facilities will remain with the property owner unless legally transferred to another person or entity by a properly recorded legal agreement. If the property owner does not maintain the facility properly, the City may authorize the maintenance to be completed and place a lien against the property for double the cost. To ensure access to the facility, a traversable access easement is recorded on the plat.

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

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

Sediment from the maintenance of detention/water quality ponds, treatment devices, or from stream restoration activities must be removed from the stormwater facility and disposed properly in a landfill classified for such material or used as fill outside the stormwater drainage system. The City does not propose to duplicate TDEC's efforts to regulate contaminated sediments from any stormwater management sources.

RC-2 Planning for New Development

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

The City of Knoxville revised the Stormwater and Street Ordinance again during year one of this permit. The ordinance is included in appendix of this report and may also be accessed on the City's web page at 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;

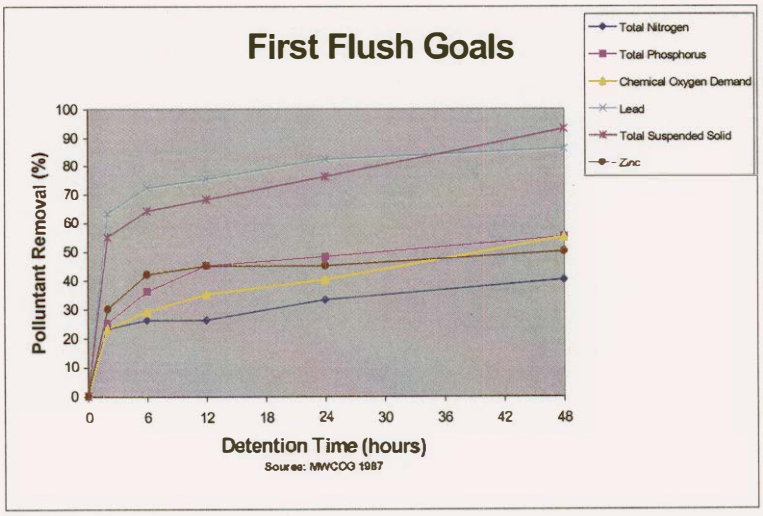
(3) Large single-family or duplex residential developments of five (5) acres or more of disturbed area or five (5) lots or more;

(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.

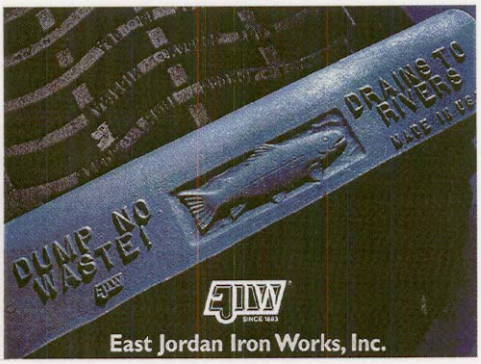
After implementing the illicit discharge program for a few years, some of these land uses were added when they proved to be common hotspots for pollution. The pollution is typically caused by illicit dumping/discharges from employees and contractors or from an increased volume of vehicle traffic. The 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.

The ordinance also requires protective 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 low-flow channel of the creek. The width required for the buffer depends on 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.

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

In January 2000, the City set a new standard to require a "No Dumping" message to be cast in all new curb irons and solid stormwater catch basin covers. The following year, the City included covers for stormwater treatment devices in this requirement. The message is an attempt to educate the public that our stormdrain system is not a sewer for their waste. When polluters are caught discharging or dumping pollutants into the stormdrain, such as the draining oil filters in the photo above, they often plead ignorance to the fact that the stormdrain is directly connected to the creeks. After using stencils and plastic curb



markers for years, the City decided to halt the growing number of curb irons that needed the temporary markers by requiring the permanently cast message.

Before setting the standard, the City contacted the major foundries to be sure they could manufacture the new irons and remain competitive in Knoxville. East Jordon Iron Works, NEENAH, John Bouchard & Sons, Acheson, and Deeter are the primary foundries that provide irons in Tennessee. Each of the foundries could provide the new pattern without any additional cost to the development community. Since there was no additional cost for the messages and the message will never need to be replaced unlike the plastic markers or stencils, this new standard may be the most cost effective educational program in the City.

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

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

The City only owns and maintains three regional detention facilities. Those facilities include the detention pond at the Acker Place development, the detention pond located at the Northwest Crossing shopping center on Clinton Highway, and the retention pond at Victor Ashe Park. However, private developers built regional ponds last year for several developments that have drainage areas well over 50 acres. Examples of private regional ponds include Colonial Pinnacle, Century Park, Fox Creek, and Weatherstone.

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

The City has successfully completed a comprehensive BMP manual during the first permit term. The manual may be accessed at www.cityofknoxville.org/engineering 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 are typically distributed during the new development seminars each spring. 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. Several other municipalities have obtained electronic copies of the Knoxville BMP manual for edit and adoption in their community.

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

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

Status: Ongoing

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

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

Status: Complete

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

The Public Service Division evaluated the snow removal activities and materials and revised the Snow Removal Plan in November 2002. The City has been able to significantly reduce the quantity of deicing materials used by improved equipment, chemicals, and operator training. The City will continue to look for opportunities to minimize the use of deicing materials to reduce costs and protect the environment.

RC-4 Evaluation of Flood Management Projects

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

The City only owns and maintains three regional detention facilities. Those facilities include the detention pond adjacent to Middlebrook Pike and Weisgarber Road at the Acker Place development, the detention pond located at the Northwest Crossing shopping center on Clinton Highway, and the regional retention pond at Victor Ashe Park. Although the regional basins were designed for flood control, the City found that it was possible to retrofit 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 Wal-Mart, Lowe's, 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 (www.crystalstream.com) were installed. The units have effectively removed large amounts of trash, sediment, hydrocarbons and organic material from the runoff and prevented the discharge of those pollutants into the receiving stream.

The retention pond at Victor Ashe Park was designed and built with water quality in mind. Three Crystal Stream stormwater treatment vaults were installed to improve the quality of the stormwater runoff from the contributing parking lots, park, and subdivisions.

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

During the last nine 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 possible improvements to existing public education program as part of the illicit connection and improper disposal program. Educate City staff, public, etc.

Status: Ongoing.

Public education programs for pesticides, herbicides, and fertilizer use have already been implemented in conjunction with City public education programs for collection and recycling of household hazardous waste. 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/ offers two BMPs for proper pesticide, herbicide, and fertilizer use and disposal. The BMP AM-13 is targeted towards institutional and commercial applications while the BMP RH-05 is directed towards residential and homeowner uses.

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

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

Status: Ongoing.

Pesticides, herbicides, and fertilizer used by the City are stored in a building at the Loraine Street Operations Center. This building is in compliance with all regulations regarding the storage of hazardous materials. The Horticulture and Grounds Maintenance section of the PSD is responsible for the application of pesticides, herbicides, and fertilizer. The herbicide "Roundup" is applied annually to City parks and rights-of-way to control unwanted weed growth. PSD personnel, who have been 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.

5.2 ILLICIT DISCHARGES AND IMPROPER DISPOSAL PROGRAM

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

ILL-1 Ordinances.

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

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

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

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

Exemptions to the non-stormwater prohibition are listed in the ordinance in accordance with the list in 40 CFR 122.26(d)(2)(iv)(B)(1). The City added language to the exemption for individual car washing on residential property to include fund-raising washes by non-profit organizations for no more than two consecutive days in duration. The City has reevaluated these exemptions allowed in the CFR but did not make any changes to the current list in the ordinance.

ILL-2 Field Screening

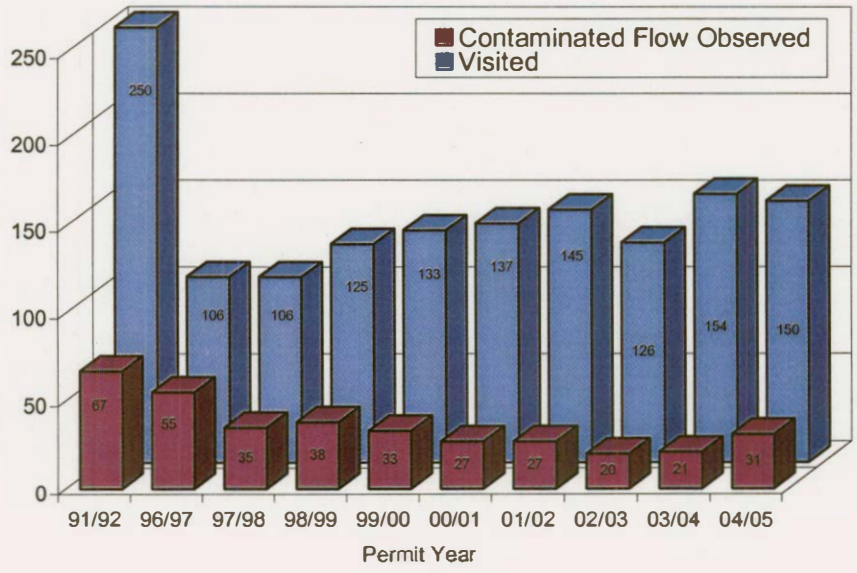
SWMP Task: Perform follow-up analysis at all high-risk screening sites. Status: Ongoing.

The Dry-Weather Screening Program was developed and implemented during the first permit term to evaluate both randomly chosen outfalls and high-risk outfalls, which were tested during the previous year. Each high-risk stormwater outfall was checked for flow after a period of dry weather. If flow was present, the discharge was tested with a Chemetrics colorimetric field test kit (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.

Number of Dry Weather Screening Sites



As illustrated by the bar graph, the percentage of high-risk outfalls decreased each year between 1991 and 2002. Since then the number of high-risk outfalls detected have slightly increased. The number of high-risk outfalls that need to be retested each year will obviously vary depending on the tested results of the previous year.

As required by Part VI (A)(2)(f)(ii) of the NPDES permit, the results of the dry-weather screening are included in the appendix of this report. Of the 5,239 outfall visits since the beginning of the program, flow from the outfall was only observed during 1480 of those visits. The results from each of the 1480 screenings are tabulated in our database by outfall identification number, testing date, and visit number. The testing results from the outfall screenings that occurred during the last permit year are included in the appendix of this report.

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

To insure that all outfalls are eventually tested each permit cycle, the City will continue to monitor a minimum of 150 outfalls each year throughout the new permit term. Last year the City did visit 150 outfalls four times each. The monitored outfalls consisted of the previous year's 21 high-risk outfall sites plus 129 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 may be resolved with education or enforcement.

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

ILL-3 Investigation of the Storm Drain System

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

The procedures for mapping, field surveys and upstream source identification were developed and included in the Part II Application section 5.3.5. These procedures were adopted as policy and successfully implemented during the first permit term. The City will continue to utilize these procedures to maintain the effectiveness of the Illicit Discharge and Illegal Dumping Program. These updated procedures were included for the Division's review in monitoring section 6.1.3 of the first annual report in 1997. Last year there were no updates to report for this procedure. If the procedure is updated, it will be included in the following annual report.

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

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

Depending on the violation, a first-time offender is usually educated and asked to remediate the damage or correct the violation if possible. This is usually followed up with a letter to inform the violator of the City's expectations and to provide helpful BMPs to prevent future problems. More severe or repeated violations will merit a Notice of Violation (NOV), which is issued in the field directly to the violator if available on site. Copies of the NOV are distributed to the property owner or developer by certified mail, the City Law Department, and the Engineering Division's file. The NOV may order specific remedies and require the violator to submit reports and/or pollution prevention plans. Penalties, if any, are only issued after the NOV expires so the violation and remedies may be fully evaluated.

In the event that a penalty is assessed, a violator may appeal the penalty before a five-member Environmental Appeals Board. The five volunteer members of the Environmental Appeals Board are appointed by the Mayor and 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 serve a 5-year term and may be re-appointed at the end of their term.

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

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

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

The City is dedicated to updating and maintaining reliable stormdrain data on the GIS. This task is implemented by a concerted effort within the Engineering Division. All employees are instructed to submit their completed stormwater work orders to a designated GIS analyst for the purpose of updating the GIS stormwater layer. That same analyst personally inspects all new annexations to insure that all existing stormdrain features are added to the system shortly after the parcel becomes part of the city. All new developments require a development certification submitted by a design professional upon completion. The analyst in the stormwater quality group records the stormdrain features from the development certifications into the GIS. Field personnel are instructed to log and report any discrepancies that are found between the maps and actual system in the field. The GIS analyst is responsible for completing the proper updates.

During the first permit term, the GIS analyst and two engineering interns began to systematically inspect the entire stormdrain system by grid to find and correct the parts of the stormwater GIS layer that may be in error. Now that much of this work has been verified and the procedures for maintaining accurate data are in place, the grid-by-grid investigations will be conducted as needed or as part of specific updates for areas of significant development. Because maintaining the integrity of the GIS via field verification is extremely time-consuming, it is reasonable to believe this will be an ongoing task.

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 continued to coordinate with both the KERT and TDEC during emergency situations. Each agency has

specific roles to play during an emergency event. When discharges enter the MS4, the City's Stormwater Quality Section assists with information gathering, investigations, GIS support, containment, remediation, follow-up monitoring, and enforcement when necessary.

The Knoxville- Knox County Emergency Management Agency (KEMA) and 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 and a Hazardous Materials truck in one fire hall to assist with spills and signification discharges into the river, creeks or stormdrains.

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

Last year, the Stormwater after-hours staff responded to assist the Fire Department with a variety of spills including several traffic accidents that lost fuel, one illegal dumping by motorist, and two fuel releases from permanent facilities. The small releases from accidents and illegal dumping were contained on the surface by the Fire Department. Stormwater management staff adsorbed the fuel that entered the MS4 in by placing adsorbent pads in the catch basins and at the outfalls. Stormwater staff and/or Service Department will remove and dispose of the materials from the small spills. Larger spills are typically referred to a private remediation company.

One of the two major fuel releases that occurred after hours last year was from a tank farm on Third Creek in November 2004. The Third Creek release occurred and was contained on a Sunday but remediation lasted for at least two weeks. The City responded with adsorbent boom barriers to be placed just downstream of the outlet pipe (photo top right). Stormwater staff did not assist with the actual remediation since the tank farm had already contracted for multiple firms to complete that work. The City did help locate the extent of the spill and locate the appropriate locations for in-stream barriers (bottom right). The remediation companies used vacuum trucks to remove free product from the pools and adsorbents behind the barriers. Leafblowers were used to blow the fuel to the next downstream barrier where it would be removed. The Stormwater staff monitored the project until remediation was complete.

The other significant release was reported on a Saturday in March 2005. Since the discharge was initially observed entering the city from the county, Rural Metro responded and placed a boom in a tributary to Turkey Creek West of Lovell Road. The City of Knoxville responded since the fuel had already entered the city limits at the Turkey Creek wetlands just South of I-40. Since the TN Izaak Walton League (IWL) has accepted a role as stewards of the Turkey Creek wetlands, they assisted with containment and remediation. For the next two weeks, Stormwater staff and the IWL replaced booms and removed soaked absorbents as the product continued to leach from the banks upstream. Three separate skimmers were maintained to capture the majority of the fuel. The City paid for the disposed the barrels of used remediation materials and product since our investigation did not produce a willing suspect immediately. Stormwater staff did investigate the industries in the county directly upstream of the spill. Since the suspect identified was located in the county outside the jurisdiction of City staff, TDEC was asked to investigate. The Division of Underground Storage Tanks successfully obtained evidence of the leak from the suspected truck stop. The responsible company reimbursed the City for time, materials, and disposal cost.

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: Continue to maintain and monitor the "Water Quality Hotline" for public reporting. Status: Ongoing.

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

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

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

The Water Quality Hotline is a dedicated phone line attached to a phone in the Stormwater 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.

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

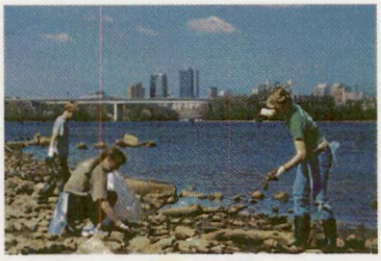
The City includes the hotline number in thousands of mass produced stormwater pollution prevention educational handouts such as magnets, brochures, presentations, business cards, and routine correspondence with residents. The hotline is prominently displayed at the bottom of the Second Creek watershed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

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

SWMP Task: Maintain public education program. Status: Ongoing.

River Rescue

The year 2005 was the 16th year for the River Rescue. The spring 2005 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 41 sites or "zones" that stretch from the forks of the river above Knoxville to Fort Loudoun Dam. River Rescue is also held in partnership with Lake User groups on Watts Bar Lake, Melton Hill Lake, and the Clinch River. Ijams Water Quality Specialists plan for this event throughout the year by recruiting volunteers, surveying riverbank conditions, securing additional sponsors, and pinpointing areas in need of cleanup.



Operation Storm Drain

The Blue Thumb Coalition started this ongoing program in 1994 in an effort to educate the public that there is a difference between the stormdrain system and the sanitary sewer.

Operation Storm Drain attempts to reduce the amount of pollutants dumped into our waterways through education instead of enforcement.

The message "DUMP NO WASTE, DRAINS TO STREAM" was stenciled on over ten thousand storm drains earlier in the first permit term. In the last few years, the City replaced the stenciling program with plastic 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. A local company recently revised the disks to include the Water Quality Hotline phone number and some Spanish text. Self-adhesive backing also helps volunteers place the disks quickly.

In January 2000, a permanent version of this educational program was initiated. The City has adopted a new development standard for all new curb irons and solid stormwater manhole covers (see task in RC-2). 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

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

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

- Characterizing the school's watershed using, at minimum, two AAW characterization tools

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

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

Adopt-A-Stream

The City of Knoxville, in conjunction with Knox County and The Town of Farragut is in the fourth year of administering the Adopt-A-Stream program. In the past fiscal year we have trained 17 Adopters and nine volunteer coordinators in the AAS program. Five of these adopters have adopted three stretches of creeks inside the City of Knoxville. They have performed over 12 creek clean-ups and other evaluation and education programs on their section 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)

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 October. The projected collected tons of trash from Goose Creek in Mary Vestal Park and educated hundreds of volunteers.

Stock Creek Watershed Initiative

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

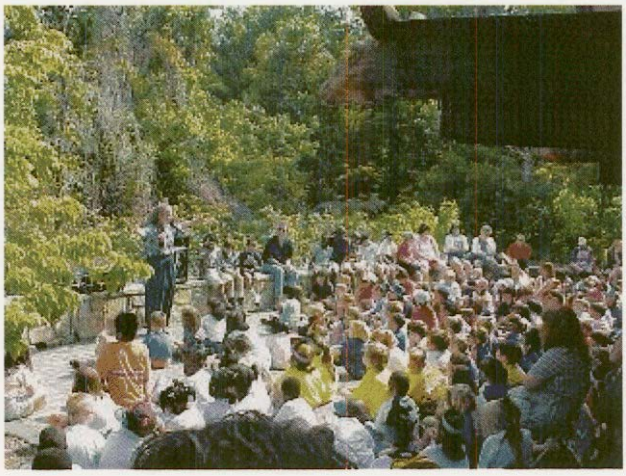
stakeholders in a participatory planning process and write a watershed restoration plan for Stock Creek. This plan will be based on EPA's Nine Components of Watershed Plans and the Center for Watershed Protection's (CWP) Eight Tools of Watershed Protection.

Public Displays And Presentations

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, Park-at-the-Park, and Earth Day Celebration. Various environmental presentations were also made to citizens through groups such as the Kiwanis Club, Boy Scouts, and University classes.

WaterFest

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



On the day of this event, WQF partners come together to make WaterFest happen. The CAC AmeriCorps Team takes the lead in conducting games, arts and crafts and model-building activities with the students. Storytellers and musicians engage students in audience participation performances and forum partners run informational/demonstration booths. Local high school and university students provide great volunteer support.

Warning Signs

In compliance with the new bacteria TMDL, the city installed eight improved warning signs along the creeks, which are on the 303(d) list for bacteria. Seventeen additional sites have been slated to receive warning signs within the next permit year. The locations for the placement of the new signs will focus on public parks, greenways, schools, and other places with easy public access. The warning signs include the prominent warning, a list of possible sources, and a phone number to report problems or obtain more information.

City Employee Training

The City purchased a stormwater pollution prevention video from Excal Visual to train City employees. The eighteen-minute long video outlines BMPs for stormwater pollution

prevention and has been shown to City employees in three different departments. The employee training will be expanded to other departments throughout the permit term. To learn more about the video, go to www.excalvisual.com.

ILL-6 Used Oil & Toxic Materials Program

SWMP Task: Continue coordination of Recycling Program. Status: Ongoing.

The Solid Waste Division manages the City of Knoxville's recycling program. The entire annual report of these programs is included in the appendix of this report.

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.

5.3 THE INDUSTRIAL AND RELATED FACILITIES PROGRAM (IN).

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

IN-1 Ordinances

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

The Stormwater and Street Ordinance was developed in 1996 to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new and redevelopment. The ordinance was updated this year but 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.

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 except those discharges pursuant to a valid NPDES permit, firefighting, or specifically exempted in the ordinance. The exemptions were copied directly from the list of possible exemptions in the CFR with the addition of charitable car washes for no longer than two days duration. This definition, along with the $5,000 penalty for violations, has formed the cornerstone of our successful enforcement program and will remain in place throughout the permit term.

IN-2 Inspection Element

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

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

In past years, the City had benefited from industrial inspections that were performed by another agency during their pre-treatment inspections. The City had proposed but had not replaced that program entirely with an alternate program to be performed by City staff. This deficiency was identified during the TDEC NPDES permit inspection conducted in July 2004. In response to the audit, the City added a new Stormwater Technician to perform additional education and inspections for industry and certain commercial areas. The new technician started

work in March 2005 and completed 50 industrial and commercial facility inspections on sites that currently have a Special Pollution Abatement Permit (SPAP). These facilities are required to have some type of structural stormwater treatment device (i.e., oil/water separators, catch basin insets, sand filters, grass swales, etc.) in addition to their pollution prevention management controls. During the SPAP inspection, the City reviewed the facilities maintenance records, provided technical advice on proper maintenance scheduling, recorded the devices co-ordinance using GPS, and updated the City's industrial and commercial facilities database. A complete list of the facilities that were inspected during this permit year can be found in the appendix. Inspection of the SPAP permitted facilities will occur systematically to insure that the structural controls are maintained and the management controls are being followed.

In addition to inspections of sites that have SPAPs, the City will select for inspection some existing sites that were built before the SPAP program was implemented. These sites will be targeted for education rather than enforcement to bring the sites into compliance using proper BMPs from the City's manual. Other commercial site inspections will need to be performed in direct response to specific complaints from citizens or tips from the water quality hotline. The City will decide on a case-by-case basis whether this group of inspections will use education or enforcement to correct any problems found. In some cases, the old facility may be required to apply for a SPAP to correct violations.

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

Section 22.5-37 of the ordinance requires a Special Pollution Abatement Permit (SPAP) for certain land uses and Section RC-2 of this report provides more details on this program.

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

During year one, 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 a d 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.

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 a d 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.

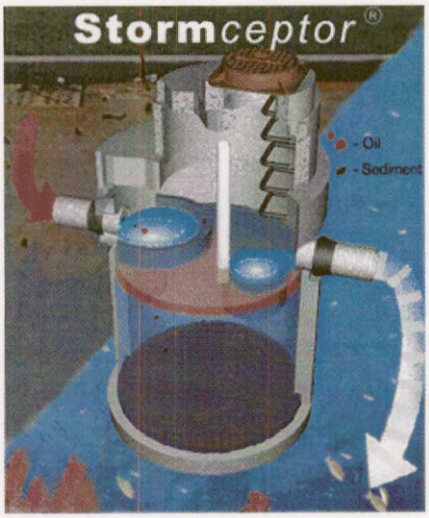
In addition to the illicit connection and improper disposal program inspections, the City routinely performs inspections at commercial and industrial sites through a random selection process using the MPC inventory of industrial space and in response to citizen concerns reported to the water quality 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 throughout the permit term.

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

During the first permit term, the City developed an inspection and pollution prevention program for municipal industrial facilities. Currently only 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 KAT bus station installed two large Stormceptor stormwater treatment devices 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 new slope directed away from the creek. The reversed slope and a large curb prevent the runoff from entering First creek directly. The runoff is now routed through the two oil/water separators before being discharged. Other measures at KAT include their commitment for ongoing upgrades to their fleet and fuels to produce less air and water pollution.

During the NPDES permit inspection conducted by

TDEC at the beginning of year one, the KAT facility was visited. After discussing the maintenance and repair of the structures, the KAT scheduled Enterprise Oil, Inc. to perform the necessary maintenance of both structures during year one. The largest structure near the intersection of Jessamine Street and First Creek appeared to be leaking water, which may prevent optimal performance. KAT contracted with a company to find and repair the leak. Although that repair was not performed until after year one had ended, it was completed before this report was written. The repair required a man to be lowered into the Stormceptor, find the leak, and plug the hole. The contractor found and documented a leaking lift hole. That lift hole was plugged with a series of materials to insure a permanent watertight seal. Rather than wait for another leak to develop, the City plans to enter both of the structures to apply a preventative seal on the remaining lift holes during year two. Since the City purchased these units, Stormceptor has started using embedded hooks instead of lift holes in their units.

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.

The TDEC inspection of the Loraine Street facility revealed two areas of concern. The large parking lot where all of the heavy equipment, truck, and trailers are parked receives a concentrated amount of oil/grease drippings, which may be washed into the storm drain system during rain events. The car wash facility did not seem long enough to adequately handle the longest truck/trailer combinations in the City fleet.

To improve the quality of stormwater runoff from the entire facility, a stormwater system retrofit project was designed to add two underground stormwater treatment structures at the outfall from the Loraine Street facility. The retrofit project will update the facility to comply with the new ordinance requirements for vehicle storage and maintenance facilities. By installing two treatment units in parallel, the City will be able to perform a full-scale efficiency study on more than one type of stormwater treatment BMP. Two different manufactures have agreed to donate their units for this impartial BMP testing project. Funding for the project was placed in the 2004-2005 budget. Monitoring should begin in year two immediately after installation is complete.

Capital funds for design and construction of the car wash extension project were approved for the 2005-2006 budget. The proposed project is to extend the roof over the wash bays a total of twenty feet each (ten foot on either side of the existing building). Additional trench drains will be installed on the perimeter to supplement the single drain in the center. All washwater will be routed to a grit chamber before discharging to the sanitary sewer. The project should be completed before the end of year two.

IN-3 Monitoring Element

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

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

If the City determines that additional data needs to be provided in the monitoring program for an industry (reports on additional parameters, etc.), requirements for an expanded program for subsequent monitoring events will be coordinated with TDEC and or the industrial discharger.

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

SWMP Task: Develop ongoing monitoring program at non-permitted commercial facilities using guidelines pursuant to 40 CFR 122.26(d)(2)(iv)(c)(2). Identify pollutants/sources as applicable. Status: Complete.

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 requirements through the SPAP program.

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 as the Stormwater & Streets ordinance is updated throughout the permit term.

To replace the monitoring by the City on specific permitted industries or industrial homogeneous land uses, the City has begun experimenting with some passive samplers on commercial sites that do not require TDEC or EPA permits. The land uses that require a City of Knoxville SPAP (see section RC-2) will be targeted for samples. The standard operating procedures for the City's wet-weather sampling program will be used except for the automatic sampler stations. The City fully expects to modify the passive samplers in the field as problems arise. At this point, a wide range of pollutants will be sampled from the hotspot land uses until a standard set of expected pollutants can be identified. These pollutants should vary from one land use to the other. For example, restaurants and grocery stores will likely have runoff containing a higher nutrient load from their dumpster/grease bin area than a new auto dealership. Both will likely have oil/grease, sediments, and metals from the vehicle traffic. This monitoring data may play an important role in determining the future direction of the SPAP program. Already some polluters and developers have questioned the validity and effectiveness of the SPAP controls.

SWMP Task: Implement the ongoing monitoring program at non-permitted commercial facilities and analyze the results from ongoing commercial monitoring program.
Schedule: Begin after 12 months.

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

The Stormwater & Streets ordinance Section 22A-54 states, *"The Director of Engineering may require any person engaging in any activity or owning any property, building or facility (including but not limited to a site of industrial activity) to undertake such reasonable monitoring of any discharge(s) to the stormwater system operated by the City and to furnish periodic reports of such discharges."* The City will maintain this legal authority to require monitoring from all facilities necessary if the Stormwater & Streets ordinance is updated in the next permit term. Additional monitoring may be required when a problem has occurred or still exists, when the City has reason to believe a pollution problem exists, when TDEC or EPA do not already require sufficient testing, or if the City is mandated to test and report those facilities.

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

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

controls. For example, the large Stormceptors that were installed at the bus terminal may be monitored with a before and after treatment sample to determine the removal efficiency of that BMP.

The Loraine Street facility will be the site for a full-scale side-by-side BMP investigation project. Before and after samples will be taken from each of the structural devices to determine the efficiency of each unit. Two different stormwater treatment device manufacturers have donated their BMPs for testing. The City plans to let a contract for installation of the test site in year two and begin sampling immediately after installation is complete. Obviously, the dry-weather screening program will continue to monitor these outfalls to insure that management controls are sufficient.

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

The monitoring program for the municipal industrial facilities was developed during the first permit term and 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 addition 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 one, 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. In addition to the dry-weather screening and BMP testing, wet-weather grab samples will continue to be collected from at least one facility per year.

5.4 CONSTRUCTION SITE RUNOFF PROGRAM (CS).

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

CS-1 Site Planning

SWMP Task: Review & update the Stormwater & Streets Ordinance which requires construction sites greater than 10,000 sq. ft. to submit Erosion and Sediment (E&S) Control Plans.

Status: Complete.

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

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

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 March 2002, or as amended by TDEC or its successor, or the City of Knoxville's Best Management Practices Manual, whichever is more restrictive.

SWMP Task: Review and update 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 at www.cityofknoxville.org/engineering/ldmanual as part of the Land Development manual.

SWMP Task: Continue Pre-construction Assistance Meetings with Developers and Contractors.

Status: Ongoing.

Since 1999, the City of Knoxville requires a Pre-construction Assistance Meeting with the Developer, contractors, design Engineers, and the City staff before a Site Development Permit is issued. This meeting is scheduled after the Site Development plans are ready for approval but before construction begins. The meeting insures that all parties involved with the construction project are equally aware of the City's expectations. Topics covered in the meeting

may include:

- The Development Inspection Checklist,
- The Stormwater & Streets Ordinance,
- The Engineering Department Enforcement Policy,
- Construction Best Management Practices,
- Inspection Schedules,
- State of Tennessee Erosion & Sediment Control Handbook,
- The City of Knoxville BMP manual,
- Special notes and considerations for the particular site,
- Other important information relevant to the project, and
- The City inspector, which is assigned to the project.

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

CS-2 BMP Requirements

SWMP Task: Require Construction BMPs from the City BMP manual or equivalent.
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 March 2002, or as amended by TDEC or its successor, or the City of Knoxville's Best Management Practices Manual, whichever is more restrictive. The requirement to use BMPs from the BMP manual or TDEC manual applies to Utility, Single Family Residential (>10,000 s.f), Large Residential and Commercial Developments.

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

The Stormwater and Street Ordinance section 22.5-22 authorizes the Engineering 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 Stormwater Section's web site at 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 post-development BMPs are constructed and maintained in the City, a standard maintenance covenant is executed before site development plans are permitted. The guidance criteria address the goals of the NPDES stormwater program by allowing only BMPs, which are effective in reducing the targeted pollutants.

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

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

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

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

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

CS-3 Inspection / Enforcement

SWMP Task: Continue expanded inspections to include smaller construction sites (single family). Status: Implement improved inspections by Year three.

In the first permit term, the City of Knoxville expanded new development construction inspections to include single-family residential sites. Implementation of this program has been problematic due to the nature of these sites. In fact, some of the inspections on the single in-fill sites may occur after the project is substantially complete or after a complaint has been filed. Since these sites are not grouped together like a subdivision, they typically require more time per lot to inspect when travel time is considered. The City's current staffing level does not allow scheduled inspections or the number of inspections that the larger commercial sites and subdivision sites receive.

During TDEC's inspection of the City's MS4 NPDES program in July 2004, the deficiencies of this program became apparent. The City had prioritized the inspection of the larger sites over the single lot sites due to the relative risk to the public, potential for erosion, and volume of sediment discharges. The Engineering Division has evaluated this issue and determined that increasing the priority of these inspections over the larger sites is not in the best

interest of the public, development community, or the environment. Therefore the Engineering Division will recommend that City Council approve funding for two additional inspectors in the budget year beginning July 1, 2006. If approved, the inspectors will be trained and scheduled to begin the inspection of single-family residential projects consistent with the City's ongoing inspections on the larger sites. Until additional staff can be added, the single-family residential sites will continue to be inspected as soon as possible or in response to complaints.

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

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

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

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

SWMP Task: Continue to require post-construction Development Certifications from licensed professional Engineers, and/or the appropriate design professionals before bond release to insure the stormwater facilities are built as planned. Status: Ongoing.

Since 1999, the City required all developments with a bond to submit to a post-construction Development Certification before the bond is released. A licensed professional Engineer and land surveyor must certify that the roads and stormwater features (quality & quantity) will function as intended. Some deviation from the permitted plan may be allowed during construction as long as the final project still meets the City's minimum requirements. If the final certified project does not meet the minimum requirements, further adjustments must be made before the entire bond is released to the developer. This program does require a second plan review by the Engineering Department after construction has finished to insure proper results in the field.

The Development Certification specifically requires the following components:

- As-built drawings
- Complete detention calculations
- Roadway inspection reports

- Final site inspection in accordance with checklist
- Verification that all stormwater quantity and quality facilities are covered by a Covenants for Permanent Maintenance of Stormwater Facilities
- Complete soil retaining calculations for slopes or retaining walls steeper than 2:1.

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

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

Status: Ongoing

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

Depending on the violation, a first-time offender is usually educated and asked to remediate the damage or correct the violation if possible. This is usually followed up with a letter to inform the violator of the City's expectations and to provide helpful BMPs to prevent future problems. More severe or repeated violations will merit a Notice of Violation (NOV), which is issued in the field directly to the violator if available on site. Copies of the NOV are distributed to the property owner or developer by certified mail, the City Law Department, and the Engineering Division's file. The NOV may order specific remedies and require the violator to submit reports and/or pollution prevention plans. Penalties, if any, are only issued after the NOV expires so the violation and remedies may be fully evaluated.

In the event that a penalty is assessed, a violator may appeal the penalty before a five-member Environmental Appeals Board. The five volunteer members of the Environmental Appeals Board are appointed by the Mayor and 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 serve a 5-year term and may be re-appointed at the end of their term. Follow-up monitoring and inspections will be a combination of City, KUB, 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.

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

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

CS-4 Training Programs

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

Status: Annually.

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

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 continue to promote and support the TDEC certification program in place of a separate competing erosion control workshop.

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 one. 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***
- ***Development Certifications***

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

5.5 COMPREHENSIVE MONITORING PROGRAM (MN).

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

MN-1 Seasonal Storm Event Monitoring

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

The original SOP was developed and submitted with the first annual report during the first permit cycle. Over time the SOP had become dated and some parts obsolete. During the last year, the City revised the SOP to make it current and valid for the equipment, software, site locations, and procedures that are currently used.

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

In 2005, the City relocated two of the five ISCO automatic monitoring stations to sites on First Creek Williams Creek. The specific locations are noted on the large inventory map in the appendix and also on the detailed maps in section 8.0 of this report. The other three stations remained in their current locations on Love and Fourth Creeks and at the outlet of the regional pond at Acker Place.

Each monitoring station consists of a tipping bucket rain gage, an automatic sampler with 24 individual bottles, and a flow meter/data logger. The intake line and flow sensors are installed in the low flow path for constant monitoring. Modems and cell phones were installed to allow City staff to remotely monitor the conditions and station activity. After each rain event, a technician will interrogate the sampler from the office and calculate the appropriate flow-weighted composite sample. The information is then used in the field to prepare the actual sample from the individual bottles. The composite sample is prepared; it is immediately transported to the laboratory for analysis.

At least one more station will be moved in year two due to sampling problems, vandalism, and damage from high flows. TDEC will be notified of future monitoring sites.

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

Each year, the automatic sampling stations should collect at least twenty (20) flow-weighted composite storm samples. Each of the five monitoring stations should collect four (4) to six (6) storm samples each year with at least one storm sample per quarter to help distribute the sampling events seasonally. During dry weather, the stations may also collect ambient samples as described below in section MN-3 unless grab samples are taken manually.

Each of the flow-weighted storm samples will be analyzed for thirteen (13) routine

parameters. Only pH will be recorded in the field. The remaining routine parameters will be analyzed and recorded in the laboratory in accordance with 40 CFR part 122.26 and 40 CFR part 136. The routine parameters to be tested in the laboratory are listed in the table below:

Routine Parameters for Laboratory Analysis		
Total Suspended Solids (TSS)	Nitrate + Nitrite Nitrogen (as N)	Total Recoverable Lead
Total Dissolved Solids (TDS)	Total Nitrogen	Total Recoverable Zinc
Total Ammonia Nitrogen (as N)	Biochemical Oxygen Demand (BOD_5)	Dissolved Phosphorus
Total Ammonia + Organic Nitrogen	Chemical Oxygen Demand (COD)	Total Phosphorus

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

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

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

Each year, one monitoring station will be selected for a full-suite grab sample. The five stations will be rotated throughout the permit term to allow one sample from each location.

In addition to the 13 routine parameters listed above, the full-suite grab sample will include analysis for oil & grease and all the pollutants listed in Tables II & III of 40 CFR Part 122 Appendix D including: volatiles, pesticides, acids, base/neutrals, toxic metals, total phenol, and cyanide.

SWMP Task: Analyze Results from Ongoing Monitoring Program. Schedule: Year 5.

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

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

The estimates of the seasonal loading and event mean concentrations will be included in the fifth annual report. An estimate of the total annual runoff from each of the major watersheds within the City will be provided in each annual report (see Section 6.2.4 in this report). Due to ongoing annexations, watersheds or portions of watersheds may be added to this estimate as needed.

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

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

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

MN-3 Ambient & Biological Monitoring

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

At least twenty (20) ambient samples will be collected each year at a rate of one sample per quarter from each of the five monitoring station locations (detailed by map in section 8.0 and on the inventory map attached). The City had already implemented a quarterly ambient sampling program during the first permit term.

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

SWMP Task: Develop/Implement a Biological-monitoring program to supplement the program previously administered by TVA. Status: Ongoing.

For the last few years, the Tennessee Izaak Walton League (IWL) has been contracted to continue their study of the biological health of urban streams. This year the IWL conducted studies at two locations on Williams Creek. The IWL collected the field data and determined an Index of Biotic Integrity (IBI) for multiple locations. This year's IBI study results are included in the appendix.

The City has encouraged the Tennessee Valley Authority (TVA) to continue selecting sites within the urban environment to help track any improvements or degradation of the urban streams. The TVA conducted studies on the lower sections of Third Creek. The IBIs were concentrated on Third Creek in preparation for the upcoming TSMP project.

SWMP Task: Develop/Implement a Bacteriological-monitoring program. Status: Ongoing.

To insure that adequate bacteriological data is collected throughout the City, a five-part monitoring program has been developed for implementation. Since the bacteria TMDL includes both e-coli and fecal coliform, the City has started requesting both analysis from the laboratory. The five-part program includes bacteria sampling during dry-weather screening (ILL-2), storm event sampling grab samples (MN-1), ambient monitoring (MN-3), TMDL specific studies (6.0), and on demand samples due to specific citizen requests.

The last part of the program involves acquiring data collected from other agencies. Specifically, the City will seek data collected from creek monitoring by sewer utilities. As part of their current Consent Decree, the Knoxville Utilities Board is required to have a bacteriological-monitoring program. The TDEC approved program is located in all of the City's 303(d) listed streams. Copies of the annual water quality report can be obtained at www.kub.org. The City will obtain copies of this data each year and may supplement additional sampling as requested by concerned citizens. For example, the City sampled First Creek and the outfall from the duck pond in Fountain City after a citizen requested this information from TDEC and the City. At the time of sampling, the water bodies did not need warning signs posted.

MN-4 Training Programs

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

During the first permit term, the City partnered with volunteers for dry-weather screening, ambient sampling, and biological monitoring. Last year, no volunteers were used for any monitoring activities. If volunteers are used in the future, the City will hold a training session to insure that proper sampling protocols are used. The City does hold training sessions for the adopt-a-stream volunteers before they begin their activities on their own.

City staff has continued to improve their skills and abilities by assisting other agencies in the field with IBIs and training new employees. During year one, the City was fortunate to hire a new stormwater quality technician with extensive sampling experience from his work for the National Park Service. He required very little orientation to become familiar with the City's sampling program and has been a welcome addition to the water quality staff.

6.0 TMDL IMPLEMENTATION AND ACTIVITIES

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

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

Wild Birds — Schedule: Complete by Year Five

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

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

Waterfowl impacted waterways within the City of Knoxville that were sampled for bacteria. Samples were taken on 06/09/05.

Location	Watershed	Fecal Coliform, cfu/100ml	E.Coli, cfu/100ml	Source or Sink
Fountain City Pond	First Creek	300	276	Source
4th Creek Embayment/Loudon Lake	TN River	390	236	Source
Peninsula Hospital Lighthouse Lake	Fourth	1300	368	Source
Pond at UT Hospital	TN River	4000	8160	Source
Pond at Chilhowee Park	Love's Creek	830	866	Sink
Butterfly Lake at Colonial Village	Knob Creek	5700	17890	Sink

Outside dumping of animal wastes — Status: Ongoing

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

Domestic Pets — Status: Ongoing

The City partnered with the Izaak Walton League and Prestige Cleaners to encourage the use of pooper-scoopers in City parks and the CBID. Four dispensers are located downtown and four are located in two City parks. Approximately 500 pooper-scoopers bags are restocked bi-weekly at the dispenser on Gay and Summit, which indicates a successful start to our pet waste challenge downtown. Additional dispensers may be added in other parks in the future. The City distributed approximately 2000 pooper-scoopers during two public functions, Bark-in-the-Park and Earth Fest. An attention-grabbing poster was placed on display at each of these functions to help educate the pet owners of their responsibility to manage their pet's waste.

Fish/Bait Shops — Status: Ongoing

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

Private Leaking Laterals — Status: Ongoing

The City has continued to coordinate with KUB to identify and correct sanitary sewer discharges as necessary. A standard procedure has been developed to insure that each possible contamination source is investigated after a problem is identified during dry weather screening. When high ammonia or fecal coliform levels are detected in the MS4, KUB and City personnel cooperate to identify the contamination source through dye testing or manhole by manhole testing. Once a source has been identified, KUB will be responsible for correcting problems in the main sanitary sewer system while the City will work with KUB and the private property owners to correct problems on private property. These coordinated inspections have identified private residences, industries, and businesses with plumbing or floor drains connected to the MS4 instead of the sanitary sewer system. This type of close coordination with all sewer utilities

is essential for solving illicit discharges to the MS4 and will likely continue throughout the new permit term.

A 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 MOU was included in the appendix of the 2003/2004 report.

Human wastes (Outdoor Elimination by Humans) Schedule: Begin Study Year Two

Illicit connections to storm drain system Status: Ongoing

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

6.0 MONITORING REPORTS SUMMARY

6.1 Dry-Weather Screening Program - New Outfall Inventory.

During the past permit year, eight 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.

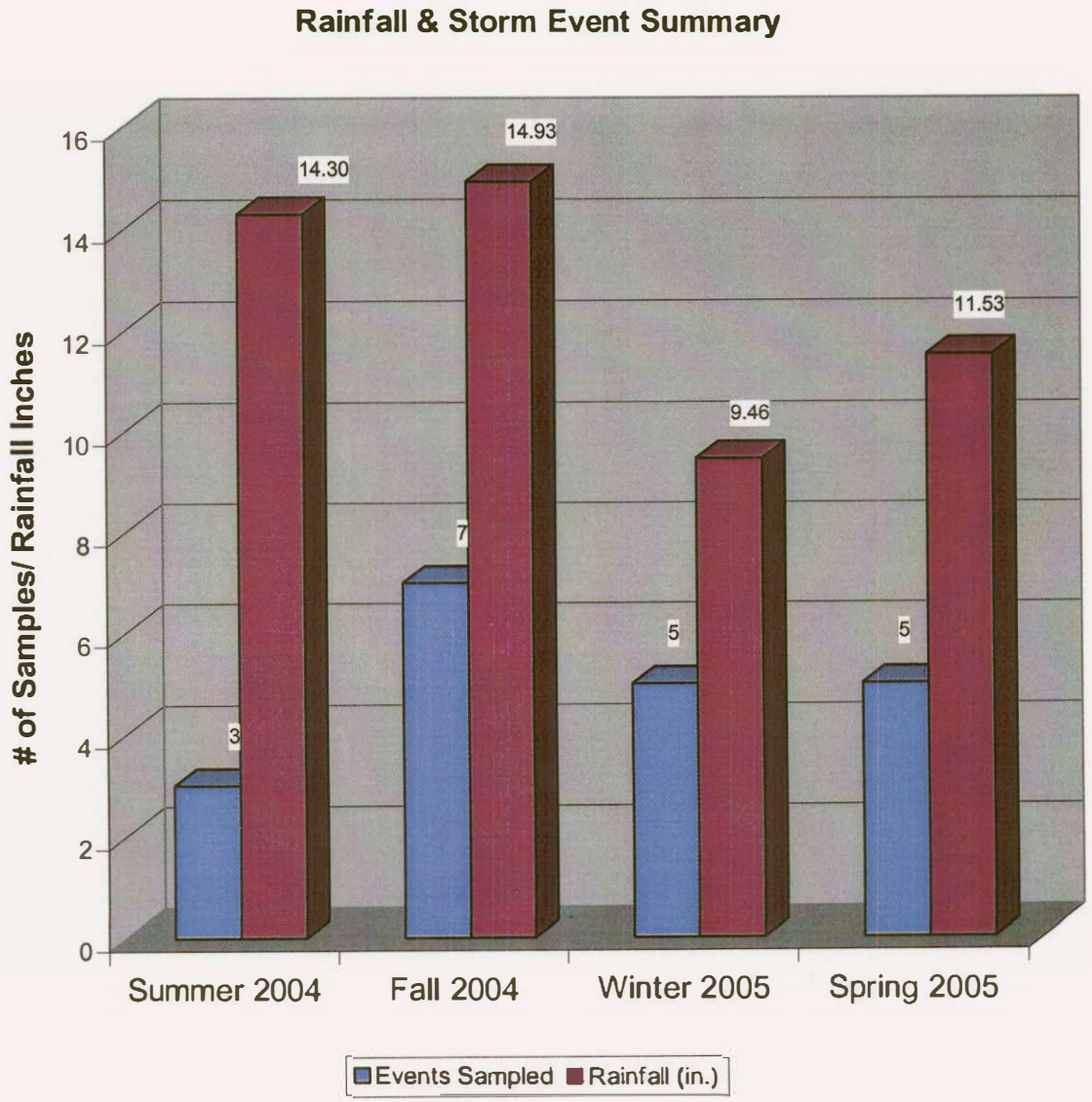
All updated outfalls are clearly marked on the inventory map located in the appendix but attached separately. The outfalls added to the system this year include the following:

00-400-0132	02-400-0096	03-400-0396
00-400-0157	02-100-0098	07-400-0030
00-400-0192	02-100-0099	

6.2 Ongoing Stormwater Monitoring Program.

6.2.1 Area Rainfall Data & Storm Event Summary.

During the July 1, 2004 to June 30, 2005 monitoring period, an average of 50.22 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 amounts of rainfall received and the number of storm events sampled per season. Monitoring data summaries for each of the sampling locations are included for TDEC's review on the following pages.



6.2.2 Laboratory Analysis Summary

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
SUMMER 2004	08/23/2004	Composite	6.0	62492	0.09	4	11.35	315	59	0.17	U	0.52	0.52	10	145	0.18
Quarter Average			6.0	62492	0.09	4	11.35	315	59	0.17	U	0.52	0.52	10	145	0.18
FALL 2004	11/04/2004	Composite	6.0	780910	0.97	2	21.3	69	100	0.29	0.10	0.45	0.35	4	79	0.113
Quarter Average			6.0	780910	0.97	2	21.3	69	100	0.29	0.10	0.45	0.35	4	79	0.113
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.46
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 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	Ortho Phosphate
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
WINTER 2005	02/08/2005	Composite	6.5	98085	0.20	8		32	136	0.86	0.23	0.53	0.3	3.0	107	0.6	
Quarter Average			6.5	98085	0.20	8	0.0	32	136	0.86	0.23	0.53	0.3	3.0	107	0.6	
SPRING 2005	04/08/2005	Composite	7.0	302271	0.44	BDL	40.0	42	100	0.56	0.25	0.66	BDL	BDL	0	BDL	0.11
Quarter Average			7.0	302271	0.44	BDL	40.0	42	100	0.56	0.3	0.66	BDL	BDL	0	BDL	0.11
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.46	
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 125	

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

6.2.2 Laboratory Analysis Summary

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
SUMMER 2004	9/8/2004	Composite	6.5	209621	1.82	4	16.8	61	111	0.38	U	0.58	0.58	7	36	0.096
Quarter Average			6.5	209621	1.82	4	16.8	61	111	0.38	U	0.58	0.58	7	36	0.096
FALL 2004	12/1/2004	Composite	6.0	1198260	1.58	4	13.30	234	90	0.164	0.04	0.75	0.71	17	64	0.241
Quarter Average			6.0	1198260	1.58	4	13.30	234	90	0.164	0.04	0.75	0.71	17	64	0.241
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10

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	Ortho Phosphate
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
WINTER 2005	2/14/2005	Composite	6.0	134402	0.75	4	16.0	233	167	1.1	0.03	0.24	0.21	21	88	0.1	
Quarter Average			6.0	134402	0.75	4	16.0	233	167	1.1	0.03	0.24	0.21	21	88	0.1	
SPRING 2005	6/7/2005	Composite	6.5	55453780	2.68	6	53	280	120	0.82	0.32	2.00	1.7	0.023	0.10	0.91	0.063
Quarter Average			6.5	55453780	2.68	6	53	280	120	0.82	0.32	2.00	1.7	0.023	0.10	0.91	0.063
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	

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

6.2.2 Laboratory Analysis Summary

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
FALL 2004	10/13/2004	Composite	7.0	548462	0.92	6	15.9	175	195	0.84	U	0.64	0.64	11	54	0.093
Quarter Average			7.0	548462	0.92	6	15.9	175	195	0.84	U	0.64	0.64	11	54	0.093
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10

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	Ortho Phosphate
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
WINTER 2005	3/14/2005	Composite	6.5	249833	0.17	U	11.00	26	264	1.40	U	0.2	0.2	1	18	U	
Quarter Average			6.5	249833	0.17	U	11.00	26	264	1.40	U	0.2	0.2	1	18	U	
SPRING 2005	4/13/2005	Composite	6.5	742699	0.69	BDL	25	78.0	170	0.91	0.3	0.94	0.65	BDL	0	BDL	
Quarter Average			6.5	742699	0.69	BDL	25	78.0	170	0.91	0.3	0.94	0.65	BDL	0	BDL	
																	0.037
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	0.037
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	

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

6.2.2 Laboratory Analysis Summary

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
FALL 2004	10/13/2004	Composite	6.5	2622003	1.12	9	17.7	122	120	0.25	U	0.32	0.32	33	129	0.095
	11/4/2004	Composite	7.0	2357414	0.92	6	14.5	100	131	0.31	0.26	0.74	0.48	41	142	0.202
Quarter Average			6.8	2489709	1.02	8	16.1	111	126	0.28	0.1	0.53	0.40	37	136	0.149

*National NURP Study Average						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160
*Characteristics of Urban Stormwater Range						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10

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	Ortho Phosphate
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
WINTER 2005	2/14/2005	Composite	6.0	980568	0.33	5	12	48	149	0.83	0.05	0.35	0.3	18	86	0.09	
Quarter Average			6.0	980568	0.33	5	12	48	149	0.83	0.05	0.35	0.3	18	86	0.09	

SPRING 2005	4/8/2005	Composite	7.0	1653591	0.25	BDL	88	26	190	1.20	0.3	BDL	BDL	BDL	0	BDL	0.034
Quarter Average			7.0	1653591	0.25	BDL	88	26	190	1.20	0.3	BDL	BDL	BDL	0	BDL	0.034

*National NURP Study Average					11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	
*Characteristics of Urban Stormwater Range					1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	

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

6.2.2 Laboratory Analysis Summary

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
SUMMER 2004	7/26/2004	Composite	7.7	1303768	1.48	7	23.42	407	132	0.74	U	0.22	0.22	21	138	0.08
Quarter Average			7.7	1303768	1.48	7	23.42	407	132	0.74	U	0.22	0.22	21	138	0.08
FALL2004	10/14/2004	Composite	6.0	1157033	1.17	4	7.99	194	124	0.42	U	0.21	0.21	10	91	0.059
	10/28/2004	Composite	7.0	1031805	0.71	6	14.0	174	128	0.71	U	0.97	0.97	9	83	0.217
Quarter Average			6.5	1094419	0.94	5	11.0	184	126	0.57	U	0.59	0.59	10	87	0.138
*National NURP Study Average						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16
*Characteristics of Urban Stormwater Range						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10

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	Ortho Phosphate
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
WINTER 2005	2/21/2005	Composite	6.0	1960532	1.35	4	8.60	116	107	0.48	U	0.21	0.2	6	64	0.06	
Quarter Average			6.0	1960532	1.35	4	8.60	116	107	0.48	U	0.2	0.2	6	64	0.06	
SPRING 2005	4/8/2005	Composite	7.0	1184898	0.34	BDL	88.0	51	180	0.99	0.26	BDL	BDL	BDL	0	BDL	0.043
Quarter Average			7.0	1184898	0.34	BDL	88.0	51	180	0.99	0.26	BDL	BDL	BDL	0	BDL	0.043
*National NURP Study Average						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	
*Characteristics of Urban Stormwater Range						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	

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

6.2.2 Laboratory Analysis Summary

Seasonal Storm Sampling Program - July 1, 2004 thru June 30, 2005

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	Ortho Phosphate
Units			cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
AP	Sum. '04	6.0	62492	0.09	4	11.35	315	59	0.17	U	0.52	0.52	10	145	0.18	—
	Fall '04	6.0	780910	0.97	2	21.3	69	100	0.29	0.1	0.45	0.35	4	79	0.113	—
	Wtr. '05	6.5	98085	0.20	8.0	0.0	32	136	0.86	0.23	0.53	0.3	3.0	107	0.56	----
	Spr. '05	7.0	3022710	0.44	BDL	40.00	42	100	0.56	0.3	0.66	BDL	BDL	0	BDL	0.11
FC	Sum. '04	6.5	209621	1.82	4	16.8	61	111	0.38	U	0.58	0.58	7	36	0.096	—
	Fall '04	6.0	1198260	1.58	4	13.30	234	90	0.16	0.04	0.75	0.71	17	64	0.24	----
	Wtr. '05	6.0	134402	0.75	4	16	233	167	1.10	0.03	0.24	0.21	21	88	0.1	—
	Spr. '05	6.5	55453780	2.68	6	53	280	120	0.82	0.32	2.0	1.7	0.023	0.10	0.91	0.063
LC	Sum. '04	---	—	—	—	—	—	—	—	—	—	—	----	—	—	—
	Fall '04	7.0	548462	0.92	6.0	15.90	175	195.0	0.8	U	0.64	0.640	11	54	0.09	—
	Wtr. '05	6.5	249833	0.17	U	11	26	264	1.4	U	0.23	0.23	1	18	U	—
	Spr. '05	6.5	742699	0.69	BDL	25	78	170	0.91	0.29	0.94	0.65	BDL	0.05	BDL	0.037
SC	Sum. '04	—	—	----	—	—	—	—	----	----	----	—	----	----	----	—
	Fall '04	6.8	2489709	1.02	7.50	16.1	111	126	0.28	0.13	0.53	0.40	37	136	0.15	—
	Wtr. '05	6.0	980568	0.33	5	12	48	149	0.83	0.05	0.35	0.3	18	86	0.090	—
	Spr. '05	7.0	1653591	0.25	BDL	88	26	190	1.2	0.3	BDL	BDL	BDL	0.049	BDL	0.034
WD	Sum. '04	7.7	1303768	1.48	7	23.42	407	132	0.74	U	0.22	0.22	21	138	0.08	—
	Fall '04	6.5	1094419	0.94	5	10.995	184	126	0.565	U	0.59	0.59	9.5	87	0.14	—
	Wtr. '05	6.0	1960532	1.35	4	8.6	116	107	0.48	U	0.21	0.21	6	64	0.06	—
	Spr. '05	7.0	1184898	0.34	BDL	88	51	180	0.99	0.26	BDL	BDL	BDL	0.043	BDL	0.043
National NURP Study Average					11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.46	
Characteristics of Urban Stormwater Range					1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 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: BMPS

-AP = Acker Place Monitoring Station

-FC = First Creek Monitoring Station

-SC = Second Creek Monitoring Station

-LC = Loves Creek Monitoring Station

-WD = Walden Drive Monitoring Station

6.2.2 Laboratory Analysis Summary

Seasonal Ambient Grab Samples 2004-2005

Summer 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	9/15/04	6.5	U	U	U	244	0.64	U	0.11	0.11	U	9	U
First Creek	9/15/04	6.5	U	U	U	244	1.24	U	U	U	U	8	0.20
Loves Creek	9/15/04	7.0	U	U	U	302	1.13	U	U	U	U	6	0.027
Second Creek	9/15/04	8.0	U	U	U	286	1.65	U	0.11	0.11	1	11	0.024
Walden Drive	9/15/04	7.0	U	U	U	256	0.95	U	0.11	0.11	U	13	0.015
Average		7.0	U	U	U	266	1.12	U	0.07	0.07	0.2	9	0.053

Fall 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	12/21/04	7.0	U	10.4	U	232	1.75	U	0.22	0.22	U	U	U
First Creek	12/21/04	7.0	U	8.56	U	252	2.41	U	0.18	0.18	U	7	U
Loves Creek	12/21/04	7.0	U	7.78	U	279	3.5	0.02	0.27	0.25	U	6	U
Second Creek	12/21/04	7.0	U	10.9	U	299	4.1	0.72	0.74	0.02	U	8	U
Walden Drive	12/21/04	7.0	U	7.91	U	228	3.5	U	0.23	0.23	2	14	U
Average		7.0	U	9.1	U	258	3.1	0.15	0.33	0.18	0.4	7	U

Winter 2005	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	3/21/05	6.0	U	U	U	218	0.74	U	0.46	0.46	U	4	0.03
First Creek	3/21/05	6.0	U	6	12	223	1.5	0.03	0.68	0.8	1	9	U
Loves Creek	3/21/05	6.0	U	7	U	282	1.3	0.02	0.45	0.45	U	9	0.02
Second Creek	3/21/05	6.0	U	U	U	256	1.3	0.02	0.57	0.57	U	9	0.03
Walden Drive	3/21/05	6.0	U	U	U	237	1.10	U	0.48	0.48	U	14	U
Average		6.0	U	2.6	2.4	243	1.19	0.014	0.53	0.55	0.2	9	0.016

Spring 2005	Date	pH	BOD	COD	Suspended Solids	Dissolved Solids	Nitrate + Nitrite Nitrogen	Ammonia Nitrogen	Total Kjeldahl Nitrogen	Total Organic Nitrogen	Lead	Zinc	Total Phosphorus	Ortho Phosphate
Acker Place	5/18/05	7.0	BDL	21	1.8	220	0.90	BDL	BDL	BDL	BDL	0.032	BDL	BDL
First Creek	5/18/05	7.0	BDL	BDL	4.0	210	1.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Loves Creek	5/18/05	7.0	BDL	22	3.0	300	1.5	0.11	BDL	BDL	BDL	BDL	BDL	BDL
Second Creek	5/18/05	7.0	BDL	BDL	1.4	300	2.0	0.18	BDL	BDL	BDL	BDL	BDL	0.029
Walden Drive	5/18/05	7.0	BDL	20	3.6	250	1.3	0.10	BDL	BDL	BDL	0.069	BDL	BDL
Average		7.0	BDL	12.6	2.8	256	1.40	0.08	BDL	BDL	BDL	0.05	BDL	0.0058

U = Analyte requested but not detected

BDL = Below Detection Limit

6.2.3 Noncompliance.

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

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 one was determined to be an average of the annual rainfall recorded during year one 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 one, the average annual rainfall amount was 50.22 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:

$$Qi = P \times Ci \times Ai$$

Where,

P = total precipitation (inches/year) = 50.22 in./yr. = 4.185 ft./yr.
C = land use area weighted runoff coefficient = 0.15*Pervious% + 0.95*Impervious%
A = drainage area (acres) = acres x (4.35E4 ft2/acre) = ft2
Q = ΣQi = total runoff rate / E6 = 37,939 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, 2004 - June 30, 2005

Watershed	Agricul./ Forest/ Vacant, Public Parks	Vacant (>10)	Rural Res.	Single Family Res.	Private Rec., Public Land	Multi-Family Res., Church	Insti-tutional	Mining, Office/ Service	Manu-facturing/ Whole-sale	Commer., Trans./ Utility/ Commun.	Major Roads/ Hwys/ ROWs	Under Const	Not Loaded	Total Acres in Watershed	Acres in the City Limits	Est. % Imperv-ious	C Value	Total Rainfall during 04/05 (in./yr)	Total Runoff for 04/05 (Mgal/yr)
Baker Cr.	412	2	107	640	90	77	32	1	1	3	269	13	27	1,674	1,674	32	0.41	50.22	930
East Fork	313	0	10	475	302	78	73	31	195	235	584	33	180	2,509	2,509	53	0.57	50.22	1,957
First Cr.	724	0	300	3,152	544	501	110	157	127	556	1,412	51	116	7,750	7,750	44	0.50	50.22	5,268
Fourth Cr.	965	57	423	2,026	468	406	93	206	201	568	881	61	414	6,769	5,920	41	0.48	50.22	3,849
Goose Cr.	639	40	126	669	213	67	8	21	77	131	327	34	29	2,381	1,755	35	0.43	50.22	1,022
Grassy Cr.	2,230	176	561	610	215	24	0	14	31	95	211	39	95	4,301	433	17	0.29	50.22	169
Holston R.	2,362	69	371	1,222	417	45	5	2	219	33	805	32	50	5,632	2,455	28	0.37	50.22	1,241
Inman Br.	563	33	214	138	4	12	0	0	0	0	145	0	34	1,143	99	21	0.31	50.22	42
Knob Cr.	1,719	195	481	843	125	84	1	19	1	29	296	4	169	3,966	989	19	0.30	50.22	410
Knob Fork	1,659	26	398	675	182	56	5	93	6	124	257	19	252	3,752	823	22	0.33	50.22	367
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	50.22	3,057
Second Cr.	443	0	90	1,281	346	247	29	107	140	542	1,161	35	82	4,503	4,498	53	0.57	50.22	3,498
Sinking Cr.	1,614	146	459	1,266	284	90	17	33	31	267	881	12	347	5,447	2,434	33	0.41	50.22	1,375
Swanpond C	3,892	303	833	604	121	36	4	79	240	232	457	65	285	7,151	499	19	0.30	50.22	207
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	50.22	2,406
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	50.22	5,120
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	50.22	3,669
Toll Cr.	535	69	154	222	42	26	1	0	37	4	93	42	4	1,229	767	22	0.32	50.22	337
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	50.22	878
Whites Cr.	2,733	154	782	1,298	575	59	31	11	49	126	608	51	578	7,055	1,634	23	0.34	50.22	750
Williams Cr.	358	11	47	561	46	96	125	17	10	61	276	3	30	1,641	1,605	37	0.45	50.22	983
Woods Cr.	1,220	106	281	371	0	26	0	2	140	43	261	1	157	2,608	143	23	0.33	50.22	65
Sink-East	1,226	0		728	9	17	0	17	3	27	0	0	0	2,027	91	12	0.24	50.22	30
Beaver Cr	21,174	0	0	21,230	1,292	845	4	259	283	712	0	160	0	45,959	162	16	0.28	50.22	61
Tuckahoe	4,293	0	0	1,829	18	14	0	8	2	1	0	4	0	6,169	229	8	0.22	50.22	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	50.22	179
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	50.22	37,939

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) = 50.22 in./yr. = 4.185 ft./yr.

C = land use area weighted runoff coefficient = 0.15*Pervious% + 0.95*Impervious%

A = drainage area (acres) = acres in watershed x (4.35E4 ft2/acre) = Ai ft2

Q = total runoff rate = sum of each watershed's Qi.

Total estimated runoff for Year One = 37,939 Mgal

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

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

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

Quantitative estimates of pollutant loads and event mean concentrations 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 since the program began.

Although testing data may not be available to substantiate all of the illicit discharges and illegal dumping problems, which have been resolved, the qualitative effect on water quality within the MS4 and waters-of-the State is irrefutable. Many industries have removed illicit discharges, homeowners and utilities have replaced sections of leaking or broken sanitary sewers, the last known sections of the combined sewers 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 Solid Waste Transfer Station and the Loraine Street fleet storage and maintenance facility during this 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.

As expected, the new permit created several modifications to the existing SWMP. Since those changes were discussed throughout the report, they will not be repeated in this section.

The five wet-weather monitoring stations will likely move locations throughout the permit. Two stations were moved as discussed in section MN-1 on page 44 of this report. The current locations for all of the monitoring stations are shown on detailed maps in the appendix. Future locations will be reported in each annual report.

9.0 FISCAL ANALYSIS

The Fiscal Analysis for the first annual report will list the first permit year budget sources and amounts along with estimates for year two 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. Future funding sources may change if a stormwater utility fee is implemented.

Program Description	**Fund Source**	**Actual FY 04/05**	**Est. FY 05/06**
Solid Waste Recycling (includes: composting, education, staff, etc.)	General Fund	$1,349,851	$1,400,000
Household Hazardous Waste Facility	General Fund	$164,434	$170,000
Stormwater Mgmt Operating expenses	220 Fund	$1,500,729	$1,617,810
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	$2,707,578	$2,800,000
First Creek Restoration/Improvements	Growth Bdry	$0	$1,000,000
Papermill Road Culverts @ 4th Creek	General Fund	$ 662,309	$42,275
Stormwater Education Project	220 Fund	$0	$13,000
Emily Avenue Sinkhole Project	General Fund	$0	$450,000
Lower Second Creek Park Project	General Fund State Grant	$0	$2,685,000
Westmoreland Hills Detention Pond	General Fund	$23,059	$0
Wilson Avenue Drainage	General Fund	$71,582	$0
Second Creek Floodway Study	General Fund	$6,703	$0
Other Capital Improvements	General Fund	$250,000	$250,000
Total Estimated Stormwater Program Costs		**$ 6,736,245**	**$ 10,428,085**

APPENDIX A

Revised Stormwater and Street Ordinance

Effective February 2005

Chapter 22.5
STORMWATER AND STREET ORDINANCE

Chapter 22.5 - STORMWATER (formerly known as Chapter 22A)

ARTICLE III. Illicit Connections and Illegal Dumping

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), August 2004 (Ordinance O-139-04), January 2005 (Ordinance O-16-05), and February 2005 (Ordinance O-45-05).

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.

Development, utilities - Physical alteration of any location for the purpose of installing utilities. This includes, but is not limited to, providing access to a site, clearing of vegetation, grading, earth moving, providing utilities, other services such as parking, altering land forms, and installing erosion control systems.

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.

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

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.

Utility, public or private - Any agency which under public franchise or ownership, or under certification of convenience and necessity, provides the public with electricity,

natural gas, steam, communication, rail transportation, water, sewage collection, or other similar service.

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; Ord. No. O-16-05, § 1, 1-18-05)

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 of the five 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.

(Ord. No. O-139-04, § 1, 8-17-04)

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. At the discretion of the Law Director, the written document may be a form document provided by the Department of Law or may be a document 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.

(Ord. No. O-139-04, § 1, 8-17-04; Ord. No. O-16-05, § 1, 1-18-05)

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-wall 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.

(f) 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 in an area bounded by the floodway line and a line defined as one-half the linear distance between the floodway line and the 100-year floodplain line. This requirement may be waived if a development occurs on a lake/river where regulated by Tennessee Valley Authority and a TVA flowage easement exists, or if a drainage study prepared by a registered Professional Engineer licensed to practice in the state of Tennessee shows a rise of less than 0.1 feet 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.

(g) 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; Ord. No. O-16-05, § 1, 1-18-05)

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

(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 a platted subdivision may be transferred, the engineer of record must sign and seal a letter stating that all supporting stormwater and street 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, cashier's 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 fixture type and any aboveground fixed objects on the right-of-way. All Large Residential and Commercial Development plans that are submitted to the Department of Engineering must meet the following minimum standards:

(A) Stamp and signature from appropriate design professional;

(B) Legible (for microfilming 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, and if applicable Lessee'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.

(3) Utilities Development -

(A) Except as provided below in subsection (B), requires plans showing the following: the names and addresses of all property owners; the name, address and contact person of the utility; the name, address and contact person of the engineering firm; a vicinity map; a graphical scale; the stamp and signature of a registered Professional Engineer licensed to practice in the State of Tennessee; total project length in feet; all property lines; existing easements; existing and proposed contours; all water features; all topographic features such as sinkholes; appropriate delineations such as no fill, buffer, floodway and F-1 zone; appropriate

construction details and an effective erosion and sediment control plan with details adequate for installation and inspection that complies with the TDEC "Erosion and Sediment Control Handbook", Second Edition dated March 2002, and all subsequent updates thereto, or the City of Knoxville's Best Management Practices (BMP) Manual, current as of the date of the submission of the plans.

(B) The site development permit requirements for any utility entity currently subject to a court order or decree shall be determined by the Department of Engineering.

(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) 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.

(h) 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.

(i) 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.

(j) 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 TDEC Erosion and Sediment Control Handbook Second Edition, dated March 2002 and all subsequent updates, or the City of Knoxville's Best Management Practices (BMP) Manual, current as of the date of the submission of the plans, 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 TDEC Erosion and Sediment Control Handbook, Second Edition, dated March 2002 and all subsequent updates, or the City of Knoxville's Best Management Practices (BMP) Manual, current as of the date of the submission of the plans, 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.

(k) 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; Ord. No. O-16-05, § 1, 1-18-05; Ord. No. O-45-05, § 1, 2-15-05)

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.

(Ord. No. O-139-04, § 1, 8-17-04)

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: $1350.00 + $5/ lot (lots 51+)

(4) Utilities (except for utility entities currently subject to a court order or decree, the fees for which shall be determined by the Department of Engineering):
(A) Maintenance: $15.00 per 20 square yards plus $0.50 per each additional square yard.
(B) Construction: $1.00 per linear foot of conduit (pipe, cable, wire, fiber optics, etc.) with a $200.00 minimum.

(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; Ord. No. O-16-05, § 1, 1-18-05)

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. An exception can be made to the minimum slope requirement in the bottom of the pond if the first flush requirement is not managed in the quantity detention pond and the pond invert is finished in concrete.

(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; Ord. No. O-16-05, § 1, 1-18-05)

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 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
(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 Street)
(6) Prosser Road #2 (approximately halfway between Knoxville Zoo Dr and Magnolia Ave)

(7) Pamela Lane

(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. Other methods may be approved by the Engineering Director in the design of curb inlets and small pipe systems when the final result is verified by a SCS method.

(Ord. No. O-139-04, § 1, 8-17-04; Ord. No. O-16-05, § 1, 1-18-05)

Section 22.5-34. Maintenance of stormwater facilities.

(a) Property owners and Lessees 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", or the Lessee shall execute a legal document entitled "Covenants for Maintenance of Stormwater Facilities on Leased Property" ("the Covenants"). The property owner or the Lessee, as the case may be, shall record the Covenants 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 property owner's or Lessee's responsibility shall be shown on a plat, or in the case of a Lessee, as an exhibit attached to the Lessee's Covenants, 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 or Lessee, as the case may be.

(c) In order to provide access to stormwater and/or water quality facilities by personnel, vehicles and equipment, the property owner or Lessee, as the case may be, 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 or Lessee, as the case may be, in writing. If property owner or Lessee, as the case may be, 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, the property owner or Lessee, as the case may be, shall reimburse the City for double its direct and related expenses. If the property owner or Lessee, as the case may be, fails to reimburse the City, the City is authorized to file a lien for said costs against the property or the Lessee's leasehold interest, as the case may be, 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; Ord. No. O-16-05, § 1, 1-18-05)

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.

(c) 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.

(d) 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-139-04, § 1, 8-17-04)

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.

(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. 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.;

(I) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

(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; Ord. No. O-16-05, § 1, 1-18-05)

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.

APPENDIX B

Summary of Dry Weather Screening Results

1. List of outfalls tested during year one with status (6 pages)
2. Table of testing results for outfalls with dry-weather flow (7 pages)

Dry Weather Screening - Sample Events for 2005

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
00-500-0075	ILLICIT DUMP	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-300-0230	DRY	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-200-0235	DRY	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-400-0245	DRY	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-400-0250	DRY	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-400-0255	DRY	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-300-0285	DRY	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-100-0300	ILLICIT CONNECTION	08/03/2004	08/03/2004	09/20/2004	09/20/2004
00-400-0305	DRY	08/16/2004	08/16/2004	09/23/2004	09/23/2004
00-400-0310	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0315	DRY	08/16/2004	08/16/2004	09/23/2004	09/23/2004
00-400-0320	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0325	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0330	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0335	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0340	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0345	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0350	DRY	08/16/2004	08/16/2004	09/23/2004	09/23/2004
00-400-0360	ILLICIT DUMP	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0365	DRY	08/16/2004	08/16/2004	09/23/2004	09/23/2004
00-400-0380	DRY	07/29/2004	07/29/2004	09/01/2004	09/01/2004
00-400-0390	ILLICIT DUMP	07/29/2004	07/29/2004	09/01/2004	09/01/2004
01-500-0002	DRY	08/25/2004	08/25/2004	09/23/2004	09/23/2004
01-400-0005	DRY	08/25/2004	08/25/2004	09/23/2004	09/23/2004
01-400-0010	DRY	08/25/2004	08/25/2004	09/30/2004	10/01/2004

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
01-400-0015	ILLICIT DUMP	08/25/2004	08/25/2004	09/30/2004	10/01/2004
01-400-0020	DRY	08/25/2004	08/25/2004	09/23/2004	09/23/2004
01-300-0060	ILLICIT DUMP	08/25/2004	08/25/2004	09/30/2004	10/01/2004
01-300-0095	ILLICIT DUMP	10/07/2004	10/07/2004	11/08/2004	11/08/2004
01-300-0150	ILLICIT CONNECTION	10/07/2004	10/07/2004	11/08/2004	11/08/2004
01-300-0160	ILLICIT CONNECTION	10/07/2004	10/07/2004	11/08/2004	11/08/2004
01-100-0230	WET	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-400-0340	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-400-0345	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-300-0350	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-400-0355	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-400-0365	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-400-0370	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-100-0375	DRY	10/18/2004	10/18/2004	11/15/2004	11/15/2004
01-300-0520	ILLICIT CONNECTION	10/22/2004	10/22/2004	11/29/2004	11/29/2004
01-400-0885	DRY	10/22/2004	10/22/2004	11/29/2004	11/29/2004
01-400-0890	DRY	10/22/2004	10/22/2004	11/29/2004	11/29/2004
01-400-0895	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-400-0900	ILLICIT CONNECTION	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-100-0905	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-100-0907	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-400-0910	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-400-0915	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-100-0920	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
01-400-0925	DRY	08/04/2004	08/04/2004	09/15/2004	09/15/2004
02-400-0005	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0010	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
02-400-0015	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0020	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0025	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0030	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0035	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0040	DRY	10/26/2004	10/26/2004	12/16/2004	12/17/2004
02-400-0045	ILLICIT CONNECTION	10/22/2004	10/22/2004	12/16/2004	12/17/2004
02-400-0050	ILLICIT DUMP	10/22/2004	10/22/2004	12/16/2004	12/17/2004
02-400-0060	WET	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-400-0065	DRY	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-400-0070	DRY	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-400-0075	DRY	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-400-0080	DRY	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-400-0085	ILLICIT DUMP	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-100-0090	DRY	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-400-0095	DRY	09/22/2004	09/22/2004	10/25/2004	10/25/2004
02-100-0100	DRY	11/09/2004	11/09/2004	12/16/2004	12/17/2004
02-100-0103	ILLICIT DUMP	11/09/2004	11/09/2004	12/16/2004	12/17/2004
02-100-0105	DRY	11/09/2004	11/09/2004	12/16/2004	12/17/2004
02-400-0110	DRY	11/09/2004	11/09/2004	12/16/2004	12/17/2004
02-300-0165	ILLICIT CONNECTION	11/10/2004	11/10/2004	12/20/2004	12/20/2004
02-400-0169	ILLICIT CONNECTION	11/10/2004	11/10/2004	12/20/2004	12/20/2004
03-300-0005	ILLICIT CONNECTION	11/10/2004	11/10/2004	12/27/2004	12/28/2004
03-400-0390	DRY	11/10/2004	11/10/2004	12/27/2004	12/28/2004
03-100-0445	DRY	12/21/2004	12/21/2004	01/20/2005	01/20/2005
03-100-0455	WET	12/21/2004	12/21/2004	01/20/2005	01/20/2005
03-300-0460	DRY	12/21/2004	12/21/2004	01/20/2005	01/20/2005

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
03-100-0465	DRY	12/21/2004	12/21/2004	01/20/2005	01/20/2005
03-400-0470	DRY	12/21/2004	12/21/2004	01/20/2005	01/20/2005
03-100-0475	WET	12/21/2004	12/21/2004	01/20/2005	01/20/2005
03-300-0480	DRY	12/21/2004	12/21/2004	01/20/2005	01/20/2005
03-300-0615	ILLICIT DUMP	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0625	DRY	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0630	DRY	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0640	DRY	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0645	DRY	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0655	WET	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0660	ILLICIT DUMP	12/28/2004	12/28/2004	01/25/2005	01/25/2005
03-300-0670	DRY	01/05/2005	01/05/2005	01/25/2005	01/25/2005
03-300-0675	WET	01/05/2005	01/05/2005	01/25/2005	01/25/2005
03-400-0950	DRY	12/29/2004	12/29/2004	01/28/2005	01/28/2005
03-100-0960	DRY	12/29/2004	12/29/2004	01/28/2005	01/28/2005
03-200-0965	WET	12/29/2004	12/29/2004	01/28/2005	01/28/2005
03-400-0970	DRY	12/29/2004	12/29/2004	01/28/2005	01/28/2005
03-400-0975	DRY	12/29/2004	12/29/2004	01/28/2005	01/28/2005
04-400-0260	WET	01/05/2005	01/05/2005	02/11/2005	02/11/2005
04-400-0265	DRY	01/05/2005	01/05/2005	02/11/2005	02/11/2005
04-200-0270	ILLICIT CONNECTION	12/29/2004	12/29/2004	02/11/2005	02/11/2005
04-400-0275	DRY	01/05/2005	01/05/2005	02/11/2005	02/11/2005
04-400-0280	DRY	01/05/2005	01/05/2005	02/11/2005	02/11/2005
04-400-0285	DRY	01/05/2005	01/05/2005	02/11/2005	02/11/2005
05-400-0075	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
05-400-0080	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
05-400-0085	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
05-400-0090	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
05-400-0095	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
05-100-0100	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
06-400-0090	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
06-400-0095	DRY	01/10/2005	01/10/2005	02/18/2005	02/18/2005
06-400-0100	DRY	01/18/2005	01/18/2005	03/02/2005	03/02/2005
06-400-0105	DRY	01/18/2005	01/18/2005	03/02/2005	03/02/2005
06-500-0110	ILLICIT DUMP	01/18/2005	01/18/2005	03/02/2005	03/02/2005
06-400-0115	DRY	01/18/2005	01/18/2005	03/02/2005	03/02/2005
07-200-0005	DRY	01/18/2005	01/18/2005	03/02/2005	03/02/2005
07-400-0070	ILLICIT CONNECTION	01/19/2005	01/19/2005	03/03/2005	03/04/2005
07-400-0075	DRY	01/19/2005	01/19/2005	03/03/2005	03/04/2005
07-400-0080	DRY	01/19/2005	01/19/2005	03/03/2005	03/04/2005
07-400-0085	DRY	01/19/2005	01/19/2005	03/03/2005	03/04/2005
07-100-0090	ILLICIT CONNECTION	01/19/2005	01/19/2005	03/03/2005	03/03/2005
07-400-0095	DRY	01/19/2005	01/19/2005	03/03/2005	03/03/2005
07-400-0100	DRY	01/19/2005	01/19/2005	03/03/2005	03/03/2005
09-400-0005	DRY	01/20/2005	01/20/2005	03/07/2005	03/07/2005
09-400-0010	DRY	01/20/2005	01/20/2005	03/07/2005	03/07/2005
10-500-0025	WET	01/21/2005	01/21/2005	03/07/2005	03/07/2005
10-500-0030	DRY	01/21/2005	01/21/2005	03/07/2005	03/07/2005
10-500-0035	DRY	01/21/2005	01/21/2005	03/07/2005	03/07/2005
11-300-0602	DRY	01/24/2005	01/24/2005	03/07/2005	03/07/2005
13-400-0130	DRY	01/24/2005	01/24/2005	03/10/2005	03/10/2005
13-300-0135	ILLICIT CONNECTION	01/24/2005	01/24/2005	03/10/2005	03/10/2005
13-300-0140	ILLICIT CONNECTION	01/24/2005	01/24/2005	03/10/2005	03/10/2005
13-300-0150	ILLICIT DUMP	01/24/2005	01/24/2005	03/10/2005	03/10/2005

Outfall	Outfall Status	Visit #1	Visit #2	Visit #3	Visit #4
13-300-0155	WET	03/15/2005	03/15/2005	04/18/2005	04/18/2005
13-300-0181	DRY	03/15/2005	03/15/2005	04/18/2005	04/18/2005
13-300-0182	DRY	03/15/2005	03/15/2005	04/18/2005	04/18/2005
13-300-0184	ILLICIT CONNECTION	03/15/2005	03/15/2005	04/18/2005	04/18/2005
13-300-0185	ILLICIT CONNECTION	03/21/2005	03/21/2005	04/18/2005	04/18/2005
13-300-0190	DRY	03/21/2005	03/21/2005	04/18/2005	04/18/2005
13-300-0226	DRY	03/21/2005	03/21/2005	04/20/2005	04/20/2005
13-300-0227	DRY	03/21/2005	03/21/2005	04/20/2005	04/20/2005
13-300-0228	ILLICIT DUMP	03/21/2005	03/21/2005	04/20/2005	04/20/2005
50-400-0050	DRY	04/04/2005	04/05/2005	05/03/2005	05/03/2005
50-200-0055	WET	04/04/2005	04/05/2005	05/03/2005	05/03/2005
50-400-0060	DRY	03/21/2005	03/21/2005	04/20/2005	04/20/2005
50-400-0065	DRY	03/21/2005	03/21/2005	04/20/2005	04/20/2005
50-400-0110	DRY	04/04/2005	04/05/2005	05/03/2005	05/03/2005
50-400-0115	DRY	04/04/2005	04/04/2005	05/03/2005	05/03/2005
50-200-0120	DRY	04/04/2005	04/05/2005	05/03/2005	05/03/2005
79-400-0340	ILLICIT CONNECTION	04/11/2005	04/11/2005	05/17/2005	05/17/2005

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
00-100-0300																
2005	8/3/04	1	Yes	48	7.0	0.40	0	0	0	0.40	No	0	0	No	No	No
	8/3/04	2	Yes	48	7.0	1.00	0	0	0	0	No	0	0	No	No	No
	9/20/04	3	Yes	29	6.0	0.80	0	0	0	0	No	0	0	No	No	No
	9/20/04	4	Yes	29	7.0	0.80	0	0	0	0	No	0	0	No	No	No
00-400-0360																
2005	7/29/04	1	Yes	0.11	7.0	2.00	0	0	0	0	No	0	0	No	No	No
	7/29/04	2	Yes	0.10	7.0	1.50	0	0	0	0	No	0	0	No	No	No
00-400-0390																
2005	7/29/04	1	Yes	14	7.0	2.00	0	0	0	0	No	0	0	No	No	No
	7/29/04	2	Yes	14	7.0	2.00	0	0	0	0	No		0	No	No	No
	9/1/04	3	Yes	6	7.0	3.00	0	0	0	0.30	No	0	0	No	No	No
00-500-0075																
2005	9/20/04	3	Yes	0.16	7.0	0	0.30	0.20	0	4.50	Yes	25	95	No	No	No
	9/20/04	4	Yes	0.08	7.0	0	0.30	0.30	0	4.50	No	25	70	No	No	No
01-100-0230																
2005	10/18/04	1	Yes	0.38	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	10/18/04	2	Yes	0.37	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	11/15/04	3	Yes	0.36	6.5	0	0	0	0	0	No	0	0	No	No	No
	11/15/04	4	Yes	0.16	7.0	0	0	0	0	0	No	0	0	No	No	No
01-300-0060																
2005	8/25/04	1	Yes	2	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	8/25/04	2	Yes	2	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	9/30/04	3	Yes	2	7.0	0	0	0	0	0	No	0	0	No	No	No
	10/1/04	4	Yes	2	7.0	0.30	0	0	0	0	No	0	0	No	No	No
01-300-0095																
2005	10/7/04	1	Yes	TLTM	7.0	5.00	0	0	0	0	No	50	60	No	No	No
	10/7/04	2	Yes	TLTM	7.0	3.00	0	0	0	0	No	25	30	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
01-300-0150																
2005	10/7/04	1	Yes	16	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	10/7/04	2	Yes	22	7.0	1.00	0	0	0	0	No	0	0	No	No	No
	11/8/04	3	Yes	48	7.0	0.80	0	0	0	0.20	No	0	10	No	No	No
	11/8/04	4	Yes	29	7.0	0.60	0	0	0	0	No	0	0	No	No	No
01-300-0160																
2005	10/7/04	1	Yes	8	7.0	1.00	0	0	0	0	No	0	0	No	No	No
	10/7/04	2	Yes	10	7.0	1.00	0	0	0	0	No	0	0	No	No	No
	11/8/04	3	Yes	8	7.0	2.00	0	0	0	0	No	0	0	No	No	No
	11/8/04	4	Yes	6	6.5	0.60	0	0	0	0	No	0	0	No	No	No
01-300-0520																
2005	10/22/04	1	Yes	15	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	10/22/04	2	Yes	15	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	11/29/04	3	Yes	6	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	11/29/04	4	Yes	6	7.0	0.20	0	0	0	0	No	0	0	No	No	No
01-400-0015																
2005	9/30/04	3	Yes	TLTM	6.0	1.00	0	0	0	0.80	No	0	50	No	No	No
	10/1/04	4	Yes	TLTM	7.0	5.00	0	0	0	0	No	0	0	No	No	No
01-400-0890																
2005	11/29/04	3	Yes	HEAVY							No	0	0	No	No	No
01-400-0900																
2005	8/4/04	1	Yes	48	6.5	0.80	0	0	0	0	No	0	0	No	No	No
	8/4/04	2	Yes	48	6.5	0.60	0	0	0	0	No	0	0	No	No	No
	9/15/04	3	Yes	38	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	9/15/04	4	Yes	38	6.5	0.40	0	0	0	0	No	0	0	No	No	No
01-400-0925																
2005	8/4/04	2	Yes	WHITE LI							No			No	No	No
02-100-0103																
2005	12/16/04	3	Yes	0.70	7.0	0	0	0	0	0.80	No	0	0	No	No	No
	12/17/04	4	Yes	0.70	7.0	0	0	0	0	0.80	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
02-300-0165																
2005	11/10/04	1	Yes	POOLED	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	11/10/04	2	Yes	POOLED	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	12/20/04	3	Yes	SLOW	6.5	0.30	0	0	0	0	No	0	0	No	No	No
	12/20/04	4	Yes	SLOW	6.5	0.30	0	0	0	0	No	0	0	No	No	No
02-400-0045																
2005	10/22/04	1	Yes	2	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	10/22/04	2	Yes	2	7.0	1.00	0	0	0	0	No	0	0	No	No	No
	12/16/04	3	Yes	1	6.5	0.40	0	0	0	0	No	0	0	No	No	No
	12/17/04	4	Yes	1	6.5	0.40	0	0	0	0	No	0	0	No	No	No
02-400-0050																
2005	10/22/04	1	Yes	0.06	7.0	0	0	0	1	10.00	Yes 50,000	0	70	No	No	No
	10/22/04	2	Yes	0.08	7.0	0	0	0	1	10.00	No	0	70	No	No	No
02-400-0060																
2005	9/22/04	1	Yes	0.08	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	9/22/04	2	Yes	0.11	7.0	0	0	0	0	0	No	0	0	No	No	No
	10/25/04	3	Yes	0.13	7.0	0	0	0	0	0	No	0	0	No	No	No
	10/25/04	4	Yes	0.13	7.0	0	0	0	0	0	No	0	0	No	No	No
02-400-0085																
2005	10/25/04	4	Yes	0.08	6.5	0.60	0	0	0	0	No	0	0	No	No	No
02-400-0169																
2005	11/10/04	1	Yes	10	7.0	0.60	0	0	0	0	No	0	20	No	No	No
	11/10/04	2	Yes	2	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	12/20/04	3	Yes	2	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	12/20/04	4	Yes	5	7.0	0.30	0	0	0	0	No	0	0	No	No	No
03-100-0455																
2005	12/21/04	1	Yes	3	7.0	0	0	0	0	0	No	0	0	No	No	No
	12/21/04	2	Yes	3	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/20/05	3	Yes	0.24	6.0	0	0	0	0	0	No	0	0	No	No	No
	1/20/05	4	Yes	0.24	6.0	0	0	0	0	0	No	0	0	No	No	No
03-100-0475																
2005	12/21/04	1	Yes	25	7.0	0	0	0	0	0	No	0	0	No	No	No
	12/21/04	2	Yes	25	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
03-200-0965																
2005	12/29/04	1	Yes	29	6.5	0	0	0	0	0	No	0	0	No	No	No
	12/29/04	2	Yes	29	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/28/05	3	Yes	MEDIUM	6.5	0	0	0	0	0	No	0	0	No	No	No
	1/28/05	4	Yes	MEDIUM	7.0	0	0	0	0	0	No	0	0	No	No	No
03-300-0005																
2005	11/10/04	1	Yes	3	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	11/10/04	2	Yes	5	7.0	0.40	0	0	0	0	No	0	0	No	No	No
	12/27/04	3	Yes	5	6.5	3.00	0	0	0	0	No	0	0	No	No	No
	12/28/04	4	Yes	5	6.0	3.00	0	0	0	0	No	0	0	No	No	No
03-300-0615																
2005	12/28/04	1	Yes	1	7.0	0	0	0	0	0	No	0	0	No	No	No
	12/28/04	2	Yes	1	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/25/05	3	Yes	0.26	7.0	0.60	0	0	0	0	No	0	30	No	No	No
	1/25/05	4	Yes	0.26	7.0	0.60	0	0	0	0	No	0	20	No	No	No
03-300-0655																
2005	12/28/04	1	Yes	0.67	6.0	0.20	0	0	0	0	No	0	0	No	No	No
	12/28/04	2	Yes	0.67	6.0	0	0	0	0	0	No	0	0	No	No	No
03-300-0660																
2005	12/28/04	1	Yes	TLTM	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	12/28/04	2	Yes	TLTM	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/25/05	3	Yes	LOW	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	1/25/05	4	Yes	LOW	7.0	0.60	0	0	0	0	No	0	0	No	No	No
03-300-0675																
2005	1/5/05	1	Yes	0.50	7.0	0	0	0	0	0	No	0	0	FUEL ODOI	ORANGE	Yes
	1/5/05	2	Yes	0.50	7.0	0	0	0	0	0	No	0	0	FUEL ODOI	ORANGE	Yes
	1/25/05	3	Yes	3	7.0	0	0.10	0	0	0	No	0	0	FUEL	ORANGE	Yes
	1/25/05	4	Yes	3	7.0	0	0	0	0	0	No	0	0	FUEL	ORANGE	Yes
04-200-0270																
2005	12/29/04	1	Yes	TLTM	7.0	0.20	0	0	0	0	No	0	0	No	No	No
	12/29/04	2	Yes	TLTM	7.0	0	0	0	0	0	No	0	0	No	No	No
	2/11/05	3	Yes	MEDIUM	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	2/11/05	4	Yes	MODERA	7.0	0.30	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
04-400-0260																
2005	2/11/05	3	Yes	0.04	6.0	0	0	0	0	0	No	0	10	No	No	No
	2/11/05	4	Yes	0.04	6.0	0	0	0	0	0	No	0	10	No	No	No
06-500-0110																
2005	1/18/05	1	Yes	LOW	6.0	0.20	0	0	0	0	No	0	0	No	No	No
	1/18/05	2	Yes	LOW	6.0	0.80	0	0	0	0	No	0	0	No	No	No
	3/2/05	3	Yes	LOW	7.0	0	0	0	0	0	No	0	0	No	No	No
	3/2/05	4	Yes	LOW	6.0	0.40	0	0	0	0	No	0	30	No	No	No
07-100-0090																
2005	1/19/05	1	Yes	3	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/19/05	2	Yes	9	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	3/3/05	3	Yes	0.59	7.0	0.60	0	0	0	0.20	No	0	0	No	No	No
	3/3/05	4	Yes	0.59	7.0	1.00	0	0	3	3.00	Yes 4	0	40	No	No	No
07-400-0070																
2005	1/19/05	1	Yes	0.63	7.0	0.30	0	0	0.75	0.40	No	0	0	No	No	No
	1/19/05	2	Yes	0.63	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	3/3/05	3	Yes	0.42	7.0	0.60	0	0	0	0.30	No	0	0	No	No	No
	3/4/05	4	Yes	0.42	7.0	0.20	0	0	1.50	0.80	No	0	0	No	No	No
10-500-0025																
2005	1/21/05	1	Yes	HEAVY	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	1/21/05	2	Yes	HEAVY	7.0	0.20	0	0	0	0	No	0	0	No	No	No
	3/7/05	3	Yes	LOW	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	3/7/05	4	Yes	LOW	7.0	0	0	0	0	0	No	0	0	No	No	No
13-300-0135																
2005	1/24/05	1	Yes	MEDIUM	6.5	0	0	0	0	5.00	No	0	0	No	No	No
	1/24/05	2	Yes	MEDIUM	6.5	0	0	0	0	5.00	No	0	0	No	No	No
	3/10/05	3	Yes	HEAVY	6.5	0.40	0	0	0	4.00	No	0	0	No	No	No
	3/10/05	4	Yes	HEAVY	6.5	0.40	0	0	0	4.00	No	0	0	No	No	No
13-300-0140																
2005	1/24/05	1	Yes	19	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/24/05	2	Yes	19	7.0	0.60	0	0	0	0	No	0	0	No	No	No
	3/10/05	3	Yes	29	6.5	0.80	0	0	0	0	No	0	0	No	No	No
	3/10/05	4	Yes	29	7.0	0.60	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
13-300-0150																
2005	1/24/05	1	Yes	1	7.0	0	0	0	0	0	No	0	0	No	No	No
	1/24/05	2	Yes	2	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	3/10/05	3	Yes	3	6.0	0.40	0	0	0	0	No	0	0	No	No	No
	3/10/05	4	Yes	3	7.0	0.60	0	0	0	0	No	0	0	No	No	No
13-300-0155																
2005	3/15/05	1	Yes	10	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	3/15/05	2	Yes	9	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	4/18/05	3	Yes	48	6.5	0.40	0	0	0	0	No	0	0	No	No	No
	4/18/05	4	Yes	48	6.5	0.40	0	0	0	0	No	0	0	No	No	No
13-300-0184																
2005	3/15/05	1	Yes	LOW	7.0	0.80	0	0.30	0	> 0.00	No	0	50	No	No	No
	3/15/05	2	Yes	LOW	7.0	1.00	0	0.30	0	> 0.00	No	0	50	No	No	No
	4/18/05	3	Yes	MODERA	6.5	0			0.25		No	0	45	No	No	No
	4/18/05	4	Yes	MODERA	6.0	0.60			0.20		No	0	60	No	No	No
13-300-0185																
2005	3/21/05	1	Yes	13	7.0	0.40	0	0	0.25	2.00	Yes 1	0	0	No	No	No
	3/21/05	2	Yes	13	7.0	0.60	0	0	0.25	2.00	No	0	0	No	No	No
	4/18/05	3	Yes	29	6.0	0.20	0	0	0	2.00	No	0	0	No	No	No
	4/18/05	4	Yes	29	5.5	0.20	0	0	0	2.00	No	0	0	No	No	No
13-300-0228																
2005	3/21/05	1	Yes	0.53	6.0	2.50	0	0	0.50	0	No	0	0	No	No	No
	3/21/05	2	Yes	0.53	6.0	2.50	0	0	0.25	0.40	No	0	0	No	No	No
	4/20/05	3	Yes	1	5.5	0.20	0	0	0	0	No	0	0	No	No	No
	4/20/05	4	Yes	1	5.5	0.20	0	0	1	0	No	0	0	No	No	No
50-200-0055																
2005	4/4/05	1	Yes	MODERA	6.5	0	0	0	0	0	No	0	0	No	No	No
	4/5/05	2	Yes	MODERA	6.5	0.40	0	0	0	0	No	0	0	No	No	No
79-400-0340																
2005	4/11/05	1	Yes	29	5.0	0	0.20	0	0	0	No	0	0	No	No	No
	4/11/05	2	Yes	29	5.0	0.40	0.20	0	0	0	No	0	0	No	No	No
	5/17/05	3	Yes	6	6.0	0.60	0.40	> 10.00	0.25	> 10.00	No	0	40	CHEMICAL	No	No
	5/17/05	4	Yes	6	5.0	0.60	0.20	> 10.00	0	> 10.00	No	0	40	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

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

Elevated readings have been underlined.

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

Record Selection Criteria: SELECT * FROM qryAllData WHERE (((flow)=Yes)) and ((PermitYear)="2005")

APPENDIX C

Summary Report for FY 04/05 IBI Studies

Third Creek - West High School (mile 2.7) - Apr 05 2005

Drainage Area: 11.6 sq.mi.

Ecoregion: Central Appalachian Ridges and Valleys

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<9	9 - 16	>16	11	3
Number of darter species	<2	2 - 3	>3	1	1
Number of sunfish species, less Micropterus	<2	2	>2	1	1
Number of sucker species	<2	2	>2	2	3
Number of intolerant species	<2	2	>2	0	1
Percent of individuals as tolerant species	>36%	18% - 36%	<18%	25.60%	3
Percent of individuals as omnivores and stoneroller species	>44%	22% - 44%	<22%	28%	3
Percent of individuals as specialized insectivores	<16%	16% - 31%	>31%	17.30%	3
Percent of individuals as piscivores	<2%	2% - 4%	>4%	1%	1
Catch rate(average number of fish per 300 sq. ft. sampling unit)	<26	26 - 52	>52	13	1
Percent of individuals as hybrids	0	TR-1%	0%	0.00%	5
Percent of individuals with disease, tumors, fin damage, and other anomalies	>5%	2% - 5%	<2%	14.20%	1
					26

very poor/poor

Common Name	Scientific Name	Count	Anomalies
Largescale stoneroller	*Campostoma oligolepis*	64	7
Striped shiner	*Luxilus chrysocephalus*	6	
Bluntnose minnow	*Pimephales notatus*	1	
Blacknose dace	*Rhinichthys atratulus*	73	8
Creek chub	*Semotilus atromaculatus*	58	26
White sucker	*Catostomus commersoni*	10	
Northern hog sucker	*Hypentelium nigricans*	3	
Bluegill	*Lepomis macrochirus*	20	
Largemouth bass	*Micropterus salmoides*	3	
Snubnose darter	*Etheostoma simoterum*	50	
Banded sculpin	*Cottus carolinae*	1	
		289	**41**

Index of Biotic Integrity

Williams Creek -(mile .8) - 6/30/05

Drainage Area

Ecoregion: Central Appalachian Ridge and Valley

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 *Micropterus*	<2	2	>2	0	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%	99.00%	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%	0.00%	1
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	3
Catch rate(average number of fish per 300 sq. ft. sampling unit) (28 sq.m)	<22	22 - 43.8	>43.8	61.8	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%	11.00%	1
IBI					**24**
IBI Classification					**Poor**

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

E.P.T. Families Present **Score: ? (Poor)**

E: Ephemeroptera (1 genus), Tricorythidae (1 genus)
P: none
T: Hydropsychidae (4 genuses)

Comments: Poor bug diversity at this location

River	Williams Cr	Date	6/30/2005			Crew	Rsain, Cfarmer, Mcampen, Dwhite						
Station	greenway	St Time	9:30	End Time	13:30					meters__*_		Tot length	150.00
Gear	Electro	St Mile	0.8	End Mile	1.1	Page	1 of 1			Feet___		YOY	60

	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type		
Species Name	**Pool**	**RUN**	**Riffle**	**Pool**	**RUN**	**RIFFLE**	**Pool**	**Run**	**Pool**	**Riffle**	**Trophic**	**Total**
central stoneroller	32	18	8	42	14	18	20	9	63	22	OMNIV	**246**
												0
striped shiner											OMNIV	**0**
												0
blacknose dace	80	46	4	32	23	24	28	42	60	20	INSECT	**359**
												0
creek chub	2	0	0	0	0	0	6	0	3	0	INSECT	**11**
												0
northern hogsucker	0	0	0	0	0	0	0	0	2	0	INSECT	**2**
un ID Mosquito fish												**0**
banded sculpin											INSECT	**0**
												0
snubnose darter											SPECIAL	**0**
Fathead												**0**
bluegill											INSECT	**0**
Small Mouth Bass											PISCIV	**0**
green sunfish											INSECT	**0**
Black Redhorse											INSECT	**0**
rockbass											PISCIV	**0**
Crayfish	0	0	0	0	0	9	0	0	0	0	YOY	
Young of Year	14	7	5	9	15	0	0	3	4	3	60	
Hybrid											Anom	
Anomolies	12	7	5	7	9	5	6	2	14	1	68	11.0
Total per Unit	114	64	12	74	37	42	54	51	128	42		618
Comments	Site adjacent to lower boundary Wee Williams to Rootwad revitment									Catch Rate	----	61.8

Index of Biotic Integrity

Williams Creek -(mile 1.3) - 6/30/05

Drainage rea

Ecoregion: Central Appalachian Ridge and Valley

Metric Description	Scoring Criteria			Observed	Score
	1	3	5		
Total number of native fish species	<10	(10 - 19)	>19	5	1
Number of darter species	<2	2	>2	0	1
Number of sunfish species, less *Micropterus*	<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%	95.00%	1
Percent of individuals as omnivores and stoneroller species	>40%	21% - 40%	<21%	55%	1
Percent of individuals as specialized insectivores	<19%	19% - 36%	>36%	0.00%	1
Percent of individuals as piscivores	<2 %	2 % - 4 %	>4 %	0.00%	3
Catch rate(average number of fish per 300 sq. ft. sampling unit) (28 sq.m)	<22	22 - 43.8	>43.8	72.6	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%	7.70%	1
IBI					**22**
IBI Classification					**Poor**

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

E.P.T. Families Present **Score: (Poor)**

E: Ephemeroptera (1 genus), Tricorythidae (1 genus)
P: none
T: Hydropsychidae (4 genuses)

Comments: Poor bug diversity at this location

River	Williams Cr	Date	6/30/2005			Crew	Rsain, Cfarmer, Mcampen, Dwhite					
Station	2	St Time	0:00	End Time	0:00					meters__*_	Tot length	100.00
Gear	Electro	St Mile	1.3	End Mile	1.5	Page	1 of 1			Feet___	YOY	0

	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type	habitat type		
Species Name	**RUN**	**Pool**	**Riffle**	**Run**	**Riffle**	**Run**	**Pool**	**Run**	**Pool**	**Riffle**	**Trophic**	**Total**
central stoneroller	4	51	80	47	1	13	41	25	0	0	OMNIV	262
												0
striped shiner											OMNIV	0
												0
blacknose dace	14	31	31	41	13	21	17	27	0	0	INSECT	195
												0
creek chub	16	0	0	1	2	0	0	0	0	0	INSECT	19
												0
northern hogsucker	1	0	0	0	0	0	0	0	0	0	INSECT	1
un ID Mosquito fish												0
banded sculpin											INSECT	0
												0
snubnose darter											SPECIAL	0
Fathead												0
bluegill	1	1	0	0	0	0	0	0	0	0	INSECT	2
Small Mouth Bass											PISCIV	0
green sunfish											INSECT	0
Black Redhorse											INSECT	0
rockbass											PISCIV	0
Crayfish	0	0	2	0	0	0	0	0	0	0	YOY	
Young of Year											0	
Hybrid											Anom	
Anomolies	6	15	12	0	0	4	0	0	0	0	37	7.7
Total per Unit	**36**	**83**	**111**	**89**	**16**	**34**	**58**	**52**	**0**	**0**		**479**
Comments	Site adjacent to upper boundary Wee Williams to more wooded area									Catch Rate	----	72.6

APPENDIX D

City of Knoxville Solid Waste Office 2004 Annual Report

Solid Waste Section
2004 Annual Report

CITY OF KNOXVILLE
BILL HASLAM, MAYOR

Department of Community & Neighborhood Services
Sam Anderson, Director

Public Service Division
Bob Whetsel, Director

INTRODUCTION

In 2004, we continued to show positive progress in the development of our solid waste programs. This is the third 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 seventh full year of operations at the Household Hazardous Waste Collection Center. The Solid Waste Office is in its third year of 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 2004.

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

* The total waste stream decreased by 15,253.92 tons from 2003
* The diversion rate decreased to 56.26% from 59.46% in 2003
* The recycling rate increased to 28.02% from 27.16% in 2003

The total waste stream shows a decrease for the first time in two years. This decrease is attributed to decreased use of the Solid Waste Management Facility (Transfer Station) by large business customers who took their material to the Waste Connections Transfer Station and a decrease in yard waste collection. Diversion and recycling rates have remained level over the last five years, varying a few points up or down each year.

I. RECYCLING

A total of 5,485.97 tons of recyclables was collected at the City's eleven drop-off recycling centers in 2004. This number is level with recyclables from 2001 to 2003, only up by 220 tons. Most commodities increased except steel and plastic showing a slight decrease. Mixed paper and cardboard showed the biggest increases.

Goodwill Industries is in the fourth 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 $112,481.80. This, and the contract with Waste Management for the other materials, combined to save the City $163,704.62 in operational costs. Fourth year contract options were approved with both companies.

In 2004, the City continued processing and marketing cardboard brought to the Solid Waste Management Facility (SWMF). We handled 72.57 tons in 2004. Businesses, in particular, are encouraged to bring recyclables to the SWMF free of charge.

II. MUNICIPAL SOLID WASTE (MSW)

A total of 52,287.78 tons of garbage was collected from Knoxville homes in 2004 as part of the weekly garbage collection service the City offers via its contractor, Waste Connections. 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	$6.03 / house/month	41,567 residents
* Backdoor Collection	$7.54 / 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 2004 were as follows:

* Jul. - Sep.	$23.29 / ton
* Oct. - Dec.	$23.55 / ton

III. COMPOSTING

A total of 33,085.57 tons of yard waste was collected by City crews in 2004. This number is down by 2,984.32 tons from last year. The Solid Waste Department attributes this decrease to the storms in early spring of 2003 that added to that year's total. 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 2004 at Shamrock were:

* Jan. - Dec.	$34 / ton

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 and Demolition waste (C&D) from Municipal Solid Waste. 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 2004, we diverted 25,868 tons of C&D waste to a Class III landfill. This was 68% of the waste received at the Transfer Station. The total number of vehicles using the facility in 2004 was over 62,000, including City of Knoxville vehicles. Total revenue from charge and cash customers was $498,307.00

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 2004, this facility was visited by 5,229 vehicles, up 309 from 2003, and processed 172 tons of HHW, 36% of which was latex paint.

Rather than pay the City's contracted hazardous materials hauler to dispose of the latex paint, we have developed an in-house paint re-manufacturing facility. Last year we produced 2,017 gallons of high quality paint of which 1,867 gallons were sold to businesses for a income of $5,300.

V. EDUCATION

The Solid Waste Office engaged in many activities and special programs throughout 2004 to educate Knoxvillians 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 eight 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 257.42 tons of old books was collected from the schools and from 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 2004 which celebrated the 34th anniversary of Earth Day at Worlds Fair Park. Over 10,000 people attended the event which had 90 + exhibitors from the environmental community.

One-Day Computer Collection Events - One-day computer collection events were held in January and July at the Staples store with ten sponsors contributing to the success of the event. Approximately 1200 residents participated in the events with just over 53 tons of electronic materials collected. The material was recycled at 5R Processors in Clinton, TN.

Other - In 2004, the Solid Waste Office continued to produce and distribute educational brochures and promotional items. Members of the Solid Waste Office participated in several educational events in 2004 using our exhibit booth display at events including the Dogwood Arts' House and Garden Show, and America Recycles Day Events. Over 200 school children toured the SWMF and listened to a presentation at the HHW facility.

Waste Connections, contractor for the collection of residential solid waste, began a subscription Curbside Recycling Program in the city. The program started in November of 2004 and Waste Connections is to provide statistics on participation to the Solid Waste Office throughout 2005. City of Knoxville residents can call Waste Connections to request the service or wait until they come into the neighborhood with door hangers describing the service. Materials collected for recycling are cardboard, glass, aluminum, newspaper, and plastics.

Solid Waste Annual Report 2004 City Drop Off Centers	Kroger 5003 N. Broadway	Kroger 4501 Asheville Hwy	Kroger 5425 Clinton Hwy	Kroger 4818 Kingston Pk.	Kroger 2217 N. Broadway	Goodwill 225 Moody Av.	Kroger 9305 Kingston Pk.	Kroger 4440 Western Av.	Food City 5941 Kingston Pk.	Food City 2939 Alcoa Hwy.	Totals
Aluminum	18778 lbs	4080 lbs	11139 lbs	21434 lbs	9424 lbs	13982 lbs	30898 lbs	7435 lbs	4189 lbs	7034 lbs	64.20 tons
Steel	23735 lbs	6531 lbs	16678 lbs	38656 lbs	15252 lbs	19515 lbs	47553 lbs	12640 lbs	200 lbs	400 lbs	90.58 tons
Plastics	46447 lbs	17558 lbs	41086 lbs	70547 lbs	26140 lbs	49077 lbs	103900 lbs	24121 lbs	4231 lbs	7516 lbs	195.31 tons
Clear Glass	78120 lbs	37830 lbs	49545 lbs	161000 lbs	74010 lbs	75455 lbs	207630 lbs	35782 lbs	0 lbs	0 lbs	359.69 tons
Brown Glass	59475 lbs	25230 lbs	37735 lbs	121720 lbs	57280 lbs	57535 lbs	158237 lbs	27290 lbs	0 lbs	0 lbs	272.25 tons
Green Glass	48265 lbs	20740 lbs	30680 lbs	97420 lbs	44930 lbs	46510 lbs	128433 lbs	22288 lbs	0 lbs	0 lbs	219.63 tons
Newspaper	563815 lbs	189500 lbs	412240 lbs	594406 lbs	320240 lbs	371370 lbs	1087446 lbs	202720 lbs	34775 lbs	74735 lbs	1,925.62 tons
Mixed Paper	418170 lbs	149740 lbs	305120 lbs	727620 lbs	233400 lbs	320890 lbs	1121800 lbs	178890 lbs	15890 lbs	38140 lbs	1,754.83 tons
Cardboard	65010 lbs	34200 lbs	135730 lbs	90590 lbs	29260 lbs	101770 lbs	465155 lbs	62330 lbs	0 lbs	14903 lbs	499.47 tons
City Processed Cardboard	67660 lbs	3340 lbs	0 lbs	75820 lbs	54180 lbs	0 lbs	7760 lbs	0 lbs	0 lbs	0 lbs	104.38 tons
Drop Off Center Totals	694.74 tons	244.37 tons	519.98 tons	999.61 tons	432.06 tons	528.05 tons	1,679.41 tons	286.75 tons	29.64 tons	71.36 tons	5,485.97 tons

KPD / Lorain St. Cardboard / Paper Recycled	22.44 tons
Downtown CBD Recycling	42.27 tons
Phone Books Recycled	257.42 tons

	Leaves	Brush	Total
Mulching Site	6,723.95 tons	26,361.62 tons	33,085.57 tons

	Scrap Metal	Cardboard	Rec. Tlr. / Carpet Backing	HHW REC.	HHW Divert.	Pallets
Transfer Station	706.66 tons	71.57 tons	103.71 tons	75.42 tons	80.65 tons	183.30 tons

	Const. & Demolition	Compacted Trash	Computers	Tires	Total
Transfer Station Cont.	25,868.00 tons	10,451.04 tons	56.97 tons	120.24 tons	37,717.56 tons
				10916	

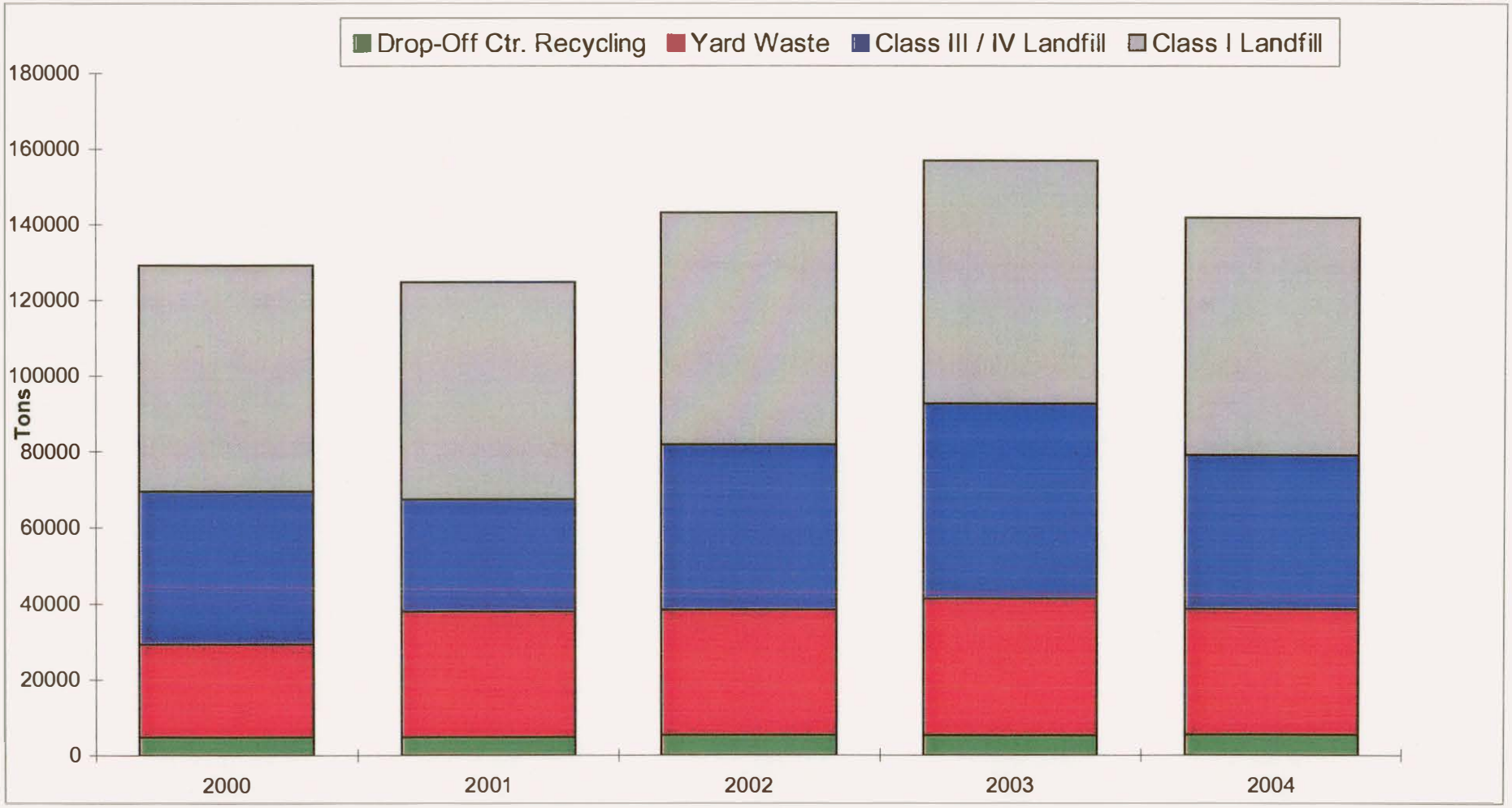
	Household Trash	Misc. Trash	Total
Landfill Class I	52,287.78 tons	33.74 tons	52,321.52 tons

	Transfer Station	Construction	Codes	Total
Landfill Class III	25,868.00 tons	11,896.00 tons	2,674.00 tons	40,438.00 tons

Total Waste Recycled	40,211.54 tons
Total Waste Diverted, Class III & Recyling	80,730.19 tons
Total Waste Landfilled, Class I	62,772.56 tons
Total Wastestream	143,502.75 tons

Recycling	28.02%
Diversion	56.26%
* *Recycling / Total WS*	6.45%
* Yard Waste Not Included w/ just residential trash	9.50%

Destination of Knoxville's Residential Waste Stream, 2000 - 2004



	2000	2001	2002	2003	2004
Diversion Rate	**54.15%**	**54.65%**	**57.81%**	**59.46%**	**56.26%**
Recycling Rate	**23.29%**	**31.35%**	**27.95%**	**27.16%**	**28.02%**

APPENDIX E

Stream Restoration/Debris Removal Contract Report
Tennessee Izaak Walton League

Weir Removal Program – Grant #3

Charles Farmer
Director of Stream and Stormwater Management
Tennessee Izaak Walton League

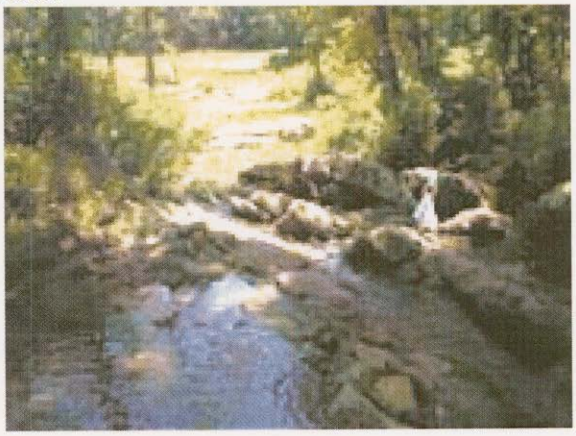
Abstract:

The third contract of the Weir survey and removal program has accomplished as much as the first two contracts. The program entails a ground survey of urban creeks throughout Knoxville where-in weirs were located, documented, and assessed as to whether they were necessary for removal. Project plans are then composed for each of the weirs that were surmised to require removal, and subsequently the weirs have been removed.

Weir #1: Williams Creek at Wee Williams Golf Course

Before

After



A weir was removed from this scenic section of Williams Creek running through the Wee Williams Golf Course. The weir was collecting trash and debris as well as impairing the sediment transport capability. One bag of trash was collected and debris removed.

Weir #2: East Fork of Third Creek

Before

After

This recently fallen tree was removed from the East Fork of Third Creek near Tyson Park. This tree would have collected more debris, developing into a larger obstruction if left unattended.

Weir #3: East Fork of Third Creek

Before

After

This large weir covering the entire stream was removed from the East Fork over most of one full field day. Two bags of trash and two tires were removed along with the debris.

Weir #4: East Fork of Third Creek

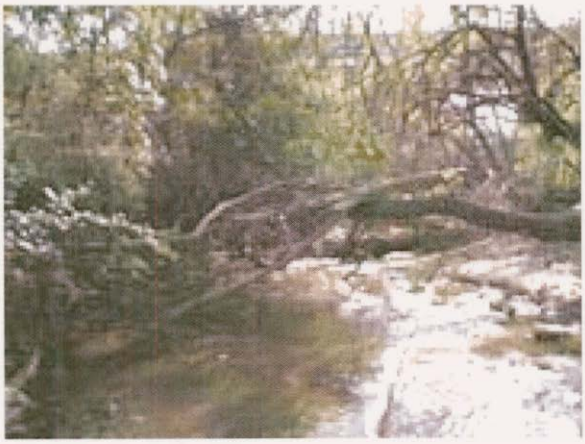
Before

After

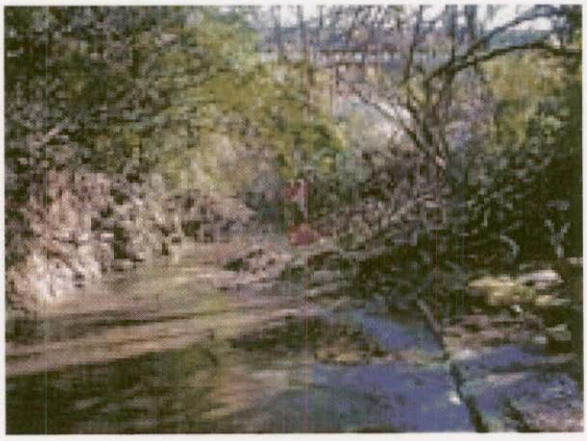
At this site we removed two fallen trees, debris, and trash and blocked 100% of the stream. The blockage was causing increased erosion towards a rail line that would have eventually been impaired by the stream. Blockage, debris, and 1.5 bags of trash were removed from the creek.

Weir #5: East Fork of Third Creek

Before



After

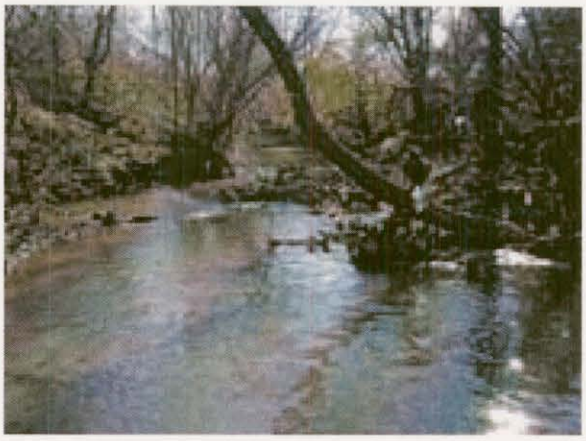


This tree had recently collapsed into the East Fork and had started to accumulate more debris. The tree was removed from the creek before a potentially large weir was formed.

Weir #6: East Fork of Third Creek

Before

After



This removal encompassed two obstructions, one in foreground and one in background of the photos, which were in need of removal. Both obstructions covered the entire stream and were causing increased siltation of the stream bed and erosion of the stream channel.

Weir #8: East Fork of Third Creek

Before

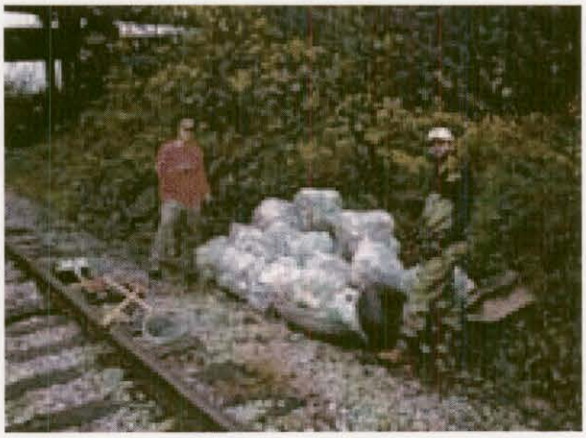
After

Pictured here is a weir that blocked roughly two thirds of the stream surface and was causing increased impairment to the opposing Streambank. The weir was removed along with a half bag of trash.

Weir #7: East Fork of Third Creek

Before

After



This weir had an exorbitantly large trash deposit that was removed over two field days other than removal days. After the initial 22 bags of trash, 3 tires and 1 gas tank were removed a weir removal was attempted but thwarted by high water at the area. A second removal day in August proved successful in the removal of the obstruction. An additional 10 bags of trash were collected before the removal of the weir.

Weir #9: East Fork of Third Creek

Before After

As with the previous weir this site involved the removal of a blockage covering roughly two-thirds the stream surface. The obstruction and trash were removed from the site.

Weir #10: East Fork of Third Creek

Before

After

This weir, encompassing one main obstruction and trash, was removed from the East Fork. One bag of trash was removed from the site along with the removal of the obstruction.

Weir #11: East Fork of Third Creek

Before

After

The obstruction above was a particularly bad case where in multiple obstructions were removed as well as two bags of trash. The weir blocked 100% of the stream and was exacerbating an erosion problem in the area that had been previously reinforced with rip-rap.

Weir #12: East Fork of Third Creek

Before

After

This obstruction in the east fork along side a train track was causing increased erosion and trash collection. The weir, which covered roughly 80% of the stream surface, was removed along with 1.5 bags of trash.

Weir #13: East Fork of Third Creek

Before

During

During

After

This weir was located over a culvert directly below Rohm Haas and was totally obstructed by debris including an old recliner. The water level of the pool that had been created by the obstruction dropped roughly 2 feet after the obstructions had been removed. This blocked culvert was causing regular flooding of the creek onto the adjacent rail line leaving debris deposits that could have impaired rail traffic. Also, outfalls from Rohm Haas were being held and concentrated in this one area rather than being diluted as it is transported downstream.

A new technique was utilized to destruct this strainer due to it submersion below the pool. Skidding tongs, a rope, and a come-a-long were used to pull out the main obstructions to the tributary flow.

Weir #14: Fourth Creek at Northshore Dr.

Before

After

Where fourth creek runs below Northshore Dr., depicted above, a large weir had formed over a large portion of the culvert. In recent years this area has had an increase in roadway flooding, specifically a problem at this site. This weir exacerbated the flooding problem and would have undoubtedly blocked more of the culvert over time. One and a half bags of trash were removed with the weir.

Weir #15: Fourth Creek upstream of Northshore

Before

Before

After

These opposing weirs were located just upstream of Fourth Creek's crossing under Northshore Rd. The first obstruction blocked roughly 75% of the stream surface. The second blocked about 30%. Debris, a wooden palate, and a bag of trash were removed from the stream.

Weir #16: Fourth Creek off Weisgarber

Before

After

This strainer was made up of two large logs and debris that had become ensnared by the logs and the sewer manhole pictured. These 20 and 30 foot logs with a 15-20 inch diameter were removed as well as one half bag of trash.

Weir #17: Fourth Creek off Weisgarber

Before

After

This strainer encompassed a collapsed willow that had blocked the stream and begun collecting debris and trash. The weir was removed as well as about a half a bag of trash. The willow tree branches were cut and planted in order to replace the tree that had been undercut.

Weir #18: Fourth Creek off Old Weisgarber

Before

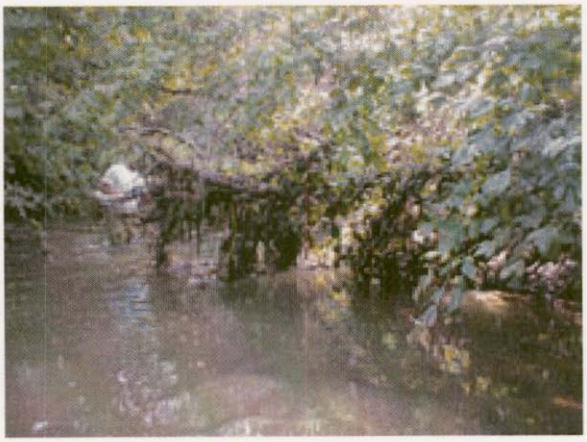
After

At this site a large pine tree had been undercut subsequently collapsed into the creek just below its intersection with Old Weisgarber. Removing this obstruction roughly one week after it occurred thwarted further debris and trash accumulation.

Weir #19: First Creek at N. Broadway

Before

Before



After

This strainer included two stages. The first is depicted above on the left and shows the downstream section of the weir. The second is depicted on right and shows the upstream section. Both sections of the weir were removed as well as a bag of trash

Weir #20: First Creek at Broadway Park

Before

After

This weir, made up of multiple trees and collected debris, was removed from First Creek at Broadway Park. One bag of trash as well as the obstruction was removed.

APPENDIX F

Table of Commercial and Industrial Facility Inspections
For SPAP Compliance

Commerial and Industrial Facilities inspected during 2004-2005

Permit Number	Project Name	Address	Street Name	Inspection Date	Inspector	Water Quality Device
00-001	Wal-Mart Supercenter	10900	Parkside Dr	05/05/2005	R. Jones	Stormceptor
00-002	Lexus of Knoxville	10315	Parkside Dr	06/29/2005	R. Jones/J. Shubzda	
00-003	Toyota of Knoxville	10415	Parkside Dr	06/29/2005	R. Jones/J. Shubzda	
00-004	SuperTarget and Retail Center	11020	Parkside Dr	05/02/2005	R. Jones	Stormceptor STC 7200
00-005	Pilot Food Mart	1826	Western Ave	06/08/2005	J. Shubzda	grass swale
00-006	Sam's Club Fueling Station	8435	Walbrook Rd	05/05/2005	R. Jones	Aqua-Swirl AS-8
01-001	Lakeside Center	2035	Lakeside Center Way	04/27/2005	J. Shubzda	Aqua-Swirl
01-003	Transglobal Gas and Oil Co.	3818	Sutherland Ave.	05/19/2005	J. Shubzda	catch basin inserts
01-004	Frito-Lay Distr. Cnt.	4744	S. Middlebrook Pk.	06/13/2005	J. Shubzda	Suntree grate inlet skimmer box
01-005	Pilot Food Mart	4603	Chapman Hwy.	05/27/2005	J. Shubzda	catch basin inserts
01-006	Hewgley US Army Reserve	1334	E. Weisgarber Rd	06/13/2005	J. Shubzda	Suntree grate inlet skimmer box
01-008	Lowes of East Knoxville	4927	Millertown Pk	05/10/2005	R. Jones	CDS PMSU30_28
01-009	Kroger Store U-558 Fuel Center	4414	Ashville Hwy	06/07/2005	J. Shubzda	Downstream Defender
01-011	Knoxville News Sentinel	2332	News Sentinel Dr	05/19/2005	J. Shubzda	Vortechnics
01-012	Kroger Store U-516 Fuel Center	5003	N. Broadway	05/12/2005	R. Jones	Fossil Filter Hydrocarbon Filter
01-013	Armstrong Relocation Co.	1812	Prosser Rd	05/26/2005	J. Shubzda	sand filter
01-014	Budget Transmission	3000	Sutherland Ave	05/19/2005	J. Shubzda/R.Jones	
02-003	Finish Line Exxon	5706	Ashville Hwy	06/07/2005	J. Shubzda	CDS PMSU30_30
02-004	CarMax	11225	Parkside Dr	05/05/2005	R. Jones	Aqua-Swirl AS-9
02-006	Chapman Hwy Car Wash	4605	Chapman Hwy	05/27/2005	J. Shubzda	sand filter
02-007	Lakeside Center III			04/27/2005	J. Shubzda	ADS unit
02-008	Mazda of Knoxville	8814	Kingston Pk	05/09/2005	Safty Kleen	O/W seperator
02-009	FedEx Ground Package	3700	Middlebrook Pk	05/05/2005	CrystalStream	Crystal Stream 1056
02-010	Cliff Walker Parkside Auto Brokers	10631	Parkside Dr	06/29/2005	J. Shubzda	Fossil Filter Flo Guard
02-011	Kroger Fuel Facility -U525	9501	S. Northshore Dr	04/27/2005	R. Jones	Aqua-Swirl AS-4
02-012	Rocky Hill Express Lube, Inc.	9345	S. Northshore Dr	04/27/2005	J. Shubzda	Stormceptor STC 450i
02-013	Kroger Fuel Facility U-531	4409	Chapman Hwy	05/27/2005	J. Shubzda	Crystal Stream 645
02-014	Speedy Clean Autowash	7670	S. Northshore Dr	04/27/2005	R. Jones	trench insert
03-001	Park West Church of God	7635	Middlebrook Pk	06/13/2005	J. Shubzda	First flush filter and skimmer plate
03-002	Ft. Sanders Park West Med. Cnt.	9352	Park West Blvd	06/22/2005	Jeffery Askew-	Crystal Stream-Oil and grit seperator
03-003	Todd Claiborne Parking Lot	302	North Ave	05/25/2005	J. Shubzda	S/w mang. device and veg. buffer strip
03-004	Chapman Hwy Wal-Mart Supercenter	7420	Chapman Hwy	05/20/2005	R. Jones	Oil and grit seperator
03-005	Shops	7420	Chapman Hwy	05/20/2005	R. Jones	Oil and grit seperator

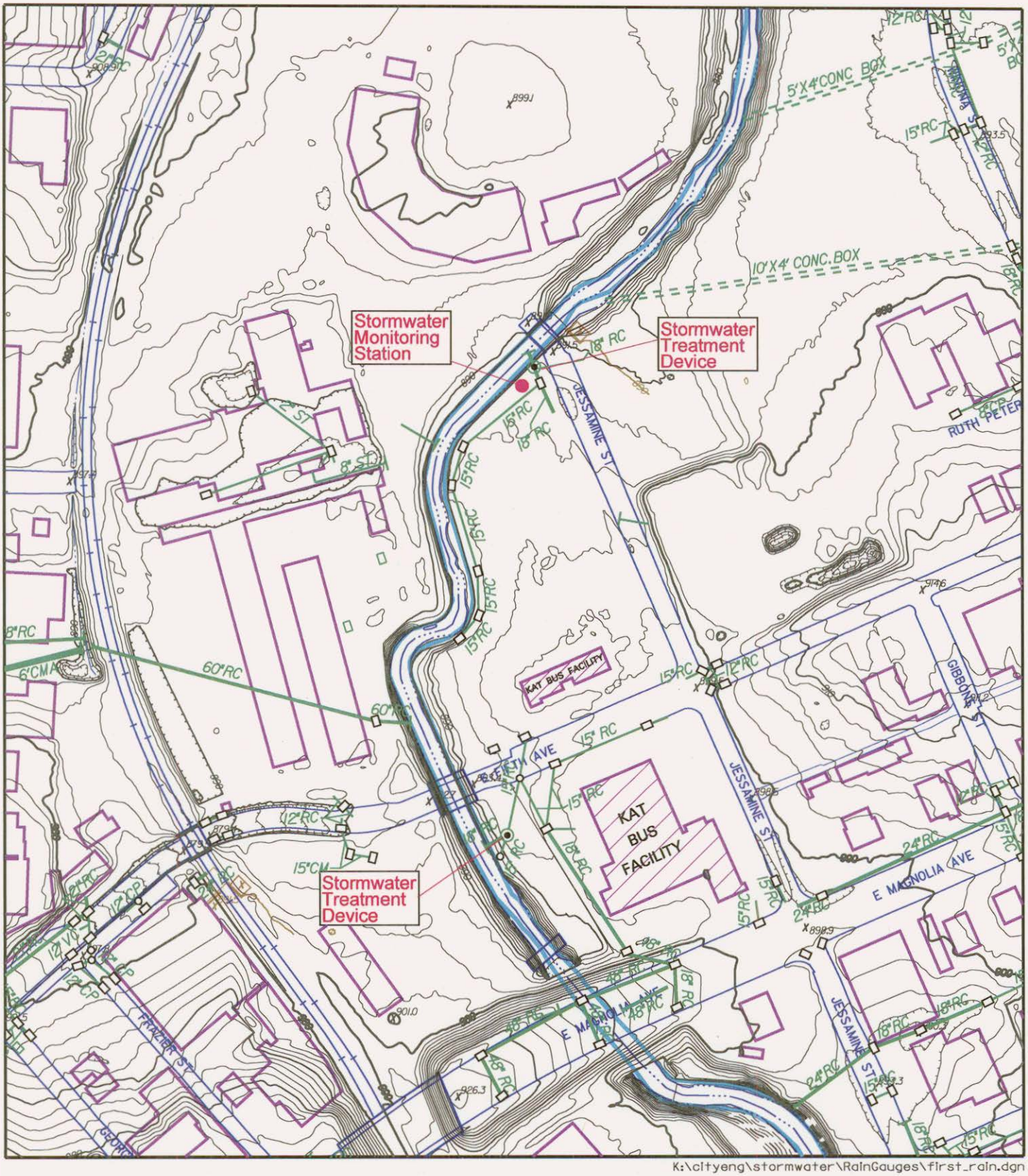
Commerial and Industrial Facilities inspected during 2004-2005

Permit Number	Project Name	Address	Street Name	Inspection Date	Inspector	Water Quality Device
03-007	Knoxville Zoological Gardens	3540	Knoxville Zoo Dr	06/07/2005	J. Shubzda	under construction
03-008	Knoxville/Knox Co. - Animal Cnt.	3201	Division St	06/14/2005	J. Shubzda	Suntree grate inlet skimmer box
03-009	Waste Connections, Inc.	1300	Prosser Rd	04/23/2005	J. Shubzda	Oil absorbent boom
03-010	Kreative Kustoms	1014	Sevier Ave	05/26/2005	J. Shubzda	Oil absorbent boom
03-011	Goodwill Industries	225	W. Moody Ave	06/07/2005	J. Shubzda	grass swale
03-012	Earthfare and Shops	10921	Parkside Dr	05/05/2005	R. Jones	grass lined storm ponds
03-013	Turner's Euro Service	317	Pelham Rd.	06/07/2005	J. Shubzda	vegetated buffer strip
03-015	Murphy Oil @ Wal-Mart Supercenter	120	Green Rd.	06/02/2005	J. Shubzda	Downstream Defender
03-017	Murphy Oil @ Wal-Mart Supercenter	6783	Clinton Highway	06/02/2005	J. Shubzda	Downstream Defender
04-002	Johnny Carino's	210	Lovell Road	06/29/2005	J. Shubzda	Catch Basin Inserts
04-005	Outback Steakhouse Strawberry Plains	7400	Sawyer Ln	06/07/2005	J. Shubzda	4 catch basin inserts
04-007	Kitt's Café	4620	Greenway Drive	06/07/2005	J. Shubzda	2 catch basin inserts
04-009	Bonefish Grill	6610	Kingston Pike	05/19/2005	J. Shubzda/R.	Grate Inlet Skimmer Box
04-010	Pepsi Bottling Group Warehouse Ex.	3501	Middlebrook Pike	06/14/2005	J. Shubzda	Grate Inlet Skimmer Box
04-012	Ruby Tuesday Restaurant	508	East Emory Road	06/22/2005	Jeffery Askew-	CrystalStream
04-013	Clayton Body Shop	4600	Clinton Highway	06/02/2005	J. Shubzda	3 catch basin inserts

APPENDIX G

Stormwater Monitoring Stations

Updated Location Maps



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Stormwater Sampling Locations
First Creek Watershed
E Fifth Av at End of Jessamine St

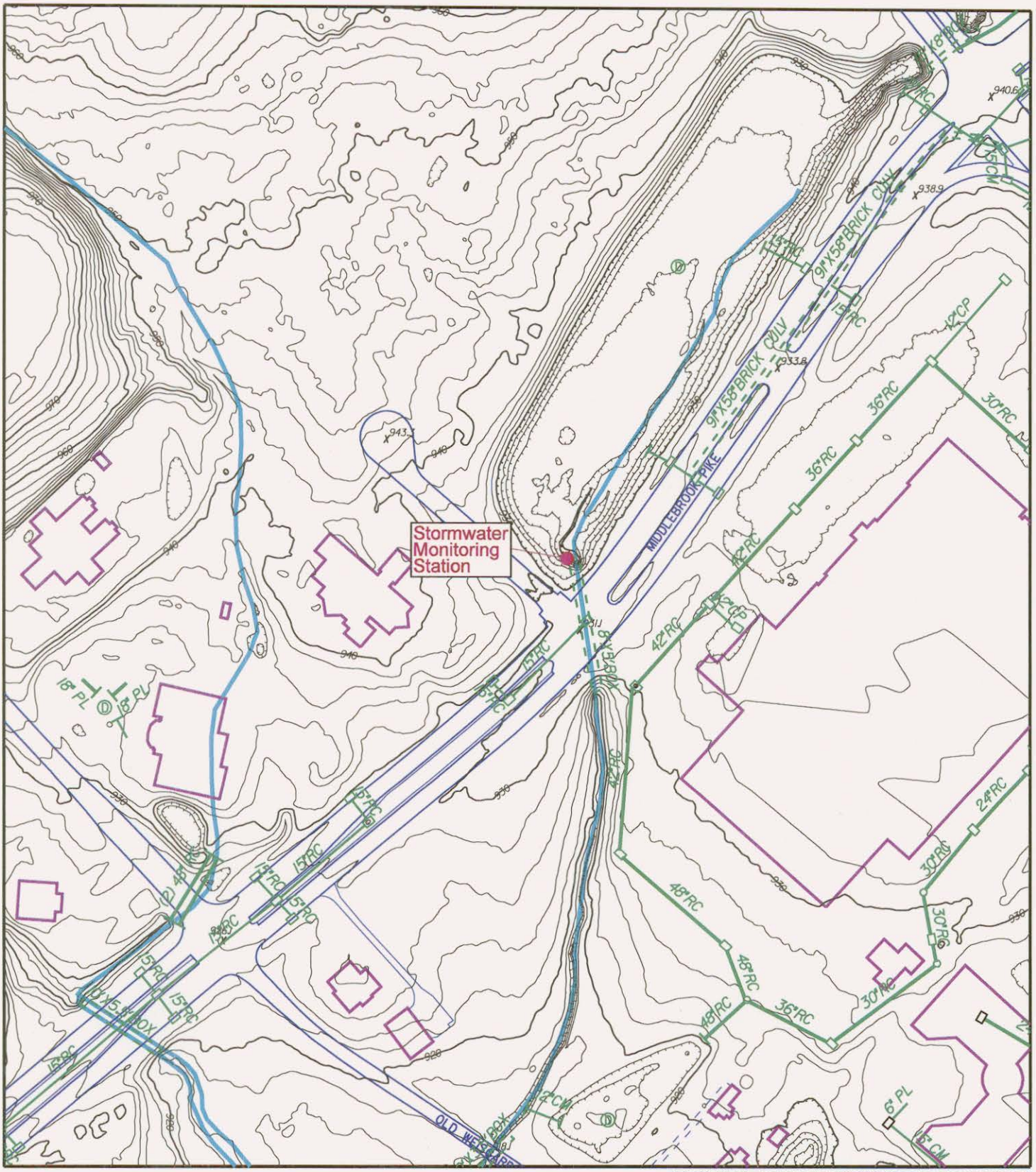
N

City of Knoxville
Dept. of Operations
Stormwater Section

Date: June 30, 2005

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'



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Stormwater Sampling Locations
Fourth Creek Watershed (Acker Place)
Middlebrook Pike at Old Weisgarber Rd

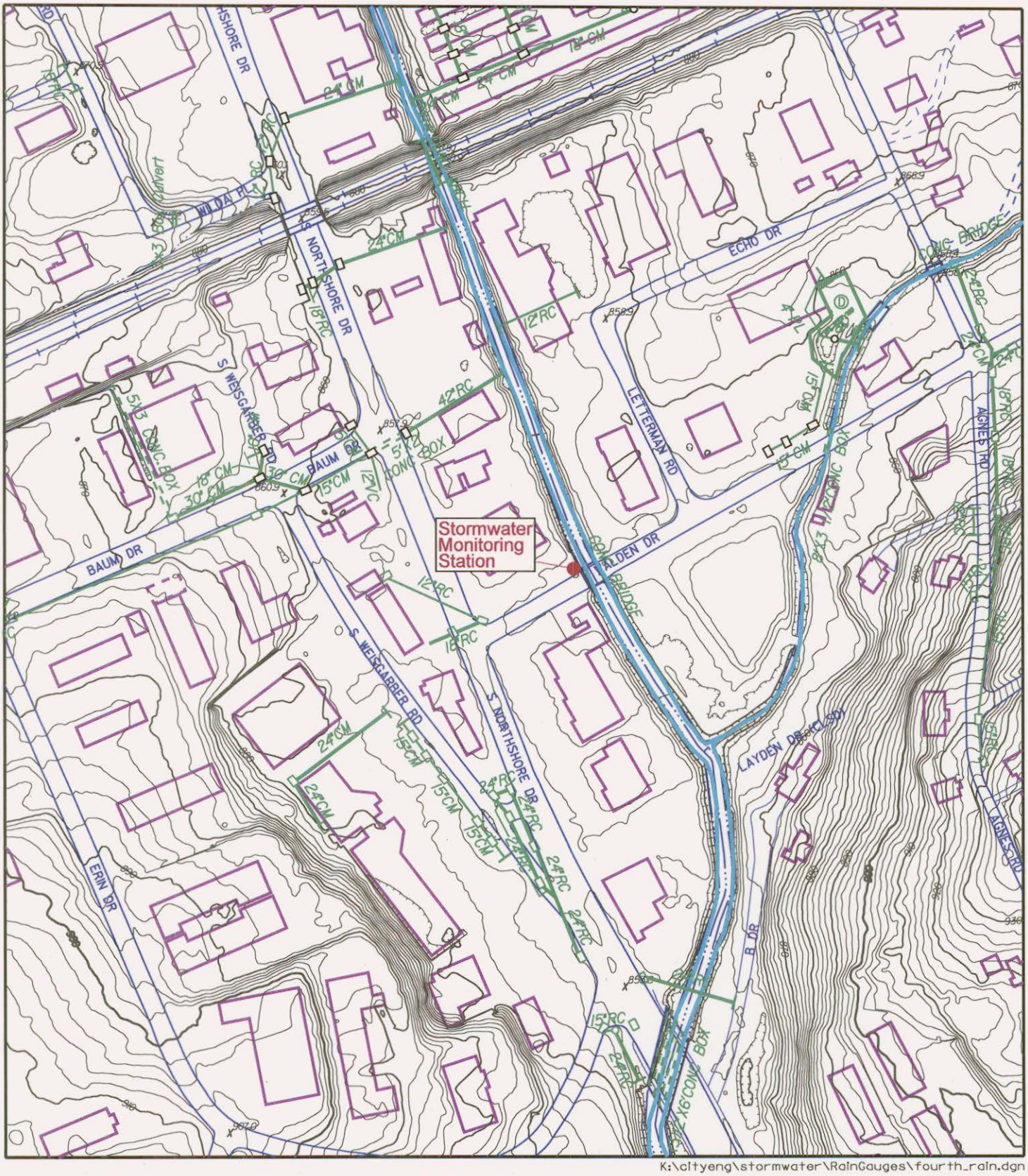
N

City of Knoxville
Dept. of Operations
Stormwater Section

Date: June 30, 2005

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'



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Stormwater Sampling Locations
Fourth Creek Watershed
S Northshore Dr at Walden Dr

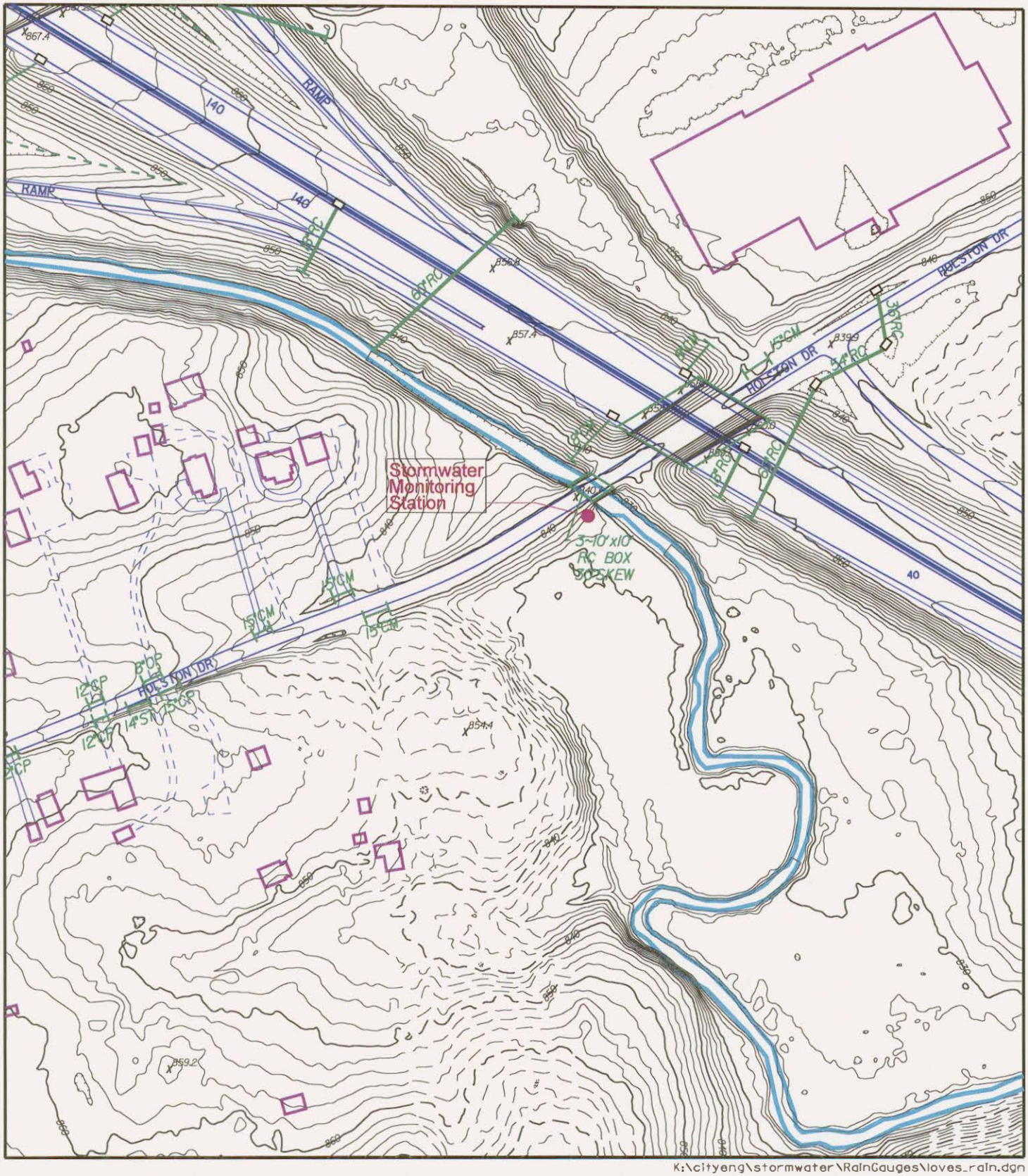
N

City of Knoxville
Dept. of Operations
Stormwater Section

Date: June 30,2005

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'



Stormwater Sampling Locations
Loves Creek Watershed
Holston Dr at I–40

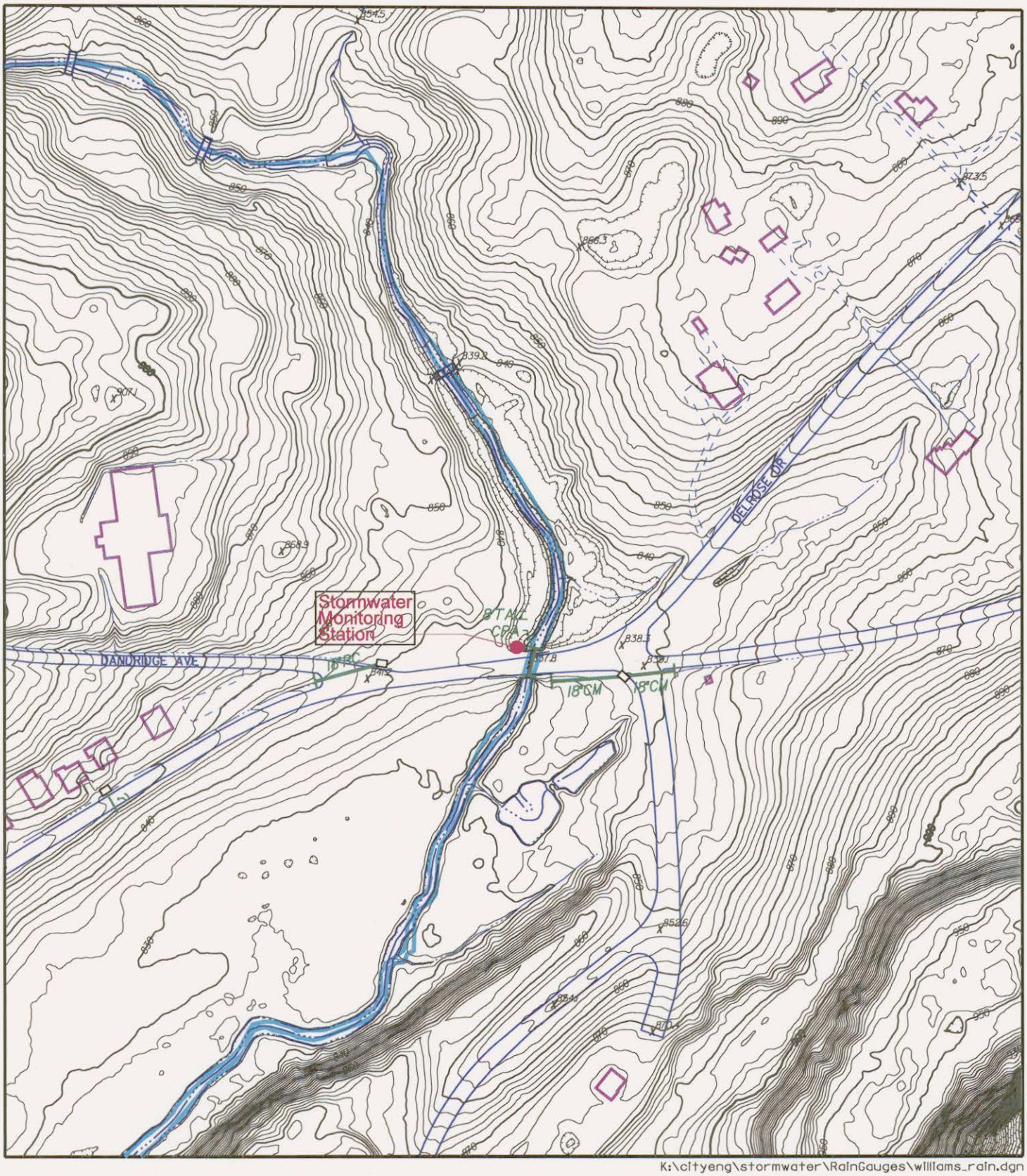
N

City of Knoxville
Dept. of Operations
Stormwater Section

Date: June 30,2005

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'



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Stormwater Sampling Locations
Williams Creek Watershed
Dandridge Av at Delrose Dr

N

City of Knoxville
Dept. of Operations
Stormwater Section

Date: June 30,2005

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'

APPENDIX H

NPDES Permit Program Inventory Map

(Attached separately)

The entire inventory map is not reproduced as part of the online version of the Year 9 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.